The Drive & Control Company

Rexroth
Bosch Group

Product catalog
Industrial hydraulics

Part 9: Filters












Product catalog Industrial hydraulics

Part 9: Filters

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Contents

General

Installation, commissioning and maintenance of hydraulic systems

RE 07900/10.06 1/6
Replaces: 08.06

1. General

1.1 Long service life and functional reliability of hydraulic systems and their components depend on correct handling.

Ensure trouble-free operation by observing the following points:

– The specific installation and operating instructions for the relevant components

– Special instructions in individual cases

– Technical data in the data sheet.

In addition, we would like to draw your attention to the following regulations:

– German standard “Hydraulic systems“ DIN 24346

– ISO standard ISO 4413

2. Installation

2.1 Preparatory work for the installation

– Sauberkeit der Anlage gewährleisten!

• For the surroundings:

Keep power units, line connections and components clean or clean them (e.g. pickling after, for example, processes have been carried out that involve heat, i.e. welding, hot bending, etc.)!

• For hydraulics fluids:

Take care of contamination and humidity; contamination from the environment must not enter the tanks! Fill oil tanks only through filters, preferably system filters or portable filter stations with fine filters.
Internal protective coatings, if any, must be resistant to the hydraulic fluid used!

• For parts taken from stock:

The storage of parts that were not filled or treated with anti-corrosion fluid can lead to the formation of resin. Solve the resin using a grease solvent and renew the lubricating film.

– Check to see that all of the parts required for the installation are available!

– Take note of any transport damage!

2.2 Carrying out the montage

– Use lifting lugs and transport facilities!

– Do not apply force to prevent transverse forces and tension on pipes and components. The valve mounting surfaces must be perfectly even. The fixing screws must be tightened evenly at the specified torque.

Take care that pipes are adequately fixed!

– When selecting pipes, hoses and fittings/flanges, observe the correct pressure stage (wall thickness, material). Use only seamless precision steel pipes.

– Do not use hemp or putty as sealing materials! This may cause contamination and thus malfunction.
– To prevent external leakage, observe the installation instructions of the pipe fittings' manufacturer. We recommend the use of fittings with elastic seals.
– Make sure that hoses are properly laid! Rubbing and abutting of the lines must be prevented.
– Provide the correct hydraulic fluids
  • Mineral oils:
    HLP hydraulic oils according to DIN 51524 part 2 are generally suitable for standard systems and components.
  • Fast bio-degradable hydraulic fluids:
    VDMA 24568.

    For these fluids, the system and components must be matched.
  • Hardly inflammable hydraulic fluids:
    VDMA 24317. For these fluids, the system and components must be matched. (Before filling in the special media, check, whether the system is compatible with the intended fluid.)

The following points must be observed in accordance with the relevant requirements:
– Viscosity of the hydraulic fluid
– Operating temperature range
– Type of seals used on the components fitted

3. Commissioning

When the installation has been carried out correctly, proceed with commissioning and functional testing.

3.1 Preparations for trial run
– Tank cleaned?
– Lines cleaned and properly installed?
– Fittings, flanges tightened?
– Lines and components correctly connected in line with installation drawings and circuit diagram?

Is the accumulator filled with nitrogen? Fill in nitrogen until the pre-charge pressure p0 as specified in the cicuit diagram is reached. (On the fluid side the system must be pressureless!). It is recommended that the gas precharge pressure is marked on the accumulator itself (e.g. self-adhesive label) and in the hydraulic circuit so that a comparative check is possible, if required.

⚠ **Caution!** Use only nitrogen as pre-charge gas!

Accumulators must comply with the safety regulations valid at the place of installation.
– Are the drive motor and pump properly installed and aligned?
– Is the drive motor correctly connected?
– Are filters with the prescribed filter rating used?
– Are filters fitted in the correct direction of flow?
– Has the specified hydraulic fluid filled up to the upper marking?

As the hydraulic fluids often do not comply with the required cleanliness, the fluids must be filled through a filter. The absolute filter rating of the filling filter should be at least that of the filters installed in the system.

3.2 Trial run
– For safety reasons, only personnel of the machine manufacturer and, if required, maintenance and operating personnel should be present.
– All pressure relief valves, pressure reducing valves, pressure controllers of pumps must be unloaded. An exemption to this are TÜV-set valves.
– Open isolator valves completely!
– Switch the system on briefly and check whether the direction of rotation of the drive motor matches the prescribed direction of rotation of the pump.
– Check the position of the directional valves and, if necessary, move the spool to the required position.
– Set the control spool to by-pass.
– Open suction valves of the pump. If required for design reasons, fill pump housing with hydraulic fluids to prevent bearings and parts of the rotary group from running dry.
– If a pilot oil pump is provided, commission it[1].
– Start up the pump, swivel it from its zero position and listen for any noises.
– Swivel the pump slightly out (ca. 5°)[1].
– Bleed the system
  Carefully loosen fittings or bleed screws at high points in the system. When the escaping fluid is free from bubbles, then the filling process is completed. Re-tighten fittings.
– Flush the system; if possible, short-circuit actuators. Flush the system until the filters remain clean; check the filters!
  With servo-systems, the servo-valves must be removed and replaced by flushing plates or direction valves of the same size. Short-circuit the actuators. During flushing, the hydraulic fluid in the complete hydraulic system should reach temperatures that are at least as high as later during operation. Change the filter elements as required.
  Flushing continues until the required minimum cleanliness is reached. This can only be achieved by continuous monitoring using a particle counter.
– Check the system functions under no-load conditions, if possible, by hand; cold-test the electrohydraulic control.
– When the operating temperature has been reached, test the system under load; slowly increase the pressure.
– Monitor control and instrumentation equipment!
– Check the housing temperature of hydraulic pumps and hydraulic motors.
– Listen for noises!
– Check the hydraulic fluid level; if required, top up!

[1] As far as possible with the control elements fitted; otherwise, start up at full displacement. In conjunction with combustion engines, start up at idle speed.

– Check the setting of pressure relief valves by loading or braking the system.
– Inspect the system for leaks.
– Switch off the drive.
– Retighten all fittings, even if there is no evidence of leakage.

  ⚠ **Caution!** Only tighten fittings when the system is depressurised!

– Is the pipe fixing adequate, even under changing pressure loads?
– Are the fixing points at the correct positions?
– Are the hoses laid so that they do not chamfer, even under pressure load?
– Check the fluid level.
– Test the system for all functions. Compare measured values with the permissible or specified data (pressure, velocity. Adjust further control components).
– Jerky movements indicate, amongst other things, the presence of air in the system. By briefly swivelling the pump in one or both directions with the actuator being loaded or braked, it is possible to eliminate certain air pockets. The system is completely bled when all functions are performed jerk-free and smoothly and the sur face of the hydraulic fluid level is free from foam. Experience has shown that foaming should have ceased one hour after start-up at the latest.
– Check the temperature.
– Switch off the drive.
– Remove filter elements (off-line and full-flow filters) and inspect them for residues. Clean filter elements or replace them, if required. Paper or glass fibre elements **cannot** be cleaned.
– If further contamination is found, additional flushing is required to prevent premature failure of the system components.
– All the adjustments made are to be recorded in an acceptance report.

3.3 Commissioning of fast running systems

Such system can often not be commissioning using the normal measuring instruments (such as pressure gauges, thermometers, electrical multimeters, etc.) and standard tools. Optimization is also not possible.
These systems include, for example, forging presses, plastics injection moulding machines, special machine tools, rolling tools, crane controls, machines with electro-hydraulic closed-loop control systems.
Commissioning and optimization of these systems often require more comprehensive measuring equipment to allow several measurements to be taken at a time (e.g. several pressures, electrical signals, travel, velocities, flows, etc.).

3.4 The most common faults occurring during commissioning

Apart from servicing, commissioning is very decisive for the service life and functional reliability of a hydraulic system.

For this reason, faults during commissioning must be avoided as far as possible.

The most common faults are:
– The fluid tank is not inspected.
– The hydraulic fluid is not filtered before being filled in.
– The installation is not checked before commissioning (subsequent conversion with loss of fluid!).
– System components are not bled.
– Pressure relief valves are set only slightly higher than the operating pressure (closing pressure differential is not observed).
– Pressure controllers of hydraulic pumps are set higher or to the same pressure as the pressure relief valve.
– The flushing time of servo systems is not adhered to.
– Abnormal pump noise is ignored (cavitation, leaking suction lines, too much air in the hydraulic fluid).
– Transversal loads on cylinder piston rods are not observed (installation error!).
– Hydraulic cylinders are not bled (damage to seals!)
– Limit switches are set too low.
– The switching hysteresis of pressure switches is not taken into account when settings are made.
– Hydraulic pump and hydraulic motor housings are not filled with hydraulic fluid prior to commissioning.
– Settings are not documented.
– Adjustment spindles are not secured or sealed.
– Unnecessary personnel present during commissioning of the system.

4. Maintenance

According to DIN 31 051 the term “maintenance” includes the following fields of activity:

– Inspection

Measures to recognise and assess the actual situation, i.e. recognise how and why the so-called wear reserve continues to decrease.

– Maintenance

Measures to preserve the nominal conditions, i.e. to take precautions in order that the reduction in the wear reserve during the useful life is kept as low as possible.

– Repair

Measures to restore the nominal condition, i.e. compensate for reduction in performance and restore the wear reserve.

Maintenance measures must be planned and taken in accordance with the operating time, the consequences of a failure and the required availability.

4.1 Inspection

The individual points to be inspected should be summarised for a specific system in so-called inspection lists in order that the inspections can be carried out adequately by employees with different qualification levels.

Important points of inspection are:
– Checking the hydraulic fluid level in the tank.
– Checking the heat exchanger (air, water) for effectiveness.

– Checking the system for external leakage (visual inspection).
– Checking the hydraulic fluid temperature during operation.
– Checking pressures
– Amount of leakage
– Checking the cleanliness of the hydraulic fluid

⚠ Caution!

Visual inspections can only give an approximation (clouding of the hydraulic fluid, darker appearance than at the time of filling, sediments in the fluid tank).

If conventional particle counting is impossible, the following three methods can be used for establishing the fluid cleanliness:

• Particle counts using electronic counting and sorting equipment.
• Microscopic examination.
• Gravimetric establishment of solids by means of finest filtration of a certain fluid volume (e.g. 100 ml) and weighing of the filter paper before and after the filtration process. This allows the establishment of the amount of solid particles in mg/l.

– Check the contamination of filters. A visual inspection of deep filters, which are widely used today, is **no** longer possible.
– Analyse the chemical properties of the hydraulic fluid.
– Check the temperature at points where bearings are located.
– Check the generation of noise.
– Test performance and velocity.
– Inspect pipes and hoses.

⚠ Caution!

Damaged pipes and hoses must be immediately replaced.

– Inspect accumulator stations.

4.2 Maintenance

In practice, inspection, maintenance and repair work is not as strictly separated as the definitions may suggest. Servicing is often done in conjunction with inspections.

For safety reason, pipe fittings, connections and components **must not** be loosened or removed as long as the system is pressurised.

Important service work is:

– Create a maintenance book

We recommend that a maintenance book is created to lay down the parts to be inspected.

– Check the hydraulic fluid level
  • continuously during commissioning
  • shortly after commissioning
  • later, at weekly intervals
– Inspect filters
  • during commissioning every two to three hours and, if necessary, replace them.
  • daily during the first week and replace them as required.
  • After one week, the filters should be cleaned as required.
  • Maintenance of suction filters:

    Suction filters require particularly thorough servicing. After the running-in period, they must be inspected at least once a week and cleaned, if necessary.
– Service the system fluid
  • Maintenance intervals depend on the following operating factors:
    - Hydraulic fluid condition (e.g. water in oil, strongly aged oil)
    - Operating temperature and oil fill

    We recommend that the fluid be changed in dependence upon an oil analysis. With systems whose oil is not analysed at regular intervals the fluid should be replaced every 2000 to 4000 operating hours at the latest.
  • Drain the system fluid at operating temperature and change it.
  • Severely aged or contaminated system fluid **cannot** be improved by adding new fluid!
  • Only fill in oil via filters that have at least the same separation capacity as the filters installed in the system, or use a system filter.
  • Take samples of the system fluid to have the type, size and amount of particles analysed in the lab. Record the results.
– Check the accumulator for its pre-charge pressure; for this, the accumulator must be depressurised on the fluid side.

⚠ Caution!

Work on systems that include accumulators may only be carried out after the fluid pressure was unloaded.

Welding or soldering work or any mechanical work on accumulators is not permitted.

Improper repairs can lead to severe accidents. Repairs on hydraulic accumulator may therefore only be carried out by Rexroth Service service personnel.

– The operating temperature must be measured. An increase in the operating temperature indicates increasing friction and leakage.
– Leakage in the pipework

Leakage, especially with underfloor piping, represents, apart from loss of fluid, a risk for equipment and concrete floors.

For safety reasons, sealing work on the pipes may only be carried out when the system is depressurised. Leakage at points that are sealed with soft seals (O-rings, form seal rings, etc.) **cannot** be eliminated by tightening as these sealing elements are either destroyed or hardened. Sealing can only be achieved by replacing the sealing elements.

– Check main and pilot pressure
  • Check interval: One week
  • Document pressure corrections in the maintenance book.
  • Frequent pressure adjustments indicate, among other things, wear of the pressure relief valve.

4.3 Repair

Locate and eliminate malfunction and damage.

– Fault localisation

A precondition for system repairs is successful, i.e. systematic fault search.

This requires in any case detailed knowledge of the structure and the operating principle of the individual components as well as of the entire system. The required documentation should be available and easily accessible.

The most important measuring instruments (thermometer, electrical multimeter, industrial stethoscope, stop watch, rpm counter, etc.) should also be available in the vicinity of the system, especially in the case of large systems.

– Fault correction

When carrying out any work, observe strictest cleanliness. Before loosening fittings, clean the surrounding area.

Generally, defective components should not be repaired on site, since for the proper repair, the required tooling and the required cleanliness are usually not given on site. On site, only complete components should be changed whenever possible, in order

• to keep the time for which the opened system is exposed to ambient influences to a minimum,
• to keep the fluid loss as low as possible,
• to ensure the shortest possible downtime through the use of overhauled and tested components.

After failed components are located, it is essential to check whether the entire system or parts of the system have been contaminated by broken parts or larger amounts of abraded metal.

4.4 Repair and major overhaul of hydraulic components

Generally, it can be said that only the component manufacturer can carry out major overhauls in the most efficiently and reliably (same quality standard, trained personnel, test facilities, warranty, etc.).

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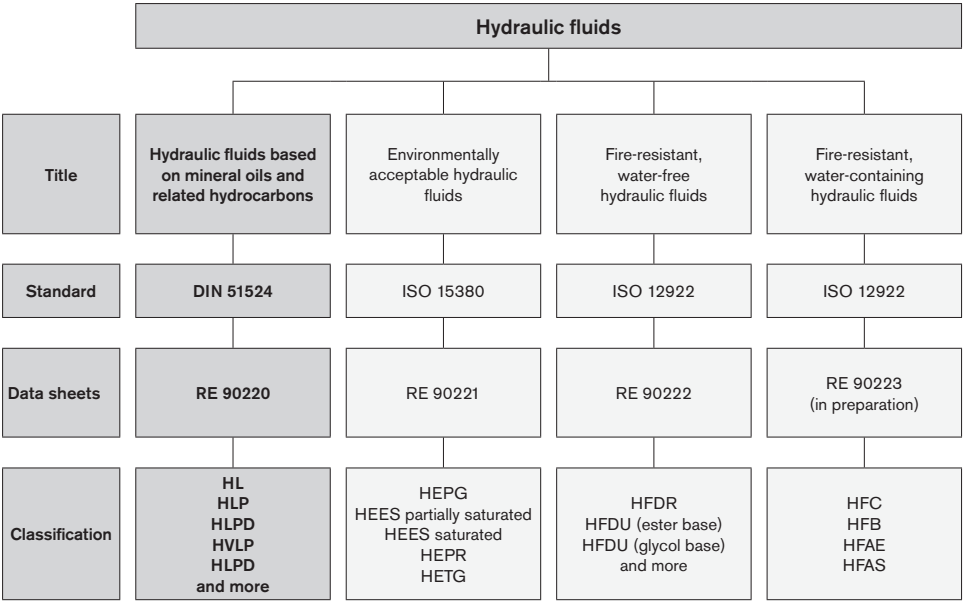
Rexroth
Bosch Group

Hydraulic fluids based on mineral oils and related hydrocarbons

RE 90220/05.12 1/16
Replaces: 05.10

Application notes and requirements for Rexroth hydraulic components



Contents

1 Basic information

1.1 General instructions

The hydraulic fluid is the common element in any hydraulic component and must be selected very carefully. Quality and cleanliness of the hydraulic fluid are decisive factors for the operational reliability, efficiency and service life of a system.

Hydraulic fluids must conform, be selected and used in accordance with the generally acknowledged rules of technology and safety provisions. Reference is made to the country-specific standards and directives (in Germany the directive of the Employer's Liability Insurance Association BGR 137).

This data sheet includes recommendations and regulations concerning the selection, operation and disposal of hydraulic fluids based on mineral oils and related hydrocarbons in the application of Rexroth hydraulic components.

The individual selection of hydraulic fluid or the choice of classification are the responsibility of the operator.

It is the responsibility of the user to ensure that appropriate measures are taken for safety and health protection and to ensure compliance with statutory regulations. The recommendations of the lubricant manufacturer and the specifications given in the safety data sheet are to be observed when using hydraulic fluid.

This data sheet does not absolve the operator from verifying the conformity and suitability of the respective hydraulic fluid for his system. He is to ensure that the selected fluid meets the minimum requirements of the relevant fluid standard during the whole of the period of use.

Other regulations and legal provisions may also apply. The operator is responsible for their observance, e.g. EU directive 2004/35/EG and their national implementations. In Germany the Water Resources Act (WHG) is also to be observed.

We recommend that you maintain constant, close contact with lubricant manufacturers to support you in the selection, maintenance, care and analyses.

When disposing of used hydraulic fluids, apply the same care as during use.

1.2 Scope

This data sheet must be observed when using hydraulic fluids based on mineral oils and related hydrocarbons in Bosch Rexroth hydraulic components.

Please note that the specifications of this data sheet may be restricted further by the specifications given in the product data sheets for the individual components.

The use of the individual hydraulic fluids in accordance with the intended purpose can be found in the safety data sheets or other product description documents of the lubricant manufacturers. In addition, each use is to be individually considered.

Rexroth hydraulic components may only be operated with hydraulic fluids based on mineral oils and related hydrocarbons according to DIN 51524 if specified in the respective component data sheet or if Rexroth approval for use is furnished.

Notes:
In the market overview RE 90220-01, hydraulic fluid based on mineral oil are described which, according to the information of the lubricant manufacturer, feature the respective parameters of the current requirements standard DIN 51524 and other parameters which are of relevance for suitability in connection with Rexroth components.

These specifications are not checked or monitored by Bosch Rexroth. The list in the market overview does not therefore represent a recommendation on the part of Rexroth or approval of the respective hydraulic fluid for use with Rexroth components and does not release the operator from his responsibility regarding selection of the hydraulic fluid.

Bosch Rexroth will accept no liability for its components for any damage resulting from failure to comply with the notes below.

1.3 Safety instructions

Hydraulic fluids can constitute a risk for persons and the environment. These risks are described in the hydraulic fluid safety data sheets. The operator is to ensure that a current safety data sheet for the hydraulic fluid used is available and that the measures stipulated therein are complied with.

2 Solid particle contamination and cleanliness levels

Solid particle contamination is the major reason for faults occurring in hydraulic systems. It may lead to a number of effects in the hydraulic system. Firstly, single large solid particles may lead directly to a system malfunction, and secondly small particles cause continuous elevated wear.

For hydraulic fluids, the cleanliness level is given as a three-digit numerical code in accordance with ISO 4406. This numerical code denotes the number of particles present in a hydraulic fluid for a defined quantity. Moreover, foreign solid matter is not to exceed a mass of 50 mg/kg (gravimetric examination according to ISO 4405).

In general, compliance with a minimum cleanliness level of 20/18/15 in accordance with ISO 4406 or better is to be maintained in operation. Special servo valves demand improved cleanliness levels of at least 18/16/13. A reduction in cleanliness level by one level means half of the quantity of particles and thus greater cleanliness. Lower numbers in cleanliness levels should always be striven for and extend the service life of hydraulic components. The component with the highest cleanliness requirements determines the required cleanliness of the overall system. Please also observe the specifications in table 1: "Cleanliness levels according to ISO 4406" and in the respective data sheets of the various hydraulic components.

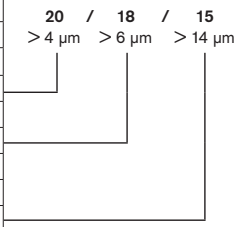
Hydraulic fluids frequently fail to meet these cleanliness requirements on delivery. Careful filtering is therefore required during operation and in particular, during filling in order to ensure the required cleanliness levels. Your lubricant manufacturer can tell you the cleanliness level of hydraulic fluids as delivered. To maintain the required cleanliness level over the operating period, you must use a reservoir breather filter. If the environment is humid, take appropriate measures, such as a breather filter with air drying or permanent off-line water separation.

Note: the specifications of the lubricant manufacturer relating to cleanliness levels are based on the time at which the container concerned is filled and not on the conditions during transport and storage.

Further information about contamination with solid matter and cleanliness levels can be found in brochure RE 08016.

Table 1: Cleanliness levels according to ISO 4406

Particles per 100 ml		Scale number
More than	Up to and including	
8,000,000	16,000,000	24
4,000,000	8,000,000	23
2,000,000	4,000,000	22
1,000,000	2,000,000	21
500,000	1,000,000	20
250,000	500,000	19
130,000	250,000	18
64000	130,000	17
32000	64000	16
16000	32000	15
8000	16000	14
4000	8000	13
2000	4000	12
1000	2000	11
500	1000	10
250	500	9
130	250	8
64	130	7
32	64	6



3 Selection of the hydraulic fluid

The use of hydraulic fluids based on mineral oils for Rexroth hydraulic components is based on compliance with the minimum requirements of DIN 51524.

3.1 Selection criteria for the hydraulic fluid

The specified limit values for all components employed in the hydraulic system, for example viscosity and cleanliness level, must be observed with the hydraulic fluid used, taking into account the specified operating conditions.

Hydraulic fluid suitability depends, amongst others, on the following factors:

3.1.1 Viscosity

Viscosity is a basic property of hydraulic fluids. The permissible viscosity range of complete systems needs to be determined taking account of the permissible viscosity of all components and it is to be observed for each individual component.

The viscosity at operating temperature determines the response characteristics of closed control loops, stability and damping of systems, the efficiency factor and the degree of wear.

We recommend that the optimum operating viscosity range of each component be kept within the permissible temperature range. This usually requires either cooling or heating, or both. The permissible viscosity range and the necessary cleanliness level can be found in the product data sheet for the component concerned.

If the viscosity of a hydraulic fluid used is above the permitted operating viscosity, this will result in increased hydraulic-mechanical losses. In return, there will be lower internal leakage losses. If the pressure level is lower, lubrication gaps may not be filled up, which can lead to increased wear. For hydraulic pumps, the permitted suction pressure may not be reached, which may lead to cavitation damage.

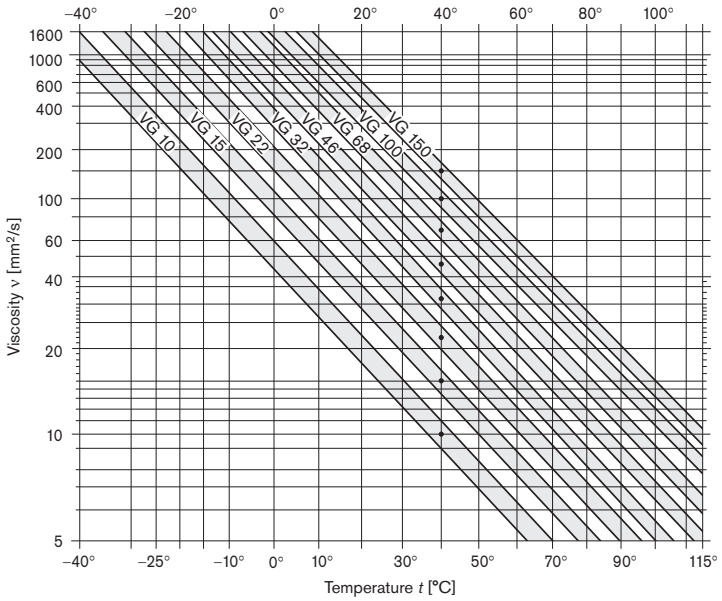
If the viscosity of a hydraulic fluid is below the permitted operating viscosity, increased leakage, wear, susceptibility to contamination and a shorter component life cycle will result.

3.1.2 Viscosity-temperature behavior

For hydraulic fluids, the viscosity temperature behavior (V-T behavior) is of particular importance. Viscosity is characterized in that it drops when the temperature increases and rises when the temperature drops; see Fig. 1 "Viscosity temperature chart for HL, HLP, HLPD (VI 100)". The interrelation between viscosity and temperature is described by the viscosity index (VI).

The viscosity temperature diagram in Fig. 1 is extrapolated in the < 40 °C range. This idealized diagram is for reference purposes only. Measured values can be obtained from your lubricant manufacturer and are to be preferred for design purposes.

Fig. 1: Viscosity-temperature chart for HL, HLP, HLPD (VI 100, double logarithmic representation)



3.1.3 Wear protection capability

Wear protection capability describes the property of hydraulic fluids to prevent or minimize wear within the components. The wear protection capability is described in DIN 51524-2,-3 via test procedures "FZG gear test rig" (ISO 14635-1) and "Mechanical test in the vane pump" (ISO 20763). From ISO VG 32 DIN 51524-2,-3 prescribes a rating of at least 10 (FZG test). At present, the FZG test cannot be applied to viscosity classes < ISO VG 32.

3.1.4 Material compatibility

The hydraulic fluid must not negatively affect the materials used in the components. Compatibility with coatings, seals, hoses, metals and plastics is to be observed in particular. The fluid classifications specified in the respective component data sheets are tested by the manufacturer with regard to material compatibility. Parts and components not supplied by us are to be checked by the user.

Table 2: Known material incompatibilities

Classification	Incompatible with:
HLxx classifications	with EPDM seals
Zinc- and ash/free hydraulic fluids	with bronze-filled PTFE seals

3.1.5 Aging resistance

The way a hydraulic fluid ages depends on the thermal, chemical and mechanical stress to which it is subjected. Aging resistance can be greatly influenced by the chemical composition of the hydraulic fluids.

High fluid temperatures (e.g. over 80 °C) result in a approximate halving of the fluid service life for every 10 °C temperature increase and should therefore by avoided. The halving of the fluid service life results from the application of the Arrhenius equation (see Glossary).

Table 3: Reference values for temperature-dependent aging of the hydraulic fluid

Reservoir temperature	Fluid life cycle
80 °C	100 %
90 °C	50 %
100 °C	25 %

Hydraulic fluids based on mineral oils and related hydrocarbons are tested with 20% water additive during testing of aging resistance according to ISO 4263-1.

The calculated fluid service life is derived from the results of tests in which the long-term characteristics are simulated in a short period of time by applying more arduous conditions (condensed testing). This calculated fluid service life is not to be equated to the fluid service life in real-life applications.

Table 3 is a practical indicator for hydraulic fluids with water content < 0.1%, cf. chapter 4.10. "Water".

3.1.6 Air separation ability (ASA)

The air separation ability (ASA) describes the property of a hydraulic fluid to separate undissolved air. Hydraulic fluids contain approx. 7 to 13 percent by volume of dissolved air (with atmospheric pressure and 50 °C). Hydraulic fluids always contain dissolved air. During operation, dissolved air may be transformed into undissolved air, leading to cavitation damages. Fluid classification, fluid product, reservoir size and design must be coordinated to take into account the dwell time and ASA value of the hydraulic fluid. The air separation capacity depends on the viscosity, temperature, basic fluid and aging.
It cannot be improved by additives.

According to DIN 51524 for instance, an ASA value ≤ 10 minutes is required for viscosity class ISO VG 46,
6 minutes are typical, lower values are preferable.

3.1.7 Demulsifying ability and water solubility

The capacity of a hydraulic fluid to separate water at a defined temperature is known as the demulsifying ability. ISO 6614 defines the demulsifying properties of hydraulic fluids.

For larger systems with permanent monitoring, a demulsifying fluid with good water separation capability (WSC) is recommended. The water can be drained from the bottom of the reservoir. In smaller systems (e.g. in mobile machines), whose fluid is less closely monitored and where water contamination into the hydraulic fluid, for instance through air condensation, cannot be ruled out completely, an HLPD fluid is recommended.

The demulsifying ability up to ISO-VG 100 is given at 54 °C, and at 82 °C for fluids with higher viscosity.

Water emulsifying HLPD hydraulic fluids have no, or a very poor, demulsifying ability.

3.1.8 Filterability

Filterability describes the ability of a hydraulic fluid to pass through a filter, removing solid contaminants. The hydraulic fluids used require a good filterability, not just when new, but also during the whole of their service life. Depending on the basic fluid used and the additives (VI enhancers) there are great differences here.

The filterability is a basic prerequisite for cleanliness, servicing and filtration of hydraulic fluids. Filterability is tested with the new hydraulic fluid and after the addition of 0.2 % water. The underlying standard (ISO 13357-1/-2) stipulates that filterability must have no negative effects on the filters or the hydraulic fluid, see chapter 4 "Hydraulic fluids in operation".

3.1.9 Corrosion protection

Hydraulic fluids should not just prevent corrosion formation on steel components, they must also be compatible with non-ferrous metals and alloys. Corrosion protection tests on different metals and metal alloys are described in DIN 51524. Hydraulic fluids that are not compatible with the materials listed above must not be used, even if they are compliant with ISO 51524.

Rexroth components are usually tested with HLP hydraulic fluids or corrosion protection oils based on mineral oils before they are delivered.

3.1.10 Additivation

The properties described above can be modified with the help of suitable additives. A general distinction is made for fluids between heavy metal-free and heavy metal-containing (generally zinc) additive systems. Both additive systems are most often incompatible with each other. The mixing of these fluids must be avoided even if the mixing ratio is very low. See chapter 4, "Hydraulic fluids in operation".

Increasing additivation generally leads to deteriorated air separation ability (ASA) and water separation capability (WSC) of the hydraulic fluid. According to the present state of knowledge, all hydraulic fluids described in this document, independently of the actual additivation, can be filtered using all filter materials with all known filtration ratings ≥ 1 µm without filtering out effective additives at the same time.

Bosch Rexroth does not prescribe any specific additive system.

3.2 Classification and fields of application

Table 4: Classification and fields of application

Classification	Features	Typical field of application	Notes
HL fluids according to DIN 51524-1 VI = 100	Hydraulic fluids predominantly only with additives for oxidation and corrosion protection, but no specific additives for wear protection in case of mixed friction	HL fluids can be used in hydraulic systems that do not pose any requirements as to wear protection.	HL fluids may be used only for components whose product data sheet specifically allows HL fluids. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. Hydraulic fluids that only comply with the requirements of classes HL and HR in accordance with ISO 11158 without proving that DIN 51524-1 is also met may be used only with written approval of Bosch Rexroth AG. Observe restrictions as to pressure, rotation speed etc.
HLP fluids according to DIN 51524-2 VI = 100	Hydraulic fluid with corrosion, oxidation and verified wear protection additives	HLP fluids are suitable for most fields of application and components provided the temperature and viscosity provisions are observed.	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. For the viscosity classes VG10, VG15 and VG22, DIN 51524 defines no requirements as to wear protection (DIN 51354 part 2 and DIN 51389 part 2). Beyond the requirements of DIN 51524 part 2, we require the same base oil type, identical refining procedure, identical additivation and identical additivation level across all viscosity classes.

Continued on page 8

Table 4: Classification and fields of application (continued from page 7)

Classification	Features	Typical field of application	Notes
HVLP fluids according to DIN 51524-3 VI > 140	HLP hydraulic fluid with additional improved viscosity temperature behavior	HVLP fluids are used in systems operated over a wide temperature range.	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. The same notes and restrictions as defined for HLP fluids apply accordingly. The effect on Rexroth components (e.g. compatibility with material seals, wear resistance capacity) may differ when using related hydrocarbons instead of mineral oils, cf. Table 6, line 8. When using HVLP fluids, the viscosity may change on account of the shear of the long-chain VI enhancers. The viscosity index, high at the start, decreases during operation. This needs to be taken into account when selecting the hydraulic fluid. The only value at present that can be used to assess viscosity changes in operation is the result of the test in accordance with DIN 51350 part 6. Please note that there are practical applications that create a much higher shear load on such fluids than can be achieved by this test. Up to VI < 160, we recommend a maximum permitted viscosity drop of 15 %, viscosity at 100 °C. The viscosity limits given by Bosch Rexroth for its components are to be observed for all operating conditions, even after the hydraulic fluids have sheared. HVLP fluids should be used only if required by the temperature ranges of the application.
HLPD fluids according to DIN 51524-2, HVLPD fluids in accordance with DIN 51524-3	HLP and HVLP hydraulic fluid with additional detergent and or dispersant additives	HLPD and HVLPD fluids are used in systems where deposits as well as solid or liquid contamination need to be kept temporarily suspended	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. Some of these fluids are able to absorb significant quantities of water (> 0.1 %). This may have negative implications for the wear protection and the aging properties of the fluid. The wetting ability of these fluids varies largely depending on the product. Therefore it is not correct to say that they are generally all very well able to prevent stick-slip. In individual cases where higher water contamination is to be expected (such as in steelworks or under humid conditions), the use of HLPD/HVLPD fluids cannot be recommended as the emulsified water does not settle in the reservoir but is evaporated in heavily loaded positions. For such cases, we recommend using HLP hydraulic fluids with particularly good demulsifying ability. The water collected at the reservoir bottom is to be drained regularly. If HLPD/HVLPD fluids are used, contamination does not settle. It rather remains suspended and needs to be filtered out or removed by appropriate draining systems. For this reason, the filter area must be increased. HLPD/HVLPD fluids may contain additives that in the long run are incompatible with plastics, elastomers and non-ferrous metals. Furthermore, these additives may lead to the premature clogging of hydraulic filters. Therefore, test the filterability and the selection of the filter material in consultation with the filter manufacturer.

4 Hydraulic fluids in operation

4.1 General

The properties of hydraulic fluids can change continually during storage and operation.

Please note that the fluid standard DIN 51524 merely describes minimum requirements for hydraulic fluids in new condition at the time of filling into the bins. The operator of a hydraulic system must ensure that the hydraulic fluid remains in a utilizable condition throughout its entire period of use.

Deviations from the characteristic values are to be clarified with the lubricant manufacturer, the test labs or Bosch Rexroth.

Please note the following aspects in operation.

4.2 Storage and handling

Hydraulic fluids must be stored correctly in accordance with the instructions of the lubricant manufacturer. Avoid exposing the containers to lengthy periods of direct heat. Containers are to be stored in such a way that the risk of any foreign liquid or solid matter (e.g. water, foreign fluids or dust) ingression into the inside of the container can be ruled out. After taking hydraulic fluids from the containers, these are immediately to be properly resealed.

Recommendation:

- Store containers in a dry, roofed place
- Store barrels on their sides
- Clean reservoir systems and machine reservoirs regularly

4.3 Filling of new systems

Usually, the cleanliness levels of the hydraulic fluids as delivered do not meet the requirements of our components. Hydraulic fluids must be filtered using an appropriate filter system to minimize solid particle contamination and water in the system.

As early as possible during test operation, new systems should be filled with the selected hydraulic fluid so as to reduce the risk of accidentally mixing the fluids (see chapter 4.5 "Mixing and compatibility of different hydraulic fluids"). Changing the hydraulic medium at a later point represents significant additional costs (see following chapter).

4.4 Hydraulic fluid changeover

Changeovers, in particular between hydraulic fluids with heavy metal-free and heavy metal-containing (generally zinc) additives, frequently lead to malfunctions, see chapter 3.1.10 "Additivation".

In the case of changeovers of the fluid in hydraulic systems, it is important to ensure compatibility of the new hydraulic fluid with the remainder of the previous hydraulic fluid. We recommend obtaining a written performance guarantee from the manufacturer or supplier of the new hydraulic fluid. The quantity of old fluid remaining should be minimized. Mixing hydraulic fluids should be avoided, see following chapter.

For information on changing over hydraulic fluids with different classifications please refer to VDMA 24314, VDMA 24569 and ISO 15380 appendix A.

Bosch Rexroth will not accept liability for any damage to its components resulting from inadequate hydraulic fluid changeovers!

4.5 Mixing and compatibility of different hydraulic fluids

If hydraulic fluids from different manufacturers or different types from the same manufacturer are mixed, gelling, silting and deposits may occur. These, in turn, may cause foaming, impaired air separation ability, malfunctions and damage to the hydraulic system.

If the fluid contains more than 2 % of another fluid then it is considered to be a mixture. Exceptions apply for water, see chapter 4.10 "Water".

Mixing with other hydraulic fluids is not generally permitted. This also includes hydraulic fluids with the same classification and from the market overview RE 90220-01. If individual lubricant manufacturers advertise miscibility and/or compatibility, this is entirely the responsibility of the lubricant manufacturer.

Bosch Rexroth customarily tests all components with mineral oil HLP before they are delivered.

Note: With connectible accessory units and mobile filtering systems, there is a considerable risk of non-permitted mixing of the hydraulic fluids!

Rexroth will not accept liability for any damage to its components resulting from mixing hydraulic fluids!

4.6 Re-additivation

Additives added at a later point in time such as colors, wear reducers, VI enhancers or anti-foam additives, may negatively affect the performance properties of the hydraulic fluid and the compatibility with our components and therefore are not permissible.

Rexroth will not accept liability for any damage to its components resulting from re-additivation!

4.7 Foaming behavior

Foam is created by rising air bubbles at the surface of hydraulic fluids in the reservoir. Foam that develops should collapse as quickly as possible.

Common hydraulic fluids in accordance with DIN 51524 are sufficiently inhibited against foam formation in new condition. On account of aging and adsorption onto surfaces, the defoamer concentration may decrease over time, leading to a stable foam.

Defoamers may be re-dosed only after consultation with the lubricant manufacturer and with his written approval.

Defoamers may affect the air separation ability.

4.8 Corrosion

The hydraulic fluid is to guarantee sufficient corrosion protection of components under all operating conditions, even in the event of impermissible water contamination.

During storage and operation, hydraulic fluid based on mineral oils with anti-corrosion additives protect components against water and "acidic" oil degradation products.

4.9 Air

Under atmospheric conditions, the hydraulic fluid contains dissolved air. In the negative pressure range, for instance in the suction pipe of the pump or downstream of control edges, this dissolved air may transform into undissolved air. The undissolved air content represents a risk of cavitation and of the diesel effect. This results in material erosion of components and increased hydraulic fluid aging.

With the correct measures, such as suction pipe and reservoir design, and an appropriate hydraulic fluid, air intake and separation can be positively influenced.

See also chapter 3.1.7 "Air separation ability (ASA)".

4.10 Water

Water contamination in hydraulic fluids can result from direct ingress or indirectly through condensation of water from the air due to temperature variations.

Water in the hydraulic fluid may result in wear or direct failure of hydraulic components. Furthermore, a high water content in the hydraulic fluid negatively affects aging and filterability and increases susceptibility to cavitation.

Undissolved water can be drained from the bottom of the reservoir. Dissolved water can be removed only by using appropriate measures. If the hydraulic system is used in humid conditions, preventive measures need to be taken, such as an air dehumidifier at the reservoir vent. During operation, the water content in all hydraulic fluids, determined according to the "Karl Fischer method" (see chapter 6 "Glossary") for all hydraulic fluids must constantly be kept below 0.1% (1000 ppm). To ensure a long service life of both hydraulic fluids and components, Bosch Rexroth recommends that values below 0.05% (500 ppm) are permanently maintained.

To ensure a long service life for the hydraulic fluids and the components, we recommend that values below 0.05 % (500 ppm) are permanently maintained. Detergent and or dispersant hydraulic fluids (HLPD / HVLPD) are able to absorb (and keep suspended) more water. Prior to using these hydraulic fluids, please contact the lubricant manufacturer.

4.11 Fluid servicing, fluid analysis and filtration

Air, water, operating temperature influences and solid matter contamination will change the performance characteristics of hydraulic fluids and cause them to age.

To preserve the usage properties and ensure a long service life for hydraulic fluid and components, the monitoring of the fluid condition and a filtration adapted to the application requirements (draining and degassing if required) are indispensable.

The effort is higher in the case of unfavorable usage conditions, increased stress for the hydraulic system or high expectations as to availability and service life, see chapter 2 "Solid particle contamination and cleanliness level".

When commissioning a system, please note that the required minimum cleanliness level can frequently be attained only by flushing the system. Due to severe start-up contamination, it may be possible that a fluid and/or filter replacement becomes necessary after a short operating period (< 50 operating hours).

The hydraulic fluid must be replaced in regular intervals and tested by the lubricant manufacturer or recognized, accredited test labs. **We recommend a reference analysis after commissioning.**

The minimum data to be tested for analyses are:

- Viscosity at 40 °C and 100 °C
- Neutralization number NN (acid number AN)
- Water content (Karl-Fischer method)
- Particle measurement with evaluation according to ISO 4406 or mass of solid foreign substances with evaluation to EN 12662
- Element analysis (RFA (EDX) / ICP, specify test method)
- Comparison with new product or available trend analyses
- Assessment / evaluation for further use
- Also recommended: IR spectrum

Compared to the pure unused hydraulic fluid, the changed neutralization number NN (acid number AN) indicates how many aging products are contained in the hydraulic fluid. This value must be kept as low as possible. As soon as the trend analysis notes a significant increase in the acid number, the lubricant manufacturer should be contacted.

In case of warranty, liability or guarantee claims to Bosch Rexroth, service verification and/or the results of fluid analyses are to be provided.

5 Disposal and environmental protection

Hydraulic fluids based on mineral oil and related hydrocarbons are hazardous for the environment. They are subject to a special disposal obligation.

The respective lubricant manufacturers provide specifications on environmentally acceptable handling and storage. Please ensure that spilt or splashed fluids are absorbed with appropriate adsorbents or by a technique that prevents it contaminating water courses, the ground or sewerage systems.

It is also not permitted to mix fluids when disposing of hydraulic fluids. Regulations governing the handing of used oils stipulate that used oils are not to mixed with other products, e.g. substances containing halogen. Non-compliance will increase disposal costs. Comply with the national legal provisions concerning the disposal of the corresponding hydraulic fluid. Comply with the local safety data sheet of the lubricant manufacturer for the country concerned.

6 Other hydraulic fluids based on mineral oil and related hydrocarbons

Table 6: Other hydraulic fluids based on mineral oils and related hydrocarbons

Serial number	Hydraulic fluids	Features / Typical field of application / Notes
1	Hydraulic fluids with classification HL, HM, HV according to ISO 11158	– Can be used without confirmation provided they are listed in the respective product data sheet and are compliant with DIN 51524. Conformity with DIN 51524 must be verified in the technical data sheet of the fluid concerned. For classification see Table 4: "Hydraulic fluid classification". – Fluids **only** classified in accordance with ISO 11158 may be used only with prior written approval of Bosch Rexroth AG.
2	Hydraulic fluids with classification HH, HR, HS, HG according to ISO 11158	– May not be used.
3	Hydraulic fluids with classification HL, HLP, HLPD, HVLP, HVLPD to DIN 51502	– DIN 51502 merely describes how fluids are classified / designated on a national level. – It contains no information on minimum requirements for hydraulic fluids. – Hydraulic fluids standardized according to DIN 51502 can be used without confirmation provided they are listed in the respective product data sheet and are compliant with DIN 51524. Conformity with DIN 51524 must be verified in the technical data sheet of the fluid concerned. For classification see Table 4: "Hydraulic fluid classification".
4	Hydraulic fluids with classification HH, HL, HM, HR, HV, HS, HG according to ISO 6743-4	– ISO 6743-4 merely describes how fluids are classified / designated on an international level. It contains no information on minimum requirements for hydraulic fluids. – Hydraulic fluids standardized according to ISO 6743 -4 can be used without confirmation provided they are listed in the respective product data sheet and are compliant with DIN 51524. Conformity with DIN 51524 must be verified in the technical data sheet of the fluid concerned. For classification see table 4: "Classification and fields of application".
5	Lubricants and regulator fluids for turbines to DIN 51515-1 and -2	– Turbine oils can be used after confirmation and with limited performance data. – They usually offer lower wear protection than mineral oil HLP. Classification of turbine oils to DIN 51515-1 comparable to HL, turbine oils to DIN 51515-2 comparable to HLP. – Particular attention must be paid to material compatibility!
6	Lube oils C, CL, CLP in accordance with DIN 51517	– Lube oils in acc. with DIN 51517 can be used after confirmation and with limited performance data. They are mostly higher-viscosity fluids with low wear protection. Classification: CL similar to HL fluids and CLP similar to HLP fluids. – Particular attention must be paid to material compatibility, specifically with non-ferrous metals!
7	Fluids to be used in pharmaceutical and foodstuff industries, in acc. with FDA / USDA / NSF H1	– There are medical white oils and synthetic hydrocarbons (PAO). – Can only be used after consultation and approval for use in the specific application, even if they are compliant with DIN 51524. – May be used only with FKM seals. – Other fluids used in pharmaceutical and foodstuff industries may be used only after confirmation. – Attention is to be paid to material compatibility in accordance with the applicable food law. **Caution!** Fluids used in pharmaceutical and foodstuff industries should not be confused with environmentally acceptable fluids!

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Table 6: Other hydraulic fluids based on mineral oils and related hydrocarbons
(continued from page 12)

Serial number	Hydraulic fluids	Features / Typical field of application / Notes
8	Hydraulic fluids of classes HVLP and HVLPD based on related hydrocarbons	– Can only be used after consultation and approval for use in the specific application, even if they are compliant with DIN 51524. – Lower pour point than HLP – Other wetting (polarity)
9	Automatic Transmission Fluids (ATF)	– ATF are operating fluids for automatic gearboxes in vehicles and machines. In special cases, ATFs are also used for certain synchronous gearboxes and hydraulic systems comprising gearboxes. – To be used only after confirmation! – Some of these fluids have poor air separation abilities and modified wear properties. – Check material compatibility and filterability!
10	Multi-purpose oil (MFO) – Industry	– Multi-purpose oils (industry) combine at least two requirements for a fluid, for instance metal machining and hydraulics. – To be used only after confirmation! – Please pay particular attention to air separation ability, modified wear properties and the reduced material life cycle. – Check material compatibility and filterability!
11	Multi-purpose oils (MFO) – Mobil UTTO, STOU	– Multi-purpose oils combine requirements for wet brakes, gearboxes, motor oil (STOU only) and hydraulics. – Fluids of the types: – UTTO (= universal tractor transmission oil) and – STOU (= Super Tractor super tractor universal oil) – To be used only after confirmation! – Please pay particular attention to shear stability, air separation ability and modified wear properties. – Check material compatibility and filterability!
12	Single-grade engine oils 10W, 20W, 30W	– To be used only after confirmation! – Please pay particular attention to the air separation ability and filtering ability.
13	Multi-grade engine oils 0Wx-30Wx	– To be used only after confirmation! – Please pay particular attention to air separation ability, changes in wear protection capability, viscosity changes during operation, material compatibility, dispersant and detergent properties and filterability. **Caution!** Multi-grade engine oils have been adapted to specific requirements in combustion engines and are suitable for use in hydraulic systems only to a limited extent.
14	Hydraulic fluids for military applications to MIL 13919 or H 540, MIL 46170 or H 544, MIL 5606 or H 515, MIL 83282 or H 537, MIL 87257	– To be used only after confirmation! – Please pay particular attention to air separation ability, changes in wear protection capability, viscosity changes during operation, material compatibility, water separation capability and filterability. **Caution!** Hydraulic fluids for military applications do not meet the current requirements for high-quality hydraulic fluids and are suitable for use only to a limited degree.
15	Motor vehicle transmission oils	– Motor vehicle transmission oil can be used after confirmation and with limited performance data. – Pay particular attention to wear protection, material compatibility, specifically with non-ferrous metals, as well as viscosity!

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Table 6: Other hydraulic fluids based on mineral oils and related hydrocarbons
(continued from page 13)

Serial number	Hydraulic fluids	Features / Typical field of application / Notes
16	Diesel, test diesel in acc. with DIN 4113	– Diesel / test diesel has poorer wear protection capabilities and a very low viscosity (< 3 mm²/s). – May be used only with FKM seals – Please note their low flash point! – To be used only after confirmation and with limited performance data!
17	Hydraulic fluids for roller processes	– Hydraulic fluids for roller processes have lower wear protection capabilities than mineral oil HLP and a lower viscosity – Please note their low flash point! – Hydraulic fluids for roller processes with limited performance data can be used only after confirmation.
18	Fluids for power steering, hydro-pneumatic suspension, active chassis etc.	– Can only be used after consultation and approval for use in the specific application, even if they are compliant with DIN 51524. – Please note the low viscosity! – In most cases they have poor water separation capability – Check the material compatibility!

7 Glossary

Additivation
Additives are chemical substances added to the basic fluids to achieve or improve specific properties.

Aging
Hydraulic fluids age due to oxidation (see chapter 3.1.5 "Aging resistance"). Liquid and solid contamination acts as a catalyzer for aging, meaning that it needs to be minimized as far as possible by careful filtration.

API classification
Classification of basic fluids by the **A**merican **P**etroleum **I**nstitute (API) – the largest association representing the US oil and gas industry.

Arrhenius equation
The quantitative relation between reaction rate and temperature is described by an exponential function, the Arrhenius equation. This function is usually visualized within the typical temperature range of the hydraulic system. For a practical example, see chapter 3.1.5 "Aging resistance".

Related hydrocarbons
Related hydrocarbons are hydrocarbon compounds that are not classified as API class 1, 2 or 5.

Basic fluids
In general, a hydraulic fluid is made up of a basic fluid, or base oil, and chemical substances, the so-called additives. The proportion of basic fluid is generally greater than 90%.

Demulsifying
Ability of a fluid to separate water contamination quickly; achieved with careful selection of base oil and additives.

Detergent
Ability of certain additives to emulsify part of the water contamination in the oil or to hold it in suspension until it has evaporated with increasing temperature. Larger water quantities, in contrast (above approx. 2 %), are separated immediately.

Dispersant
Ability of certain additives to keep insoluble liquid and solid contamination in suspension in the fluid.

Diesel effect
If hydraulic fluid that contains air bubbles is compressed quickly, the bubbles are heated to such a degree that a self-ignition of the air-gas mix may occur. The resultant temperature increase may lead to seal damage and increased aging of the hydraulic fluid.

Hydraulic fluids based on mineral oils
Hydraulic fluids based on mineral oils are made from petroleum (crude oil).

ICP (atomic emission spectroscopy)
The ICP procedure can be used to determine various wear metals, contamination types and additives. Practically all elements in the periodic system can be detected with this method.

Karl Fischer method
Method to determine the water content in fluids. Indirect coulometric determination procedure in accordance with DIN EN ISO 12937 in connection with DIN 51777-2. Only the combination of both standards will assure adequately accurate measured values.

Cavitation
Cavitation is the creation of cavities in fluids due to pressure reduction below the saturated vapour pressure and subsequent implosion when the pressure increases. When the cavities implode, extremely high acceleration, temperatures and pressure may occur temporarily, which may damage the component surfaces.

Neutralization number (NN)
The neutralization number (NN) or acid number (AN) specifies the amount of caustic potash required to neutralize the acid contained in one gram of fluid.

Pour point
The lowest temperature at which the fluid still just flows when cooled down under set conditions. The pour point is specified in the lubricant manufacturers' technical data sheets as a reference value for achieving this flow limit.

RFA (wavelength dispersive x-ray fluorescence analysis)
Is a procedure to determine nearly all elements in liquid and solid samples with nearly any composition. This analysis method is suitable for examining additives and contamination, delivering fast results.

Shearing/shear loss
Shearing of molecule chains during operation can change the viscosity of hydraulic fluids with long chain VI enhancers. The initially high viscosity index drops. This needs to be taken into account when selecting the hydraulic fluid.

The only value at present that can be used to assess viscosity changes in operation is the result of the test in accordance with DIN 51350 part -6. Please note that there are practical applications that create a much higher shear load on such hydraulic fluids than can be achieved by this test.

Stick-slip effect (sliding)
Interaction between a resilient mass system involving friction (such as cylinder + oil column + load) and the pressure increase at very low sliding speeds. The static friction of the system is a decisive value here. The lower it is, the lower the speed that can still be maintained without sticking. Depending on the tribologic system, the stick-slip effect may lead to vibrations generated and sometimes also to significant noise emission. In many cases, the effect can be attenuated by replacing the lubricant.

Viscosity
Viscosity is the measure of the internal friction of a fluid to flow. It is defined as the property of a substance to flow under tension. Viscosity is the most important characteristic for describing the load-bearing capacity of a hydraulic fluid.

Kinematic viscosity is the ratio of the dynamic viscosity and the density of the fluid; the unit is mm²/s. Hydraulic fluids are classified by their kinematic viscosity into ISO viscosity classes. The reference temperature for this is 40 °C.

Viscosity index (VI)
Refers to the viscosity temperature behavior of a fluid.
The lower the change of viscosity in relation the temperature, the higher the VI.

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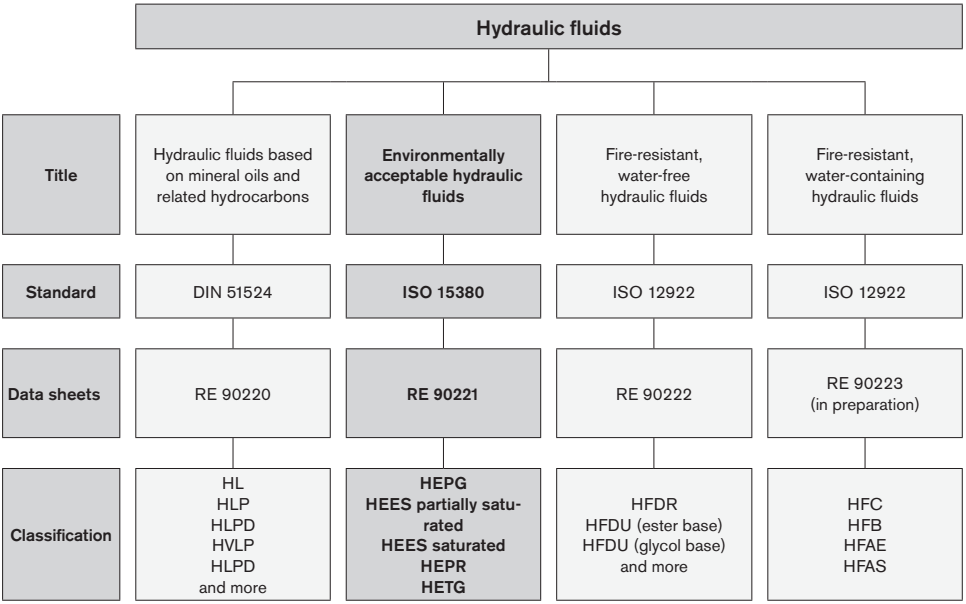
Rexroth
Bosch Group

Environmentally acceptable hydraulic fluids

RE 90221/05.12 **1**/14
Replaces: 05.10

Application notes and requirements for Rexroth hydraulic components



Contents

1 Basic information

1.1 General instructions

The hydraulic fluid is the common element in any hydraulic component and must be selected very carefully. Quality and cleanliness of the hydraulic fluid are decisive factors for the operational reliability, efficiency and service life of a system.

Hydraulic fluids must conform, be selected and used in accordance with the generally acknowledged rules of technology and safety provisions. Reference is made to the country-specific standards and directives (in Germany the directive of the Employer's Liability Insurance Association BGR 137).

This data sheet includes recommendations and regulations concerning the selection, operation and disposal of environmentally compatible hydraulic fluids in the application of Rexroth hydraulic components.

The individual selection of hydraulic fluid or the choice of classification are the responsibility of the operator.

It is the responsibility of the user to ensure that appropriate measures are taken for safety and health protection and to ensure compliance with statutory regulations. The recommendations of the lubricant manufacturer and the specifications given in the safety data sheet are to be observed when using hydraulic fluid.

This data sheet does not absolve the operator from verifying the conformity and suitability of the respective hydraulic fluid for his system. He is to ensure that the selected fluid meets the minimum requirements of the relevant fluid standard during the whole of the period of use.

Other regulations and legal provisions may also apply. The operator is responsible for their observance, e.g. EU directive 2004/35/EG, 2005/360/EG and their national implementation. In Germany the Water Resources Act (WHG) is also to be observed.

We recommend that you maintain constant, close contact with lubricant manufacturers to support you in the selection, maintenance, care and analyses.

When disposing of used hydraulic fluids, apply the same care as during use.

Environmentally acceptable hydraulic fluids have been used successfully for many years. In some countries, the use of environmentally acceptable hydraulic fluids is already prescribed in ecologically sensitive areas (e.g. forestry, locks, weirs).

Environmentally acceptable hydraulic fluids may only be used in the pharmaceutical and food industry subject to required certification to FDA/USDA/NSF **H1**.

1.2 Environmental compatibility

There is no unambiguous legal definition for environmentally acceptable hydraulic fluids as different testing procedures can be applied for biological degradation and toxicity.

According to ISO 15380 the definition of "environmentally acceptable" is as follows: Humans, animals, plants, air and soil must not be endangered. With regard to hydraulic fluids in an unused condition in the bin this mainly means:

- biological degradation at least 60 % (according to ISO 14593 or ISO 9439)
- acute fish toxicity at least 100 mg/l (according to ISO 7346-2)
- acute daphnia toxicity at least 100 mg/l (according to ISO 5341)
- acute bacteria toxicity at least 100 mg/l (according to ISO 8192)

The same amount of care should be taken when handling environmentally acceptable hydraulic fluids as for mineral oils, leakage from the hydraulic system should be avoided. Environmentally acceptable hydraulic fluids are designed so that in the event of accidents and leakage,less permanent environmental damage is caused than by mineral oils, see also chapter 5 "Disposal and environmental protection".

In comparison to mineral oil HLP/HVLP , the biological degradation of environmentally acceptable hydraulic fluids may change fluid aging, see chapter 3.1.5 "Aging resistance", 3.1.6. "Biological degradation" and 4 "Hydraulic fluids in operation".

1.3 Scope

This data sheet must be applied when using environmentally acceptable hydraulic fluids with Rexroth hydraulic components. The specifications of this data sheet may be further restricted by the specification given in the data sheets for the individual components.

The use of the individual environmentally acceptable hydraulic fluids in accordance with the intended purpose can be found in the safety data sheets or other product description documents of the lubricant manufacturers. In addition, each use is to be individually considered.

Rexroth hydraulic components may only be operated with environmentally acceptable hydraulic fluids according to ISO 15380 if specified in the respective component data sheet or if a Rexroth approval for use is furnished.

The manufacturers of hydraulic systems must adjust their systems and operating instructions to the environmentally acceptable hydraulic fluids.

Notes:
In the market overview RE 90221-01, environmentally acceptable hydraulic fluids based on mineral oil are described which, according to the information of the lubricant manufacturer, feature the respective parameters of the current requirements standard ISO 15380 and other parameters which are of relevance for suitability in connection with Rexroth components.

These specifications are not checked or monitored by Bosch Rexroth. The list in the market overview does not therefore represent a recommendation on the part of Rexroth or approval of the respective hydraulic fluid for use with Rexroth components and does not release the operator from his responsibility regarding selection of the hydraulic fluid.

Bosch Rexroth will accept no liability for its components for any damage resulting from failure to comply with the notes below.

1.4 Safety instructions

Hydraulic fluids can constitute a risk for persons and the environment. These risks are described in the hydraulic fluid safety data sheets. The operator is to ensure that a current safety data sheet for the hydraulic fluid used is available and that the measures stipulated therein are complied with.

2 Solid particle contamination and cleanliness levels

Solid particle contamination is the major reason for faults occurring in hydraulic systems. It may lead to a number of effects in the hydraulic system. Firstly, single large solid particles may lead directly to a system malfunction, and secondly small particles cause continuous elevated wear.

For mineral oils, the cleanliness level of environmentally acceptable hydraulic fluids is given as a three-digit numerical code in accordance with ISO 4406. This numerical code denotes the number of particles present in a hydraulic fluid for a defined quantity. Moreover, foreign solid matter is not to exceed a mass of 50 mg/kg (gravimetric examination according to ISO 4405).

In general, compliance with a minimum cleanliness level of 20/18/15 in accordance with ISO 4406 or better is to be maintained in operation. Special servo valves demand improved cleanliness levels of at least 18/16/13. A reduction in cleanliness level by one level means half of the quantity of particles and thus greater cleanliness. Lower numbers in cleanliness levels should always be striven for and extend the service life of hydraulic components. The component with the highest cleanliness requirements determines the required cleanliness of the overall system. Please also observe the specifications in table 1: "Cleanliness levels according to ISO 4406" and in the respective data sheets of the various hydraulic components.

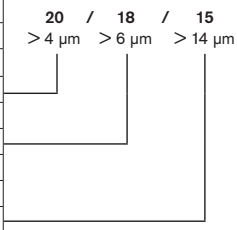
Hydraulic fluids frequently fail to meet these cleanliness requirements on delivery. Careful filtering is therefore required during operation and in particular, during filling in order to ensure the required cleanliness levels. Your lubricant manufacturer can tell you the cleanliness level of hydraulic fluids as delivered. To maintain the required cleanliness level over the operating period, you must use a reservoir breather filter. If the environment is humid, take appropriate measures, such as a breather filter with air drying or permanent off-line water separation.

Note: the specifications of the lubricant manufacturer relating to cleanliness levels are based on the time at which the container concerned is filled and not on the conditions during transport and storage.

Further information about contamination with solid matter and cleanliness levels can be found in brochure RE 08016.

Table 1: Cleanliness levels according to ISO 4406

Particles per 100 ml		Scale number
More than	Up to and including	
8,000,000	16,000,000	24
4,000,000	8,000,000	23
2,000,000	4,000,000	22
1,000,000	2,000,000	21
500,000	1,000,000	20
250,000	500,000	19
130,000	250,000	18
64000	130,000	17
32000	64000	16
16000	32000	15
8000	16000	14
4000	8000	13
2000	4000	12
1000	2000	11
500	1000	10
250	500	9
130	250	8
64	130	7
32	64	6



3 Selection of the hydraulic fluid

Environmentally acceptable hydraulic fluids for Bosch Rexroth hydraulic components are assessed on the basis of their fulfillment of the minimum requirements of ISO 15380.

3.1 Selection criteria for the hydraulic fluid

The specified limit values for all components employed in the hydraulic system, for example viscosity and cleanliness level, must be observed with the hydraulic fluid used, taking into account the specified operating conditions.

Hydraulic fluid suitability depends, amongst others, on the following factors:

3.1.1 Viscosity

Viscosity is a basic property of hydraulic fluids. The permissible viscosity range of complete systems needs to be determined taking account of the permissible viscosity of all components and it is to be observed for each individual component.

The viscosity at operating temperature determines the response characteristics of closed control loops, stability and damping of systems, the efficiency factor and the degree of wear.

We recommend that the optimum operating viscosity range of each component be kept within the permissible temperature range. This usually requires either cooling or heating, or both. The permissible viscosity range and the necessary cleanliness level can be found in the product data sheet for the component concerned.

If the viscosity of a hydraulic fluid used is above the permitted operating viscosity, this will result in increased hydraulic-mechanical losses. In return, there will be lower internal leakage losses. If the pressure level is lower, lubrication gaps may not be filled up, which can lead to increased wear. For hydraulic pumps, the permitted suction pressure may not be reached, which may lead to cavitation damage.

If the viscosity of a hydraulic fluid is below the permitted operating viscosity, increased leakage, wear, susceptibility to contamination and a shorter life cycle will result.

Please ensure that the permissible temperature and viscosity limits are observed for the respective components. This usually requires either cooling or heating, or both.

3.1.2 Viscosity-temperature behavior

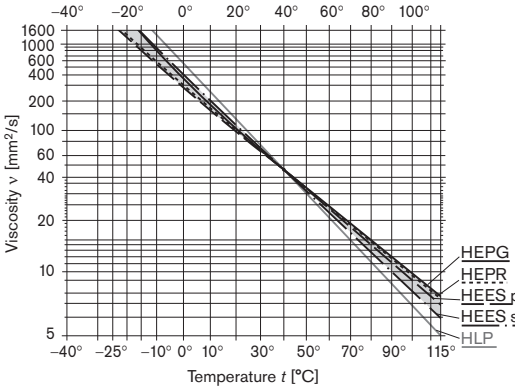
For hydraulic fluids, the viscosity temperature behavior (V-T behavior) is of particular importance. Viscosity is characterized in that it drops when the temperature increases and rises when the temperature drops. The interrelation between viscosity and temperature is described by the viscosity index (VI).

If exposed to the cold for several days, viscosity may rise significantly (HETG and HEES). After heating, the characteristic values as specified on the data sheet are restored. Please ask your lubricant manufacturer for the " Flow capacity after 7 days at low temperature" (ASTM D 2532) of fluid classifications HETG and partially saturated HEES.

All known environmentally acceptable hydraulic fluids have better viscosity temperature behavior than mineral oil HLP and generally feature greater shear stability than HVLP mineral oils. This should be taken into consideration when selecting hydraulic fluid for the required temperature range. A lower viscosity level can frequently be used to save any drive power during a cold start and avoid viscosity being too low at higher temperatures. The required viscosity and temperature limits in the product data sheets are to be observed in all operating conditions.

Depending on the basic fluid types/classes, VI indices can be achieved of 140–220, see Fig. 1: "Examples: V-T diagrams in comparison to HLP (reference values)" and Table 4: "Classification and fields of application of environmentally acceptable hydraulic fluids".

Fig. 1: Examples V-T diagrams in comparison to HLP (reference values, double-logarithmic representation)



Typical viscosity data [mm²/s]			
Temperature	–20 °C	40 °C	100 °C
HEES partially saturated	1250	46	9
HEES saturated	2500	46	8
HEPG	2500	46	10
HEPR	1400	46	10
For comparison HLP (see RE 90220)	4500	46	7

Detailed V-T diagrams may be obtained from your lubricant manufacturer for their specific products.

3.1.3 Wear protection capability

Wear protection capability describes the property of hydraulic fluids to prevent or minimize wear within the components. The wear protection capability is described in ISO 15380 via test procedures"FZG gear test rig" (ISO 14635-1) and "Mechanical test in the vane pump" (ISO 20763). From ISO VG 32, ISO 15380 prescribes a rating of at least 10 (FZG test). At present, the FZG test cannot be applied to viscosity classes < ISO VG 32. The wear protection capability of environmentally acceptable hydraulic fluids in relation to the two test procedures is comparable to that of mineral oil HLP/HVLP.

3.1.4 Material compatibility

The hydraulic fluid must not negatively affect the materials used in the components. Compatibility with coatings, seals, hoses, metals and plastics is to be observed in particular. The fluid classifications specified in the respective component data sheets are tested by the manufacturer with regard to material compatibility. Parts and components not supplied by us are to be checked by the user.

Table 2: Known material incompatibilities

Classification	Incompatible with:
HE... general	One-component color coatings, lead, galvanized zinc coatings, some non-ferrous metals, seals made of NBR. In some cases, the latter show major increases in volume when impermissibly aged hydraulic fluids come into contact with the material. NBR is only permitted by prior consent, please observe the customary seal and tube replacement intervals. Do not use any hydrolysis/susceptible polyurethane qualities. **Note** Please check seals and coatings of control cabinets, outer coatings of hydraulic components and accessories (connectors, cables, control cabinets) for resistance to vapors issuing from hydraulic fluids.
HETG/HEES	Zinc, some non-ferrous alloys with zinc
HEPG	Steel/aluminum tribocontacts, paper filters, polymethylmethacrylate (PMMA), NBR **Note** Check plastics for resistance

The material incompatibilities mentioned here do not automatically result in function problems. However the elements of the materials are found in the hydraulic fluids after use. The biological degradation of hydraulic fluids is negatively influenced.

3.1.5 Aging resistance

The way an environmentally acceptable hydraulic fluids ages depends on the thermal, chemical and mechanical stress to which it is subjected. The influence of water, air, temperature and contamination may be significantly greater than for mineral oils HLP/HVLP. Aging resistance can be greatly influenced by the chemical composition of the hydraulic fluids .

High fluid temperatures (e.g. over 80 °C) result in a approximate halving of the fluid service life for every 10 °C temperature increase and should therefore by avoided. The halving of the fluid service life results from the application of the Arrhenius equation (see Glossary).

Table 3: Reference values for temperature-dependent aging of the hydraulic fluid

Reservoir temperature	Fluid life cycle
80 °C	100 %
90 °C	50 %
100 °C	25 %

A modified aging test (without adding water) is prescribed for fluid classifications HETG and HEES. Hydraulic fluids with HEPG and HEPR classification are subjected to the identical test procedure as mineral oils (with 20 % water added). The calculated fluid service life is derived from the results of tests in which the long-term characteristics are simulated in a short period of time by applying more arduous conditions (condensed testing). This calculated fluid service life is not to be equated to the fluid service life in real-life applications.

Table 3 is a practical indicator for hydraulic fluids with water content < 0.1%, cf. chapter 4.10. "Water".

3.1.6 Biological degradation

Environmentally acceptable hydraulic fluids are ones which degrade biologically much faster than mineral oils. Biological degradation is a biochemical transformation effected by micro-organisms resulting in mineralization. For environmentally acceptable hydraulic fluids that make reference to ISO 15380, biological degradation according to ISO 14593 or ISO 9439 must be verified. 60% minimum degradation is defined as limit value. Proof of biological degradation is furnished for the new, unmixed, ready-formulated hydraulic fluids. Aged or mixed hydraulic fluids are less able to degrade biologically. Biological degradation outside the defined test procedure is subject to a variety of natural influences. The key factors are temperature, humidity, contamination, fluid concentration, type and quantity of micro-organisms. Environmentally acceptable hydraulic fluids require no extended maintenance in comparison to mineral oils, please observe chapter 4 "Hydraulic fluids in operation".

3.1.7 Air separation ability (ASA)

The air separation ability (ASA) describes the property of a hydraulic fluid to separate undissolved air. Hydraulic fluids always contain dissolved air. During operation, dissolved air may be transformed into undissolved air, leading to cavitation damages. Fluid classification, fluid product, reservoir size and design must be coordinated to take into account the dwell time and ASA value of the hydraulic fluid. The air separation capacity depends on the viscosity, temperature, basic fluid and aging. It cannot be improved by additives.

According to ISO 15380, for instance, an ASA value ≤ 10 minutes is required for viscosity class ISO VG 46, 6 minutes are typical, lower values are preferable.

3.1.8 Demulsifying ability and water solubility

The capacity of a hydraulic fluid to separate water at a defined temperature is known as the demulsifying ability. ISO 6614 defines the demulsifying properties of hydraulic fluids.

Fluids classified HETG, HEES and HEPR separate from water. HETG and HEES hydraulic fluids have a different water separation ability to mineral oil HLP/HVLP. At 20 °C, in comparison to mineral oil HLP/HVLP, a multiple (> factor 3) of water can separate in the hydraulic fluid. Water solubility is also more temperature-dependent than for mineral oils. With regard to water solubility, HEPR hydraulic fluids behave like HVLP hydraulic fluids (see RE 90220). In the majority of cases, HEPG-classified fluids HEPG dissolve water completely , see chapter "4.10 Water".

3.1.9 Filterability

Filterability describes the ability of a hydraulic fluid to pass through a filter, removing solid contaminants. The hydraulic fluids used require a good filterability, not just when new, but also during the whole of their service life. Depending on the different basic fluids (glycols, saturated and partially saturated ester oils, hydrocrack oils, polyalpha olefins, triglycerides) and additives (VI enhancers), there are great differences here.

The filterability is a basic prerequisite for cleanliness, servicing and filtration of hydraulic fluids. Rexroth therefore requires the same degree of filterability of environmentally acceptable hydraulic fluids as for mineral oils HLP/HVLP to DIN 51524. As ISO 15380 does not comment on the filterability of hydraulic fluids, filterability comparable to that of mineral oils HLP/HVLP must be requested of lubricant manufacturers.

Filterability is tested with the new hydraulic fluid and after the addition of 0.2 % water. The underlying standard (ISO 13357-1/-2) stipulates that filterability must have no negative effects on the filters or the hydraulic fluid, see chapter 4 "Hydraulic fluids in operation".

3.1.10 Corrosion protection

Hydraulic fluids should not just prevent corrosion formation on steel components, they must also be compatible with non-ferrous metals and alloys. Corrosion protection tests on different metals and metal alloys are described in ISO 15380. Hydraulic fluids that are not compatible with the materials listed above must not be used, even if they are compliant with ISO 15380.

Rexroth components are usually tested with HLP hydraulic fluids or corrosion protection oils based on mineral oils before they are delivered.

3.1.11 Additivation

The properties described above can be modified with the help of suitable additives. Environmentally acceptable hydraulic fluids should never contain heavy metals. According to the present state of knowledge, all hydraulic fluids, regardless of additivation, can be filtered with all customary filter materials in all known filtration ratings (≥ 0.8 µm), without filtering out effective additives at the same time.

Bosch Rexroth does not prescribe any specific additive system.

3.2 Classification and fields of application

Table 4: Classification and fields of application

Classification	Features	Typical field of application	Notes
HEPG according to ISO 15380 Density at 15 °C: typically > 0.97 kg/dm³ VI: typical > 170	Basic fluid, glycols	Systems on exposed water courses (locks, weirs, dredgers)	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. – Very good viscosity/temperature characteristics, shear stability – Resistant to aging – Incompatible with mineral oil (exceptions must be confirmed by the lubricant manufacturer) – Can be water-soluble – Can be mixed with water – Very good wear protection properties – A higher implementation temperature with the same viscosity in comparison to mineral oil is to be expected – Due to the higher density in comparison to HLP, lower suction pressures are to be anticipated for pumps. Reduce the maximum speed as required and optimize suction conditions. – Classified as insignificantly water-endangering (water hazard class WGK 1) – Prior to commissioning, contact the lubricant manufacturer, as the components are tested with mineral oil HLP/corrosion protection oil.
HEES partially saturated according to ISO 15380 Density at 15 °C: typically 0.90–0.93 kg/dm³ VI: typical > 160 Iodine count < 90	Basic fluid: Ester based on renewable raw materials, synthetic esters, mixtures of various esters, mixtures with polyalphaolefines (< 30%)	Suitable for most fields of application and components.	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. – Preferred use of FKM seals. Please enquire for shaft seal rings and implementation temperatures under –15 °C. – In operation, a higher temperature in comparison to mineral oil HLP/HVLP is to be expected given identical design and viscosity – Limit lower (depending on viscosity class) and upper implementation temperatures (maximum 80 °C due to aging) – Good viscosity/temperature characteristics, shear stability. – Good corrosion protection, if correspondingly additivized – Mostly classed as insignificantly water-endangering (water hazard class WGK 1), in some cases as not water-endangering – High dirt dissolving capacity on fluid changeovers – In unfavorable operating conditions (high water content, high temperature), HEES on ester basis have a tendency to hydrolysis. The acidic organic decomposition products can chemically attack materials and components.

Continued on page 9

Table 4: Classification and fields of application (continued from page 8)

Classification	Features	Typical field of application	Notes
HEES saturated according to ISO 15380 Density at 15 °C: typically 0.90–0.93 kg/dm³ VI: typical 140–160 Iodine count <15	Basic fluid: Ester based on renewable raw materials, synthetic esters, mixtures of various esters, mixtures with polyalphaolefines (< 30%)	Suitable for most fields of application and components. Saturated HEES should be preferred over partially saturated HEES and HETG for components and systems exposed to high stress levels.	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. – Preferred use of FKM seals. Please enquire for shaft seal rings and implementation temperatures under –15 °C. – In operation, a higher temperature in comparison to mineral oil HLP/HVLP is to be expected given identical design and viscosity – Good viscosity/temperature characteristics, shear stability – Good corrosion protection, if correspondingly additivized – Mostly classed as insignificantly water-endangering (water hazard class WGK 1), in the case of low viscosity classes (up to ISO VG 32) also classed as not water-endangering – High dirt dissolving capacity on fluid changeovers
HEPR according to ISO 15380 Density at 15 °C: typically 0.87 kg/dm³ VI : typical 140–160	Basic fluid: synthetically manufactured hydrocarbons (polyalpha olefins PAO) partly mixed with esters (< 30 %)	Suitable for most fields of application and components. HEPR should be preferred over partially saturated HEES and HETG for components and systems exposed to high stress levels.	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. – Behaves similarly to HVLP- hydraulic fluids, individual products comply with ISO 15380 HEPR and DIN 51524-3 HVLP – Preferred use of FKM seals. Please enquire for shaft seal rings and implementation temperatures under –15 °C. – Good viscosity-temperature behavior – Classified as insignificantly water-endangering (water hazard class WGK 1) **Note:** Note shear stability (see chapter 4.11 "Fluid servicing, fluid analysis and filtration" and chapter 6 "Glossary")
HETG according to ISO 15380 Density at 15 °C: typically 0.90-0.93 kg/dm³ VI: typical > 200 Iodine count > 90	Basic fluid: vegetable oils and triglycerides	Not recommended for Rexroth components!	Practical requirements are frequently not fulfilled by hydraulic fluids in this classification. Use only permissible after consultation. – Viscosity is not stable over time – Very fast fluid aging, very hydrolysis-susceptible (please observe neutralization number) – Tendency to gumming, gelling and setting. – Limit the lower (depending on viscosity class) and upper implementation temperatures (see chapter 3.1.5) – Only limited material compatibility – Filterability problems at water ingress – High dirt dissolving capacity on fluid changeovers – Mostly classed as not water-endangering

4 Hydraulic fluids in operation

4.1 General

The properties of hydraulic fluids can change continually during storage and operation.

Please note that the fluid standard ISO 15380 merely describes minimum requirements for hydraulic fluids in new condition at the time of filling into the bins. The operator of a hydraulic system must ensure that the hydraulic fluid remains in a utilizable condition throughout its entire period of use.

Deviations from the characteristic values are to be clarified with the lubricant manufacturer, the test labs or Bosch Rexroth.

Bosch Rexroth will accept no liability for damage to its components within the framework of the applicable liability legislation insofar as the latter is due to non-observance of the following instructions.

Please note the following aspects in operation.

4.2 Storage and handling

Hydraulic fluids must be stored correctly in accordance with the instructions of the lubricant manufacturer. Avoid exposing the containers to lengthy periods of direct heat. Containers are to be stored in such a way that the risk of any foreign liquid or solid matter (e.g. water, foreign fluids or dust) ingression into the inside of the container can be ruled out. After taking hydraulic fluids from the containers, these are immediately to be properly resealed.

Recommendation:

- Store containers in a dry, roofed place
- Store barrels on their sides
- Clean reservoir systems and machine reservoirs regularly

4.3 Filling of new systems

Usually, the cleanliness levels of the hydraulic fluids as delivered do not meet the requirements of our components. Hydraulic fluids must be filtered using an appropriate filter system to minimize solid particle contamination and water in the system.

As early as possible during test operation, new systems should be filled with the selected hydraulic fluid so as to reduce the risk of accidentally mixing fluids (see chapter 4.5 "Mixing and compatibility of different hydraulic fluids"). Changing the hydraulic medium at a later point represents significant additional costs (see following chapter).

4.4 Hydraulic fluid changeover

In particular with the changeover from mineral oils to environmentally acceptable hydraulic fluids, but also from one environmentally acceptable hydraulic fluids to another, there may be interference (e.g. incompatibility in the form of gelling, silting, stable foam or reduced filterability or filter blockage).

In the case of changeovers of the fluid in hydraulic systems, it is important to ensure compatibility of the new hydraulic fluid with the remains of the previous hydraulic fluid. Bosch Rexroth recommends obtaining verification of compatibility from the manufacturer or supplier of the new hydraulic fluid. The quantity of old fluid remaining should be minimized. Mixing hydraulic fluids should be avoided, see following chapter.

For information on changing over hydraulic fluids with different classifications, please refer to VDMA 24314, VDMA 24569 and ISO 15380 appendix A.

Bosch Rexroth will not accept liability for any damage to its components resulting from inadequate hydraulic fluid changeovers!

4.5 Mixing and compatibility of different hydraulic fluids

If hydraulic fluids from different manufacturers or different types from the same manufacturer are mixed, gelling, silting and deposits may occur. These, in turn, may cause foaming, impaired air separation ability, malfunctions and damage to the hydraulic system.

If the fluid contains more than 2 % of another fluid then it is considered to be a mixture. Exceptions apply for water, see chapter 4.10 "Water".

Mixing with other hydraulic fluids is not generally permitted. This also includes hydraulic fluids with the same classification and from the market overview RE 90221-01. If individual lubricant manufacturers advertise miscibility and/or compatibility, this is entirely the responsibility of the lubricant manufacturer.

Bosch Rexroth customarily tests all components with mineral oil HLP before they are delivered.

Note: With connectible accessory units and mobile filtering systems, there is a considerable risk of non-permitted mixing of the hydraulic fluids!

Rexroth will not accept liability for any damage to its components resulting from mixing hydraulic fluids!

4.6 Re-additivation

Additives added at a later point in time such as colors, wear reducers, VI enhancers or anti-foam additives, may negatively affect the performance properties of the hydraulic fluid and the compatibility with our components and therefore are not permissible.

Rexroth will not accept liability for any damage to its components resulting from re-additivation!

4.7 Foaming behavior

Foam is created by rising air bubbles at the surface of hydraulic fluids in the reservoir. Foam that develops should collapse as quickly as possible.

Common hydraulic fluids in accordance with ISO 15380 are sufficiently inhibited against foam formation in new condition. On account of aging and adsorption onto surfaces, the defoamer concentration may decrease over time, leading to a stable foam.

Defoamers may be re-dosed only after consultation with the lubricant manufacturer and with his written approval.

Defoamers may affect the air separation ability.

4.8 Corrosion

The hydraulic fluid is to guarantee sufficient corrosion protection of components under all operating conditions, even in the event of impermissible water contamination.

Environmentally acceptable hydraulic fluids are tested for corrosion protection in the same way as mineral oil HLP/HVLP. When used in practice other corrosion mechanisms are revealed in detail and in individual cases, for the most part in contact with non-ferrous and white alloys.

4.9 Air

Under atmospheric conditions the hydraulic fluid contains dissolved air. In the negative pressure range, for instance in the suction pipe of the pump or downstream of control edges, this dissolved air may transform into undissolved air. The undissolved air content represents a risk of cavitation and of the diesel effect. This results in material erosion of components and increased hydraulic fluid aging.

With the correct measures, such as suction pipe and reservoir design, and an appropriate hydraulic fluid, air intake and separation can be positively influenced.

See also chapter 3.1.7 "Air separation ability (ASA)".

4.10 Water

Water contamination in hydraulic fluids can result from direct ingress or indirectly through condensation of water from the air due to temperature variations.

HEPG dissolves water completely. This means that any water that has ingressed into the system cannot be drained off in the sump of the reservoir.

In the case of hydraulic fluids classed HETG, HEES and HEPR undissolved water can be drained off from the reservoir sump, the remaining water content is however too high to ensure that the maximum permissible water limit values are observed in the long term.

Water in the hydraulic fluid can result in wear or direct failure of hydraulic components. Furthermore, a high water content in the hydraulic fluid negatively affects aging and filterability and increases susceptibility to cavitation. During operation, the water content in all hydraulic fluids, determined according to the "Karl Fischer method" (see chapter 6 "Glossary") for all environmentally acceptable hydraulic fluids must constantly be kept below 0.1% (1000 ppm). To ensure a long service life of both hydraulic fluids and components, Bosch Rexroth recommends that values below 0.05% (500 ppm) are permanently maintained.

Due to the higher water solubility (except for HEPR) in comparison to mineral oil HLP/HVLP it is urgently advised that precautions be taken when using environmentally acceptable hydraulic fluids, such as a dehumidifier on the reservoir ventilation.

Water content has an affect particularly in the case of HETG and partially saturated HEES in that it accelerates aging (hydrolysis) of the hydraulic fluid and biological degradation, see chapter 4.11 "Fluid servicing, fluid analysis and filtration".

4.11 Fluid servicing, fluid analysis and filtration

Air, water, operating temperature influences and solid matter contamination will change the performance characteristics of hydraulic fluids and cause them to age.

To preserve the usage properties and ensure a long service life for hydraulic fluid and components, the monitoring of the fluid condition and a filtration adapted to the application requirements (draining and degassing if required) are indispensable.

The effort is higher in the case of unfavorable usage conditions, increased stress for the hydraulic system or high expectations as to availability and service life, see chapter 2 "Solid particle contamination and cleanliness levels".

When commissioning a system, please note that the required minimum cleanliness level can frequently be attained only by flushing the system. Due to severe start-up contamination, it may be possible that a fluid and/or filter replacement becomes necessary after a short operating period (< 50 operating hours).

The hydraulic fluid must be replaced at regular intervals and tested by the lubricant manufacturer or recognized accredited test labs. **We recommend a reference analysis after commissioning.**

The minimum data to be tested for analyses are:

- Viscosity at 40 °C and 100 °C
- Neutralization number NN (acid number AN)
- Water content (Karl-Fischer method)
- Particle measurement with evaluation according to ISO 4406 or mass of solid foreign substances with evaluation to EN 12662
- Element analysis (RFA (EDX) / ICP, specify test method)
- Comparison with new product or available trend analyses
- Assessment / evaluation for further use
- Also recommended: IR spectrum"

Differences in the maintenance and upkeep of environmentally acceptable hydraulic fluids with the corresponding suitability characteristics (as required in market overview RE 90221-01) in comparison to mineral oil HLP/HVLP are not necessary. Attention is however drawn to the note in chapter 1.3.

After changing over hydraulic fluids it is recommended that the filters be replaced again after 50 operating hours as fluid aging products may have detached themselves ("self-cleaning effect").

Compared to the pure unused hydraulic fluid the changed neutralization number NN (acid number AN) indicates how many aging products are contained in the hydraulic fluid. This difference must be kept as low as possible. As soon as the trend analysis notes a significant increase in the values, the lubricant manufacturer should be contacted.

A higher viscosity than that of new materials indicates that the hydraulic fluid has aged. Evaluation by the test lab or lubricant manufacturers is however authoritative, whose recommendation should be urgently observed.

On systems where the possibility of water contamination cannot be completely ruled out (also condensation), it should be ensured via the hydraulic system circuit that fluid aging products are not accumulating in individual areas of the hydraulic system, but are being removed from the system in a controlled manner via the filtration system. This should be ensured via suitable hydraulic circuits (e.g. flushing circuit) or system manufacturer's operating instructions/specifications.

In case of warranty, liability or guarantee claims to Bosch Rexroth, service verification and/or the results of fluid analyses are to be provided.

5 Disposal and environmental protection

All environmentally acceptable hydraulic fluids, are like mineral oil-based hydraulic fluids, subject to special disposal obligations.

The respective lubricant manufacturers provide specifications on environmentally acceptable handling and storage. Please ensure that spilt or splashed fluids are absorbed with appropriate adsorbents or by a technique that prevents it contaminating water courses, the ground or sewerage systems.

It is also not permitted to mix fluids when disposing of hydraulic fluids. Regulations governing the handing of used oils stipulate that used oils are not to mixed with other products, e.g. substances containing halogen. Non-compliance will increase disposal costs. Comply with the national legal provisions concerning the disposal of the corresponding hydraulic fluid. Comply with the local safety data sheet of the lubricant manufacturer for the country concerned.

6 Glossary

Additivation
Additives are chemical substances added to the basic fluids to achieve or improve specific properties.

Aging
Hydraulic fluids age due to oxidation (see chapter 3.1.5 "Aging resistance"). Liquid and solid contamination acts as a catalyzer for aging, meaning that it needs to be minimized as far as possible by careful filtration. Please refer to Hydrolysis.

Arrhenius equation
The quantitative relation between reaction rate and temperature is described by an exponential function, the Arrhenius equation. This function is usually visualized within the typical temperature range of the hydraulic system. For a practical example, see chapter 3.1.5 "Aging resistance".

Basic fluids
In general, a hydraulic fluid is made up of a basic fluid, or base oil, and chemical substances, the so-called additives. The proportion of basic fluid is generally greater than 90%.

Diesel effect
If hydraulic fluid that contains air bubbles is compressed quickly, the bubbles are heated to such a degree that a self-ignition of the air-gas mix may occur. The resultant temperature increase may lead to seal damage and increased aging of the hydraulic fluid.

Saturated esters
Esters differ by the number of C atoms (chain length) and position of the bonds between the C atoms. Saturated esters do not have double/multiple bonds between C atoms and are therefore more resistant to aging than partially saturated esters.

Partially saturated esters
In contrast to saturated esters, partially saturated esters have double/multiple bonds between C atoms. Rexroth defines partially saturated esters as unsaturated bonds and mixtures of esters with unsaturated and saturated bonds. Esters with unsaturated bonds are produced on the basis of renewable raw materials.

Depending on their number and position, these unsaturated bonds between the C atoms are instable. These bonds can detach themselves and form new bonds, thus changing the properties of those liquids (an aging mechanism). One of the underlying requirements for inclusion in the market overview RE 90221-01 is an aging stability characteristic. Attention is however drawn to the note in chapter 1.3.

Hydrolysis
Hydrolysis is the splitting of a chemical bond through the reaction with water under the influence of temperature.

ICP (atomic emission spectroscopy)
The ICP procedure can be used to determine various wear metals, contamination types and additives. Practically all elements in the periodic system can be detected with this method..

Iodine count
The iodine count is a yardstick for the quantity of single and multiple unsaturated bonds between C atoms in the basic fluid. A low iodine count indicates that the hydraulic fluid contains few unsaturated bonds and is thus considerably more resistant to aging than a hydraulic fluid with a high iodine count. A statement about the position at which these multiple bonds are located and about how "stable" they are against influencing factors cannot be derived simply by stating the iodine count.

Karl Fischer method
Method to determine the water content in fluids. Indirect coulometric determination procedure in accordance with DIN EN ISO 12937 in connection with DIN 51777-2. Only the combination of both standards will assure adequately accurate measured values. For hydraulic fluids based on glycol, DIN EN ISO 12937 is to be applied in conjunction with DIN 51777-1.

Cavitation
Cavitation is the creation of cavities in fluids due to pressure reduction below the saturated vapour pressure and subsequent implosion when the pressure increases. When the cavities implode, extremely high acceleration, temperatures and pressure may occur temporarily, which may damage the component surfaces.

Neutralization number (NN)
The neutralization number (NN) or acid number (AN) specifies the amount of caustic potash required to neutralize the acid contained in one gram of fluid.

Pour point
The lowest temperature at which the fluid still just flows when cooled down under set conditions. The pour point is specified in the lubricant manufacturers' technical data sheets as a reference value for achieving this flow limit.

RFA (wavelength dispersive x-ray fluorescence analysis)
Is a procedure to determine nearly all elements in liquid and solid samples with nearly any composition. This analysis method is suitable for examining additives and contamination, delivering fast results.

Shearing/shear loss
Shearing of molecule chains during operation can change the viscosity of hydraulic fluids with long chain VI enhancers. The initially high viscosity index drops. This needs to be taken into account when selecting the hydraulic fluid.

The only value at present that can be used to assess viscosity changes in operation is the result of the test in accordance with DIN 51350 part -6. Please note that there are practical applications that create a much higher shear load on such hydraulic fluids than can be achieved by this test.

Stick-slip
Interaction between a resilient mass system involving friction (such as cylinder + oil column + load) and the pressure increase at very low sliding speeds. The static friction of the system is a decisive value here. The lower it is, the lower the speed that can still be maintained without sticking. Depending on the tribologic system, the stick-slip effect may lead to vibrations generated and sometimes also to significant noise emission. In many cases, the effect can be attenuated by replacing the lubricant.

Viscosity
Viscosity is the measure of the internal friction of a fluid to flow. It is defined as the property of a substance to flow under tension. Viscosity is the most important characteristic for describing the load-bearing capacity of a hydraulic fluid.

Kinematic viscosity is the ratio of the dynamic viscosity and the density of the fluid; the unit is mm^2/s. Hydraulic fluids are classified by their kinematic viscosity into ISO viscosity classes. The reference temperature for this is 40 °C.

Viscosity index (VI)
Refers to the viscosity temperature behavior of a fluid. The lower the change of viscosity in relation the temperature, the higher the VI.

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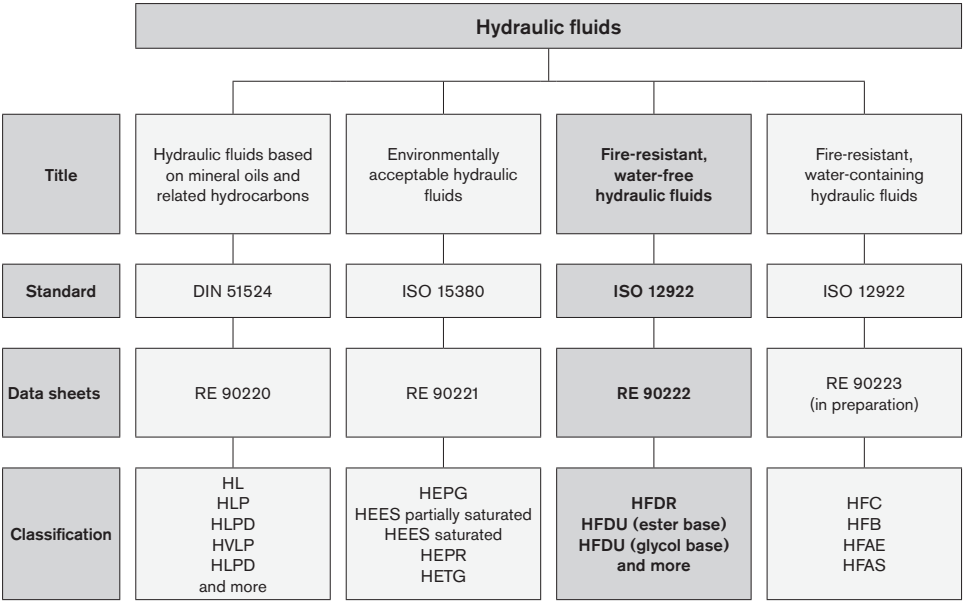
Rexroth
Bosch Group

Fire-resistant, water-free hydraulic fluids (HFDR/HFDU)

RE 90222/05.12 1/16

Application notes and requirements for Rexroth hydraulic components



Contents

1 Basic information

1.1 General instructions

The hydraulic fluid is the common element in any hydraulic component and must be selected very carefully. Quality and cleanliness of the hydraulic fluid are decisive factors for the operational reliability, efficiency and service life of a system.

Hydraulic fluids must conform, be selected and used in accordance with the generally acknowledged rules of technology and safety provisions. Reference is made to the country-specific standards and directives (in Germany the directive of the Employer's Liability Insurance Association BGR 137).

This data sheet includes recommendations and regulations concerning the selection, operation and disposal of fire-resistant, water-free hydraulic fluids in the application of Rexroth hydraulic components.

The individual selection of hydraulic fluid or the choice of classification are the responsibility of the operator.

It is the responsibility of the user to ensure that appropriate measures are taken for safety and health protection and to ensure compliance with statutory regulations. The recommendations of the lubricant manufacturer and the specifications given in the safety data sheet are to be observed when using hydraulic fluid.

This data sheet does not absolve the operator from verifying the conformity and suitability of the respective hydraulic fluid for his system. He is to ensure that the selected fluid meets the minimum requirements of the relevant hydraulic fluid standard during the whole of the period of use.

The currently valid standard for fire-resistant hydraulic fluids is the ISO 12922. In addition, other, more detailed documents, guidelines, specifications and legislation may also be valid. The operator is responsible for ensuring that such regulations are observed, for example:

- 7th Luxembourg Report: Luxembourg, April 1994, Doc. No. 4746/10/91 EN "Requirements and tests applicable to fire-resistant hydraulic fluids for hydrostatic and hydrokinetic power transmission and control"
- VDMA 24314 (1981-11): "Changing hydraulic fluids – guidelines"
- VDMA 24317 (2005-11): "Fire-resistant hydraulic fluids – minimum technical requirements"
- FM Approval Standard 6930 (2009-04): "Flammability Classification of Industrial Fluids" (only available in English)
- DIN Technical Report CEN/TR 14489 (2006-01): "Selection guidelines for protecting safety, health and the environment"

We recommend that you maintain constant, close contact with lubricant manufacturers to support you in the selection, maintenance, care and analyses.

When disposing of used hydraulic fluids, apply the same care as during use.

1.2 Fire resistance

There is no clear legal definition of fire-resistant hydraulic fluids. There are great differences regarding fire resistance. The selection is the sole responsibility of the system operator with respect to requirements (application, construction and design of the system, hottest source in the system, necessary fire protection).

Different test procedures are applied for evaluating fire resistance.

Fire resistance test procedure according to ISO 12922:

- Ignition properties of spray according to ISO 15029-1 (Spray flame persistence – hollow-cone nozzle method)
- Ignition properties of spray according to ISO 15029-2 (Stabilized flame heat release)
- Wick flame persistence of fluids according to ISO 14935 (average flame persistence)
- Determination of the flammability characteristics of fluids in contact with hot surfaces, ignition process according to ISO 20823 (ignition temperature, flame spread)

In general, fire-resistant hydraulic fluids are distinguished between **water-containing** fire-resistant and **water-free** fire-resistant hydraulic fluids. Water-containing fire-resistant hydraulic fluids are described in RE 90223.

Water-free, fire-resistant hydraulic fluid means hydraulic fluids with a water-proportion of 0.1% by volume ("Karl Fischer method", see chapter 6 "Glossary"), measured at the time of filling in the transport container.

In Europe water-free, fire-resistant hydraulic fluids are not approved for use in underground coal mining. The classification HFDU is no longer included in the VDMA 24317: 2005.

Note
In contrast to water-containing fluids, all water-free, fire-resistant hydraulic fluids have a flash point and a fire point. Specific parameters for flash point and fire point can be found in the technical and/or safety data sheet for the hydraulic fluid concerned.

Just as much care should be taken when working with fire-resistant hydraulic fluids are with other hydraulic fluids, e.g. mineral oils. A leak from the hydraulic system must be avoided. The best and most cost-effective protection against fire and explosion is to prevent leakage with meticulous service, maintenance and care of the hydraulic system.

1.3 Scope

This data sheet must be applied when using water-free, fire-resistant hydraulic fluids with Rexroth hydraulic components. The specifications of this data sheet may be further restricted by the specifications given in data sheets for the individual components concerned.

The use of the individual water-free, fire-resistant hydraulic fluids in accordance with the intended purpose can be found in the safety data sheets or other product description documents of the lubricant manufacturers. In addition, each use is to be individually considered.

Rexroth hydraulic components may only be operated with water-free, fire-resistant hydraulic fluids according to ISO 12922 if specified in the respective component data sheet or if a Rexroth approval for use is furnished.

The manufacturers of hydraulic systems must adjust their systems and operating instructions to the water-free, fire-resistant hydraulic fluids.

Bosch Rexroth will accept no liability for its components for any damage resulting from failure to comply with the notes below.

1.4 Safety instructions

Hydraulic fluids can constitute a risk for persons and the environment. These risks are described in the hydraulic fluid safety data sheets. The operator is to ensure that a current safety data sheet for the hydraulic fluid used is available and that the measures stipulated therein are complied with.

2 Solid particle contamination and cleanliness levels

Solid particle contamination is the major reason for faults occurring in hydraulic systems. It may lead to a number of effects in the hydraulic system. Firstly, single large solid particles may lead directly to a system malfunction, and secondly small particles cause continuous elevated wear.

For mineral oils, the cleanliness level of water-free, fire-resistant hydraulic fluids is given as a three-digit numerical code in accordance with ISO 4406. This numerical code denotes the number of particles present in a hydraulic fluid for a defined quantity. Moreover, foreign solid matter is not to exceed a mass of 50 mg/kg (gravimetric examination according to ISO 4405).

In general, compliance with a minimum cleanliness level of 20/18/15 in accordance with ISO 4406 or better is to be maintained in operation. Special servo valves demand improved cleanliness levels of at least 18/16/13. A reduction in cleanliness level by one level means half of the quantity of particles and thus greater cleanliness. Lower numbers in cleanliness levels should always be striven for and extend the service life of hydraulic components. The component with the highest cleanliness requirements determines the required cleanliness of the overall system. Please also observe the specifications in table 1: "Cleanliness levels according to ISO 4406" and in the respective data sheets of the various hydraulic components.

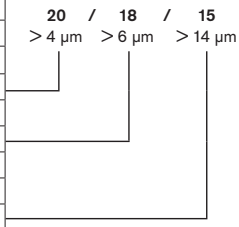
Hydraulic fluids frequently fail to meet these cleanliness requirements on delivery. Careful filtering is therefore required during operation and in particular, during filling in order to ensure the required cleanliness levels. Your lubricant manufacturer can tell you the cleanliness level of hydraulic fluids as delivered. To maintain the required cleanliness level over the operating period, you must use a reservoir breather filter. If the environment is humid, take appropriate measures, such as a breather filter with air drying or permanent off-line water separation.

Note: the specifications of the lubricant manufacturer relating to cleanliness levels are based on the time at which the container concerned is filled and not on the conditions during transport and storage.

Further information about contamination with solid matter and cleanliness levels can be found in brochure RE 08016.

Table 1: Cleanliness levels according to ISO 4406

Particles per 100 ml		Scale number
More than	Up to and including	
8,000,000	16,000,000	24
4,000,000	8,000,000	23
2,000,000	4,000,000	22
1,000,000	2,000,000	21
500,000	1,000,000	20
250,000	500,000	19
130,000	250,000	18
64000	130,000	17
32000	64000	16
16000	32000	15
8000	16000	14
4000	8000	13
2000	4000	12
1000	2000	11
500	1000	10
250	500	9
130	250	8
64	130	7
32	64	6



3 Selection of the hydraulic fluid

Water-free, fire-resistant hydraulic fluids for Bosch Rexroth hydraulic components are assessed on the basis of their fulfillment of the minimum requirements of ISO 12922.

3.1 Selection criteria for the hydraulic fluid

The specified limit values for all components employed in the hydraulic system, for example viscosity and cleanliness level, must be observed with the hydraulic fluid used, taking into account the specified operating conditions.

Hydraulic fluid suitability depends, amongst others, on the following factors:

3.1.1 Viscosity

Viscosity is a basic property of hydraulic fluids. The permissible viscosity range of complete systems needs to be determined taking account of the permissible viscosity of all components and it is to be observed for each individual component.

The viscosity at operating temperature determines the response characteristics of closed control loops, stability and damping of systems, the efficiency factor and the degree of wear.

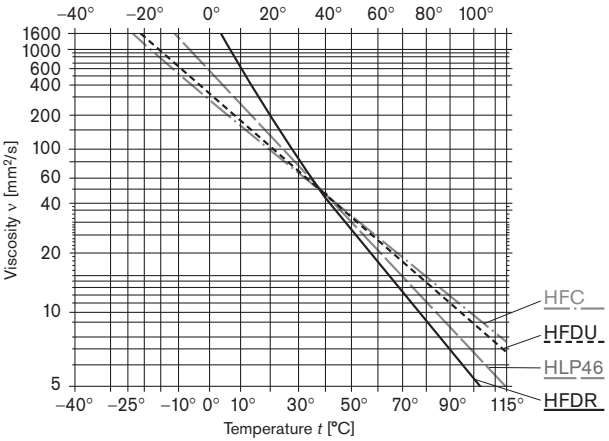
We recommend that the optimum operating viscosity range of each component be kept within the permissible temperature range. This usually requires either cooling or heating, or both. The permissible viscosity range and the necessary cleanliness level can be found in the product data sheet for the component concerned.

If the viscosity of a hydraulic fluid used is above the permitted operating viscosity, this will result in increased hydraulic-mechanical losses. In return, there will be lower internal leakage losses. If the pressure level is lower, lubrication gaps may not be filled up, which can lead to increased wear. For hydraulic pumps, the permitted suction pressure may not be reached, which may lead to cavitation damage.

If the viscosity of a hydraulic fluid is below the permitted operating viscosity, increased leakage, wear, susceptibility to contamination and a shorter component life cycle will result.

Please ensure that the permissible temperature and viscosity limits are observed for the respective components. This usually requires either cooling or heating, or both.

Fig. 1: Examples V-T diagrams for water-free, fire-resistant hydraulic fluids in comparison to HLP and HFC (reference values, double-logarithmic representation)



Typical viscosity data [mm²/s] at temperature	0 °C	40 °C	100 °C
HFDR	2500	43	5,3
HFDU (ester base)	330	46	9,2
HFDU (glycol base)	350	46	8,7
For comparison HLP (see RE 90220)	610	46	7
For comparison HFC (see RE 90223)	280	46	

Detailed V-T diagrams may be obtained from your lubricant manufacturer for their specific products. Descriptions of the individual classifications can be found in chapter 3.2 and in Table 4.

3.1.2 Viscosity-temperature behavior

For hydraulic fluids, the viscosity temperature behavior (V-T behavior) is of particular importance. Viscosity is characterized in that it drops when the temperature increases and rises when the temperature drops. The interrelation between viscosity and temperature is described by the viscosity index (VI).

For cold testing over a period of several days, the viscosity of ester-based HFDU can increase greatly. After heating, the characteristic values as specified on the data sheet are restored. Please ask your lubricant manufacturer for the "Flow capacity after seven days at low temperature" (ASTM D 2532) for the fluid classification ester-based HFDU .

HFDU fluid based on ester and glycol have better viscosity/temperature characteristics than mineral oil HLP (see Fig. 1). This should be taken into consideration when selecting hydraulic fluid for the required temperature range. The viscosity and temperature limits required in the product data sheets are to be observed in all operating conditions.

Note
For ambient temperatures below 0 °C, fire-resistant, **water-containing** hydraulic fluids of classification HFC are to be preferred because they observe the component-related viscosity ranges and because the have better pour points (see RE 90223).

3.1.3 Wear protection capability

Wear protection capability describes the property of hydraulic fluids to prevent or minimize wear within the components. The wear protection capability is described in ISO 12922 via test procedures"FZG gear test rig" (ISO 14635-1) and "Mechanical test in the vane pump" (ISO 20763). The wear protection capability of water-free, fire-resistant hydraulic fluids in relation to the two test procedures is comparable to that of mineral oil HLP/HVLP.

3.1.4 Material compatibility

The hydraulic fluid must not negatively affect the materials used in the components. Compatibility with coatings, seals, hoses, metals and plastics is to be observed in particular. The fluid classifications specified in the respective component data sheets are tested by the manufacturer with regard to material compatibility. Parts and components not supplied by us are to be checked by the user.

Table 2: Known material incompatibilities

Classification	Incompatible with:
HFD in general	Seals, plastics and coatings of control cabinets, outer coatings of hydraulic components and accessory components (connectors, wiring harnesses, control cabinets) are to be tested for stability. **Note:** hydraulic fluid vapors can also lead to incompatibility!
HFDR	Individual component color coating, lead, galvanic zinc-plating, in part non-ferrous metals with zinc, tin and aluminum in a tribological system. Sealing elements made of NBR. In some cases, the latter show major increases in volume when impermissibly aged hydraulic fluids come into contact with the material. Do not use any hydrolysis/susceptible polyurethane qualities.
HFDU based on ester	Single-component color coatings, lead, galvanized zinc coatings, in part non-ferrous metals with zinc, tin, seals made of NBR. In some cases, the latter show major increases in volume when impermissibly aged hydraulic fluids come into contact with the material. Do not use any hydrolysis/susceptible polyurethane qualities.
HFDU based on glycol	Single-component color coatings, steel/aluminum tribocontacts, paper filters, polymethylmethacrylate (PMMA). The compatibility of NBR is to be examined for individual case.

The material incompatibilities mentioned here do not automatically result in function problems. However the elements of the materials are found in the hydraulic fluids after use. The material incompatibilities described here may lead to accelerated aging of the hydraulic fluid and to reduced fire resistance.

3.1.5 Aging resistance

The way a water-free, fire-resistant hydraulic fluid ages depends on the thermal, chemical and mechanical stress to which it is subjected. The influence of water, air, temperature and contamination may be significantly greater than for mineral oils HLP/HVLP. Aging resistance can be greatly influenced by the chemical composition of the hydraulic fluids.

High fluid temperatures (e.g. over 80 °C) result in a approximate halving of the fluid service life for every 10 °C temperature increase and should therefore by avoided. The halving of the fluid service life results from the application of the Arrhenius equation (see Glossary).

Table 3: Reference values for temperature-dependent aging of the hydraulic fluid

Reservoir temperature	Fluid life cycle
80 °C	100 %
90 °C	50 %
100 °C	25 %

A modified aging test (ISO 4263-3 or ASTM D943 – without the addition of water) is specified for fluid classification HFDU. Fluid classification HFDR is described with a special procedure with respect to oxidation stability (EN 14832) and oxidation service life (ISO 4263-3). The calculated fluid service life is derived from the results of tests in which the long-term characteristics are simulated in a short period of time by applying more arduous conditions (condensed testing). This calculated fluid service life is not to be equated to the fluid service life in real-life applications.

Table 3 is a practical indicator for hydraulic fluids with water content < 0.1%, cf. chapter 4.10. "Water".

3.1.6 Environmentally acceptable

HFDU fluids based on ester and glycol are hydraulic fluids which may also be classified as environmentally acceptable. The main criteria for fire-resistant, water-free hydraulic fluids are the leak-free, technically problem-free use and the necessary fire resistance. Environmentally acceptable is merely a supplementary criterion. Notes on environmentally compatible hydraulic fluids can be found in RE 90221.

3.1.7 Air separation ability (ASA)

The air separation ability (ASA) describes the property of a hydraulic fluid to separate undissolved air. Hydraulic fluids always contain dissolved air. During operation, dissolved air may be transformed into undissolved air, leading to cavitation damages. Fluid classification, fluid product, reservoir size and design must be coordinated to take into account the dwell time and ASA value of the hydraulic fluid. The air separation capacity depends on the viscosity, temperature, basic fluid and aging. It cannot be improved by additives.

According to ISO 12922 for instance, an ASA value ≤ 15 minutes is required for viscosity class ISO VG 46, practical values on delivery are < 10 minutes, lower values are preferable.

3.1.8 Demulsifying ability and water solubility

The capacity of a hydraulic fluid to separate water at a defined temperature is known as the demulsifying ability. ISO 6614 defines the demulsifying properties of hydraulic fluids.

The fluid classifications HFDU based on ester and HFDR separate water, but HFD hydraulic fluids have a different water separation ability to mineral oil HLP/HVLP. At 20 °C, in comparison to mineral oil HLP/HVLP, a multiple (> factor 3) of water can separate in the hydraulic fluid. Water solubility is also more temperature-dependent than for mineral oils. The fluid classification HFDU based on glycol usually dissolves water completely, see chapter "4.10 Water".

3.1.9 Filterability

Filterability describes the ability of a hydraulic fluid to pass through a filter, removing solid contaminants. The hydraulic fluids used require a good filterability, not just when new, but also during the whole of their service life. This can differ greatly depending on the different basic fluids (glycols, esters) and additives (VI enhancers, anti-fogging additives).

The filterability is a basic prerequisite for cleanliness, servicing and filtration of hydraulic fluids. Rexroth therefore requires the same degree of filterability of water-free, fire-resistant hydraulic fluids as for mineral oils HLP/HVLP to DIN 51524.
As ISO 12922 does not comment on the filterability of hydraulic fluids, filterability comparable to that of mineral oils HLP/HVLP must be requested of lubricant manufacturers.

Filterability is tested with the new hydraulic fluid and after the addition of 0.2 % water. The underlying standard (ISO 13357-1/-2) stipulates that filterability must have no negative effects on the filters or the hydraulic fluid, see chapter 4 "Hydraulic fluids in operation".

3.1.10 Corrosion protection

Hydraulic fluids should not just prevent corrosion formation on steel components, they must also be compatible with non-ferrous metals and alloys. Corrosion protection tests on different metals and metal alloys are described in ISO 12922.

Rexroth components are usually tested with HLP hydraulic fluids or corrosion protection oils based on mineral oils before they are delivered.

3.1.11 Additivation

The properties described above can be modified with the help of suitable additives.
Bosch Rexroth does not prescribe any specific additive system.

3.2 Classification and fields of application

Table 4: Classification and fields of application

Classification	Features	Typical field of application	Notes
HFDU (glycol-based) according to ISO 12922 Density at 15 °C: typically > 0.97 kg/dm³ VI: typical > 170 The classification "HFDU" is no longer listed in the current standard sheet VDMA 24317.	Base fluid: Glycols	Mobile systems with high thermal loading	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. – Very good viscosity/temperature characteristics, shear stability – Resistant to aging – Can be water-soluble – Can be mixed with water – Very good wear protection properties – A higher implementation temperature with the same viscosity in comparison to mineral oil is to be expected – Due to the higher density in comparison to HLP, lower suction pressures are to be anticipated for pumps. Reduce the maximum speed as required and optimize suction conditions. – Prior to commissioning, contact the lubricant manufacturer, as the components are tested with mineral oil HLP/corrosion protection oil. – Incompatible with mineral oil (exceptions must be confirmed by the lubricant manufacturer).
HFDU (ester-based) according to ISO 12922 Density at 15 °C: typically 0.90-0.93 kg/dm³ VI: typical > 160 Iodine count < 90 The classification "HFDU" is no longer listed in the current standard sheet VDMA 24317.	Base fluid: Ester based on regenerative raw materials, synthetic ester and mixtures of different esters Because of the fire resistance, HFDU hydraulic fluids based on ester are usually partially saturated esters	Suitable for most fields of application and components.	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. – Preferred use of FKM seals. Please enquire about shaft seal rings and implementation temperatures under –15 °C. – Note shear stability (see chapter 4.11 "Fluid servicing, fluid analysis and filtration" and chapter 6 "Glossary") – Fire resistance is not stable over time – In operation, a higher temperature in comparison to mineral oil HLP/HVLP is to be expected given identical design and viscosity. Please check ATEX approvals for hydraulic components. – Limit the lower (see chapter 3.1.2) and upper implementation temperatures (see chapter 3.1.5) – Good viscosity-temperature behavior – Usually classified as insignificantly water-endangering (water hazard class WGK 1) – High dirt dissolving capacity on fluid changeovers – In unfavorable operating conditions (high water content, high temperature), HFDU on ester basis have a tendency to hydrolysis. The acidic organic decomposition products can chemically attack materials and components.

Classification	Features	Typical field of application	Notes
HFDR according to ISO 12922 Density at 15 °C: typically 1.1 kg/dm³ VI : typical 140–160	Base fluid: phosphoric acid ester	Turbine control systems	For information on approved components, please refer to the respective product data sheet. For components which have not been approved according to the product data sheet, please consult your Bosch Rexroth sales partner. – Classified as hazardous materials (for transportation and storage) – Hazardous working material – Water-endangering (Water hazard class 2 – WGK2) – Develops toxic vapors in case of fire – Preferred use of FKM, and possibly PTFE seals. Please enquire for shaft seal rings and implementation temperatures under –15 °C. – In operation, a higher temperature in comparison to mineral oil HLP/HVLP is to be expected given identical design and viscosity – Phosphoric acid esters display a tendency to hydrolysis when they come into contact with moisture. Under the influence of water/moisture, they become unstable or form highly aggressive, acidic components which could damage the hydraulic fluid and component beyond repair. – Poor viscosity/temperature characteristics – Due to the higher density in comparison to HLP, lower suction pressures are to be anticipated for pumps. Reduce the maximum speed as required and optimize suction conditions. – In unfavorable operating conditions (high water content, high temperature), HFDR have a tendency to hydrolysis. The acidic inorganic decomposition products chemically attack materials and components.
HFDU (continued)	Based on triglycerides, mineral oils or related hydrocarbons	Not recommended for Rexroth components!	Hydraulic fluids based on polyalphaolefines are not recommended on account of their poor fire resistance. This classification can usually be identified from: density < 0.89; VI < 140 to 160 Hydraulic fluids based on triglycerides are not recommended on account of their aging resistance. This classification can usually be identified from: density > 0.92; VI > 190; iodine count > 90 Consult your lubricant manufacturer or your Bosch Rexroth sales partner if the classification of a hydraulic fluid is not clear.
HFDS HFDT	Based on halogenated hydrocarbons or mixtures with halogenated hydrocarbons	Not approved for Rexroth components!	HFDS and HFDT have not been permitted to be manufactured or used since 1989 for environmental reasons.

4 Hydraulic fluids in operation

4.1 General

The properties of hydraulic fluids can change continually during storage and operation.

Please note that the fluid standard ISO 12922 merely describes minimum requirements for hydraulic fluids in new condition at the time of filling into the bins. The operator of a hydraulic system must ensure that the hydraulic fluid remains in a utilizable condition throughout its entire period of use.

Deviations from the characteristic values are to be clarified with the lubricant manufacturer, the test labs or Bosch Rexroth.

Bosch Rexroth will accept no liability for damage to its components within the framework of the applicable liability legislation insofar as the latter is due to non-observance of the following instructions.

Please note the following aspects in operation.

4.2 Storage and handling

Hydraulic fluids must be stored correctly in accordance with the instructions of the lubricant manufacturer. Avoid exposing the containers to lengthy periods of direct heat. Containers are to be stored in such a way that the risk of any foreign liquid or solid matter (e.g. water, foreign fluids or dust) ingression into the inside of the container can be ruled out. After taking hydraulic fluids from the containers, these are immediately to be properly resealed.

Recommendation:

– Store containers in a dry, roofed place

– Store barrels on their sides

– Clean reservoir systems and machine reservoirs regularly

4.3 Filling of new systems

Usually, the cleanliness levels of the hydraulic fluids as delivered do not meet the requirements of our components. Hydraulic fluids must be filtered using an appropriate filter system to minimize solid particle contamination and water in the system.

As early as possible during test operation, new systems should be filled with the selected hydraulic fluid so as to reduce the risk of accidentally mixing fluids (see chapter 4.5 "Mixing and compatibility of different hydraulic fluids"). Changing the hydraulic medium at a later point represents significant additional costs (see following chapter).

4.4 Hydraulic fluid changeover

Problems may be encountered in particular when changing over from water-containing, fire-resistant hydraulic fluid or mineral oils to water-free, fire-resistant hydraulic fluids (e.g. incompatibilities in the form of gelling, silting, stable foam, reduced filterability or filter blockage). This may also happen when changing products within the same classification.

In the case of changeovers of the fluid in hydraulic systems, it is important to ensure compatibility of the new hydraulic fluid with the remains of the previous hydraulic fluid. Bosch Rexroth recommends obtaining verification of compatibility from the manufacturer or supplier of the new hydraulic fluid. The quantity of old fluid remaining should be minimized. Mixing hydraulic fluids should be avoided, see following chapter.

Information about changing to a hydraulic fluid of a different classification can be found, for example, in VDMA 24314 and in ISO 7745. In addition, the information given in chapter 3.1.4 "Material compatibility" is also to be observed.

Bosch Rexroth will not accept liability for any damage to its components resulting from inadequate hydraulic fluid changeovers!

4.5 Mixing and compatibility of different hydraulic fluids

If hydraulic fluids from different manufacturers or different types from the same manufacturer are mixed, gelling, silting and deposits may occur. These, in turn, may cause foaming, impaired air separation ability, malfunctions and damage to the hydraulic system.

If the fluid contains more than 2 % of another fluid then it is considered to be a mixture. Exceptions apply for water, see chapter 4.10 "Water".

Mixing with other hydraulic fluids is not generally permitted. This includes hydraulic fluids with the same classification. If individual lubricant manufacturers advertise miscibility and/or compatibility, this is entirely the responsibility of the lubricant manufacturer.

Bosch Rexroth customarily tests all components with mineral oil HLP before they are delivered.

Note: With connectible accessory units and mobile filtering systems, there is a considerable risk of non-permitted mixing of the hydraulic fluids!

Rexroth will not accept liability for any damage to its components resulting from mixing hydraulic fluids!

4.6 Re-additivation

Additives added at a later point in time such as colors, wear reducers, VI enhancers or anti-foam additives, may negatively affect the performance properties of the hydraulic fluid and the compatibility with our components and therefore are not permissible.

Rexroth will not accept liability for any damage to its components resulting from re-additivation!

4.7 Foaming behavior

Foam is created by rising air bubbles at the surface of hydraulic fluids in the reservoir. Foam that develops should collapse as quickly as possible.

Common hydraulic fluids in accordance with ISO 12922 are sufficiently inhibited against foam formation in new condition. On account of aging and adsorption onto surfaces, the defoamer concentration may decrease over time, leading to a stable foam.

Defoamers may be re-dosed only after consultation with the lubricant manufacturer and with his written approval.

Defoamers may affect the air separation ability.

4.8 Corrosion

The hydraulic fluid is to guarantee sufficient corrosion protection of components under all operating conditions, even in the event of impermissible water contamination.

Water-free, fire-resistant hydraulic fluids are tested for corrosion protection in the same way as mineral oil HLP/HVLP. When used in practice other corrosion mechanisms are revealed in detail and in individual cases, for the most part in contact with non-ferrous and white alloys.

4.9 Air

Under atmospheric conditions the hydraulic fluid contains dissolved air. In the negative pressure range, for instance in the suction pipe of the pump or downstream of control edges, this dissolved air may transform into undissolved air. The undissolved air content represents a risk of cavitation and of the diesel effect. This results in material erosion of components and increased hydraulic fluid aging.

With the correct measures, such as suction pipe and reservoir design, and an appropriate hydraulic fluid, air intake and separation can be positively influenced.

See also chapter 3.1.7 "Air separation ability (ASA)".

4.10 Water

Water contamination in hydraulic fluids can result from direct ingress or indirectly through condensation of water from the air due to temperature variations.

HFDU hydraulic fluids on glycol basis are water-soluble or can be mixed with water. This means that any water that has ingressed into the system cannot be drained off in the sump of the reservoir.

In the case of HDFU hydraulic fluids on ester basis, undissolved water can be drained off from the reservoir sump, the remaining water content is however too high to ensure that the maximum permissible water limit values are observed in the long term.

With the fluid classification HFDR, the greater density of the ester means that the any water that has ingressed will be on the surface of the hydraulic fluid. This means that any water that has ingressed into the system cannot be drained off in the sump of the reservoir.

Water in the hydraulic fluid can result in wear or direct failure of hydraulic components. Furthermore, a high water content in the hydraulic fluid negatively affects aging and filterability and increases susceptibility to cavitation. During operation, the water content in all hydraulic fluids, determined according to the "Karl Fischer method" (see chapter 6 "Glossary") for all water-free, fire-resistant hydraulic fluids must constantly be kept below 0.1% (1000 ppm). To ensure a long service life of both hydraulic fluids and components, Bosch Rexroth recommends that values below 0.05% (500 ppm) are permanently maintained.

Due to the higher water solubility in comparison to mineral oil HLP/HVLP it is urgently advised that precautions be taken when using water-free, fire-resistant hydraulic fluids, such as a dehumidifier on the reservoir ventilation.

Water content has an affect particularly in the case of HEDU hydraulic fluid on ester basis and HFDR in that it accelerates aging (hydrolysis) of the hydraulic fluid and biological degradation, see chapter 4.11 "Fluid servicing, fluid analysis and filtration".

4.11 Fluid servicing, fluid analysis and filtration

Air, water, operating temperature influences and solid matter contamination will change the performance characteristics of hydraulic fluids and cause them to age.

To preserve the usage properties and ensure a long service life for hydraulic fluid and components, the monitoring of the fluid condition and a filtration adapted to the application requirements (draining and degassing if required) are indispensable.

The effort is higher in the case of unfavorable usage conditions, increased stress for the hydraulic system or high expectations as to availability and service life, see chapter 2 "Solid particle contamination and cleanliness levels".

When commissioning a system, please note that the required minimum cleanliness level can frequently be attained only by flushing the system. Due to severe start-up contamination, it may be possible that a fluid and/or filter replacement becomes necessary after a short operating period (< 50 operating hours).

The hydraulic fluid must be replaced at regular intervals and tested by the lubricant manufacturer or recognized accredited test labs. **We recommend a reference analysis after commissioning.**

The minimum data to be tested for analyses are:

- Viscosity at 40 °C and 100 °C
- Neutralization number NN (acid number AN)
- Water content (Karl-Fischer method)
- Particle measurement with evaluation according to ISO 4406 or mass of solid foreign substances with evaluation to EN 12662
- Element analysis (RFA (EDX) / ICP, specify test method)
- Comparison with new product or available trend analyses
- Assessment / evaluation for further use
- Also recommended: IR spectrum

No differences are needed in the maintenance and care of water-free, fire-resistant hydraulic fluids with the appropriate suitability parameters compared to HLP/HVLP mineral oils. Attention is however drawn to the note in chapter 1.3.

After changing over hydraulic fluids it is recommended that the filters be replaced again after 50 operating hours as fluid aging products may have detached themselves ("self-cleaning effect").

Compared to the pure unused hydraulic fluid the changed neutralization number NN (acid number AN) indicates how many aging products are contained in the hydraulic fluid. This difference must be kept as small as possible. The lubricant manufacturer should be contacted as soon as the trend analysis notes a significant increase in values.

A higher viscosity than that of new materials indicates that the hydraulic fluid has aged. Evaluation by the test lab or lubricant manufacturers is however authoritative, whose recommendation should be urgently observed.

On systems where the possibility of water contamination cannot be completely ruled out (also condensation), it should be ensured via the hydraulic system circuit that fluid aging products are not accumulating in individual areas of the hydraulic system, but are being removed from the system in a controlled manner via the filtration system. This should be ensured via suitable hydraulic circuits (e.g. flushing circuit) or system manufacturer's operating instructions/specifications.

In case of warranty, liability or guarantee claims to Bosch Rexroth, service verification and/or the results of fluid analyses are to be provided.

5 Disposal and environmental protection

All water-free, fire-resistant hydraulic fluids, are, like mineral oil-based hydraulic fluids, subject to special disposal obligations.

The respective lubricant manufacturers provide specifications on environmentally acceptable handling and storage. Please ensure that spilt or splashed fluids are absorbed with appropriate adsorbents or by a technique that prevents it contaminating water courses, the ground or sewerage systems.

It is also not permitted to mix fluids when disposing of hydraulic fluids. Regulations governing the handing of used oils stipulate that used oils are not to mixed with other products, e.g. substances containing halogen. Non-compliance will increase disposal costs. Comply with the national legal provisions concerning the disposal of the corresponding hydraulic fluid. Comply with the local safety data sheet of the lubricant manufacturer for the country concerned.

6 Glossary

Additivation
Additives are chemical substances added to the basic fluids to achieve or improve specific properties.

Aging
Hydraulic fluids age due to oxidation (see chapter 3.1.5 "Aging resistance"). Liquid and solid contamination acts as a catalyzer for aging, meaning that it needs to be minimized as far as possible by careful filtration. Please refer to Hydrolysis.

Arrhenius equation
The quantitative relation between reaction rate and temperature is described by an exponential function, the Arrhenius equation. This function is usually visualized within the typical temperature range of the hydraulic system. For a practical example, see chapter 3.1.5 "Aging resistance".

Basic fluids
In general, a hydraulic fluid is made up of a basic fluid, or base oil, and chemical substances, the so-called additives. The proportion of basic fluid is generally greater than 90%.

Diesel effect

If hydraulic fluid that contains air bubbles is compressed quickly, the bubbles are heated to such a degree that a self-ignition of the air-gas mix may occur. The resultant temperature increase may lead to seal damage and increased aging of the hydraulic fluid.

Partially saturated esters
In contrast to saturated esters, partially saturated esters have double/multiple bonds between C atoms. Rexroth defines partially saturated esters as unsaturated bonds and mixtures of esters with unsaturated and saturated bonds. Esters with unsaturated bonds are produced on the basis of renewable raw materials.

Depending on their number and position, these unsaturated bonds between the C atoms are instable. These bonds can detach themselves and form new bonds, thus changing the properties of those liquids (an aging mechanism). Attention is however drawn to the note in chapter 1.3.

Hydrolysis
Hydrolysis is the splitting of a chemical bond through the reaction with water under the influence of temperature.

ICP (atomic emission spectroscopy)
The ICP procedure can be used to determine various wear metals, contamination types and additives. Practically all elements in the periodic system can be detected with this method.

Iodine count
The iodine count is a yardstick for the quantity of single and multiple unsaturated bonds between C atoms in the basic fluid. A low iodine count indicates that the hydraulic fluid contains few unsaturated bonds and is thus considerably more resistant to aging than a hydraulic fluid with a high iodine count. A statement about the position at which these multiple bonds are located and about how "stable" they are against influencing factors cannot be derived simply by stating the iodine count.

Karl Fischer method
Method to determine the water content in fluids. Indirect coulometric determination procedure in accordance with DIN EN ISO 12937 in connection with DIN 51777-2. Only the combination of both standards will assure adequately accurate measured values. For hydraulic fluids based on glycol, DIN EN ISO 12937 is to be applied in conjunction with DIN 51777-1.

Cavitation
Cavitation is the creation of cavities in fluids due to pressure reduction below the saturated vapour pressure and subsequent implosion when the pressure increases. When the cavities implode, extremely high acceleration, temperatures and pressure may occur temporarily, which may damage the component surfaces.

Neutralization number (NN)
The neutralization number (NN) or acid number (AN) specifies the amount of caustic potash required to neutralize the acid contained in one gram of fluid.

Pour point
The lowest temperature at which the fluid still just flows when cooled down under set conditions. The pour point is specified in the lubricant manufacturers' technical data sheets as a reference value for achieving this flow limit.

RFA (wavelength dispersive x-ray fluorescence analysis)
Is a procedure to determine nearly all elements in liquid and solid samples with nearly any composition. This analysis method is suitable for examining additives and contamination, delivering fast results.

Shearing/shear loss
Shearing of molecule chains during operation can change the viscosity of hydraulic fluids with long chain VI enhancers and anti-fogging additives. The initially high viscosity index drops. This needs to be taken into account when selecting the hydraulic fluid.

The only value at present that can be used to assess viscosity changes in operation is the result of the test in accordance with DIN 51350 part -6. Please note that there are practical applications that create a much higher shear load on such hydraulic fluids than can be achieved by this test.

Viscosity
Viscosity is the measure of the internal friction of a fluid to flow. It is defined as the property of a substance to flow under tension. Viscosity is the most important characteristic for describing the load-bearing capacity of a hydraulic fluid.

Kinematic viscosity is the ratio of the dynamic viscosity and the density of the fluid; the unit is mm^2/s. Hydraulic fluids are classified by their kinematic viscosity into ISO viscosity classes. The reference temperature for this is 40 °C.

Viscosity index (VI)
Refers to the viscosity temperature behavior of a fluid. The lower the change of viscosity in relation the temperature, the higher the VI.

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Filters

Oil is the central component of every hydraulic system. The most common causes for the failure of a system is oil contamination.
Rexroth filter and cleaning systems for hydraulic oil and lubricating oil applications ensure ideal operating conditions throughout the entire life cycle.
With a broad range of completely new and revised filter systems, we have the right solution for all pressure ranges and applications for you. Our filter media reliably remove particles from all hydraulic fluids and thus protect your system against damage. In addition, our filters reliably remove free water from the medium and thus prevent corrosion. However, Rexroth offers more than just the standard: Specific process filters will meet the requirements of your individual applications as well.

We have prepared our modern filter systems for the current and future requirements of condition-dependent maintenance strategies. Sensors that have been integrated into our filter assemblies continuously measure contamination and indicate necessary filter changes well in advance (even applying several indication levels) – either visually at the filter or via a message on the operator‘s device of the control system. This reduces maintenance costs while at the same time ensuring optimum working conditions for your system.

Breather filters

Designation	Type	Size	q_{max} in l/min	Data sheet	Page
Breather filter	FEF, BFS	0, 1, 7, 20	400	51413	63
Breather filter	BF, BS, BE, B	45/21, 90, 130	1800	51414	69
Breather filter	TLF	1 ... 250	80000	51415	75
Silica gel air filter	BFSK	45/21, 60/21, 90, 130	2000	51456	85

EPE®

Rexroth
Bosch Group

Breather filter

RE 51413/02.09 1/6
Replaces: 08.08

Types FEF 0, FEF 1; BFS 7..., BFS 20...


H7625

Nominal size: 0 and 1; 7 and 20
Connections up to DN 55
Operating temperature –20 °C to +100 °C

Table of contents

Application

- Filtration and dehumidification of the intake air of industrial systems.
- Avoidance of initial damage in pumps and bearings and system components.

Design

FEF 0, FEF 1:
Combination of flange-on filling filter (screen basket 500 µm) and cap removable via bayonet lock as breather with internal filter element 40 µm. The filter element must be exchanged together with the cap. The breather cap is secured against loss by means of a chain.
Materials as per spare parts list.

BFS 7…, BFS 20…:
Compact housing for ventilation with pleated filter element of paper.
Materials as per spare parts list.

Maintenance intervals

Fields of application of the filter	Environmental conditions average dust content	Maintenance interval
General mechanical engineering	9…25 mg/m^3	4,000 h
Heavy industry	50…80 mg/m^3	3,000 h
Mobile hydraulics	30…100 mg/m^3	3,000 h

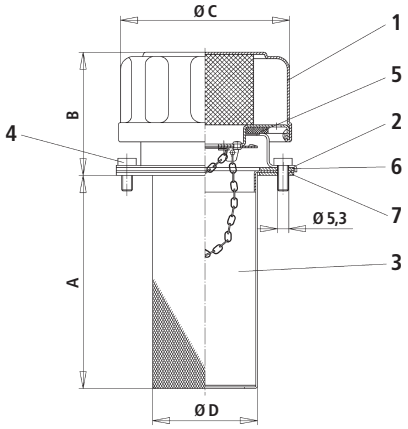
Spare parts list

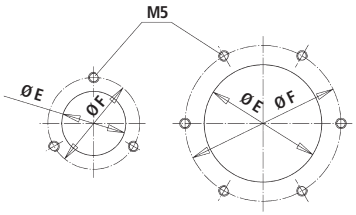
Size				FEF 1	FEF 0
Part	**Piece**	**Description**	**Material**		
1	1	Cover	various	Indicate the ordering information "Filter"	—
2	1	Flange	Steel		
3	1	Filling screen	Steel	Part No. 5379	
4	6	Socket head cap screw	5	Part No. 5770	
5	1	Seal	NBR	Indicate the ordering information "Filter"	
6	1	Seal	Fiber		
7	1	Seal	Fiber		

All part nos. BRFS.specific.

Size				BFS 7	BFS 20
Part	**Piece**	**Description**	**Material**		
10	1	Seal	Fiber	Indicate the ordering information "Filter"	

Unit dimensions FEF 0 and FEF 1 (dimensions in mm)





Hole pattern FEF 0 Hole pattern FEF 1

lockable upon request

	FEF 0	FEF 1
A	64	98
B	38	58
Ø C	48	81
Ø D	27	49
Ø E	30	55
Ø F	41	73

Ordering details FEF 0 and FEF 1

FEF		–	F	0	0

Design
Filling and breather filter **= FEF**

Nom. size
= 0
= 1

Filtration rating in µm
nominal
Paper, non-cleanable
P10, P25 **= P...**
absolute (ISO 16889)
Micro glass, non-cleanable
H10XL **= H10XL**

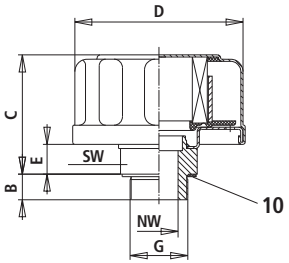
Seal
F = Fiber (series)

Material
0 = Standard

Complementary details
0 = without

Ordering example:
FEF 0 P10-F00

Unit dimensions BFS 7… and BFS 20… (dimensions in mm)



	BFS 7	BFS 20
Weight in kg	0.03	0.3
B	11	12
C	41	56
D	Ø 46	Ø 81
E	6	14
G	G1/4	G3/4
SW	17	32
NW	Ø 7	Ø 18

Ordering details BFS 7… and BFS 20…

BFS		–	F	0	0

Design
Breather filter with filter element **= BFS**

Nom. size
= 7
= 20

Filtration rating in µm
nominal
Paper, non-cleanable
P5, P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H10XL **= H10XL**

F = **Seal**
Fiber (series)

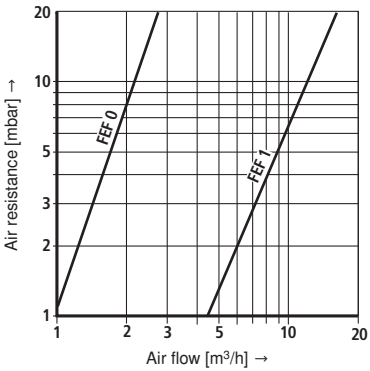
0 = **Material**
Standard

0 = **Complementary details**
without

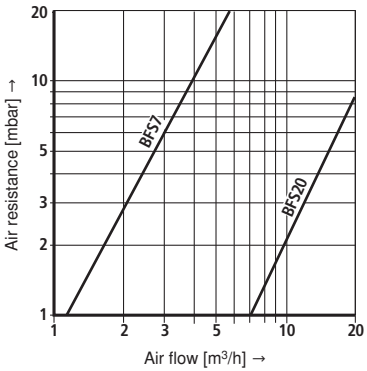
Ordering example:
BFS 7 P10-F00

Characteristic curves (measured at test temperature = 20 °C, filter material P10)

FEF 0, FEF 1



BFS7, BFS20



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Notes

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EPE®

Rexroth
Bosch Group

Breather filter

RE 51414/02.09 1/6
Replaces: 08.08

Types BF 7 SL...; BS 7 SL...; BE 7 SL...; B 7 SL

Nominal size: BF 7 SL 45/21, 90, 130;
BS 7 SL 45/21, 90, 130;
BE 7 SL 45/21;
B 7 SL 45/21
Connections up to DN 32
Operating temperature –20 °C to +100 °C

Table of contents

Application

- Filtration and dehumidification of the intake air of industrial systems.
- Avoidance of initial damage in pumps and bearings and system components.

Design

BF 7 SL…, BS 7 SL…:
Breather filter with screw-off exchange filter cartridge and internal pleated filter element of filter paper P or micro glass H10XL.

Design with flange connection (BF 7 SL...)
and/or welding socket (BS 7 SL...).

B 7 SL…, BE 7 SL…:
Breather filter with screw-off exchange filter cartridge and internal pleated filter element of filter paper P or micro glass H10XL.

Connection possibility for a clogging indicator (B 7 SL) and/or attachment of a filling filter (screen basket 500 µm). Materials as per spare parts list.

Maintenance intervals

Fields of application of the filter	Environmental conditions average dust content	Maintenance interval
General mechanical engineering	9…25 mg/m^3	4,000 h
Heavy industry	50…80 mg/m^3	3,000 h
Mobile hydraulics	30…100 mg/m^3	3,000 h

Spare parts list

Size				BF 7 SL 45/21	BF 7 SL 90 and 130, BS 7 SL 45/21, BS 7 SL 90 and 130, B 7 SL 45/21	BE 7 SL 45/21
Part	**Piece**	**Description**	**Material**			
1	1	Filter cartridge	various	Please indicate ordering information “Filter Cartridge”		
2	1	Seal ring	Fiber	Please indicate ordering information “Filter”		
3	1	Seal	Klingersil C4400	–	Please indicate the ordering information "Filter"	–
	2				–	Please indicate the ordering information "Filter"
	1		NBR	Please indicate the ordering information "Filter"	–	–
4	1	Filling screen	Steel	–		Part No. 5379
5	1	Seal	Cu			Please indicate the ordering information "Filter"
6	1	Countersunk screw	4.8			Part No. 4285

All part numbers BRFS specific.

Ordering details of the filter

		–S	–0	0	0–00	M	0	0

Design
Breather with flange **= BF 7 SL**
Breather with welding socket **= BS 7 SL**
Breather with filler **= BE 7 SL**
Breather without filler **= B 7 SL**

Nom. size
BF 7 SL **= 45/21 90 130**
BS 7 SL **= 45/21 90 130**
BE 7 SL **= 45/21**
B 7 SL **= 45/21**

Filtration rating in µm
nominal
Paper, non-cleanable
P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H10XL **= H10XL**

Pressure differential
Max. admissible pressure differential of the filter element
Standard **= S**

Element model
Standard adhesive T = 100 °C **= 0…**
Standard material **= …0**

Complementary details
0 = without

Material
0 = Standard

Seal
M = NBR seal

Connection
00 = Standard
Connection in B 7 SL welding socket

Clogging indicator
0 = without

Bypass valve
0 = without

Solenoid
0 = without

Ordering example:
BF 7 SL 90 P10-S00-000-00M00

Ordering details of the filter cartridge

80.		–S	–0	–M

Filter cartridge
Design **= 80.**

Nom. size
BF 7 SL **= 45/21 90 130**
BS 7 SL **= 45/21 90 130**
BE 7 SL **= 45/21**
B 7 SL **= 45/21**

Filtration rating in µm
nominal
Paper, non-cleanable
P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H10XL **= H10XL**

Seal
M = NBR seal

Bypass valve
0 = without

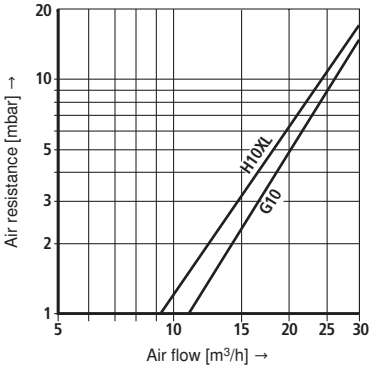
Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material

Pressure differential
Max. admissible pressure differential of the filter element
S = Standard

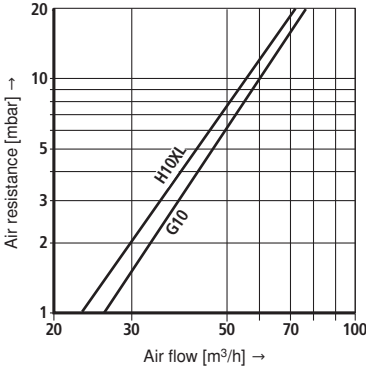
Ordering example:
80. 90 P10-S00-0-M

Characteristic curves (measured at test temperature = 20 °C)

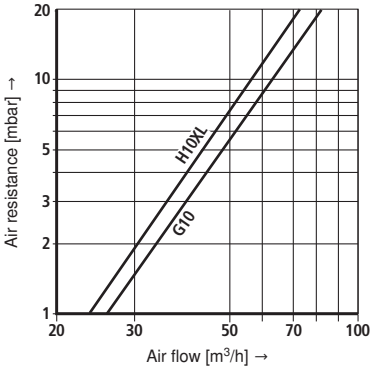
BF, BS 7 SL 45/21



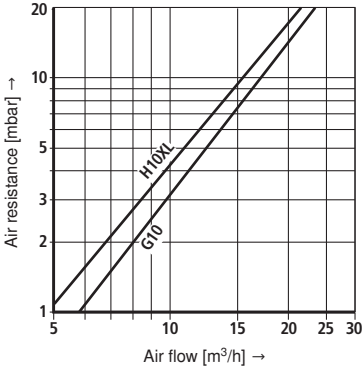
BF, BS 7 SL 90



BF, BS 7 SL 130

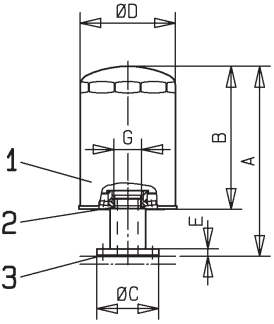


BF, B 7 SL 45/21

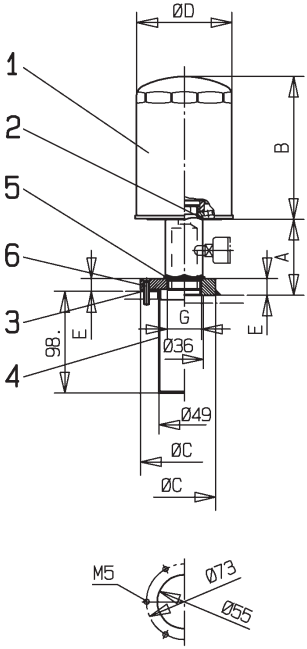


Unit dimensions (dimensions in mm)

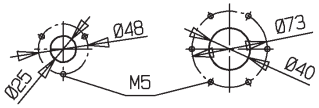
BF 7 SL 45/21
BF 7 SL 90
BF 7 SL 130



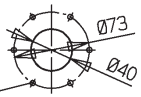
BE 7 SL 45/21
B 7 SL 45/21



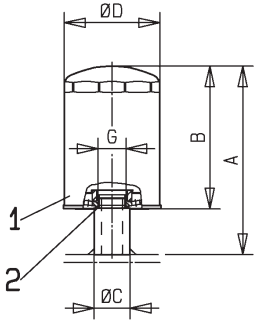
BF 7 SL 45/21



BF 7 SL 90
BF 7 SL 130



BS 7 SL 45/21
BS 7 SL 90
BS 7 SL 130



Size	Weight in kg	A	B	Ø C	Ø D	E	G
BF 7 SL 45/21	0.8	189	146	60	92	7	G 3/4
BF 7 SL 90	1.4	231	183	85	128	9.5	G 1 1/4
BF 7 SL 130	1.5	279	231				
BS 7 SL 45/21	0.7	189	146	35	92	–	G 3/4
BS 7 SL 90	1.3	231	183	50	128		G 1 1/4
BS 7 SL 130	1.4	279	231				
BE 7 SL 45/21	1.3	67	146	85	92	11.5	G 1
B 7 SL 45/21	1.2	73		60		16	

Notes

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EPE®

Rexroth
Bosch Group

Breather filter

RE 51415/02.09 1/10
Replaces: 08.08
RE 51416

Types TLF I...; TLF II...; TLF III...


H7623

Nominal size: TLF I; II; III 1 - 25 to 8 - 250
Connections up to DN 250
Operating temperature –20 °C to +100 °C

Table of contents

Application

- Filtration and dehumidification of the intake air of industrial systems.
- Avoidance of initial damage in pumps and bearings and system components.

Design

Dismountable filter housing for ventilation with internal, exchangeable filter element. Filter elements H10XL up to a filtration rating of 10 µm with glass fiber mat and P… up to 25 µm with paper mat.
Materials as per spare parts list.

Designs:

TLF I…: with internal screw-in thread,

TLF II…: with external screw-in thread,

TLF III…: with external screw-in thread and filling filter (screen basket 130 µm).

TLF I 7-125: with DIN flange,

TLF I 8-250: with DIN flange,

TLF III 7-125: with DIN flange and filling filter (screen basket 130 µm).

Maintenance intervals

Fields of application of the filter	Environmental conditions average dust content	Maintenance interval
General mechanical engineering	9…25 mg/m³	4,000 h
Heavy industry	50…80 mg/m³	3,000 h
Mobile hydraulics	30…100 mg/m³	3,000 h

Spare parts nominal sizes 1-25 to 6-80

Part	Piece	Size Description	Material	TLF I, TLF II, TLF III					
				1-25	2-32	3-40	4-50	5-65	6-80
1	1	Cover	Steel	Please indicate ordering information “Filter”					
2	1	Wing nut	Steel	Part No. 4349					
3	1	Filter element	various	Please indicate ordering information “Filter Element”					
4	1	Lower housing part	various	Please indicate ordering information “Filter”					
5	1	Filling piece	Al	Part No. 3650	Part No. 3658	Part No. 3659	Part No. 3660	Part No. 3661	Part No. 3662
6	1	Filling screen	Steel	Part No. 3651	Part No. 3663	Part No. 3664	Part No. 3665	Part No. 3666	Part No. 3667

All part nos. BRFS.specific.

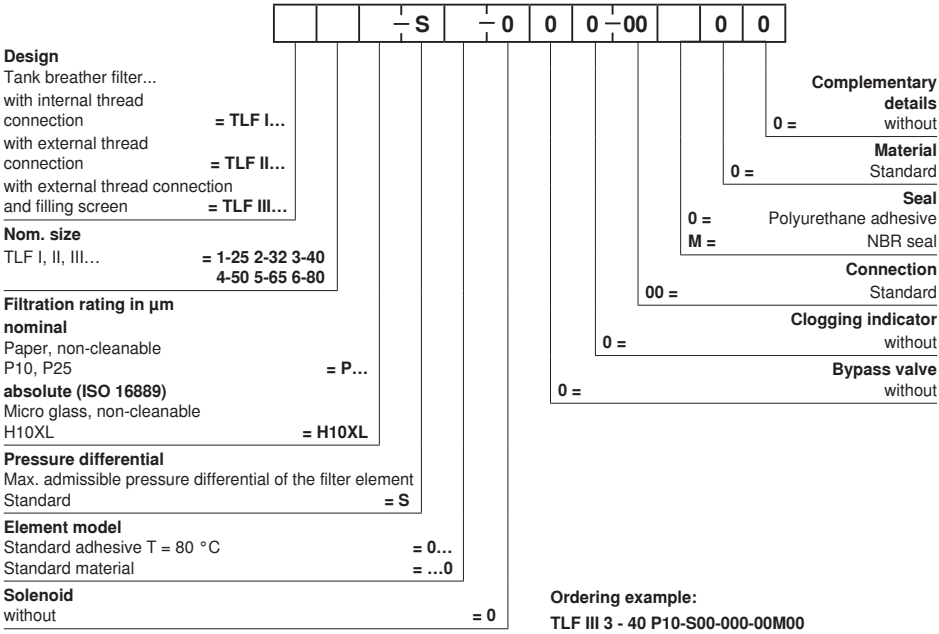
Filling piece and filling screen only available as unit.

Spare parts nominal sizes 7-125, 8-250

Part	Piece	Size Description	Material	TLF I/TLF III 7-125	TLF I 8-250
1	1	Cover	Steel	Please indicate ordering information “Filter”	
2	1	Wing nut	Steel	Part No. 5233	
3	1	Filter element	various	Please indicate ordering information “Filter Element”	
4	1	Lower housing part	various	Please indicate ordering information “Filter”	
6	1	Filling screen	various	Part no. 5784	—
7	1	Seal	NBR	Please indicate ordering information “Filter”	
8	1	Seal	NBR	Please indicate ordering information “Filter”	
			Weight (in kg)	8.0	33.0

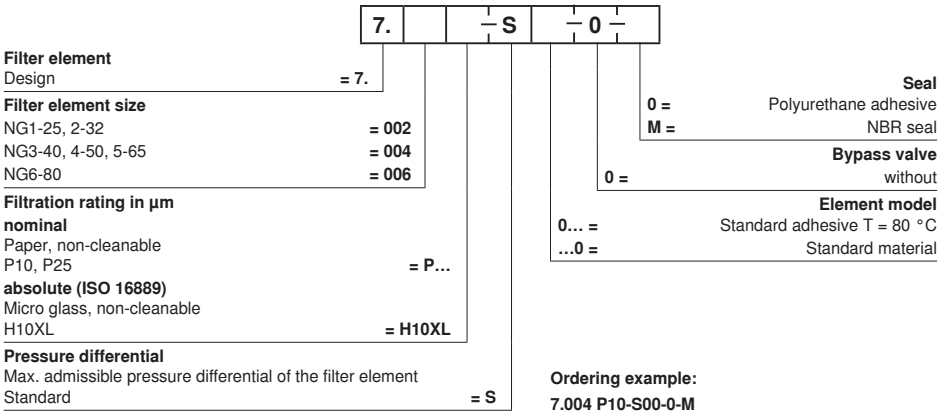
All part numbers. BRFS specific.

Ordering details of the filter nominal sizes 1-25 to 6-80



Ordering example:
TLF III 3 - 40 P10-S00-000-00M00

Ordering details of the filter element nominal size 1-25 to 6-80



Ordering example:
7.004 P10-S00-0-M

Ordering details of the filter nominal sizes 7-125, 8-250

		– S	– 0	0	0 – 00	M	0	0

Design
Tank breather filter with DIN flange connection **= TLF I…**
Tank breather filter with DIN flange connection and filling screen **= TLF III…**

Nom. size
TLF I, III **= 7-125**
TLF I **= 8-250**

Filtration rating in µm nominal
Paper, non-cleanable
P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H10XL **= H10XL**

Pressure differential
Max. admissible pressure differential of the filter element
Standard **= S**

Element model
Standard adhesive T = 80 °C **= 0…**
Standard material **= …0**

Solenoid
without **= 0**

Complementary details
0 = without

Material
0 = Standard

Seal
M = NBR seal

Connection
00 = Standard

Clogging indicator
0 = without

Bypass valve
0 = without

Ordering example:
TLF III 7 - 125 P10-S00-000-00M00

Ordering details of the filter element nominal sizes 7-125, 8-250

7.		– S	– 0 – M

Filter element
Design **= 7.**

Filter element size
NG7-125 **= 007**
NG8-250 **= 008**

Filtration rating in µm nominal
Paper, non-cleanable
P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H10XL **= H10XL**

Pressure differential
Max. admissible pressure differential of the filter element
Standard **= S**

Seal
M = NBR seal

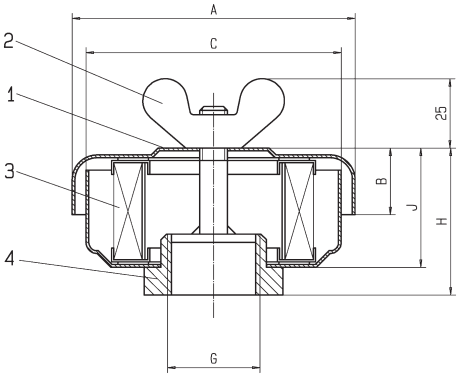
Bypass valve
0 = without

Element model
0… = Standard adhesive T = 80 °C
…0 = Standard material

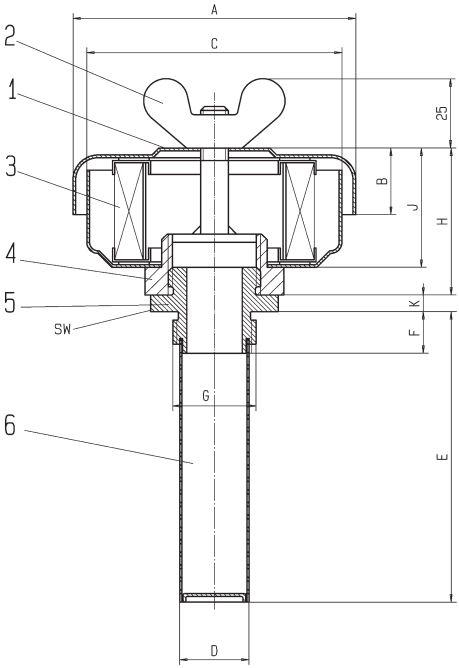
Ordering example:
7.007 P10-S00-0-M

Unit dimensions nominal sizes 1-25 to 6-80

TLF I…

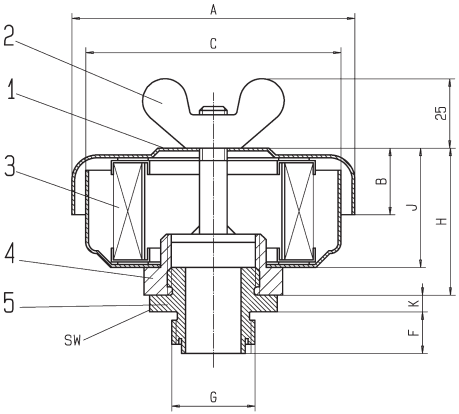


TLF III…



Design with filling piece and filling screen

TLF II…



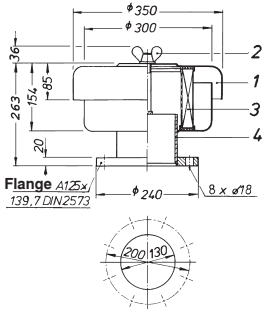
Design with filling piece

Unit dimensions nominal sizes 1-25 to 6-80 (dimensions in mm)

Size	Weight in kg	A	B	C	D	E	F	G	H	J	K	SW
TLF I 1-25	0.5	Ø 104	24	Ø 92	—	—	—	G 1	53	43	—	—
TLF I 2-32	0.6							G 1 1/4	63			
TLF I 3-40	2.1	Ø 177	46	Ø 162				G 1 1/2	90	80		
TLF I 4-50	2.1							G 2				
TLF I 5-65	2.1							G 2 1/2				
TLF I 6-80	2.4	Ø 210	45	Ø 190				G 3	88	78		
TLF II 1-25	0.6	Ø 104	24	Ø 92	—	—	25	G 1	53	43	6	46
TLF II 2-32	0.7							G 1 1/4	63			55
TLF II 3-40	2.3	Ø 177	46	Ø 162			26	G 1 1/2	90	80	7	60
TLF II 4-50	2.3							G2				75
TLF II 5-65	2.3						28	G2 1/2			8	90
TLF II 6-80	2.7	Ø 210	45	Ø 190			30	G 3	88	78	9	105
TLF III 1-25	0.7	Ø 104	24	Ø 92	Ø 28	107	25	G 1	53	43	6	46
TLF III 2-32	0.8				Ø 34	131		G 1 1/4	63			55
TLF III 3-40	2.5	Ø 177	46	Ø 162	Ø 42	155	26	G 1 1/2	90	80	7	60
TLF III 4-50	2.5				Ø 53	185		G 2				75
TLF III 5-65	2.5				Ø 67	217	28	G 2 1/2			8	90
TLF III 6-80	2.8	Ø 210	45	Ø 190	Ø 82	254	30	G 3	88	78	9	105

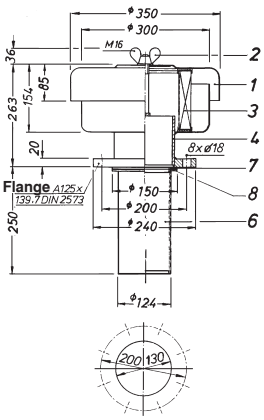
Unit dimensions nominal sizes 7-125, 8-250

TLF I 7-125



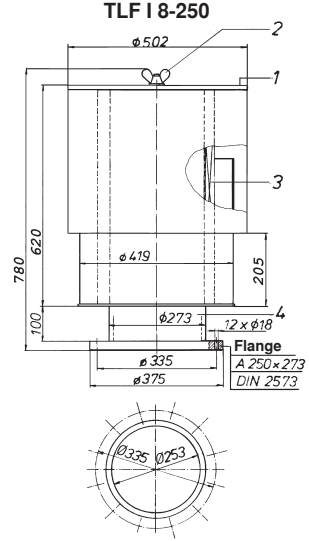
Hole pattern

TLF III 7-125



Hole pattern

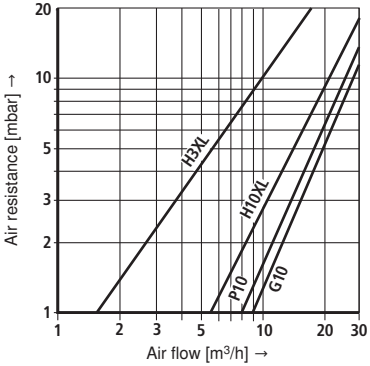
TLF I 8-250



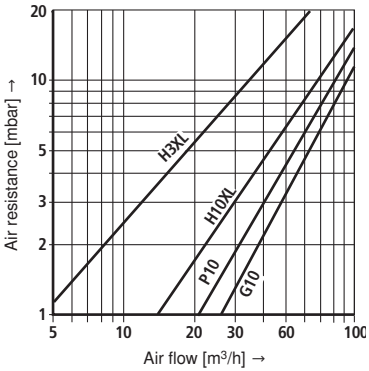
Hole pattern

Characteristic curves (measured at test temperature = 20 °C)

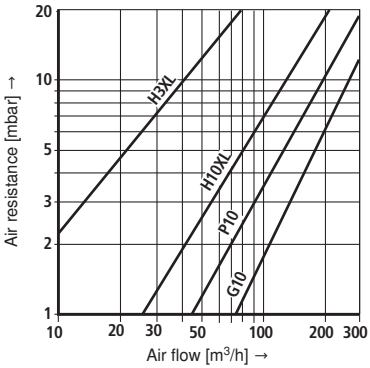
TLF…1-25, TLF…2-32



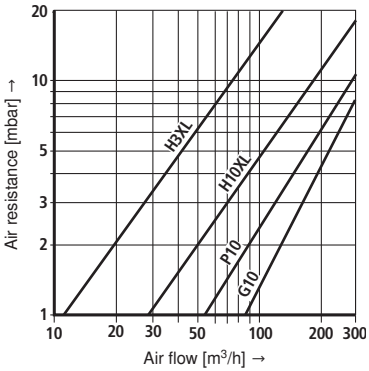
TLF…3-40, TLF…4-50



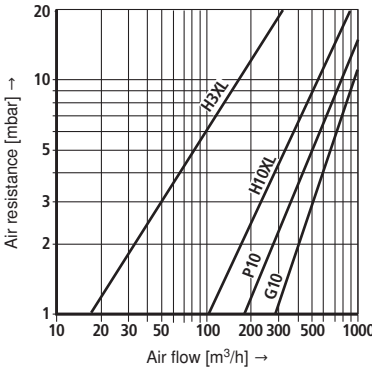
TLF…5-65



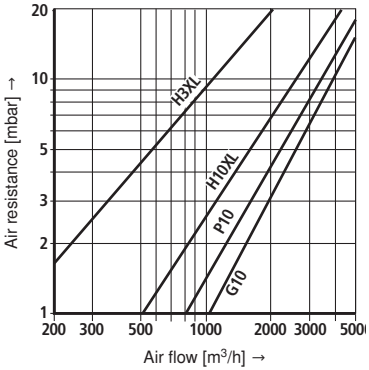
TLF…6-80



TLF…7-125



TLF…8-250



Notes

Notes

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Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.eppensteiner.de

Breathing and air bleed filter, water-absorbing

Type BFSK

RE 51456
Edition: 05.13
Replaces: 51412

BR231012_124_W

- Size 25 to 125
- Component series 2X
- Maximum operating pressure 1 bar *[14.5 psi]*
- Maximum flow: 1500 l/min *[396.3 US gpm]*
- Connection G 3/8 to G 1 1/4 BSP; (ISO 228)
- Operating temperature 0 °C to 85 °C *[–18 °F to 185 °F]*

Features

- Highly efficient, special filter material
- Filtration of very fine particles and high dirt holding capacity across a broad pressure differential range
- Minimizes the risk of corrosion in the hydraulic tank
- Filter cartridge as well as water-absorbing granules exchangeable
- Optional check valves to avoid air exchange at no-load operation
- Optional adapter plate including check valve for discharge air from tank, without filtration
- Air filtration and dehumidification in fluid systems

Contents

Ordering codes

Filter

01	02		03		04		05		06		07
BFSK		**–**	**2X**	**/**	**H3V3**	**–**	**M**	**–**		**–**	

Series

01	Air filter with water-absorbing granules	**BFSK**

Size

02	BFSK	**25**
		40
		80
		125

Component series

03	Component series 20 to 29 (20 to 29: Unchanged installation and connection dimensions)	**2X**

Filter rating in µm

04	Micro glass, not cleanable	**H3V3**

Seal

05	NBR seals	**M**

Material

06	Plastic variant – male thread for size 25 (steel double nipple)	**0**
	Stainless steel variant – male thread for sizes 40 - 125	**S**

Check valve

07	**Without** check valve (standard)	**0**
	With check valve, cracking pressure of anti-cavitation valve 0.01 bar *[0.15 psi]*, cracking pressure of preload valve 0.01 bar *[0.15 psi]*	**CV**

Order example: BFSK25-2X/H3V3-M-0-CV

Preferred types

Breathing and air bleed filter, water-absorbing	Material no.	Material no. Spare cartridge	Material no. Refill granules
BFSK25-2X/H3V3-M-0-0	R928049169	R928049574	Refilling of granules not possible/ spare filter: R928049169
BFSK40-2X/H3V3-M-S-0	R928049173	R928049575	R928049184
BFSK80-2X/H3V3-M-S-0	R928049175	R928049576	R928049185
BFSK125-2X/H3V3-M-S-0	R928049177	R928049577	R928049186

Accessories

Ordering codes, visual maintenance indicator [1)]

01	02		03
W	**O**	**–**	**V01**

01	Maintenance indicator	**W**
02	Visual indicator	**O**

Design

04	Vacuum differential, design 01	**V01**

Type	Material no.
WO-V01	R928049181

[1)] Only in connection with adapter plate (AP1, AP2 or APCV)

Ordering codes, adapter plate

01	02		03		04		05
ACC	**–**		**–**		**–**	**2X**	**/**	**M**

01	Accessories	**ACC**

Design

02	Adapter plate size 1 for sizes 25 [2)] and 40	**AP1**
	Adapter plate size 2 for sizes 80 and 125	**AP2**
	Adapter plate with check valves not available for BFSK with integrated check valve (BRSK...-CV)	**APCV**

Series/size

03	Adapter plate 1	**BFSK25-40**
	Adapter plate 2 or adapter plate CV	**BFSK80-125**

Component series

04	Component series 20 to 29 (20 to 29: Unchanged installation and connection dimensions)	**2X**

Seal

05	NBR seals	**M**

Order example: ACC-AP1-BFSK25-40-2X/M

[2)] Size 25 only possible in connection with reducing fitting (R900183367 G3/4 - G3/8 (ISO228)). The fitting must be ordered separately.

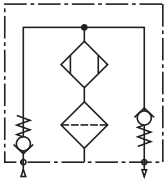
Type	Material no.
ACC-AP1-BFSK25-40-2X/M	R928049178
ACC-AP2-BFSK80-125-2X/M	R928049179
ACC-APCV-BFSK80-125-2X/M	R928049180

	Adapter plate		
Size	**AP1**	**AP2**	**APCV**
25	X	–	–
40	●	–	–
80	–	●	●
125	–	●	●

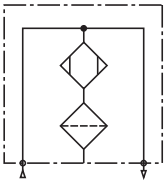
●	Standard
X	Possible if a reducing fitting is used
–	Not possible

Symbols

Breathing and air bleed filter with valve



Breathing and air bleed filter without valve



Function, section

In hydraulics, air exchange at the fluid tank must be ensured at all times. Depending on the machine cycles, air is sucked into the tank and pressed out again. The air contains miniature particles as well as water steam. Due to temperature variations, the exchanged air condenses and stimulates the oxidation process of the oil. This leads to corrosion resulting in damage to the fluid tank.
By means of the Rexroth BFSK breathing and air bleed filter, the fluid tank can suck in and give off clean and dry air. It is intended to be directly attached to a tank.
The BFSK breathing and air bleed filters basically consist of an unscrewable replacement cartridge (1) with an integrated, pleated filter element (2) and an air filter housing (3).
The air filter housing (3) is filled with water-absorbing granules (WA granules) (4). Optionally, check valves (5) can be installed.
The BFSK breathing and air bleed filter is available with and without integrated check valves. The version with integrated check valves is primarily used in wind turbines.
The WA granules contain red indicator beads. The water saturation is indicated by a color change from red to orange.

In addition, the optionally available visual maintenance indicator provides information on the state of the filter. The maintenance indicator (7) is mounted using an adapter plate (6), which is sold separately. In addition, the adapter plate makes a direct connection to the fluid tank possible.

Standard version without check valve (figure 1):
The contaminated air is transported to the WA granules (4) via opening A, is dried there and then flows through the pleated filter element. Solid dirt particles are captured here. Via connection T, only dried and filtered air gets into the tank. Air escaping from the system in the opposite direction is dried as well.

Version with check valve (5) in BFSK (figure 2):
Functions in the same way as the standard version, but includes check valves (5) to prevent air exchange at no-load operation.

Version with check valve in the adapter plate (6) (figure 3):
Functions in the same way as the standard version, but the escaping air, which may be mixed with oil mist, is diverted directly from the tank upstream of the filter **via connection B** into the environment.

Figure 1

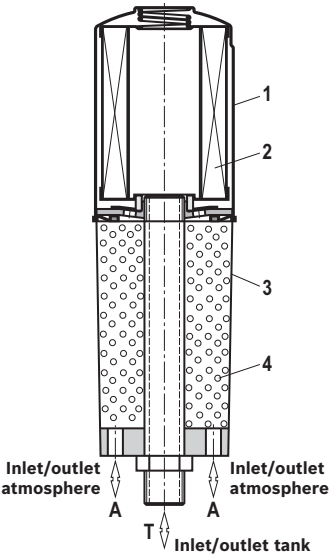


Figure 2

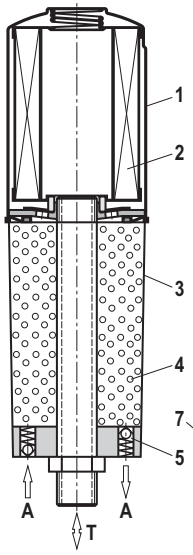
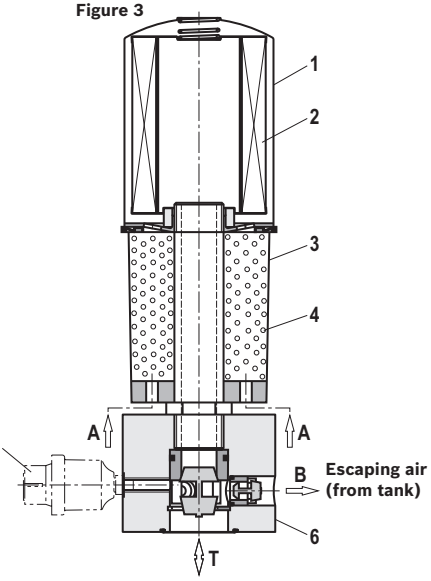


Figure 3



Technical data
(for applications outside these parameters, please consult us!)

general						
Weight		Size	25	40	80	125
		kg *[lbs]*	0.4 *[0.9]*	1.5 *[3.3]*	2.92 *[6.4]*	4.1 *[9.0]*
Installation position			Vertical			
Ambient temperature range		°C *[°F]*	–40 ... +85 *[–40 ... +185]*			
Operating temperature		°C *[°F]*	0 ... +85 *[–18 ...+185]*			
Material	Replacement cartridge		Steel			
	Air filter housing		Polymethyl methacrylate			
	Adapter plate		Anodized aluminum			
	Visual maintenance indicator		Housing made of polycarbonate			

Cracking pressure of check valve	bar *[psi]*	0.01 *[0.15]*
Type of pressure measurement of the maintenance indicator		Underpressure
Response pressure of the maintenance indicator	bar *[psi]*	0.05 *[0.73]*

Filter element		
Micro glass H3V3		Single-use element on the basis of inorganic fiber
Admissible pressure differential	bar *[psi]*	1 *[14.5]*

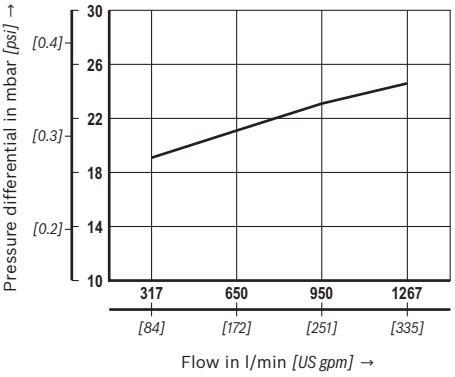
Permitted fluids		**Classification**	**Suitable sealing materials**	**Standards**
Mineral oil		HLP	NBR	DIN 51524
Bio-degradable	– insoluble in water	HETG	NBR	VDMA 24568

Important information on hydraulic fluids!
- For more information and data on the use of other hydraulic fluids refer to data sheet 90220 or contact us!

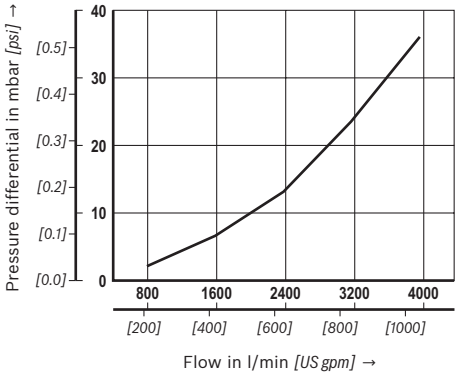
Filter material (WA granules)					
Volume	Size	25	40	80	125
	cm^3 *[in^3]*	100 *[6.1]*	600 *[36.6]*	1000 *[61.0]*	2000 *[122.0]*
Max. water absorption	l *[US gal]*	0.028 *[0.0074]*	0.172 *[0.0454]*	0.288 *[0.07608]*	0.576 *[0.1521]*
Information on water absorption		Oil mist reduces efficiency			

Characteristic curves

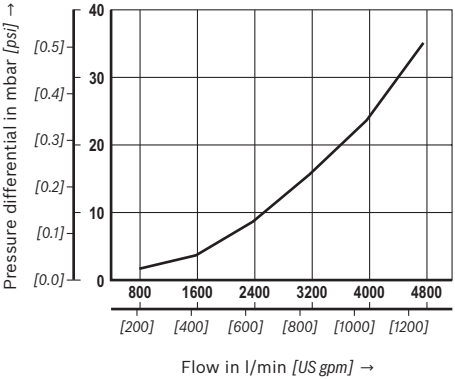
89.25-2X/H3V3-S00-0-M



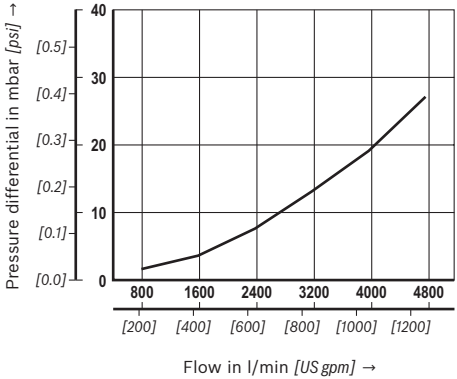
89.40-2X/H3V3-S00-0-M



89.80-2X/H3V3-S00-0-M

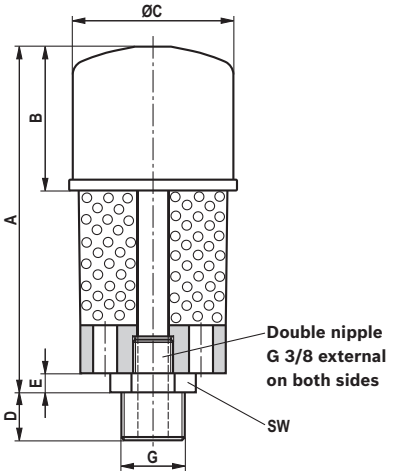


89.125-2X/H3V3-S00-0-M

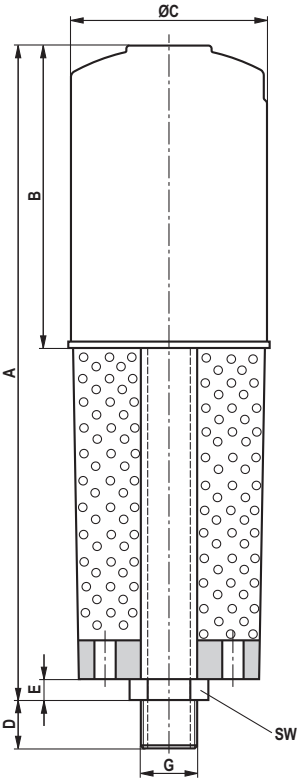


Dimensions: Breathing and air bleed filter
(dimensions in mm *[inch]*)

BFSK25



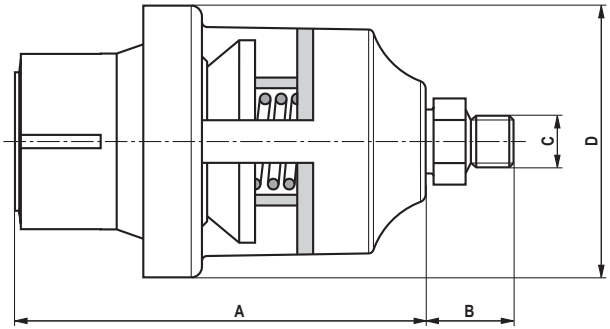
BFSK40 – 125



Filter types

Type BFSK...	A	B	ØC	D	E	G	SW
25	146	60	70	12	~10	G 3/8	22
40	281	121	97	23	~10	G ¾	32
80	335	181	130	30	~11	G 1¼	50
125	495	231	130	27	~11	G 1¼	50

Dimensions: Maintenance indicator, visual
(dimensions in mm *[inch]*)

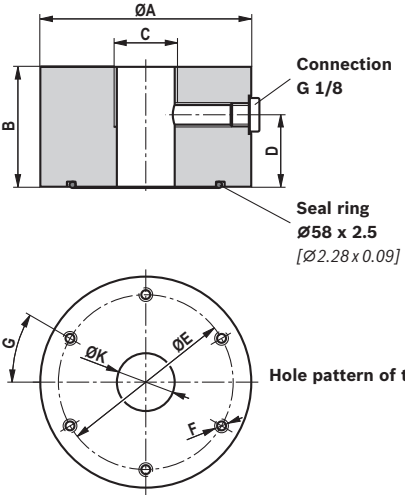


Type	A	B	C	D
WO-V01	70	16.5	G 1/8	50

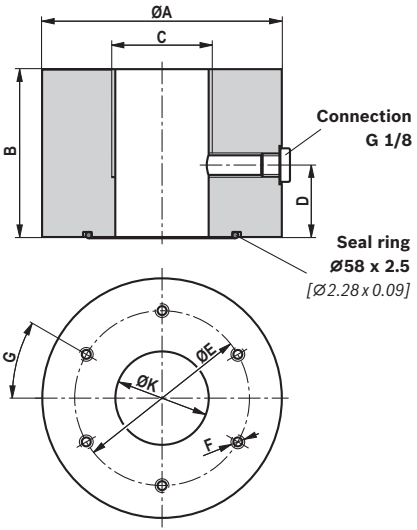
Dimensions: Adapter plates

(dimensions in mm *[inch]*)

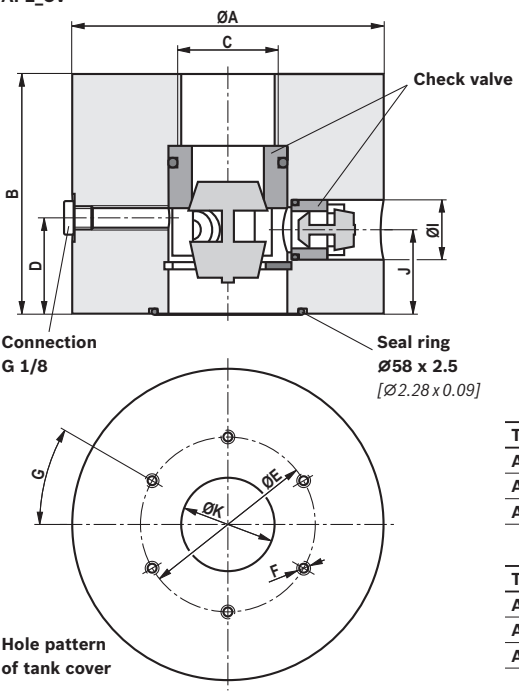
AP1



AP2



AP2_CV



Type	ØA	B	C	D	ØE
AP1	88	50	G 3/4	30	73
AP2	100	70	G 1 1/4	30	
AP2_CV	130	100	G 1 1/4	40	

Type	ØF	G	ØI	J	ØK
AP1	M5 x 10	30°	–	–	50
AP2			–	–	
AP2_CV			25	35	

Spare parts

Ordering code, replacement cartridge and refill pack

01	02		03		04		05		06		07
89.		**–**	**2X**	**/**	**H3V3**	**–**	**S00**	**–**	**0**	**–**	**M**

Filter cartridge

01	Design	**89.**

Size

02	BFSK	**25**
		40
		80
		125

03	Component series 20 to 29 (20 to 29: Unchanged installation and connection dimensions)	**2X**

Filter rating in µm absolute

04	Micro glass, not cleanable	**H3V3**

Pressure differential

05	Standard	**S00**

Bypass valve

06	**Without** check valve	**0** [1]

Seal

07	NBR seals	**M**

[1] For replacement cartridge always 0

Order example: 89.25-2X/H3V3-S00-0-M

Breathing and air bleed filter, water-absorbing	Replacement cartridge	Refill granules (incl. 2 foam pads)
BFSK25-2X/H3V3-M-0-0	**R928049574**	Refilling of granules not possible/ spare filter: R928049169
BFSK40-2X/H3V3-M-S-0	**R928049575**	R928049184
BFSK80-2X/H3V3-M-S-0	**R928049576**	R928049185
BFSK125-2X/H3V3-M-S-0	**R928049577**	R928049186

Assembly, commissioning and maintenance

Assembly

The connection thread of the filter must correspond to the connection thread of the tank cap. If an adapter plate is used, the hole pattern (DIN 24557-2) of the tank cap must be compared to the dimensions from the "Dimensions" chapter prior to installation. Please remove the sealing foil (air inlet A) and the end cap of the filter connection prior to use. Screw the filter directly into the tank bore or the adapter plate. When installing the filter, the required servicing height of the replacement cartridge (approx. 50 mm *[1.97 inch]*) must be taken into account. For servicing reasons, we recommend installing the filter in a standing position. All filter components must be screwed on hand-tight.

Commissioning

It is not necessary to commission the filter.

Maintenance

Exchange of the replacement cartridge

If the red mark on the maintenance indicator is reached, the cartridge must be replaced. It should, however, be replaced at least every 6 months.

Exchanging the WA granules

If the indicator beads of the WA granules change their color from red to orange, the granules must be exchanged. The material numbers of the corresponding spare parts are indicated on the name plate of the complete filter. They must correspond to the material numbers on the replacement cartridge or the refill pack.

Maintenance instructions

- Remove the complete breathing and air bleed filter by turning the air filter housing manually counter-clockwise.
- Remove the replacement cartridge by turning it counter-clockwise (hold tank port downwards).
- The WA granules are protected against falling out by a foam pad. In case of incorrect handling (shaking, turning upside down, ...) the granules might fall out.
- Remove foam pad prior to exchanging the WA granules.
- Dispose of the used WA granules and foam pads in accordance with environmental and applicable local requirements.
- Insert new bottom foam pad, fill in fresh WA granules and insert new upper foam pad.
- Screw air filter housing on tank port, put new seal ring (part of spare replacement cartridge) over air filter housing, center and install replacement cartridge (hand-tight) clockwise.

Do not forget to reset the visual maintenance indicator. This is done by pressing the RESET button.

☞ **Notice!**
Servicing should not take place below 10 °C. Should this still be necessary, however, special care must be taken when working with the plastic housing.

Tightening torques

Adapter plates	AP1	AP2	APCV
Tightening torque, at µtotal = 0.14	5 Nm ± 1 Nm		
Quantity	6		
Screw x length	M5 x 60	M5 x 80	M5 x 110
Recommended property class of screw	8.8		

Directives and standardization

Classification according to the Pressure Equipment Directive
Water-absorbing Bosch Rexroth BFSK breathing and air bleed filters according to 51456 are not classified as devices or components for the purpose of the Pressure Equipment Directive 97/23/EC (PED).

Directive 94/9/EC (ATEX)
According to the assessment of the risk of ignition, Bosch Rexroth BFSK breathing and air bleed filters must not be used in explosive areas.

Notes

Bosch Rexroth Filtration Systems GmbH
Hardtwaldstraße 43
68775 Ketsch, Germany
Phone +49 (0) 62 02/6 03-0
filter-support@boschrexroth.de
www.boschrexroth.de

Bosch Rexroth AG, RE 51456, edition: 05.13

Tank mounted filters / Return line filters

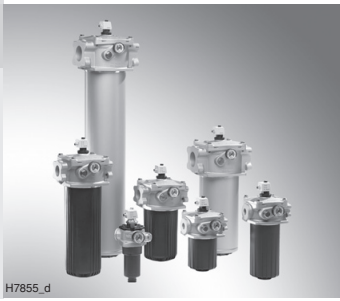
Designation	Type	Size	q_{Vmax} in l/min	p_{max} in bar	Data sheet	Page
Tank mounted filter / Return line filter	10 TE(N)	0040 ... 2500	1300	10	51424	101

Rexroth
Bosch Group

Tank mounted return line filter

RE 51424/06.11 1/26
Replaces: 11.09

Type 10TEN0040 to 1000; 10TE2000/2500


H7855_d

Size according to **DIN 24550**: 0040 to 1000
Additional sizes: 2000, 2500
Nominal pressure 10 bar *[145 psi]*
Connection up to G 1 1/2; to SAE 4"; to SAE 24

Table of contents

Features

The tank mounted return line filters are designed for installation on fluid tanks. They serve the separation of solid materials from the whole fluid flowing back to the tanks.

They distinguish themselves by the following:

- Adsorption of very fine particles across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings: 3…100 µm
- By default, the filters are equipped with a bypass valve
- Broad range of accessories, e.g. different maintenance indicators, outlet pipes, ...

Ordering code

of the filters of sizes 0040 to 0100

10	TEN	–	A	00	–	–	–

Pressure
10 bar *[145 psi]* **= 10**

Design
Return line filter, simple, with filter element according to DIN 24550 **= TEN**

Size
0040 **= 0040**
0063 **= 0063**
0100 **= 0100**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G60, G100 **= G…**
Paper, non-cleanable
P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element 30 bar *[435 psi]* with bypass valve (cracking pressure 3.5 bar *[51 psi]*) **= A**

Element model
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Maintenance indicator
Without **= 0**
Mechanical optical (polyamide, switching pressure 2.2 bar *[32 psi]*) **= P2,2**
Mechanical optical (aluminum, switching pressure 2.2 bar *[32 psi]*) **= V2,2**
Mechanical optical (aluminum, switching pressure 1.5 bar *[22 psi]*) **= V1,5**
Mechanical optical (aluminum, switching pressure 0.8 bar *[12 psi]*) **= V0.8**
Pressure gauge 0...6 bar *[0…87 psi]* right **= MR**
Mechanical optical + pressure gauge right **= MRV2,2**

Complementary details (if necessary)
NB = Without bypass
F = Ventilation filter
FN = Ventilation filter with surge protection
M = Minimess connection (not possible with pressure gauge)
R110 = Outlet pipe 110 mm *[4.3"]*
R150 = Outlet pipe 150 mm *[5.9"]*
R250 = Outlet pipe 250 mm *[9.8"]*
S = Filling port (not possible with mech.-opt. maintenance indicator)

Main inlet

	Port	Frame size 0040	Frame size 0063-0100
R3 =	G3/4	●	x
R4 =	G1	x	●
U4 =	1 1/16-12 UN-2B *[SAE 12]*	x	x
U9 =	1 5/16-12 UN-2B *[SAE 16]*	x	x

● = Standard port
x = Alternative port

Seal
M = NBR seal
V = FKM seal

Example: 10TEN0040-H10XLA00-P2,2-M-R3
10TEN0100-H10XLA00-MR-M-R4

Further models, e.g. filter media, connections, are available at request.

Ordering code

of the filters of sizes 0160 to 0630

10	TEN	–	A	00	–	–	–

Pressure
10 bar *[145 psi]* **= 10**

Design
Return line filter, simple, with filter element according to DIN 24550 **= TEN**

Size
0160 **= 0160**
0250 **= 0250**
0400 **= 0400**
0630 **= 0630**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G60, G100 **= G…**
Paper, non-cleanable
P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element 30 bar *[435 psi]* incl. bypass valve (cracking pressure 3.5 bar *[51 psi]*) **= A**

Element model
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Maintenance indicator
Without **= 0**
Mechanical optical (polyamide, switching pressure 2.2 bar *[32 psi]*) **= P2,2**
Mechanical optical (aluminum, switching pressure 2.2 bar *[32 psi]*) **= V2,2**
Mechanical optical (aluminum, switching pressure 1.5 bar *[22 psi]*) **= V1,5**
Mechanical optical (aluminum, switching pressure 0.8 bar *[12 psi]*) **= V0.8**
Pressure gauge 0...6 bar *[0…87 psi]* left **= ML**
Mechanical optical + pressure gauge left **= MLV2,2**

Complementary details (if necessary)
NB = Without bypass
M = Minimess connection (not possible with pressure gauge)
S = Filling port (not possible with mech.-opt. maintenance indicator)

Main inlet

	Port	Frame size 0160	0250	0400	0630
R5 =	G1 1/4	●	x		
R6 =	G1 1/2	x	●		
S5 =	SAE 1 1/4" 3000 psi	x	x	–	
S6 =	SAE 1 1/2" 3000 psi	x	x		
U6 =	1 7/8-12 UN 2B *[SAE 24]*	x	x		
S8 =	SAE 2" 3000 psi	–		●	x
S9 =	SAE 2 1/2" 3000 psi			x	●

● = Standard port
x = Alternative port

Seal
M = NBR seal
V = FKM seal

Example: 10TEN0160-P25A00-P2,2-M-R5
10TEN0630-H10XLA00-ML-M-S9

Further models, e.g. filter media, connections, are available at request.

Ordering code

of the filters of sizes 1000 to 2500

10	TE				A	00				

Pressure
10 bar *[145 psi]* **= 10**

Design
Return line filter simple **= TE**

Filter element
According to DIN 24550
(not with 2000 and 2500) **= N**

Size
10TEN1000 **= 1000**
10TE2000 **= 2000**
10TE2500 **= 2500**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G60, G100 **= G…**
Paper, non-cleanable
P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]* incl. bypass valve
(cracking pressure 3.5 bar *[51 psi]*) **= A**

Element model
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Maintenance indicator
Without **= 0**
Mechanical optical (polyamide, switching pressure 2.2 bar *[32 psi]*) **= P2,2**
Mechanical optical (aluminum, switching pressure 2.2 bar *[32 psi]*) **= V2,2**
Mechanical optical (aluminum, switching pressure 1.5 bar *[22 psi]*) **= V1,5**
Mechanical optical (aluminum, switching pressure 0.8 bar *[12 psi]*) **= V0.8**
Pressure gauge 0...6 bar *[0…87 psi]* left **= ML**
Mechanical optical + pressure gauge left **= MLV2,2**

Complementary details (if necessary)
NB = Without bypass
M = Minimess connection (not possible with pressure gauge)
S = Filling port (not possible with mech.-opt. maintenance indicator)

Main inlet

	Port	Frame size 1000	2000	2500
S10 =	SAE 3" 3000 psi	●	x	x
S12 =	SAE 4" 3000 psi	x	●	●

● = Standard port
x = Alternative port

Seal
M = NBR seal
V = FKM seal

Example: 10TEN1000-H10XLA00-P2,2-M-S10
10TE2500-H20XLA00-P2,2-M-S12

Further models, e.g. filter media, connections, are available at request.

Ordering code

of the filter element

1. [ ] – **A00** – **0** –

Design **= 1.**

Size

TEN…
(filter elements according to DIN 24550)
= 0040 0063 0100 0160 0250
0400 0630 1000

TE… **= 2000 2500**

Filter rating in µm

nominal

Stainless steel wire mesh, cleanable
G10, G25, G40, G60, G100 **= G…**

Paper, non-cleanable
P10, P25 **= P…**

absolute (ISO 16889)

Micro glass, non-cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Seal

M = NBR seal
V = FKM seal

Bypass valve

0 = at filter element always 0

Pressure differential

Max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*

Order example:

1.0100 H3XL-A00-0-M

For detailed information on Rexroth filter elements please refer to data sheet 51420.

Standard types

Tank mounted return line filter, filter rating 3 µm, 10 µm and 20 µm

Filter type	Flow in l/min *[gpm]* with ν = 30 mm²/s *[142 SUS]* and Δp = 0.5 bar *[7.25 psi]*	Port/Material no.			
10TEN0040-H20XLA00-P2,2-M-…	62 *[16.4]*	..R3	**R928041199**	..U4	**R928041200**
10TEN0063-H20XLA00-P2,2-M-…	80 *[21.1]*	..R4	**R928041201**	..U9	**R928041202**
10TEN0100-H20XLA00-P2,2-M-…	95 *[25.1]*	..R4	**R928041203**	..U9	**R928041204**
10TEN0160-H20XLA00-P2,2-M-…	260 *[68.7]*	..R5	**R928041205**	..S5	**R928041206**
10TEN0250-H20XLA00-P2,2-M-…	320 *[84.5]*	..R6	**R928041208**	..S6	**R928041209**
10TEN0400-H20XLA00-P2,2-M-…	560 *[147.9]*	..S8	**R928041210**	..S9	**R928041211**
10TEN0630-H20XLA00-P2,2-M-…	630 *[166.4]*	..S9	**R928041223**	..S8	**R928041224**
10TEN1000-H20XLA00-P2,2-M-…	1270 *[335.5]*	..S10	**R928041225**	..S12	**R928041226**
10TE2000-H20XLA00-P2,2-M-…	1600 *[422.7]*	..S12	**R928041228**	..S10	**R928041229**
10TE2500-H20XLA00-P2,2-M-…	1680 *[443.8]*	..S12	**R928041230**	..S10	**R928041231**
10TEN0040-H10XLA00-P2,2-M-…	43 *[11.3]*	..R3	**R928041271**	..U4	**R928041272**
10TEN0063-H10XLA00-P2,2-M-…	62 *[16.4]*	..R4	**R928041273**	..U9	**R928041274**
10TEN0100-H10XLA00-P2,2-M-…	80 *[21.1]*	..R4	**R928041275**	..U9	**R928041276**
10TEN0160-H10XLA00-P2,2-M-…	190 *[50.2]*	..R5	**R928041277**	..S5	**R928041278**
10TEN0250-H10XLA00-P2,2-M-…	260 *[68.7]*	..R6	**R928041279**	..S6	**R928041280**
10TEN0400-H10XLA00-P2,2-M-…	460 *[121.5]*	..S8	**R928041281**	..S9	**R928041282**
10TEN0630-H10XLA00-P2,2-M-…	560 *[147.9]*	..S9	**R928041283**	..S8	**R928041284**
10TEN1000-H10XLA00-P2,2-M-…	970 *[256.2]*	..S10	**R928041285**	..S12	**R928041286**
10TE2000-H10XLA00-P2,2-M-…	1350 *[356.6]*	..S12	**R928041288**	..S10	**R928041289**
10TE2500-H10XLA00-P2,2-M-…	1450 *[383.0]*	..S12	**R928041290**	..S10	**R928041291**
10TEN0040-H3XLA00-P2,2-M-…	23 *[6.1]*	..R3	**R928041292**	..U4	**R928041293**
10TEN0063-H3XLA00-P2,2-M-…	35 *[9.2]*	..R4	**R928041294**	..U9	**R928041295**
10TEN0100-H3XLA00-P2,2-M-…	52 *[13.7]*	..R4	**R928041296**	..U9	**R928041297**
10TEN0160-H3XLA00-P2,2-M-…	105 *[27.7]*	..R5	**R928041298**	..S5	**R928041299**
10TEN0250-H3XLA00-P2,2-M-…	160 *[42.3]*	..R6	**R928041300**	..S6	**R928041301**
10TEN0400-H3XLA00-P2,2-M-…	290 *[76.6]*	..S8	**R928041302**	..S9	**R928041303**
10TEN0630-H3XLA00-P2,2-M-…	410 *[108.3]*	..S9	**R928041304**	..S8	**R928041305**
10TEN1000-H3XLA00-P2,2-M-…	560 *[147.9]*	..S10	**R928041306**	..S12	**R928041307**
10TE2000-H3XLA00-P2,2-M-…	900 *[237.7]*	..S12	**R928041308**	..S10	**R928041309**
10TE2500-H3XLA00-P2,2-M-…	1100 *[290.6]*	..S12	**R928041310**	..S10	**R928041311**

Standard types

Element type	Filter material/Material no.		
	H3XL	H10XL	H20XL
1.0040 …A00-0-M	**R928005835**	**R928005837**	**R928005838**
1.0063 …A00-0-M	**R928005853**	**R928005855**	**R928005856**
1.0100 …A00-0-M	**R928005871**	**R928005873**	**R928005874**
1.0160 …A00-0-M	**R928005889**	**R928005891**	**R928005892**
1.0250 …A00-0-M	**R928005925**	**R928005927**	**R928005928**
1.0400 …A00-0-M	**R928005961**	**R928005963**	**R928005964**
1.0630 …A00-0-M	**R928005997**	**R928005999**	**R928006000**
1.1000 …A00-0-M	**R928006033**	**R928006035**	**R928006036**
1.2000 …A00-0-M	**R928041312**	**R928040797**	**R928041313**
1.2500 …A00-0-M	**R928041314**	**R928040800**	**R928041315**

3

Ordering code, standard types: Electronic switching element for maintenance indicator

If an electric switching element with signal suppression up to 30 °C is used (WE-2SPSU-M12X1, **R928028411**), it has to be ensured that the aluminum version of the mechanical-optical maintenance indicator must be used. In the filter type key, these maintenance indicators are referred to as "V2,2", "V1,5" or "V0,8". Also refer to the chapter "Spare parts and accessories".

The temperature-controlled signal processing does not work with mechanical-optical maintenance indicators made of polyamide.

WE — — —

Maintenance indicator
Electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression up to 30 °C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pin
EN 175301-803 = Rectangular plug-in connector, 2-pin design A according to EN-175301-803

Material numbers of the mechanical optical maintenance indicators

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %)/ normally closed contact (at 100 %)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

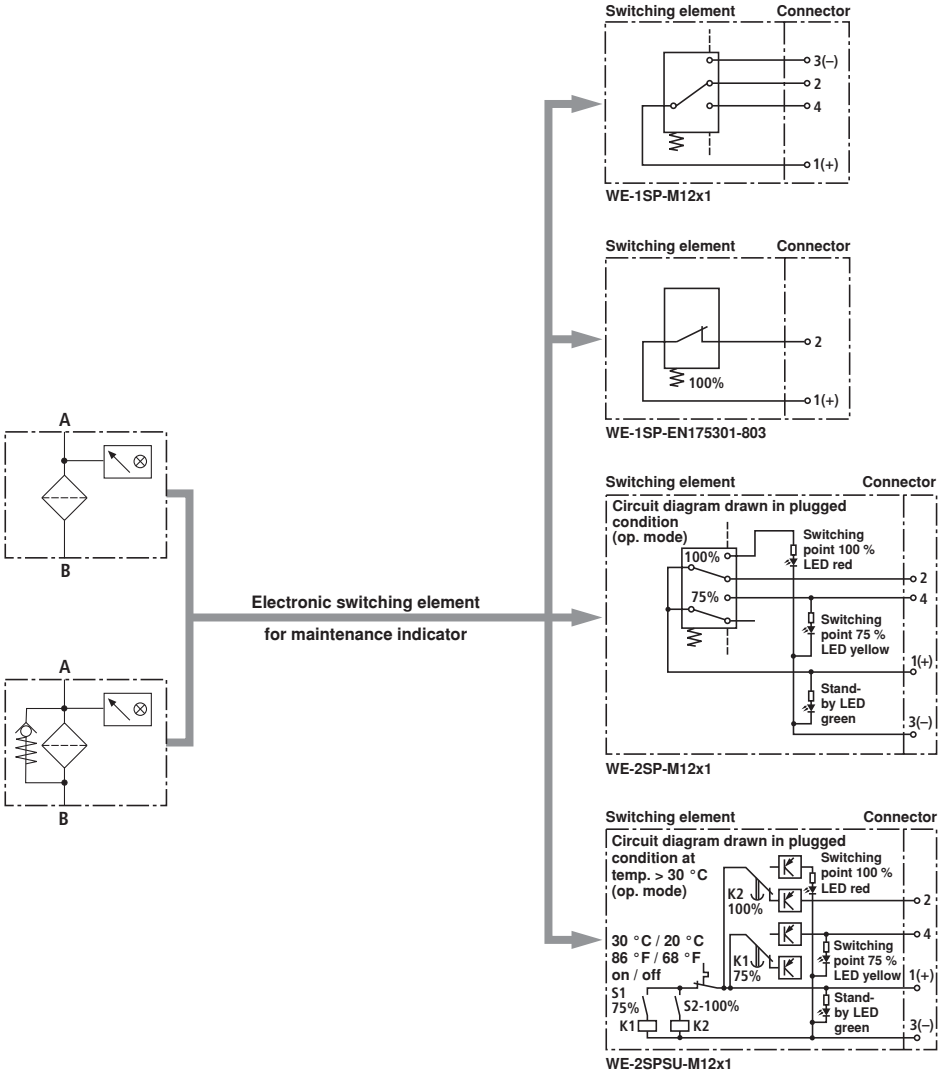
Order example:

Tank mounted return line filter with mechanical-optical maintenance indicator for $p_{nom.}$ = 10 bar *[145 psi]*, size 0100, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

Filter: **10TEN0100-H10XLA00-P2,2-M-R4** **Material no.: R928041275**
El. maintenance indicator: **WE-1SP-M12x1** **Material no.: R928028409**

For round plug-in connections refer to data sheet 08006.

Symbols


Switching element
Connector
3(–)
2
4
1(+)
WE-1SP-M12x1
Switching element
Connector
2
100%
1(+)
WE-1SP-EN175301-803
A
B
Electronic switching element
for maintenance indicator
Switching element
Connector
Circuit diagram drawn in plugged condition (op. mode)
100%
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
WE-2SP-M12x1
Switching element
Connector
Circuit diagram drawn in plugged condition at temp. > 30 °C (op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
WE-2SPSU-M12x1

Function, section

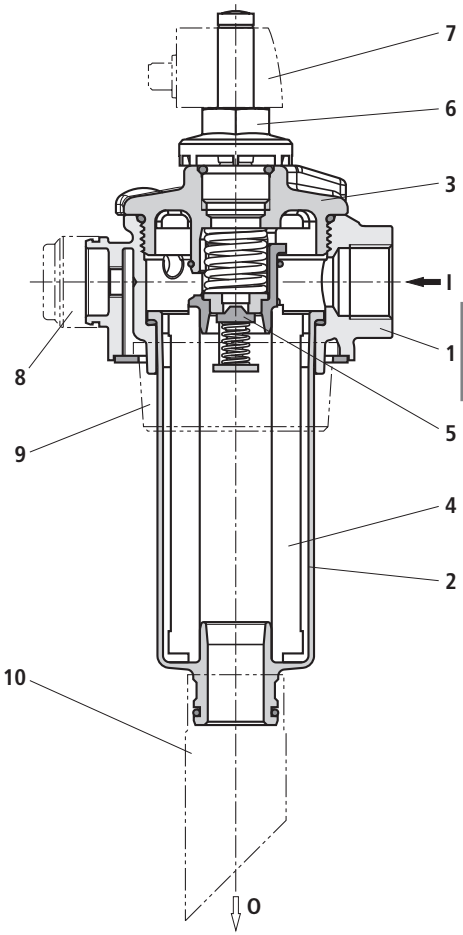
The tank mounted return line filters are designed for direct attachment to the fluid tank.

They basically consist of filter head (1), filter bowl (2), cover (3), filter element (4) as well as a serial bypass valve (5).

The filters can be configured with different maintenance indicators - here, you are shown a mechanical-optical maintenance indicator (6) in connection with an electronic switching element (7).

Depending on the filter size, more additional functions are available - e.g. a ventilation filter (8), surge protection (9) or return pipes in different lengths (10) – in this connection, also refer to the chapter "Spare parts and accessories".

During operation, the hydraulic fluid reaches the filter housing via port I, here flows through the filter element (4) in the flow direction from outside to inside and is cleaned according to the filter rating. The dirt particles filtered out settle in the filter element. Via the outlet opening 0, the filtered hydraulic fluid enters the tank.



Sample presentation using a 10TEN0063 filter.

Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical				
Ambient temperature range		°C *[°F]*	–10…+100 *[14…+212]* (shortly to –30 *[–22]*)				
Size		Size	0040	0063	0100	0160	0250
Weight		kg *[lbs]*	1.4 *[3.09]*	1.6 *[3.53]*	1.8 *[3.97]*	4.5 *[9.92]*	5.0 *[11.03]*
Size		Size	0400	0630	1000	2000	2500
Weight		kg *[lbs]*	8.0 *[17.64]*	10.0 *[22.05]*	18 *[39.7]*	21.5 *[47.42]*	27 *[59.55]*
Material	Filter cover		Carbon fiber reinforced plastic (sizes 0040...0100) Aluminum (sizes 0160...2500)				
	Filter head		Aluminum				
	Filter bowl		Carbon fiber reinforced plastic (sizes 0040...0630) Coated steel (sizes 1000...2500)				
	Optical maintenance indicator	(P2,2)	Plastic PA6				
		(V…)	Aluminum				
	Electronic switching element		Plastic PA6				
	Pressure gauge		Plastic				

hydraulic

Maximum operating pressure	bar *[psi]*	10 *[145]*
Hydraulic fluid temperature range	°C *[°F]*	–10…+100 *[+14…+212]*
Minimum conductivity of the medium	pS/m	300
Fatigue strength according to ISO 10771	Load cycles	> 10^5 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	3.5 ± 0.35 *[50.7 ± 5]*
Type of pressure measurement of the maintenance indicator		Backpressure
Response pressure of the P2,2 maintenance indicator	bar *[psi]*	2.2 (+0.45/–0.25) *[31.9 (+6.4/–3.6)]*
Response pressure of the V... maintenance indicator	bar *[psi]*	2.2 ± 0.25 *[31.9 ± 3.6]*, 1.5 ± 0.2 *[21.8 ± 2.9]*, 0.8 ± 0.15 *[11. 6 ± 2.2]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12x1, 4-pin			Standard connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. switching power with resistive load		W	20			70
Switching type	75 % signal		–	Normally open contact		–
	100 % signal		Change-over	Normally closed contact		Normally closed contact
	2SPSU				Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25…+85 *[–13…+185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Technical data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL		Single-use element on the basis of inorganic fiber				
		Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*		Achievable oil cleanliness according to ISO 4406 (SAE-AS 4059)		
Particle separation	H20XL	$\beta_{20(c)} \geq 200$		19/16/12 … 22/17/14		
	H10XL	$\beta_{10(c)} \geq 200$		17/14/10 … 21/16/13		
	H6XL	$\beta_{6(c)} \geq 200$		15/12/10 … 19/14/11		
	H3XL	$\beta_{5(c)} \geq 200$		13/10/8 … 17/13/10		
Admissible pressure differential	bar *[psi]*	30 *[435]*				
Size	Size	0040	0063	0100	0160	0250
Weight	kg *[lbs]*	0.20 *[0.44]*	0.30 *[0.66]*	0.35 *[0.77]*	0.8 *[1.76]*	1.1 *[2.42]*
Size	Size	0400	0630	1000	2000	2500
Weight	kg *[lbs]*	2.0 *[4.41]*	2.3 *[5.07]*	3.0 *[6.62]*	3.5 *[7.72]*	5.0 *[11.03]*

Seal material for hydraulic fluids

Mineral oils			Ordering code
Mineral oil	HLP	according to DIN 51524	M

Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V

Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

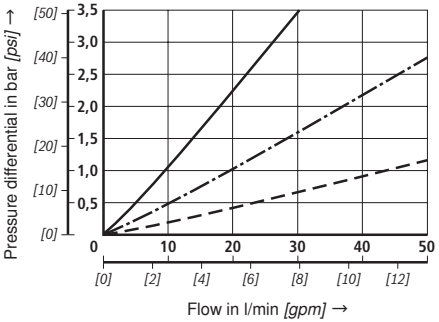
Characteristic curves (measured with mineral oil HLP46 according to DIN 51524 at T = 40 °C) *[104 °F]* **H3XL**

An optimal filter design and the design with other filter media and filtration ratings are enabled by our computer program "BR Filter Select".

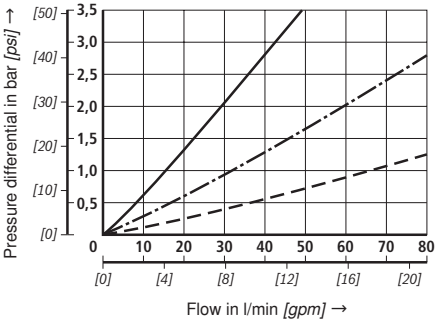
Oil viscosity:

- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[142 SUS]*

10TEN0040-H3XLA00...R3



10TEN0063-H3XLA00...R4



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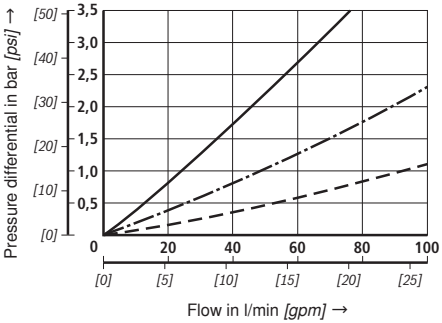
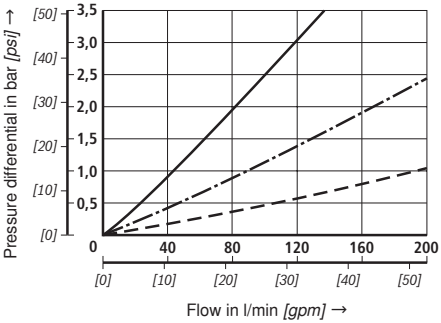
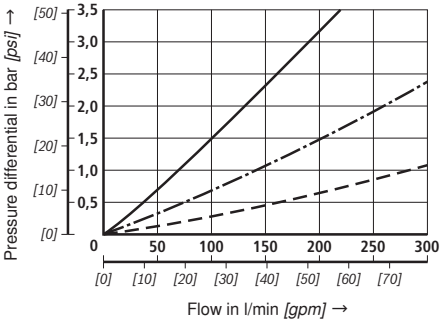


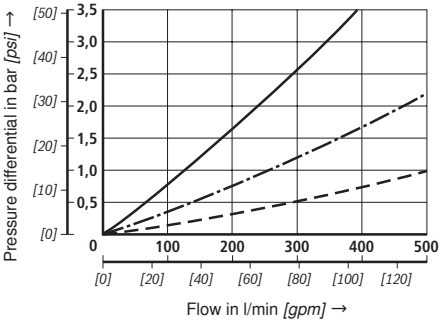
10TEN0160-H3XLA00...R5



10TEN0250-H3XLA00...R6



10TEN0400-H3XLA00...S8



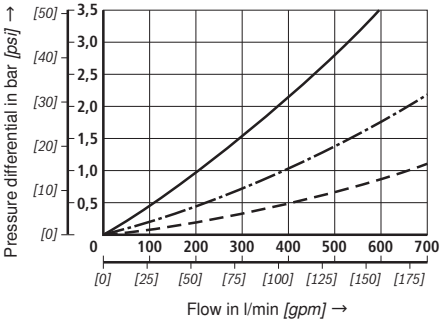
Characteristic curves (measured with mineral oil HLP46 according to DIN 51524 at T = 40 °C) *[104 °F]* H3XL

An optimal filter design and the design with other filter media and filtration ratings are enabled by our computer program "BR Filter Select".

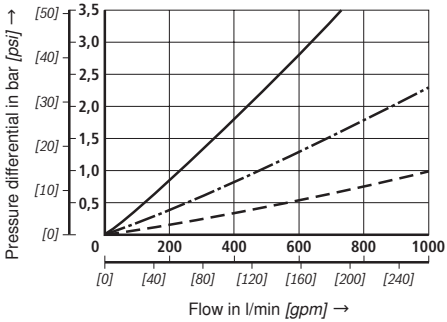
Oil viscosity:

- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[142 SUS]*

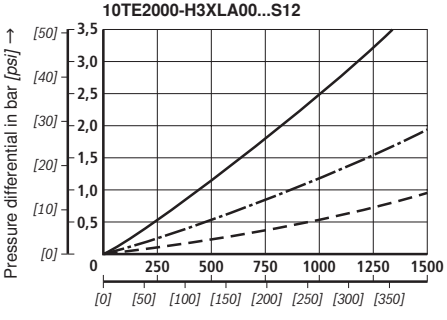
10TEN0630-H3XLA00...S9



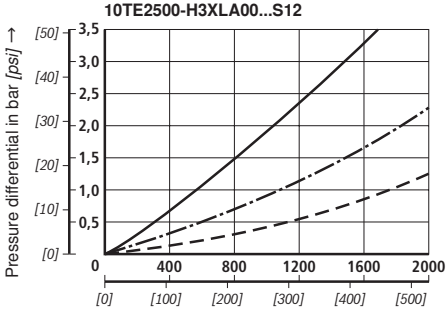
10TEN1000-H3XLA00...S10



10TE2000-H3XLA00...S12



10TE2500-H3XLA00...S12



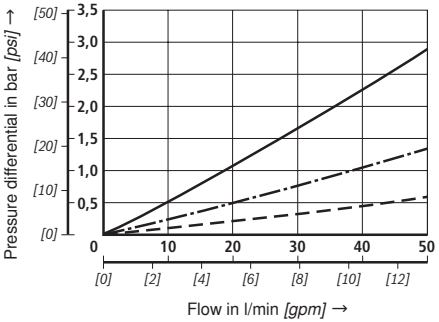
Characteristic curves (measured with mineral oil HLP46 according to DIN 51524 at T = 40 °C) *[104 °F]* **H10XL**

An optimal filter design and the design with other filter media and filtration ratings are enabled by our computer program "BR Filter Select".

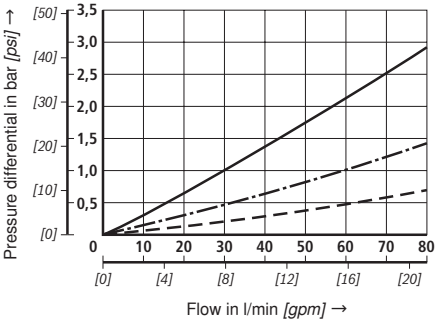
Oil viscosity:

- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[142 SUS]*

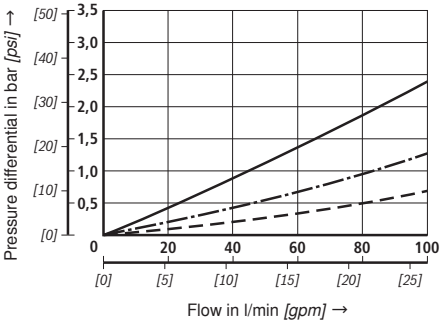
10TEN0040-H10XLA00...R3



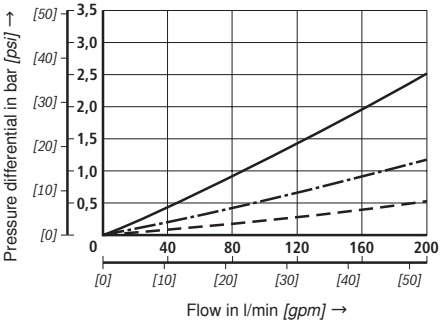
10TEN0063-H10XLA00...R4



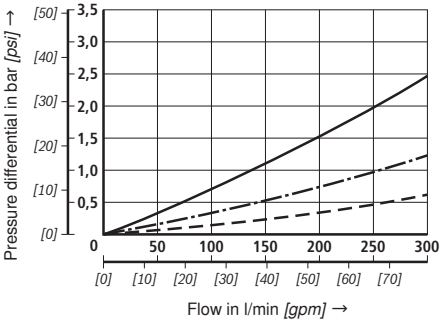
10TEN0100-H10XLA00...R4



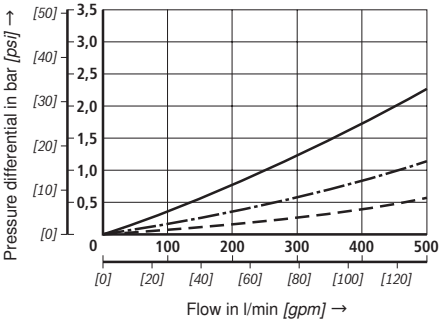
10TEN0160-H10XLA00...R5



10TEN0250-H10XLA00...R6



10TEN0400-H10XLA00...S8



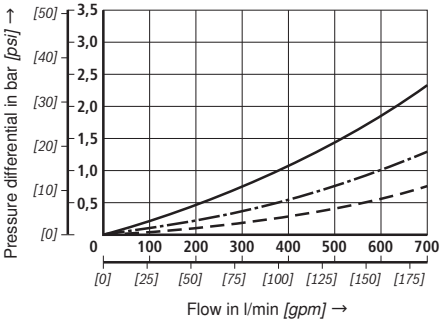
Characteristic curves (measured with mineral oil HLP46 according to DIN 51524 at T = 40 °C) *[104 °F]* H10XL

An optimal filter design and the design with other filter media and filtration ratings are enabled by our computer program "BR Filter Select".

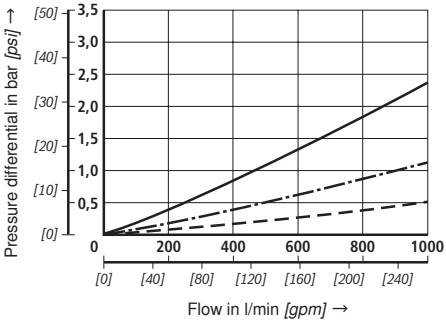
Oil viscosity:

- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[142 SUS]*

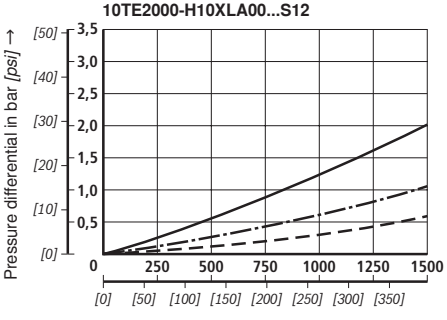
10TEN0630-H10XLA00...S9



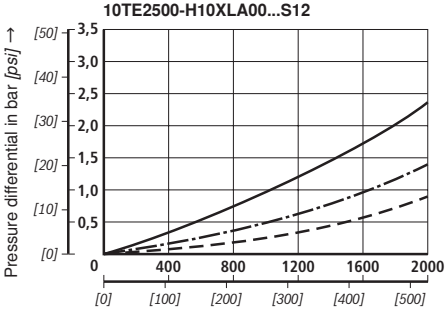
10TEN1000-H10XLA00...S10



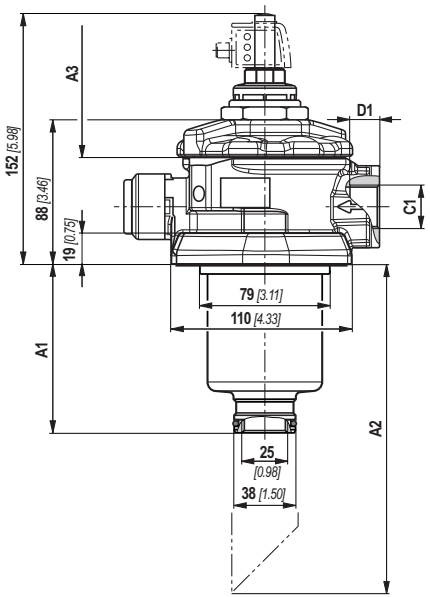
10TE2000-H10XLA00...S12

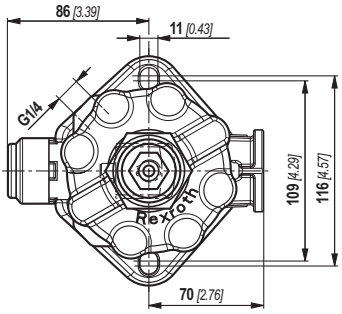


10TE2500-H10XLA00...S12

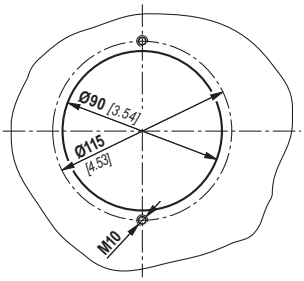


Unit dimensions size 0040...0100 (dimensions in mm *[inch]*)





Tank connection diagram:



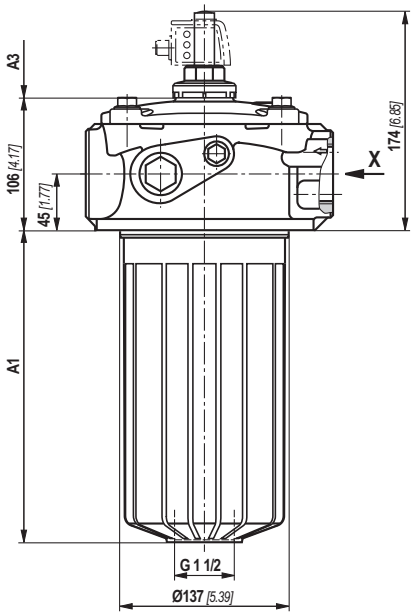
Filter housing for filter elements in accordance with DIN 24550

Type 10 TEN	Content in l *[gal]*	A1	A2 [1]	A3 [2]	C1		D1
					Standard	Optional	
					Pipe thread according to ISO 228	Pipe thread according to SAE J1926	
0040	0.6 *[0.16]*	103 *[4.06]*	230 *[9.06]*	100 *[3.94]*	G3/4	SAE 12 1 1/16-12 UN-2B	16 *[0.63]*
0063	0.8 *[0.21]*	163 *[6.42]*	290 *[11.42]*	160 *[6.30]*	G1	SAE 16 1 5/16-12 UN-2B	18 *[0.71]*
0100	1.2 *[0.32]*	253 *[9.96]*	380 *[14.96]*	250 *[9.84]*			

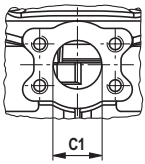
[1] With outlet pipe 150 mm *[5.9"]*

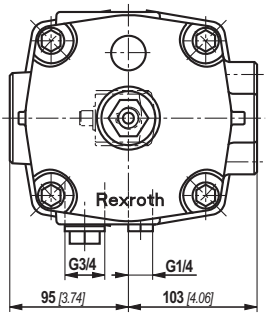
[2] Servicing height for filter elements

Unit dimensions size 0160...0250 (dimensions in mm *[inch]*)

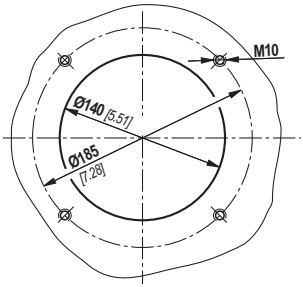


View X





Tank connection diagram:

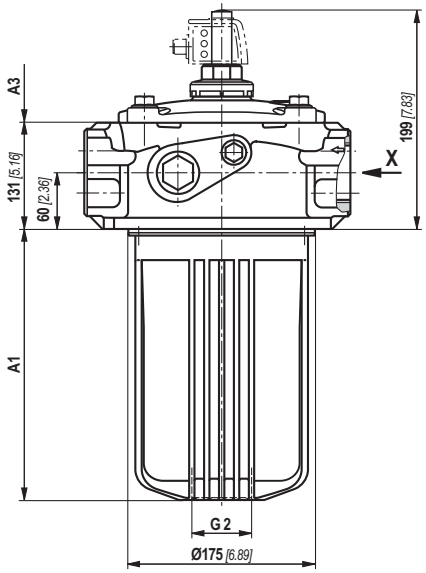


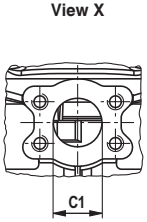
Filter housing for filter elements in accordance with DIN 24550

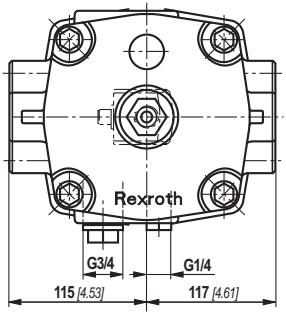
Type 10 TEN	Content in l *[gal]*	A1	A3 [1]	C1			
				Standard	Optional		
				Pipe thread according to ISO 228	Pipe thread according to ISO 228	SAE flange according to ISO 6162	Pipe thread according to SAE J1926
0160	3.5 *[0.92]*	160 *[6.30]*	160 *[6.30]*	G1 1/4	G1 1/2	SAE 1 1/4" 3000 psi/ SAE 1 1/2" 3000 psi/	SAE 24 1 7/8-12 UN-2B
0250	4.5 *[1.19]*	250 *[9.84]*	260 *[10.24]*	G1 1/2	G1 1/4		

[1] Servicing height for filter element replacement

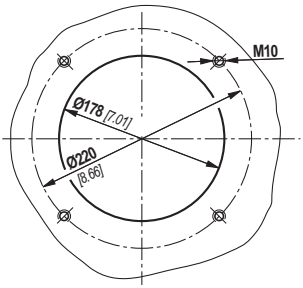
Unit dimensions size 0400...0630 (dimensions in mm *[inch]*)







Tank connection diagram:

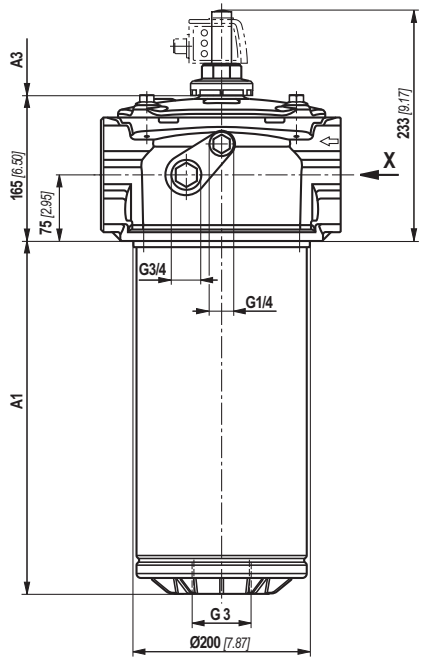


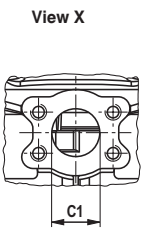
Filter housing of sizes 0400 to 0630

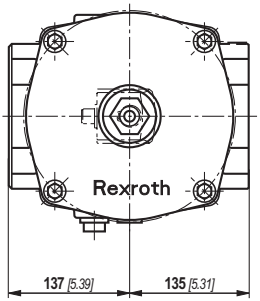
Size	Content in l *[gal]*	A1	A3 [1]	C1	
				Standard	Optional
				SAE flange according to ISO 6162	SAE flange according to ISO 6162
0400	7 *[1.85]*	255 *[10.04]*	250 *[9.84]*	SAE 2" 3000 psi	SAE 2 1/2" 3000 psi
0630	10 *[2.64]*	405 *[15.94]*	400 *[15.75]*	SAE 2 1/2" 3000 psi	SAE 2" 3000 psi

[1] Servicing height for filter element replacement

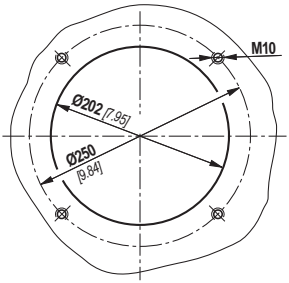
Unit dimensions size 1000...2500 (dimensions in mm *[inch]*)







Tank connection diagram:

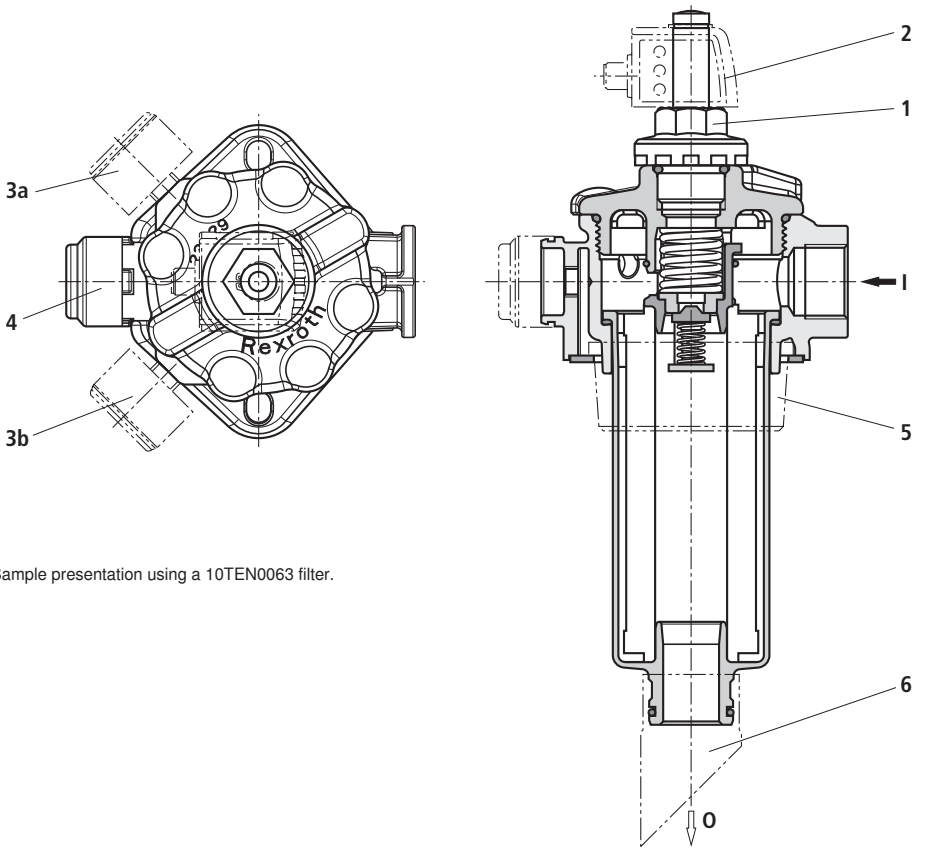


Filter housing of sizes 1000, 2000 and 2500

Size	Content in l *[gal]*	A1	A3 [1]	C1	
				Standard	Optional
				SAE flange according to ISO 6162	SAE flange according to ISO 6162
1000	15 *[3.96]*	391 *[15.39]*	530 *[20.87]*	SAE 3" 3000 psi	SAE 4" 3000 psi
2000	25 *[6.60]*	749 *[29.49]*	880 *[34.65]*	SAE 4" 3000 psi	SAE 3" 3000 psi
2500	32 *[8.45]*	983 *[38.70]*	1130 *[44.49]*		

[1] Servicing height for filter element replacement

Options



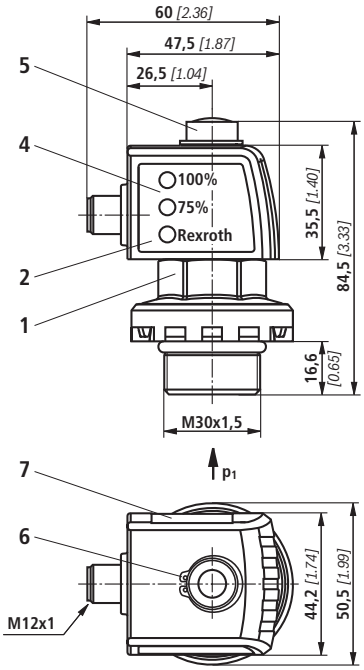
Sample presentation using a 10TEN0063 filter.

Options	Item	Ordering code	Filter size		
			0040…0100	0160…0630	1000…2500
Mechanical optical indicator	1	P2,2; V0,8; V1,5; V2,2	●	●	●
Pressure gauge right	3.a	MR	●	-	-
Pressure gauge left	3.b	ML	-	●	●
Mechanical optical + pressure gauge right	1 + 3.b	MRV2,2	●	●	●
Minimess connection	3.a or 3.b	M	●	●	●
Filling port (without maintenance indicator)	1	S	●	●	●
Outlet pipe [1]	6	R	●	See chapter "Spare parts and accessories"	
Ventilation filter	4	F	●	-	-
Ventilation filter + surge protection	4 + 5	FN	●	-	-
Electronic switching element	2	See chapter "Ordering code, standard types"			

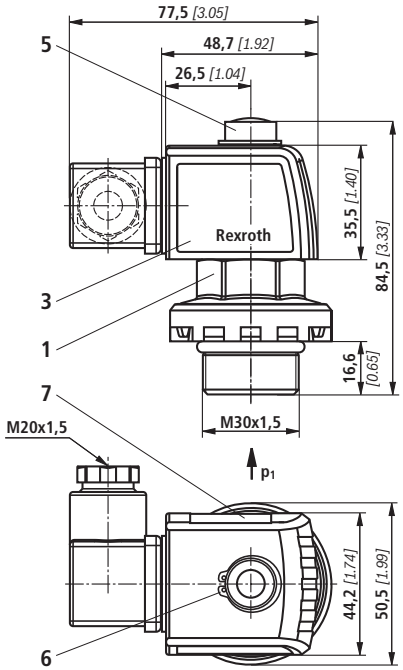
[1] Outlet pipe for sizes 0040…0100 are only available pre-assembled through the complete filter.
Outlet pipes for other sizes must be ordered separately and are not pre-assembled.
For the ordering code refer to "Spare parts and accessories".

Maintenance indicator (dimensions in mm *[inch]*)

Electronic switching element with round plug-in connection M12x1, 4-pin



Electronic switching element with rectangular plug-in connection EN 175301-803



1 Mechanical optical maintenance indicator;
max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*
Tightening torque for backpressure indicator in PA6.6 $M_{A\,max}$ = 35 Nm *[25.82 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°);
plug-in connection M12x1, 4-pin

3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°);
plug-in connection EN175301-803

4 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

5 Optical indicator bistable

6 Locking ring DIN 471-16x1,
Material no. R900003923

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

Switching elements with increased switching power at request.

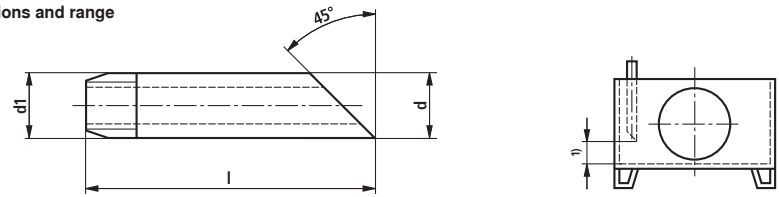
If an electronic switching element with signal suppression up to 30 °C is used (WE-2SPSU-M12X1, **R928028411**), it has to be ensured that the aluminum version of the mechanical-optical maintenance indicator must be used. In the filter type key, these maintenance indicators are referred to as "V2,2", "V1,5" or "V0,8". Also refer to the chapter "Spare parts and accessories".

The temperature-controlled signal processing does not work with mechanical-optical maintenance indicators made of polyamide.

Spare parts and accessories (dimensions in mm *[inch]*)

Pipes with threaded connection

Dimensions and range



1) Recommended distance to tank bottom (unless otherwise specified): 60…160 mm *[2.4…6.3"]*
From a pipe length of 400 mm, we strongly recommend fixing the outlet pipe by means of a tank-internal pipe bracket.

DN	Dimensions				Galvanized	ES (stainless)
					Description: **ROHR AB23-03/R...**	Description: **ROHR AB23-03/R... -ES**
	d	d1	l		Material no.	Material no.
40	48.3	R 1 1/2	250	1 1/2 L = 250	**R900109501**	**R900062066**
			400	1 1/2 L = 400	**R900083146**	**R900074878**
			800	1 1/2 L = 800	**R900029854**	–
			1300	1 1/2 L = 1300	**R900302230**	–
			2000	1 1/2 L = 2000	**R900229461**	–
50	60.3	R 2	400	2 L = 400	**R900727174**	**R900987657**
			800	2 L = 800	**R900029856**	**R900226706**
80	88.9	R 3	160	3 L = 160	**R900062845**	–
			200	3 L = 200	**R900061785**	**R900062067**
			350	3 L = 350	**R900084137**	–
			650	3 L = 650	**R900076923**	**R900757513**
			800	3 L = 800	**R900029838**	**R900987653**

Thread: Whitworth pipe thread according to DIN 2999 part 1, poppet 1:16
Material/surface treatment: St 33-1 according to DIN 17100 / galvanized (B) according to DIN 2444
1.4541

Order example/search term

Pipe according to DIN 2440 (ISO 65) with thread R 1 1/2 and L = 250 mm, galvanized:
ROHR AB23-03/R 1 1/2L = 250 Material no. R900109501

Spare parts and accessories

Mechanical optical maintenance indicator

W | O – S01 – – – 10 |

Maintenance indicator = W

Mechanical optical indicator = O

Design
Backpressure M30x1.5 = **S01**

Switching pressure
0.8 bar (not possible with PA version) = **0.8**
1.5 bar (not possible with PA version) = **1.5**
2.2 bar = **2.2**

Housing material
PA = Plastic
no code = Aluminum

Max. nominal pressure
10 = 10 bar

Seal
M = NBR seal
V = FKM seal

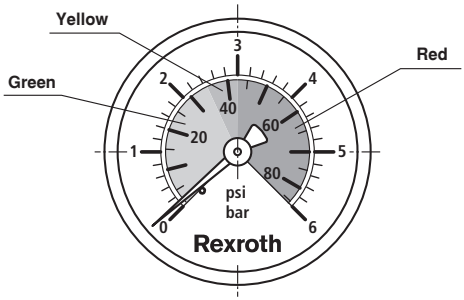
Mechanical optical maintenance indicator	Material no.
WO-S01-2,2-M-10	**R901025310**
WO-S01-2,2-V-10	**R901066232**
WO-S01-1,5-M-10	**R928038776**
WO-S01-1,5-V-10	**R928038774**
WO-S01-0,8-M-10	**R928038773**
WO-S01-0,8-V-10	**R928038772**
WO-S01-2,2-M-10-PA	**R928038771**
WO-S01-2,2-V-10-PA	**R928038769**

Ventilation filter element (only for 10TEN0040-0100)

Type	Material no.
71.001 P5-S00-0-0	**R928019705**

Pressure gauge

Type	Material no.
M010 0-6 bar	**R928019224**



Seal kit

D | 10TE | – |

Seal kit

Series 10 TE

Size
0040-0100 **N0040-0100**
0160-0250 **N0160-0250**
0400-0630 **N0400-0630**
1000 **N1000**
2000-2500 **2000-2500**

Seal
NBR seal = **M**
FKM seal = **V**

Seal kit	Material no.
D10TEN0040-0100-M	**R928028013**
D10TEN0160-0250-M	**R928028014**
D10TEN0400-0630-M	**R928028015**
D10TEN1000-M	**R928039806**
D10TE2000-2500-M	**R928039807**

Installation, commissioning and maintenance

Installation of the filter

When installing the filter make sure that

a) the required servicing height for removing the filter element and the filter bowl is available,

b) the installation opening for mounting the filter in the tank is not too large so that unobjectionable sealing is guaranteed,

c) the filter is assembled on the tank cover without tension stress, and

d) the filter housing is grounded.

The filter is designed with a two-part housing. It is to be installed into the tank with the filter bowl downward. It is recommended to lead drain pipes as of a length of 500 mm in a bracket in order to avoid oscillations caused by the fluid flow in the tank. It is to be ensured that in case of maintenance works, the filter bowl and the drain pipe are pulled out of the filter head together.

Connection of the electrical maintenance indicator

The electrical maintenance indicator is connected via the electrical switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

– After initial start-up of the system, the filter element is to be exchanged.

– Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.

– The filter element should be replaced or cleaned after max. 6 months.

Element exchange

– Switch off the system, discharge the filter on the pressure side.

– Remove the screws at the filter cover, loosen the filter cover and remove it upwards.

– Remove the filter element from the lower spigot in the filter bowl by turning it slightly.

– Check the seal rings at the filter cover and at the filter bowl for damage. If necessary, renew them. Also refer to seal kits in the "Spare parts and accessories" section.

– Renew filter element, filter elements made of wire mesh can be cleaned. The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the pressure differential after the filter element exchange exceeds 150 % of the value of a brand-new filter element, the G… element also needs to be replaced.

– Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.

– Install the new or cleaned filter element on the spigot again by slightly turning it.

– Reassemble the filter in reverse order.

Classification according to pressure equipment directive 97/23/EC

The tank mounted return line filters according to 51425 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). As the maximum operating pressure does not exceed 10 bar, they are - according to annex II diagram 4 of the PED - produced according to article 3 and not provided with a CE mark.

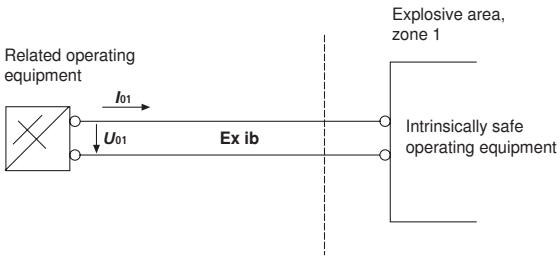
Use in explosive areas according to directive 94/9/EC (ATEX)

The tank mounted return line filters according to 51424 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

When using Rexroth filters in explosive areas, potential equalization must always be ensured.

Possible circuit according to DIN EN 60079-14



The manufacturer's declaration according to DIN EN 13463 is available for this filter separately, with Material no. R928028899.

Notes

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brfs-support@boschrexroth.de
www.eppensteiner.de

Inline Filters

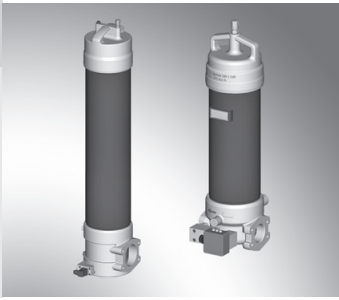
Designation	Type	Size	q_{Vmax} in l/min	p_{max} in bar	Data sheet	Page
Inline Filter with filter element according to DIN 24550	40 FLE(N)	0045 ... 1000	2000	40	51401	129
Inline Filter with filter element according to DIN 24550	100 FLE(N)	0045 ... 0630	1700	100	51402	145
Inline Filter	16 FE	2500 ... 7500	16000	16	51403	159
Inline Filter with filter element according to DIN 24550	245 LE(N)	0040 ... 0400	450	250	51421	175
Inline Filter with filter element according to DIN 24550	350 LE(N)	0040 ... 1000	700	350	51422	191
Inline Filter with filter element according to DIN 24550	445 LEN	0040 ... 1000	700	450	51423	209
Inline Filter with filter element according to DIN 24550	50 LE(N)	0040 ... 0400	300	50	51447	229
Inline Filter with filter element according to DIN 24550	110 LE(N)	0040 ... 0400	450	110	51448	245

Rexroth
Bosch Group

Inline filter

RE 51401/09.10 1/16
Replaces: 01.09

Types 40 FLEN 0160 to 1000; 40 FLE 0045, 0055, 0120 to 0270



Nominal sizes **according to DIN 24550**: 0160 to 1000
Nominal sizes according to BRFS: 0045, 0055, 0120 to 270
Nominal pressure 40 bar
Connections up to SAE 4”
Operating temperature –10 °C to +100 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Filtration of fluids and gases.
- Direct installation into pipe work.
- Direct wear protection of downstream components and systems.
- Offline filtration at high filter service lives.

Features

- Filters for inline installation
- Particularly suited for off-line filtration
- Extremely large filter area
- Flow optimised design due to 3D computer-supported design
- Low pressure drop
- Special highly efficient filter media

Design

Three part modular design comprising of lower filter part with inlet and outlet, mantel tube and removable threaded filter head.

Further design variants available on request.

Filter element

Pleated design with optimised pleat density and various filter media.

The filter element is the most important component of the system “FILTER” in view of prolonged life and wear protection of the system.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our “Filter Elements” brochure.

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Bypass valve

To protect the filter element during startup and over pressurisation due to clogging.

Characteristic curves

Our software “BRFilterSelect” makes it possible to optimise filter selection, see download area http://www.eppensteiner.de.

1)Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation programme.

Quality and standardization

The development, manufacture and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The pressure filters for hydraulic applications according to 51401 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EG (DGRL) However, on the basis of the exception in article 1, section 3.6 of the DGRL hydraulic filters are exempt from the DGRL, if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering code

Of the filter

40 | | | – A | – 0 | | V2,2 – S0 | | | |

Pressure
40 bar **= 40**

Design
Inline filter with filter element according to DIN 24550 **= FLEN**
Inline filter with filter element according to BRFS standard **= FLE**

Nom. size
FLEN… **= 0160 0250 0400 0630 1000**
FLE… **= 0045 0055 0120 0200 0270**

Filtration rating µm
Nominal
Stainless steel wire mesh, cleanable:
G10, G25 **= G…**
Paper, non-cleanable P10 **= P…**
Absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**

Element model
Standard adhesive T = 100 °C **= 0…**
Standard material **= …0**
Chemically nickel-plated **= …D** [1]

Solenoid
Without **= 0**

Complementary details
0 = Without
Z [2] **=** Certificate

Material
0 = Standard
D [1] **=** Chemically nickelplated

Seal
M = NBR seal
V = FKM seal

Connection
Inlet/Outlet
S0 = SAE flange

Clogging indicator
V2,2 = Clogging indicator, optical specify hydraulic pressure 2.2 bar

Bypass valve
0 = Without
7 = 3.5 bar

Ordering example:
40 FLE 0270 H10XL-A00-07V2,2-S0M00

Of the filter element

1. | | – A | – 0 –

Filter element
Design **= 1.**

Nom. size
FLEN… **= 0160 0250 0400 0630 1000**
FLE… **= 0045 0055 0120 0200 0270**

Filtration rating µm
Nominal
Stainless steel wire mesh, cleanable: G10, G25 **= G…**
Paper, non-cleanable: P10 **= P…**
Absolute (ISO 16889)
Micro glass, non-cleanable: H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = With filter element always 0

Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material
…D [1] **=** Chemically nickel-plated

Ordering example:
1. 0270 H10XL-A00-0-M

[1] Only in connection with FKM seal.

[2] Z = Manufacturer's inspection certificate M according to DIN 55350 T18

Preferred types

Inline filter with bypass, filtration rating 10 µm and nominal pressure 40 bar

Type	Flow [Li/min] → at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLEN 0160 H10XL-A00-07V2,2-S0M00	317	**R928000335**
40 FLEN 0250 H10XL-A00-07V2,2-S0M00	416	**R928000336**
40 FLE 0045 H10XL-A00-07V2,2-S0M00	496	**R928000340**
40 FLE 0055 H10XL-A00-07V2,2-S0M00	537	**R928000341**
40 FLEN 0400 H10XL-A00-07V2,2-S0M00	885	**R928000337**
40 FLEN 0630 H10XL-A00-07V2,2-S0M00	1129	**R928000338**
40 FLE 0120 H10XL-A00-07V2,2-S0M00	1355	**R928000342**
40 FLEN 1000 H10XL-A00-07V2,2-S0M00	1610	**R928000339**
40 FLE 0200 H10XL-A00-07V2,2-S0M00	2180	**R928000343**
40 FLE 0270 H10XL-A00-07V2,2-S0M00	2360	**R928000344**

Inline filter with bypass, filtration rating 3 µm and nominal pressure 40 bar

Type	Flow [Li/min] → at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLEN 0160 H3XL-A00-07V2,2-S0M00	135	**R928000325**
40 FLEN 0250 H3XL-A00-07V2,2-S0M00	210	**R928000326**
40 FLE 0045 H3XL-A00-07V2,2-S0M00	310	**R928000330**
40 FLE 0055 H3XL-A00-07V2,2-S0M00	385	**R928000331**
40 FLEN 0400 H3XL-A00-07V2,2-S0M00	390	**R928000327**
40 FLEN 0630 H3XL-A00-07V2,2-S0M00	610	**R928000328**
40 FLEN 1000 H3XL-A00-07V2,2-S0M00	715	**R928000329**
40 FLE 0120 H3XL-A00-07V2,2-S0M00	960	**R928000332**
40 FLE 0200 H3XL-A00-07V2,2-S0M00	1260	**R928000333**
40 FLE 0270 H3XL-A00-07V2,2-S0M00	1520	**R928000334**

Ordering details: Electronic switching element for clogging indicator

ABZ | F | V – | –1X/ | –DIN

Rexroth power unit accessories

Filter

Clogging indicator

Electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

Electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

Electronic switching element with 2 switching points (normally open/ normally closed), 75%, 100%, signal suppression up to 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = Unit series 10 to 19 (10 to 19: unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

4

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 40 bar *[580 psi]* with bypass valve, nominal size 270, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure fluid mineral oil HLP according to DIN 51524.

Filter: **40 FLE 0270 H10XL-A00-07V2,2-S0M00** **Material number: R928000344**

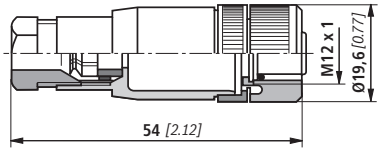
Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12 x 1

Plug-in connector for K24 4-pin, M12 x 1 with screwed connection, cable fitting Pg9.

Material no. R900031155



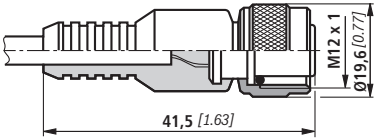
Plug-in connector for K24-3m 4-pin, M12 x 1 with moulded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

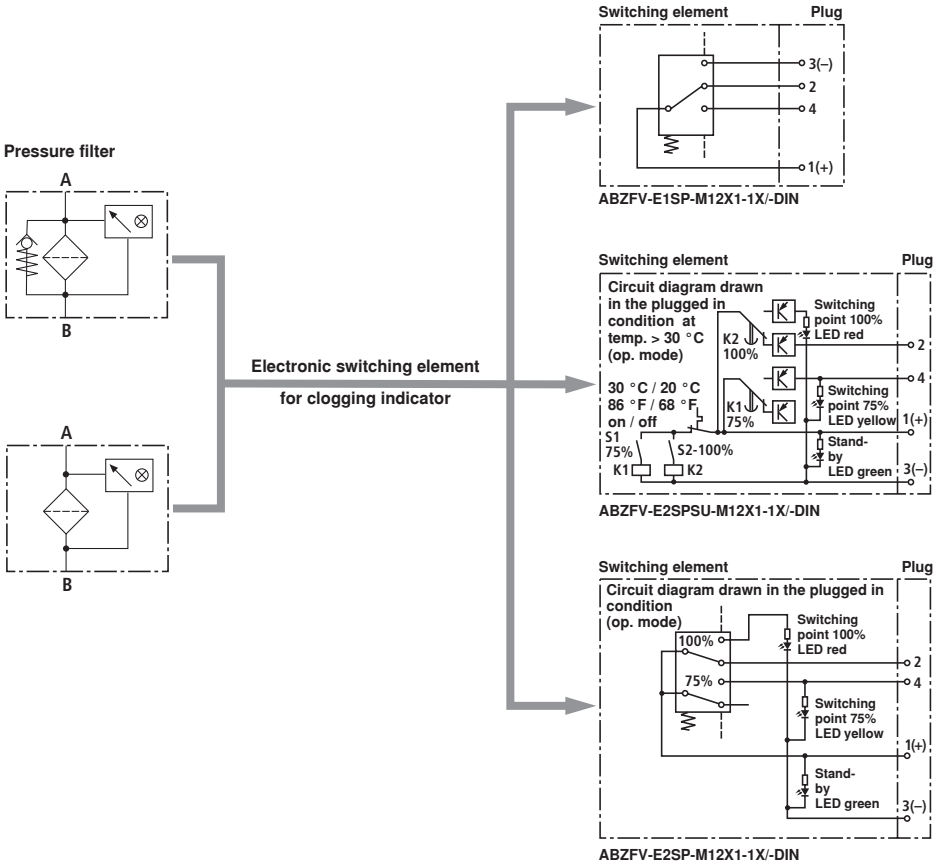
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For additional round plug-in connections, see data sheet 08006.

Symbols


Pressure filter
A
B
A
B
Electronic switching element
for clogging indicator
Switching element
Plug
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in condition at temp. > 30 °C (op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching point 100%
LED red
Switching point 75%
LED yellow
Stand-by
LED green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in condition
(op. mode)
100%
75%
Switching point 100%
LED red
Switching point 75%
LED yellow
Stand-by
LED green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

Technical data (For applications outside these parameters, please consult us!)

Electronic (electric switching element)

Electrical connection		Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage	A	max. 1
Voltage range	E1SP-M12x1 V DC/AC	max. 150
	E2SP V DC	10 to 30
Max. switching capacity with ohmic loads		20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1	Changeover
	E2SP-M12x1	Normally open at 75% of the response pressure Normally closed at 100% of the response pressure
	E2SPSU-M12x1	Normally open at 75% of the response pressure Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...		Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529		IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.		
Weight Electronic switching element: – with round plug-in connection M12 x 1	kg *[lbs]*	0.1 *[0.22]*

Characteristic curves

H3XL…

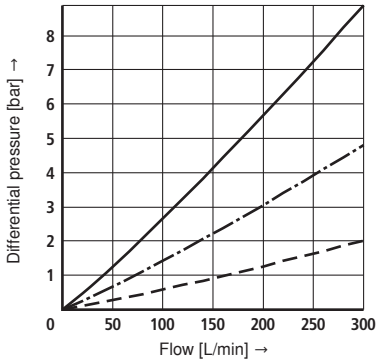
Specific weight: < 0.9 kg/dm^3

Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

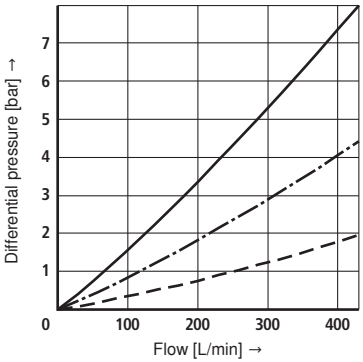
An optimum filter selection is made possible by using our "BRFilterSelect" computer programme.

Oil viscosity: 120 mm^2/s, 46 mm^2/s, 30 mm^2/s

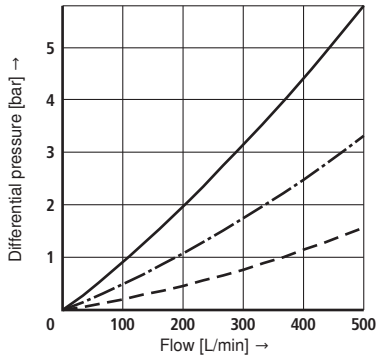
H3XL…0160



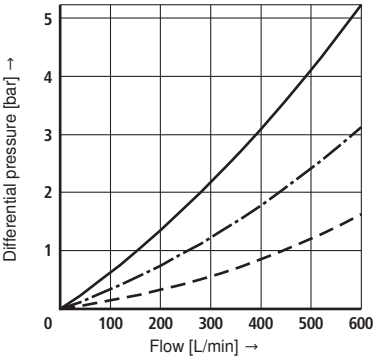
H3XL…0250



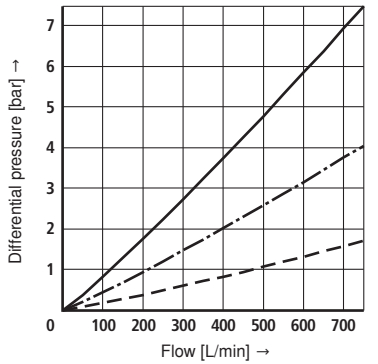
H3XL…0045



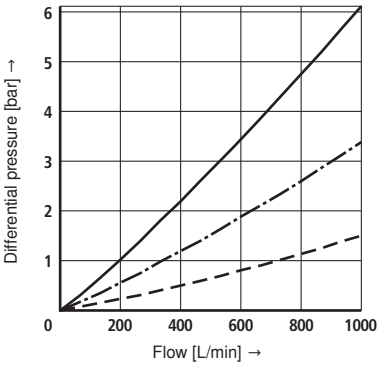
H3XL…0055



H3XL…0400



H3XL…0630



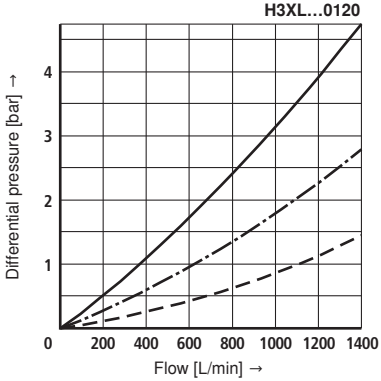
Characteristic curves

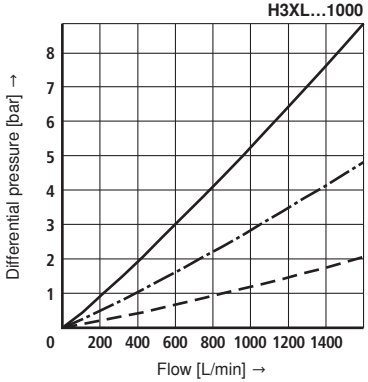
H3XL… und H10XL…

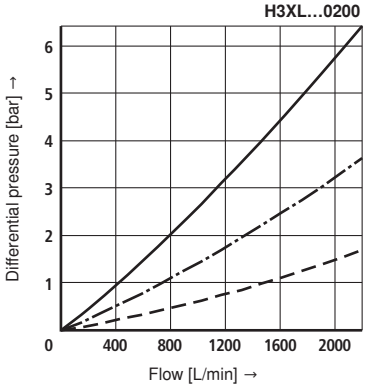
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

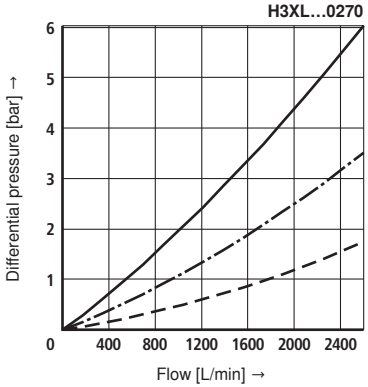
An optimum filter selection is made possible by using our "BRFilterSelect" computer programme.

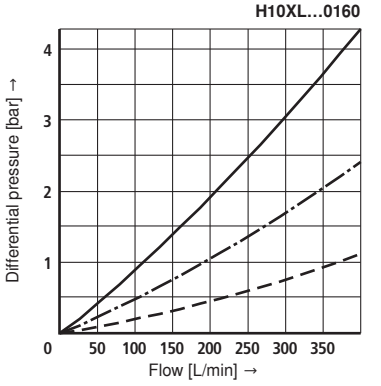
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

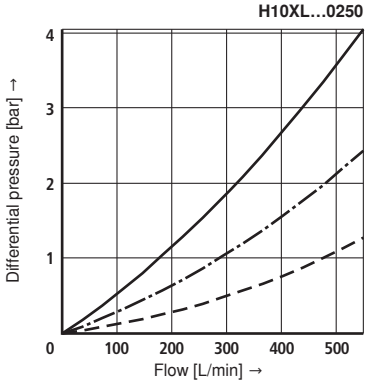












4

Characteristic curves

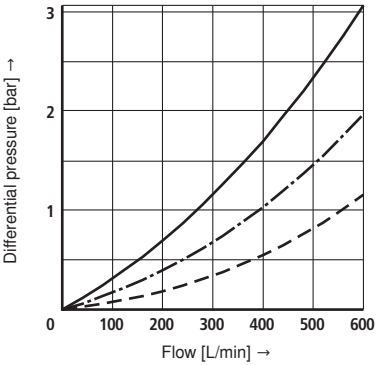
H10XL…

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

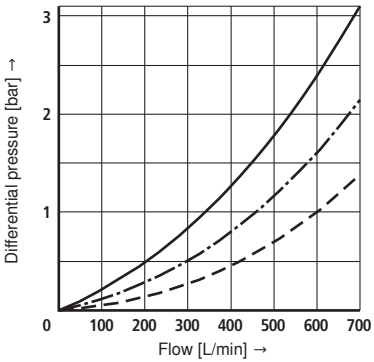
An optimum filter selection is made possible by using our "BRFilterSelect" computer programme.

Oil viscosity: —— 120 mm²/s, —·— 46 mm²/s, – – – 30 mm²/s

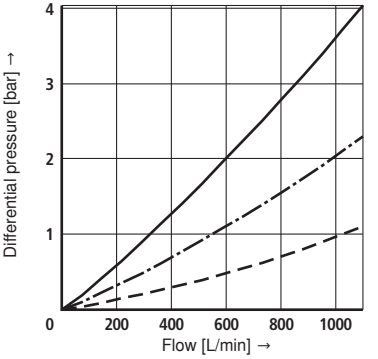
H10XL…0045



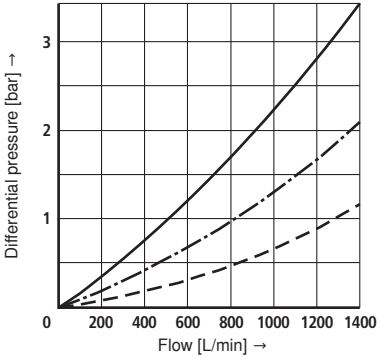
H10XL…0055



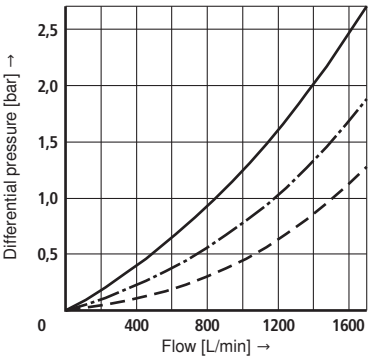
H10XL…0400



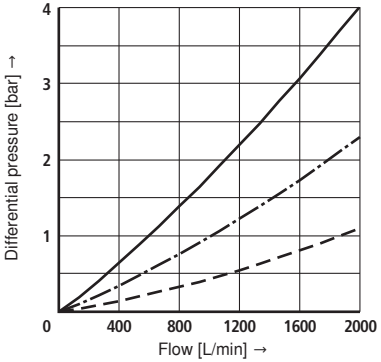
H10XL…0630



H10XL…0120



H10XL…1000



Characteristic curves

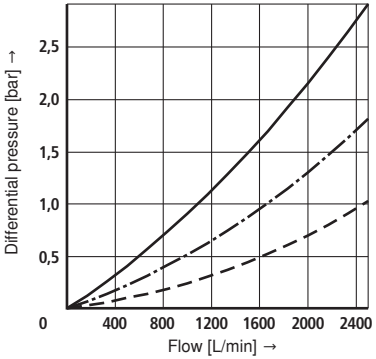
H10XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

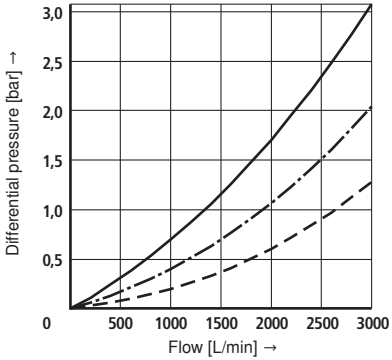
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

H10XL...0200

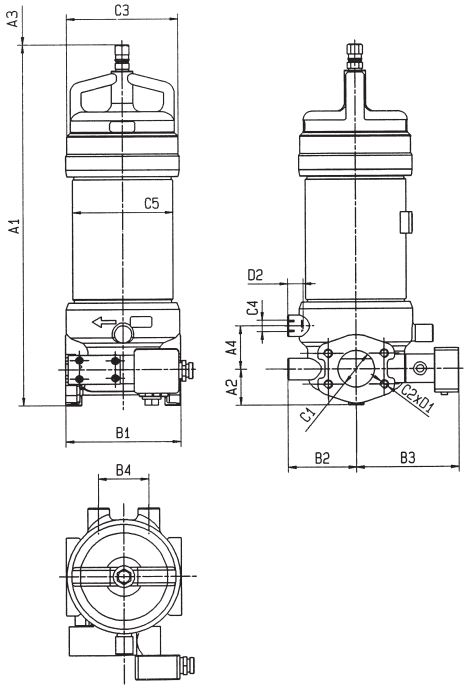


H10XL...0270



4

Dimensions: 40 FLEN 0160 - 0630, 40 FLE 0045, 0055, 0120 (dimensions in mm)



Filter housing for filter elements in accordance with DIN 24550

Type 40 FLEN...	Volume in L	Weight in kg [1]	A1	A2	A3 [2]	A4	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2
0160	1.4	12.0	411	49.5	160	60	160	95	143	70	SAE 2" 3000 psi DN50	M12	Ø 158	M16	Ø 140	21	22
0250	2.7	13.2	501		250												
0400	4.0	19.5	543	61.5		70	195	105	155	90	SAE 3" 3000 psi DN80	M16	Ø 188	M16	Ø 170	21	20
0630	7.1	21.9	693		400												

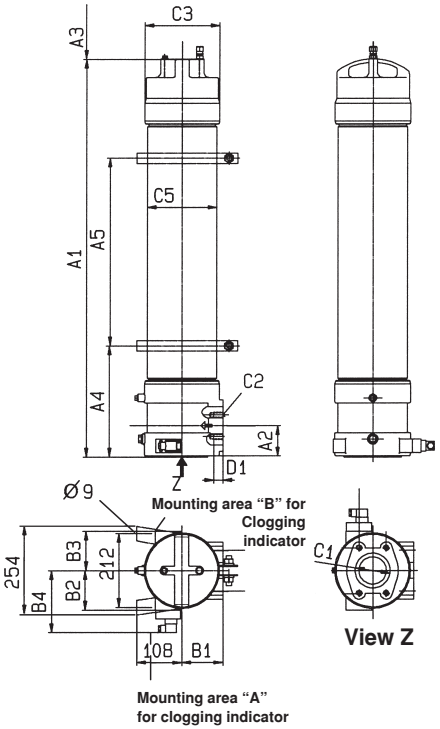
Filter housing for filter elements according to BRFS standard

Type 40 FLE...	Volume in L	Weight in kg [1]	A1	A2	A3 [2]	A4	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2
0045	4.8	19.0	663	49.5	400	60	160	95	143	70	SAE 2" 3000 psi DN50	M12	Ø 158	M16	Ø 140	21	22
0055	6.8	23.0	831		568												
0120	14	27.4	1050	61.5	750	70	195	105	155	90	SAE 3" 3000 psi DN80	M16	Ø 188	M16	Ø 170	21	20

[1] Weight including standard filter element and clogging indicator.

[2] Withdrawal dimension for filter element replacement.

Dimensions: 40 FLEN 1000, 40 FLE 0200 - 0270 (dimensions in mm)



Filter housing for filter elements in accordance with DIN 24550

Type 40 FLEN...	Volume in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	B1	B2	B3	B4	C1	C2	C3	C5	D1
1000	12	50	553	90		260	65	118	113	113	183	SAE 4" 3000 psi DN100	M16	Ø 216	Ø 200	26

Filter housing for filter elements according to BRFS standard

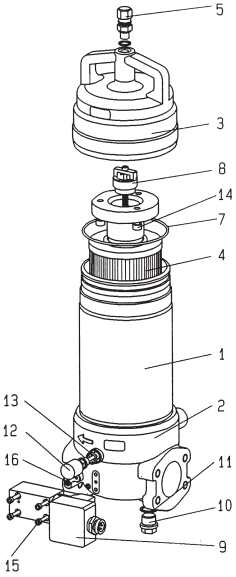
Type 40 FLE...	Volume in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	B1	B2	B3	B4	C1	C2	C3	C5	D1
0200	22	60	911	90	758	320	310	118	113	113	183	SAE 4" 3000 psi DN100	M16	Ø 188	Ø 200	26
0270	28	70	1145		992		540									

[1] Weight including standard filter element and clogging indicator.

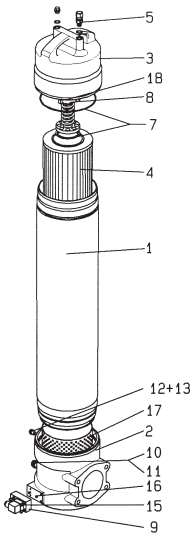
[2] Withdrawal dimension for filter element replacement.

Spare parts list

40 FLEN 0160 - 0630
40 FLE 0045 - 0120



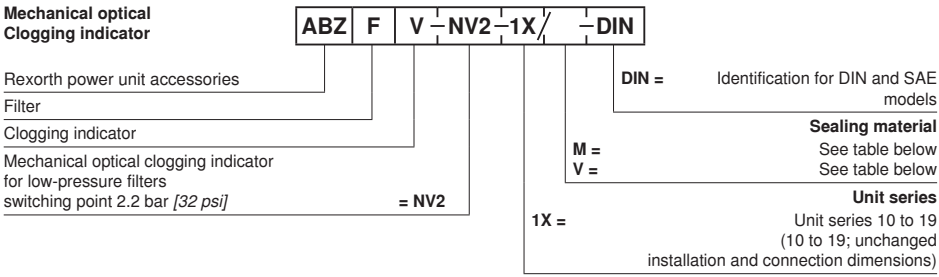
40 FLEN 1000
40 FLE 0200 - 0270



		Size FLEN		0160	0250			0400	0630		1000		
		FLE				0045	0055			0120		0200	0270
Part	**Piece**	**Description**	**Material**										
1	1	Filter housing	Various	Please indicate ordering information “Filter”									
2	1	Lower filter part	Various	Please indicate ordering information “Filter”									
3	1	Filter head	Various	Please indicate ordering information “Filter”									
4	1	Filter element	Various	Please indicate ordering information “Filter Element”									
5	1	Bleed screw	5.8	Part No. 4158									
7	3	Seal ring	NBR / FKM	Please indicate ordering information “Filter”									
8	1	Bypass valve	Various	Part No. 5360							Please indicate ordering information “Filter”		
9	1	Clogged indicator	Various	See ordering information “Clogging indicator”									
10	1	Blanking plug	Steel	Part No. 789									
11	1	Seal ring	Soft steel	Please indicate ordering information “Filter”									
12	1	Locking screw	Various	Part No. 4844									
13	1	Seal ring	Soft steel	Please indicate ordering information “Filter”									
14	3	Socket head cap screw	8.8	Part No. 637					Part No. 652		–		
15	4	Socket head cap screw	8.8	Part No. 633									
16	2	Seal ring	NBR / FKM	Please indicate ordering information “Filter”									
17	1	Protective basket	Steel	–							Part No. 4736		
18	1	Blanking plug	Steel	–							Part No. 795		

All part no.s BRFS-specific.

Spare parts (insert for DIN and SAE filters)



Mechanical optical Clogging indicator	Material no.
ABZFV-NV2-1X/M-DIN	R901025312

The ordering details for filter elements can be found on page 3.

Sealing kits must be ordered by stating the complete part key.

Sealing material and surface coating for pressure fluids

			Ordering detail	
Mineral oils			Sealing material	Element model and material
Mineral oil	HLP	according to DIN 51524	M	...0
Fire-resistant hydraulic fluids				
Emulsions	HFA-E	according to DIN 24320	M	...0
Synthetic water solutions	HFA-S	according to DIN 24320	M	...D
Water solutions	HFC	according to VDMA 24317	M	...D
Phosphate esters	HFD-R	according to VDMA 24317	V	...D
Organic esters	HFD-U	according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable				
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M	...D
Synthetic esters	HEES	according to VDMA 24568	V	...D
Polyglycoles	HEPG	according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information.

Screw the filter housing (position 1) to the fastening device considering the flow direction (direction arrows) and withdrawal height of the filter element (position 4).

Remove the plugs from the filter inlet and outlets. Fit the filter into the pipe work, ensuring that it is fitted free of tension.

⚠ Warning!

Assemble and disassemble the filter only when system is depressurised!

Vessel is under pressure!

When disassembling the filter, please note that the filter inlet and the filter outlet need to be emptied separately!

Remove the filter bowl only if it is not pressurised!

Do not replace the clogging indicator while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Switch on system pump.

Bleed filter by opening the plug / bleed valve (position 5), close when operating fluid vents.

Maintenance

If the red indicator pin shows out of the logging indicator and/ or if the switching process in the electric display is triggered, the filter element is clogged and needs to be replaced or cleaned respectively.

Filter element replacement

Switch of the operating pump.

Open bleed screw (position 5) and relieve pressure.

Open plug Pos. 10 and drain the contaminated oil from the filter housing.

Unscrew upper filter part / filter cover (position 3) and pull filter element from the spigot by rotating it slightly, and remove the same from the filter housing.

Again close plug Pos. 10.

Replace filter elements H...-XL, P..., clean the filter element with material G … . The efficiency of the cleaning process depends on the type of contamination and the value of the pressure differential before the filter element was exchanged.

If the pressure differential after replacing the filter element is more than 50% of the value before replacing the filter element then the G…. element also needs to be replaced.

Install the cleaned or new filter element into the filter housing and with light turning movements push it on to the centering spigot. Beforehand apply some oil to the filter element seal ring. During installation take care to ensure that the filter element is not damaged due to contact on the top edge of the mantel tube.

Check the seal ring Pos. 7 in the mantel tube for damage or wear and replace if necessary. Install filter head by rotating it clock-wise by hand up to the last thread and rotate back 1/4 rotation. Don't use any tools.

Carry out commissioning as described above.

Technical modifications reserved!

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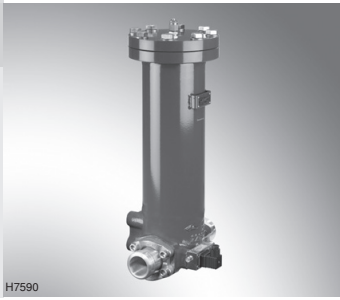
brfs-support@boschrexroth.de
www.eppensteiner.de

Rexroth
Bosch Group

Inline filter

RE 51402/09.10 1/14
Replaces: 02.09

Types 100 FLEN 0160 to 0630; 100 FLE 0045, 0055, 0120


H7590

Nominal sizes **according to DIN 24550:** 0160 to 0630
Nominal sizes according to BRFS: 0045, 0055, 0120
Nominal pressure 100 bar
Connections up to SAE 3“
Operating temperature –10 °C to +100 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Filtration of fluids and gases.
- Direct installation into pipelines.
- Direct wear protection of downstream components and systems.
- Offline filtration at high filter service lives.

Features:

- Filters for inline installation
- Particularly suited for off-line filtration
- Extremely large filter area
- Flow-optimized design due to 3D computer-supported design
- Low pressure drop
- Special highly efficient filter media

Design

Two-part design of filter housing with inlet and outlet as well as flange-mounted filter cover.

Further design variants available on request.

Filter element

Pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the “FILTER” system in view of prolonged life and the wear protection of the systems.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our brochure “Filter elements”.

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Characteristic curves

An optimum filter selection is made possible by our “BRFilterSelect” software, see download area http://www.eppensteiner.de.

Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation program.

Quality and standardization

The development, manufacture and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The pressure filters for hydraulic applications according to 51402 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (DGRL). However, on the basis of the exception in article 1, section 3.6 of the DGRL, hydraulic filters are exempt from the DGRL if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering code

Of the filter

100 | | | – | – 0 | | V5,0 – S0 | | 0 | |

Pressure
100 bar = **100**

Design
Inline filter with filter element according to DIN 24550 = **FLEN**
Inline filter with filter element according to BRFS standard = **FLE**

Nom. size
FLEN… = **0160 0250 0400 0630**
FLE… = **0045 0055 0120**

Filtration rating in µm

Nominal
Stainless steel wire mesh, cleanable:
G10, G25 = **G…**
Paper, non-cleanable P10 = **P…**

Absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL = **H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar = **A**
160 bar = **C**

Element model
Standard adhesive T = 100 °C = **0…**
Standard material = **…0**
Chemically nickel-plated = **…D** [1]

Solenoid
without = **0**

Bypass valve
0 = without
9 = 7 bar

Clogging indicator
V5,0 = Clogging indicator, optical
State switching pressure 5.0 bar

Connection
S0 = SAE flange

Seal
M = NBR-seal
V = FKM-seal

Material
0 = Standard

Complementary details
0 = without
Z [2] **=** Certificate

Ordering example:
100 FLE 0045 H10XL-A00-09V5,0-S0M00

Of the filter element

1. | | – | – 0 –

Filter element
Design = **1.**

Nom. size
FLEN… = **0160 0250 0400 0630**
FLE… = **0045 0055 0120**

Filtration rating in µm

Nominal
Stainless steel wire mesh, cleanable: G10, G25 = **G…**
Paper, non-cleanable: P10 = **P…**

Absolute (ISO 16889)
Micro glass, non-cleanable: H3XL, H10XL, H20XL = **H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar = **A**
160 bar = **C**

Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material
…D [1] **=** Chemically nickel-plated

Bypass valve
0 = with filter element always 0

Seal
M = NBR-seal
V = FKM-seal

Ordering example:
1. 0045 H10XL-A00-0-M

[1] Only in connection with FKM seal

[2] Manufacturer's inspection certificate M according to DIN 55350 T18

Preferred types

Inline filter with bypass, filtration rating 10 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLEN 0160 H10XL-A00-09V5,0-S0M00	317	**R928000536**
100 FLEN 0250 H10XL-A00-09V5,0-S0M00	416	**R928000537**
100 FLE 0045 H10XL-A00-09V5,0-S0M00	496	**R928000540**
100 FLE 0055 H10XL-A00-09V5,0-S0M00	537	**R928000541**
100 FLEN 0400 H10XL-A00-09V5,0-S0M00	885	**R928000538**
100 FLEN 0630 H10XL-A00-09V5,0-S0M00	1129	**R928000539**
100 FLE 0120 H10XL-A00-09V5,0-S0M00	1355	**R928000542**

Inline filter with bypass, filtration rating 3 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLEN 0160 H3XL-A00-09V5,0-S0M00	135	**R928000529**
100 FLEN 0250 H3XL-A00-09V5,0-S0M00	210	**R928000530**
100 FLE 0045 H3XL-A00-09V5,0-S0M00	310	**R928000533**
100 FLE 0055 H3XL-A00-09V5,0-S0M00	385	**R928000534**
100 FLEN 0400 H3XL-A00-09V5,0-S0M00	390	**R928000531**
100 FLEN 0630 H3XL-A00-09V5,0-S0M00	610	**R928000532**
100 FLE 0120 H3XL-A00-09V5,0-S0M00	960	**R928000535**

Inline filter without bypass, filtration rating 10 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLEN 0160 H10XL-C00-00V5,0-S0M00	317	**R928000578**
100 FLEN 0250 H10XL-C00-00V5,0-S0M00	416	**R928000579**
100 FLE 0045 H10XL-C00-00V5,0-S0M00	496	**R928000582**
100 FLE 0055 H10XL-C00-00V5,0-S0M00	537	**R928000583**
100 FLEN 0400 H10XL-C00-00V5,0-S0M00	885	**R928000580**
100 FLEN 0630 H10XL-C00-00V5,0-S0M00	1129	**R928000581**
100 FLE 0120 H10XL-C00-00V5,0-S0M00	1355	**R928000584**

Inline filter without bypass, filtration rating 3 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLEN 0160 H3XL-C00-00V5,0-S0M00	135	**R928000571**
100 FLEN 0250 H3XL-C00-00V5,0-S0M00	210	**R928000572**
100 FLE 0045 H3XL-C00-00V5,0-S0M00	310	**R928000575**
100 FLE 0055 H3XL-C00-00V5,0-S0M00	385	**R928000576**
100 FLEN 0400 H3XL-C00-00V5,0-S0M00	390	**R928000573**
100 FLEN 0630 H3XL-C00-00V5,0-S0M00	610	**R928000574**
100 FLE 0120 H3XL-C00-00V5,0-S0M00	960	**R928000577**

Ordering details: Electronic switching element for clogging indicator

ABZ | F | V – – 1X / – DIN

Rexroth power unit accessories

Filter

Clogging indicator

Electronic switching element with 1 switching point (changeover)
Round plug-in connection M12x1 **= E1SP-M12X1**

Electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

Electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, signal suppression until 30 °C
Round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = Unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

4

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 100 bar *[1450 psi]* with bypass valve, nominal size 0045, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure fluid mineral oil HLP according to DIN 51524.

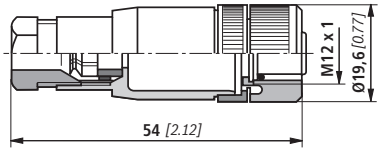
Filter: **100 FLE 0045 H10XL-A00-09V5,0-S0M00** **Material number: R928000540**
Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12 x 1

Plug-in connector for K24 4-pin, M12 x 1 with screwed connection, cable fitting Pg9.

Material no. R900031155

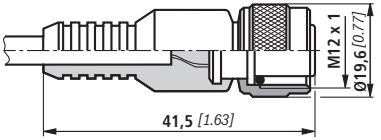


Plug-in connector for K24-3m 4-pin, M12 x 1 with molded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

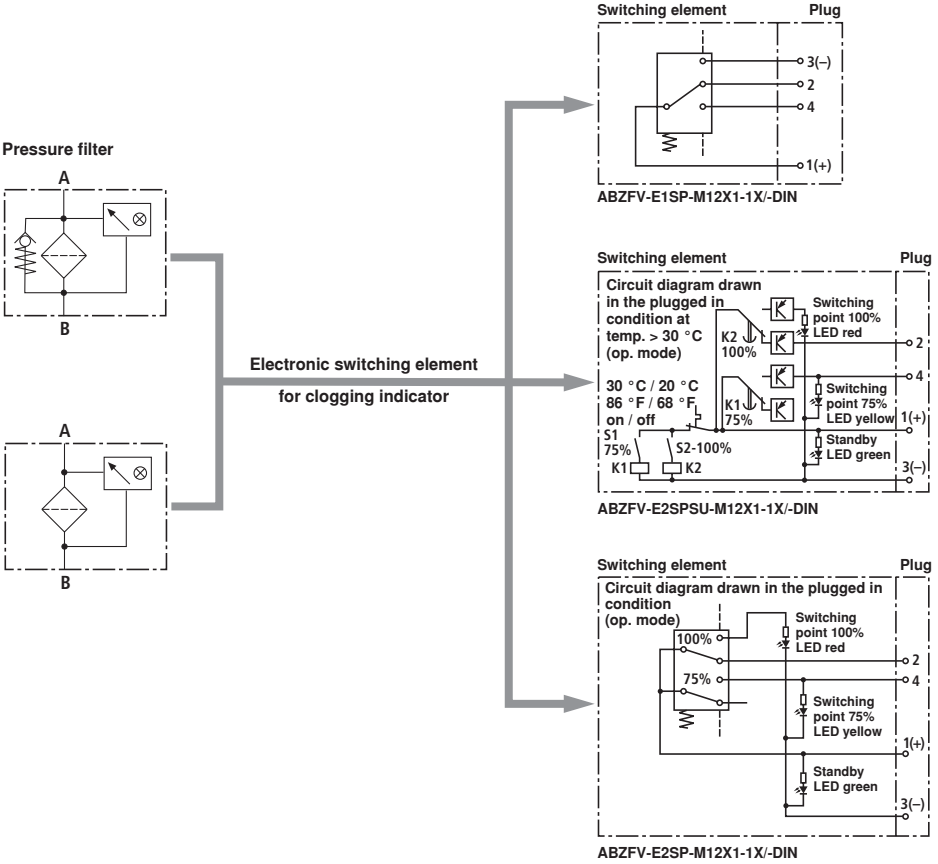
Core marking:
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For additional round plug-in connections, see data sheet 08006.

Symbols


Pressure filter
A
B
A
B
Electronic switching element
for clogging indicator
Switching element
Plug
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in condition at temp. > 30 °C (op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching point 100%
LED red
Switching point 75%
LED yellow
Standby
LED green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in condition
(op. mode)
100%
75%
Switching point 100%
LED red
Switching point 75%
LED yellow
Standby
LED green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

Technical data (For applications outside these parameters, please consult us!)

Electronic (electric switching element)

Electrical connection			Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage		A	Max. 1
Voltage range	E1SP-M12x1	V DC/AC	Max. 150
	E2SP	V DC	10 to 30
Max. switching capacity with ohmic loads			20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1		Changeover
	E2SP-M12x1		Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure
	E2SPSU-M12x1		Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...			Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529			IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.			
Weight Electronic switching element: – with round plug-in connection M12 x 1		kg *[lbs]*	0.1 *[0.22]*

Characteristic curves

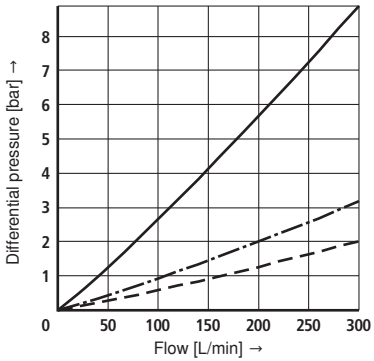
H3XL…

Specific weight: < 0.9 kg/dm³
Δp Q characteristic curves for complete filters
Recommended initial Δp for design = 0.8 bar

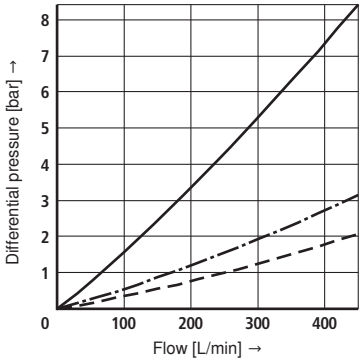
An optimum filter selection is made possible by our computer program “BRFilterSelect”.

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

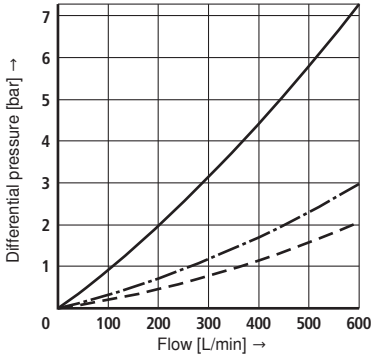
H3XL…0160



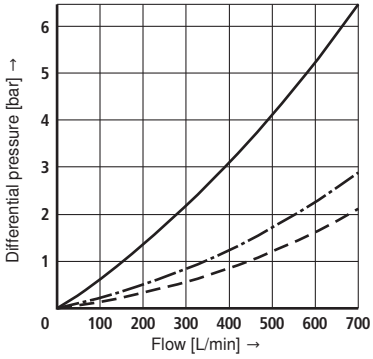
H3XL…0250



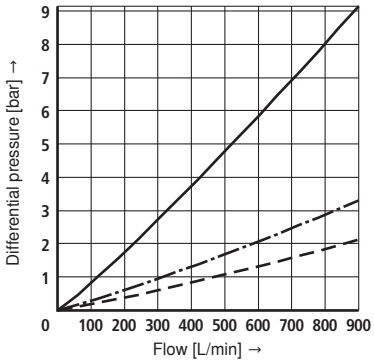
H3XL…0045



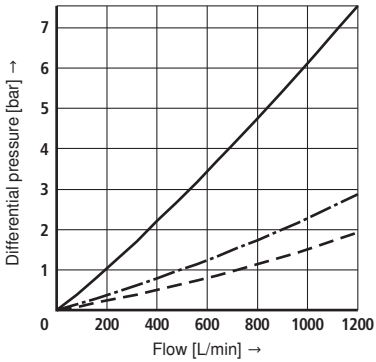
H3XL…0055



H3XL…0400



H3XL…0630



Characteristic curves

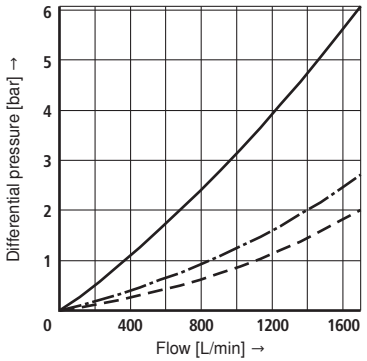
H3XL… and H10XL…

Specific weight: < 0.9 kg/dm³
Δp Q characteristic curves for complete filters
Recommended initial Δp for design = 0.8 bar

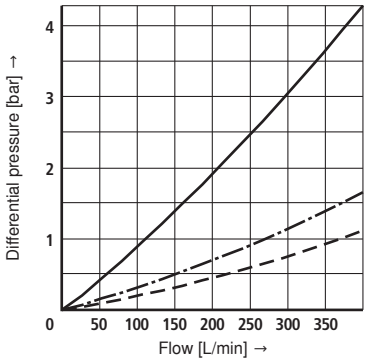
An optimum filter selection is made possible by our computer program “BRFilterSelect”.

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

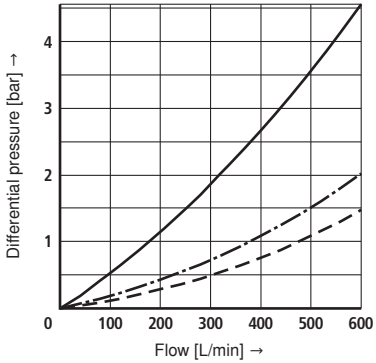
H3XL…0120



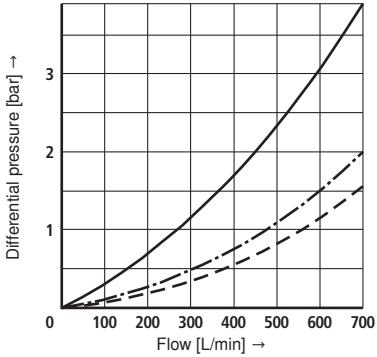
H10XL…0160



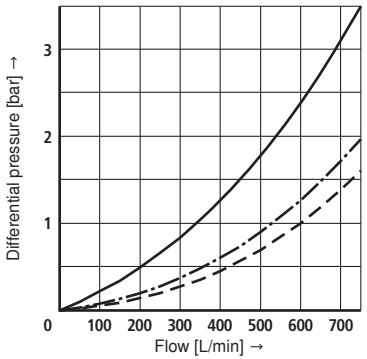
H10XL…0250



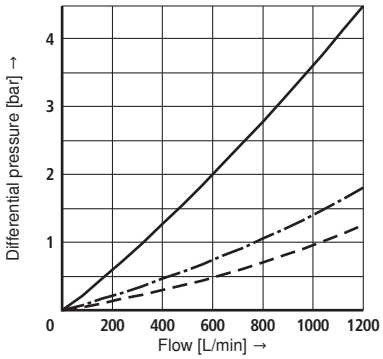
H10XL…0045



H10XL…0055



H10XL…0400



4

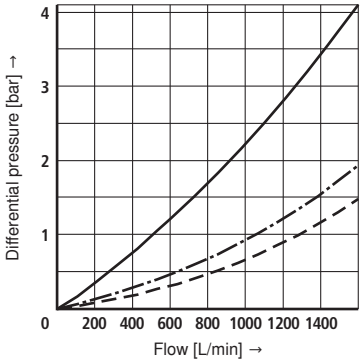
Characteristic curves H10XL…

Specific weight: < 0.9 kg/dm³
Δp Q characteristic curves for complete filters
Recommended initial Δp for design = 0.8 bar

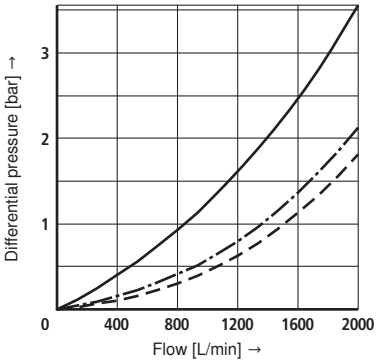
An optimum filter selection is made possible by our computer program “BRFilterSelect”.

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

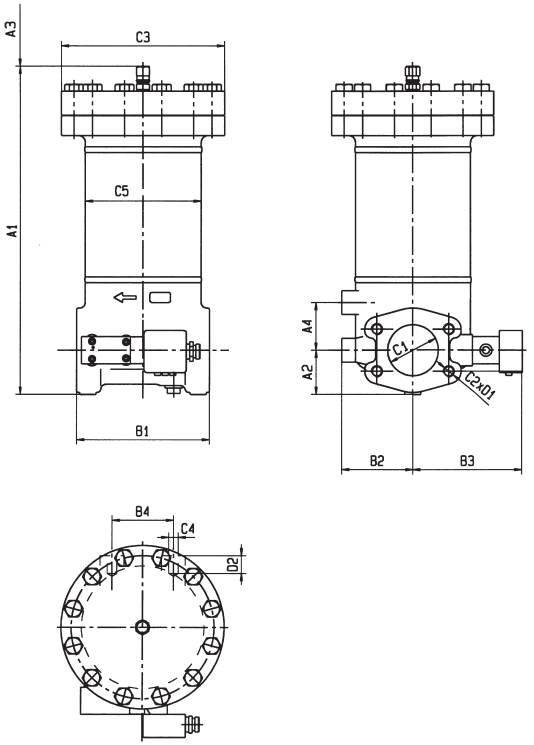
H10XL…0630



H10XL…0120



Unit dimensions (dimensions in mm)



Filter housing for filter elements in accordance with DIN 24550

Type 100 FLEN…	Volume in l	Weight in kg [1]	A1	A2	A3 [2]	A4	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2
0160	2.1	22.4	351	50	160	60	160	95	144	70	SAE 2“ 3000 psi DN50	M12	Ø 200	M16	Ø 140	21	22
0250	3.2	28.0	441		250												
0400	5.1	34.0	482	65		70	195	105	158	90	SAE 3“ 3000 psi DN80	M16	Ø 240	M16	Ø 170	22	20
0630	7.8	38.3	632		400												

Filter housing for filter elements according to BRFS standard

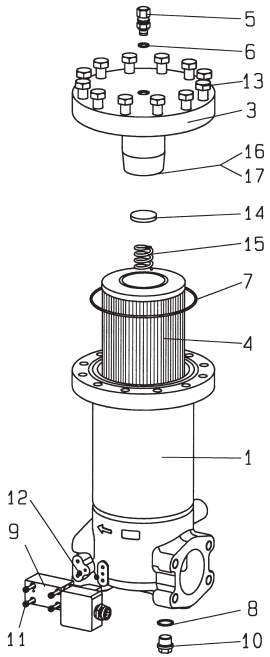
Type 100 FLE…	Volume in l	Weight in kg [1]	A1	A2	A3 [2]	A4	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2
0045	5.1	29.0	591	50	400	60	160	95	144	70	SAE 2“ 3000 psi DN50	M12	Ø 200	M16	Ø 140	21	22
0055	7.1	33	759		568												
0120	14.3	49.2	989	65	750	70	195	105	158	90	SAE 3“ 3000 psi DN80	M16	Ø 240	M16	Ø 170	22	20

[1] Weight including standard filter element and clogging indicator.

[2] Withdrawal dimension for filter element replacement.

Spare parts list

100 FLEN 0160 - 0630
100 FLE 0045 - 0120



		Size FLEN		0160	0250			0400	0630	
		FLE				0045	0055			0120
Part	**Piece**	**Description**	**Material**							
1	1	Filter housing	Various	Please indicate ordering information “Filter”						
3	1	Filter cover	Various	Please indicate ordering information “Filter”						
4	1	Filter element	Various	Please indicate ordering information “Filter Element”						
5	1	Bleed screw	5.8	Part No. 4158						
6	1	Seal ring	Soft steel	Please indicate ordering information “Filter”						
7	1	Seal ring	NBR / FKM	Please indicate ordering information “Filter”						
8	1	Seal ring	Soft steel	Please indicate ordering information “Filter”						
9	1	Maintenance indicator	Various	See ordering information “Clogging indicator”						
10	1	Plug	Steel	Part No. 789						
11	4	Hexagon socket head cap screw	8.8	Part No. 633						
12	2	Seal ring	NBR / FKM	Please indicate ordering information “Filter”						
13	8	Hexagonal head screw	8.8	Part No. 602				–		
	12			–				Part No. 603		
14	1	Valve calotte	Various	Please indicate ordering information “Filter”						
15	1	Valve spring	1.0600							
16	1	Valve disk	Steel							
17	1	Locking ring	Spring steel							

All part no.s BRFS-specific.

Spare parts (insert for DIN and SAE filters)

Mechanical optical Clogging indicator

Rexroth power unit accessories

Filter

Clogging indicator

Mechanical optical clogging indicator for high-pressure filters
Switching point 5 bar *[72 psi]* **= HV5**

DIN = Identification for DIN and SAE model

Sealing material

M = See table below
V = See table below

Unit series

1X = Unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Mechanical optical clogging indicator	**Material no.**
ABZFV-HV5-1X/M-DIN	R901025313

The ordering details for filter elements and sealing kits can be found on page 3.

Sealing kits must be ordered by stating the complete part key.

Sealing material and surface coating for pressure fluids

			Order detail	
Mineral oils			Sealing material	Element model
Mineral oil	HLP	according to DIN 51524	M	...0
Fire-resistant hydraulic fluids				
Emulsions	HFA-E	according to DIN 24320	M	...0
Synthetic water solutions	HFA-S	according to DIN 24320	M	...D
Water solutions	HFC	according to VDMA 24317	M	...D
Phosphate esters	HFD-R	according to VDMA 24317	V	...D
Organic esters	HFD-U	according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable				
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M	...D
Synthetic esters	HEES	according to VDMA 24568	V	...D
Polyglycoles	HEPG	according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information.

Screw the filter housing Pos. 1 to the fastening device, considering the flow direction (direction arrows) and the withdrawal height of the filter element Pos. 4.

Remove the plugs from the filter inlet and outlets. Fit the filter into the pipe work, ensuring that it is fitted free of tension.

⚠ Warning!

Assemble and disassemble the filter only when system is depressurized!

Vessel is under pressure!

When disassembling the filter, please note that the filter inlet and the filter outlet need to be emptied separately!

Remove the filter bowl only if it is not pressurized!

Do not replace the clogging indicator while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Switch on system pump.

Bleed filter by opening the plug / bleed valve position 5, close when operating fluid vents.

Maintenance

If at operating temperature, the red indicator pin shows out of the clogging indicator Pos. 9 and/or if the switching process in the electric display is triggered, the filter element is clogged and needs to be replaced or cleaned.

Filter element replacement

Switch of the system pump.

Open bleed screw (position 5) and relieve pressure.

Open plug Pos. 10 and drain the contaminated oil from the filter housing.

Unscrew the filter head / filter cover Pos. 3 and remove the filter element from the centering spigot in the lower filter part by turnign it lightly and remove it from the filter housing.

Again close plug Pos. 10.

Replace filter elements H...-XL and P..., clean the filter element with material G …. The efficiency of the cleaning process depends on the type of contamination and the value of the pressure differential before the filter element was exchanged.

If the pressure differential after replacing the filter element is more than 50% of the value before replacing the filter element then the G…. element also needs to be replaced.

Install the cleaned or new filter element into the filter housing and with light turning movements push it on to the centering spigot. Beforehand, apply some oil to the seal ring in the filter element. During installation take care to ensure that the filter element is not damaged due to contact on the top edge of the mantel tube.

Check the seal ring Pos. 7 in the mantel tube for damage or wear and replace if necessary.

Re-mount the filter cover with hexagonal head screws. (100 FLE...).

Carry out commissioning as described above.

Technical modifications reserved!

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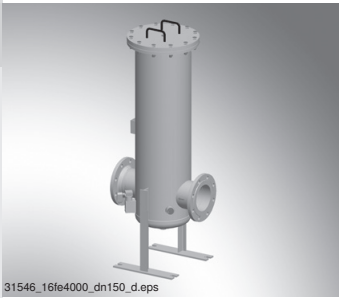
Phone +49 (0) 62 02 / 6 03-0
Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.eppensteiner.de

Inline filter

RE 51403/09.10 1/16
Replaces: 02.09

Types 16 FE 2500 to 7500



Nominal size: 2500 to 7500
Nominal pressures 16 bar
Connections up to DN 300
Operating temperature -10 °C to +90 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Filtration of fluids and gases.
- Direct installation into pipelines.
- Direct wear protection of downstream components and systems.

Features

- Filters for inline installation
- Particularly suited for off-line filtration
- Extremely large filter area
- Flow-optimized design due to 3D computer-supported design
- Low pressure drop.
- Special highly efficient filter media

Design

Steel welded construction of filter housing with connection for inlet and outlet positioned on the opposite side. Filter cover with bleed and filter housing with drain screws. Filter mounting by means of two welded on feet.
Materials as per spare parts list.

Further design variants available on request.

Filter element

Pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the "FILTER" system in view of the prolonged life and the wear protection of the systems.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our brochure "Filter Elements".

Bypass valve

To protect the filter element during startup and over pressurization due to clogging.

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electrical switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Bleed valve

For bleeding the filter in the commissioning and for the safe reduction of the operating pressure.

Cover lifting tool

For the simple lifting and pivoting of the filter cover in case of filter element replacement and maintenance.

Characteristic curves

An optimum filter selection is made possible by our "BRFilterSelect" software, see download area http://www.eppensteiner.de.

Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation program.

Quality and standardization

The development, manufacture, and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The strength calculation and filter tests are completed according to current rules as well as according to national and international standards.

The CE marking according to DGRL will be performed optionally, depending on the individual case and the operating conditions.

We will willingly perform the conformity evaluation according to DGRL for you.

Acceptance of the filters by classification companies will be possible upon request.

Ordering details

of the filter

16 | FE | | – A | – 0 | | V2,2 – D0 | | 0 | |

Pressure
16 bar = **16**

Design
Inline filter = **FE**

Nom. size
FE… = **2500 3000 4000 6000 7000 7500**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable:
G10, G25 = **G…**
Paper, non-cleanable P10 = **P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL = **H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar = **A**

Element model
Standard adhesive T = 100 °C = **0…**
Standard material = **…0**
chemically nickel-plated = **…D** [1]

Solenoid
without = **0**

Complementary details
0 = without
M = with cover lifting tool
Z [2] **=** Certificate

Material
0 = Standard

Seal
M = NBR seal
V = FKM seal

Connection
D0 = DIN flange

Clogging indicator
V2,2 = clogging indicator, optical
State switching pressure 2.2 bar

Bypass valve
0 = without
6 = 3 bar

Ordering example:
16 FE 3000 H10XL-A00-00V2,2-D0M00

of the filter element

2. | | – A | – | –

Filter element
Design = **2.**

Nom. size

Filter	Filter element	
	Number	Type
2500, 3000	3	**= 0058**
4000	4	**= 0059**
6000	6	**= 0059**
7000, 7500	10	**= 0059**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable: G10, G25 = **G…**
Paper, non-cleanable: P10 = **P…**
absolute (ISO 16889)
Micro glass, non-cleanable: H3XL, H10XL, H20XL = **H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar = **A**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = without
6 = 3 bar

Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material
…D [1] **=** chemically nickel-plated

Ordering example:
2.0058 H10XL-A00-0-M

[1] Only in connection with FKM seal.

[2] Z = manufacturer's inspection certificate M according to DIN 55350 T18

Preferred types

Inline filter with bypass, filtration rating 20 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.5 bar	Material number
16 FE 2500 H20XL-A 00-06V2,2-D0M00	2780	**R928001255**
16 FE 3000 H20XL-A 00-06V2,2-D0M00	3650	**R928001256**
16 FE 4000 H20XL-A 00-06V2,2-D0M00	4060	**R928001257**
16 FE 6000 H20XL-A 00-06V2,2-D0M00	6750	**R928001258**
16 FE 7000 H20XL-A 00-06V2,2-D0M00	9100	**R928001259**
16 FE 7500 H20XL-A 00-06V2,2-D0M00	13300	**R928001260**

Inline filter with bypass, filtration rating 10 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.5 bar	Material number
16 FE 2500 H10XL-A 00-06V2,2-D0M00	2400	**R928001249**
16 FE 3000 H10XL-A 00-06V2,2-D0M00	2950	**R928001250**
16 FE 4000 H10XL-A 00-06V2,2-D0M00	3540	**R928001251**
16 FE 6000 H10XL-A 00-06V2,2-D0M00	5750	**R928001252**
16 FE 7000 H10XL-A 00-06V2,2-D0M00	8100	**R928001253**
16 FE 7500 H10XL-A 00-06V2,2-D0M00	11800	**R928001254**

Inline filter with bypass, filtration rating 3 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.5 bar	Material number
16 FE 2500 H3XL-A 00-06V2,2-D0M00	1390	**R928001243**
16 FE 3000 H3XL-A 00-06V2,2-D0M00	1480	**R928001244**
16 FE 4000 H3XL-A 00-06V2,2-D0M00	2100	**R928001245**
16 FE 6000 H3XL-A 00-06V2,2-D0M00	3250	**R928001246**
16 FE 7000 H3XL-A 00-06V2,2-D0M00	5050	**R928001247**
16 FE 7500 H3XL-A 00-06V2,2-D0M00	5550	**R928001248**

Preferred types

Inline filter without bypass, filtration rating 20 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.5 bar	Material number
16 FE 2500 H20XL-A 00-00V2,2-D0M00	2780	**R928001237**
16 FE 3000 H20XL-A 00-00V2,2-D0M00	3650	**R928001238**
16 FE 4000 H20XL-A 00-00V2,2-D0M00	4060	**R928001239**
16 FE 6000 H20XL-A 00-00V2,2-D0M00	6750	**R928001240**
16 FE 7000 H20XL-A 00-00V2,2-D0M00	9100	**R928001241**
16 FE 7500 H20XL-A 00-00V2,2-D0M00	13300	**R928001242**

Inline filter without bypass, filtration rating 10 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.5 bar	Material number
16 FE 2500 H10XL-A 00-00V2,2-D0M00	2400	**R928001231**
16 FE 3000 H10XL-A 00-00V2,2-D0M00	2950	**R928001232**
16 FE 4000 H10XL-A 00-00V2,2-D0M00	3540	**R928001233**
16 FE 6000 H10XL-A 00-00V2,2-D0M00	5750	**R928001234**
16 FE 7000 H10XL-A 00-00V2,2-D0M00	8100	**R928001235**
16 FE 7500 H10XL-A 00-00V2,2-D0M00	11800	**R928001236**

Inline filter without bypass, filtration rating 3 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.5 bar	Material number
16 FE 2500 H3XL-A 00-00V2,2-D0M00	1390	**R928001225**
16 FE 3000 H3XL-A 00-00V2,2-D0M00	1480	**R928001226**
16 FE 4000 H3XL-A 00-00V2,2-D0M00	2100	**R928001227**
16 FE 6000 H3XL-A 00-00V2,2-D0M00	3250	**R928001228**
16 FE 7000 H3XL-A 00-00V2,2-D0M00	5050	**R928001229**
16 FE 7500 H3XL-A 00-00V2,2-D0M00	5550	**R928001230**

Ordering details: electronic switching element for clogging indicator

ABZ | F | V – | –1X / –DIN

Rexroth power unit accessories

Filter

Clogging indicator

electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

electronic switching element with 2 switching points (normally open/ normally closed), 75%, 100%, signal suppression until 30 °C Round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 16 bar *[232 psi]* with bypass valve, nominal size 3000, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure liquid mineral oil HLP according to DIN 51524.

Filter: **16 FE 3000 H10XL-A00-00V2,2-D0M00** **Material number: R928001232**

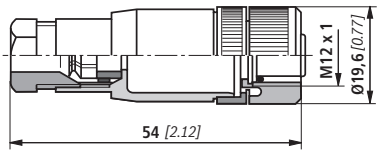
Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12 x 1

Plug-in connector for K24 4-pin, M12 x 1 with screwed connection, cable fitting Pg9.

Material no. R900031155



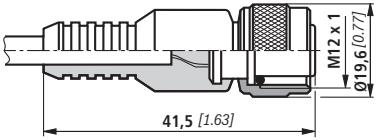
Plug-in connector for K24-3m 4-pin, M12 x 1 with molded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

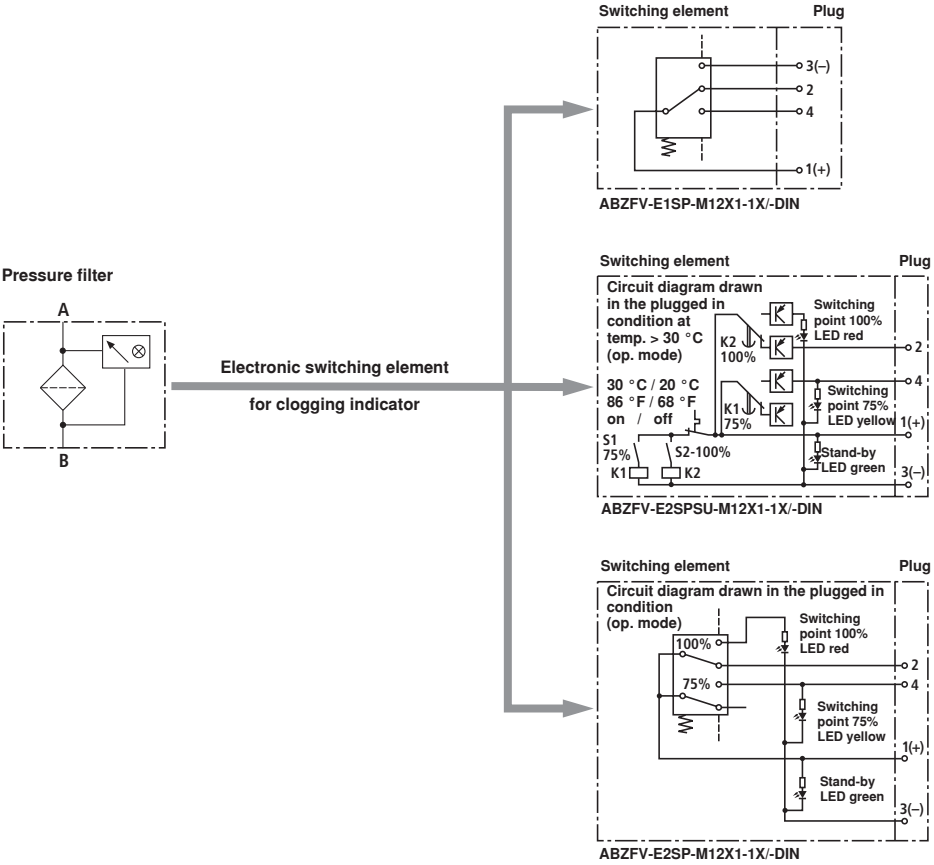
1 brown
2 white
3 blue
4 black

Material no. R900064381



For additional round plug-in connections, see data sheet 08006.

Symbols


Pressure filter
A
B
Electronic switching element
for clogging indicator
Switching element
Plug
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in condition at temp. > 30 °C (op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching point 100% LED red
Switching point 75% LED yellow
Stand-by LED green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in condition (op. mode)
100%
75%
Switching point 100% LED red
Switching point 75% LED yellow
Stand-by LED green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

4

Technical data (for applications outside these parameters, please consult us!)

Electronic (electric switching element)

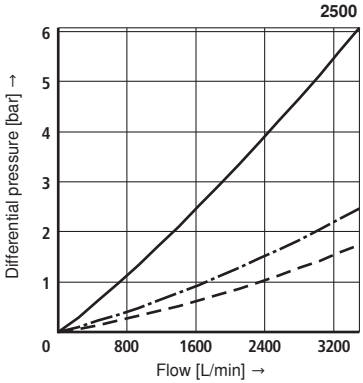
Electrical connection		Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage	A	Max. 1
Voltage range	E1SP-M12x1 V DC/AC	Max. 150
	E2SP V DC	10 to 30
Max. switching capacity with ohmic loads		20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1	Changeover
	E2SP-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure
	E2SPSU-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...		Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529		IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.		
Weight electronic switching element: – with round plug-in connection M12 x 1	kg *[lbs]*	0.1 *[0.22]*

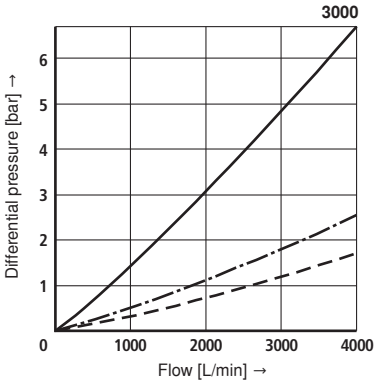
Characteristic curves H3XL...

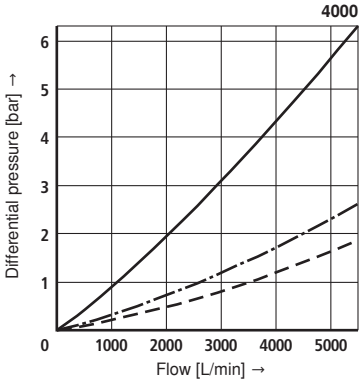
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended
initial Δ*p* for design = 0.8 bar

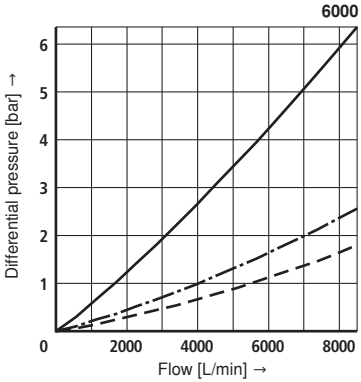
An optimum filter selection is made possible by our computer program "BRFilterSelect".

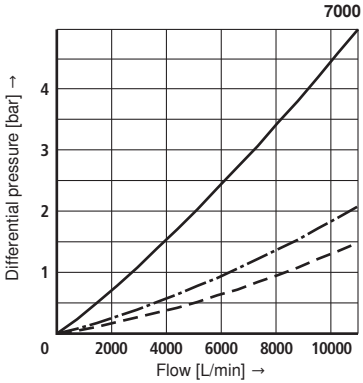
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

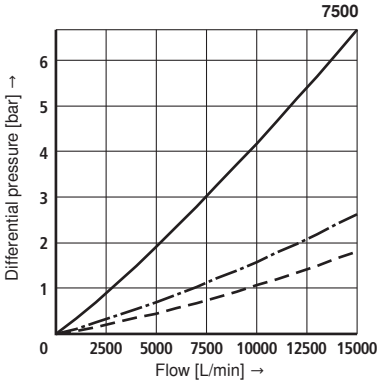












4

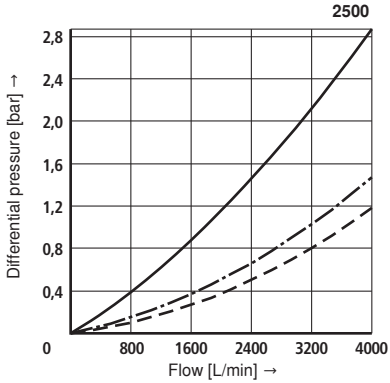
Characteristic curves

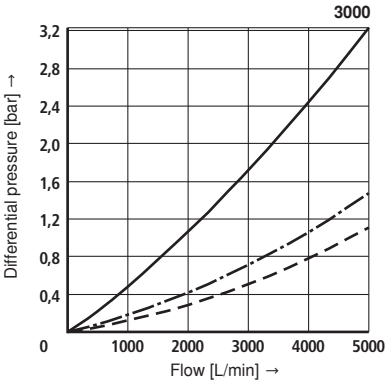
H10XL...

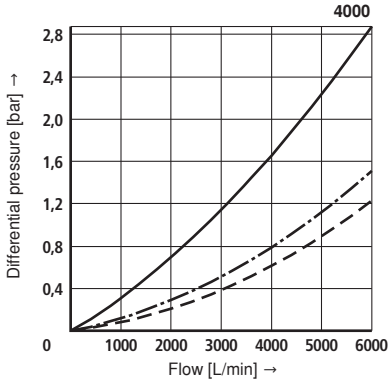
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

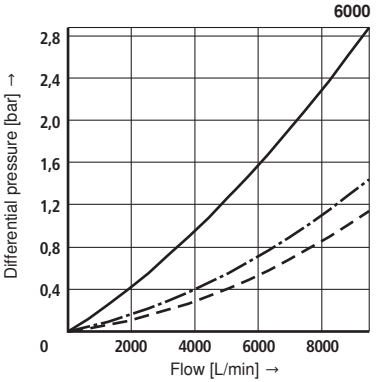
An optimum filter selection is made possible by our computer program "BRFilterSelect".

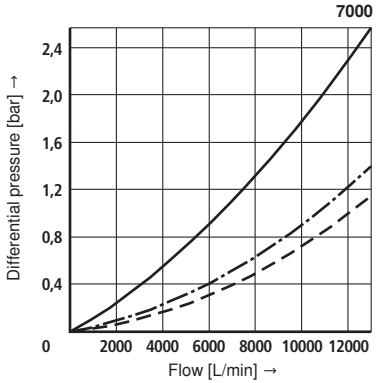
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

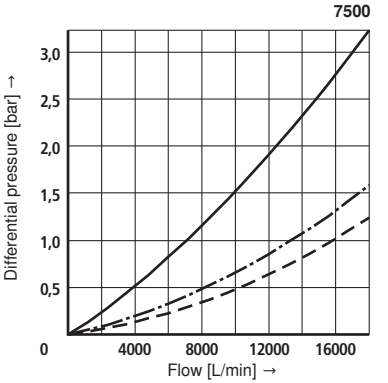












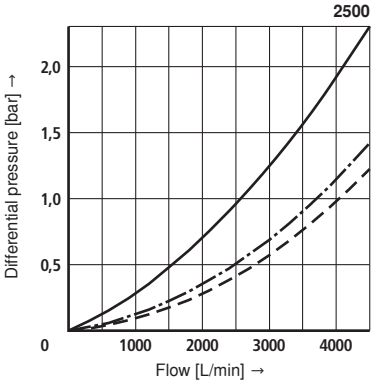
Characteristic curves

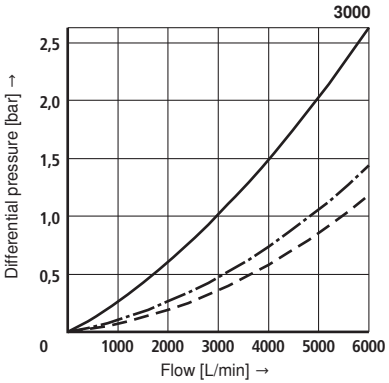
H20XL...

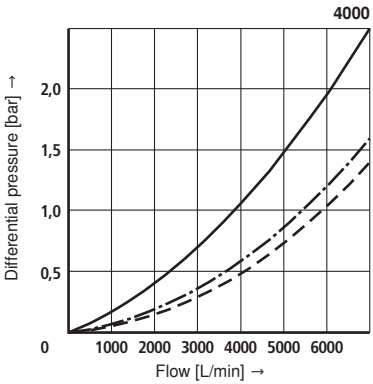
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

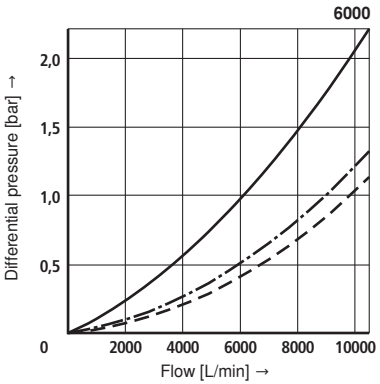
An optimum filter selection is made possible by our computer program "BRFilterSelect".

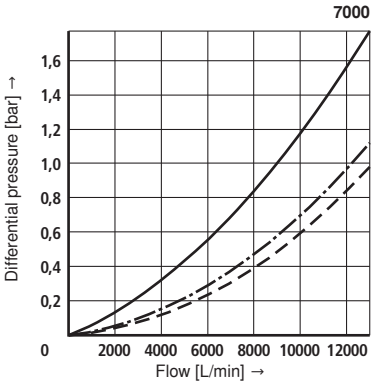
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

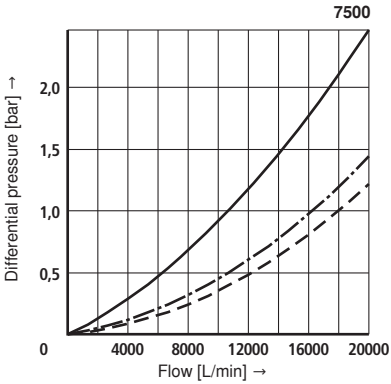












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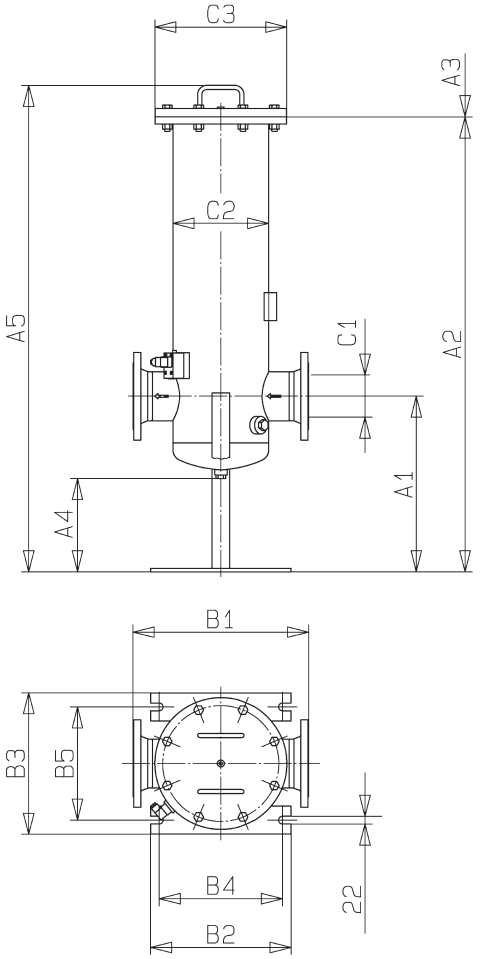
Unit dimensions (dimensions in mm)

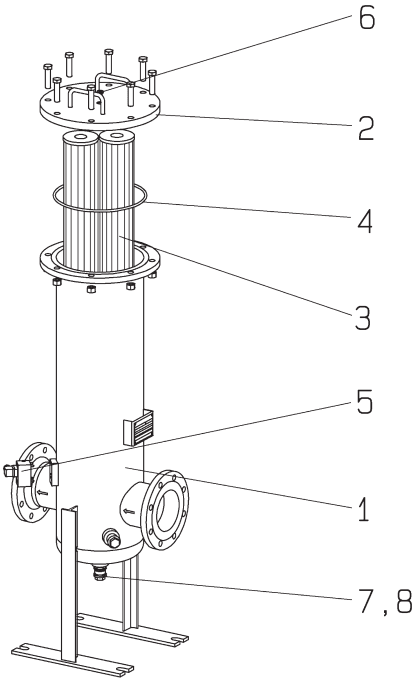


Type 16 FE…	Content in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3
2500	51	104	500	1295	860	257	1385	500	400	403	350	323	DN 125	Ø 273	Ø 375
3000	53	108	500	1295	860	257	1385	500	400	403	350	323	DN 150	Ø 273	Ø 375
4000	94	140	450	1375	990	214	1465	550	400	454	350	374	DN 150	Ø 323.9	Ø 420
6000	149	168	500	1640	990	212	1730	600	400	486	350	406	DN 200	Ø 355.6	Ø 445
7000	335	333	500	1675	990	150	1841	740	400	639	350	559	DN 250	Ø 508	Ø 645
7500	344	355	500	1705	990	114	1870	750	400	639	350	559	DN 300	Ø 508	Ø 645

[1] Weight including standard filter element and clogging indicator.

[2] Withdrawal dimension for filter element replacement.

Spare parts



Part	Piece	Description	Material	Ordering information 16 FE…					
			Steel	2500	3000	4000	6000	7000	7500
1	1	Filter housing	Steel	Please indicate ordering information “Filter”					
2	1	Filter cover	Steel	Please indicate ordering information “Filter”					
3	1	Filter element kit	various	Please indicate ordering information “Filter Element”					
				3 Single elements 2.0058		4 Single elements 2.0059	6 Single elements 2.0059	10 Single elements 2.0059	
3.1	1	Seal ring kit	NBR / FKM	Please indicate ordering information “Filter”					
4	1	Seal ring	NBR / FKM	Please indicate ordering information “Filter”					
5	1	Clogging indicator	various	Please indicate ordering information “Clogging indicator”					
6	1	Bleed	1.4571 / FKM	Part No. 13284					
7	2	Plug	5.8	Part No. 791					
8	2	Seal ring	Soft steel	Part No. 335					

All part numbers BRFS specific.

Spare parts (insert for DIN and SAE filters)

Mechanical optical clogging indicator

ABZ F V – NV2 – 1X / – DIN

Rexroth power unit accessories

Filter

Clogging indicator

mechanical optical clogging indicator for low-pressure filters
Switching point 2.2 bar *[32 psi]* **= NV2**

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Unit series

M = see table below
V = see table below

Sealing material

DIN = Identification for DIN and SAE models

Mechanical optical clogging indicator	**Material no.**
ABZFV-NV2-1X/M-DIN	R901025312

The ordering details for filter elements can be found on page 3.

Sealing kits must be ordered by stating the complete part key.

Sealing material and surface coating for pressure fluids

		Ordering details	
Mineral oils		Sealing material	Element model
Mineral oil	HLP according to DIN 51524	M	...0
Fire-resistant hydraulic fluids			
Emulsions	HFA-E according to DIN 24320	M	...0
Synthetic water solutions	HFA-S according to DIN 24320	M	...D
Water solutions	HFC according to VDMA 24317	M	...D
Phosphate esters	HFD-R according to VDMA 24317	V	...D
Organic esters	HFD-U according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable			
Triglycerides (rape seed oil)	HETG according to VDMA 24568	M	...D
Synthetic esters	HEES according to VDMA 24568	V	...D
Polyglycoles	HEPG according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information.

Install the filter into the pipe work; when doing so, consider the flow direction and the withdrawal height of the filter elements.

⚠ Warning!

Vessel is under pressure!

Assemble and disassemble the filter only when system is depressurized!

Do not replace the clogging indicator while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Switch on system pump.

Bleed filter by opening the bleed screw, close when operating fluid vents.

Maintenance

If at operating temperature, the red indicator pin shows out of the clogging indicator so far that it contacts the plastic-cap and/or if the switching process in the electric display is triggered, the filter elements are clogged and need to be replaced or cleaned respectively.

Filter element replacement

Close the shut-off device.

Open the bleed screw and reduce the pressure. Lift off the filter cover. Open the plug at the filter housing and drain the filter. Remove the filter elements from the lower centering spigots in the filter housing by turning them lightly.

Check the filter housing for cleanliness and clean if necessary.

Replace the filter elements.

Re-install the cleaned or new filter elements (fabric material) into the filter housing. Check the seal and replace it in case of damage or wear. Re-attach the filter cover.

Close the plug at the filter housing. Fill the filter slowly. When operating fluid vents, close the bleed screw.

Filter is ready for use.

Notes

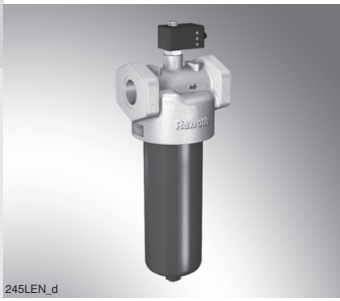
Bosch Rexroth Filtration Systems GmbH
Hardtwaldstraße 43, 68775 Ketsch, Germany
POB 1120, 68768 Ketsch, Germany
Phone +49 (0) 62 02 / 6 03-0
Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.eppensteiner.de

Rexroth
Bosch Group

Inline filter with filter element according to DIN 24550

RE 51421/07.11 1/16
Replaces: 12.10

Type 245LEN0040 to 400; 245LE0130, 0150



245LEN_d

Size according to **DIN 24550**: 0040 to 0400
Additional sizes: 0130, 0150
Nominal pressure 250 bar *[3628 psi]*
Connection up to G 1 1/2; SAE 1 1/2; SAE 24
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

Inline filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for installation into pipelines.

They distinguish themselves by the following:

- Special highly efficient filter media
- Adsorption of very fine particles across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized design due to 3D computer-supported design

Ordering code

of the filter

245	LE	N	–		00	–	V5,0	–	

Pressure
250 bar
[3628 psi] **= 245**

Inline filter
simple **= LE**

Filter element
according to DIN 24550 **= N**

Size
LEN… **= 0040 0063 0100 0160 0250 0400**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Element design
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Connection

	Frame size	0040	0063-0100	0130-0150	0160-0400	
	Connection					
R2 =	G1/2	•	x			Pipe thread according to ISO 228
R3 =	G3/4	x	x			
R4 =	G1	x	•	x		
R5 =	G1 1/4			•	x	
R6 =	G1 1/2			x	•	
S6 =	SAE 1 1/2"				x	SAE flange 6000 psi
U3 =	SAE 10	x				Pipe thread according to SAE J1926
U4 =	SAE 12		x			
U5 =	SAE 20			x		
U6 =	SAE 24				x	

• = Standard connection
x = Additional connection possibility

Seal
M = NBR seal
V = FKM seal

Maintenance indicator
V5.0 = Maintenance indicator, optical specify switching pressure 5.0 bar *[72.5 psi]*

Order example:
245LEN0100-H10XLA00-V5,0-M-R4

Further models (filter materials, connections,...) are available at request.

of the filter element

2.		–	–	0	–	

Filter element
Design **= 2.**

Size
LEN… **= 0040 0063 0100 0160 0250 0400**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Pressure differential
max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*
B00 = 330 bar *[4786 psi]*

Order example:
2.0100 H3XL-A00-0-M

Standard types

245LE(N) standard types, NBR seal, flow information for v = 30 mm²/s *[150 SUS]*

Inline filter with bypass, filtration rating 3 µm

Type	Flow in l/min *[gpm]* with Δ*p* = 1 bar *[14.5 psi]* [1)]	Material no. Filter				Material no. Replacement element
245LEN0040-H3XLA00-V5,0-M-..	23 *[5.1]*	..R2	**R928030024**	..U3	**R928030216**	**R928006645**
245LEN0063-H3XLA00-V5,0-M-..	30 *[6.6]*	..R4	**R928030025**	..U4	**R928030217**	**R928006699**
245LEN0100-H3XLA00-V5,0-M-..	44 *[9.7]*	..R4	**R928030026**	..U4	**R928030218**	**R928006753**
245LE0130-H3XLA00-V5,0-M-..	74 *[16.3]*	..R5	**R928030027**	..U5	**R928030219**	**R928022274**
245LE0150-H3XLA00-V5,0-M-..	89 *[19.6]*	..R5	**R928030028**	..U5	**R928030220**	**R928022283**
245LEN0160-H3XLA00-V5,0-M-..	132 *[29.0]*	..R6	**R928030029**	..U6	**R928030221**	**R928006807**
245LEN0250-H3XLA00-V5,0-M-..	190 *[41.8]*	..R6	**R928030030**	..U6	**R928030222**	**R928006861**
245LEN0400-H3XLA00-V5,0-M-..	250 *[55.0]*	..R6	**R928030031**	..U6	**R928030223**	**R928006915**

Inline filter with bypass, filtration rating 6 µm

Type	Flow in l/min *[gpm]* with Δ*p* = 1 bar *[14.5 psi]* [1)]	Material no. Filter				Material no. Replacement element
245LEN0040-H6XLA00-V5,0-M-..	30 *[6.6]*	..R2	**R928030280**	..U3	**R928030472**	**R928006646**
245LEN0063-H6XLA00-V5,0-M-..	52 *[11.4]*	..R4	**R928030281**	..U4	**R928030473**	**R928006700**
245LEN0100-H6XLA00-V5,0-M-..	61 *[13.4]*	..R4	**R928030282**	..U4	**R928030474**	**R928006754**
245LE0130-H6XLA00-V5,0-M-..	101 *[22.2]*	..R5	**R928030283**	..U5	**R928030475**	**R928022275**
245LE0150-H6XLA00-V5,0-M-..	120 *[26.4]*	..R5	**R928030284**	..U5	**R928030476**	**R928022284**
245LEN0160-H6XLA00-V5,0-M-..	172 *[37.8]*	..R6	**R928030285**	..U6	**R928030477**	**R928006808**
245LEN0250-H6XLA00-V5,0-M-..	226 *[49.7]*	..R6	**R928030286**	..U6	**R928030478**	**R928006862**
245LEN0400-H6XLA00-V5,0-M-..	276 *[60.7]*	..R6	**R928030287**	..U6	**R928030479**	**R928006916**

Inline filter with bypass, filtration rating 10 µm

Type	Flow in l/min *[gpm]* with Δ*p* = 1 bar *[14.5 psi]* [1)]	Material no. Filter				Material no. Replacement element
245LEN0040-H10XLA00-V5,0-M-..	36 *[7.9]*	..R2	**R928030536**	..U3	**R928030728**	**R928006647**
245LEN0063-H10XLA00-V5,0-M-..	69 *[15.2]*	..R4	**R928030537**	..U4	**R928030729**	**R928006701**
245LEN0100-H10XLA00-V5,0-M-..	75 *[16.5]*	..R4	**R928030538**	..U4	**R928030730**	**R928006755**
245LE0130-H10XLA00-V5,0-M-..	127 *[27.9]*	..R5	**R928030539**	..U5	**R928030731**	**R928022276**
245LE0150-H10XLA00-V5,0-M-..	150 *[33.0]*	..R5	**R928030540**	..U5	**R928030732**	**R928022285**
245LEN0160-H10XLA00-V5,0-M-..	210 *[46.2]*	..R6	**R928030541**	..U6	**R928030733**	**R928006809**
245LEN0250-H10XLA00-V5,0-M-..	260 *[57.2]*	..R6	**R928030542**	..U6	**R928030734**	**R928006863**
245LEN0400-H10XLA00-V5,0-M-..	300 *[66.0]*	..R6	**R928030543**	..U6	**R928030735**	**R928006917**

[1)] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

WE – – –

Maintenance indicator
Electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression at 30 °C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pin
EN 175301-803 = Rectangular plug-in connection, 2-pin design A according to EN-175301-803

Material numbers of the electronic switching elements

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

Order example: Inline filter with mechanical optical maintenance indicator for $p_{nom.}$ = 250 bar *[3628 psi]* with bypass valve, size 0100, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

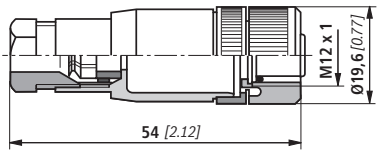
Filter:	**245LEN0100-H10XLA00-V5,0-M-R4**	**Material no. R928030538**
Maintenance indicator:	**WE-1SP-M12x1**	**Material no. R928028409**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12x1

Mating connector for K24 4-pin, M12x1 with screw connection, cable gland Pg9.

Material no. R900031155

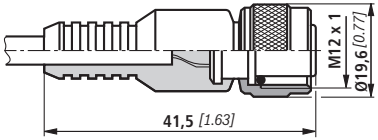


Mating connector for K24-3m 4-pin, M12x1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

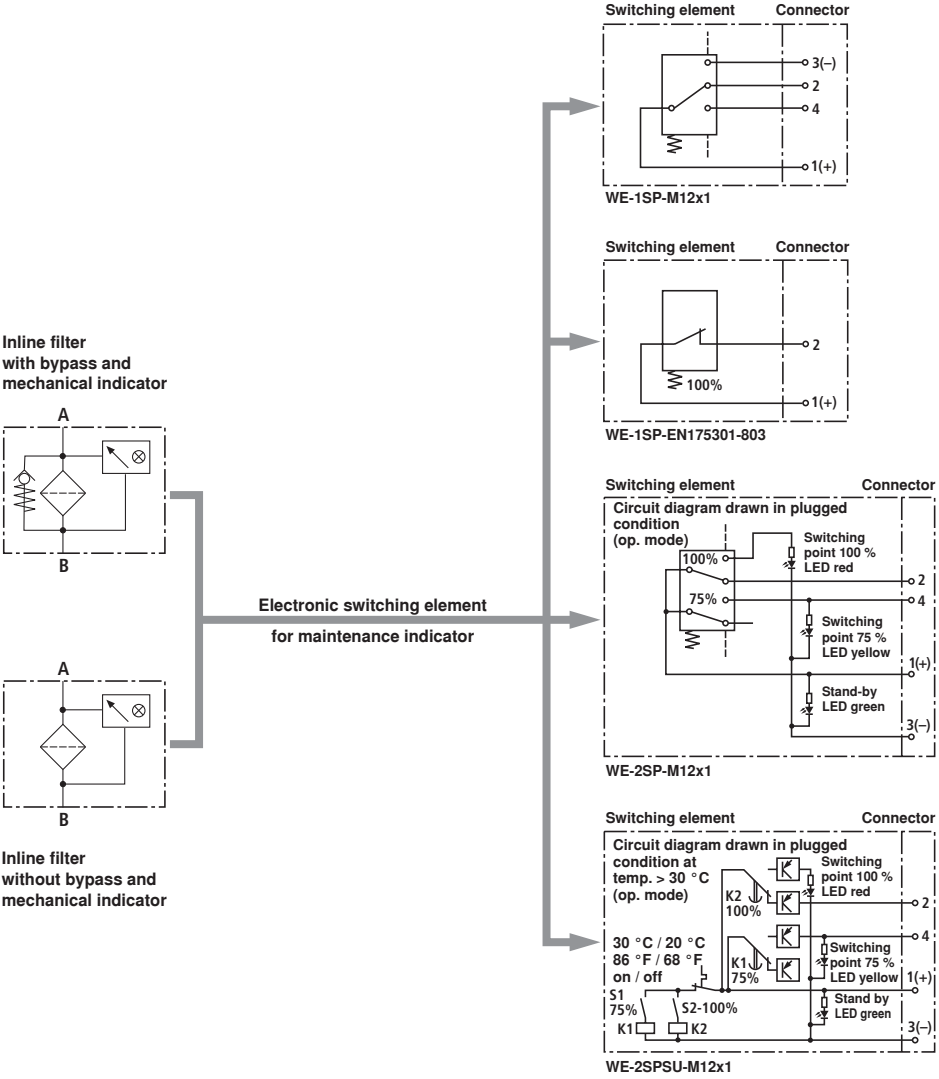
Core marking:
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For more round plug-in connections, see data sheet 08006.

Symbols


Switching element
Connector
3(–)
2
4
1(+)
WE-1SP-M12x1
Switching element
Connector
2
100%
1(+)
WE-1SP-EN175301-803
Inline filter
with bypass and
mechanical indicator
A
B
Electronic switching element
for maintenance indicator
Switching element
Connector
Circuit diagram drawn in plugged
condition
(op. mode)
100%
75%
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand-by
LED green
2
4
1(+)
3(–)
WE-2SP-M12x1
Inline filter
without bypass and
mechanical indicator
A
B
Switching element
Connector
Circuit diagram drawn in plugged
condition at
temp. > 30 °C
(op. mode)
K2
100%
K1
75%
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
S2-100%
K1
K2
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand by
LED green
2
4
1(+)
3(–)
WE-2SPSU-M12x1

4

Function, section

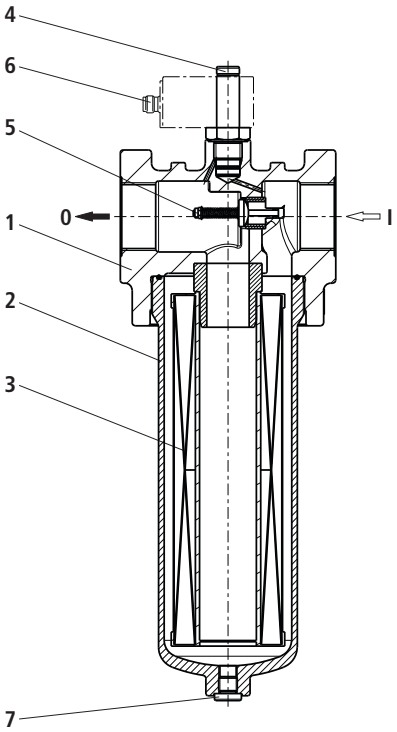
The 245LE(N) inline filters are suitable for direct installation into pressure lines. They are mostly installed upstream open-loop or closed-loop control units to be protected.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of the abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (7).

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points (6), which has to be ordered separately. The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.



Technical data (For applications outside these parameters, please consult us!)

general

Installation position			vertical			
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*			
Weight		Size	**0040**	**0063**	**0100**	**0130**
		kg *[lbs]*	3.2 *[7.10]*	3.8 *[8.40]*	4.2 *[9.30]*	6.95 *[15.30]*
Weight		Size	**0150**	**0160**	**0250**	**0400**
		kg *[lbs]*	*7.25 [16]*	11.5 *[25.40]*	12.2 *[26.90]*	13.8 *[30.40]*
Material	Filter head		GGG			
	Filter bowl		Steel			
	Optical maintenance indicator		Brass			
	Electronic switching element		Plastic PA6			

hydraulic

Maximum operating pressure	bar *[psi]*	250 *[3628]*
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]*
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	7 ± 0.5 *[100 ± 7]*
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12x1, 4-pin			Standard connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. switching power with resistive load		W	20			70
Switching type	75 % signal		–	Normally open contact		–
	100 % signal		Change-over	Normally closed contact		Normally closed contact
	2SPSU				Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Technical data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{3}(c) \geq 200$	13/10/8 – 17/13/10
admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4785]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluid			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

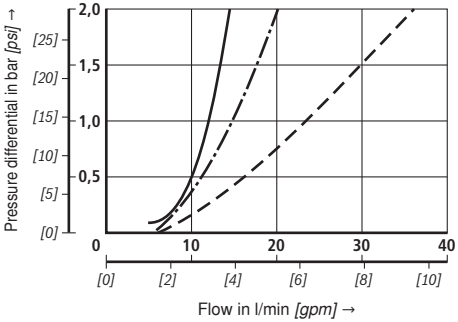
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL

Specific weight: < 0.9 kg/dm³
Δp-Q characteristic curves for complete filters recommended
initial Δp for design = 1 bar *[14.5 psi]*

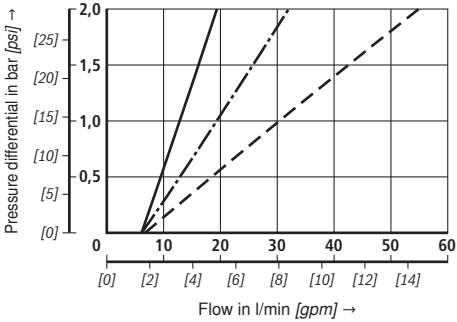
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[142 SUS]*

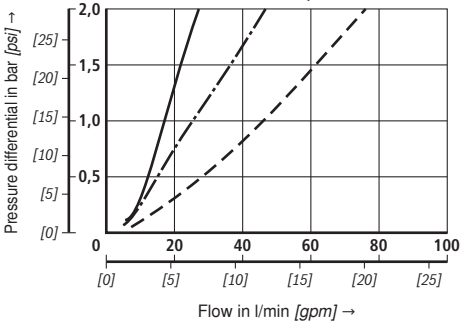
245LEN0040-H3XLA00-V5,0-M-R2



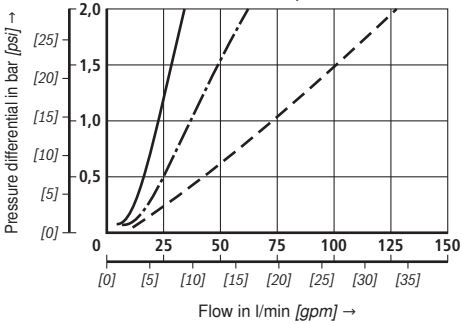
245LEN0063-H3XLA00-V5,0-M-R4



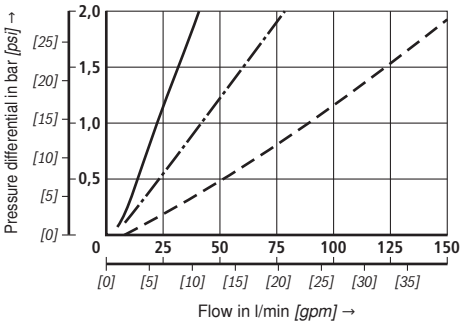
245LEN0100-H3XLA00-V5,0-M-R4



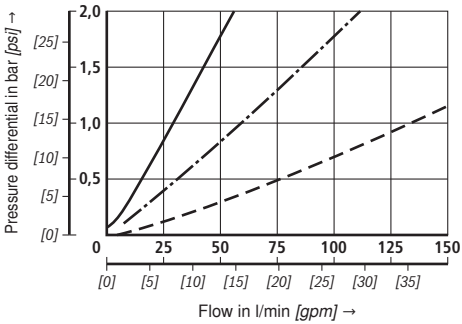
245LE0130-H3XLA00-V5,0-M-R5



245LE0150-H3XLA00-V5,0-M-R5



245LEN0160-H3XLA00-V5,0-M-R6



4

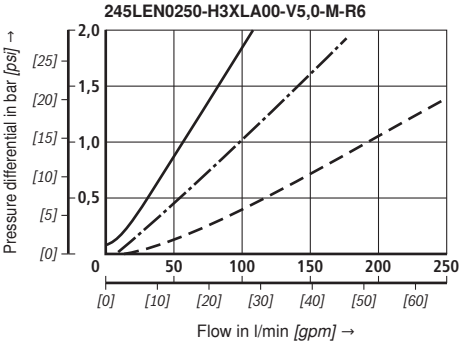
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL, H10XL

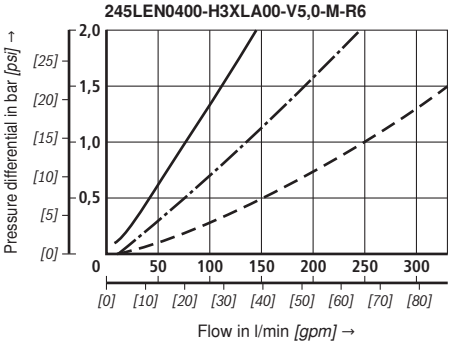
Specific weight: < 0.9 kg/dm³
Δp-Q characteristic curves for complete filters recommended
initial Δp for design = 1 bar *[14.5 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

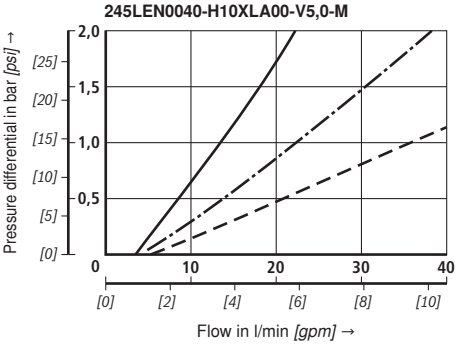
Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[142 SUS]*

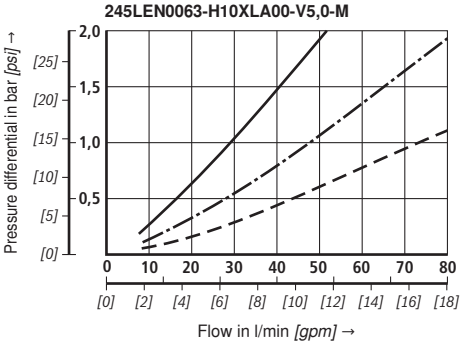
H3XL





H10XL





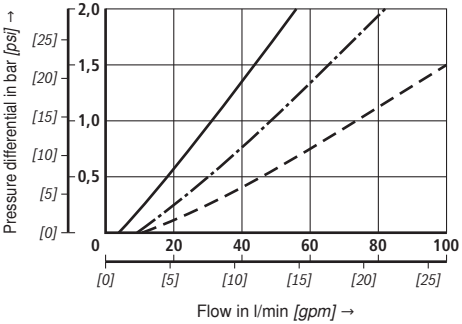
Characteristic curves (measured with HLP46, according to ISO 3968) H10XL

Specific weight: < 0.9 kg/dm³
Δp-Q characteristic curves for complete filters recommended
initial Δp for design = 1 bar *[14.5 psi]*

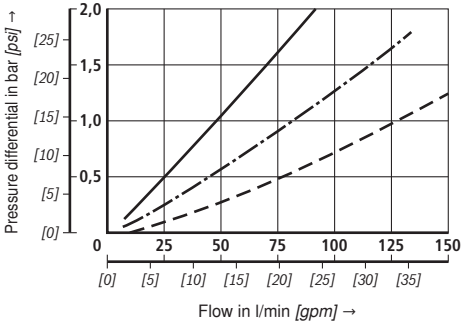
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[142 SUS]*

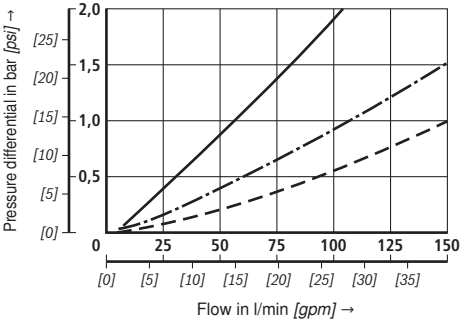
245LEN0100-H10XLA00-V5,0-M



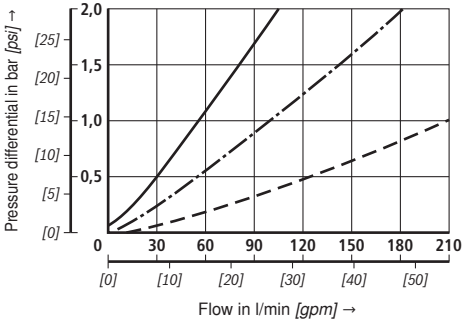
245LE0130-H10XLA00-V5,0-M



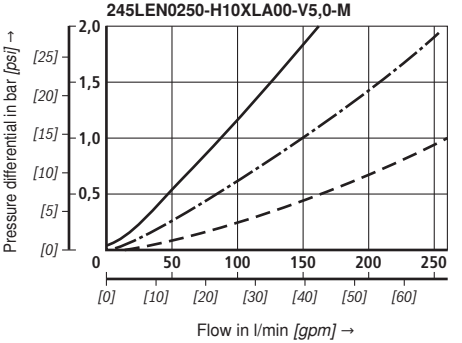
245LE0150-H10XLA00-V5,0-M



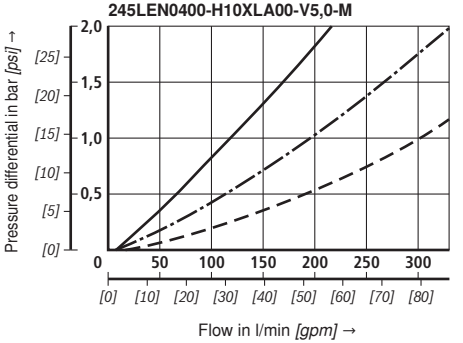
245LEN0160-H10XLA00-V5,0-M



245LEN0250-H10XLA00-V5,0-M



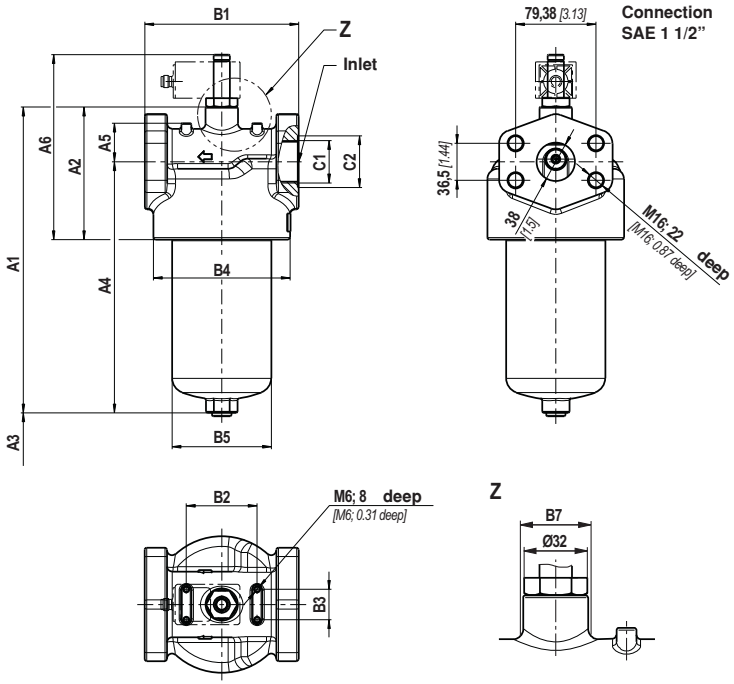
245LEN0400-H10XLA00-V5,0-M



4

Unit dimensions NG 0040 to NG 0400 (dimensions in mm *[inch]*)

Connections pipe threads UNF thread



Filter housing for filter elements in accordance with DIN 24550 and according to BR standard

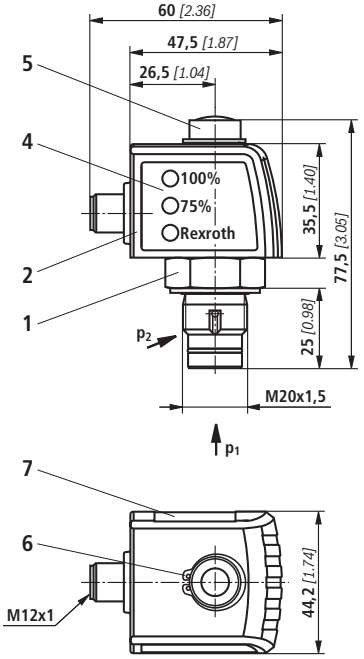
Type 245 LE(N)…	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	A6	B1 [2]	B2	B3	B4 Ø	B5 Ø	B7 Ø	C1 Stan-dard	C1 U… (SAE J1926)
0040	0.21 *[0.06]*	200 *[7.87]*			156 *[6.14]*									G1/2	SAE 10 7/8-14 UNF-2B
0063	0.38 *[0.10]*	264 *[10.39]*	94 *[3.70]*	120 *[4.72]*	220 *[8.66]*	25 *[0.98]*	146 *[5.75]*	92 *[3.62]*	60 *[2.36]*	25 *[0.98]*	85 *[3.35]*	55 *[2.17]*	34 *[1.34]*	G1	SAE 12 1 1/16-12 UN-2B
0100	0.53 *[0.14]*	354 *[13.94]*			310 *[12.20]*										
0130	0.76 *[0.20]*	324 *[12.76]*	121 *[4.76]*	140 *[5.51]*	270 *[10.63]*		173 *[6.81]*	122 *[4.80]*	80 *[3.15]*		116 *[4.57]*	77 *[3.03]*	32 *[1.26]*	G1 1/4	SAE 20 1 5/8-12 UN-2B
0150	0.96 *[0.25]*	374 *[14.72]*			320 *[12.60]*										
0160	1.13 *[0.30]*	356 *[14.02]*			302 *[11.89]*	38 *[1.50]*				30 *[1.18]*					
0250	1.6 *[0.42]*	392 *[15.43]*	131 *[5.16]*	120 *[4.72]*	338 *[13.31]*		183 *[7.20]*	152 *[5.98]*	70 *[2.76]*		135 *[5.31]*	98 *[3.86]*	32 *[1.26]*	G1 1/2	SAE 24 1 7/8-12 UN-2B
0400	2.4 *[0.63]*	542 *[21.34]*			488 *[19.21]*										

[1] Servicing height for filter element replacement

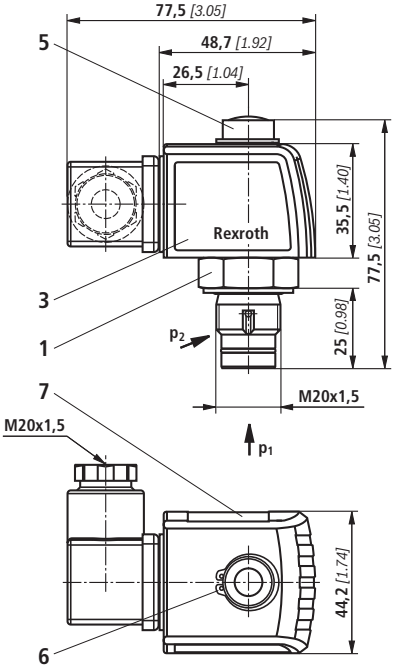
[2] For SAE flanges dimension B1 is reduced by 4 mm *[0.16 inch]*

Maintenance indicator (dimensions in mm *[inch]*)

Pressure differential indicator with assembled switching element M12x1



Pressure differential indicator with assembled switching element EN-175301-803



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\ max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); round plug-in connection M12x1, 4-pin

3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); rectangular plug-in connection EN175301-803

4 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

5 Optical indicator bistable

6 Locking ring DIN 471-16x1,
Material no. R900003923

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

Switching elements with increased switching power at request.

Spare parts

Mechanical optical maintenance indicator

W | O – D01 – – – 160

Maintenance indicator **= W**

Mechanical optical indicator **= O**

Design

Pressure differential, design 01 **= D01**

Switching pressure

5.0 bar **= 5.0**
2.2 bar **= 2.2**
1.5 bar **= 1.5**

M = NBR seal
V = FKM seal

Max. operating pressure

D01-1,5; D01-2,2
160 = 160 bar *[2321 psi]*
D01-5,0
450 = 450 bar *[6527 psi]*

Mechanical optical maintenance indicator	Material no.
WO-D01-5,0-M-450	**R901025313**
WO-D01-2,2-M-160	**R901025312**
WO-D01-1,5-M-160	**R928038781**

Seal kit

D | 245LE | | |

Seal kit **= D**

Series **= 245LE**

Size

NG0040-0100 **= N0040-0100**
NG0130-0150 **= 0130-0150**
NG0160-0400 **= N0160-0400**

M = NBR seal
V = FKM seal

Seal kit	Material no.
D245LEN0040-0100-M	R928028016
D245LE0130-0150-M	R928028214
D245LEN0160-0400-M	R928028017

Installation, commissioning and maintenance

Installation of the filter

Verify operating overpressure with name plate information. Remove the blanking plugs in the filter inlet and outlet. Screw the filter head (1) to the fastening device, considering flow direction (direction arrows) and servicing height of the element. Make sure that the components are assembled in a stress-less form. The housing must be grounded.

The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electronic maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element (6) with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

- After initial start-up of the system, the filter element is to be exchanged.
- Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.
- The filter element should be replaced or cleaned after max. 6 months at the latest.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the spigot in the filter head by turning it slightly.
- Check the seal ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H...XL, clean filter elements G....
- The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the differential pressure after the filter element exchange exceeds 150 % of the value of a brand-new filter element, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl to stop (torque 50 Nm $^{+10\ Nm}$).

Quality and standardization

The inline filters for hydraulic applications according to 51448 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

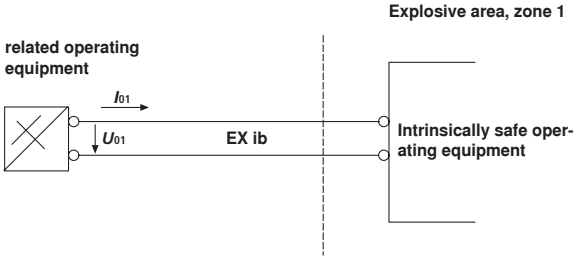
Use in explosive areas according to directive 94/9/EC (ATEX)

The inline filters according to 51448 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the inline filters according to 51448 in explosive areas, potential equalization has to be ensured.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



The manufacturer's declaration according to DIN EN 13463 is available for this filter separately, with Material no. R928028899.

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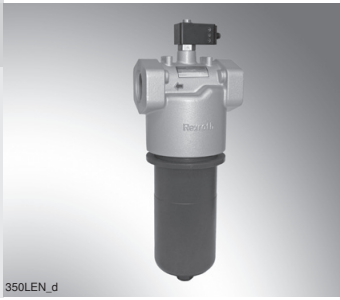
Rexroth
Bosch Group

Inline filter with filter element according to DIN 24550

RE 51422/07.11 1/18
Replaces: 12.10

Type 350LEN0040 to 1000; 350LE0130, 0150



Size according to **DIN 24550**: 0040 to 1000
Additional sizes: 0130, 0150
Nominal pressure 350 bar *[5079 psi]*
Port up to G 2; SAE 2”; SAE 24
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

Inline filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for installation into pipelines.

They distinguish themselves by the following:

- Special highly efficient filter media
- Adsorption of very fine particles across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized version due to 3D computer-supported design

Ordering code

of the filter

350	LE	N			00	V5,0	

Pressure
350 bar
[5079 psi] **= 350**

Inline filter
Simple **= LE**

Filter element
According to DIN 24550 **= N**

Size
LEN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Element version
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material tin-plated **= …0**

Maintenance indicator
Maintenance indicator, optical **= V5,0**
specify switching pressure 5.0 bar *[72.5 psi]*

Port

	Frame size	0040	0063-0100	0130-0150	0160-0400	0630-1000	
	Port						
R2 =	G1/2	•	x				Pipe-thread according to ISO 228
R3 =	G3/4	x	x				
R4 =	G1	x	•	x			
R5 =	G1 1/4			•	x		
R6 =	G1 1/2			x	•		
R8 =	G2					•	
S6 =	SAE 1 1/2"				x		SAE flange 6000 psi
S8 =	SAE 2"					x	
U3 =	SAE 10	x					Pipe-thread according to SAE J1926
U4 =	SAE 12		x				
U5 =	SAE 20			x			
U6 =	SAE 24				x		

• = Standard port
x = Additional connection possibility

Seal
M = NBR seal
V = FKM seal

Order example:
350LEN0100-H10XLA00-V5,0-M-R4

Further versions (filter materials, connections, ...) are available at request.

of the filter element

2.				0	

Filter element
Design **= 2.**

Size
LEN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Pressure differential
Max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*
B00 = 330 bar *[4786 psi]*

Order example:
2.0100 H10XL-A00-0-M

Standard types

350LE(N) standard types, NBR seal, flow information for ν **= 30 mm²/s** *[150 SUS]*

Inline filter with bypass, filtration rating 3 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
350LEN0040-H3XLA00-V5,0-M-..	26 *[6.87]*	..R2	**R928033024**	..U3	**R928033216**	**R928006645**
350LEN0063-H3XLA00-V5,0-M-..	36 *[9.51]*	..R4	**R928033025**	..U4	**R928033217**	**R928006699**
350LEN0100-H3XLA00-V5,0-M-..	46 *[12.15]*	..R4	**R928033026**	..U4	**R928033218**	**R928006753**
350LE0130-H3XLA00-V5,0-M-..	74 *[19.55]*	..R5	**R928033027**	..U5	**R928033219**	**R928022274**
350LE0150-H3XLA00-V5,0-M-..	83 *[21.93]*	..R5	**R928033028**	..U5	**R928033220**	**R928022283**
350LEN0160-H3XLA00-V5,0-M-..	125 *[33.02]*	..R6	**R928033029**	..U6	**R928033221**	**R928006807**
350LEN0250-H3XLA00-V5,0-M-..	200 *[52.83]*	..R6	**R928033030**	..U6	**R928033222**	**R928006861**
350LEN0400-H3XLA00-V5,0-M-..	253 *[66.84]*	..R6	**R928033031**	..U6	**R928033223**	**R928006915**
350LEN0630-H3XLA00-V5,0-M-..	340 *[89.82]*	..R8	**R928034432**	..S8	**R928034448**	**R928006969**
350LEN1000-H3XLA00-V5,0-M-..	470 *[124.16]*	..R8	**R928034433**	..S8	**R928034449**	**R928007023**

Inline filter with bypass, filtration rating 6 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
350LEN0040-H6XLA00-V5,0-M-..	33 *[8.72]*	..R2	**R928033280**	..U3	**R928033472**	**R928006646**
350LEN0063-H6XLA00-V5,0-M-..	55 *[14.53]*	..R4	**R928033281**	..U4	**R928033473**	**R928006700**
350LEN0100-H6XLA00-V5,0-M-..	69 *[18.23]*	..R4	**R928033282**	..U4	**R928033474**	**R928006754**
350LE0130-H6XLA00-V5,0-M-..	114 *[30.12]*	..R5	**R928033283**	..U5	**R928033475**	**R928022275**
350LE0150-H6XLA00-V5,0-M-..	130 *[34.34]*	..R5	**R928033284**	..U5	**R928033476**	**R928022284**
350LEN0160-H6XLA00-V5,0-M-..	168 *[44.38]*	..R6	**R928033285**	..U6	**R928033477**	**R928006808**
350LEN0250-H6XLA00-V5,0-M-..	232 *[61.29]*	..R6	**R928033286**	..U6	**R928033478**	**R928006862**
350LEN0400-H6XLA00-V5,0-M-..	281 *[74.23]*	..R6	**R928025783**	..U6	**R928033479**	**R928006916**
350LEN0630-H6XLA00-V5,0-M-..	405 *[106.99]*	..R8	**R928034464**	..S8	**R928034480**	**R928006970**
350LEN1000-H6XLA00-V5,0-M-..	492 *[129.97]*	..R8	**R928034465**	..S8	**R928034481**	**R928007024**

Inline filter with bypass, filtration rating 10 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
350LEN0040-H10XLA00-V5,0-M-..	37 *[9.77]*	..R2	**R928033536**	..U3	**R928033728**	**R928006647**
350LEN0063-H10XLA00-V5,0-M-..	70 *[18.49]*	..R4	**R928033537**	..U4	**R928033729**	**R928006701**
350LEN0100-H10XLA00-V5,0-M-..	78 *[20.61]*	..R4	**R928033538**	..U4	**R928033730**	**R928006755**
350LE0130-H10XLA00-V5,0-M-..	138 *[36.46]*	..R5	**R928025653**	..U5	**R928033731**	**R928022276**
350LE0150-H10XLA00-V5,0-M-..	162 *[42.80]*	..R5	**R928028868**	..U5	**R928033732**	**R928022285**
350LEN0160-H10XLA00-V5,0-M-..	198 *[52.31]*	..R6	**R928033541**	..U6	**R928033733**	**R928006809**
350LEN0250-H10XLA00-V5,0-M-..	252 *[66.57]*	..R6	**R928033542**	..U6	**R928033734**	**R928006863**
350LEN0400-H10XLA00-V5,0-M-..	301 *[79.52]*	..R6	**R928033543**	..U6	**R928033735**	**R928006917**
350LEN0630-H10XLA00-V5,0-M-..	450 *[118.88]*	..R8	**R928034496**	..S8	**R928034512**	**R928006971**
350LEN1000-H10XLA00-V5,0-M-..	521 *[137.63]*	..R8	**R928034497**	..S8	**R928034513**	**R928007025**

[1] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

WE – – –

Maintenance indicator
Electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression at 30 °C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pin
EN 175301-803 = Rectangular plug-in connection, 2-pin design A according to EN-175301-803

Material numbers of the electronic switching elements

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

More information on maintenance indicators is available in the data sheet 51450

Order example: Inline filter with mechanical optical maintenance indicator for $p_{nom.}$ = 350 bar *[5079 psi]* with bypass valve, size 0100, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

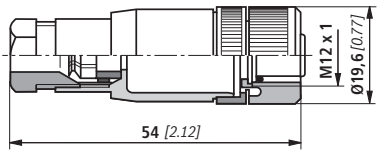
Filter:	**350LEN0100-H10XLA00-V5,0-M-R4**	**Material no. R928033538**
Maintenance indicator:	**WE-1SP-M12x1**	**Material no. R928028409**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12 x 1

Mating connector for K24 4-pin, M12 x 1 with screw connection, cable gland Pg9.

Material no. R900031155

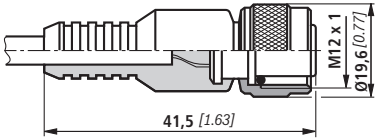


Mating connector for K24-3m 4-pin, M12 x 1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

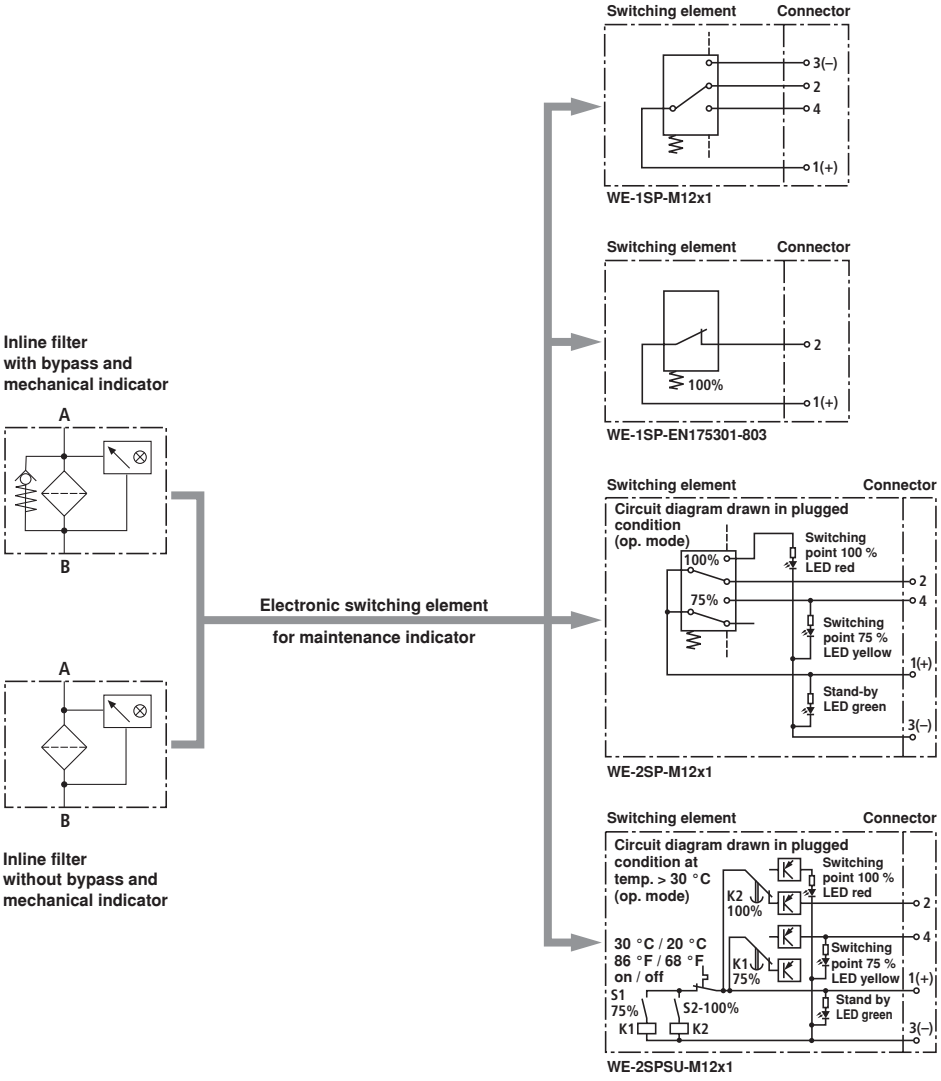
Core marking:
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For more round plug-in connections, see data sheet 08006.

Symbols


Switching element
Connector
3(–)
2
4
1(+)
WE-1SP-M12x1
Switching element
Connector
2
100%
1(+)
WE-1SP-EN175301-803
Inline filter
with bypass and
mechanical indicator
A
B
Electronic switching element
for maintenance indicator
Switching element
Connector
Circuit diagram drawn in plugged
condition
(op. mode)
100%
75%
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand-by
LED green
2
4
1(+)
3(–)
WE-2SP-M12x1
Inline filter
without bypass and
mechanical indicator
A
B
Switching element
Connector
Circuit diagram drawn in plugged
condition at
temp. > 30 °C
(op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand by
LED green
2
4
1(+)
3(–)
WE-2SPSU-M12x1

4

Function, section

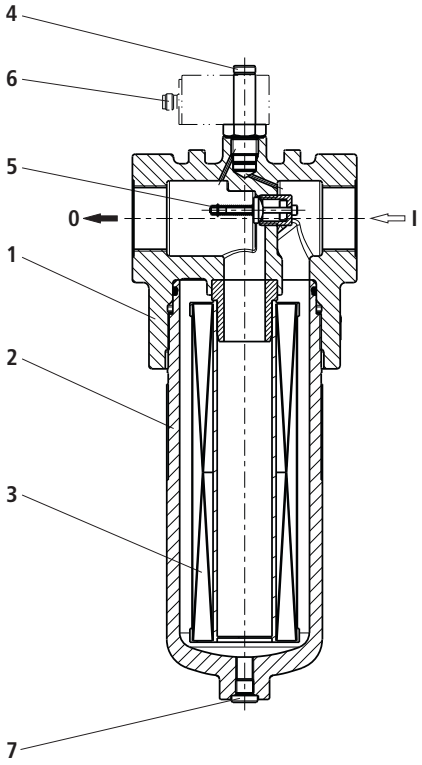
The 350LE(N) Inline filters are suitable for direct installation into pressure lines. They are mostly installed upstream open-loop or closed-loop control units to be protected.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of the abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (7). With size 1000, the filter bowl has a two-part design.

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points (6), which has to be ordered separately. The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.



Technical Data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical				
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*				
Weight		Size	**0040**	**0063**	**0100**	**0130**	**0150**
		kg *[lbs]*	4.4 *[9.73]*	5.0 *[11.1]*	5.9 *[13]*	10.5 *[23.21]*	11.2 *[24.76]*
Weight		Size	**0160**	**0250**	**0400**	**0630**	**1000**
		kg *[lbs]*	17.2 *[30.02]*	19.5 *[43.11]*	23.0 *[50.84]*	45.0 *[99.47]*	93.0 *[205.58]*
Material	Filter head		GGG				
	Filter bowl		Steel				
	Optical maintenance indicator		Brass				
	Electronic switching element		Plastic PA6				

hydraulic

Maximum operating pressure	bar *[psi]*	350 *[5079]*
Plage de température du fluide hydraulique	°C *[°F]*	–10 to +100 *[+14 to +212]* (shortly –30 *[–22]*)
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	7 ± 0.5 *[100 ± 7]*
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12x1, 4-pin			Standard connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. switching power with resistive load		W	20			70
Switching type	75 % signal		–	Normally open contact		–
	100 % signal		Change-over	Normally closed contact		Normally closed contact
	2SPSU				Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Technical Data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4785]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluid			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

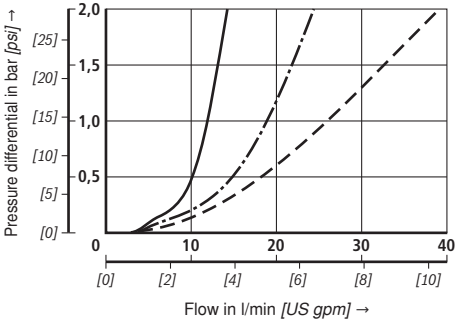
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended
initial Δ*p* for design = 1 bar *[14.5 psi]*

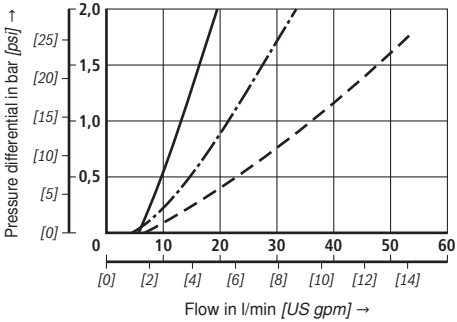
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[139 SUS]*

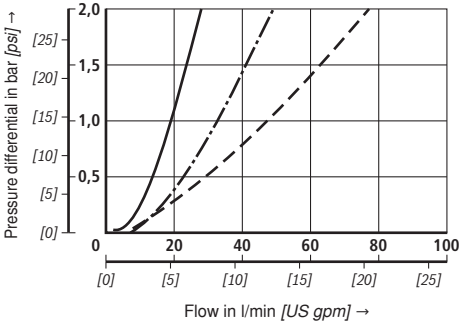
350LEN0040-H3XLA00-V5,0-M-R2



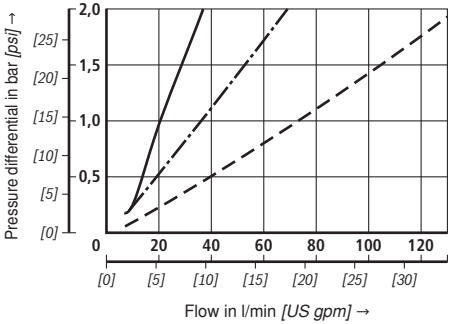
350LEN0063-H3XLA00-V5,0-M-R4



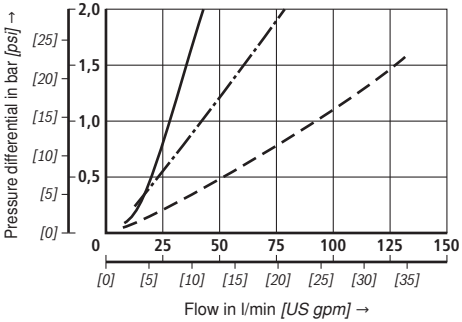
350LEN0100-H3XLA00-V5,0-M-R4



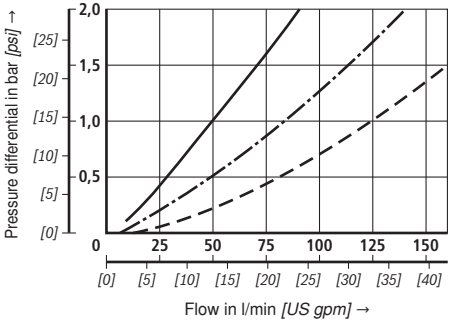
350LE0130-H3XLA00-V5,0-M-R5



350LE0150-H3XLA00-V5,0-M-R5



350LEN0160-H3XLA00-V5,0-M-R6



4

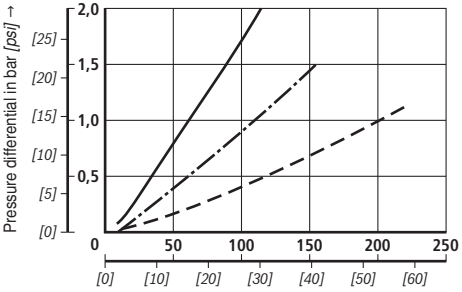
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[139 SUS]*

350LEN0250-H3XLA00-V5,0-M-R6



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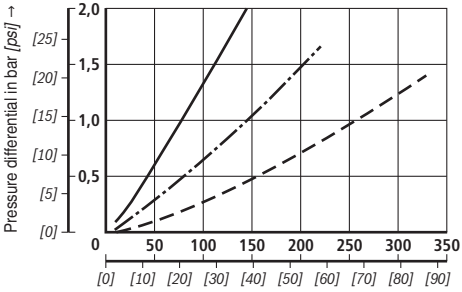
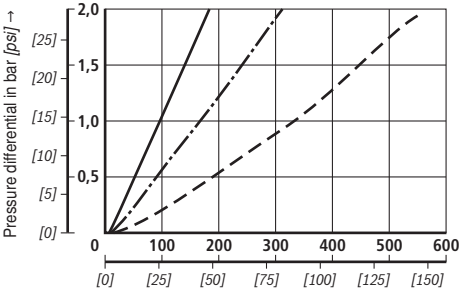
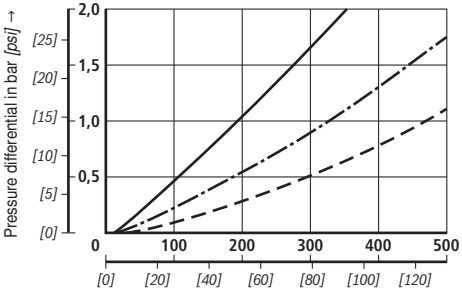


350LEN0630-H3XLA00-V5,0-M-R8



350LEN1000-H3XLA00-V5,0-M-R8



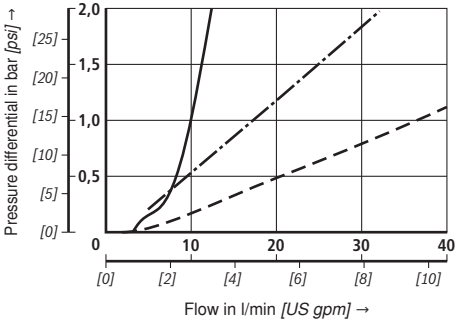
Characteristic curves (measured with HLP46, according to ISO 3968) H10XL

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended
initial Δ*p* for design = 1 bar *[14.5 psi]*

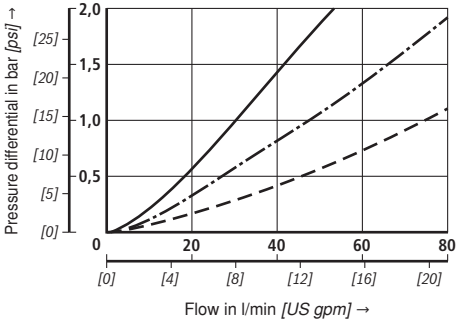
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[139 SUS]*

350LEN0040-H10XLA00-V5,0-M-R2



350LEN0063-H10XLA00-V5,0-M-R4



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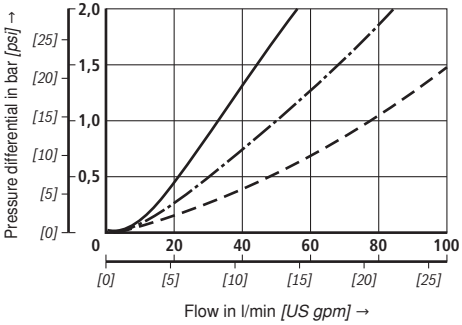
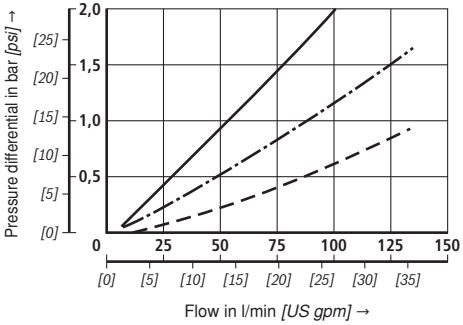
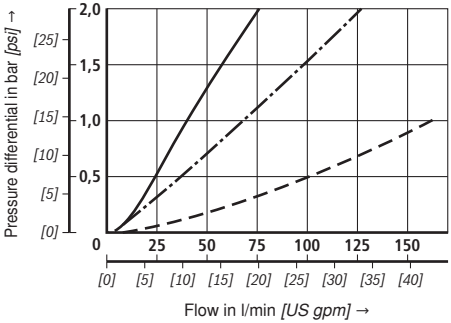


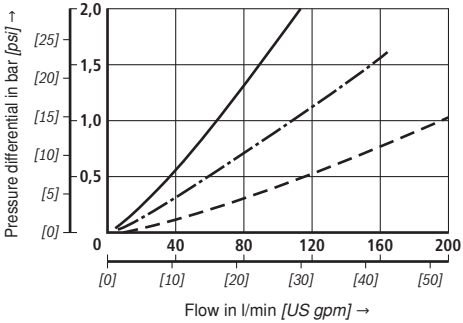
350LE0130-H10XLA00-V5,0-M-R5



350LE0150-H10XLA00-V5,0-M-R5



350LEN0160-H10XLA00-V5,0-M-R6



4

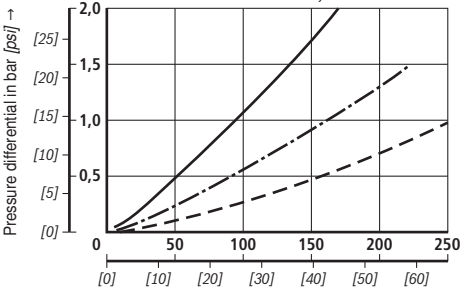
Characteristic curves (measured with HLP46, according to ISO 3968) **H10XL**

Specific weight: < 0.9 kg/dm³
Δ***p***-Q characteristic curves for complete filters recommended initial Δ***p*** for design = 1 bar *[14.5 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

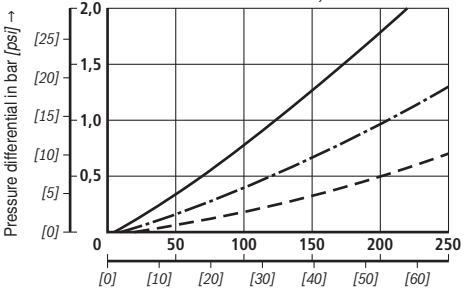
Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[139 SUS]*

350LEN0250-H10XLA00-V5,0-M-R6



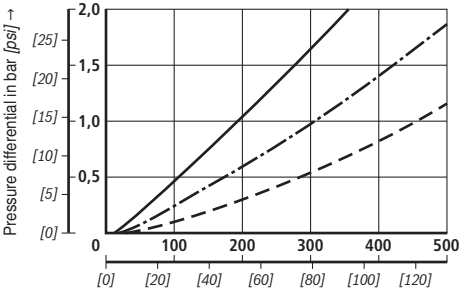
Flow in l/min *[US gpm]* →

350LEN0400-H10XLA00-V5,0-M-R6



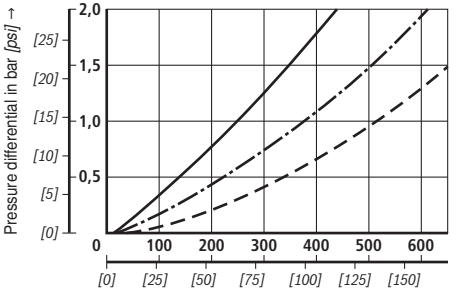
Flow in l/min *[US gpm]* →

350LEN0630-H10XLA00-V5,0-M-R8



Flow in l/min *[US gpm]* →

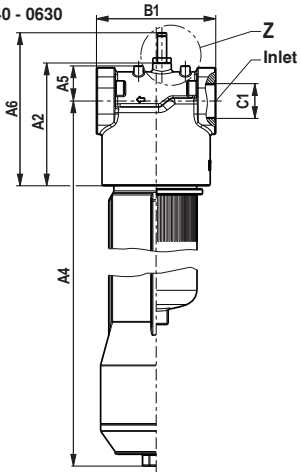
350LEN1000-H10XLA00-V5,0-M-R8



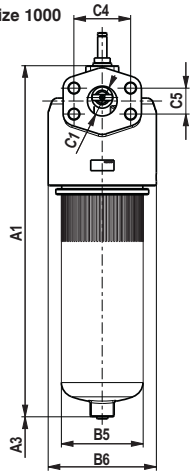
Flow in l/min *[US gpm]* →

Unit dimensions size 0040 to size 1000 (dimensions in mm *[inch]*)

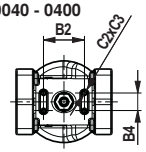
Size 0040 - 0630



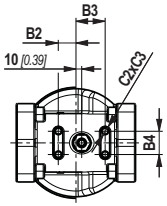
Size 1000



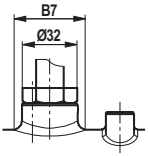
Size 0040 - 0400



Size 0630 - 1000



Z



Filter housing for filter elements according to DIN 24550 and according to Rexroth standard

Type 350LE(N)	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	A6	B1 [2]	B2
0040	0.25 *[0.07]*	203 *[7.99]*	115 *[4.53]*	80 *[3.15]*	158 *[6.22]*	25 *[0.98]*	167 *[6.57]*	92 *[3.62]*	65 *[2.56]*
0063	0.35 *[0.09]*	266 *[10.47]*			221 *[8.70]*				
0100	0.52 *[0.14]*	356 *[14.02]*			311 *[12.24]*				
0130	0.9 *[0.24]*	328 *[12.91]*	150 *[5.91]*	140 *[5.51]*	273 *[10.75]*	40 *[1.57]*	202 *[7.95]*	132 *[5.20]*	80 *[3.15]*
0150	1.1 *[0.29]*	364 *[14.33]*			324 *[12.76]*				
0160	1.3 *[0.34]*	322 *[12.68]*	170 *[6.69]*		262 *[10.31]*	50 *[1.97]*	222 *[8.74]*	164 *[6.46]*	70 *[2.76]*
0250	1.9 *[0.50]*	412 *[16.22]*			352 *[13.86]*				
0400	3.0 *[0.79]*	562 *[22.13]*			502 *[19.76]*				
0630	4.5 *[1.19]*	605 *[23.82]*	210 *[8.27]*	160 *[6.30]*	540 *[21.26]*	60 *[2.36]*	262 *[10.31]*	204 *[8.03]*	30 *[1.18]*
1000	6.5 *[1.72]*	843 *[33.19]*		650 *[25.59]*	778 *[30.63]*				

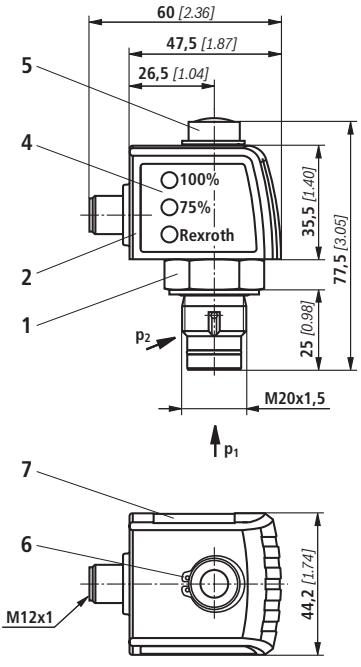
Type 350LE(N)	B3	B4	B5 Ø	B6 Ø	B7 Ø	C1 Standard (ISO 228)	C1 U… (SAE J1926)	SAE flanges	C2	C3	C4	C5
0040	-	30 *[1.18]*	64 *[2.52]*	85 *[3.35]*	47 *[1.85]*	G 1/2	SAE 10 7/8-14 UNF-2B	-	M6	8 *[0.32]*	-	-
0063						G 1	SAE 12 1 1/16-12 UN-2B					
0100												
0130	-	30 *[1.18]*	92 *[3.62]*	118 *[4.65]*	47 *[1.85]*	G 1 1/4	SAE 20 1 5/8-12 UN-2B					
0150												
0160	-	30 *[1.18]*	114 *[4.49]*	140 *[5.51]*	32 *[1.26]*	G 1 1/2	SAE 24 1 7/8-12 UN-2B	SAE 1 1/2" 6000 psi	M8	12 *[0.47]*	79.38 *[3.13]*	36.5 *[1.44]*
0250												
0400												
0630	50 *[1.97]*	40 *[1.57]*	140 *[5.51]*	185 *[7.28]*	32 *[1.26]*	G 2	-	SAE 2" 6000 psi	M12		96.82 *[3.81]*	44.45 *[1.75]*
1000			190 *[7.48]*									

[1] Servicing height for filter element replacement

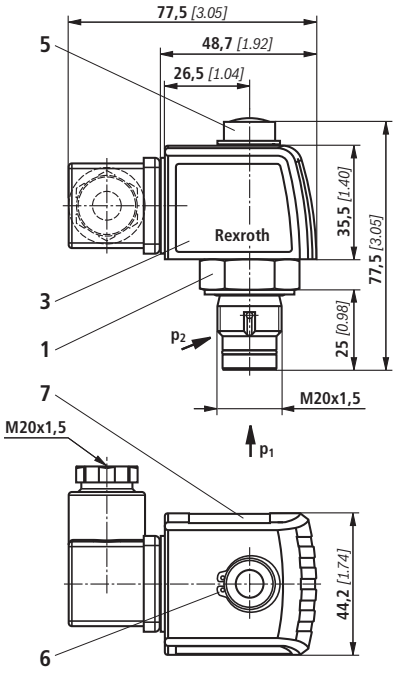
[2] For SAE flanges dimension B1 is reduced by 4 mm *[0.16 inch]*

Maintenance indicator (dimensions in mm *[inch]*)

Pressure differential indicator with assembled switching element M12x1



Pressure differential indicator with assembled switching element EN-175301-803



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); round plug-in connection M12x1, 4-pin

3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); rectangular plug-in connection EN175301-803

4 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

5 Optical indicator bistable

6 Locking ring DIN 471-16x1,
Material no. R900003923

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

Switching elements with increased switching power at request.

Spare parts

Mechanical optical maintenance indicator

W | O – D01 – – – 160

Maintenance indicator = W
Mechanical optical indicator = O

Design
Pressure differential, design 01 = D01

Switching pressure
5.0 bar = 5.0
2.2 bar = 2.2
1.5 bar = 1.5

Max. operating pressure
D01-1,5; D01-2,2
160 = 160 bar *[2321 psi]*
D01-5,0
450 = 450 bar *[6527 psi]*

Seal
M = NBR seal
V = FKM seal

Mechanical optical maintenance indicator	Material no.
WO-D01-5,0-M-450	**R901025313**
WO-D01-2,2-M-160	**R901025312**
WO-D01-1,5-M-160	**R928038781**

Seal kit

D | 350LE | –

Seal kit = D
Series = 350LE

Size
Size 0040-0100 = N0040-0100
Size 0130-0150 = 0130-0150
Size 0160-0400 = N0160-0400
Size 0630 = N0630
Size 1000 = N1000

Seal
M = NBR seal
V = FKM seal

Seal kit	Material no.
D350LEN0040-0100-M	R928028527
D350LE0130-0150-M	R928028530
D350LEN0160-0400-M	R928028532
D350LEN0630-M	R928028536
D350LEN1000-M	R928028537

Installation, commissioning and maintenance

Installation of the filter

Verify operating overpressure with name plate information. Remove the blanking plugs in the filter inlet and outlet. Screw the filter head (1) to the fastening device, considering flow direction (direction arrows) and servicing height of the element. Make sure that the components are assembled in a stress-less form. The housing must be grounded.

The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electronic maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element (6) with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

- After initial start-up of the system, the filter element is to be exchanged.
- Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.
- The filter element should be replaced or cleaned after max. 6 months at the latest.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the spigot in the filter head by turning it slightly.
- Check the seal ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H...XL, clean filter elements G....
- The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the differential pressure after the filter element exchange exceeds 150 % of the value of a brand-new filter element, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl to stop (torque 50 Nm $^{+10\ Nm}$).

Quality and standardization

The inline filters for hydraulic applications according to 51422 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

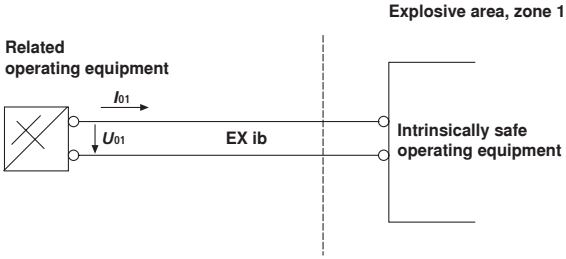
Use in explosive areas according to directive 94/9/EC (ATEX)

The inline filters according to 51422 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the inline filters according to 51422 in explosive areas, potential equalization has to be ensured.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



The manufacturer's declaration according to DIN EN 13463 is available for this filter separately, with Material no. R928028899.

Notes

Bosch Rexroth AG
Hydraulics
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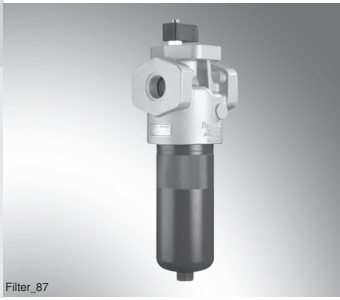
Rexroth
Bosch Group

Line filter with filter element according to DIN 24550

RE 51423/09.12 1/20
Replaces: 07.10

Type 445LEN0040 to 1000


Filter_87

Size according to **DIN 24550**: 0040 to 1000
Nominal pressure: 450 bar *[6527 psi]*
Connection up to G 1 1/2; to SAE 2 1/2"; to SAE 24
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

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Features

Line filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for installation into piping.

They distinguish themselves by the following:

- Special highly efficient filter media
- Adsorption of very fine particles across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized version due to 3D computer-supported design

Ordering code

of the filter

445 LE [ ] – [ ] 00 – V5,0 – [ ] [ ]

Pressure
450 bar
[6527 psi] **= 445**

Line filter
Simple **= LE**

Filter element
According to DIN 24550 **= N**

Size
LEN… **= 0040 0063 0100 0160 0250 0400 0630 1000**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Element design
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Maintenance indicator
Maintenance indicator, mechanical optical
specify switching pressure 5.0 bar *[72.5 psi]* **= V5,0**

Seal
NBR seal **= M**
FKM seal **= V**

Order example:

445LEN0400-H10XLA00-V5,0-M-R6

Further versions (filter materials, connections,...) are available at request.

Complementary details

V3 = Maintenance indicator right (size 0160-1000; not possible with **M**)
V9 = Maintenance indicator left (size 0160-1000; not possible with **M**)
M = Two Minimess ports (size 0160-1000; not possible in combination with **7** and **9**)
7 = Outlet at the top, outlet opposite to the inlet closed (size 160-1000)
9 = Filter rotated by 180°, filter bowl can be unscrewed to the top (size 0160-1000)

Connection

	Frame size	0040	0063-0100	0160-0400	0630-1000	
	Connection					
R2 =	G1/2	•	x			Pipe thread according to ISO 228
R3 =	G3/4	x	x			
R4 =	G1	x	•			
R6 =	G1 1/2			•		
R8 =	G2				x	
S6 =	SAE 1 1/2"			x		SAE flange 6000 psi
S8 =	SAE 2"			x	•	
S9 =	SAE 2 1/2"				x	
U3 =	SAE 10	x				Pipe thread according to SAE J1926
U4 =	SAE 12		x			
U6 =	SAE 24			x		

• = Standard connection
x = Additional connection possibility

of the filter element

2. [ ] – – 0 –

Filter element
Design **= 2.**

Size
LEN… **= 0040 0063 0100 0160 0250 0400 0630 1000**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Pressure differential
Max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*
B00 = 330 bar *[4786 psi]*

Order example:
2.0400 H10XL-A00-0-M

Standard types

445LE(N) standard types, NBR seal, flow information for 30 mm²/s *[150 SUS]*

Line filter with bypass, filtration rating 3 µm

Type	Flow in l/min *[gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
445LEN0040-H3XLA00-V5,0-M-..	26 *[6.87]*	..R2	**R928043216**	..U3	**R928043456**	**R928006645**
445LEN0063-H3XLA00-V5,0-M-..	36 *[9.51]*	..R4	**R928043217**	..U4	**R928043457**	**R928006699**
445LEN0100-H3XLA00-V5,0-M-..	46 *[12.15]*	..R4	**R928043218**	..U4	**R928043458**	**R928006753**
445LEN0160-H3XLA00-V5,0-M-..	126 *[33.29]*	..R6	**R928043221**	..U6	**R928043461**	**R928006807**
445LEN0250-H3XLA00-V5,0-M-..	212 *[56.01]*	..R6	**R928043222**	..U6	**R928043462**	**R928006861**
445LEN0400-H3XLA00-V5,0-M-..	258 *[68.16]*	..R6	**R928043223**	..U6	**R928043463**	**R928006915**
445LEN0630-H3XLA00-V5,0-M-..	325 *[85.86]*	..R8	**R928043224**	..S8	**R928043304**	**R928006969**
445LEN1000-H3XLA00-V5,0-M-..	486 *[128.40]*	..R8	**R928043225**	..S8	**R928043305**	**R928007023**

Line filter with bypass, filtration rating 6 µm

Type	Flow in l/min *[gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
445LEN0040-H6XLA00-V5,0-M-..	33 *[8.72]*	..R2	**R928043520**	..U3	**R928043760**	**R928006646**
445LEN0063-H6XLA00-V5,0-M-..	55 *[14.53]*	..R4	**R928043521**	..U4	**R928043761**	**R928006700**
445LEN0100-H6XLA00-V5,0-M-..	69 *[18.23]*	..R4	**R928043522**	..U4	**R928043762**	**R928006754**
445LEN0160-H6XLA00-V5,0-M-..	175 *[46.23]*	..R6	**R928043525**	..U6	**R928043765**	**R928006808**
445LEN0250-H6XLA00-V5,0-M-..	253 *[66.84]*	..R6	**R928043526**	..U6	**R928043766**	**R928006862**
445LEN0400-H6XLA00-V5,0-M-..	298 *[78.73]*	..R6	**R928043527**	..U6	**R928043767**	**R928006916**
445LEN0630-H6XLA00-V5,0-M-..	406 *[107.26]*	..R8	**R928043528**	..S8	**R928043608**	**R928006970**
445LEN1000-H6XLA00-V5,0-M-..	505 *[133.42]*	..R8	**R928043529**	..S8	**R928043609**	**R928007024**

Line filter with bypass, filtration rating 10 µm

Type	Flow in l/min *[gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
445LEN0040-H10XLA00-V5,0-M-..	37 *[9.77]*	..R3	**R928043904**	..U3	**R928044064**	**R928006647**
445LEN0063-H10XLA00-V5,0-M-..	70 *[18.49]*	..R4	**R928043825**	..U4	**R928044065**	**R928006701**
445LEN0100-H10XLA00-V5,0-M-..	78 *[20.60]*	..R4	**R928043826**	..U4	**R928044066**	**R928006755**
445LEN0160-H10XLA00-V5,0-M-..	211 *[55.75]*	..R6	**R928043829**	..U6	**R928044069**	**R928006809**
445LEN0250-H10XLA00-V5,0-M-..	280 *[73.98]*	..R6	**R928043830**	..U6	**R928044070**	**R928006863**
445LEN0400-H10XLA00-V5,0-M-..	325 *[85.86]*	..R6	**R928043831**	..U6	**R928044071**	**R928006917**
445LEN0630-H10XLA00-V5,0-M-..	460 *[121.53]*	..R8	**R928043832**	..S8	**R928043912**	**R928006971**
445LEN1000-H10XLA00-V5,0-M-..	515 *[136.06]*	..R8	**R928043833**	..S8	**R928043913**	**R928007025**

[1] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

ABZ	F	V –	– 1X / – DIN

ABZ: Rexroth plant construction accessories

F: Filter

V: Maintenance indicator

V =
- Electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**
- Electronic switching element with 2 switching points (normally open/normally closed), 75 %, 100 %, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**
- Electronic switching element with 2 switching points (normally open/ normally closed), 75 %, 100 %, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Component series

–DIN = Mark for DIN version

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Order example: Line filter with mechanical optical maintenance indicator for $p_{nom.}$ = 450 bar *[6527 psi]* with bypass valve, size 0400, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

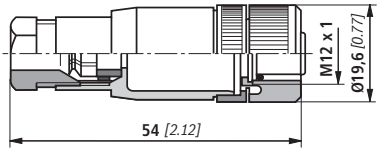
Filter: **445LEN0400-H10XLA00-V5,0-M-R6** **Material no. R928025563**
Electron. switching element: **ABZFV-E1SP-M12X1-1X/-DIN** **Material no. R901025339**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12 x 1

Mating connector for K24 4-pin, M12 x 1 with screw connection, cable gland Pg9.

Material no. R900031155

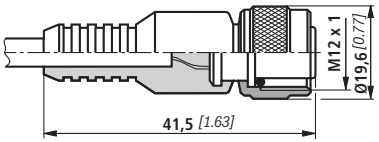


Mating connector for K24-3m 4-pin, M12 x 1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

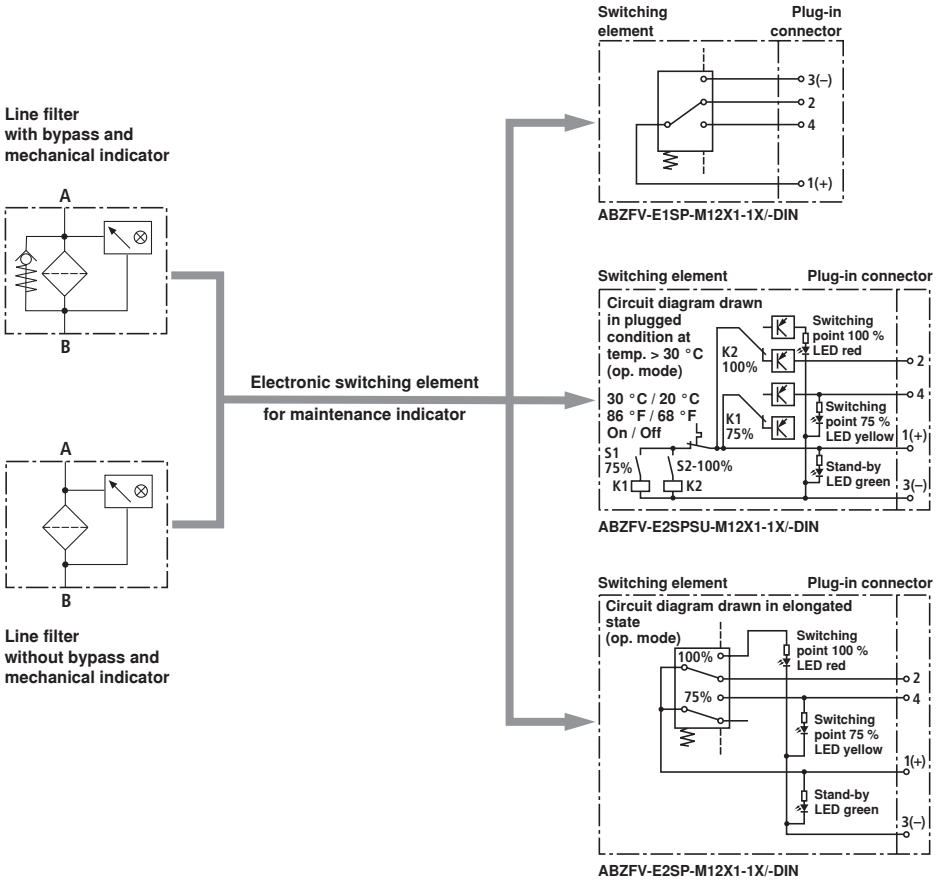
Core marking:
- **1** Brown
- **2** White
- **3** Blue
- **4** Black

Material no. R900064381



For more round plug-in connections, see data sheet RE 08006.

Symbols


Line filter
with bypass and
mechanical indicator
A
B
A
B
Line filter
without bypass and
mechanical indicator
Electronic switching element
for maintenance indicator
Switching
element
Plug-in
connector
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn
in plugged
condition at
temp. > 30 °C
(op. mode)
30 °C / 20 °C
86 °F / 68 °F
On / Off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand-by
LED green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn in elongated
state
(op. mode)
100%
75%
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand-by
LED green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

Function, section

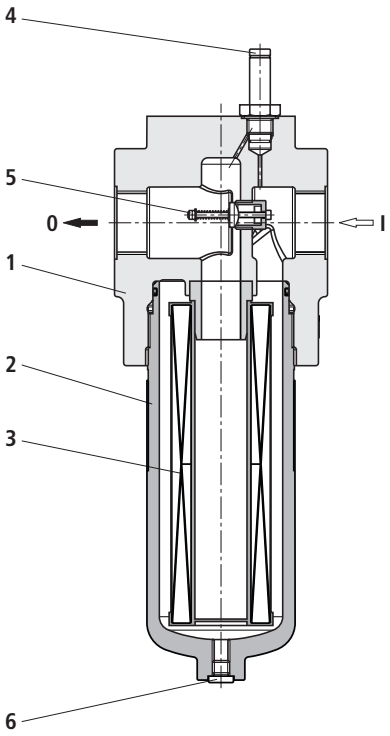
The 445LE(N) line filters are suitable for direct installation into pressure lines. They are mostly installed upstream control units or controllers to be protected.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the hydraulic circuit.

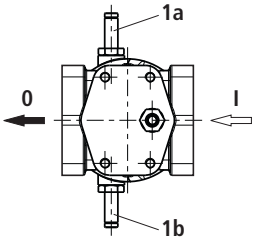
The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of the abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (6). With size 1000, the filter bowl has a two-part design.

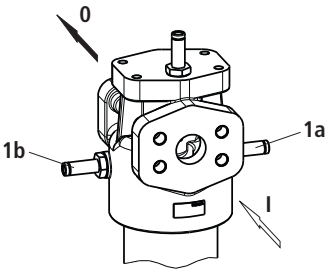
The filter is basically equipped with a mechanical-optical maintenance indicator (4) or alternatively, with an additional pressure gauge (See chapter Complementary details). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately.
The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.



Additional design options

Position of the mechanical optical maintenance indicator (standard position at the top)

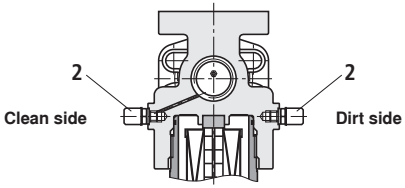




Complementary details	Item	Ordering code	Example
Maintenance indicator right	1a	V3	445LEN0160-H3XLA00-V5,0-M-R4-V3
Maintenance indicator left	1b	V9	445LEN0160-H3XLA00-V5,0-M-R4-V9

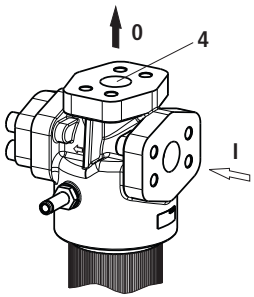
4

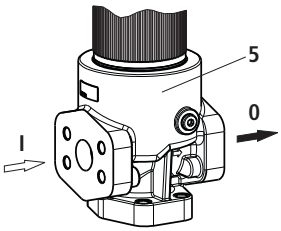
2 additional Minimess connections on clean and dirt side



Complementary details	Item	Ordering code	Example
Minimess connections (2 x)	2	M	445LEN0160-H3XLA00-V5,0-M-R4-M

Outlet at the top, outlet opposite to the inlet closed





Filter rotated by 180°, filter bowl can be unscrewed to the top

Complementary details	Item	Ordering code	Example
Outlet at the top	4	7	445LEN0160-H3XLA00-V5,0-M-R4-7
Filter rotated by 180°	5	9	445LEN0160-H3XLA00-V5,0-M-R4-9

Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical				
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*				
Weight		Size	**0040**	**0063**	**0100**		
		kg *[lbs]*	4.4 *[9.7]*	5 *[11.1]*	5.9 *[13.1]*		
Weight		Size	**0160**	**0250**	**0400**	**0630**	**1000**
		kg *[lbs]*	24 *[53.2]*	26 *[57.7]*	30 *[66.5]*	60 *[133.1]*	104 *[230.7]*
Material	Filter head		GGG				
	Filter bowl		Steel				
	Optical maintenance indicator		Brass				
	Electronic switching element		Plastic PA6				

hydraulic

Maximum operating pressure	bar *[psi]*	450 *[6527]*
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]*
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	7 ± 0.5 *[100 ± 7]*
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage		A	Max. 1
Voltage range	E1SP-M12x1	V DC/AC	Max. 150
	E2SP	V DC	10 to 30
Max. switching power with resistive load			20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1		Changeover
	E2SP-M12x1		Normally open contact at 75 % of the response pressure, normally closed contact at 100 % of the response pressure
	E2SPSU-M12x1		Normally open contact at 75 % of the response pressure, normally closed contact at 100 % of the response pressure Signal interconnection at 30 °C *[86 °F]*, return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...			Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)
Protection class according to EN 60529			IP 65
For direct voltage above 24 V, a spark extinguishing is to be planned to protect the switching contacts.			
Weight Electronic switching element: – with round plug-in connection M12 x 1		kg *[lbs]*	0.1 *[0.22]*

Technical data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4785]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

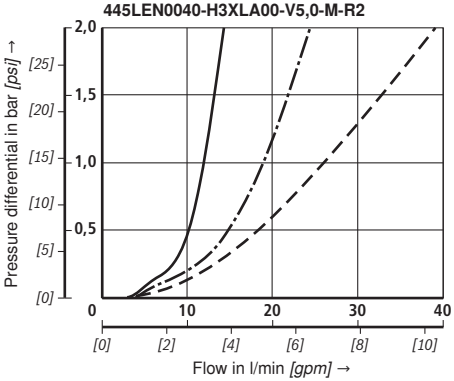
Characteristic curves (measured with HLP46, according to ISO 3968) **H3XL**

Specific weight: < 0.9 kg/dm³
Δ***p***-Q characteristic curves for complete filters
recommended initial Δ***p*** for design = 1 bar *[14.5 psi]*

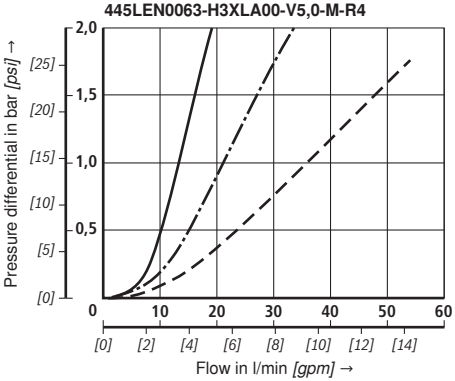
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[139 SUS]*

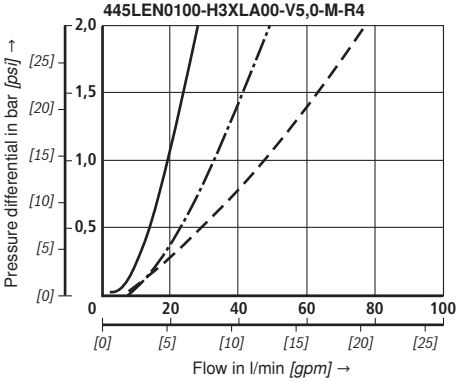
445LEN0040-H3XLA00-V5,0-M-R2



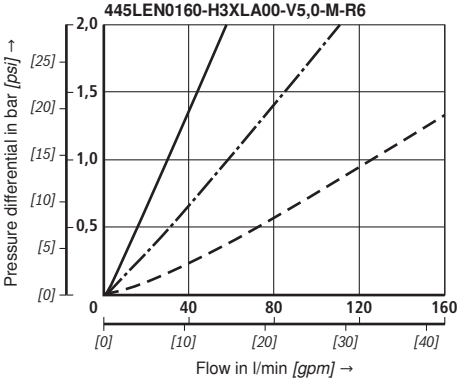
445LEN0063-H3XLA00-V5,0-M-R4



445LEN0100-H3XLA00-V5,0-M-R4



445LEN0160-H3XLA00-V5,0-M-R6



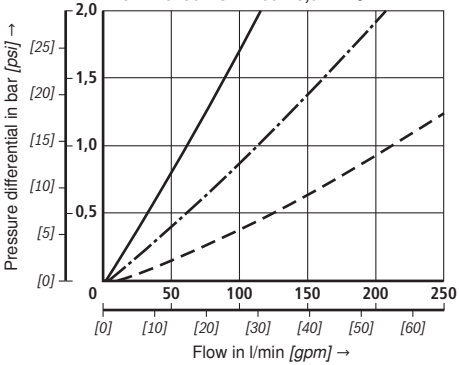
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

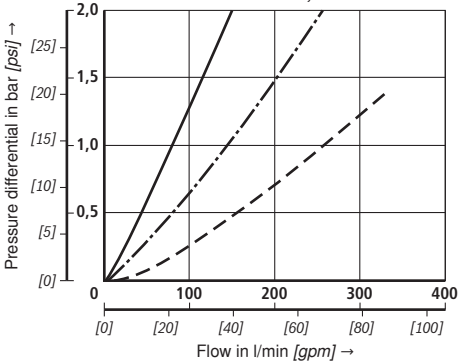
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s *[649 SUS]*
68 mm²/s *[315 SUS]*
30 mm²/s *[139 SUS]*

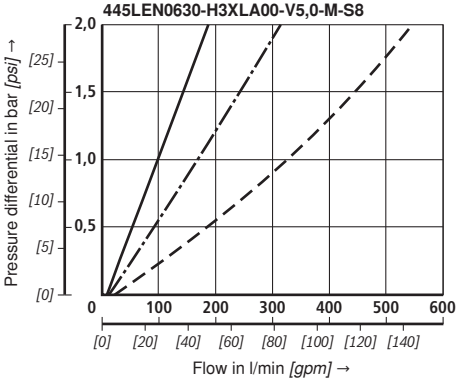
445LEN0250-H3XLA00-V5,0-M-R6



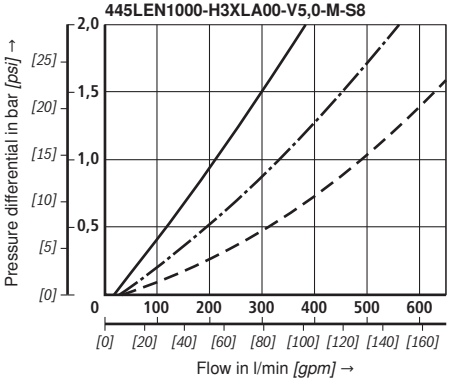
445LEN0400-H3XLA00-V5,0-M-R6



445LEN0630-H3XLA00-V5,0-M-S8



445LEN1000-H3XLA00-V5,0-M-S8



4

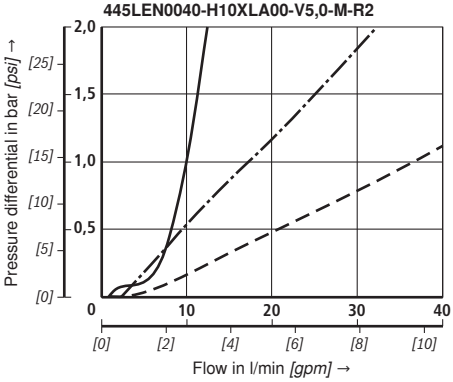
Characteristic curves (measured with HLP46, according to ISO 3968) **H10XL**

Specific weight: < 0.9 kg/dm³
Δ***p***-Q characteristic curves for complete filters
recommended initial Δ***p*** for design = 1 bar *[14.5 psi]*

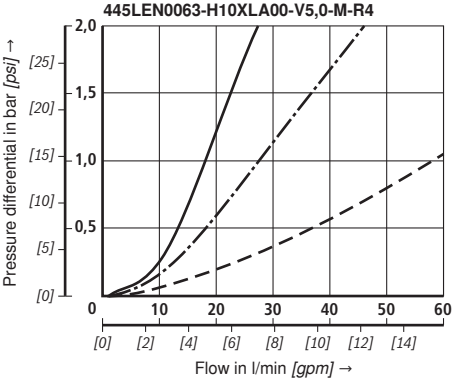
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[139 SUS]*

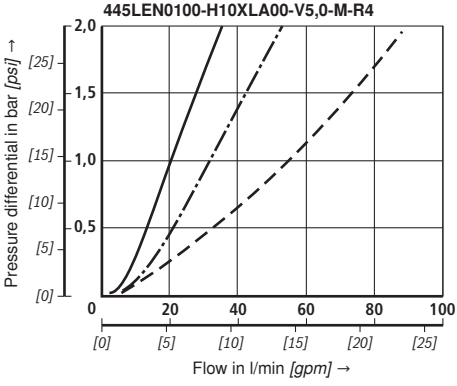
445LEN0040-H10XLA00-V5,0-M-R2



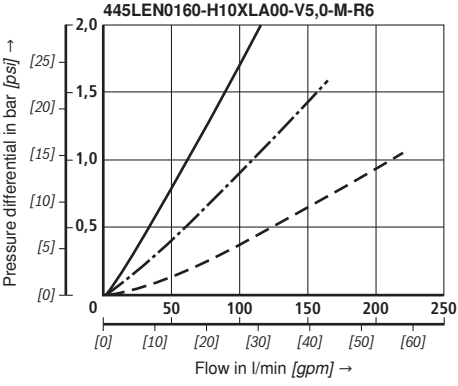
445LEN0063-H10XLA00-V5,0-M-R4



445LEN0100-H10XLA00-V5,0-M-R4



445LEN0160-H10XLA00-V5,0-M-R6



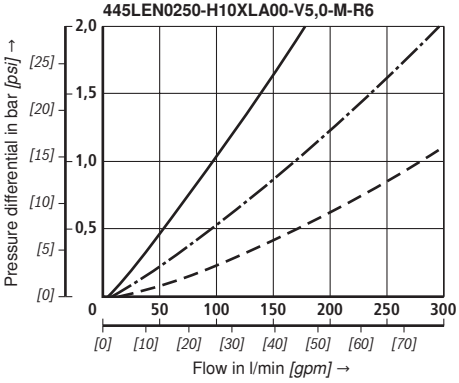
Characteristic curves (measured with HLP46, according to ISO 3968) H10XL

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

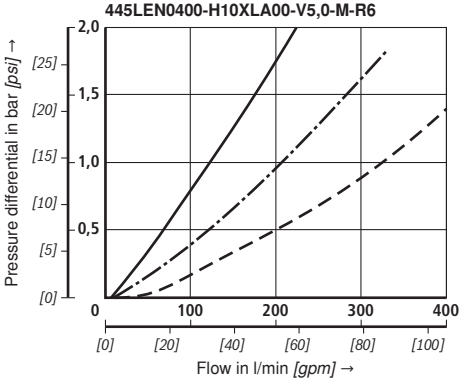
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s *[649 SUS]*, 68 mm²/s *[315 SUS]*, 30 mm²/s *[139 SUS]*

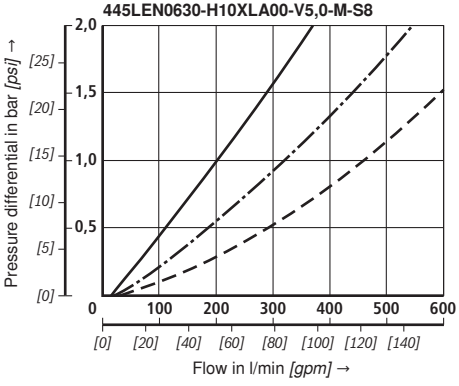
445LEN0250-H10XLA00-V5,0-M-R6



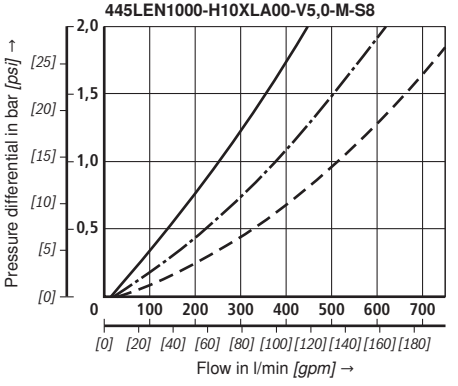
445LEN0400-H10XLA00-V5,0-M-R6



445LEN0630-H10XLA00-V5,0-M-S8



445LEN1000-H10XLA00-V5,0-M-S8

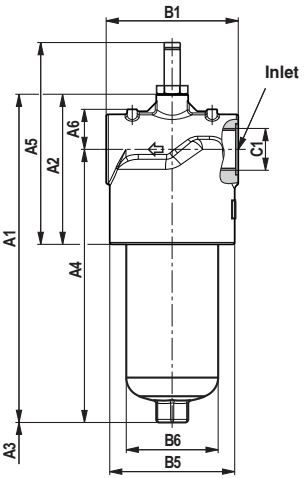


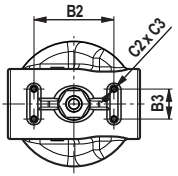
4

Unit dimensions size 0040 to size 1000 (dimensions in mm *[inch]*)

Size 0040-0100

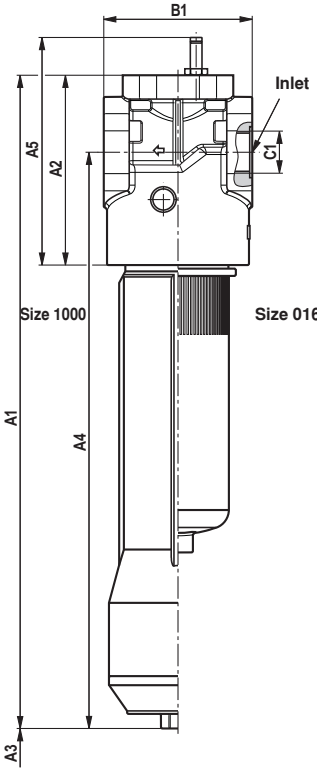
Connections
pipe threads
UNF thread

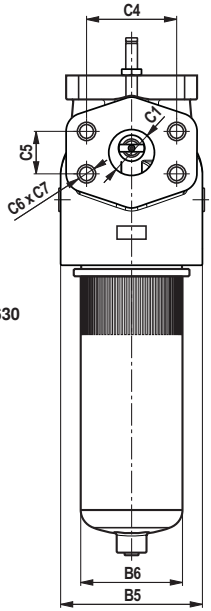




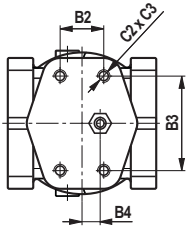
Size 0160-1000

Connections
SAE





Size 0160-0630



Unit dimensions size 0040 to size 1000 (dimensions in mm *[inch]*)

Filter housing for filter elements in accordance with DIN 24550 and according to BR standard

Type 445 LE(N)	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	A6	B1	B2	B3
0040	0.25 *[0.07]*	203 *[7.99]*	115 *[4.53]*	80 *[3.15]*	158 *[6.22]*	167 *[6.57]*	25 *[0.98]*	92 *[3.62]*	65 *[2.56]*	30 *[1.18]*
0063	0.35 *[0.09]*	266 *[10.47]*			221 *[8.70]*					
0100	0.52 *[0.14]*	356 *[14.02]*		80 *[3.15]*	311 *[12.24]*					
0160	1.4 *[0.37]*	344 *[13.54]*	192 *[7.56]*	120 *[4.72]*	262 *[10.31]*	244 *[9.61]*	-	164 *[6.46]*	55 *[2.17]*	105 *[4.13]*
0250	1.95 *[0.52]*	434 *[17.09]*			352 *[13.86]*					
0400	3.1 *[0.82]*	584 *[22.99]*			502 *[19.76]*					
0630	5.0 *[1.32]*	656 *[25.83]*	261 *[10.28]*	160 *[6.30]*	550 *[21.65]*	313 *[12.32]*		204 *[8.03]*	60 *[2.36]*	130 *[5.12]*
1000	6.5 *[1.72]*	984 *[38.74]*		650 *[25.59]*	788 *[31.02]*					

Type 445 LE(N)	B4	B5 Ø	B6 Ø	C1 Standard	C1 R…	C1 S…	C1 U…	C2	C3
0040	-	85 *[3.35]*	64 *[2.52]*	G 1/2	G 3/4	-	SAE 10 7/8-12 UNF-2B	M6	8 *[0.31]*
0063				G 1			SAE 12 1 1/16-12 UN-2B		
0100									
0160	30 *[1.18]*	150 *[5.91]*	114 *[4.49]*	G 1 1/2	-	SAE 1 1/2" 6000 psi SAE 2" 6000 psi	SAE 24 1 7/8-12 UN-2B	M12	28 *[1.10]*
0250									
0400									
0630	25 *[0.98]*	195 *[7.68]*	140 *[5.51]*	SAE 2" 6000 psi	G 2	SAE 2 1/2" 6000 psi	-	M16	33 *[1.30]*
1000			188 *[7.40]*						

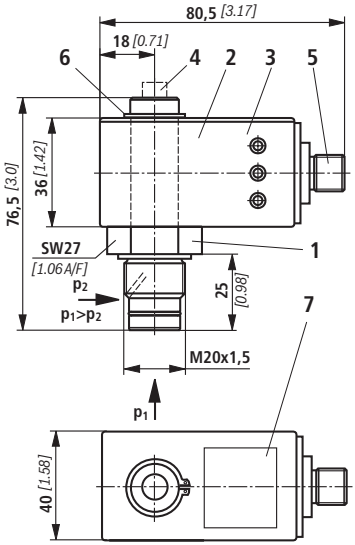
Additional ports

Port	C1 Ø	C4	C5	C6	C7
SAE 1 1/2" 6000 psi	38 *[1.50]*	79.38 *[3.13]*	36.5 *[1.44]*	M16	22 *[0.87]*
SAE 2" 6000 psi	51 *[2.01]*	96.82 *[3.81]*	44.45 *[1.75]*	M20	33 *[1.30]*
SAE 2 1/2" 6000 psi	63 *[2.48]*	123.8 *[4.87]*	58.7 *[2.31]*	M24	33 *[1.30]*

[1] Servicing height for filter element replacement.

Maintenance indicator (dimensions in mm *[inch]*)

Electronic switching element M12x1



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\ max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (can be rotated by 360°); plug-in connection M12x1 or according to DIN EN 175201-804

3 Housing with three LEDs: 24 V =
- a. Green: Stand-by
- b. Yellow: Switching point 75 %
- c. Red: Switching point 100 %

4 Optical indicator bistable

5 Round connector M12x1, 4-pin

6 Locking ring

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2).

Round plug-in connection M12x1 (5)
For connection e.g. to ABZFV-E1SP-M12x1-1X/-DIN (see page 4).

Switching elements with increased switching power at request.

Spare parts

Mechanical optical maintenance indicator

ABZ F V – HV5 – 1X / – DIN

Rexroth plant construction accessories

Filter

Maintenance indicator

Mechanical optical maintenance indicator for high-pressure filters switching point 5 bar *[72 psi]* **= HV5**

DIN = Mark for DIN and SAE version

Seal material

M = NBR seal

V = FKM seal

Component series

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Mechanical optical maintenance indicator	Material no.
ABZFV-HV5-1X/M-DIN	**R901025313**

4

Seal kit

D 350/445LE –

Seal kit **= D**

Series **= 350/445LE**

Size

Size 0040-0100 **= N0040-0100**

Size 0160-0400 **= N0160-0400**

Size 0630 **= N0630**

Size 1000 **= N1000**

Seal

M = NBR seal

V = FKM seal

Seal kit	Material no.
D350/445LEN0040-0100-M	**R928028527**
D350/445LEN0160-0400-M	**R928028532**
D350/445LEN0630-M	**R928028536**
D350/445LEN1000-M	**R928028537**

Installation, commissioning and maintenance

Installation of the filter

Verify operating overpressure with name plate information. Remove the blanking plugs in the filter inlet and outlet. Screw the filter head (1) to the fastening device, considering flow direction (direction arrows) and servicing height of the element.

The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electronic maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) or the floor (size 1000) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the centering spigot in the filter head by turning it slightly
- Check the seal ring and the support ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H...XL, clean filter elements G....
- The efficiency of the cleaning process depends on the characteristics of contamination and the amount of the pressure differential before the filter element exchange. If the pressure differential after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl to stop. Then turn out the filter bowl by 1/8 to 1/2 turn so that the filter bowl is not stuck due to the pressure pulsation and can be easily loosened in case of maintenance works.

Quality and standardization

The line filters for hydraulic applications according to RE 51423 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

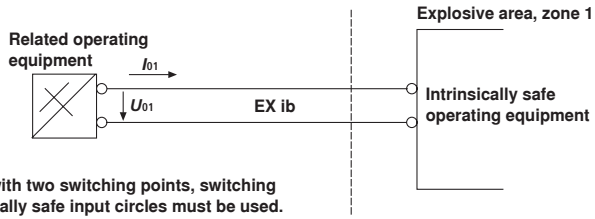
Use in explosive areas according to directive 94/9/EC (ATEX)

The line filters according to RE 51423 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the line filters according to RE 51423 in explosive areas, potential equalization has to be ensured.

According to DIN EN 50020, the electronic maintenance indicators are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib] be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



With electrical maintenance indicators with two switching points, switching devices with two intrinsically safe input circles must be used.

Notes

Notes

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Fax +49 (0) 93 52 / 18-23 58
documentation@boschrexroth.de
www.boschrexroth.de

Rexroth
Bosch Group

Inline filter with filter element according to DIN 24550

RE 51447/10.11 1/16
Replaces: RE 51400

Type 50LEN0040 to 0400; 50LE0130, 0150


H7819_d

Size **according to DIN 24550**: 0040 to 0400
Additional sizes: 0130, 0150
Nominal pressure 50 bar *[725 psi]*
Port up to G 1 1/2; SAE 24
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

Inline filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for attachment in pipelines.

They distinguish themselves by the following:

- Adsorption of very fine particles across a broad pressure differential range
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized design due to 3D computer-supported design.

Ordering code

of the filter

50	LE		—	A00	—	—	—	

Pressure
up to 50 bar *[725 psi]* **= 50**

Inline filter
Single **= LE**

Filter element
not according to DIN 24550 **= no code**
according to DIN 24550 **= N**

Size
LEN… **= 0040 0063 0100 0160 0250 0400**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve **= A00**

Maintenance indicator
Maintenance indicator, mechanical optical
Switching pressure 5.0 bar *[72.5 psi]* **= V5,0**
Switching pressure 2.2 bar *[31.9 psi]* **= V2,2**
Switching pressure 1.5 bar *[21.8 psi]* **= V1,5**

Supplementary information
No code = without supplementary information
– NB = without bypass valve

Port

		Frame size 0040-0100	0130-0150	0160-0400	
	Port				
R3 =	G 3/4	•			Pipe thread according to ISO 228
R4 =	G 1		•		
R6 =	G 1 1/2			•	
U4 =	SAE 12	x			Pipe thread according to SAE J1926
U9 =	SAE 16		x		
U6 =	SAE 24			x	

• = Standard port
x = Additional connection possibility

Seal
M = NBR seal
V = FKM seal

Order example:
50LEN0100-H3XLA00-V5,0-M-R4

Further versions (filter materials, connections,...) are available at request.

of the filter element

2.		—	A00	—	0	—

Filter element
Design **= 2.**

Size
LEN… **= 0040 0063 0100 0160 0250 0400**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*

Bypass valve
0 = with filter element always 0

Seal
M = NBR seal
V = FKM seal

Order example:
2.0100 H3XL-A00-0-M

More information on Rexroth filter elements is available in the data sheet 51420

Preferred types

NBR seal, with bypass, flow specifications for 30 mm²/s *[143 SUS]*

Inline filter 50 LE(N), filter rating **3 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1 bar *[14.5 psi]*	Material no. Filter				Material no. Replacement element
50LEN0040-H3XLA00-V2,2-M-..	23 *[6.08]*	..R3	**R928048449**	..U4	**R928048452**	**R928006645**
50LEN0063-H3XLA00-V2,2-M-..	30 *[7.93]*	..R3	**R928050995**	..U4	**R928048453**	**R928006699**
50LEN0100-H3XLA00-V2,2-M-..	44 *[11.62]*	..R3	**R928051075**	..U4	**R928048454**	**R928006753**
50LE0130-H3XLA00-V2,2-M-..	74 *[19.55]*	..R4	**R928050770**	..U9	**R928048455**	**R928022274**
50LE0150-H3XLA00-V2,2-M-..	89 *[23.51]*	..R4	**R928050850**	..U9	**R928048456**	**R928022283**
50LEN0160-H3XLA00-V2,2-M-..	132 *[34.87]*	..R6	**R928051152**	..U6	**R928048457**	**R928006807**
50LEN0250-H3XLA00-V2,2-M-..	190 *[50.19]*	..R6	**R928051232**	..U6	**R928048458**	**R928006861**
50LEN0400-H3XLA00-V2,2-M-..	250 *[66.04]*	..R6	**R928051312**	..U6	**R928048459**	**R928006915**

Inline filter 50 LE(N), filter rating **10 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1 bar *[14.5 psi]*	Material no. Filter				Material no. Replacement element
50LEN0040-H10XLA00-V2,2-M-..	36 *[9.51]*	..R3	**R928047959**	..U4	**R928048460**	**R928006647**
50LEN0063-H10XLA00-V2,2-M-..	69 *[18.23]*	..R3	**R928050967**	..U4	**R928048461**	**R928006701**
50LEN0100-H10XLA00-V2,2-M-..	75 *[19.81]*	..R3	**R928051047**	..U4	**R928048462**	**R928006755**
50LE0130-H10XLA00-V2,2-M-..	127 *[33.55]*	..R4	**R928050743**	..U9	**R928048463**	**R928022276**
50LE0150-H10XLA00-V2,2-M-..	150 *[39.63]*	..R4	**R928050822**	..U9	**R928048464**	**R928022285**
50LEN0160-H10XLA00-V2,2-M-..	210 *[55.48]*	..R6	**R928051125**	..U6	**R928048465**	**R928006809**
50LEN0250-H10XLA00-V2,2-M-..	260 *[68.68]*	..R6	**R928051204**	..U6	**R928048466**	**R928006863**
50LEN0400-H10XLA00-V2,2-M-..	300 *[79.25]*	..R6	**R928051284**	..U6	**R928048467**	**R928006917**

Ordering code: Electronic switching element for maintenance indicator

WE – – –

Maintenance indicator
electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression up to 30 °C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pin
EN175301-803 = Rectangular plug-in connection, 2-pin design A according to EN-175301-803

Material numbers of the electronic switching elements

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2	M12x1	3 pieces
R928028411	WE-2SPSU-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2	M12x1	3 pieces
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

More information on maintenance indicators is available in the data sheet 51450

Order example: Inline filter with mechanical optical maintenance indicator for $p_{Nominal}$ = 50 bar *[725 psi]* with bypass valve, size 0160, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

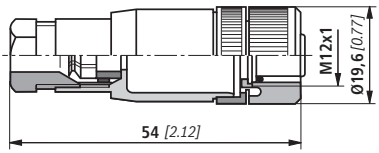
Filter with mech.-opt. maintenance indicator:	**50LEN0160-H10XLA00-V5,0-M-R6**	**Material no. R928051126**
Electr. switching element:	**WE-1SP-M12x1**	**Material no. R928028409**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12x1

Mating connector suitable for K24 4-pin, M12x1 with screw connection, cable gland Pg9.

Material no. R900031155

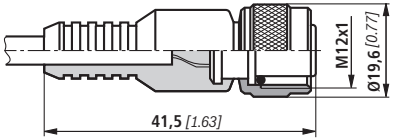


Mating connector suitable for K24-3m 4-pin, M12x1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

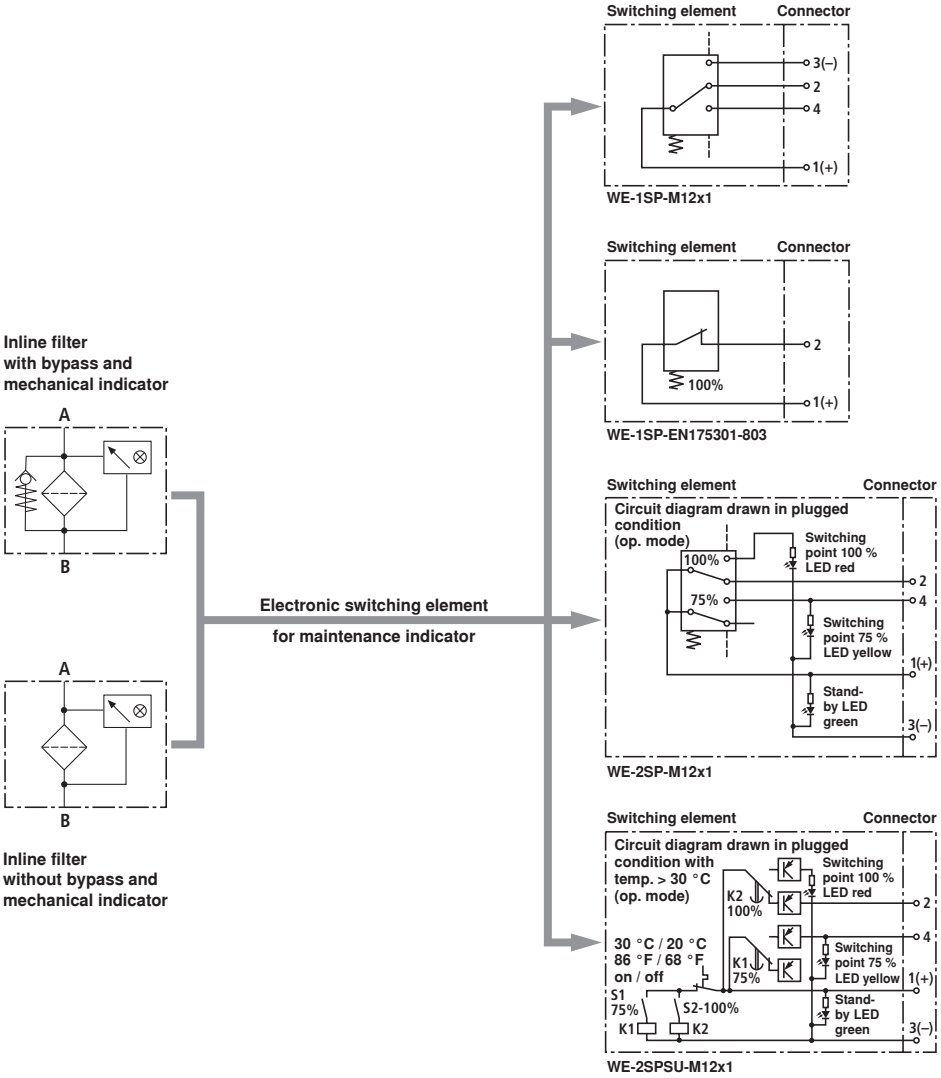
Core marking:
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For more round plug-in connections refer to data sheet 08006.

Symbols


Switching element
Connector
3(–)
2
4
1(+)
WE-1SP-M12x1
Switching element
Connector
2
100%
1(+)
WE-1SP-EN175301-803
Inline filter
with bypass and
mechanical indicator
A
B
Electronic switching element
for maintenance indicator
Switching element
Connector
Circuit diagram drawn in plugged
condition
(op. mode)
100%
75%
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand-
by LED
green
2
4
1(+)
3(–)
WE-2SP-M12x1
Inline filter
without bypass and
mechanical indicator
Switching element
Connector
Circuit diagram drawn in plugged
condition with
temp. > 30 °C
(op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching
point 100 %
LED red
Switching
point 75 %
LED yellow
Stand-
by LED
green
2
4
1(+)
3(–)
WE-2SPSU-M12x1

4

Function, section

The 50LE(N) inline filters are suitable for direct installation into pressure lines. They are mostly installed upstream open-loop or closed-loop control units to be protected.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

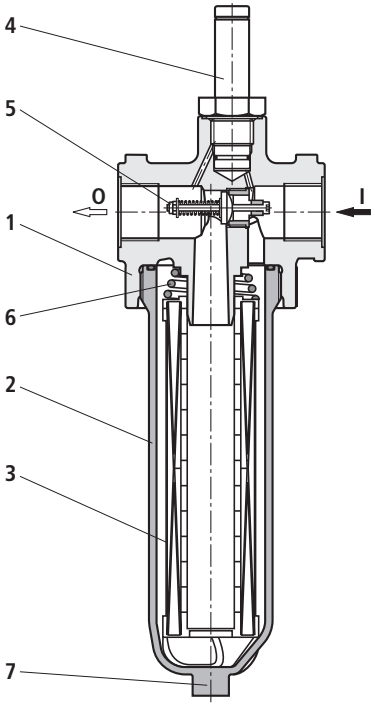
The installed spring (6) prevents possible vibrations of the filter element (3). During disassembly, the contact pressure of the spring (6) holds the filter element in the filter bowl (2).

Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (7).

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points (see p. 4), which has to be ordered separately.

The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.



Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical			
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*			
Weight		Size	**0040**	**0063**	**0100**	**0130**
		kg *[lbs]*	1.05 *[2.3]*	1.1 *[2.4]*	1.2 *[2.6]*	1.91 *[4.2]*
		Size	**0150**	**0160**	**0250**	**0400**
		kg *[lbs]*	2.06 *[4.5]*	3.1 *[6.8]*	3.3 *[7.3]*	3.8 *[8.4]*
Volume		Size	**0040**	**0063**	**0100**	**0130**
		l *[US gal]*	0.27 *[0.07]*	0.39 *[0.1]*	0.58 *[0.15]*	0.89 *[0.23]*
		Size	**0150**	**0160**	**0250**	**0400**
		l *[US gal]*	1.1 *[0.29]*	1.31 *[0.35]*	1.89 *[0.50]*	2.84 *[0.75]*
Material	Filter head		Aluminum			
	Filter bowl		Aluminum			
	Optical maintenance indicator	V1.5; V2.2	Aluminum			
		V5.0	Brass			
	Electronic switching element		Plastic PA6			

hydraulic

Maximum operating pressure	bar *[psi]*	50 *[725]*	
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]*	
Minimum conductivity of the medium	pS/m	300	
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure	
Type of pressure measurement of the maintenance indicator		Pressure differential	
Assignment: Response pressure of the maintenance indicator / cracking pressure of the bypass valve		Response pressure of the maintenance indicator	Cracking pressure of the bypass valve
	bar *[psi]*	1.5 ± 0.2 *[21.8 ± 2.9]*	2.5 ± 0.25 *[36.3 ± 3.6]*
		2.2 ± 0.3 *[31.9 ± 4.4]*	3.5 ± 0.35 *[50.8 ± 5.1]*
		5.0 ± 0.5 *[72.5 ± 7.3]*	7.0 ± 0.5 *[101.5 ± 7.3]*

4

Technical data (For applications outside these parameters, please consult us!)

electric (electronic switching element)

Electrical connection			Round plug-in connection M12x1, 4-pin			Standard connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. Switching power with resistive load		W	20			70
Switching type	75 % signal		–	Normally open contact		–
	100 % signal		Changeover	Normally closed contact		Normally closed contact
	2SPSU				Signal inter-connection at 30 °C *[86 °F]*, return switch-ing at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4785]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

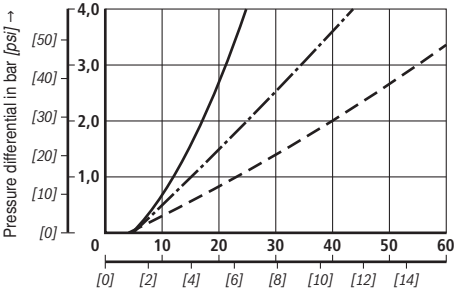
Characteristic curves H3XL

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

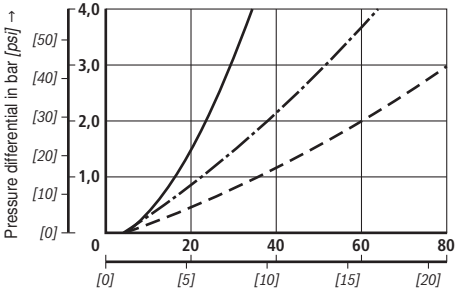
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[143 SUS]*

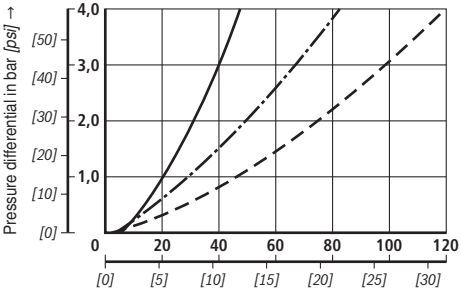
50LEN0040-H3XLA00-V5,0-M-R3



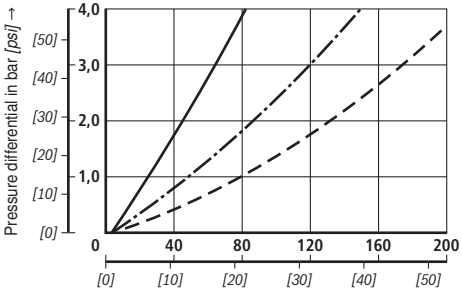
50LEN0063-H3XLA00-V5,0-M-R3



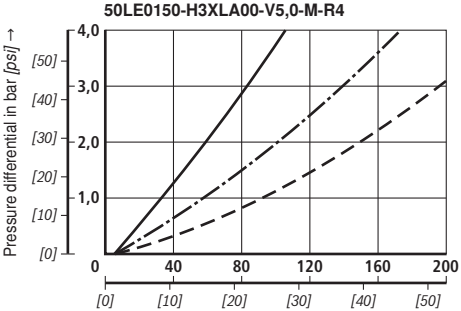
50LEN0100-H3XLA00-V5,0-M-R3



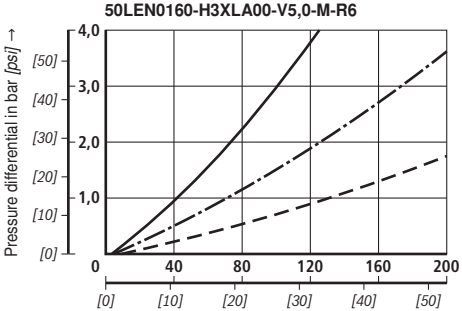
50LE0130-H3XLA00-V5,0-M-R4



50LE0150-H3XLA00-V5,0-M-R4



50LEN0160-H3XLA00-V5,0-M-R6



4

Characteristic curves — H3XL, H10XL

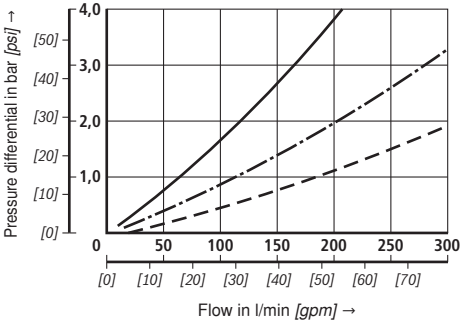
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

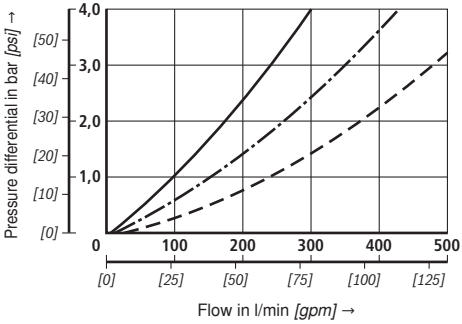
Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[143 SUS]*

H3XL

50LEN0250-H3XLA00-V5,0-M-R6

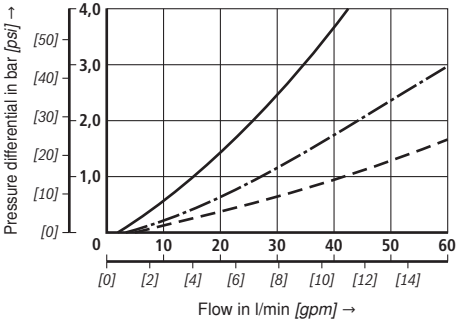


50LEN0400-H3XLA00-V5,0-M-R6

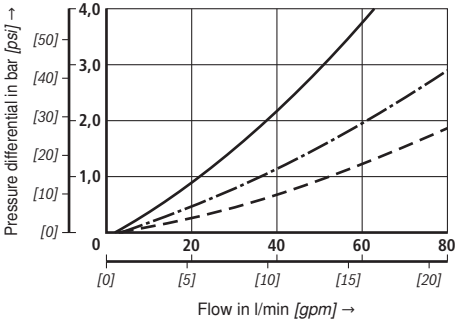


H10XL

50LEN0040-H10XLA00-V5,0-M-R3



50LEN0063-H10XLA00-V5,0-M-R3



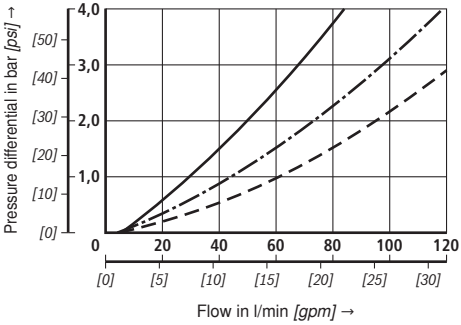
Characteristic curves H10XL

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

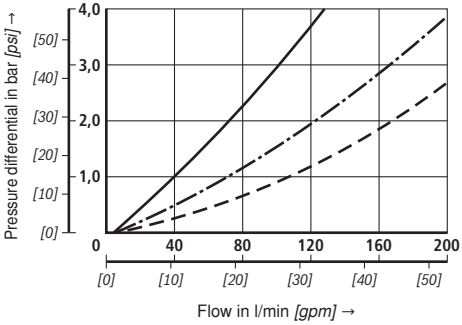
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[143 SUS]*

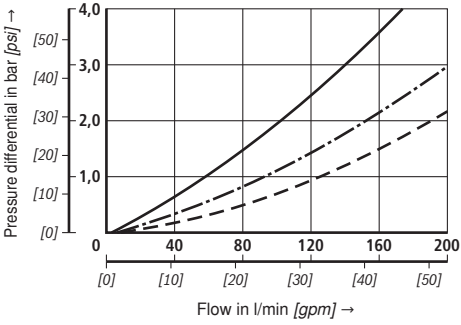
50LEN0100-H10XLA00-V5,0-M-R3



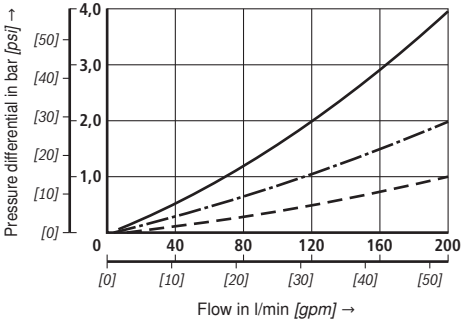
50LE0130-H10XLA00-V5,0-M-R4



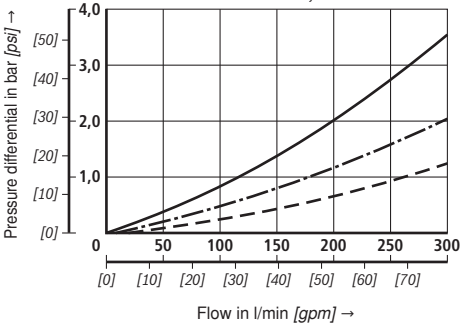
50LE0150-H10XLA00-V5,0-M-R4



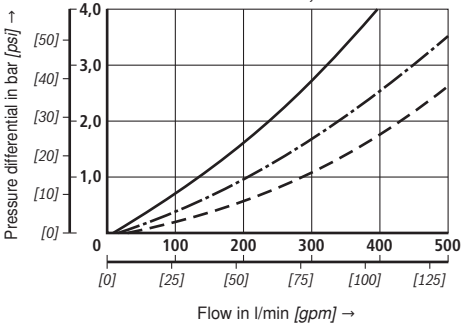
50LEN0160-H10XLA00-V5,0-M-R6



50LEN0250-H10XLA00-V5,0-M-R6



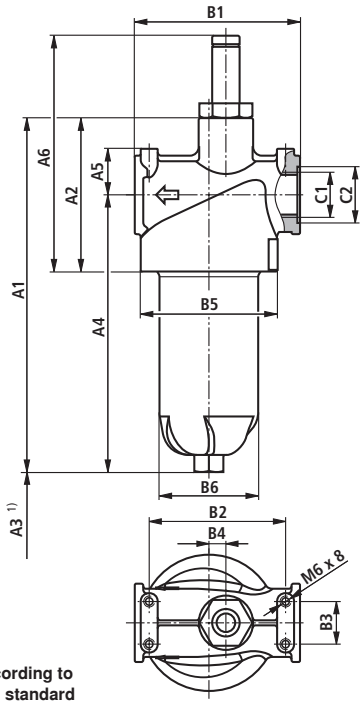
50LEN0400-H10XLA00-V5,0-M-R6



4

Unit dimensions size 0040 - 0400 (dimensions in mm *[inch]*)

50 LEN 0040-0400



Filter housing for filter elements according to DIN 24550 and according to Rexroth standard

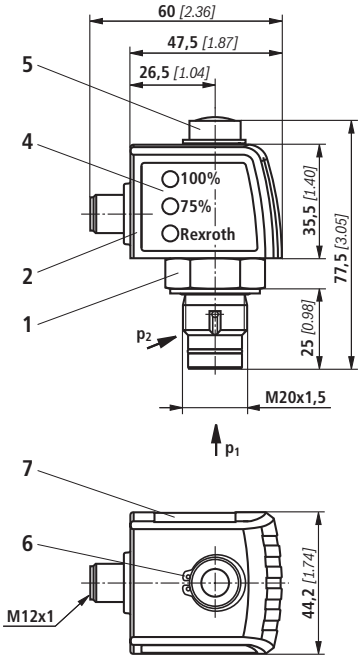
Type 50 LE(N)	A1	A2	A3	A4	A5	A6	B1	B2	B3
0040	209 *[8.23]*	87 *[3.43]*	80 *[3.15]*	164 *[6.46]*	24 *[0.94]*	139 *[5.47]*	92 *[3.62]*	65 *[2.56]*	20 *[0.79]*
0063	269 *[10.59]*			224 *[8.82]*					
0100	359 *[14.13]*			314 *[12.36]*					
0130	299 *[11.77]*	98 *[3.86]*	140 *[5.51]*	251 *[9.88]*	30 *[1.18]*	150 *[5.91]*	122 *[4.80]*	90 *[3.54]*	20 *[0.79]*
0150	350 *[13.78]*			302 *[11.89]*					
0160	310 *[12.20]*	122 *[4.80]*	140 *[5.51]*	255 *[10.04]*	35 *[1.38]*	174 *[6.85]*	142 *[5.59]*	110 *[4.33]*	30 *[1.18]*
0250	400 *[15.75]*			345 *[13.58]*					
0400	550 *[21.65]*			495 *[19.49]*					

Type 50 LE(N)	B4	Ø B5	ØB6	C1 connection		ØC2	
				Standard	U…(SAE J1926)	Standard	U…(SAE J1926)
0040	10 *[0.39]*	75 *[2.95]*	58 *[2.28]*	G 3/4	SAE 12 1 1/16-12 UN-2B	33 *[1.30]*	41 *[1.61]*
0063							
0100							
0130	14 *[0.55]*	105 *[4.13]*	82 *[3.23]*	G 1	SAE 16 1 5/16-12 UN-2B	41 *[1.61]*	49 *[1.93]*
0150							
0160	20 *[0.79]*	125 *[4.92]*	102 *[4.02]*	G 1 1/2	SAE 24 1 7/8-12 UN-2B	56 *[2.20]*	65 *[2.56]*
0250							
0400							

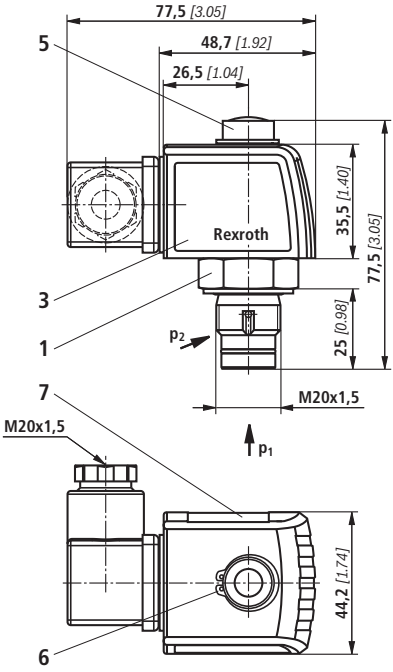
1) Servicing height for filter element replacement

Maintenance indicator (dimensions in mm *[inch]*)

Pressure differential indicator with mounted switching element M12x1



Pressure differential indicator with mounted switching element EN-175301-803



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electric maintenance indicator (rotatable by 360°); round plug-in connection M12x1, 4-pin

3 Switching element with locking ring for electric maintenance indicator (rotatable by 360°); rectangular plug-in connection EN175301-803

4 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

5 Optical indicator bistable

6 Locking ring DIN 471-16x1,
Material no. R900003923

7 Name plate

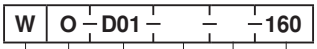
Notice:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

Switching elements with increased switching power at request.

Spare parts

Mechanical optical maintenance indicator



Maintenance indicator **= W**
Mechanical optical indicator **= O**

Design
Pressure differential, design 01 **= D01**

Switching pressure
5.0 bar **= 5,0**
2.2 bar **= 2,2**
1.5 bar **= 1,5**

Max. operating pressure
D01-1.5; D01-2.2
160 = 160 bar *[2321 psi]*
D01-5.0
450 = 450 bar *[6527 psi]*

Seal
M = NBR seal
V = FKM seal

Mechanical optical maintenance indicator	**Material no.**
WO-D01-5,0-M-450	**R901025312**
WO-D01-2.2-M-160	**R901025312**
WO-D01-1.5-M-160	**R928038781**

Seal kit

Seal kit **= D**
Series 50LE and 110LE **= 50/110LE**

Size
Size 0040-0100 **= N0040-0100**
Size 0130-0150 **= 0130-0150**
Size 0160-0400 **= N0160-0400**

Seal
M = NBR seal
V = FKM seal

Seal kit	**Material no.**
D50/110LEN0040-0100-M	**R928046935**
D50/110LE0130-0150-M	**R928046936**
D50/110LEN0160-0400-M	**R928046937**

Installation, operating and maintenance notes

Installation of the filter

Verify operating overpressure with name plate information. Remove the blanking plugs in the filter inlet and outlet. Screw the filter head (1) to the fastening device, considering flow direction (direction arrows) and servicing height of the element. Make sure that the components are assembled without tension stress. The housing must be grounded.

The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electronic maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element (6) with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

- The filter element is to be exchanged after initial start-up of the system.
- Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.
- The filter element should be replaced or cleaned after max. 6 months at the latest.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the spigot in the filter head by turning it slightly
- Check the seal ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H...XL, clean filter elements G.....
- The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the differential pressure after the filter element exchange exceeds 150 % of the value of a brand-new filter element, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl to stop (torque 50 Nm $^{+10\ Nm}$).

Quality and standardization

The inline filters for hydraulic applications according to 51447 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

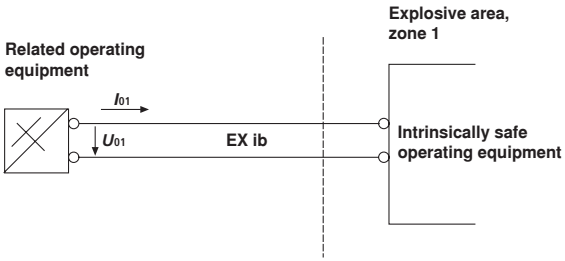
Use in explosive areas according to directive 94/9/EC (ATEX)

The inline filters according to 51447 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the inline filters according to 51447 in explosive areas, potential equalization has to be ensured.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



The manufacturer's declaration according to DIN EN 13463 is available for this filter separately, with Material no. R928028899.

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Rexroth
Bosch Group

Inline filter with filter element according to DIN 24550

RE 51448/05.12 1/18
Replaces: 03.12

Type 110LEN0040 to 0400; 110LE0130, 0150


H7819_d

Size **according to DIN 24550**: 0040 to 0400
Additional sizes: 0130, 0150
Nominal pressure 110 bar *[1595 psi]*
Connection up to G 1 1/2; SAE 24
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

Inline filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for attachment in pipelines.

They distinguish themselves by the following:

- Filtration of very fine particles across a broad pressure differential range
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized design due to 3D computer-supported design
- Optional Minimess connections from size 0130

Ordering code

of the filter

110 | LE | | – | – – – |

Pressure
up to 110 bar
[1595 psi] **= 110**

Inline filter
Single **= LE**

Filter element
Not according to DIN 24550 **= no code**
According to DIN 24550 **= N**

Size
LEN… **= 0040 0063 0100 0160 0250 0400**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve **= A00**
330 bar *[4786 psi]*, without bypass valve **= B00**

Maintenance indicator
Maintenance indicator, mechanical optical
Switching pressure 5.0 bar *[72.5 psi]* **= V5.0**
Switching pressure 2.2 bar *[31.9 psi]* **= V2.2**
Switching pressure 1.5 bar *[21.8 psi]* **= V1.5**

Supplementary information
no code = Without supplementary information
– M = Minimess connections G 1/4 at the side (from size 0130)

Port

	Frame size	0040	0063-0100	0130-0150	0160-0400	
	Port					
R3 =	G 3/4	•	x			Pipe thread according to ISO 228
R4 =	G 1	x	•	x		
R5 =	G 1 1/4			•		
R6 =	G 1 1/2				•	
U4 =	SAE 12	x	x			Pipe thread according to SAE J1926
U9 =	SAE 16			x		
U6 =	SAE 24				x	

• = Standard port
x = Additional connection possibility

Seal
M = NBR seal
V = FKM seal

Order example:
110LEN0100-H3XLA00-V5,0-M-R4

Further versions (filter materials, connections,...) are available upon request.

of the filter element

2. | | – – 0 –

Filter element
Design **= 2.**

Size
LEN… **= 0040 0063 0100 0160 0250 0400**
LE… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = With filter element always 0

Pressure differential
Max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*
B00 = 330 bar *[4786 psi]*

Order example:
2.0100 H3XL-A00-0-M

More information on Rexroth filter elements is available in the data sheet 51420

Preferred types

NBR seal, with bypass, flow specifications for 30 mm²/s *[143 SUS]*

Inline filter 110 LE(N), filter rating **3 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1 bar *[14.5 psi]*	Material no. Filter				Material no. Replacement element
110LEN0040-H3XLA00-V5,0-M-..	24 *[6.34]*	..R3	R928046899	..U4	R928046914	R928006645
110LEN0063-H3XLA00-V5,0-M-..	32 *[8.45]*	..R4	R928046901	..U4	R928046915	R928006699
110LEN0100-H3XLA00-V5,0-M-..	46 *[12.15]*	..R4	R928046903	..U4	R928046916	R928006753
110LE0130-H3XLA00-V5,0-M-..	90 *[23.78]*	..R5	R928046909	..U9	R928046917	R928022274
110LE0150-H3XLA00-V5,0-M-..	92 *[24.31]*	..R5	R928046910	..U9	R928046918	R928022283
110LEN0160-H3XLA00-V5,0-M-..	115 *[30.38]*	..R6	R928046911	..U6	R928046919	R928006807
110LEN0250-H3XLA00-V5,0-M-..	152 *[40.16]*	..R6	R928046912	..U6	R928046920	R928006861
110LEN0400-H3XLA00-V5,0-M-..	250 *[66.04]*	..R6	R928046913	..U6	R928046921	R928006915

Inline filter 110 LE(N), filter rating **10 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1 bar *[14.5 psi]*	Material no. Filter				Material no. Replacement element
110LEN0040-H10XLA00-V5,0-M-..	33 *[8.72]*	..R3	R928046922	..U4	R928046923	R928006647
110LEN0063-H10XLA00-V5,0-M-..	50 *[14.53]*	..R4	R928041640	..U4	R928046924	R928006701
110LEN0100-H10XLA00-V5,0-M-..	61 *[16.12]*	..R4	R928041641	..U4	R928046925	R928006755
110LE0130-H10XLA00-V5,0-M-..	100 *[26.42]*	..R5	R928037470	..U9	R928046926	R928022276
110LE0150-H10XLA00-V5,0-M-..	127 *[33.55]*	..R5	R928041642	..U9	R928046927	R928022285
110LEN0160-H10XLA00-V5,0-M-..	192 *[50.73]*	..R6	R928037471	..U6	R928046928	R928006809
110LEN0250-H10XLA00-V5,0-M-..	243 *[64.20]*	..R6	R928041643	..U6	R928046929	R928006863
110LEN0400-H10XLA00-V5,0-M-..	300 *[79.25]*	..R6	R928041644	..U6	R928046930	R928006917

Ordering code: Electronic switching element for maintenance indicator

WE – – –

Maintenance indicator
Electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression up to 30 °C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pole
EN175301-803 = Rectangular plug-in connection, 2-pole design A according to EN-175301-803

Material numbers of the electronic switching elements

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

More information on maintenance indicators is available in the data sheet 51450

Order example: Inline filter with mechanical optical maintenance indicator for $p_{Nominal}$ = 110 bar *[1595 psi]* with bypass valve, size 0160, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

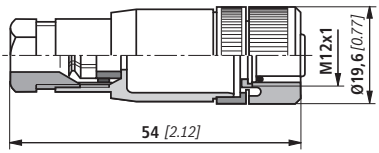
Filter with mech.-opt. maintenance indicator:	**110LEN0160-H10XLA00-V5,0-M-R6**	**Material no. R928037471**
Electr. switching element:	**WE-1SP-M12x1**	**Material no. R928028409**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12x1

Mating connector suitable for K24 4-pole M12x1 with screw connection, cable gland Pg9.

Material no. R900031155

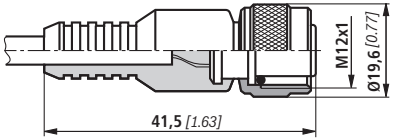


Mating connector suitable for K24-3m 4-pole, M12x1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

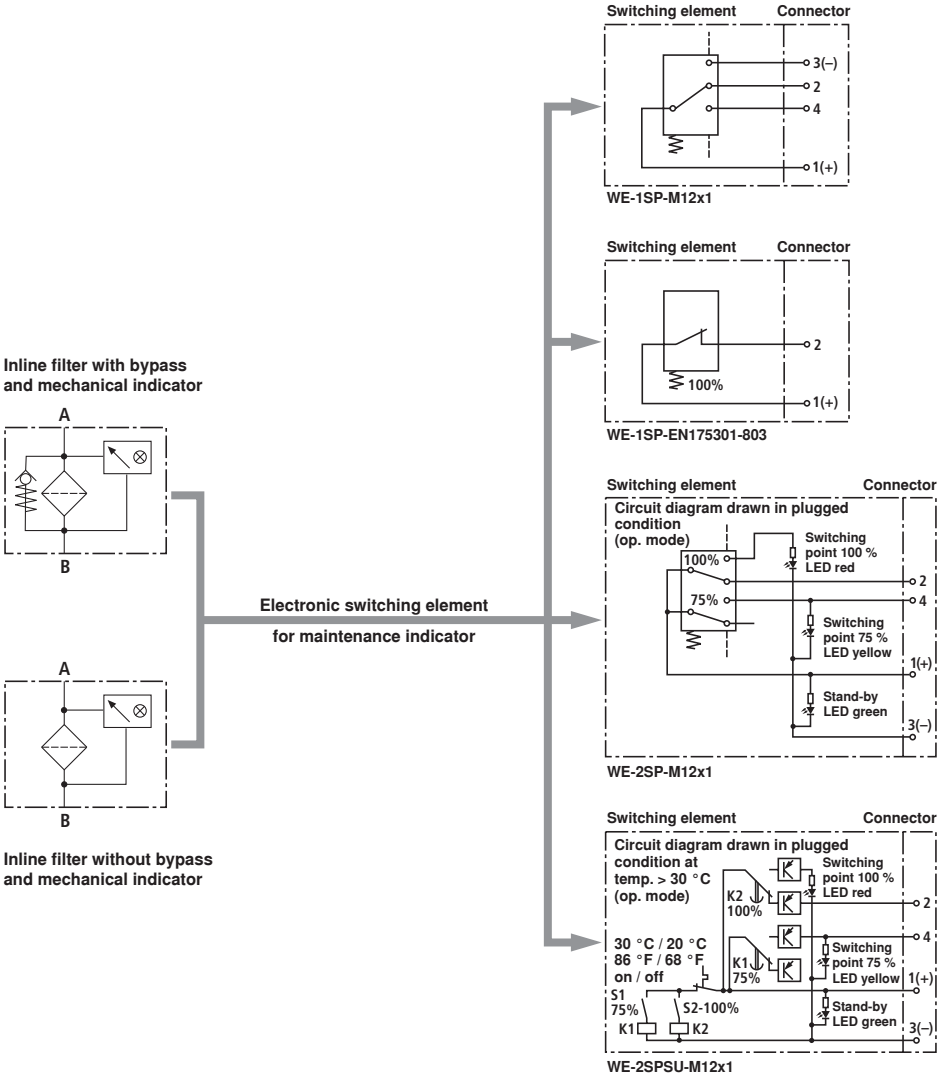
Core marking:
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For more round plug-in connections refer to data sheet 08006.

Symbols


Switching element
Connector
3(–)
2
4
1(+)
WE-1SP-M12x1
Switching element
Connector
2
100%
1(+)
WE-1SP-EN175301-803
Inline filter with bypass and mechanical indicator
A
B
Electronic switching element
for maintenance indicator
Switching element
Connector
Circuit diagram drawn in plugged condition (op. mode)
100%
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
WE-2SP-M12x1
Inline filter without bypass and mechanical indicator
Switching element
Connector
Circuit diagram drawn in plugged condition at temp. > 30 °C (op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2 100%
K1 75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
WE-2SPSU-M12x1

4

Function, section

The 110LE(N) inline filters are suitable for direct installation into pressure lines. They are mostly installed upstream open-loop or closed-loop control units to be protected.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

The installed spring (6) prevents possible vibrations of the filter element (3). During disassembly, the contact pressure of the spring (6) holds the filter element in the filter bowl (2).

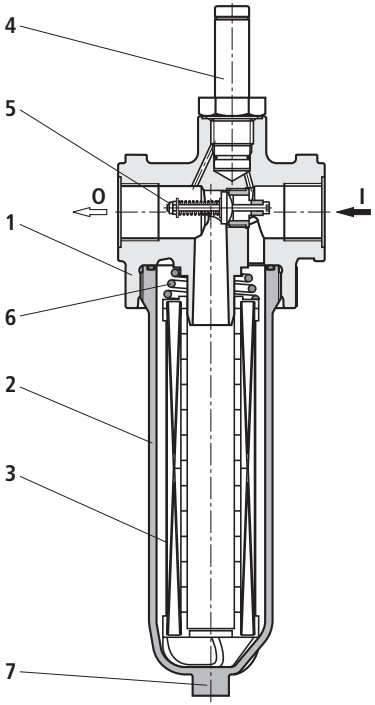
Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the hydraulic circuit.

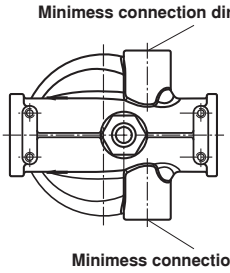
The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (7).

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points (see p. 4), which has to be ordered separately.

The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.

As of size 0130, bores for Minimess connections can be ordered.





Type 110LEN0100

Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical			
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*			
Weight		Size	**0040**	**0063**	**0100**	**0130**
		kg *[lbs]*	1.1 *[2.4]*	1.3 *[2.9]*	1.5 *[3.3]*	2.5 *[5.5]*
		Size	**0150**	**0160**	**0250**	**0400**
		kg *[lbs]*	2.6 *[5.7]*	3.5 *[7.7]*	4.0 *[8.8]*	4.9 *[10.8]*
Volume		Size	**0040**	**0063**	**0100**	**0130**
		l *[US gal]*	0.3 *[0.08]*	0.4 *[0.11]*	0.6 *[0.16]*	0.9 *[0.24]*
		Size	**0150**	**0160**	**0250**	**0400**
		l *[US gal]*	1.1 *[0.29]*	1.3 *[0.34]*	1.9 *[0.50]*	2.9 *[0.77]*
Material	Filter head		Aluminum			
	Filter bowl		Aluminum			
	Optical maintenance indicator	V1.5; V2.2	Aluminum			
		V5.0	Brass			
	Electronic switching element		Plastic PA6			

hydraulic

Maximum operating pressure	bar *[psi]*	110 *[1595]*	
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]*	
Minimum conductivity of the medium	pS/m	300	
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure	
Type of pressure measurement of the maintenance indicator		Pressure differential	
Assignment: Response pressure of the maintenance indicator / cracking pressure of the bypass valve		Response pressure of the maintenance indicator	Cracking pressure of the bypass valve
	bar *[psi]*	1.5 ± 0.2 *[21.8 ± 2.9]*	2.5 ± 0.25 *[36.3 ± 3.6]*
		2.2 ± 0.3 *[31.9 ± 4.4]*	3.5 ± 0.35 *[50.8 ± 5.1]*
		5.0 ± 0.5 *[72.5 ± 7.3]*	7.0 ± 0.5 *[101.5 ± 7.3]*

Technical data (For applications outside these parameters, please consult us!)

electric (electronic switching element)

Electrical connection			Round plug-in connection M12x1, 4-pole			Standard connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. switching power with resistive load		W	20			70
Switching type	75 % signal		–	Normally open contact		–
	100 % signal		Changeover	Normally closed contact		Normally closed contact
	2SPSU				Signal interconnection at 30 °C *[86 °F]*, return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Filter element

Glass fiber paper H..XL		Single-use element on the basis of inorganic fiber	
		Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
	H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
	H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
	H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
	H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential A	bar *[psi]*	30 *[435]*	
B	bar *[psi]*	330 *[4785]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

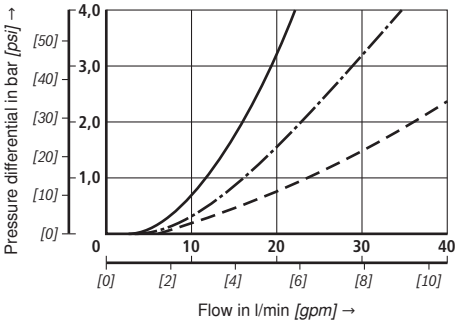
Characteristic curves H3XL

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

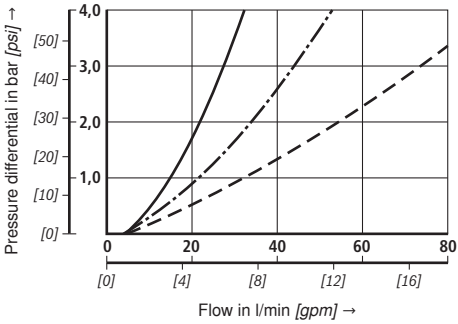
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[143 SUS]*

110LEN0040-H3XLA00-V5,0-M-R3



110LEN0063-H3XLA00-V5,0-M-R4



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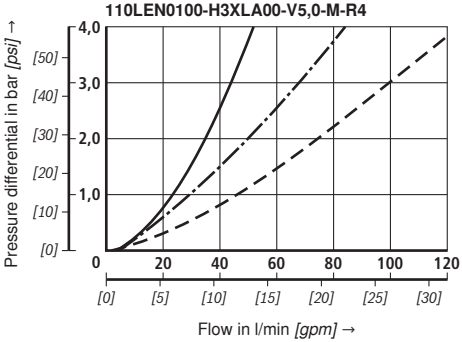
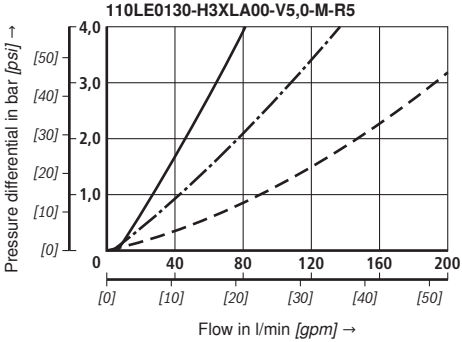
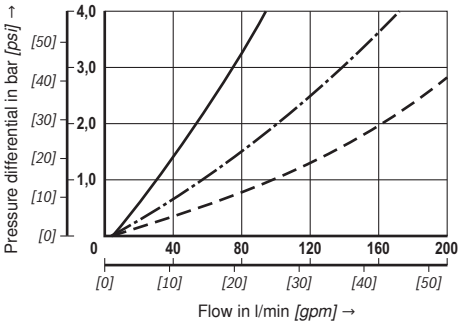


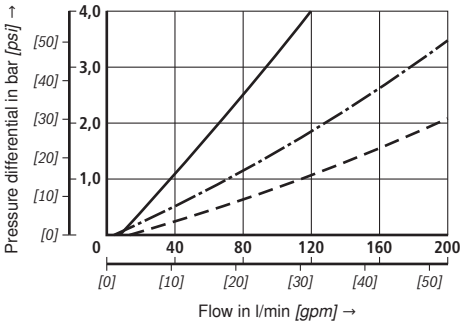
110LE0130-H3XLA00-V5,0-M-R5



110LE0150-H3XLA00-V5,0-M-R5



110LEN0160-H3XLA00-V5,0-M-R6



4

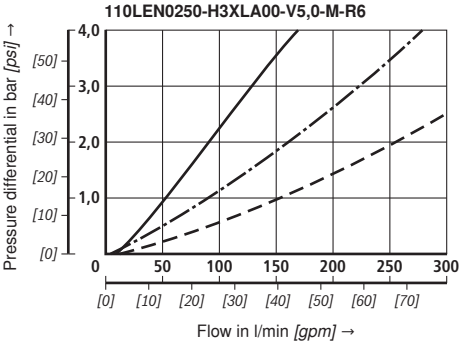
Characteristic curves H3XL, H10XL

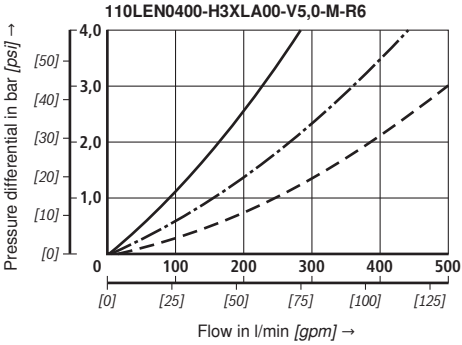
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

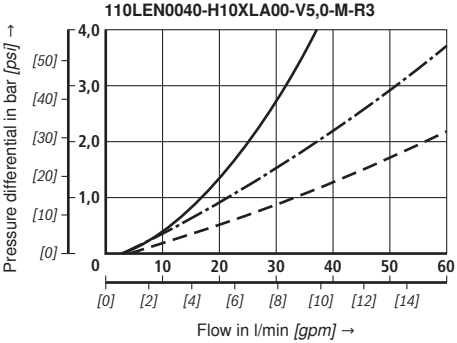
Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[143 SUS]*

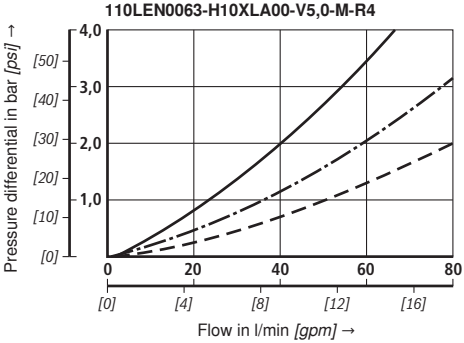
H3XL





H10XL





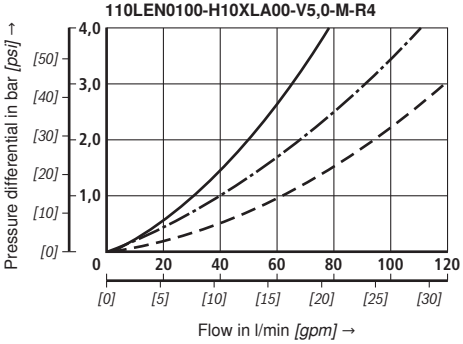
Characteristic curves H10XL

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1 bar *[14.5 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[143 SUS]*

110LEN0100-H10XLA00-V5,0-M-R4



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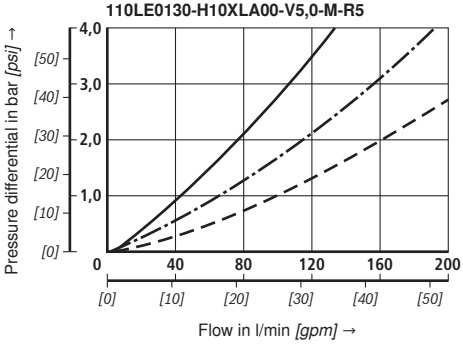

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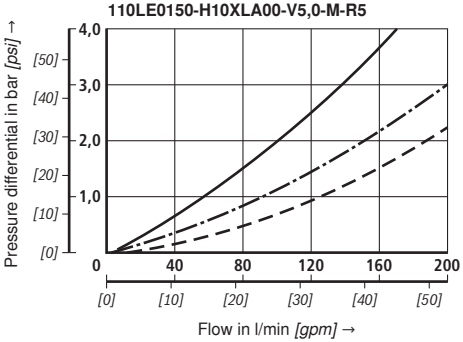
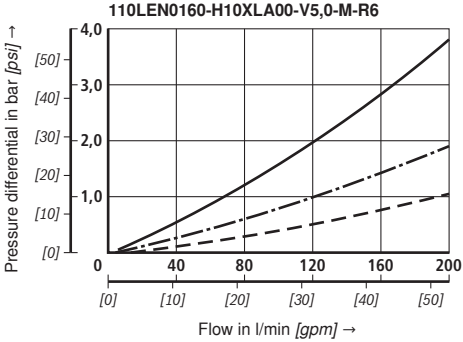
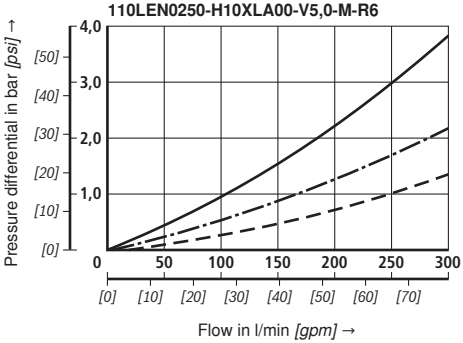


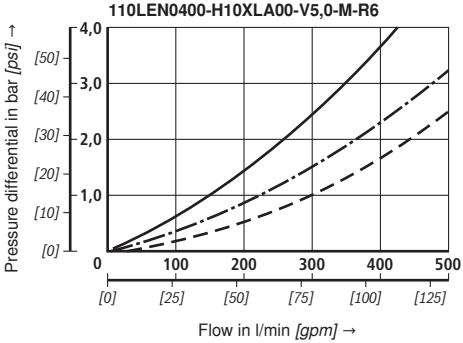
110LEN0160-H10XLA00-V5,0-M-R6



110LEN0250-H10XLA00-V5,0-M-R6



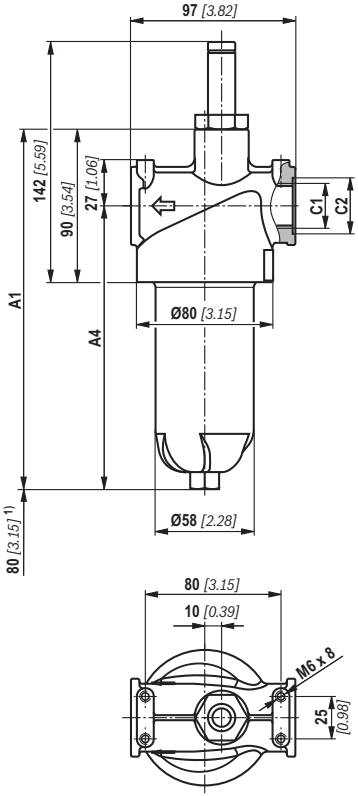
110LEN0400-H10XLA00-V5,0-M-R6



4

Unit dimensions size 0040 - size 0100 (dimensions in mm *[inch]*)

110 LEN 0040-0100



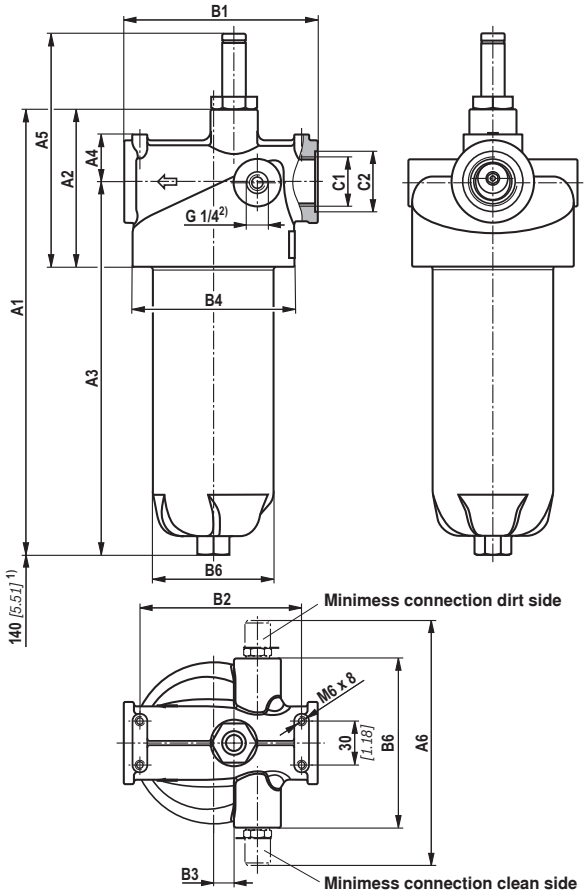
Filter housing for filter elements according to DIN 24550 and according to Rexroth standard

Type 110 LEN	A1	A4	C1 connection			
			Standard	ØC2	U… (SAE J1926)	ØC2
0040	212 *[8.35]*	167 *[6.57]*	G 3/4	33 *[1.30]*	SAE 12 1 1/16-12 UN-2B	41 *[1.61]*
0063	272 *[10.71]*	227 *[8.94]*	G 1	41 *[1.61]*		
0100	*362* *[14.25]*	317 *[12.48]*				

1) Servicing height for filter element exchange

Unit dimensions size 0130 - size 0150 (dimensions in mm *[inch]*)

110 LE 0130, 0150



Filter housing for filter elements according to Rexroth standard

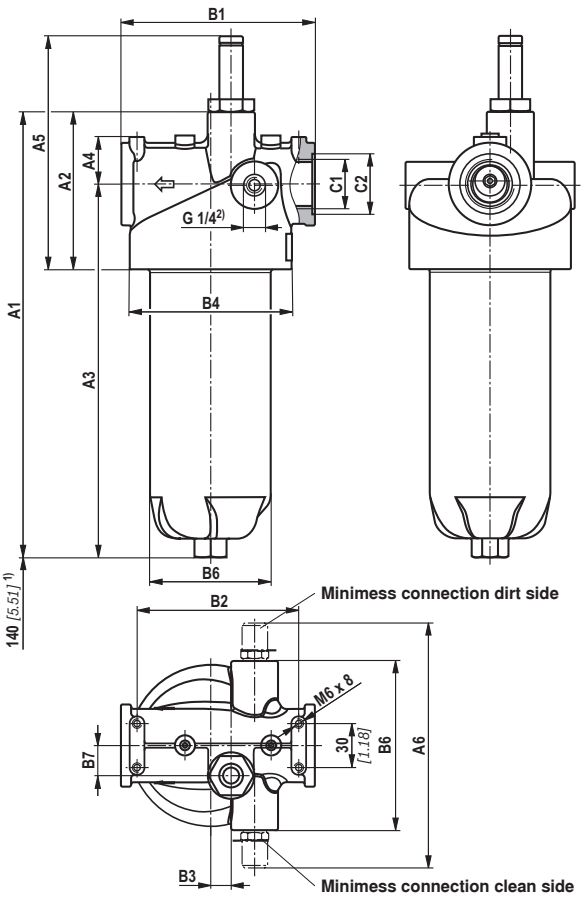
Type 110 LE	A1	A2	A3	A4	A5	A6	B1	B2	B3	ØB4	ØB5	B6	C1 connection			
													Standard	ØC2	U… (SAE J1926)	ØC2
0130	*303 [11.93]*	107 *[4.21]*	254 *[10.00]*	32 *[1.26]*	159 *[6.26]*	175 *[6.89]*	132 *[5.20]*	110 *[4.33]*	14 *[0.55]*	110 *[4.33]*	82 *[3.23]*	115 *[4.53]*	G 1 1/4	51 *[2.01]*	SAE 16 1 5/16-12 UN-2B	49 *[1.93]*
0150	*354 [13.94]*		305 *[12.01]*													

1) Servicing height for filter element exchange

2) Thread only drilled with Minimess connection option

Unit dimensions size 0160 - size 0400 (dimensions in mm *[inch]*)

110 LEN 0160-0400



Filter housing for filter elements according to DIN 24550

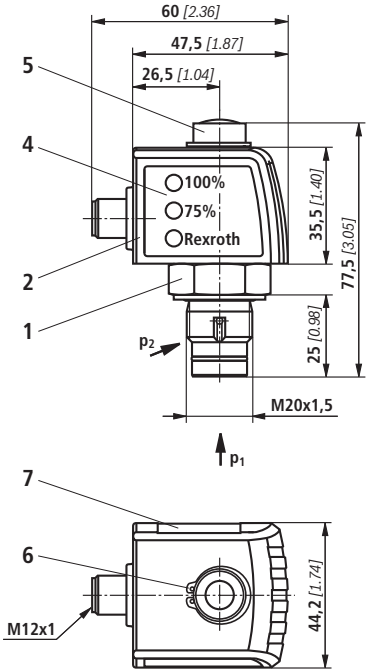
Type 110 LEN	A1	A2	A3	A4	A5	A6	B1	B2	B3	ØB4	ØB5	B6	B7	C1 connection			
														Standard	ØC2	U... (SAE J1926)	ØC2
0160	*305 [12.01]*	120 *[4.72]*	255 *[10.04]*	38 *[1.50]*	172 *[6.77]*	200 *[7.87]*	152 *[5.98]*	130 *[5.12]*	15 *[0.59]*	132 *[5.20]*	102 *[4.02]*	140 *[5.51]*	20 *[0.79]*	G 1 1/2	56 *[2.20]*	SAE 24 1 7/8-12 UN-2B	65 *[2.56]*
0250	*395 [15.55]*		345 *[13.58]*														
0400	545 *[21.46]*		495 *[19.49]*														

1) Servicing height for filter element exchange

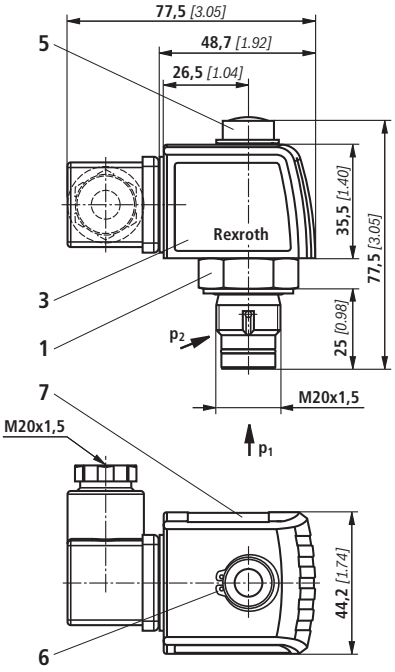
2) Thread only drilled with Minimess connection option

Maintenance indicator (dimensions in mm *[inch]*)

Pressure differential indicator with assembled switching element M12x1



Pressure differential indicator with assembled switching element EN-175301-803



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); round plug-in connection M12x1, 4-pole

3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); rectangular plug-in connection EN175301-803

4 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

5 Optical display bistable

6 Locking ring DIN 471-16x1, **material no. R900003923**

7 Name plate

Notice:

Representation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

Switching elements with increased switching power upon request.

Spare parts

Mechanical optical maintenance indicator

W | O – D01 – – – 160

Maintenance indicator **= W**
Mechanical optical indicator **= O**

Design
Pressure differential, design 01 **= D01**

Switching pressure
5.0 bar **= 5.0**
2.2 bar **= 2.2**
1.5 bar **= 1.5**

Seal
M = NBR seal
V = FKM seal

Max. operating pressure
D01-1,5; D01-2,2
160 = 160 bar *[2321 psi]*
D01-5,0
450 = 450 bar *[6527 psi]*

Mechanical optical maintenance indicator	Material no.
WO-D01-5,0-M-450	**R901025312**
WO-D01-2,2-M-160	**R901025312**
WO-D01-1,5-M-160	**R928038781**

Seal kit

D | 110LE | –

Seal kit **= D**
Series **= 110LE**

Size
Size 0040-0100 **= N0040-0100**
Size 0130-0150 **= 0130-0150**
Size 0160-0400 **= N0160-0400**

Seal
M = NBR seal
V = FKM seal

Seal kit	Material no.
D110LEN0040-0100-M	R928046935
D110LE0130-0150-M	R928046936
D110LEN0160-0400-M	R928046937

Installation, operating and maintenance notes

Installation of the filter

Verify operating pressure with name plate information. Remove the blanking plugs in the filter inlet and outlet. Screw the filter head (1) to the fastening device, considering flow direction (direction arrows) and servicing height of the element. Make sure that the components are assembled without tension stress. The housing must be grounded.

The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electronic maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element (6) with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

- The filter element is to be exchanged after initial start-up of the system.
- Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.
- The filter element should be replaced or cleaned after max. 6 months. Cleaning instructions for filter elements G.. see data sheet 51420.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the spigot in the filter head by turning it slightly.
- Check the seal ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H...XL, clean filter elements G....
- The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the differential pressure after the filter element exchange exceeds 150 % of the value of a brand-new filter element, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl to stop (torque 50 Nm $^{+10\ Nm}$).

Quality and standardization

The inline filters for hydraulic applications according to 51448 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Use in explosive areas according to directive 94/9/EC (ATEX)

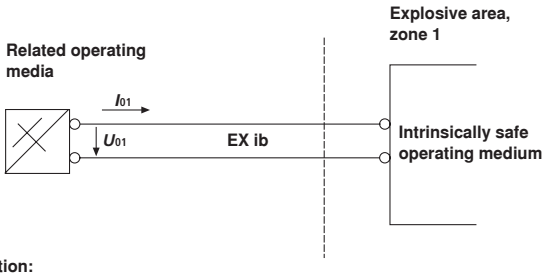
The inline filters according to 51448 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the inline filters according to 51448 in explosive areas, appropriate equipotential bonding has to be ensured.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 and WE-1SP-EN175301-803 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electric circuits (EEx ib) be used in systems without marking and certification.

Use / assignment		**Gas 2G**	**Dust 2D**
Assignment		Ex II 2G Ex ib IIB T4 Gb	Ex II 2D Ex ib IIIC T100°C Db
Zone suitability		Zone 1, zone 2	Zone 21, zone 22
Adm. intrinsically safe electric circuits		Ex ia IIC, Ex ib IIC, Ex ic IIC	Ex ia IIIC, Ex ib IIIC
Technical data			
Switching voltage	Ui_{max} V AC/DC	150	
Switching current	Ii_{max} A	1.0	
Switching power	Pi_{max}	1.3 W T4 T_{max} 40 °C	750 mW T_{max} 40 °C
Max. switching power		1.0 W T4 T_{max} 80 °C	550 mW T_{max} 100 °C
Surface temperature	°C *[°F]*	–	Max 100 *[212]*
Inner capacity	*Ci*	Neglectable	
Inner inductivity	*Li*	Neglectable	
Dust accumulation	mm *[inch]*	–	0.5 *[0.02]*

Possible circuit according to DIN EN 60079-14



Planner/operator documentation:

R928028899 Declaration of Incorporation according to DIN EN 13463 for components not subject to approval.

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Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.boschrexroth.de

Duplex filters / Inline filters switchable

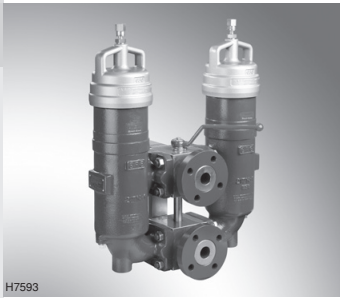
Designation	Type	Size	q_{Vmax} in l/min	p_{max} in bar	Data sheet	Page
Duplex filter	40 FLDK(N)	0015 ... 0630	1500	40	51407	265
Duplex filter with Segment Change-over	40 FLD(N)	0045 ... 1001	2000	40	51408	283
Duplex filter	100 FLD(N)	0045 ... 1000	1700	100	51409	301
Duplex filter	16 FD	2500 ... 7500	16000	16	51410	317
Duplex filter with filter element according to DIN 24550	400 LD(N)	0040 ... 0400	300	400	51429	333
Duplex filter with filter element according to DIN 24550	150 LD(N)	0040 ... 0400		160	51446	357
Duplex filter with filter element according to DIN 24550	50 LD(N)	0040 ... 0400		50	51453	375

Rexroth
Bosch Group

Duplex filter

RE 51407/09.10 1/18
Replaces: 02.09

Types 40 FLDKN 0063 to 0630; 40 FLDK 0015 to 0120


H7593

Nominal sizes **according to DIN 24550**: 0063 to 0630
Nominal sizes according to BRFS: 0015 to 0120
Nominal pressures 40 bar
Connections up to DN 80
Operating temperature –10 °C to +100 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Filtration of fluids and gases.
- Direct installation into pipelines.
- Direct wear protection of downstream components and systems.
- Continuous operating mode due to duplex filter design.

Features

- Filters for inline installation
- Versatile applications
- Compact design
- Low pressure drop
- Special highly efficient filter media

Design

Two filter housings in cast design, connected by means of a ball valve with integrated pressure compensation. Vertically aligned connections for inlet and outlet at the front of the switch housing.
Materials as per spare parts list.

Further design variants available on request.

Filter element

Pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the "FILTER" system in view of the prolonged life and the wear protection of the systems.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our brochure "Filter Elements".

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Bypass valve

To protect the filter element during startup and over pressurization due to clogging.

Characteristic curves

An optimum filter selection is made possible by our "BRFilterSelect" software, see download area http://www.eppensteiner.de.

Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation program.

Quality and standardization

The development, manufacture, and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The pressure filters for hydraulic applications according to 51407 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (DGRL). However, on the basis of the exception in article 1, section 3.6 of the DGRL, hydraulic filters are exempt from the DGRL if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering details

of the filter

40 | | | – A | – 0 | | V2,2 – D0 | | | |

Pressure
40 bar **= 40**

Design
Duplex filter with ball valve change over valve with filter element according to DIN 24550 **= FLDKN**
Duplex filter with ball valve change over valve with filter element according to BRFS standard **= FLDK**

Nom. size
FLDKN… **= 0063 0100 0160 0250 0400 0630**
FLDK… **= 0015 0018 0045 0055 0120**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable:
G10, G25 **=G…**
Paper, non-cleanable P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**

Element model
Standard adhesive T = 100 °C **= 0…**
Standard material **= …0**
chemically nickel-plated **= …D** [1]

Solenoid
without **= 0**

Complementary details
0 = without
Z [2] **=** Certificate

Material
0 = Standard
D [1] **=** chemically nickel-plated

Seal
M = NBR seal
V = FKM seal

Connection
D0 = DIN flange

Clogging indicator
V2,2 = clogging indicator, optical state switching pressure 2.2 bar

Bypass valve
0 = without
7 = 3.5 bar

Ordering example:
40 FLDK 0063 H10XL-A00-07V2,2-D0M00

of the filter element

1. | | – A | – 0 –

Filter element
Design **= 1.**

Nom. size
FLDKN… **= 0063 0100 0160 0250 0400 0630**
FLDK… **= 0015 0018 0045 0055 0120**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable: G10, G25 **=G…**
Paper, non-cleanable: P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = with filter element always 0

Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material
…D [1] **=** chemically nickel-plated

Ordering example:
1.0008 H10XL-A00-0-M

[1] Only in connection with FKM seal

[2] Z = manufacturer's inspection certificate M according to DIN 55350 T18

Preferred types

Duplex filter with bypass, filtration rating 10 µm and nominal pressure 40 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLDKN 0063 H10XL-A00-07V2,2-D0M00	88	R928000478
40 FLDKN 0100 H10XL-A00-07V2,2-D0M00	105	R928000479
40 FLDK 0015 H10XL-A00-07V2,2-D0M00	114	R928000480
40 FLDK 0018 H10XL-A00-07V2,2-D0M00	124	R928000481
40 FLDKN 0160 H10XL-A00-07V2,2-D0M00	290	R928000474
40 FLDKN 0250 H10XL-A00-07V2,2-D0M00	380	R928000475
40 FLDK 0045 H10XL-A00-07V2,2-D0M00	460	R928000482
40 FLDK 0055 H10XL-A00-07V2,2-D0M00	506	R928000483
40 FLDKN 0400 H10XL-A00-07V2,2-D0M00	690	R928000476
40 FLDKN 0630 H10XL-A00-07V2,2-D0M00	830	R928000477
40 FLDK 0120 H10XL-A00-07V2,2-D0M00	950	R928000484

Duplex filter with bypass, filtration rating 3 µm and nominal pressure 40 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLDKN 0063 H3XL-A00-07V2,2-D0M00	45	R928000467
40 FLDKN 0100 H3XL-A00-07V2,2-D0M00	65	R928000468
40 FLDK 0015 H3XL-A00-07V2,2-D0M00	79	R928000469
40 FLDK 0018 H3XL-A00-07V2,2-D0M00	98	R928000470
40 FLDKN 0160 H3XL-A00-07V2,2-D0M00	130	R928000463
40 FLDKN 0250 H3XL-A00-07V2,2-D0M00	198	R928000464
40 FLDK 0045 H3XL-A00-07V2,2-D0M00	285	R928000471
40 FLDK 0055 H3XL-A00-07V2,2-D0M00	350	R928000472
40 FLDKN 0400 H3XL-A00-07V2,2-D0M00	355	R928000465
40 FLDKN 0630 H3XL-A00-07V2,2-D0M00	515	R928000466
40 FLDK 0120 H3XL-A00-07V2,2-D0M00	732	R928000473

Preferred types

Duplex filter without bypass, filtration rating 10 µm and nominal pressure 40 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLDKN 0063 H10XL-A00-00V2,2-D0M00	88	R928020261
40 FLDKN 0100 H10XL-A00-00V2,2-D0M00	105	R928020262
40 FLDK 0015 H10XL-A00-00V2,2-D0M00	114	R928020263
40 FLDK 0018 H10XL-A00-00V2,2-D0M00	124	R928020264
40 FLDKN 0160 H10XL-A00-00V2,2-D0M00	290	R928020257
40 FLDKN 0250 H10XL-A00-00V2,2-D0M00	380	R928020258
40 FLDK 0045 H10XL-A00-00V2,2-D0M00	460	R928020265
40 FLDK 0055 H10XL-A00-00V2,2-D0M00	506	R928020266
40 FLDKN 0400 H10XL-A00-00V2,2-D0M00	690	R928020259
40 FLDKN 0630 H10XL-A00-00V2,2-D0M00	830	R928020260
40 FLDK 0120 H10XL-A00-00V2,2-D0M00	950	R928020267

Duplex filter without bypass, filtration rating 3 µm and nominal pressure 40 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLDKN 0063 H3XL-A00-00V2,2-D0M00	45	R928020250
40 FLDKN 0100 H3XL-A00-00V2,2-D0M00	65	R928020251
40 FLDK 0015 H3XL-A00-00V2,2-D0M00	79	R928020252
40 FLDK 0018 H3XL-A00-00V2,2-D0M00	98	R928020253
40 FLDKN 0160 H3XL-A00-00V2,2-D0M00	130	R928020246
40 FLDKN 0250 H3XL-A00-00V2,2-D0M00	198	R928020247
40 FLDK 0045 H3XL-A00-00V2,2-D0M00	285	R928020254
40 FLDK 0055 H3XL-A00-00V2,2-D0M00	350	R928020255
40 FLDKN 0400 H3XL-A00-00V2,2-D0M00	355	R928020248
40 FLDKN 0630 H3XL-A00-00V2,2-D0M00	515	R928020249
40 FLDK 0120 H3XL-A00-00V2,2-D0M00	732	R928020256

Ordering details: electronic switching element for clogging indicator

ABZ | F | V – | –1X / –DIN

Rexroth power unit accessories

Filter

Clogging indicator

electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

electronic switching element with 2 switching points (normally open/ normally closed), 75%, 100%, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 40 bar *[580 psi]* with bypass valve, nominal size 0063, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure liquid mineral oil HLP according to DIN 51524.

Filter: **40 FLDKN 0063 H10XL-A00-07V2,2-D0M00** **Material number: R928000478**

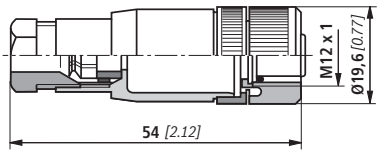
Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12 x 1

Plug-in connector for K24 4-pin, M12 x 1 with screwed connection, cable fitting Pg9.

Material no. R900031155



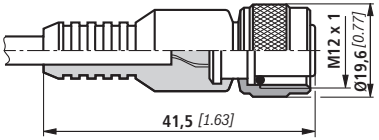
Plug-in connector for K24-3m 4-pin, M12 x 1 with molded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

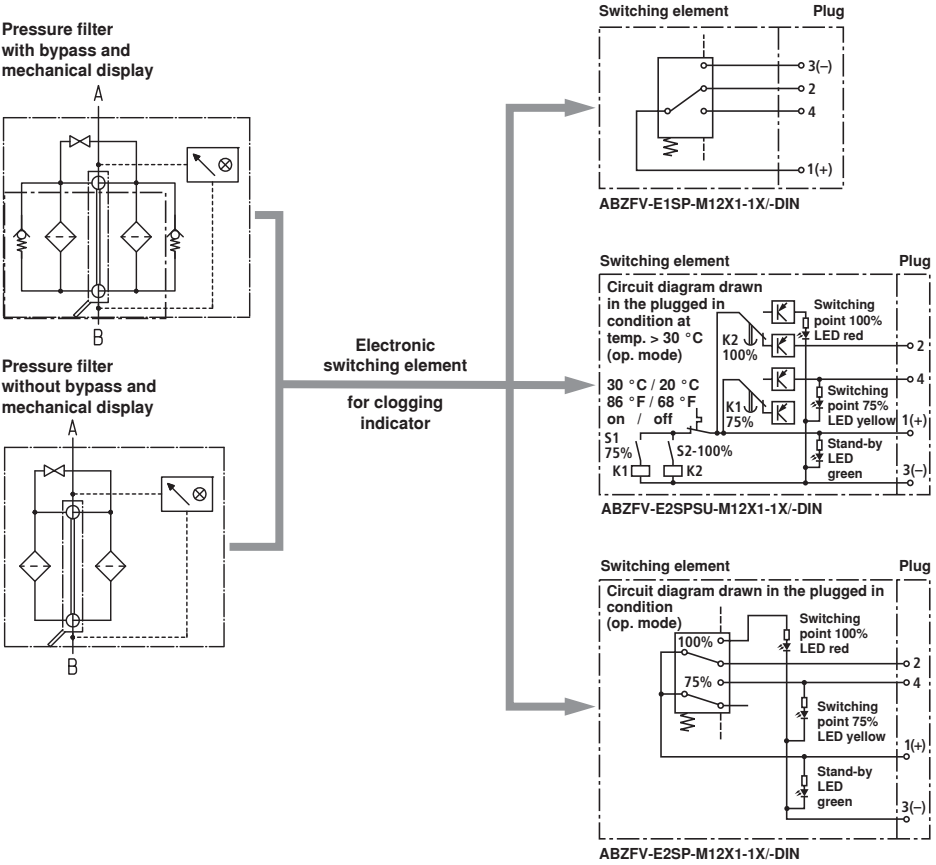
1 brown
2 white
3 blue
4 black

Material no. R900064381



For additional round plug-in connections, see data sheet 08006.

Symbols


Pressure filter
with bypass and
mechanical display
A
B
Pressure filter
without bypass and
mechanical display
A
B
Electronic
switching element
for clogging
indicator
Switching element
Plug
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn
in the plugged in
condition at
temp. > 30 °C
(op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in
condition
(op. mode)
100%
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

5

Technical data (for applications outside these parameters, please consult us!)

Electronic (electric switching element)

Electrical connection		Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage	A	Max. 1
Voltage range	E1SP-M12x1 V DC/AC	Max. 150
	E2SP V DC	10 to 30
Max. switching capacity with ohmic loads		20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1	Changeover
	E2SP-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure
	E2SPSU-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...		Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529		IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.		
Weight electronic switching element: – with round plug-in connection M12 x 1 kg *[lbs]*		0.1 *[0.22]*

Characteristic curves

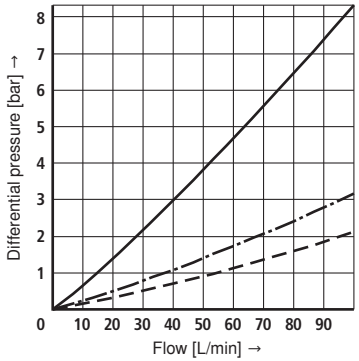
H3XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended
initial Δ*p* for design = 0.8 bar

An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

0063



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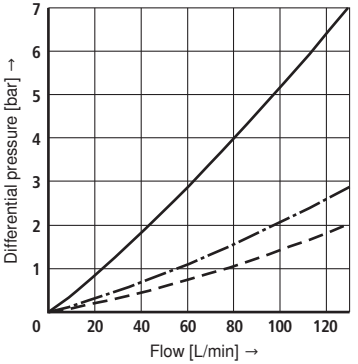
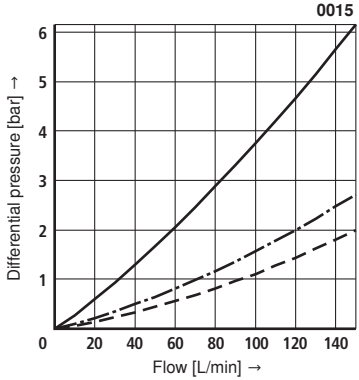


0015



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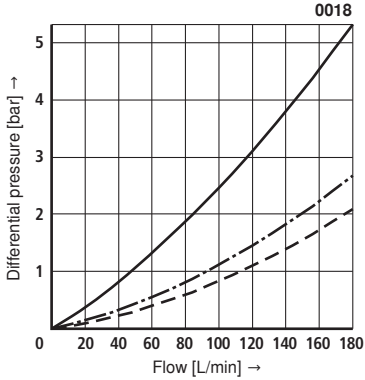

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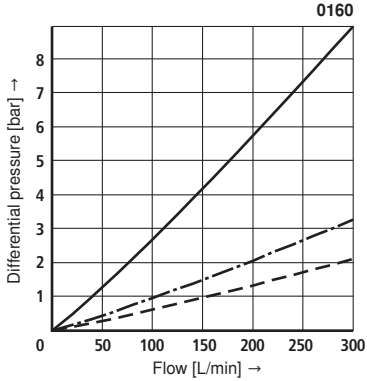

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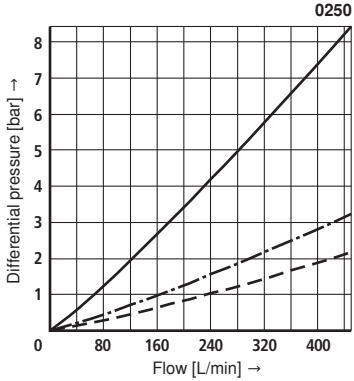

5

Characteristic curves

H3XL…

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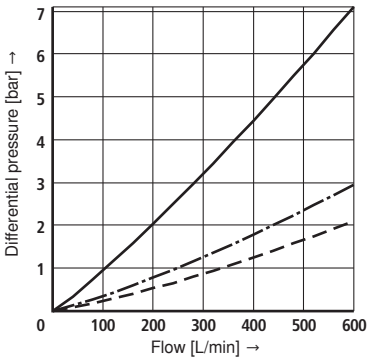
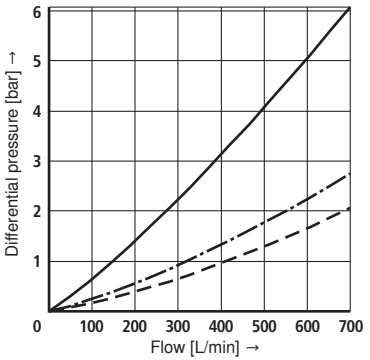
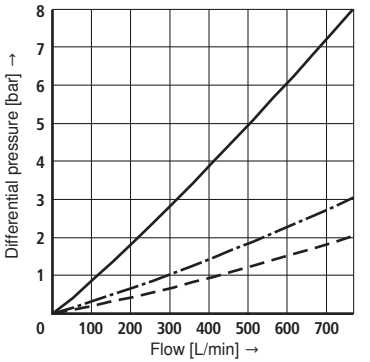
0045



0055



0400



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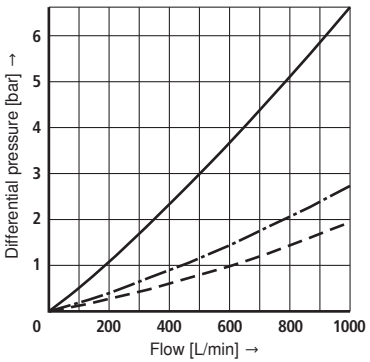

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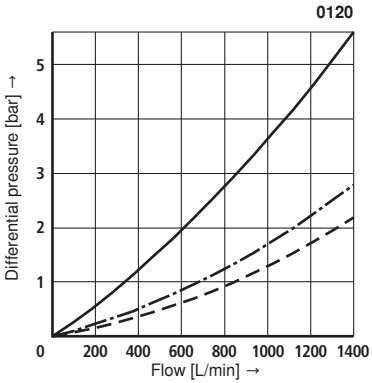

Characteristic curves

H10XL...

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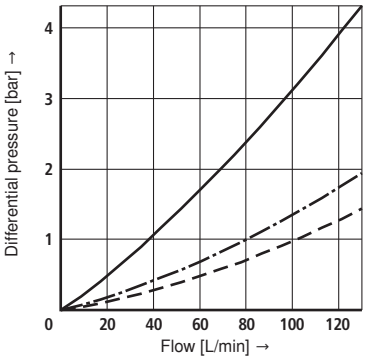
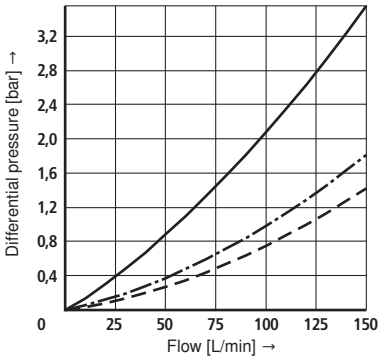
0063



0100



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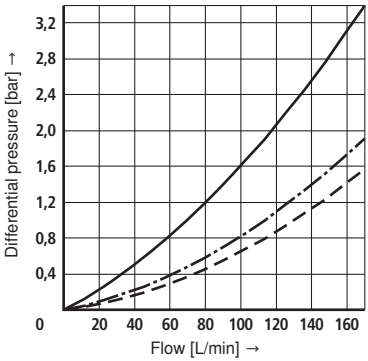

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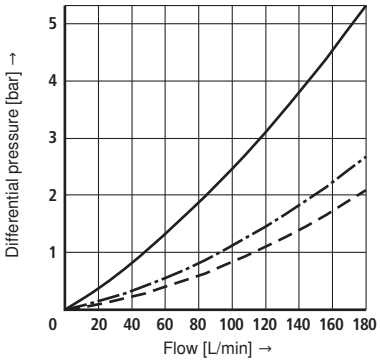

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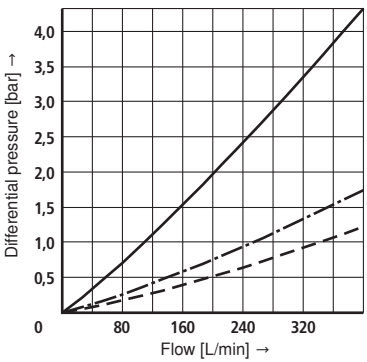

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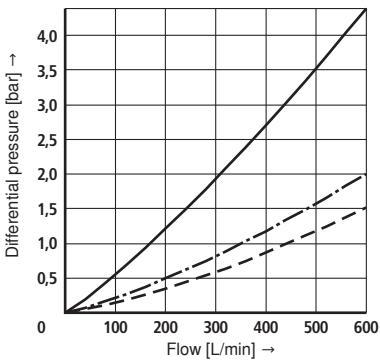

5

Characteristic curves

H10XL…

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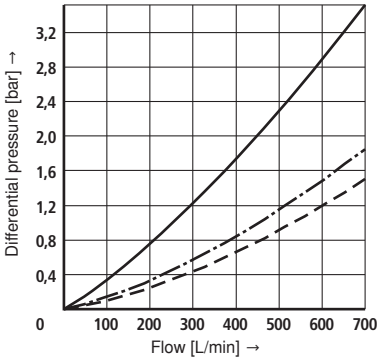
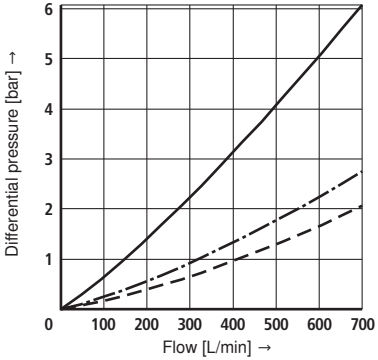
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

0045



0055



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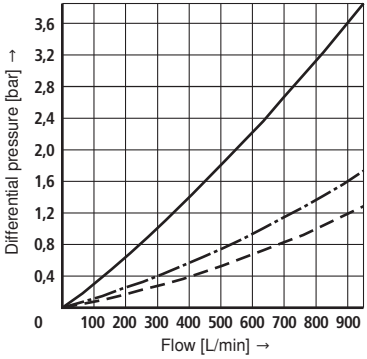

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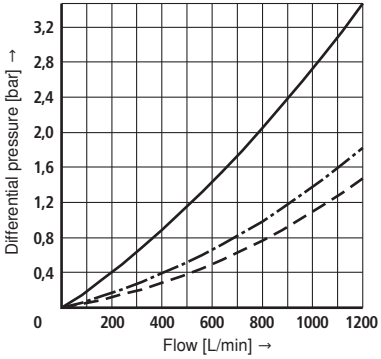

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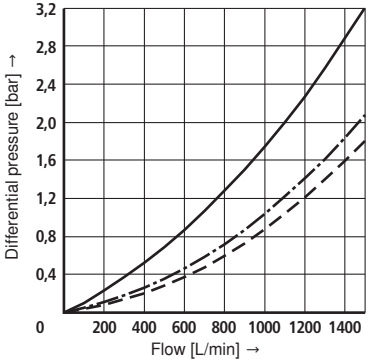
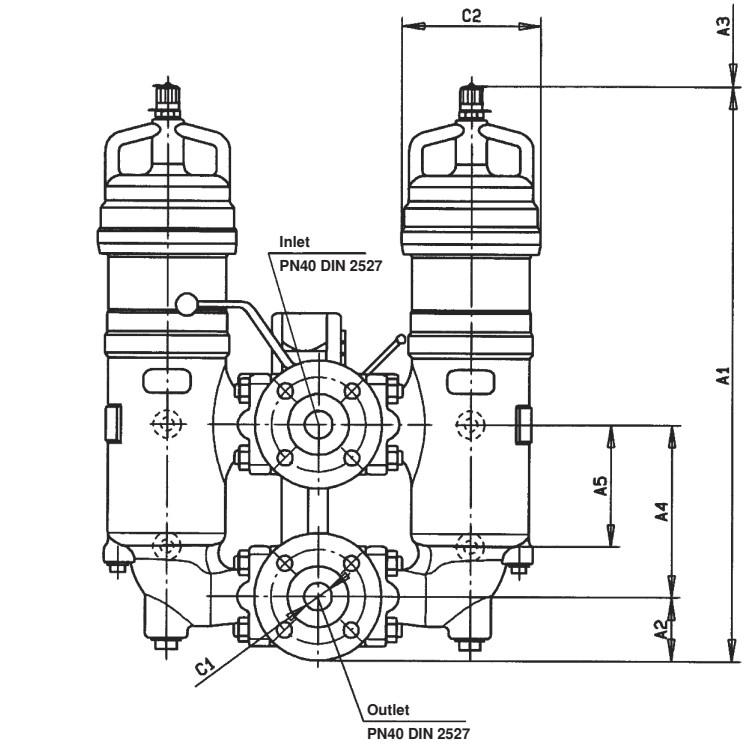
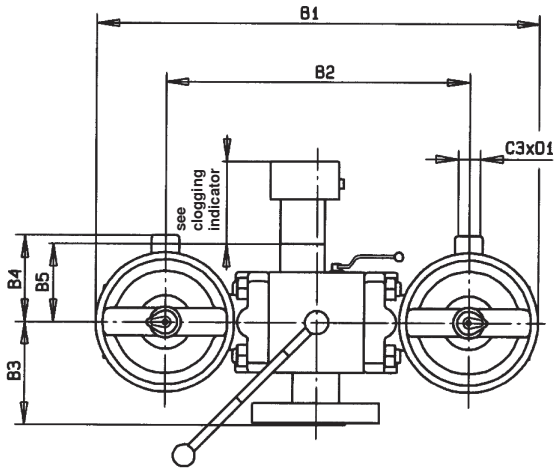


Unit dimensions





The changeover lever is located on the side that is in operation

Unit dimensions (dimensions in mm)

Filter housing for filter elements in accordance with DIN 24550

Type	Content in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	D1
40 FLDKN 0063	2 x 1.5	39	416	95	160	155	110	399	274	92.5	77.5	70	DN 25	Ø 125	M12	18
40 FLDKN 0100	2 x 2.0	42	506		250											
40 FLDKN 0160	2 x 4.0	90	586	70	160	210	210	629	375	149	100	85	DN 50	Ø 158	M16	23
40 FLDKN 0250	2 x 4.0	90			250											
40 FLDKN 0400	2 x 9.0	152	686	100	250	230	230	729	484	155	115	130	DN 80	Ø 188	M20	22
40 FLDKN 0630	2 x 9.0	152	836		400											

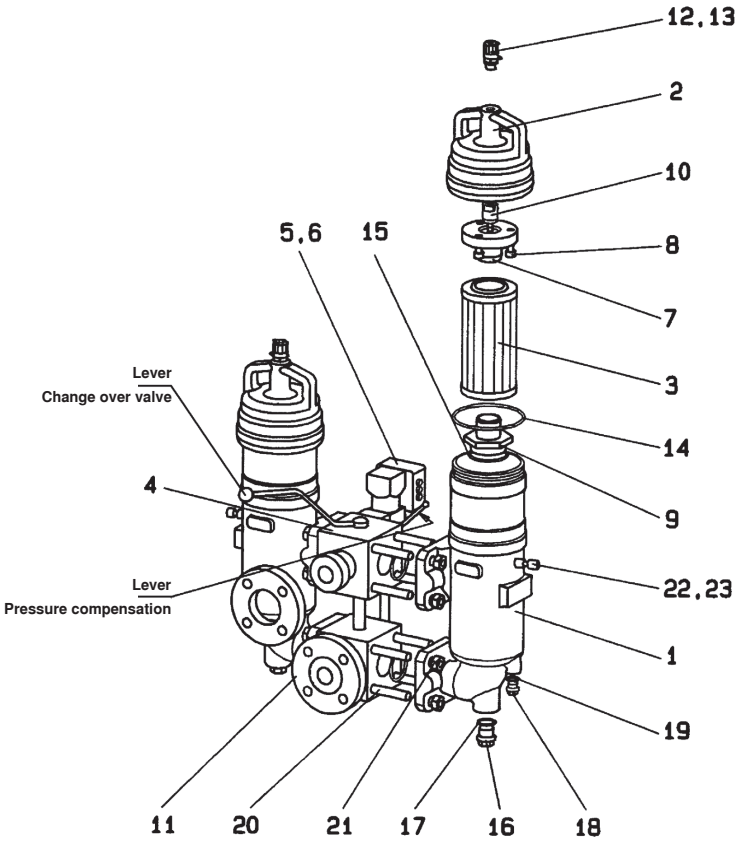
Filter housing for filter elements according to BRFS standard

Type	Content in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	D1
40 FLDK 0015	2 x 1.5	39	416	95	164	155	110	399	274	92.5	77.5	70	DN 25	Ø 125	M12	18
40 FLDK 0018	2 x 2.0	42	506		254											
40 FLDK 0045	2 x 6.0	97	741	70	400	210	210	629	375	149	100	85	DN 50	Ø 158	M16	23
40 FLDK 0055	2 x 8.0	105	909		568											
40 FLDK 0120	2 x 16.0	161	1193	100	757	230	230	729	484	155	115	130	DN 80	Ø 188	M20	22

[1] Weight including standard filter element and clogging indicator.

[2] Withdrawal dimension for filter element replacement.

Spare parts list



Spare parts list

Pos.	Piece	Size FLDKN; FLDK	FLDKN FLDK	0063	0100	0015	0018	0160	0250	0045	0055	0400	0630	0120
		Description	Material	Parts number										
1	2	Filter housing	GGG50	Please indicate ordering information “Filter”										
2	2	Filter head	GkAlSi10Mg	Please indicate ordering information “Filter”										
3	2	Filter element	various	Please indicate ordering information “Filter Element”										
4	1	Ball valve combination	various	Please indicate ordering information “Filter”										
4.1	1	Ball valve Sealing kit	various	Please indicate ordering information “Filter”										
5	1	Clogging indicator	various	Please indicate ordering information “Clogging indicator”										
6	2	Seal ring	NBR / FKM	Please indicate ordering information “Filter”										
7	2	Centering spigot	AlCuMgPb	Please indicate ordering information “Filter”										
8	6	Socket head cap screw	8.8	637								652		
9	2	Centering spigot	AlCuMgPb	Please indicate ordering information “Filter”										
10	2	Bypass valve [1] or plug	various	5118				5360						
				793				825						
11	2	DIN flange	C22	5204				5296				4969		
12	2	Bleed screw	5.8	4158										
13	2	Seal ring	Soft steel	832										
14	2	Seal ring	NBR / FKM	Please indicate ordering information “Filter”										
15	2	Seal ring	NBR / FKM	Please indicate ordering information “Filter”										
16	2	Plug	Steel	789										
17	2	Seal ring	Soft steel	Please indicate ordering information “Filter”										
18	2	Plug	Steel	770										
19	2	Seal ring	Soft steel	Please indicate ordering information “Filter”										
20	16/32	Stud screw	8.8	9587(16x)				9586(16x)				9586(32x)		
21	16/32	Hexagonal nut	5	683(16x)				684(16x)				684(32x)		
22	2	Locking screw	various	–								4844		
23	2	Seal ring	Soft steel	–								Indicate ordering information "Filter"		

[1] Please specify opening pressure.

All part numbers BRFS specific.

Spare parts (insert for DIN and SAE filters)

Mechanical optical clogging indicator

ABZ F V – NV2 – 1X / – DIN

Rexroth power unit accessories

Filter

Clogging indicator

Mechanical optical clogging indicator for low-pressure filters
Switching point 2.2 bar *[32 psi]* **= NV2**

DIN = Identification for DIN and SAE models

Sealing material

M = see table below
V = see table below

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Mechanical optical clogging indicator	Material no.
ABZFV-NV2-1X/M-DIN	R901025312

The ordering details for filter elements can be found in the order details on page 3.

Sealing kits must be ordered by stating the complete part key.

5

Sealing material and surface coating for pressure fluids

		Ordering details	
Mineral oils		Sealing material	Element model / and material
Mineral oil	HLP according to DIN 51524	M	...0
Fire-resistant hydraulic fluids			
Emulsions	HFA-E according to DIN 24320	M	...0
Synthetic water solutions	HFA-S according to DIN 24320	M	...D
Water solutions	HFC according to VDMA 24317	M	...D
Phosphate esters	HFD-R according to VDMA 24317	V	...D
Organic esters	HFD-U according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable			
Triglycerides (rape seed oil)	HETG according to VDMA 24568	M	...D
Synthetic esters	HEES according to VDMA 24568	V	...D
Polyglycoles	HEPG according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information, mount the filter housing (pos. 1) on the fastening device, considering the withdrawal height of the filter element (pos.3).

Remove the plugs from the filter inlet and outlet. Connect inlet and outlet at the pipe work free of tension, considering the flow direction (direction arrows).

⚠ Warning!

Vessel is under pressure!

Assemble and disassemble the filter only when system is depressurized!

Keep the pressure compensation closed if the filter is open (vertical lever position)!

Do not operate the change over valve when the filter is opened!

Do not replace the clogging indicator and the pressure compensation while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Switch on system pump, open the pressure compensation (horizontal lever position).

Bleed filter by opening the bleed screw (pos. 12), close when operating fluid vents. Pressure compensation remains open.

Maintenance

If at operating temperature, the red indicator pin shows out of the clogging indicator (pos. 5) so far that it contacts the plastic cap and/or if the switching process in the electric display is triggered, the filter element is clogged and needs to be replaced or cleaned respectively.

Filter element replacement

Actuate the switch-over lever and switch over to the second filter housing.

Close the pressure compensation (vertical lever position).

Depressurize the decommissioned filter housing.

Open bleed screw (pos. 12) by one turn.

Open the plugs (pos. 16 +18) and drain contaminated oil.

Screw off the filter head (pos. 2).

Pull off the filter element (pos. 3) from the centering spigot in the lower filter part by turning it lightly and remove it from the filter housing (pos. 1).

Close the plugs (pos. 16 + 18) and bleed screw (pos. 12) again. Check the filter housing for cleanliness and clean it, if necessary.

Replace filter elements H...XL and P..., clean the filter element with material G... . The efficiency of the cleaning process depends on the type of contamination and the value of the pressure differential.
If the pressure differential after replacing the element is more than 50% of the value before replacing the element then the G… filter element also needs to be replaced.

Install the cleaned or new filter element into the filter housing and, with light turning movements, plug it onto the centering spigot.

Beforehand apply some oil to the filter element seal ring. During installation take care to ensure that the filter element is not damaged at the top end of the filter housing.

Check the seal ring (pos. 14) in the filter head for damage or wear and replace if necessary. Without any tools, install filter head by rotating it clockwise by hand up to the last thread. Rotate back 1/4 rotation.

Open the pressure compensation (horizontal lever position). Bleed filter by opening the bleed screw (pos. 12), close when operating fluid vents.

Pressure compensation remains open.

Technical modifications reserved!

Bosch Rexroth Filtration Systems GmbH
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POB 1120, 68768 Ketsch, Germany
Phone +49 (0) 62 02 / 6 03-0
Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.eppensteiner.de

Rexroth
Bosch Group

Duplex filter with segment change over

RE 51408/09.10 1/18
Replaces: 02.09

Types 40 FLDN 0160 to 1001; 40 FLD 0045 to 0274

Nominal sizes **according to DIN 24550**: 0160 to 1001
Nominal sizes according to BRFS: 0045 to 0274
Nominal pressures 40 bar
Connections up to DN 100
Operating temperature –10 °C to +100 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Direct installation into pipelines.
- Direct wear protection of downstream components and systems.

Features

- Filters for inline installation
- Extremely large filter area
- Low pressure drop
- Special highly efficient filter media
- Versatile applications

Design

The duplex filter consists of two or more filter -housings that are connected by means of tube sockets via a switch housing with segment change over.

Materials: as per spare parts list.

Further design variants available on request.

Filter element

Pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the "FILTER" system in view of the prolonged life and the wear protection of the systems.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our brochure "Filter Elements".

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Bypass valve

To protect the filter element during startup and over pressurization due to clogging.

Characteristic curves

An optimum filter selection is made possible by our "BRFilterSelect" software, see download area http://www.eppensteiner.de.

Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation program.

Quality and standardization

The development, manufacture, and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The pressure filters for hydraulic applications according to 51408 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (DGRL). However, on the basis of the exception in article 1, section 3.6 of the DGRL, hydraulic filters are exempt from the DGRL if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering details

of the filter

40 | | | – A | – 0 | | V2,2 – S0 | | | |

Pressure
40 bar **= 40**

Design
Duplex filter with filter element according to DIN 24550 **= FLDN**
Duplex filter with filter element according to BRFS standard **= FLD**

Nom. size
FLDN… **= 0160 0250 0400 0630 1001**
FLD… **= 0045 0055 0120 0201 0271 0272 0273 0274**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable:
G10, G25 **= G…**
Paper, non-cleanable
P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**

Element model
Standard adhesive **= 0…**
Standard material **= …0**
chemically nickel-plated **= …D** [1]

Solenoid
without **= 0**

Complementary details
A = with pressure compensation line
Z [2] **=** Certificate

Material
0 = Standard
D [1] **=** chemically nickel-plated

Seal
M = NBR seal
V = FKM seal

Connection
S0 = SAE 3000 psi

Clogging indicator
V2,2 = clogging indicator, optical
State switching pressure 2.2 bar

Bypass valve
Opening pressure:
0 = without
7 = 3.5 bar

Ordering example:
40 FLD 0055 H10XL-A00-07V2,2-S0M0A

of the filter element

1. | | – A | – 0 –

Filter element
Design **= 1.**

Nom. size
FLDN… **= 0160 0250 0400 0630 1001**
FLD… **= 0045 0055 0120 0201 0271 0272 0273 0274**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable: G10, G25 **= G…**
Paper, non-cleanable: P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable: H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**

Seal
M = NBR seal
V = FKM seal

Bypass valve
Opening pressure:
0 = With filter element always 0

Element model
0… = Standard adhesive
…0 = Standard material
…D [1] **=** chemically nickel-plated

Ordering example:
1.0055 H10XL-A00-0-M

[1] Only in connection with FKM seal (for all nominal sizes) and nickel-plated housing (only for NG1001, 0201-0274)

[2] Z = manufacturer's inspection certificate M according to DIN 55350 T18

Preferred types

Duplex filter with bypass, filtration rating 10 µm and nominal pressure 40 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLDN 0160 H10XL-A00-07V2,2-S0M0A	290	R928000395
40 FLDN 0250 H10XL-A00-07V2,2-S0M0A	380	R928000396
40 FLD 0045 H10XL-A00-07V2,2-S0M0A	460	R928000400
40 FLD 0055 H10XL-A00-07V2,2-S0M0A	510	R928000401
40 FLDN 0400 H10XL-A00-07V2,2-S0M0A	710	R928000397
40 FLDN 0630 H10XL-A00-07V2,2-S0M0A	830	R928000398
40 FLD 0120 H10XL-A00-07V2,2-S0M0A	950	R928000402
40 FLDN 1001 H10XL-A00-07V2,2-S0M0A	850	R928000399
40 FLD 0201 H10XL-A00-07V2,2-S0M0A	1500	R928000403
40 FLD 0271 H10XL-A00-07V2,2-S0M0A	1570	R928000404
40 FLD 0272 H10XL-A00-07V2,2-S0M0A	1690	R928000446
40 FLD 0273 H10XL-A00-07V2,2-S0M0A	1750	R928000452
40 FLD 0274 H10XL-A00-07V2,2-S0M0A	1800	R928000458

Duplex filter with bypass, filtration rating 3 µm and nominal pressure 40 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLDN 0160 H3XL-A00-07V2,2-S0M0A	130	R928000385
40 FLDN 0250 H3XL-A00-07V2,2-S0M0A	198	R928000386
40 FLD 0045 H3XL-A00-07V2,2-S0M0A	285	R928000390
40 FLD 0055 H3XL-A00-07V2,2-S0M0A	352	R928000391
40 FLDN 0400 H3XL-A00-07V2,2-S0M0A	355	R928000387
40 FLDN 0630 H3XL-A00-07V2,2-S0M0A	515	R928000388
40 FLD 0120 H3XL-A00-07V2,2-S0M0A	735	R928000392
40 FLDN 1001 H3XL-A00-07V2,2-S0M0A	550	R928000389
40 FLD 0201 H3XL-A00-07V2,2-S0M0A	1040	R928000393
40 FLD 0271 H3XL-A00-07V2,2-S0M0A	1190	R928000394
40 FLD 0272 H3XL-A00-07V2,2-S0M0A	1480	R928000445
40 FLD 0273 H3XL-A00-07V2,2-S0M0A	1600	R928000451
40 FLD 0274 H3XL-A00-07V2,2-S0M0A	1650	R928000457

Preferred types

Duplex filter without bypass, filtration rating 10 µm and nominal pressure 40 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
40 FLDN 0160 H10XL-A00-00V2,2-S0M0A	290	R928020178
40 FLDN 0250 H10XL-A00-00V2,2-S0M0A	380	R928020179
40 FLD 0045 H10XL-A00-00V2,2-S0M0A	460	R928020183
40 FLD 0055 H10XL-A00-00V2,2-S0M0A	510	R928020184
40 FLDN 0400 H10XL-A00-00V2,2-S0M0A	710	R928020180
40 FLDN 0630 H10XL-A00-00V2,2-S0M0A	830	R928020181
40 FLD 0120 H10XL-A00-00V2,2-S0M0A	950	R928020185
40 FLDN 1001 H10XL-A00-00V2,2-S0M0A	850	R928020182
40 FLD 0201 H10XL-A00-00V2,2-S0M0A	1500	R928020186
40 FLD 0271 H10XL-A00-00V2,2-S0M0A	1570	R928020187
40 FLD 0272 H10XL-A00-00V2,2-S0M0A	1690	R928020229
40 FLD 0273 H10XL-A00-00V2,2-S0M0A	1750	R928020235
40 FLD 0274 H10XL-A00-00V2,2-S0M0A	1800	R928020241

Duplex filter without bypass, filtration rating 3 µm and nominal pressure 40 bar

Type	Flow in L/min at 30 mm/s and Δp = 0.8 bar	Material number
40 FLDN 0160 H3XL-A00-00V2,2-S0M0A	130	R928020168
40 FLDN 0250 H3XL-A00-00V2,2-S0M0A	198	R928020169
40 FLD 0045 H3XL-A00-00V2,2-S0M0A	285	R928020173
40 FLD 0055 H3XL-A00-00V2,2-S0M0A	352	R928020174
40 FLDN 0400 H3XL-A00-00V2,2-S0M0A	355	R928020170
40 FLDN 0630 H3XL-A00-00V2,2-S0M0A	515	R928020171
40 FLD 0120 H3XL-A00-00V2,2-S0M0A	735	R928020175
40 FLDN 1001 H3XL-A00-00V2,2-S0M0A	550	R928020172
40 FLD 0201 H3XL-A00-00V2,2-S0M0A	1040	R928020176
40 FLD 0271 H3XL-A00-00V2,2-S0M0A	1190	R928020177
40 FLD 0272 H3XL-A00-00V2,2-S0M0A	1480	R928020228
40 FLD 0273 H3XL-A00-00V2,2-S0M0A	1600	R928020234
40 FLD 0274 H3XL-A00-00V2,2-S0M0A	1650	R928020240

Ordering details: electronic switching element for clogging indicator

ABZ | F | V – | –1X/ | –DIN

Rexroth power unit accessories

Filter

Clogging indicator

electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

electronic switching element with 2 switching points (normally open/ normally closed), 75%, 100%, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 40 bar *[580 psi]* with bypass valve, nominal size 0055, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure liquid mineral oil HLP according to DIN 51524.

Filter: **40 FLD 0055 H10XL-A00-07V2,2-S0M0A** **Material number: R928000401**

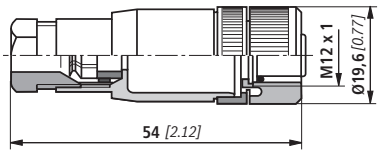
Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12 x 1

Plug-in connector for K24 4-pin, M12 x 1 with screwed connection, cable fitting Pg9.

Material no. R900031155



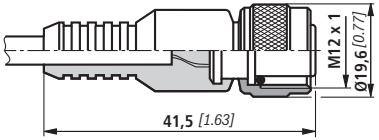
Plug-in connector for K24-3m 4-pin, M12 x 1 with molded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

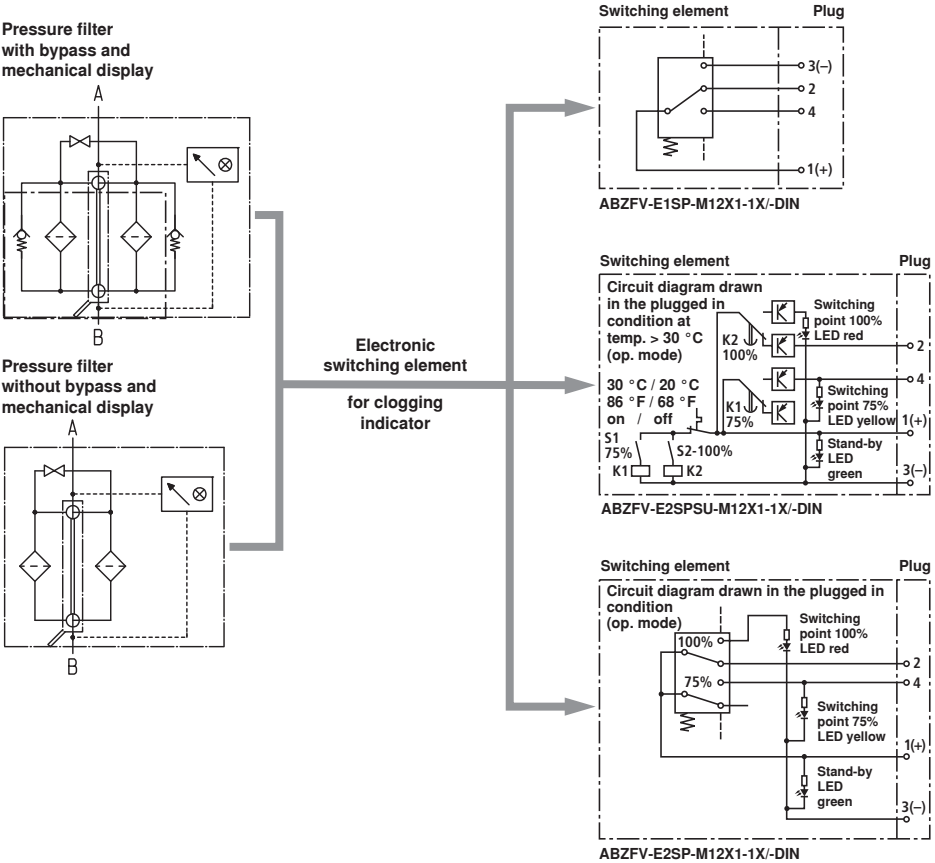
1 brown
2 white
3 blue
4 black

Material no. R900064381



For additional round plug-in connections, see data sheet 08006.

Symbols


Pressure filter
with bypass and
mechanical display
A
B
Pressure filter
without bypass and
mechanical display
A
B
Electronic
switching element
for clogging
indicator
Switching element
Plug
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn
in the plugged in
condition at
temp. > 30 °C
(op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in
condition
(op. mode)
100%
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

5

Technical data (for applications outside these parameters, please consult us!)

Electronic (electric switching element)

Electrical connection		Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage	A	Max. 1
Voltage range	E1SP-M12x1 V DC/AC	Max. 150
	E2SP V DC	10 to 30
Max. switching capacity with ohmic loads		20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1	Changeover
	E2SP-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure
	E2SPSU-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...		Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529		IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.		
Weight electronic switching element: – with round plug-in connection M12 x 1	kg *[lbs]*	0.1 *[0.22]*

Characteristic curves

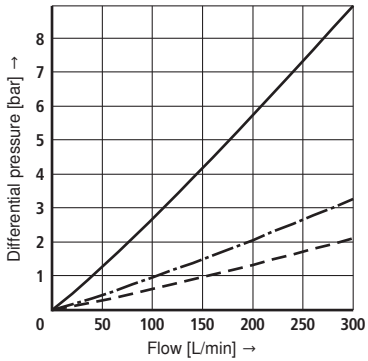
H3XL…

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

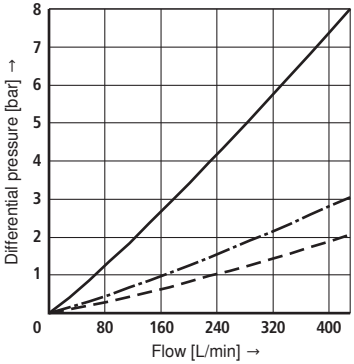
An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

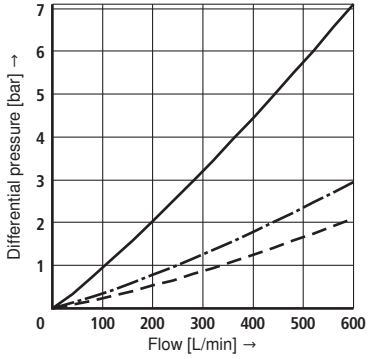
H3XL…0160



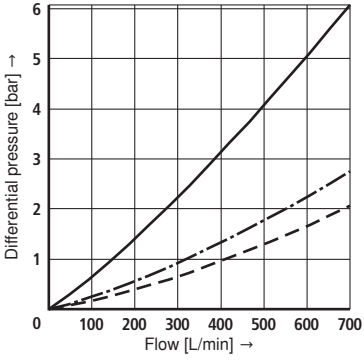
H3XL…0250



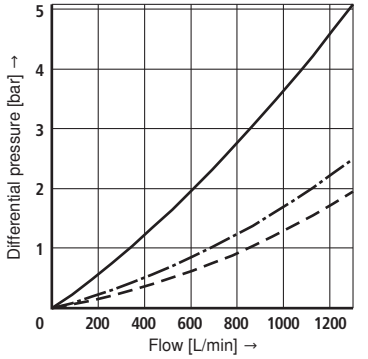
H3XL…0045



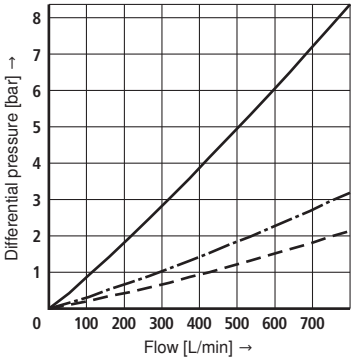
H3XL…0055



H3XL…0120



H3XL…0400



5

Characteristic curves

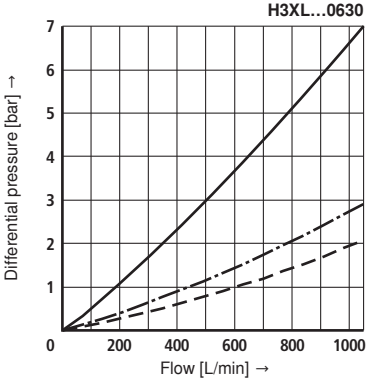
H3XL…

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

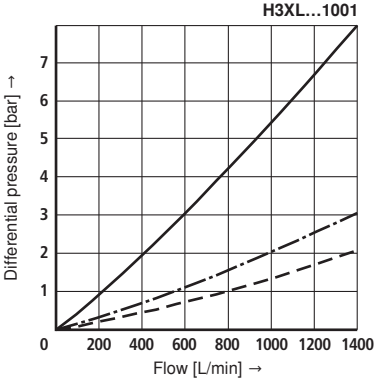
An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

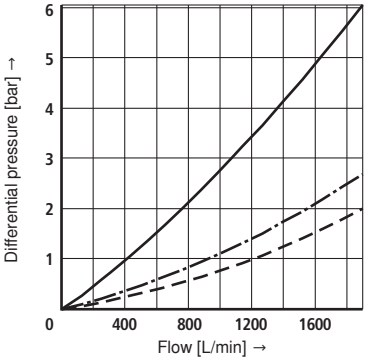
H3XL…0630



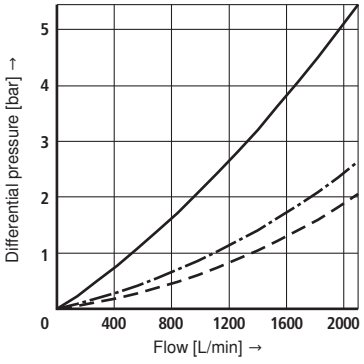
H3XL…1001



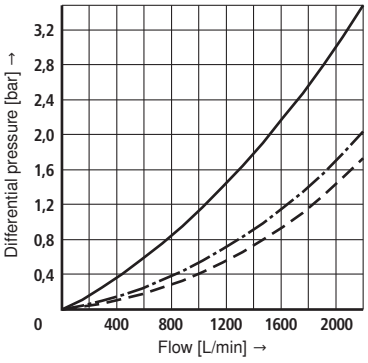
H3XL…0201



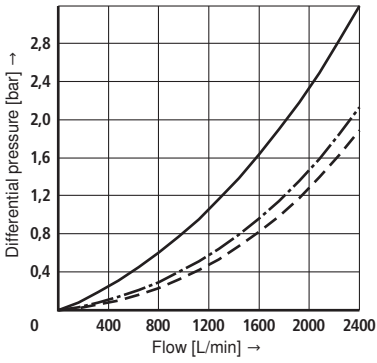
H3XL…0271



H3XL…0272



H3XL…0273



Characteristic curves

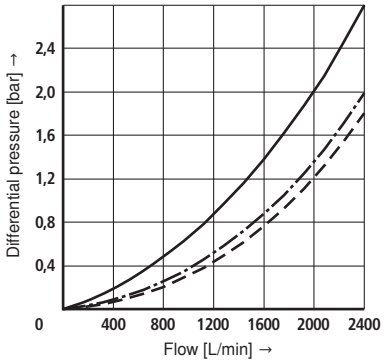
H3XL… and H10XL…

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

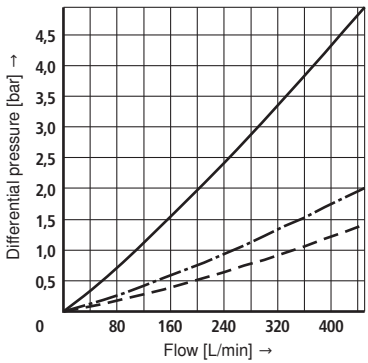
An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s; 46 mm²/s; 30 mm²/s

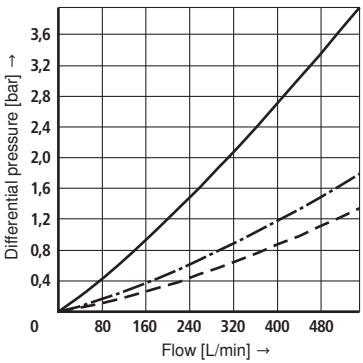
H3XL…0274



H10XL…0160



H10XL…0250



5

Characteristic curves

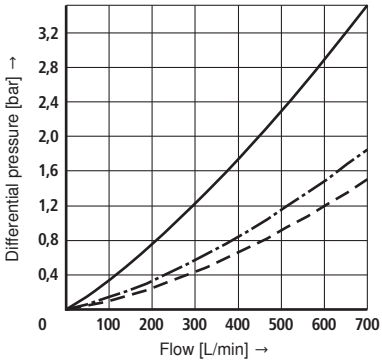
H10XL…

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

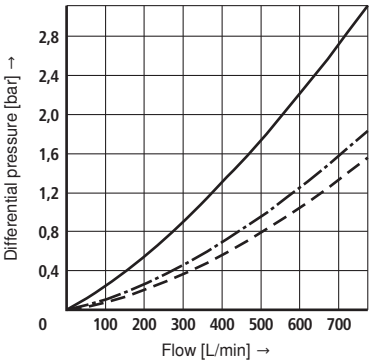
An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

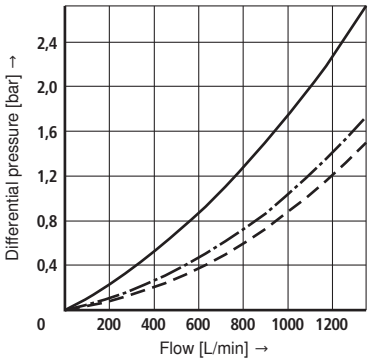
H10XL…0045



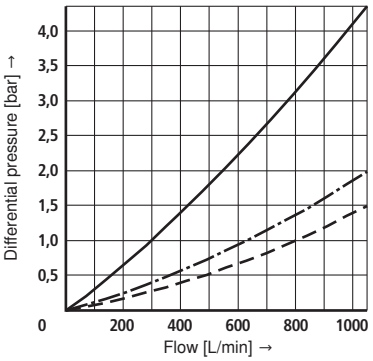
H10XL…0055



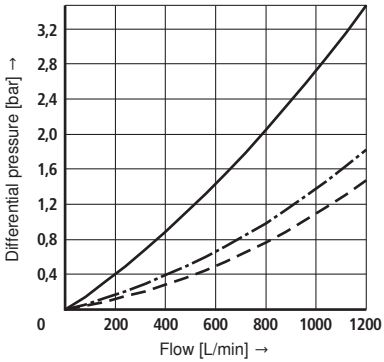
H10XL…0120



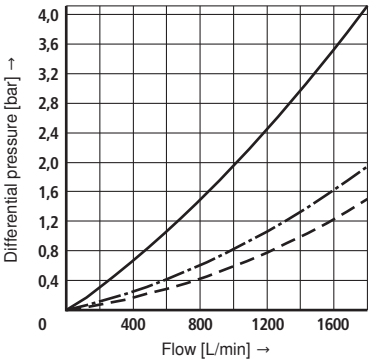
H10XL…0400



H10XL…0630



H10XL…1001



Characteristic curves

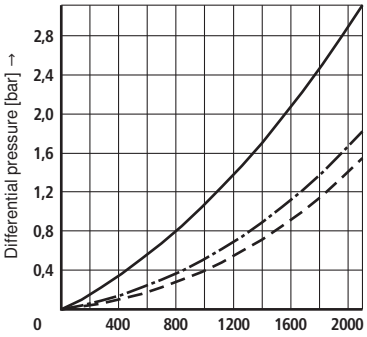
H10XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

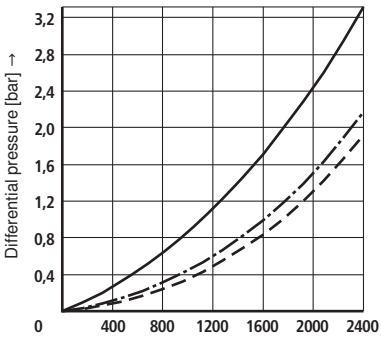
An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

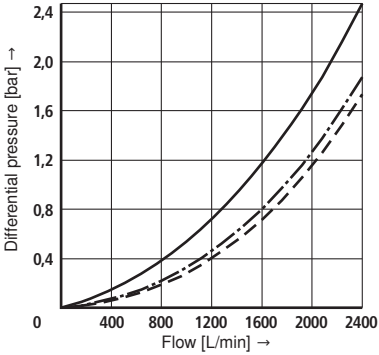
H10XL...0201



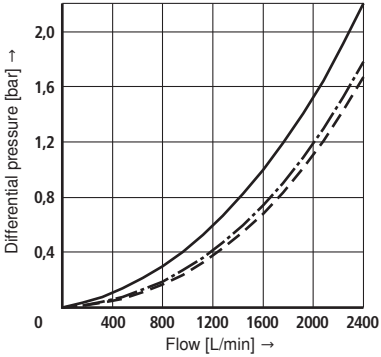
H10XL...0271



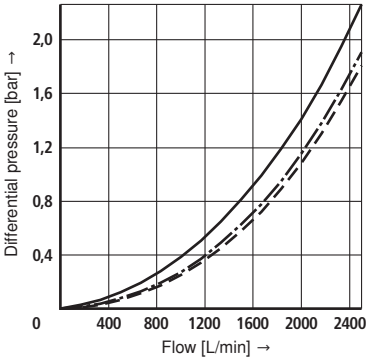
H10XL...0272



H10XL...0273

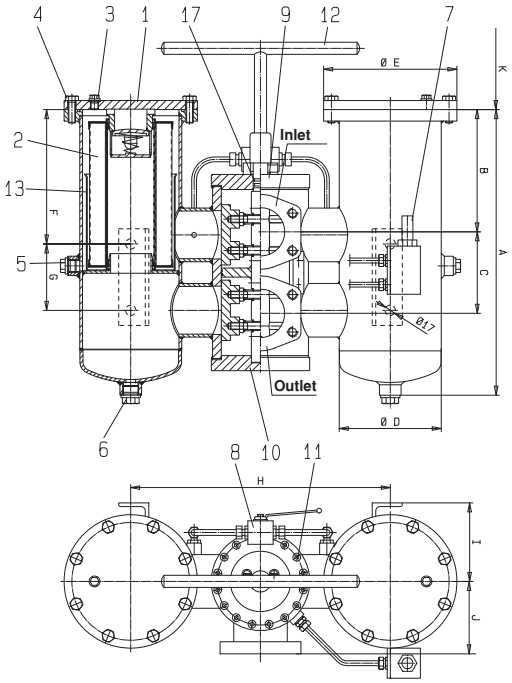


H10XL...0274



5

Unit dimensions, spare parts: Types 40 FLDN 0400 - 0630, types 40 FLD 0120 (dimensions in mm)

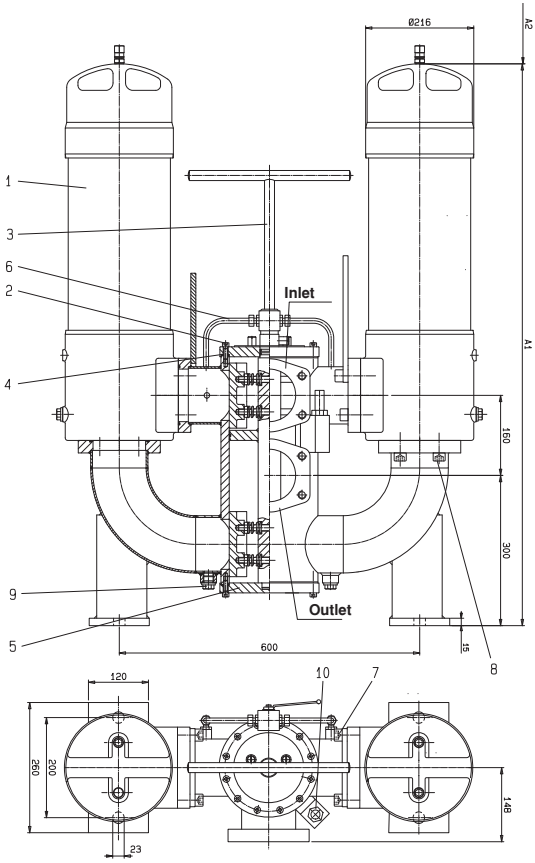


Type	40 FLDN 0160	40 FLDN 0250	40 FLDN 0400	40 FLDN 0630	40 FLD 0045	40 FLD 0055	40 FLD 0120
Volume in L	2 x 4	2 x 5	2 x 8	2 x 11	2 x 6.6	2 x 8.6	2 x 18
Weight in kg			84	86			99
Connection SAE 3000 psi	2“	2“	3“	3“	2“	2“	3“
A	331	421	471	621	571	739	978
B	118	208	200	350	358	526	707
C	105	105	135	135	105	105	135
D	133	133	168.3	168.3	133	133	168.3
E	180	180	220	220	180	180	220
F	108	198	220	370	208	376	587
G	110	110	110	110	250	250	250
H	300	300	430	430	300	300	430
I	111	111	130	130	111	111	130
J	95	95	120	120	95	95	120
K	160	250	250	400	400	570	760

Spare parts **All part numbers BRFS-specific.**

Size		**FLDN**		**0160**	**0250**			**0400**	**0630**	
		FLD				**0045**	**0055**			**0120**
Part	**Piece**	**Description**	**Material**	**Ordering information**						
1	2	Filter cover	Steel	Please indicate ordering information Filter						
2	2	Filter element	various	See ordering information Filter Element						
3	2	Bleed screw	Steel	Part No. 4158						
4	12	Hexagonal head screw	8.8	Part No. 596				–		
	16			–				Part No. 595		
5	2	Plug	Steel	Part No. 770				Part No. 789		
6	2	Plug	Steel	Part No. 789				Part No. 790		
7	1	Clogging indicator	various	See ordering information Clogging indicator						
8	1	Pressure compensation valve	various	Please indicate ordering information Filter						
9	1	Switch housing cover	Steel	Please indicate ordering information Filter						
10	1	Switch housing bottom	Steel	Please indicate ordering information Filter						
11	16	Socket head cap screw	8.8	Part No. 637				–		
	32			–				Part No. 639		
12	1	Plug key	Steel	Please indicate ordering information Filter						
13	2	Impact absorber	Steel	Please indicate ordering information Filter						
	1	Sealing kit	various	Please indicate ordering information Filter						

Unit dimensions, spare parts: 40 FLDN 1001, 40 FLD 0201, 0271 (dimensions in mm)



Filter housing for filter element according to DIN 24550

Type 40 FLDN…	Volume in L	Weight in kg [1]	A1	A2 [2]	Connection SAE 3000 psi
1001	2 x 12	128	930	400	4“

Filter housing for filter elements according to BRFS standard

Type 40 FLD…	Volume in L	Weight in kg [1]	A1	A2 [2]	Connection SAE 3000 psi
0201	2 x 22	176	1280	760	4“
0271	2 x 28	198	1522	990	4“

[1] Weight including standard filter element and maintenance indicator.

[2] Withdrawal dimension for filter element replacement.

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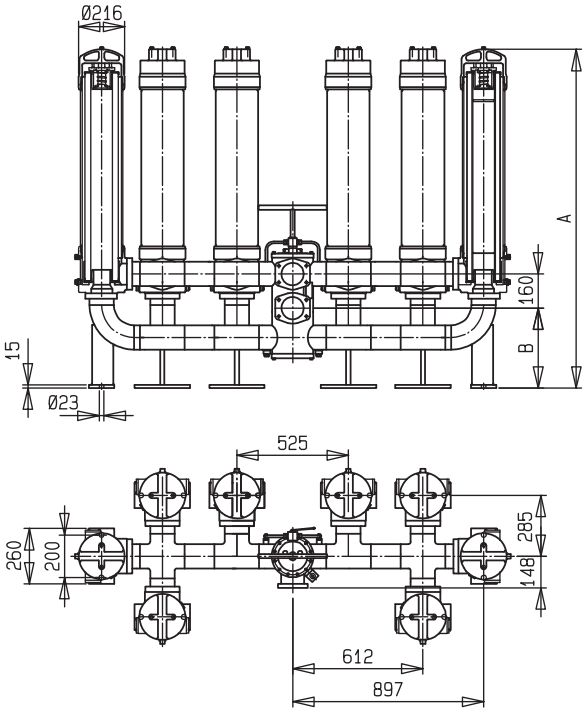
Spare parts **All part numbers BRFS-specific.**

Size		FLDN		1001		
		FLD			0201	0271
Part	Piece	Description	Material	Ordering information		
1	2	Line filter	various	See spare parts data sheet 51401		
2	24	Socket head cap screw	8.8	Part No. 638		
3	1	Plug key	Steel	Part No. 1260		
4	1	Switch housing cover	Steel	Please indicate ordering information Filter		
5	1	Switch housing bottom	Steel	Please indicate ordering information Filter		
6	1	Pressure compensation line	various	Please indicate ordering information Filter		
7	4	Socket head cap screw	8.8	Part No. 5011		
8	12	Socket head cap screw	8.8	Part No. 661		
9	2	Plug	Steel	Part No. 789		
10	1	Clogging indicator	various	Please indicate ordering information Filter		
	1	Sealing kit	various	Please indicate ordering information Filter		

Unit dimensions: type 40 FLDN 1001, types 40 FLD 0201 - 0274 (dimensions in mm)



Filter housing for filter element in accordance with DIN 24550

Type	Number of filters	Number of filter elements	A	B	Connection SAE 3000 psi
40 FLDN 1001	2 x 1	2 x 1.1000	930	300	4“

Filter housing for filter elements according to BRFS standard

Type	Number of filters	Number of filter elements	A	B	Connection SAE 3000 psi
40 FLD 0201	2 x 1	2 x 1.0200	1280	300	4“
40 FLD 0271	2 x 1	2 x 1.0270	1522		4“
40 FLD 0272	2 x 2	4 x 1.0270	1590	375	DN 100
40 FLD 0273	2 x 3	6 x 1.0270			
40 FLD 0274	2 x 4	8 x 1.0270			

Spare parts (insert for DIN and SAE filters)

Mechanical optical clogging indicator

ABZ F V – NV2 – 1X / – DIN

Rexroth power unit accessories

Filter

Clogging indicator

Mechanical optical clogging indicator for low-pressure filters
Switching point 2.2 bar *[32 psi]* **= NV2**

DIN = Identification for DIN and SAE models

Sealing material
M = see table below
V = see table below

Unit series
1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Mechanical optical clogging indicator	Material no.
ABZFV-NV2-1X/M-DIN	R901025312

The ordering details for filter elements can be found on page 3.

Sealing kits must be ordered by stating the complete part key.

Sealing material and surface coating for pressure fluids

		Ordering details	
Mineral oils		Sealing material	Element model and material
Mineral oil	HLP according to DIN 51524	M	...0
Fire-resistant hydraulic fluids			
Emulsions	HFA-E according to DIN 24320	M	...0
Synthetic water solutions	HFA-S according to DIN 24320	M	...D
Water solutions	HFC according to VDMA 24317	M	...D
Phosphate esters	HFD-R according to VDMA 24317	V	...D
Organic esters	HFD-U according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable			
Triglycerides (rape seed oil)	HETG according to VDMA 24568	M	...D
Synthetic esters	HEES according to VDMA 24568	V	...D
Polyglycoles	HEPG according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information. Install the filter into the pipe work; when doing so, consider the flow direction (direction arrows) and the withdrawal height of the filter elements.

⚠ Warning!

Vessel is under pressure!

Assemble and disassemble the filter only when system is depressurized!

Keep the pressure compensation closed if the filter is open!

Do not operate the change over valve when the filter is opened!

Do not replace the clogging indicator and the pressure compensation while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Move the switch lever into the central position in order to fill both filter sides. Switch on system pump. Bleed filter by opening the bleed screw, close when operating fluid vents. Switch filter into its operating position. In this connection, the switch lever must be in the stop position.

Maintenance

If at operating temperature, the red indicator pin shows out of the clogging indicator so far that it contacts the plastic cap and/or if the switching process in the electric display is triggered, the filter element is clogged and needs to be replaced or cleaned respectively.

Filter element replacement

Open the pressure compensation line, switch the switch lever over into the opposite direction to the stop to the clean filter side. Close the pressure compensation line again. Open the bleed screw and reduce the pressure. Close the bleed screw again. Disassemble the filter cover. Open the plug and drain the filter; then close the plug again. Remove the filter element from the lower centering spigot in the filter housing by turning it lightly. Check the filter housing for cleanliness and clean if necessary.

Replace filter elements H…-XL, P. The filter element with mater G... is cleanable. The efficiency of the cleaning process depends on the type of contamination and the value of the pressure differential before the filter element was exchanged. If the pressure differential after replacing the filter element is less than 50% of the value of a new filter element, the cleaning is not reasonable any more. Install the cleaned or new filter element into the filter housing. Check the seal ring and replace it in case of damage. Mount the filter cover. Bleed filter by opening the bleed screw, close again when operating fluid vents.

Technical modifications reserved!

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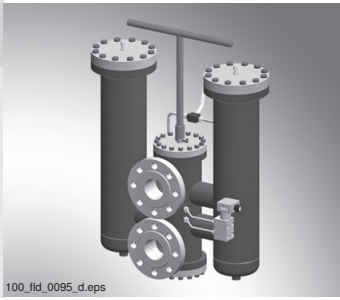
brfs-support@boschrexroth.de
www.eppensteiner.de

Rexroth
Bosch Group

Duplex filter

RE 51409/09.10 1/16
Replaces: 02.09

Types 100 FLDN 0160 to 1000; 100 FLD 0045, 0055, 0120, 0200, 0270


100_fld_0095_d.eps

Nominal sizes **according to DIN 24550**: 0160 to 1000
Nominal sizes according to BRFS: 0045, 0055, 0120, 0200, 0270
Nominal pressures 100 bar
Connections up to DN 100
Operating temperature –10 °C to +100 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Filtration of fluids and gases.
- Direct installation into pipelines.
- Direct wear protection of downstream components and systems.
- Continuous operating mode due to duplex filter design.

Features

- Filters for inline installation, for continuous operation
- FLDN series with filter elements in accordance with DIN 24550
- Versatile applications
- Compact modular design
- Low pressure drop
- Special highly efficient filter media

Design

Two filter housings in steel welded design, connected by means of switch housing. Vertically aligned connections for inlet and outlet at the front of the switch housing. Materials as per spare parts list.

Further design variants available on request.

Filter element

Pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the "FILTER" system in view of the prolonged life and the wear protection of the systems.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our brochure "Filter Elements".

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Bypass valve

To protect the filter element during startup and over pressurization due to clogging.

Characteristic curves

An optimum filter selection is made possible by our "BRFilterSelect" software, see download area http://www.eppensteiner.de.

Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation program.

Quality and standardization

The development, manufacture, and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with
ISO 9001:2000.

The pressure filters for hydraulic applications according to 51409 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (DGRL). However, on the basis of the exception in article 1, section 3.6 of the DGRL, hydraulic filters are exempt from the DGRL if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering details

of the filter

100 | | | – | – 0 | | V5,0–D0 | | 0 | |

Pressure
100 bar **= 100**

Design
Duplex filter with filter element according to DIN 24550 **= FLDN**
Duplex filter with filter element according to BRFS standard **= FLD**

Nom. size
FLDN… **= 0160 0250 0400 0630 1000**
FLD… **= 0045 0055 0120 0200 0270**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable:
G10, G25 **= G…**
Paper, non-cleanable
P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**
60 bar not for 100 FLD 0200 and 100 FLD 0270 **= C**

Element model
Standard adhesive T = 100 °C **= 0…**
Standard material **= …0**
chemically nickel-plated **= …D** [1]

Solenoid
without **= 0**

Complementary details
A = Pressure compensation line
Z [2] **=** Certificate

Material
0 = Standard

Seal
M = NBR seal
V = FKM seal

Connection
D0 = DIN flange

Clogging indicator
V5,0 = clogging indicator, optical state switching pressure 5.0 bar

Bypass valve
Opening pressure:
0 = without
7 = 3.5 bar

Ordering example:
100 FLD 0045 H10XL-A00-07V5,0-D0M0A

of the filter element

1. | | – | – 0 –

Filter element
Design **= 1.**

Nom. size
FLDN… **= 0160 0250 0400 0630 1000**
FLD… **= 0045 0055 0120 0200 0270**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable: G10, G25 **= G…**
Paper, non-cleanable: P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable: H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar **= A**
60 bar not for 100 FLD 0200 and 100 FLD 0270 **= C**

Seal
M = NBR seal
V = FKM seal

Bypass valve
Opening pressure:
0 = With filter element always 0

Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material
…D [1] **=** chemically nickel-plated

Ordering example:
1.0045 H10XL-A00-0-M

[1] Only in connection with FKM seals

[2] Z = manufacturer's inspection certificate M according to DIN 55350 T18

Preferred types

Duplex filter with bypass, filtration rating 10 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLDN 0160 H10XL-A00-09V5,0-D0M0A	290	**R928000621**
100 FLDN 0250 H10XL-A00-09V5,0-D0M0A	380	**R928000622**
100 FLD 0045 H10XL-A00-09V5,0-D0M0A	460	**R928000626**
100 FLD 0055 H10XL-A00-09V5,0-D0M0A	510	**R928000627**
100 FLDN 0400 H10XL-A00-09V5,0-D0M0A	690	**R928000623**
100 FLDN 0630 H10XL-A00-09V5,0-D0M0A	830	**R928000624**
100 FLD 0120 H10XL-A00-09V5,0-D0M0A	950	**R928000628**
100 FLDN 1000 H10XL-A00-09V5,0-D0M0A	850	**R928000625**
100 FLD 0201 H10XL-A00-09V5,0-D0M0A	1500	**R928000705**
100 FLD 0271 H10XL-A00-09V5,0-D0M0A	1570	**R928000706**

Duplex filter with bypass, filtration rating 3 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLDN 0160 H3XL-A00-09V5,0-D0M0A	130	**R928000613**
100 FLDN 0250 H3XL-A00-09V5,0-D0M0A	198	**R928000614**
100 FLD 0045 H3XL-A00-09V5,0-D0M0A	285	**R928000618**
100 FLD 0055 H3XL-A00-09V5,0-D0M0A	352	**R928000619**
100 FLDN 0400 H3XL-A00-09V5,0-D0M0A	355	**R928000615**
100 FLDN 0630 H3XL-A00-09V5,0-D0M0A	515	**R928000616**
100 FLD 0120 H3XL-A00-09V5,0-D0M0A	735	**R928000620**
100 FLDN 1000 H3XL-A00-09V5,0-D0M0A	550	**R928000617**
100 FLD 0201 H3XL-A00-09V5,0-D0M0A	1040	**R928000703**
100 FLD 0271 H3XL-A00-09V5,0-D0M0A	1190	**R928000704**

Duplex filter without bypass, filtration rating 10 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLDN 0160 H10XL-C00-00V5,0-D0M0A	290	**R928000668**
100 FLDN 0250 H10XL-C00-00V5,0-D0M0A	380	**R928000669**
100 FLD 0045 H10XL-C00-00V5,0-D0M0A	460	**R928000672**
100 FLD 0055 H10XL-C00-00V5,0-D0M0A	510	**R928000673**
100 FLDN 0400 H10XL-C00-00V5,0-D0M0A	690	**R928000670**
100 FLDN 0630 H10XL-C00-00V5,0-D0M0A	830	**R928000671**
100 FLD 0120 H10XL-C00-00V5,0-D0M0A	950	**R928000674**

Duplex filter without bypass, filtration rating 3 µm and nominal pressure 100 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0.8 bar	Material number
100 FLDN 0160 H3XL-C00-00V5,0-D0M0A	130	**R928000661**
100 FLDN 0250 H3XL-C00-00V5,0-D0M0A	198	**R928000662**
100 FLD 0045 H3XL-C00-00V5,0-D0M0A	285	**R928000665**
100 FLD 0055 H3XL-C00-00V5,0-D0M0A	352	**R928000666**
100 FLDN 0400 H3XL-C00-00V5,0-D0M0A	355	**R928000663**
100 FLDN 0630 H3XL-C00-00V5,0-D0M0A	515	**R928000664**
100 FLD 0120 H3XL-C00-00V5,0-D0M0A	735	**R928000667**

Ordering details: electronic switching element for clogging indicator

ABZ | F | V – | –1X / | –DIN

Rexroth power unit accessories

Filter

Clogging indicator

electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

electronic switching element with 2 switching points (normally open/ normally closed), 75%, 100%, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 100 bar *[1450 psi]* with bypass valve,
nominal size 0045, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure liquid mineral oil HLP according to DIN 51524.

Filter: **100 FLD 0045 H10XL-A00-07V5,0-D0M0A** **Material number: R928000626**

Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

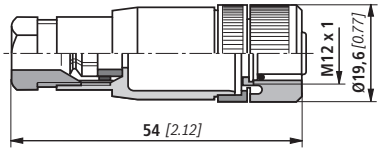
5

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12 x 1

Plug-in connector for K24 4-pin, M12 x 1 with screwed connection, cable fitting Pg9.

Material no. R900031155



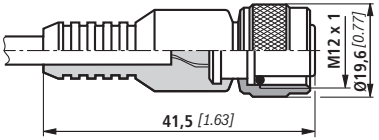
Plug-in connector for K24-3m 4-pin, M12 x 1 with molded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

1 brown
2 white
3 blue
4 black

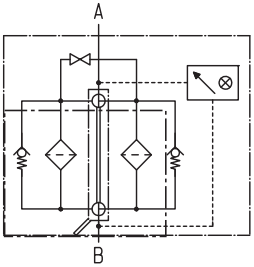
Material no. R900064381



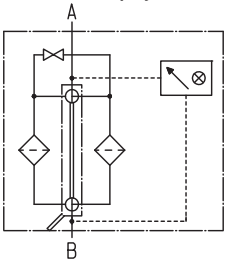
For additional round plug-in connections, see data sheet 08006.

Symbols

Pressure filter with bypass and mechanical display

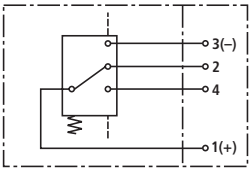


Pressure filter without bypass and mechanical display



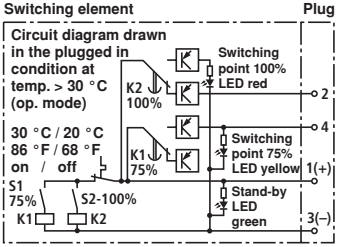
Electronic switching element for clogging indicator

Switching element **Plug**



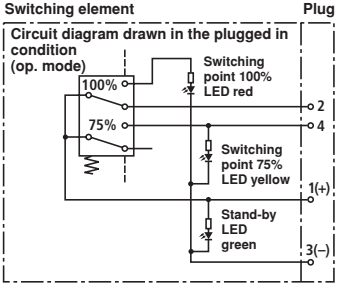
ABZFV-E1SP-M12X1-1X/-DIN

Switching element **Plug**



ABZFV-E2SPSU-M12X1-1X/-DIN

Switching element **Plug**



ABZFV-E2SP-M12X1-1X/-DIN

Technical data (for applications outside these parameters, please consult us!)

Electronic (electric switching element)

Electrical connection		Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage	A	Max. 1
Voltage range	E1SP-M12x1 V DC/AC	Max. 150
	E2SP V DC	10 to 30
Max. switching capacity with ohmic loads		20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1	Changeover
	E2SP-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure
	E2SPSU-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...		Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529		IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.		
Weight electronic switching element: – with round plug-in connection M12 x 1	kg *[lbs]*	0.1 *[0.22]*

Characteristic curves

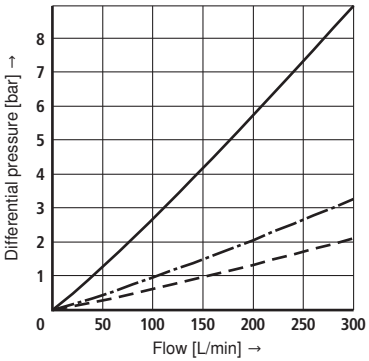
H3XL…

Specific weight: < 0.9 kg/dm^3
Δp-Q characteristic curves for complete filters recommended initial Δp for design = 0.8 bar

An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm^2/s, 46 mm^2/s, 30 mm^2/s

0160



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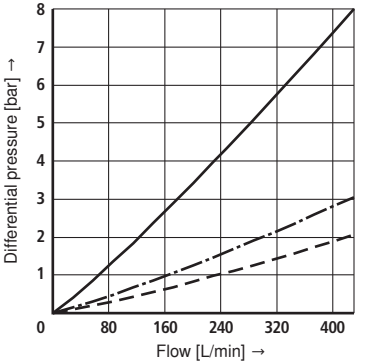

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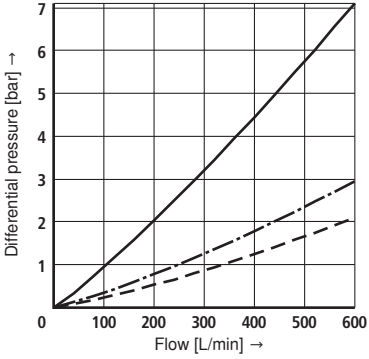

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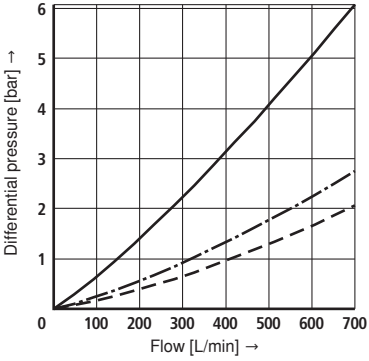

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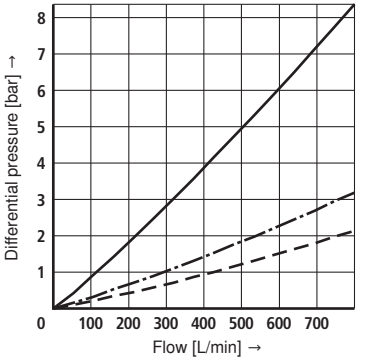

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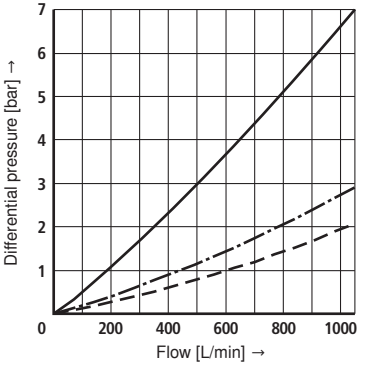


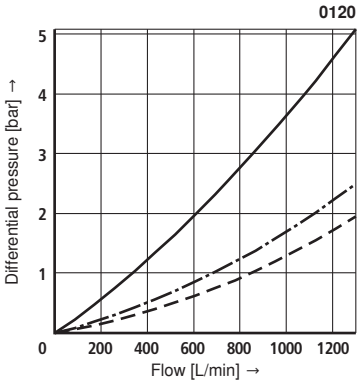
Characteristic curves

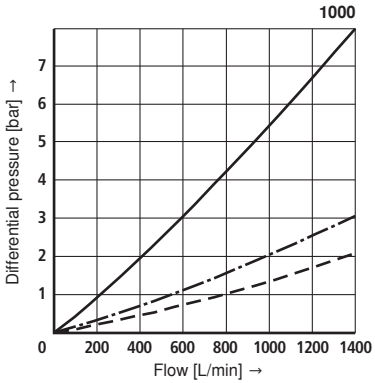
H3XL...

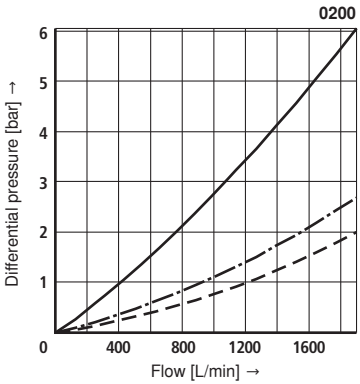
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.8 bar

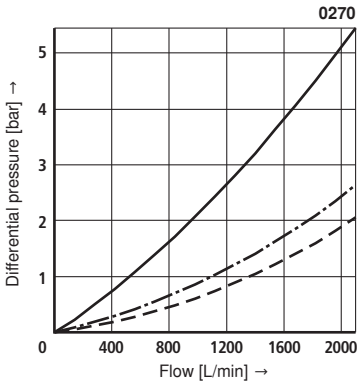
An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity:
— 120 mm²/s
-·- 46 mm²/s
– – 30 mm²/s









5

Characteristic curves

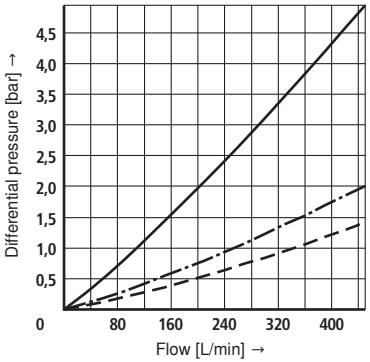
H10XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended
initial Δ*p* for design = 0.8 bar

An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

0160



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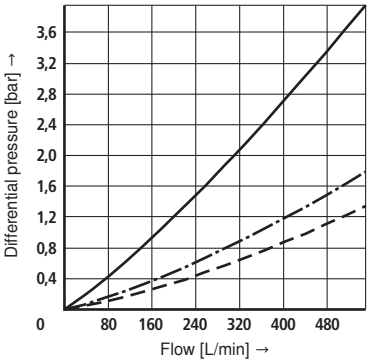

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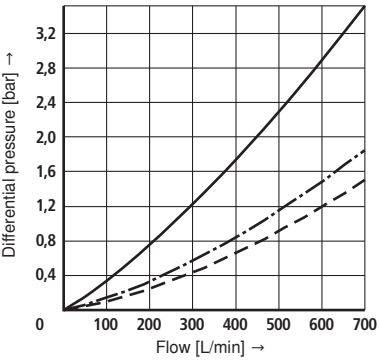
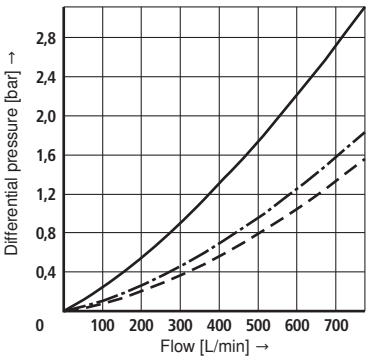


0055



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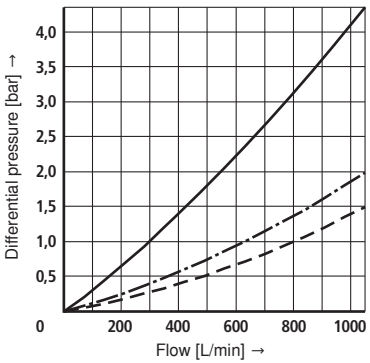

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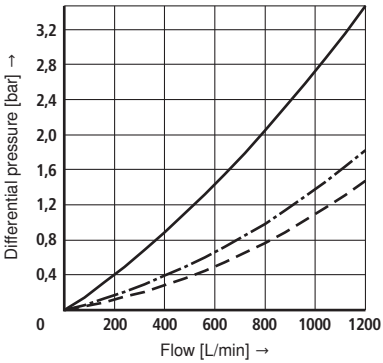

Characteristic curves

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Specific weight: < 0.9 kg/dm³
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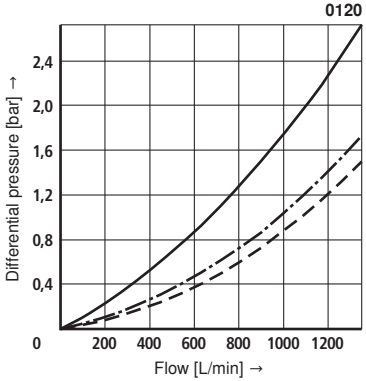
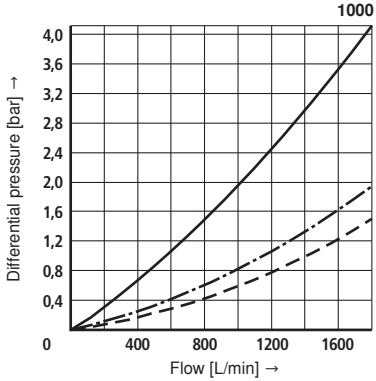
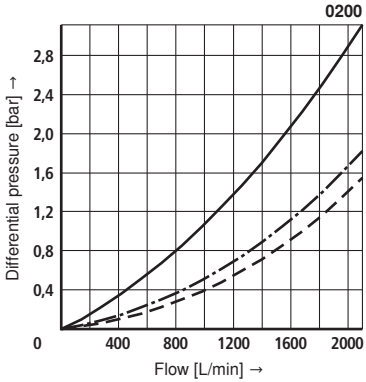
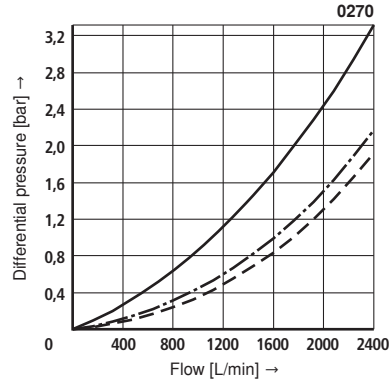
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s



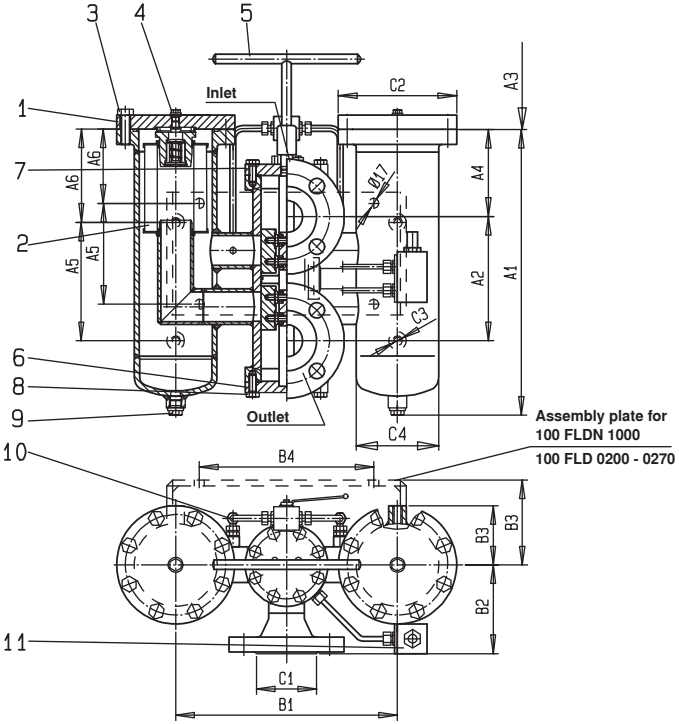






5

Unit dimensions, spare parts (dimensions in mm)



Filter housing for filter elements in accordance with DIN 24550

Type 100 FLDN…	Content in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	A6	B1	B2	B3	B4	C1 Connection DIN 2637	C2	C3	C4
0160	2 x 5	127.5	490	210	180	148	–	210	375	150	100	–	DN 50	Ø 200	M16	Ø 139.7
0250	2 x 6	130	580		270	238										
0400	2 x 10	181.5	627	235		256		230	485	180	115		DN 80	Ø 240	M20	Ø 168.3
0630	2 x 13	187	777		420	406										
1000	2 x 19	226	888	270		463	250	–	480	225	–	188	DN 100	Ø 260	–	Ø 193.7

Filter housing for filter elements according to BRFS standard

Type 100 FLD…	Con-tent in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	A6	B1	B2	B3	B4	C1 Connection DIN 2637	C2	C3	C4
0045	2 x 8	134.5	730	210	420	388	–	210	375	150	100	–	DN 50	Ø 200	M16	Ø 139.7
0055	2 x 10	139	898		590	556										
0120	2 x 20	199	1134	235	780	763		230	485	180	115		DN 80	Ø 240	M20	Ø 168.3
0200	2 x 28	322	1246	270	780	821		–	480	225	–		DN 100	Ø 260	–	Ø 193.7
0270	2 x 33	384	1480		1010	1055	250					188				

[1] Weight including standard filter element and clogging indicator.

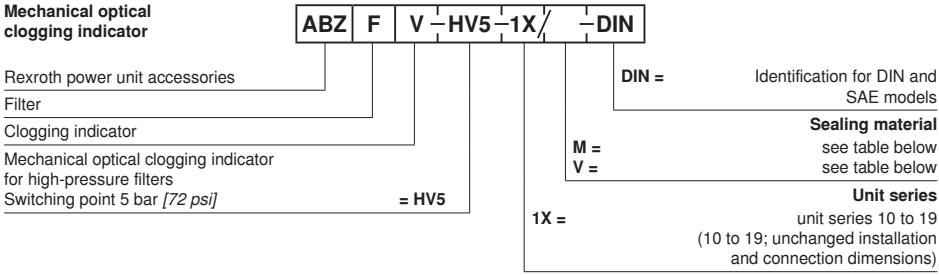
[2] Withdrawal dimension for filter element replacement.

Spare parts list

		Size FLDN		0160	0250			0400	0630		1000		
		FLD				0045	0055			0120		0200	0270
Part	**Piece**	**Description**	**Material**	**Ordering information**									
1	2	Filter cover	various	Please indicate ordering information Filter									
2	2	Filter element	various	See ordering information Filter Element									
3	16	Hexagonal head screw	8.8	602				–					
	24			–				605					
4	2	Bleed screw	5.8	4158									
5	1	Plug key	Steel	Please indicate ordering information Filter									
6	1	Switch housing bottom	Steel	4019				4055			4075		
7	1	Switch housing cover	Steel	4018				4056			4058		
8	32	Socket head cap screw	8.8	–				654			–		
	24			–							662		
	16	Hexagonal head screw		594				–					
9	2	Plug	5.8	789							790		
10	1	Pressure compensation line	Steel	Please indicate ordering information Filter									
11	1	Clogging indicator	various	See ordering information Clogging indicator									
	1	Sealing kit	various	Please indicate ordering information Filter									

All part numbers BRFS specific.

Spare parts (insert for DIN and SAE filters)



Mechanical optical clogging indicator	Material no.
ABZFV-HV5-1X/M-DIN	R901025313

The ordering details for filter elements can be found in the order details on page 3.

Sealing kits must be ordered by stating the complete part key.

Sealing material and surface coating for pressure fluids

		Ordering detail	
Mineral oils			Element model
Mineral oil	HLP according to DIN 51524	M	...0
Fire-resistant hydraulic fluids			
Emulsions	HFA-E according to DIN 24320	M	...0
Synthetic water solutions	HFA-S according to DIN 24320	M	...D
Water solutions	HFC according to VDMA 24317	M	...D
Phosphate esters	HFD-R according to VDMA 24317	V	...D
Organic esters	HFD-U according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable			
Triglycerides (rape seed oil)	HETG according to VDMA 24568	M	...D
Synthetic esters	HEES according to VDMA 24568	V	...D
Polyglycoles	HEPG according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information. Install the filter into the pipe work; when doing so, consider the flow direction (direction arrows) and the withdrawal height of the filter elements.

⚠ Warning!

Vessel is under pressure!

Assemble and disassemble the filter only when system is depressurized!

Keep the pressure compensation closed if the filter is open!

Do not operate the change over valve when the filter is opened!

Do not replace the clogging indicator and the pressure compensation while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Move the switch lever into the central position in order to fill both filter sides. Switch on system pump. Bleed filter by opening the bleed screw, close when operating fluid vents. Switch filter into its operating position. In this connection, the switch lever must be in the stop position.

Maintenance

If at operating temperature, the red indicator pin shows out of the clogging indicator so far that it contacts the plastic cap and/or if the switching process in the electric display is triggered, the filter element is clogged and needs to be replaced or cleaned respectively.

Filter element replacement

Open the pressure compensation line, switch the switch lever over into the opposite direction to the stop to the clean filter side. Close the pressure compensation line again. Open the bleed screw and reduce the pressure. Close the bleed screw again. Screw off the filter head. Open the plug and drain the filter; then close the plug again. Remove the filter element from the lower centering spigot in the filter housing by turning it lightly. Check the filter housing for cleanliness and clean if necessary.

Replace filter elements H…-XL, P. The filter element with mater G... is cleanable. The efficiency of the cleaning process depends on the type of contamination and the value of the pressure differential before the filter element was exchanged. If the pressure differential after replacing the filter element is less than 50% of the value of a new filter element, the cleaning is not reasonable any more. Install the cleaned or new filter element into the filter housing. Check the seal ring and replace it in case of damage. Without any tools, install filter head by rotating it clockwise by hand up to the last thread. Rotate back 1/4 rotation. Bleed filter by opening the bleed screw, close again when operating fluid vents.

Notes

Bosch Rexroth Filtration Systems GmbH
Hardtwaldstraße 43, 68775 Ketsch, Germany
POB 1120, 68768 Ketsch, Germany
Phone +49 (0) 62 02 / 6 03-0
Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.eppensteiner.de

Rexroth
Bosch Group

Duplex filter

RE 51410/12.10 1/16
Replaces: 02.09

Types 16 FD 2500 to 7500


H7724_d

Nominal sizes according to BRFS: 2500 to 7500
Nominal pressures 16 bar
Connections up to DN 300
Operating temperature –10 °C to +90 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Filtration of fluids and gases.
- Direct installation into pipelines.
- Direct wear protection of downstream components and systems.
- Continuous operating mode due to duplex filter design.

Features

- Filters for inline installation
- Extremely large filter area
- Low pressure drop
- Special highly efficient filter media
- Versatile applications

Design

Steel welded construction of two filter housings that are connected with each other as switch unit by means of four shut-off valves. The connections are aligned vertically. Filter cover with bleed and filter housing with drain screws.
Materials as per spare parts list.

Further design variants available on request.

Filter element

Pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the "FILTER" system in view of the prolonged life and the wear protection of the systems.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our brochure "Filter Elements".

Bypass valve

To protect the filter element during startup and over pressurization due to clogging.

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Bleed valve

For bleeding the filter in the commissioning and for the safe reduction of the operating pressure.

Characteristic curves

An optimum filter selection is made possible by our "BRFilterSelect" software, see download area http://www.boschrexroth.com/filter.

Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation program.

Quality and standardization

The development, manufacture, and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The pressure filters for hydraulic applications according to 51410 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (DGRL). However, on the basis of the exception in article 1, section 3.6 of the DGRL, hydraulic filters are exempt from the DGRL if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering details

of the filter

16 | FD | | –A | –0 | | V2,2–D0 | | 0 | |

Pressure
16 bar = **16**

Design
Duplex filter = **FD**

Nom. size
FD… = **2500 3000 4000 6000 7000 7500**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable:
G10, G25, G40, G100 = **G…**
Paper, non-cleanable P10 = **P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL = **H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar = **A**

Element model
Standard adhesive T = 100 °C = **0…**
Special adhesive T = 200 °C = **E…**
Standard material = **…0**
chemically nickel-plated = **…D** [1]

Solenoid
without = **0**

Further models, e.g. filter media, connections, are available at request.

Complementary details
A = Pressure compensation line (standard)
M = with cover lifting tool
Z [2] **=** Certificate

Material
0 = Standard

Seal
M = NBR seal
V = FKM seal

Connection
D0 = DIN flange

Clogging indicator
V2,2 = clogging indicator, optical state switching pressure 2.2 bar

Bypass valve
0 = without
6 = 3.0 bar standard

Ordering example:
16 FD 3000 H10XL-A00-06V2,2-D0M0A

of the filter element

2. | | –A | – –

Filter element
Design = **2.**

Nom. size

Filter	Filter element Number	Type
2500, 3000	2 x 3	**= 0058**
4000	2 x 4	**= 0059**
6000	2 x 6	**= 0059**
7000, 7500	2 x 10	**= 0059**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable:
G10, G25, G40, G100 = **G…**
Paper, non-cleanable: P10 = **P…**
absolute (ISO 16889)
Micro glass, non-cleanable: H3XL, H10XL, H20XL = **H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar = **A**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = without
6 = 3.0 bar standard

Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material
…D [1] **=** chemically nickel-plated

Ordering example:
2.0058 H10XL-A00-6-M

[1] Only in connection with FKM seal.

[2] Z = manufacturer's inspection certificate M according to DIN 55350 T18

5

Preferred types

Duplex filter with bypass, filtration rating 20 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm^2/s and Δp = 0,5 bar	Material number
16 FD 2500 H20XL-A00-06V2,2-D0M0A	2650	**R928001327**
16 FD 3000 H20XL-A00-06V2,2-D0M0A	3500	**R928001328**
16 FD 4000 H20XL-A00-06V2,2-D0M0A	3900	**R928001329**
16 FD 6000 H20XL-A00-06V2,2-D0M0A	6400	**R928001330**
16 FD 7000 H20XL-A00-06V2,2-D0M0A	8700	**R928001331**
16 FD 7500 H20XL-A00-06V2,2-D0M0A	12000	**R928001332**

Duplex filter with bypass, filtration rating 10 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm^2/s and Δp = 0,5 bar	Material number
16 FD 2500 H10XL-A00-06V2,2-D0M0A	2200	**R928001321**
16 FD 3000 H10XL-A00-06V2,2-D0M0A	2700	**R928001322**
16 FD 4000 H10XL-A00-06V2,2-D0M0A	3400	**R928001323**
16 FD 6000 H10XL-A00-06V2,2-D0M0A	5500	**R928001324**
16 FD 7000 H10XL-A00-06V2,2-D0M0A	7400	**R928001325**
16 FD 7500 H10XL-A00-06V2,2-D0M0A	10500	**R928001326**

Duplex filter with bypass, filtration rating 3 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm^2/s and Δp = 0,5 bar	Material number
16 FD 2500 H3XL-A00-06V2,2-D0M0A	1360	**R928001315**
16 FD 3000 H3XL-A00-06V2,2-D0M0A	1465	**R928001316**
16 FD 4000 H3XL-A00-06V2,2-D0M0A	2055	**R928001317**
16 FD 6000 H3XL-A00-06V2,2-D0M0A	3200	**R928001318**
16 FD 7000 H3XL-A00-06V2,2-D0M0A	4950	**R928001319**
16 FD 7500 H3XL-A00-06V2,2-D0M0A	5500	**R928001320**

Preferred types

Duplex filter without bypass, filtration rating 20 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0,5 bar	Material number
16 FD 2500 H20XL-A00-00V2,2-D0M0A	2650	**R928001309**
16 FD 3000 H20XL-A00-00V2,2-D0M0A	3500	**R928001310**
16 FD 4000 H20XL-A00-00V2,2-D0M0A	3900	**R928001311**
16 FD 6000 H20XL-A00-00V2,2-D0M0A	6400	**R928001312**
16 FD 7000 H20XL-A00-00V2,2-D0M0A	8700	**R928001313**
16 FD 7500 H20XL-A00-00V2,2-D0M0A	12000	**R928001314**

Duplex filter without bypass, filtration rating 10 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0,5 bar	Material number
16 FD 2500 H10XL-A00-00V2,2-D0M0A	2200	**R928001303**
16 FD 3000 H10XL-A00-00V2,2-D0M0A	2700	**R928001304**
16 FD 4000 H10XL-A00-00V2,2-D0M0A	3400	**R928001305**
16 FD 6000 H10XL-A00-00V2,2-D0M0A	5500	**R928001306**
16 FD 7000 H10XL-A00-00V2,2-D0M0A	7400	**R928001307**
16 FD 7500 H10XL-A00-00V2,2-D0M0A	10500	**R928001308**

Duplex filter without bypass, filtration rating 3 µm and nominal pressure 16 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 0,5 bar	Material number
16 FD 2500 H3XL-A00-00V2,2-D0M0A	1360	**R928001297**
16 FD 3000 H3XL-A00-00V2,2-D0M0A	1465	**R928001298**
16 FD 4000 H3XL-A00-00V2,2-D0M0A	2055	**R928001299**
16 FD 6000 H3XL-A00-00V2,2-D0M0A	3200	**R928001300**
16 FD 7000 H3XL-A00-00V2,2-D0M0A	4950	**R928001301**
16 FD 7500 H3XL-A00-00V2,2-D0M0A	5500	**R928001302**

Ordering details: electronic switching element for clogging indicator

ABZ | F | V – | –1X / –DIN

Rexroth power unit accessories

Filter

Clogging indicator

electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

electronic switching element with 2 switching points (normally open/ normally closed), 75%, 100%, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 16 bar *[230 psi]* with bypass valve, nominal size 3000, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure liquid mineral oil HLP according to DIN 51524.

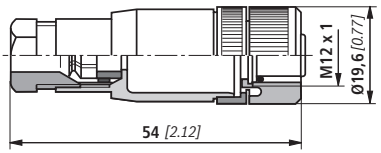
Filter: **16 FD 3000 H10XL-A00-06V2,2-D0M0A** **Material number: R928001250**
Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12x1

Plug-in connector for K24 4-pin, M12x1 with screwed connection, cable fitting Pg9.

Material no. R900031155



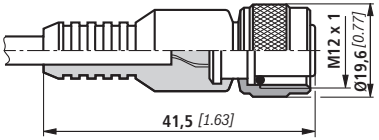
Plug-in connector for K24-3m 4-pin, M12x1 with molded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

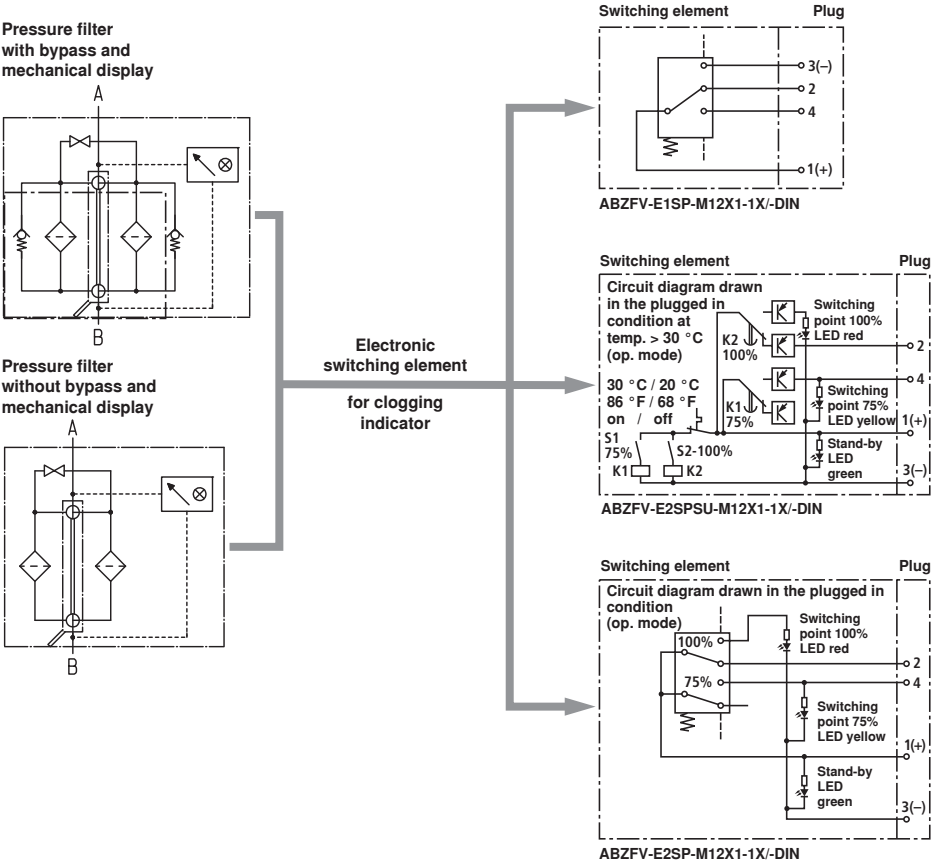
1	brown
2	white
3	blue
4	black

Material no. R900064381



For additional round plug-in connections, see data sheet 08006.

Symbols


Pressure filter
with bypass and
mechanical display
A
B
Pressure filter
without bypass and
mechanical display
A
B
Electronic
switching element
for clogging
indicator
Switching element
Plug
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn
in the plugged in
condition at
temp. > 30 °C
(op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in
condition
(op. mode)
100%
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

5

Technical data (for applications outside these parameters, please consult us!)

Electronic (electric switching element)

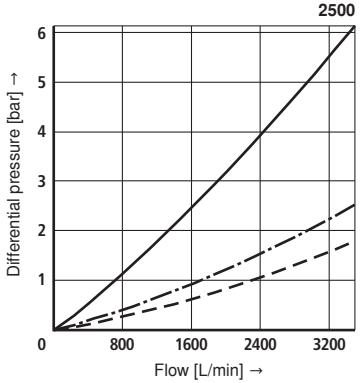
Electrical connection			Round plug-in connection M12x1, 4-pin
Contact load, direct voltage		A	Max. 1
Voltage range	E1SP-M12x1	V DC/AC	Max. 150
	E2SP	V DC	10 to 30
Max. switching capacity with ohmic loads			20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1		Changeover
	E2SP-M12x1		Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure
	E2SPSU-M12x1		Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...			Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529			IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.			
Weight electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*

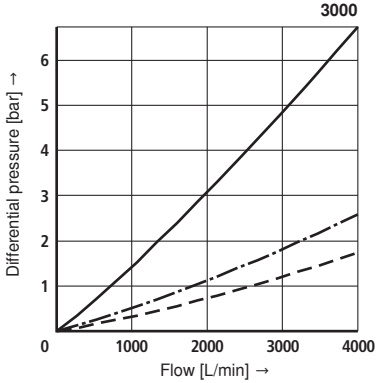
Characteristic curves H3XL...

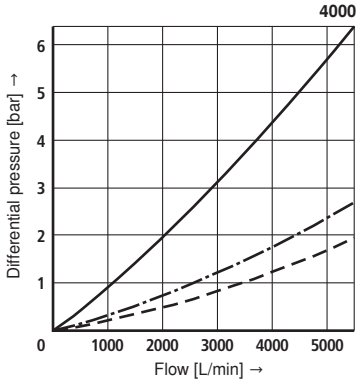
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.5 bar

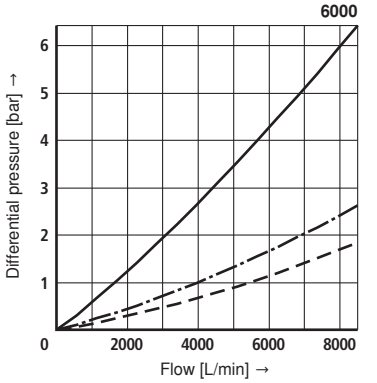
An optimum filter selection is made possible by our computer program "BRFilterSelect".

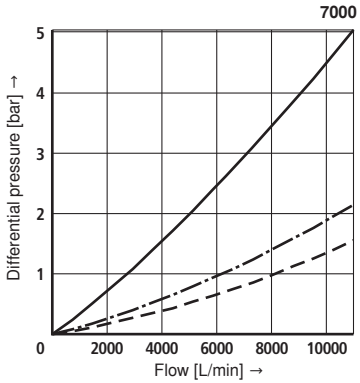
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

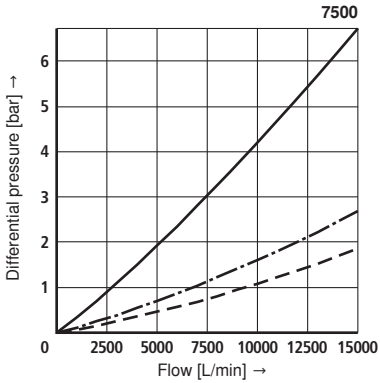












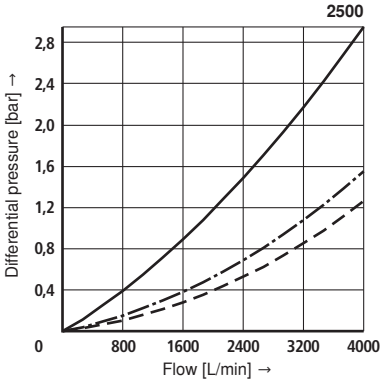
5

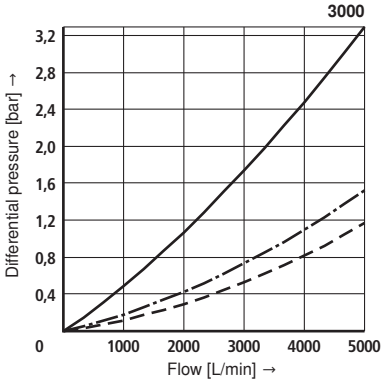
Characteristic curves **H10XL...**

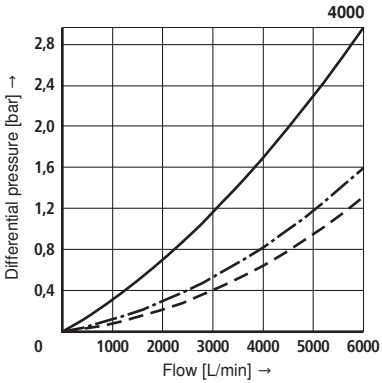
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.5 bar

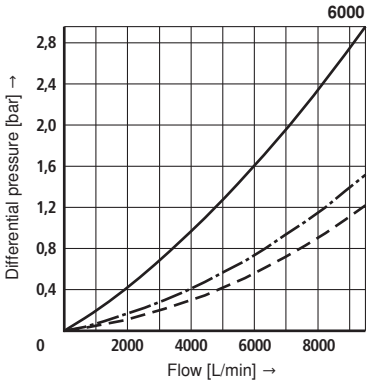
An optimum filter selection is made possible by our computer program "BRFilterSelect".

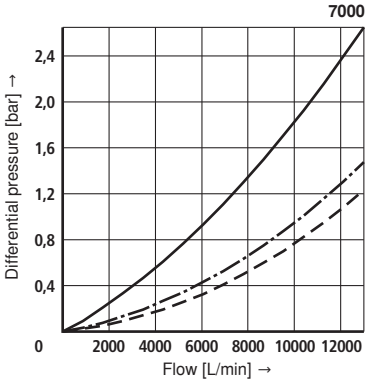
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

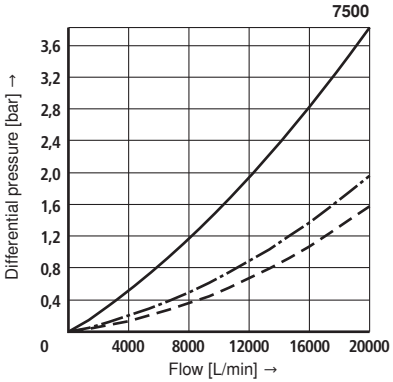












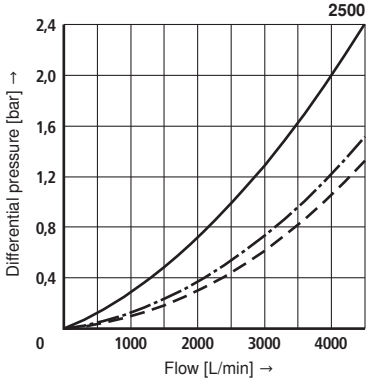
Characteristic curves

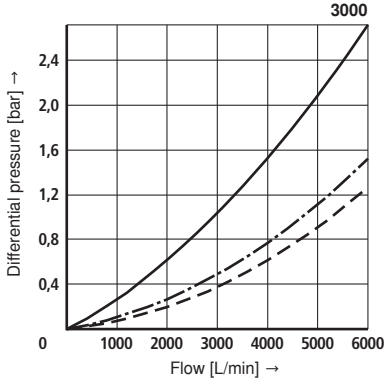
H20XL...

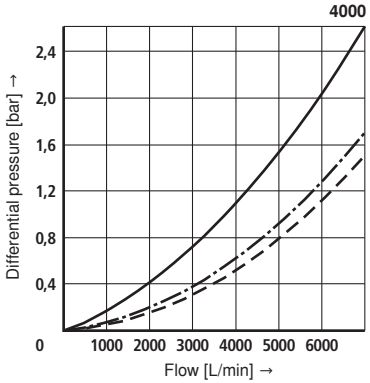
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended initial Δ*p* for design = 0.5 bar

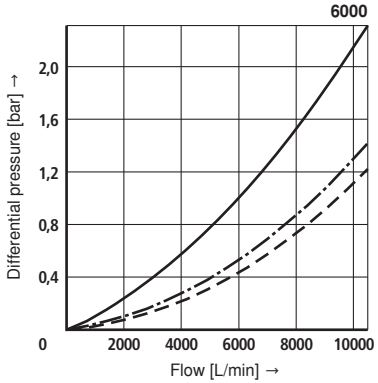
An optimum filter selection is made possible by our computer program "BRFilterSelect".

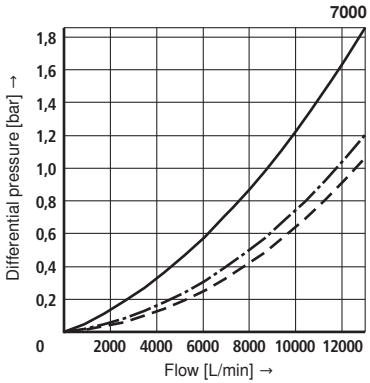
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

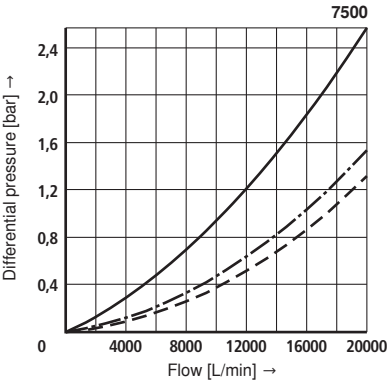






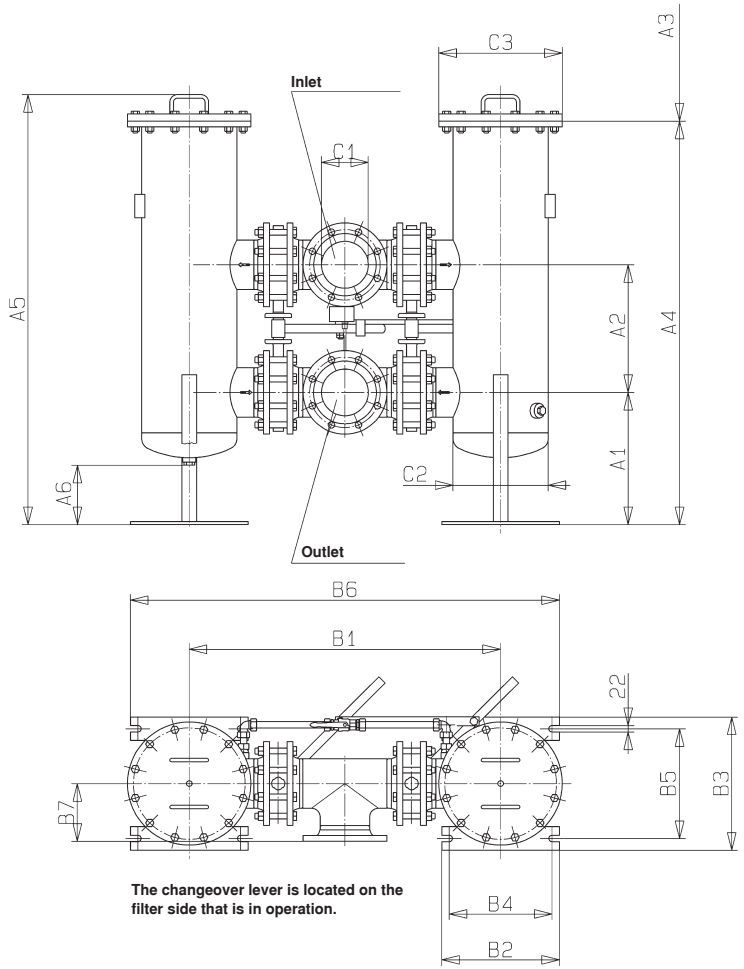






5

Unit dimensions (dimensions in mm)



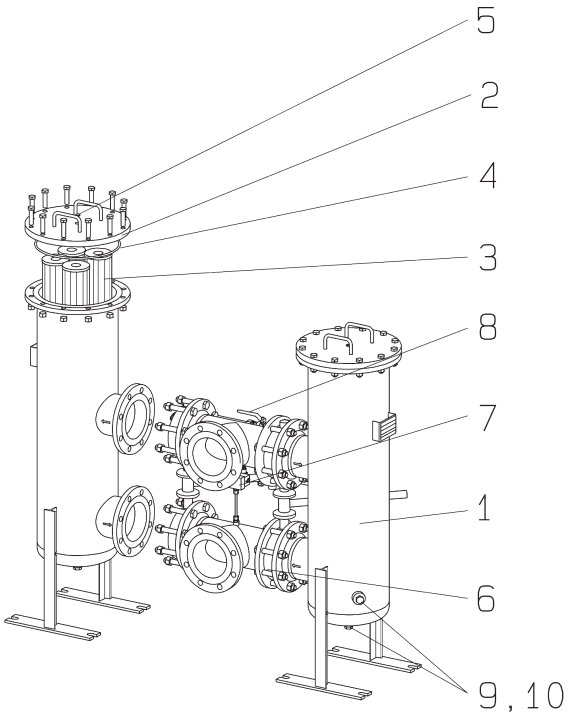
The changeover lever is located on the filter side that is in operation.

Type 16 FD…	Con-tent in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	A6	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3
2500	2 x 64	285	500	435	860	1295	1385	257	972	400	403	350	323	1372	180	DN 125	Ø 273	Ø 375
3000	2 x 70	325	500	435	860	1295	1385	257	1010	400	403	350	323	1410	199	DN 150	Ø 273	Ø 375
4000	2 x 99	420	450	435	990	1375	1465	197	1060	400	454	350	374	1460	199	DN 150	Ø 323.9	Ø 420
6000	2 x 178	505	500	480	990	1640	1730	212	1202	400	486	350	406	1602	241	DN 200	Ø 355.6	Ø 445
7000	2 x 395	995	500	585	990	1675	1841	150	1450	400	639	350	559	1850	287	DN 250	Ø 508	Ø 645
7500	2 x 412	1210	500	635	990	1705	1870	114	1642	400	639	350	559	2042	333	DN 300	Ø 508	Ø 645

[1] Weight including standard filter element and clogging indicator.

[2] Withdrawal dimension for filter element replacement.

Spare parts



Part	Piece	Description	Material		Ordering information 16FD...					
			Steel	Stainless steel	2500	3000	4000	6000	7000	7500
1	2	Filter housing	Steel	1.4571	Please indicate ordering information “Filter”					
2	2	Filter cover	Steel	1.4571	Please indicate ordering information “Filter”					
3	1	Filter element kit	various	various	Please indicate ordering information “Filter Element”					
					2 x 3 Single elements 2.0058		2 x 4 Single elements 2.0059	2 x 6 Single elements 2.0059	2 x 10 Single elements 2.0059	
3.1	1	Seal ring kit	NBR / FKM		Please indicate ordering information “Filter”					
4	1	Seal ring	NBR / FKM		Please indicate ordering information “Filter”					
5	2	Bleed screw	1.4571 / FKM		Part No. 13284					
6	2	Shut-off valve	various		Please indicate ordering information “Filter”					
7	1	Clogging indicator	various		See ordering information "Clogging indicator"					
8	1	Pressure compensation line	various		Please indicate ordering information “Filter”					
9	4	Plug	5.8	A4	Part no. 791/part no. 3485 for design "Stainless steel"					
10	4	Seal ring	Soft steel	A4	Part no. 335/part no. 3752 for design "Stainless steel"					

All part numbers BRFS specific.

Spare parts (insert for DIN and SAE filters)

Mechanical optical clogging indicator

ABZ F V – –1X/ –DIN

Rexroth power unit accessories

Filter

Clogging indicator

Mechanical optical clogging indicator for low-pressure filters
Switching point 2.2 bar *[32 psi]* **= NV2**

DIN = Identification for DIN and SAE models

Sealing material

M = see table below

V = see table below

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Mechanical optical clogging indicator	**Material no.**
ABZFV-NV2-1X/M-DIN	R901025312

The ordering details for filter elements can be found in the order details on page 3.

Sealing kits must be ordered by stating the complete part key.

Sealing material and surface coating for pressure fluids

		Ordering detail	
Mineral oils		Sealing material	Element model
Mineral oil	HLP according to DIN 51524	M	...0
Fire-resistant hydraulic fluids			
Emulsions	HFA-E according to DIN 24320	M	...0
Synthetic water solutions	HFA-S according to DIN 24320	M	...D
Water solutions	HFC according to VDMA 24317	M	...D
Phosphate esters	HFD-R according to VDMA 24317	V	...D
Organic esters	HFD-U according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable			
Triglycerides (rape seed oil)	HETG according to VDMA 24568	M	...D
Synthetic esters	HEES according to VDMA 24568	V	...D
Polyglycoles	HEPG according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information.

Install the filter into the pipe work; when doing so, consider the flow direction and the withdrawal height of the filter elements.

⚠ Warning!

Vessel is under pressure!

Assemble and disassemble the filter only when system is depressurized!

Keep the pressure compensation closed if the filter is open!

Do not operate the change over valve when the filter is opened!

Do not replace the clogging indicator and the pressure compensation while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Move the switch lever into the central position in order to fill both filter sides.

Switch on system pump. Pressure compensation is open. Bleed filter by opening the bleed screw, close when operating fluid vents. Close the pressure compensation.
Switch filter into its operating position. In this connection, the switch lever must be in the stop position. Pressure compensation remains closed.

Maintenance

If at operating temperature, the red indicator pin shows out of the clogging indicator so far that it contacts the plastic cap and/or if the switching process in the electric display is triggered, the filter elements are clogged and need to be replaced or cleaned respectively.

Filter element replacement

Open the pressure compensation. Switch the switch lever over into the opposite direction to the stop to the clean filter side. Close the pressure compensation. At the decommissioned filter, reduce the operating pressure by opening the bleed screw. Lift off the filter cover. Open the plugs at the filter housing and drain the filter.
Remove the filter elements from the lower centering spigots in the filter housing by turning them lightly.

Check the filter housing for cleanliness and clean if necessary.

Replace filter element H…-XL and P10. Clean the filter element with material G... .

Install the cleaned or new filter elements into the filter housing. Check the seal and replace it in case of damage or wear. Re-attach the filter cover. Open the pressure compensation. Bleed filter by opening the bleed screw, close when operating fluid vents. Close the pressure compensation.

Technical modifications reserved!

Notes

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POB 1120, 68768 Ketsch, Germany
Phone +49 (0) 62 02 / 6 03-0
Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.eppensteiner.de

The Drive & Control Company

Rexroth
Bosch Group

Duplex filter
with filter element according to DIN 24550

Type 400LDN0040 to 1000; 400LD0130, 0150

RE 51429
Edition: 2012-07
Replaces: 02.11


H7834_d

- Size **according to DIN 24550:** 0040 to 1000
- Additional sizes: 0130, 0150
- Nominal pressure 400 bar *[5714 psi]*
- Connection with SAE 2" 6000 psi
- Operating temperature –10 °C to 100 °C *[14 °F to 212 °F];*

Features

Duplex filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for installation into piping. They allow for the exchange of the filter element without operational interruption.

They distinguish themselves by the following:

- Filtration of very fine particles and high dirt holding capacity across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter surface
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function

Contents

Ordering code

of the filter

01	02	03	04		05	06	07		08		09		10
400	**LD**			**–**		**B**	**00**	**–**		**–**		**–**	

Pressure

01	400 bar *[5714 psi]*	**400**

Design

02	Duplex filter	**LD**

Filter element

03	according to **DIN 24550** (only with frame size 0040 ... 0100 + 0160 ... 1000)	**N**

Size

04	LDN...	**0040** **0063** **0100** **0160** **0250** **0400** **0630** **1000**
	LD...	**0130** **0150**

Filter rating in µm

05	**Nominal**	Stainless steel wire mesh, cleanable	**G10** **G25** **G40** **G100**
	Absolute (ISO 16889)	Micro glass, not cleanable	**H3XL** **H6XL** **H10XL** **H20XL**

Pressure differential

06	max. admissible pressure differential of the filter element 330 bar *[4786 psi]*, without bypass valve	**B**

Element design

07	Standard adhesive T = 100 °C *[212 °F]*	**0**...
	Standard material tinned	...**0**

Maintenance indicator

08	Maintenance indicator, visual, specify switching pressure: 5.0 bar *[72.5 psi]*	**V5,0**
	Maintenance indicator, visual, specify switching pressure: 8.0 bar *[116 psi]*	**V8,0**

Seal

09	NBR seal	**M**
	FKM seal	**V**

Ordering code

of the filter

01	02	03	04		05	06	07		08		09		10
400	**LD**			**–**		**B**	**00**	**–**		**–**		**–**	

Connection

10	**Frame size** / **Connection**	**0040 ... 0100**	**0130 ... 0150**	**0160 ... 0400**	**0630 ... 1000**		
	G 1/2	●				Pipe thread according to ISO 228	**R2**
	SAE 10	X				Pipe thread according to SAE J1926	**U3**
	SAE 1"		●			SAE flange 6000 psi	**S4**
	SAE 1 1/2"			●			**S6**
	SAE 2"				●		**S8**
	● Standard connection X additional connection possibility						

Order example:
400LDN0160-H3XLB00-V5,0-M-S6

Further versions (filter materials, connections,...) are available on request.

5

Ordering code

of the filter element

01	02	03		04		05		06
2.			**–**	**B00**	**–**	**0**	**–**	

Filter element

01	Design	**2.**

Size

02	LDN...	**0040** **0063** **0100** **0160** **0250** **0400** **0630** **1000**
	LD...	**0130** **0150**

Filter rating in µm

03	**Nominal**	Stainless steel wire mesh, cleanable	**G10** **G25** **G40** **G100**
	Absolute (ISO 16889)	Micro glass, not cleanable	**H3XL** **H6XL** **H10XL** **H20XL**

Pressure differential

04	Max. admissible pressure differential of the filter element 330 bar *[4786 psi]*	**B00**

Bypass valve

05	at filter element always 0	**0**

Seal

06	NBR seal	**M**
	FKM seal	**V**

Order example:

2.0160 H3XL-B00-0-M

Preferred types

400LD(N) preferred types, NBR seal, flow specification for 30 mm²/s *[142 SUS]*

Duplex filter, filter rating 3 µm

Type	Flow in l/min *[US gpm]* with ν = 30 mm²/s and Δ*p* = 1.5 bar *[21.75 psi]* [1]	Material no. Filter				Material no. Replacement element
400LDN0040-H3XLB00-V5,0-M-..	27 *[7.13]*	..R2	**R928039411**	..U3	**R928039437**	**R928006654**
400LDN0063-H3XLB00-V5,0-M-..	33 *[8.72]*	..R2	**R928039412**	..U3	**R928039438**	**R928006708**
400LDN0100-H3XLB00-V5,0-M-..	42 *[11.10]*	..R2	**R928039413**	..U3	**R928039439**	**R928006762**
400LD0130-H3XLB00-V5,0-M-..	73 *[19.28]*	..S4	**R928039415**			**R928022310**
400LD0150-H3XLB00-V5,0-M-..	92 *[24.30]*	..S4	**R928039416**			**R928022319**
400LDN0160-H3XLB00-V5,0-M-..	159 *[42.00]*	..S6	**R928039417**			**R928006816**
400LDN0250-H3XLB00-V5,0-M-..	202 *[53.36]*	..S6	**R928039418**			**R928006870**
400LDN0400-H3XLB00-V5,0-M-..	238 *[62.87]*	..S6	**R928039419**			**R928006924**
400LDN0630-H3XLB00-V5,0-M-..	300 *[79.36]*	..S8	**R928039420**			**R928006978**
400LDN1000-H3XLB00-V5,0-M-..	375 *[99.21]*	..S8	**R928039421**			**R928007032**

Duplex filter, filter rating 6 µm

Type	Flow in l/min *[US gpm]* with ν = 30 mm²/s and Δ*p* = 1.5 bar *[21.75 psi]* [1]	Material no. Filter				Material no. Replacement element
400LDN0040-H6XLB00-V5,0-M-..	30 *[7.93]*	..R2	**R928039422**	..U3	**R928039441**	**R928006655**
400LDN0063-H6XLB00-V5,0-M-..	40 *[10.57]*	..R2	**R928039423**	..U3	**R928039442**	**R928006709**
400LDN0100-H6XLB00-V5,0-M-..	45 *[11.89]*	..R2	**R928039424**	..U3	**R928039443**	**R928006763**
400LD0130-H6XLB00-V5,0-M-..	88 *[23.25]*	..S4	**R928039426**			**R928022311**
400LD0150-H6XLB00-V5,0-M-..	100 *[26.42]*	..S4	**R928039427**			**R928022320**
400LDN0160-H6XLB00-V5,0-M-..	188 *[49.66]*	..S6	**R928039429**			**R928006817**
400LDN0250-H6XLB00-V5,0-M-..	215 *[56.80]*	..S6	**R928039430**			**R928006871**
400LDN0400-H6XLB00-V5,0-M-..	258 *[68.16]*	..S6	**R928039431**			**R928006925**
400LDN0630-H6XLB00-V5,0-M-..	340 *[89.95]*	..S8	**R928039432**			**R928006979**
400LDN1000-H6XLB00-V5,0-M-..	525 *[138.89]*	..S8	**R928039433**			**R928007033**

[1] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Preferred types

400LD(N) preferred types, NBR seal, flow specification for 30 mm²/s *[142 SUS]*

Duplex filter, filter rating 10 µm

Type	Flow in l/min *[US gpm]* with ν = 30 mm²/s and Δ*p* = 1.5 bar *[21.75 psi]* [1]	Material no. Filter				Material no. Replacement element
400LDN0040-H10XLB00-V5,0-M-..	31 *[8.19]*	..R2	**R928038630**	..U3	**R928039444**	**R928006656**
400LDN0063-H10XLB00-V5,0-M-..	43 *[11.36]*	..R2	**R928038632**	..U3	**R928039445**	**R928006710**
400LDN0100-H10XLB00-V5,0-M-..	46 *[12.15]*	..R2	**R928038550**	..U3	**R928039446**	**R928006764**
400LD0130-H10XLB00-V5,0-M-..	99 *[26.15]*	..S4	**R928038549**			**R928022312**
400LD0150-H10XLB00-V5,0-M-..	105 *[27.74]*	..S4	**R928039285**			**R928022321**
400LDN0160-H10XLB00-V5,0-M-..	208 *[54.95]*	..S6	**R928039283**			**R928006818**
400LDN0250-H10XLB00-V5,0-M-..	223 *[58.91]*	..S6	**R928039436**			**R928006872**
400LDN0400-H10XLB00-V5,0-M-..	268 *[70.80]*	..S6	**R928038551**			**R928006926**
400LDN0630-H10XLB00-V5,0-M-..	450 *[119.95]*	..S8	**R928038848**			**R928006980**
400LDN1000-H10XLB00-V5,0-M-..	545 *[144.18]*	..S8	**R928038849**			**R928004034**

[1] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

01		02		03
WE	–		–	

Maintenance indicator

01	Electronic switching element	**WE**

Type of signal

02	1 switching point	**1SP**
	2 switching points, 3 LED	**2SP**
	2 switching points, 3 LED and signal suppression up to 30 °C *[86 °F]*	**2SPSU**

Connector

03	Round plug-in connection M12x1, 4-pole	**M12x1**
	Rectangular plug-in connector, 2-pin, design A according to EN-175301-803	**EN175301-803**

Material numbers of the electronic switching elements

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

Order example:

Duplex filter with mechanical visual maintenance indicator for $p_{Nominal}$ = 400 bar *[5714 psi]* without bypass valve, size 0160, with filter element 3 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

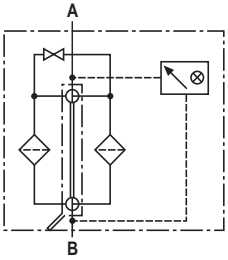
Filter with mech.-visual maintenance indicator: **400LDN0160-H3XLB00-V5,0-M-S6** **Material no. R928039417**

Electr. switching element: **WE-1SP-M12x1** **Material no. R928028409**

For round plug-in connections refer to data sheet 08006.

Symbols

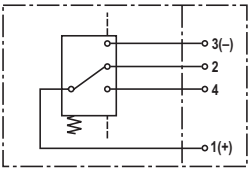
Duplex filter
without bypass and
with mechanical indicator



Electronic switching element

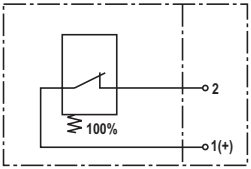
for maintenance indicator

Switching element **Connector**



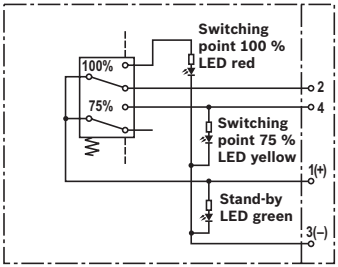
WE-1SP-M12x1

Switching element **Connector**



WE-1SP-EN175301-803

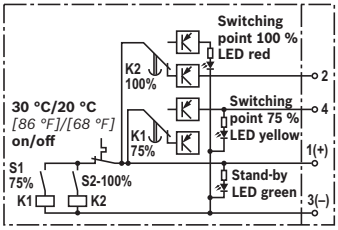
Switching element **Connector**



WE-2SP-M12x1

Circuit diagram drawn in plugged condition (operating state)

Switching element **Connector**



WE-2SPSU-M12x1

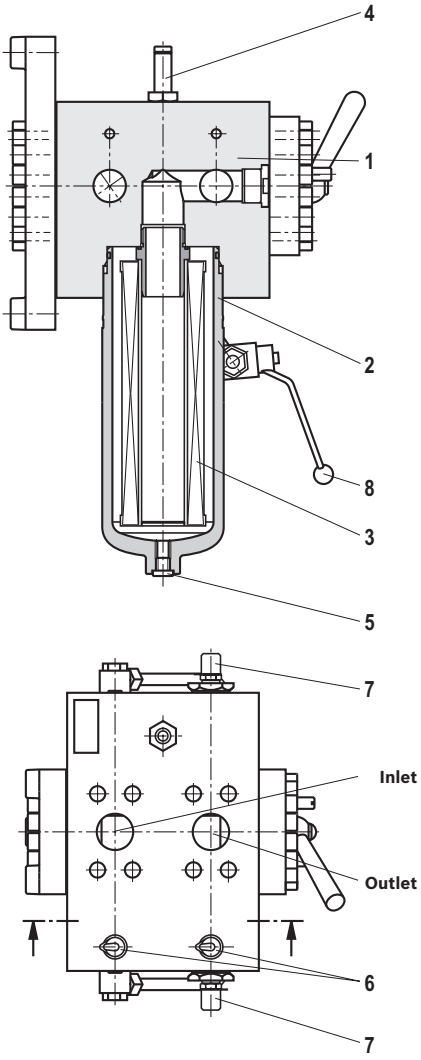
Circuit diagram drawn in plugged condition at temperature > 30 °C *[86 °F]* **(operating state)**

Function, section

The 400LD(N) duplex filters are suitable for direct installation into pressure lines. They are mostly installed upstream open-loop or closed-loop control units to be protected. They basically comprise of a filter head with switch-over fitting (1), a screwable filter bowl (2), a filter element (3) and a mechanical-visual maintenance indicator (4).
Via the inlet, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via the outlet, the filtered hydraulic fluid enters the hydraulic circuit.
The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. All filters have one Minimess connection (6) each as measuring port at the inlet and the outlet. By default, the bleeding is effected via lateral Minimess connections (7). As of size 0160, the standard equipment comprises an oil drain plug (5).

Basically, the filter is equipped with mechanical visual maintenance indicator (4). Connection of the electronic maintenance indicator is established via the electronic switching element with 1 or 2 switching points, which must be ordered separately. The electronic switching element is attached to the mechanical visual maintenance indicator and held by means of a locking ring.

☞ **Notice!**
Size 1000 is equipped with a divided filter bowl (2). See device dimensions page 16. This enlarges the servicing height as shown in the measurement chart.



Type 400LDN0250...

Technical data

(For applications outside these parameters, please consult us!)

general			
Duplex filter: Filter bowls			
Filter type	Filter bowl	Weight in kg *[lbs]*	Volume in l *[gal]*
400 LDN 0040	450 LE 0003	1.33 *[2.93]*	2 x 0.2 *[2 x 0.05]*
400 LDN 0063	450 LE 0005	1.33 *[2.93]*	2 x 0.3 *[2 x 0.08]*
400 LDN 0100	450 LE 0008	2.10 *[4.63]*	2 x 0.5 *[2 x 0.13]*
400 LD 0130	450 LE 0015	3.76 *[8.29]*	2 x 0.9 *[2 x 0.24]*
400 LD 0150	450 LE 0018	4.65 *[10.25]*	2 x 1.1 *[2 x 0.29]*
400 LDN 0160	450 LE 0020	5.52 *[12.17]*	2 x 1.3 *[2 x 0.34]*
400 LDN 0250	450 LE 0030	8.02 *[17.68]*	2 x 1.9 *[2 x 0.50]*
400 LDN 0400	450 LE 0045	12.21 [26.91]	2 x 3.0 *[2 x 0.79]*
400 LDN 0630	450 LE 0095	21.36 *[47.08]*	2 x 4.5 *[2 x 1.19]*
400 LDN 1000	445 LEN 1000	Filter bowl 45.34 *[99.93]* Cover 12.08 *[26.62]*	2 x 6.2 *[2 x 1.64]*

Installation position		vertical
Ambient temperature range	°C *[°F]*	–30 ... +100 *[–22 ... +212]*
Material	– Filter head	Spheroidal graphite iron
	– Filter bowl	Steel
	– Visual maintenance indicator	Brass
	– Electronic switching element	Plastic PA6

hydraulic		
Maximum operating pressure	bar *[psi]*	400 *[5714]*
Hydraulic fluid temperature range	°C *[°F]*	–10 ... +100 *[+14 ... +212]* (short-time –30 *[–22]*)
Minimum conductivity of the medium	pS/m	300
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	Not available
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]* alternatively 8 ± 0.8 *[115 ± 12]*

Technical data

(For applications outside these parameters, please consult us!)

electric (electronic switching element)					
Electrical connection		Round plug-in connection M12x1, 4-pole			Standard connection EN 175301-803
	Version	1SP-M12x1	2SP-M12x1	2SPSU-M12x1	1SP-EN175301-803
Contact load, direct voltage	$A_{max.}$	1			
Voltage range	$V_{max.}$	150 (AC/DC)	10 ... 30 (DC)		250 (AC)/200 (DC)
Max. switching power with resistive load	W	20			70
Switching type – 75 % signal		–	Normally open contact		–
– 100 % signal		Changeover	Normally closed contact		Normally closed contact
– 2SPSU				Signal interconnection at 30 °C *[86 °F]*, return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...			Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529		IP 67			IP 65
Ambient temperature range	°C *[°F]*	–25 ... +85 *[–13 ... +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.					
Weight Electronic switching element: – with round plug-in connection M12x1	kg *[lbs]*	0.1 *[0.22]*			

Filter element			
Glass fiber paper H..XL		Single-use element on the basis of inorganic fiber	
		Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
Particle separation	H20XL	$\beta_{20(c)} \geq 200$	19/16/12 ... 22/17/14
	H10XL	$\beta_{10(c)} \geq 200$	17/14/10 ... 21/16/13
	H6XL	$\beta_{6(c)} \geq 200$	15/12/10 ... 19/14/11
	H3XL	$\beta_{5(c)} \geq 200$	13/10/8 ... 17/13/10
Admissible pressure differential B	bar *[psi]*	330 *[4785]*	

Seal material for hydraulic fluids			
Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M

Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V

Fast bio-degradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

Characteristic curves (measured with mineral oil HLP46 according to ISO 3968) **H3XL**

Spec. weight: < 0.9 kg/dm³

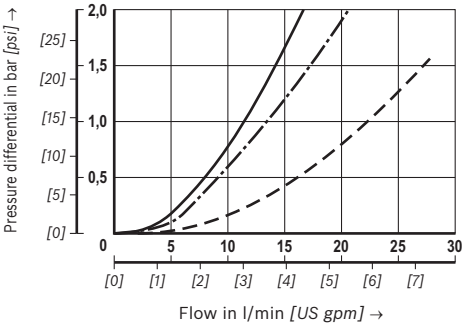
Δ*p*-Q characteristic curves for complete filter

recommended initial Δ*p* for design = 1.5 bar *[21.75 psi]*

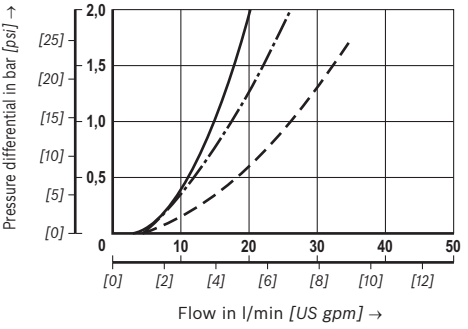
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: **140 mm²/s** *[649 SUS]*, **68 mm²/s** *[315 SUS]*, **30 mm²/s** *[142 SUS]*

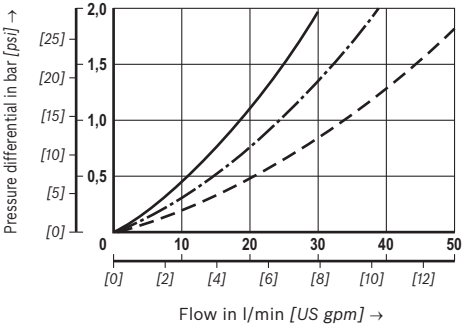
400LDN0040-H3XL



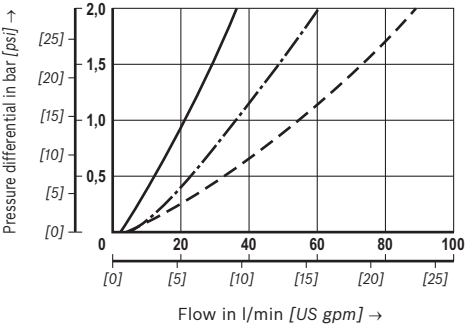
400LDN0063-H3XL



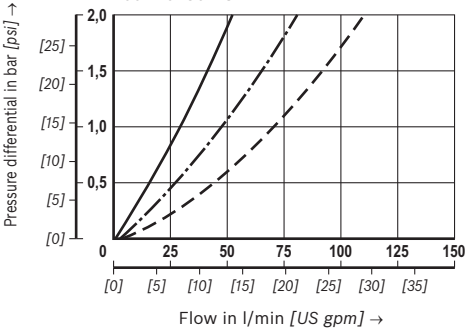
400LDN0100-H3XL



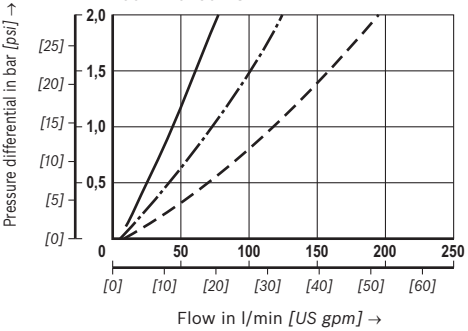
400LD0130-H3XL



400LD0150-H3XL



400LDN0160-H3XL



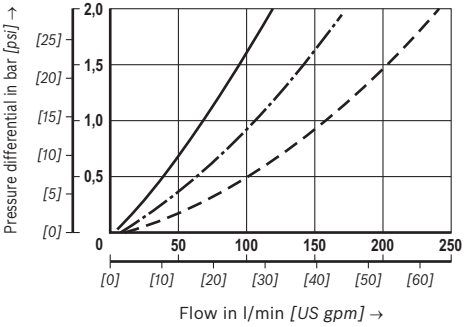
Characteristic curves (measured with mineral oil HLP46 according to ISO 3968) **H3XL**

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1.5 bar *[21.75 psi]*

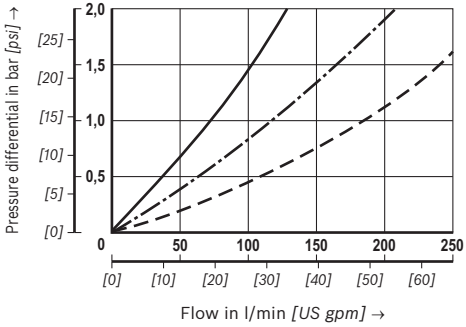
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[142 SUS]*

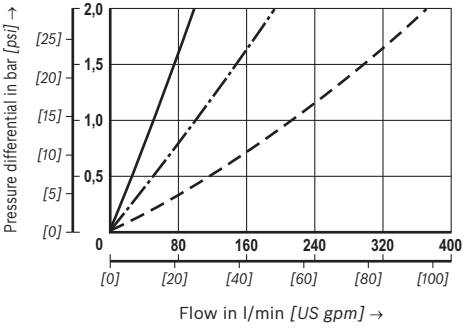
400LDN0250-H3XL



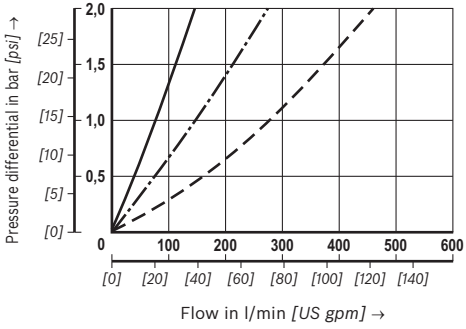
400LDN0400-H3XL



400LDN0630-H3XL



400LDN1000-H3XL



5

Characteristic curves (measured with mineral oil HLP46 according to ISO 3968) **H10XL**

Spec. weight: < 0.9 kg/dm³

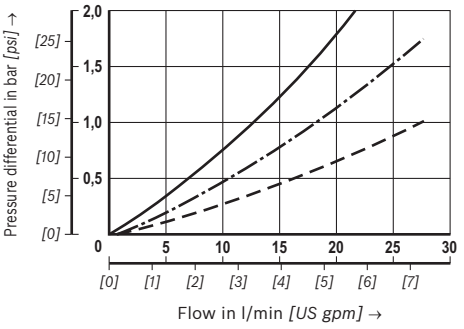
Δ*p*-Q characteristic curves for complete filter

recommended initial Δ*p* for design = 1.5 bar *[21.75 psi]*

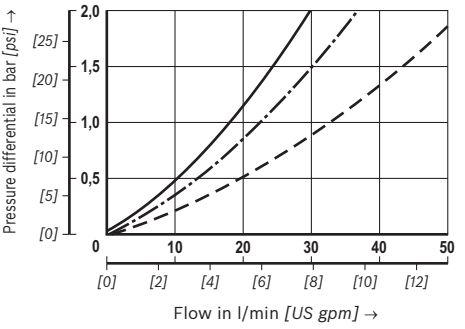
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: **140 mm²/s** *[649 SUS]*, **68 mm²/s** *[315 SUS]*, **30 mm²/s** *[142 SUS]*

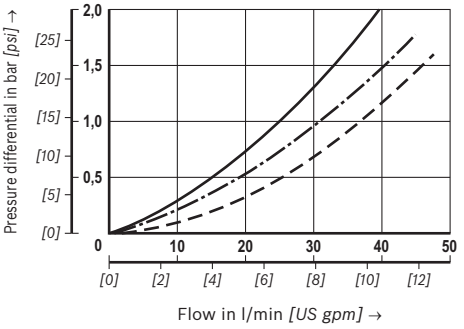
400LDN0040-H10XL



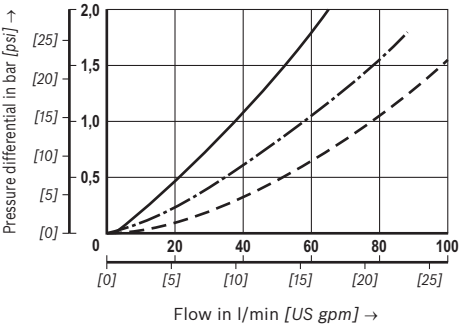
400LDN0063-H10XL



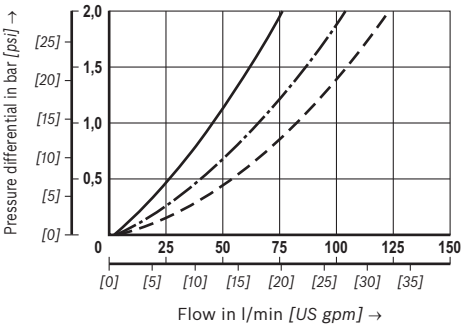
400LDN0100-H10XL



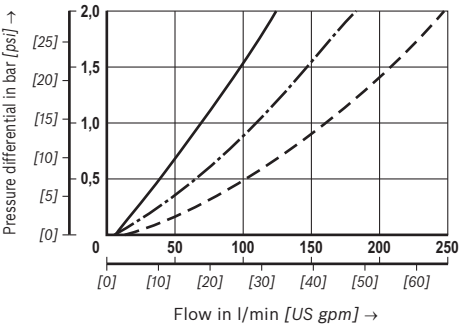
400LD0130-H10XL



400LD0150-H10XL



400LDN0160-H10XL



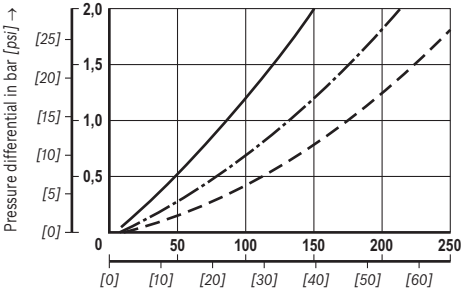
Characteristic curves (measured with mineral oil HLP46 according to ISO 3968) **H10XL**

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filter
recommended initial Δ*p* for design = 1.5 bar *[21.75 psi]*

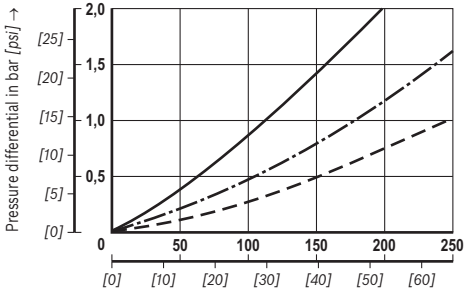
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s *[649 SUS]*
- 68 mm²/s *[315 SUS]*
- 30 mm²/s *[142 SUS]*

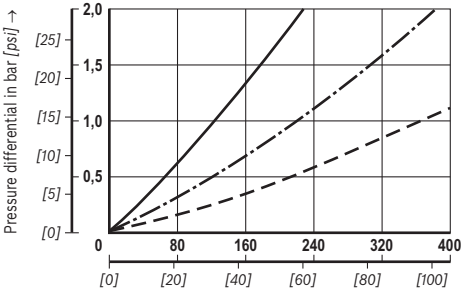
400LDN0250-H10XL



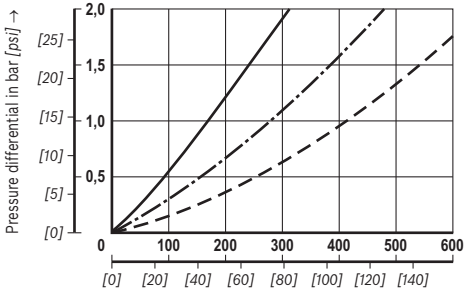
400LDN0400-H10XL



400LDN0630-H10XL

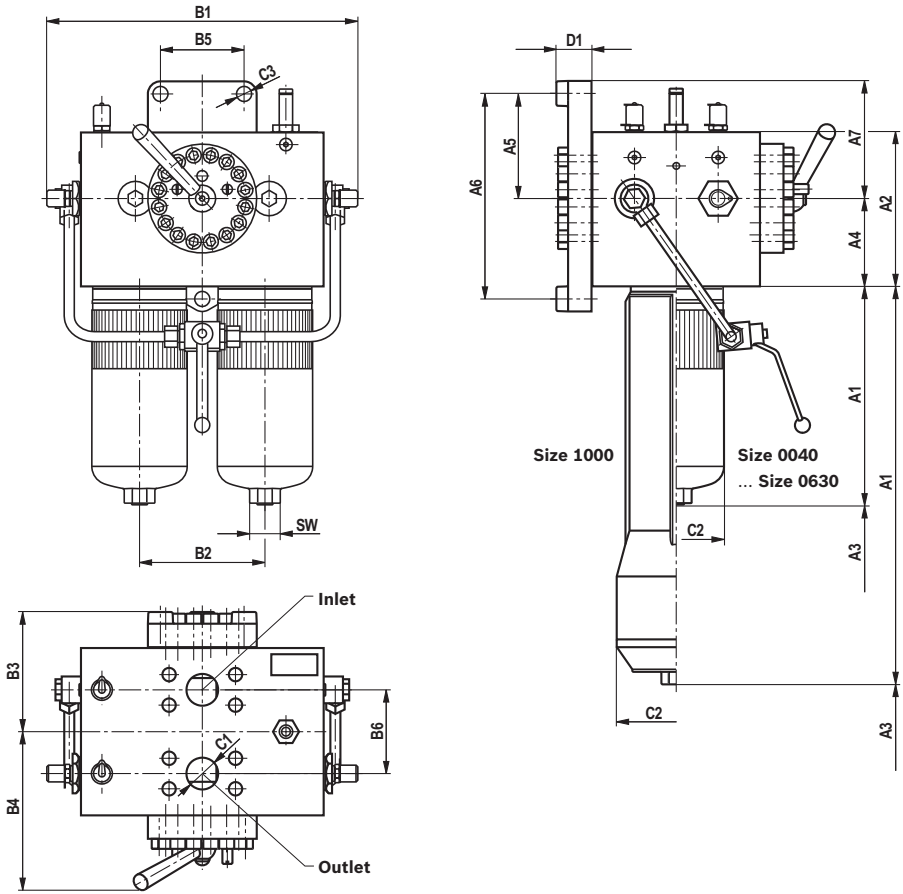


400LDN1000-H10XL



5

Device dimensions size 0040 ... size 1000 (dimensions in mm *[inch]*)



Device dimensions size 0040 ... size 0400 (dimensions in mm *[inch]*)

Filter housing for filter elements according to DIN 24550 and according to Rexroth standard

Type 400 LD(N)	A1	A2	A3 [1]	A4	A5	A6	A7	B1	B2	B3
0040	100 *[3.94]*	101 *[3.98]*	110 *[4.33]*	52 *[2.05]*	60 *[2.36]*	120 *[4.72]*	72 *[2.83]*	240 *[9.45]*	90 *[3.54]*	85 *[3.35]*
0063	163 *[6.42]*									
0100	253 *[9.96]*									
0130	191 *[7.52]*	130 *[5.12]*	120 *[4.72]*	74 *[2.91]*	72.5 *[2.85]*	170 *[6.69]*	85 *[3.35]*	350 *[13.78]*	120 *[4.72]*	111 *[4.37]*
0150	241 *[9.49]*									
0160	169 *[6.65]*	184 *[7.24]*		105 *[4.13]*	125 *[4.92]*	245 *[9.65]*	140 *[5.51]*	372 *[14.65]*	150 *[5.91]*	144 *[5.67]*
0250	259 *[10.20]*									
0400	409 *[16.10]*									
0630	420 *[16.54]*	190 *[7.48]*	160 *[6.30]*	108 *[4.25]*	110 *[4.33]*	240 *[9.45]*	130 *[5.11]*	530 *[20.87]*	200 *[7.87]*	166 *[6.54]*
1000	650 *[25.59]*		550 *[21.65]*							

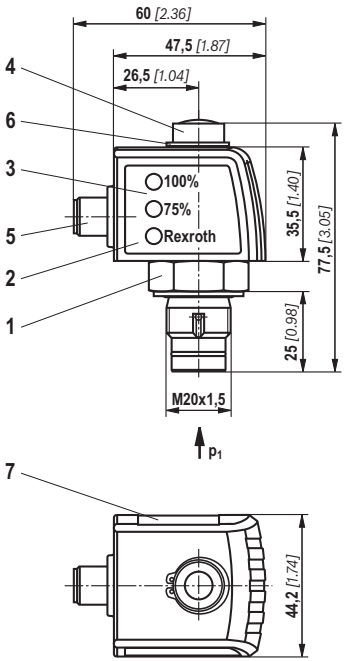
Type 400 LD(N)	B4	B5	B6	C1	C2 Ø	C3 Ø	D1	SW
0040	118 *[4.65]*	56 *[2.20]*	40 *[1.57]*	G 1/2	64 *[2.52]*	9 *[0.35]*	33 *[1.30]*	24 *[0.94]*
0063								
0100								
0130	160 *[6.30]*	80 *[3.15]*	75 *[2.95]*	SAE 1" 6000 psi	92 *[3.62]*	14 *[0.55]*	35 *[1.38]*	32 *[1.26]*
0150								
0160	188 *[7.40]*	100 *[3.94]*	100 *[3.94]*	SAE 1 1/2" 6000 psi	114 *[4.49]*	18 *[0.71]*	42 *[1.65]*	
0250								
0400								
0630	242 *[9.53]*	110 *[4.33]*	120 *[4.72]*	SAE 2" 6000 psi	141 *[5.55]*	23 *[0.91]*	40 *[1.57]*	41 *[1.61]*
1000					188 *[7.40]*			

[1] Servicing height for filter element exchange

Filter bowl weight and contents see technical data!

Maintenance indicator (dimensions in mm *[inch]*)

Electronic switching element M12x1



1 Mechanical visual maintenance indicator;
max. tightening torque $M_{A\ max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); plug-in connection M12x1

3 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

4 Visual indicator bistable

5 Round connector M12x1, 4-pole

6 Locking ring DIN 471-16x1,
material no. R900003923

7 Name plate

☞ **Notices!**
Representation contains mechanical visual maintenance indicator (1) and electronic switching element (2).
Switching elements with increased switching power upon request.

Spare parts

Electronic switching element

01	02		03		04		05	06
W	**O**	**–**	**D01**	**–**		**–**		

01	Maintenance indicator	**W**
02	mechanical visual indicator	**O**
03	Design pressure differential M20x1.5	**D01**

Switching pressure

04	5.0 bar *[72.5 psi]*	**5.0**
	8.0 bar *[116 psi]*	**8.0**

Seal

05	NBR seal	**M**
	FKM seal	**V**

Max. nominal pressure

06	450 bar *[6527 psi]*	**450**

Mechanical visual maintenance indicator	Material no.
WO-D01-5,0-M-450	**R901025313**
WO-D01-8,0-M-450	**R928038785**

5

Seal kit

01	02	03	04
D	**400LD**		

01	**Seal kit**	**D**
02	**Series**	**400LD**

Size

03	Size 0040 ... 0100	**N0040 ... 0100**
	Size 0130 ... 0150	**0130 ... 0150**
	Size 0160 ... 0400	**N0160 ... 0400**
	Size 0630	**N0630**
	Size 1000	**N1000**

Seal

04	NBR seal	**M**
	FKM seal	**V**

Seal kit	Material no.
D400LDN0040 ... 0100-M	**R928039584**
D400LD0130 ... 0150-M	**R928039585**
D400LDN0160 ... 0400-M	**R928039586**
D400LDN0630-M	**R928039587**
D400LDN1000-M	**R928039588**

Installation, commissioning and maintenance

Installation of the filter

Verify operating overpressure with name plate information. Screw the filter head item 1 to the mounting device considering flow direction (direction arrows) and servicing height of the filter element item 3.

Remove the blanking plugs from filter inlet and outlet, screw filter in pipeline without tension stress. The filter housing must be grounded via the mounting.

Bring the conical handle item 8 into central position in order to fill both filter sides. Open the ball valve of the compensation line (lever item 12 horizontal). Switch on system pump. Bleed filter by opening the bleed valves item 9; close them again when operating liquid escapes. Switch the filter into the operating position. The conical handle item 8 must rest against the stop and close the pressure compensation (lever item 12) again (lever vertical).

Connection of the electronic maintenance indicator

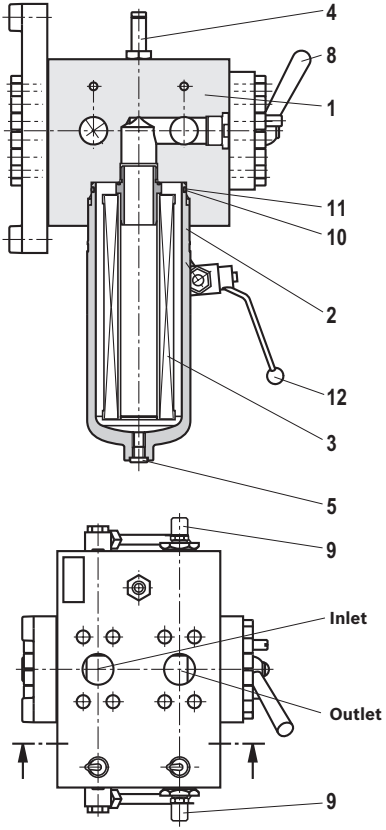
Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

After initial start-up of the system, the filter element is to be exchanged.

Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electric signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively.

The filter element should be replaced or cleaned after max. 6 months. Cleaning of the filter element see data sheet 51420.



Recommended mounting screws according to ISO 4762

Friction coefficient μ_{total} = 0.14

Size		Tightening torque
0040 ... **0100**	3 pieces M8 x 45 - 8.8	20 Nm + 5 Nm
0130 ... **0150**	3 pieces M12 x 55 - 8.8	80 Nm + 8 Nm
0160 ... **0400**	3 pieces M16 x 70 - 8.8	190 Nm ± 10 Nm
0630 ... **1000**	3 pieces M20 x 80 - 8.8	250 Nm ± 15 Nm

Installation, commissioning and maintenance

Element exchange

- Open the shut-off cock item 12 in order to compensate the pressure in both filter halves.
- Operate the conical handle item 8 and select the second filter. The conical handle (item 8) always points at the filter side which is in operation.
- Close the shut-off cock item 12 again.
- At the decommissioned filter side, reduce the operating pressure by opening the bleed valve item 9.
- Drain the filter bowl via the drain screw (item 5) if available.
- Screw off the filter bowl item 2 and/or the base (size 1000) and pull off the filter element item 3 from the spigot in the filter head item 1 by turning it slightly. Check the filter bowl item 2 for cleanliness and clean it if necessary. Replace the filter element H...-XL. Clean the filter element with material G ....
- The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the pressure differential after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G... element also needs to be replaced.
- Install cleaned or replaced filter element by slightly turning it back on its spigot.
- Check seal ring item 10+11 in the filter bowl item 2 and replace when damaged or worn.
- Screw the filter bowl item 2 and/or the base (size 1000) to the stop and rotate it back by 1/4 rotation.
- Open the shut-off cock item 12, bleed the filter by opening the valve item 9; close it again when operating liquid escapes.
- Close the shut-off cock item 12 again.

Quality and standardization

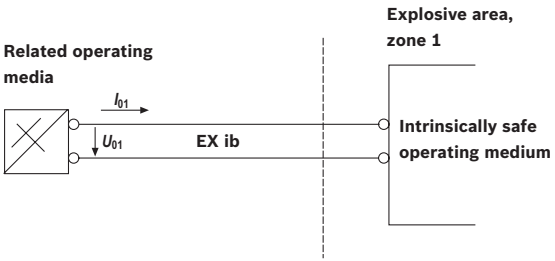
The duplex filters for hydraulic applications according to 51429 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19).
They do not receive a CE mark.

Use in explosive areas according to directive 94/9/EC (ATEX)
When using the inline filters according to 51429 in explosive areas, appropriate equipotential bonding has to be ensured.
According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 and WE-1SP-EN175301-803 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electric circuits (EEx ib) be used in systems without marking and certification.

Use / assignment	**Gas 2G**	**Dust 2D**
Assignment	Ex II 2G Ex ib IIB T4 Gb	Ex II 2D Ex ib IIIC T100°C Db
Zone suitability	Zone 1, zone 2	Zone 21, zone 22
Adm. intrinsically safe electric circuits	Ex ia IIC, Ex ib IIC, Ex ic IIC	Ex ia IIIC, Ex ib IIIC

Technical data				
Switching voltage	Ui_{max}	V AC/DC	150	
Switching current	Ii_{max}	A	1.0	
Switching power	Pi_{max}		1.3 W T4 T_{max} 40 °C	750 mW T_{max} 40 °C
Max. switching power			1.0 W T4 T_{max} 80 °C	550 mW T_{max} 100 °C
Surface temperature		°C *[°F]*	–	Max 100 *[212]*
Inner capacity	*Ci*		Neglectable	
Inner inductivity	*Li*		Neglectable	
Dust accumulation		mm *[inch]*	–	0.5 *[0.02]*

Possible circuit according to DIN EN 60079-14



Planner/operator documentation:
R928028899 = Declaration of Incorporation according to DIN EN 13463 for components not subject to approval.

Notes

Bosch Rexroth AG
Filtration systems
Hardtwaldstr. 43
68775 Ketsch, Germany
Phone +49 (0) 62 02 / 603-0
filter-support@boschrexroth.de
www.boschrexroth.de

Notes

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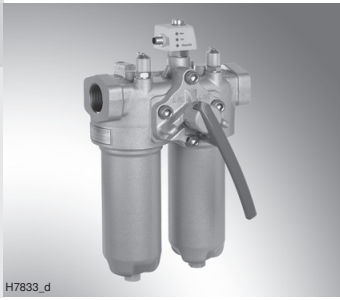
Duplex filter with filter element according to DIN 24550

RE 51446/09.11 1/18
Replaces: 07.11

Type 150LDN0040 to 0400; 50/150LD0130, 0150


H7833_d

Size according to **DIN 24550**: 0040 to 0400
Additional sizes: 0130, 0150
Nominal pressure 160 bar *[2321 psi]*
Connection up to SAE 1 1/2" 6000 psi
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F];*
Shortly –30 °C *[–22 °F]*

Table of contents

Features

Duplex filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for installation into piping. They allow for the exchange of the filter element without operational interruption.

They distinguish themselves by the following:

- Special highly efficient filter media
- Absorption of very fine particles across a broad pressure differential range
- High dirt holding capacity across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filtration ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Continuous operating mode due to duplex filter design

Ordering code

of the filter

150LD | | — | — | — | — | —

Series
Duplex filter 150 bar
[2176 psi] **= 150LD**

Filter element
with filter element according
to DIN 24550 (only with size
0040-0100 + 0160-0400) **= N**

Size
LDN… **= 0040 0063 0100 0160 0250 0400**
LD… **= 0130 0150**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve **= A00**
330 bar *[4785 psi]*, without bypass valve **= B00**

Maintenance indicator
Maintenance indicator, mech./optical
Specify switching pressure 2.2 bar *[32psi]* –
Bypass cracking pressure 3.5 bar *[51 psi]* **= V2,2**
Maintenance indicator, mech./optical
Specify switching pressure 5.0 bar *[78.5 psi]* –
Bypass cracking pressure 7 bar *[102 psi]* **= V5,0**

Complementary details
M = Additional Minimess connections G1/4 at the top
E = Bleeding valve instead of bleed screw
NB = Without bypass valve (only with filter element version "A00")

Port

	Port	Frame size 0040-0100	0130-0150	0160-0400	
R4 =	G1	•			Pipe thread according to ISO 228
R5 =	G1 1/4		•		
R6 =	G1 1/2			•	
U4 =	SAE 12	x			Pipe thread according to SAE J1926
S5 =	SAE 1 1/4"		x		SAE flange 3000 psi
S6 =	SAE 1 1/2"			x	

• = Standard connection
x = Additional connection possibility

Seal
M = NBR seal
V = FKM seal

Order example:
150LDN0160-H3XLA00-V2,2-M-R6

Further versions (filter materials, connections,...) are available at request.

of the filter element

2. | | — | — **0** —

Filter element
Design **= 2.**

Size
LDN… **= 0040 0063 0100 0160 0250 0400**
LD… **= 0130 0150**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Pressure differential
Max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*
B00 = 330 bar *[4785 psi]*

Order example:
2.0100 H3XL-A00-0-M

Standard types

150LD(N) standard types, NBR seal, flow information for 30 mm²/s *[143 SUS]*

Duplex filter, filtration rating 3 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1)]	Material no. Filter				Material no. Replacement element
150LDN0040-H3XLA00-V5,0-M-..	25 *[6.60]*	..R4	**R928039315**	..U4	**R928041843**	**R928006645**
150LDN0063-H3XLA00-V5,0-M-..	35 *[9.25]*	..R4	**R928039318**	..U4	**R928041844**	**R928006699**
150LDN0100-H3XLA00-V5,0-M-..	42 *[11.10]*	..R4	**R928039319**	..U4	**R928041845**	**R928006753**
150LD0130-H3XLA00-V5,0-M-..	62 *[16.38]*	..R5	**R928039322**	..S5	**R928041841**	**R928022274**
150LD0150-H3XLA00-V5,0-M-..	80 *[21.13]*	..R5	**R928039324**	..S5	**R928041842**	**R928022283**
150LDN0160-H3XLA00-V5,0-M-..	85 *[22.45]*	..R6	**R928039326**	..S6	**R928039327**	**R928006807**
150LDN0250-H3XLA00-V5,0-M-..	100 *[26.42]*	..R6	**R928039354**	..S6	**R928039352**	**R928006861**
150LDN0400-H3XLA00-V5,0-M-..	125 *[33.02]*	..R6	**R928039357**	..S6	**R928039355**	**R928006915**

150LD(N) standard types, NBR seal, flow information for 30 mm²/s *[143 SUS]*

Duplex filter, filtration rating 6 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1)]	Material no. Filter				Material no. Replacement element
150LDN0040-H6XLA00-V5,0-M-..	30 *[7.93]*	..R4	**R928041846**	..U4	**R928041860**	**R928006646**
150LDN0063-H6XLA00-V5,0-M-..	39 *[10.30]*	..R4	**R928041847**	..U4	**R928041861**	**R928006700**
150LDN0100-H6XLA00-V5,0-M-..	49 *[12.94]*	..R4	**R928041848**	..U4	**R928041862**	**R928006754**
150LD0130-H6XLA00-V5,0-M-..	79 *[20.87]*	..R5	**R928041849**	..S5	**R928041850**	**R928022275**
150LD0150-H6XLA00-V5,0-M-..	92 *[24.30]*	..R5	**R928041851**	..S5	**R928041852**	**R928022284**
150LDN0160-H6XLA00-V5,0-M-..	101 *[26.68]*	..R6	**R928041853**	..S6	**R928041854**	**R928006808**
150LDN0250-H6XLA00-V5,0-M-..	115 *[30.38]*	..R6	**R928041855**	..S6	**R928041856**	**R928006862**
150LDN0400-H6XLA00-V5,0-M-..	131 *[34.61]*	..R6	**R928041857**	..S6	**R928041858**	**R928006916**

150LD(N) standard types NBR seal, flow information for 30 mm²/s *[143 SUS]*

Duplex filter, filtration rating 10 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1)]	Material no. Filter				Material no. Replacement element
150LDN0040-H10XLA00-V5,0-M-..	33 *[8.72]*	..R4	**R928038264**	..U4	**R928041838**	**R928006647**
150LDN0063-H10XLA00-V5,0-M-..	41 *[10.83]*	..R4	**R928038267**	..U4	**R928041839**	**R928006701**
150LDN0100-H10XLA00-V5,0-M-..	53 *[14.00]*	..R4	**R928038268**	..U4	**R928041840**	**R928006755**
150LD0130-H10XLA00-V5,0-M-..	90 *[23.78]*	..R5	**R928038269**	..S5	**R928041836**	**R928022276**
150LD0150-H10XLA00-V5,0-M-..	100 *[26.42]*	..R5	**R928038270**	..S5	**R928041837**	**R928022285**
150LDN0160-H10XLA00-V5,0-M-..	112 *[29.59]*	..R6	**R928039325**	..S6	**R928038271**	**R928006809**
150LDN0250-H10XLA00-V5,0-M-..	125 *[33.02]*	..R6	**R928039353**	..S6	**R928038272**	**R928006863**
150LDN0400-H10XLA00-V5,0-M-..	135 *[35.66]*	..R6	**R928039356**	..S6	**R928038273**	**R928006917**

[1)] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

WE – – –

Maintenance indicator
Electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression up to 30 °C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pin
EN 175301-803 = Rectangular plug-in connector, 2-pin design A according to EN-175301-803

Material numbers of the electronic switching elements

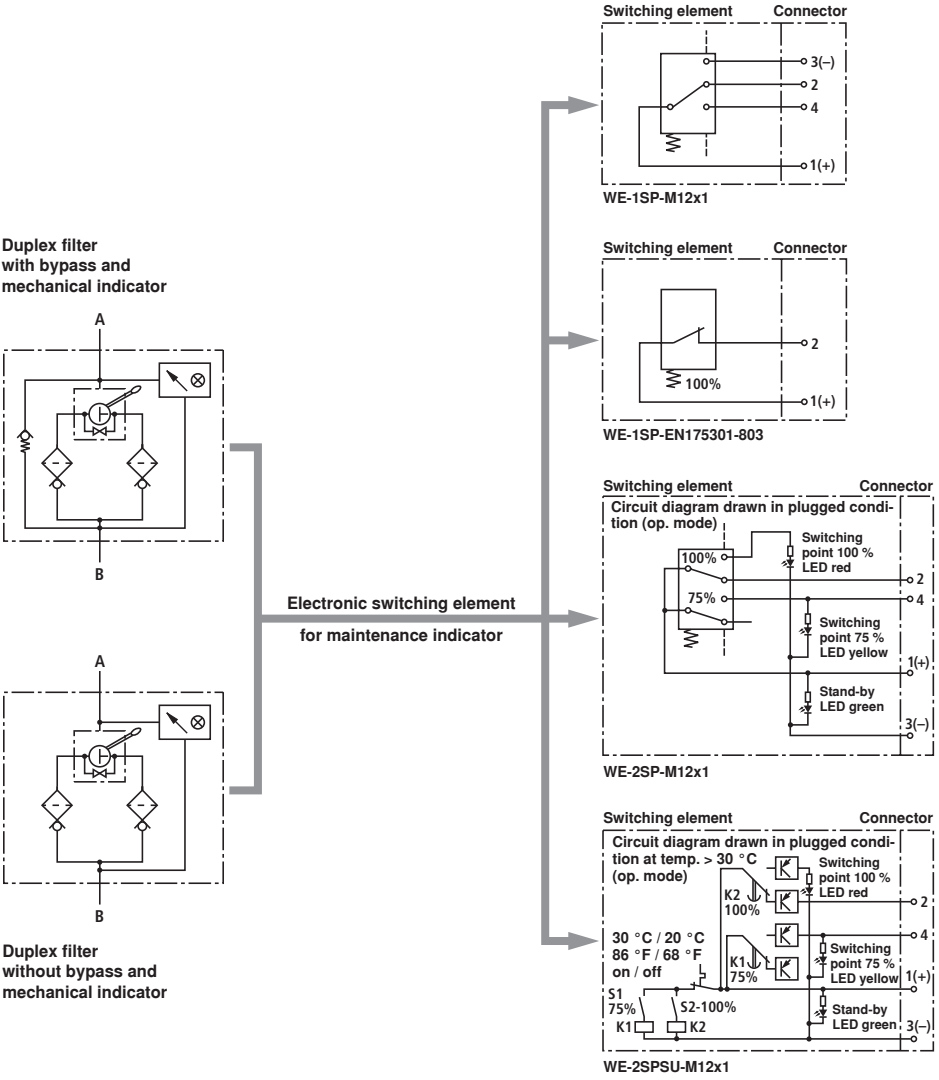
Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

Order example: Duplex filter with mechanical optical maintenance indicator for $p_{nom.}$ = 150 bar *[2176 psi]* with bypass valve, size 0160, with filter element 3 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

Filter:	**150LDN0160-H3XLA00-V2,2-M-R6**	**Material no. R928039326**
Maintenance indicator:	**WE-1SP-M12x1**	**Material no. R928028409**

For round plug-in connections refer to data sheet 08006.

Symbols


Switching element
Connector
3(–)
2
4
1(+)
WE-1SP-M12x1
Switching element
Connector
2
100%
1(+)
WE-1SP-EN175301-803
Switching element
Connector
Circuit diagram drawn in plugged condition (op. mode)
100%
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
WE-2SP-M12x1
Switching element
Connector
Circuit diagram drawn in plugged condition at temp. > 30 °C (op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
WE-2SPSU-M12x1
Duplex filter with bypass and mechanical indicator
A
B
Duplex filter without bypass and mechanical indicator
A
B
Electronic switching element for maintenance indicator

Function, section

The 150LD(N) duplex filters are suitable for direct installation into pressure lines. They are mostly installed upstream control units or controllers to be protected.

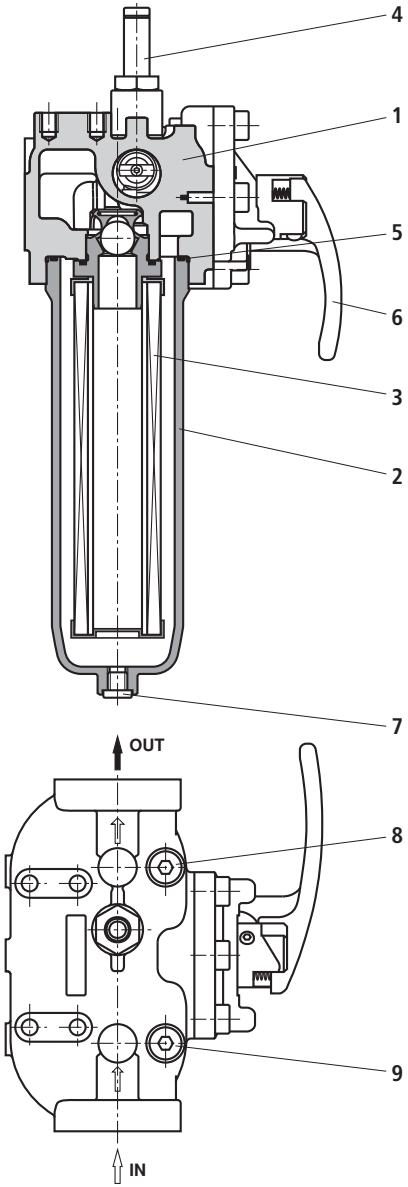
They basically consist of filter head (1) with switch-over fitting (6), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4).

Via port IN, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port OUT, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks – as they may e.g. occur in case of abrupt opening of large control valves due to the accelerated fluid weight – can be securely absorbed.

As of size 0160, the standard equipment comprises an oil drain plug (7).

Via the bleed screws and/or bleeding valves – complementary detail E – (8, 9), the filter side to be maintained can be bled.



Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical			
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*			
Weight		Size	**0040**	**0063**	**0100**	**0130**
		kg *[lbs]*	7.4 *[16.3]*	8.5 *[18.7]*	10.3 *[22.7]*	13.9 *[30.6]*
Weight		Size	**0150**	**0160**	**0250**	**0400**
		kg *[lbs]*	17.3 *[38.1]*	21.6 *[47.6]*	23.4 *[51.6]*	26.2 *[57.7]*
Material	Filter head		GGG			
	Filter bowl		Steel			
	Optical maintenance indicator	V2.2	Aluminum			
		V5.0	Brass			
	Electronic switching element		Plastic PA6			

hydraulic

Maximum operating pressure	bar *[psi]*	160 *[2288]*
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]* (shortly –30 *[–22]*)
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	Not available
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	2.2 ± 0.25 *[31.9 ± 3.6]*; 5 ± 0.5 *[72 ± 7]*

5

of the electronic switching element

Electrical connection			Round plug-in connection M12x1, 4-pin			Standard connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. switching power with resistive load		W	20			70
Switching type	75 % signal		–	Normally open contact		–
	100 % signal		Changeover	Normally closed contact		Normally closed contact
	2SPSU				Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Technical data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4785]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

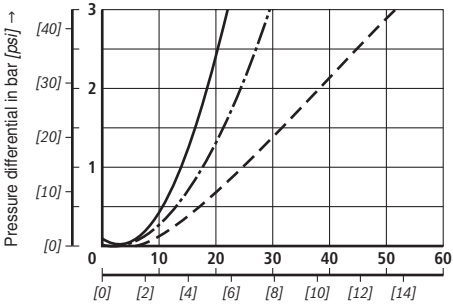
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL

Specific weight: < 0.9 kg/dm³
Δp-Q characteristic curves for complete filters
recommended initial Δp for design = 0.8 bar *[11.6 psi]*

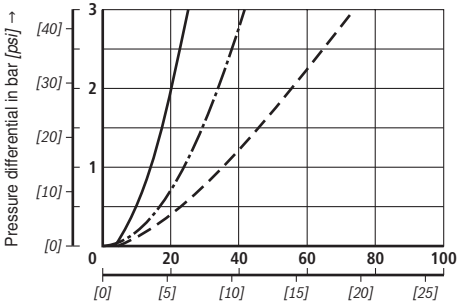
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s *[649 SUS]*, 68 mm²/s *[315 SUS]*, 30 mm²/s *[143 SUS]*

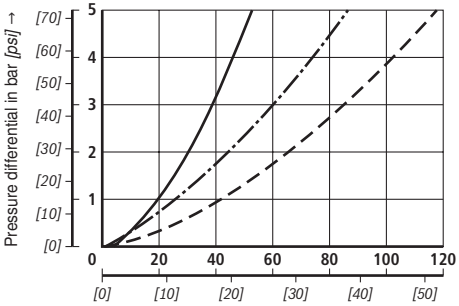
150LDN0040-H3XLA00-...-R4



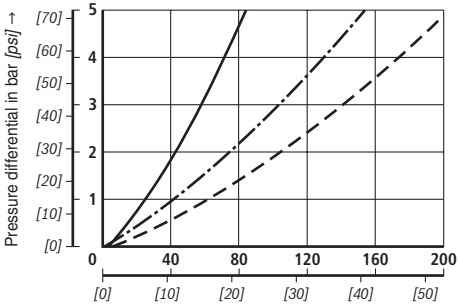
150LDN0063-H3XLA00-...-R4



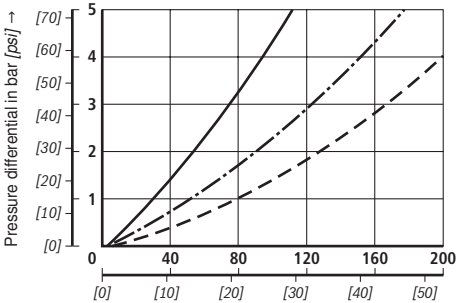
150LDN0100-H3XLA00-...-R4



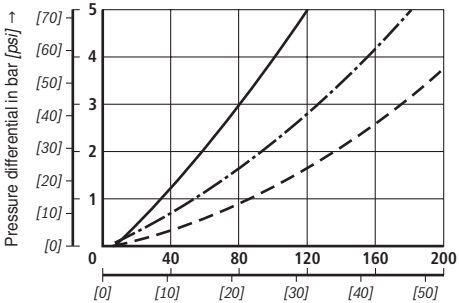
150LD0130-H3XLA00-...-R5



150LD0150-H3XLA00-...-R5



150LDN0160-H3XLA00-...-R6



5

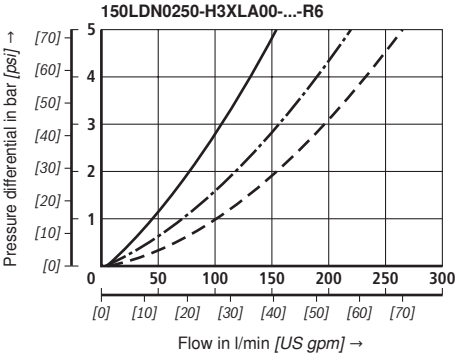
Characteristic curves (measured with HLP46, according to ISO 3968) **H3XL; H10XL**

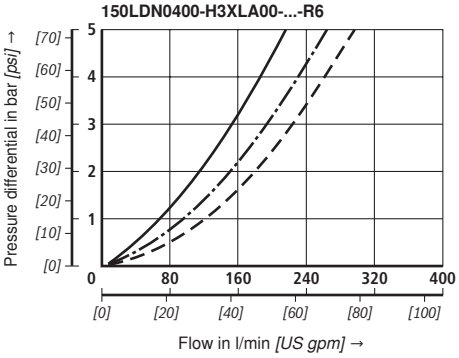
Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 0.8 bar *[11.6 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

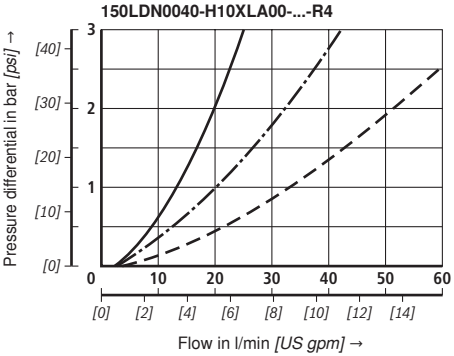
Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[143 SUS]*

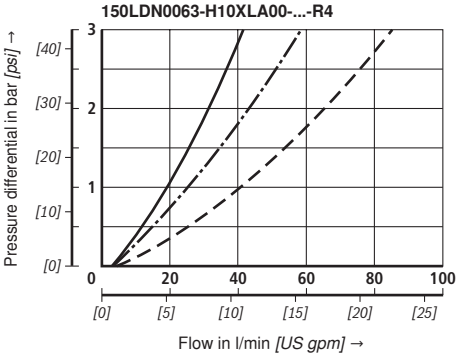
H3XL





H10XL





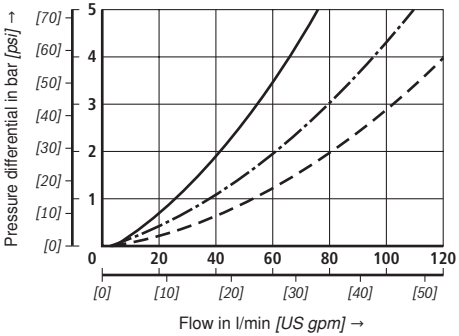
Characteristic curves (measured with HLP46, according to ISO 3968) H10XL

Specific weight: < 0.9 kg/dm³
Δp-Q characteristic curves for complete filters
recommended initial Δp for design = 0.8 bar *[11.6 psi]*

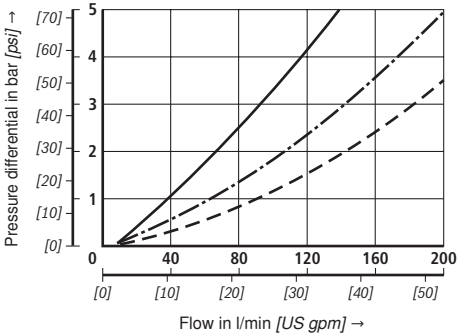
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s *[649 SUS]*
68 mm²/s *[315 SUS]*
30 mm²/s *[143 SUS]*

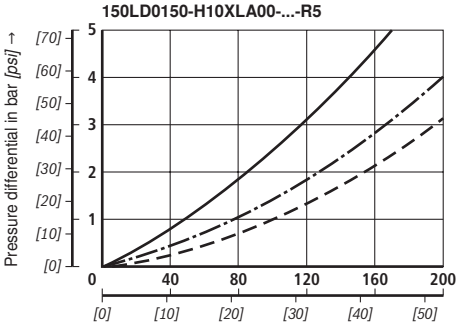
150LDN0100-H10XLA00-...-R4



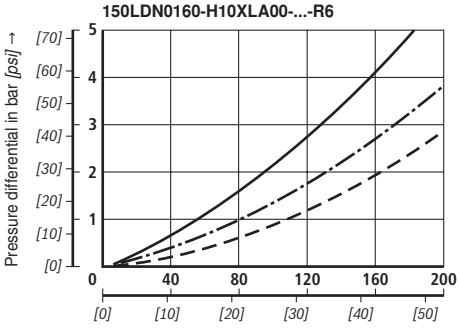
150LD0130-H10XLA00-...-R5



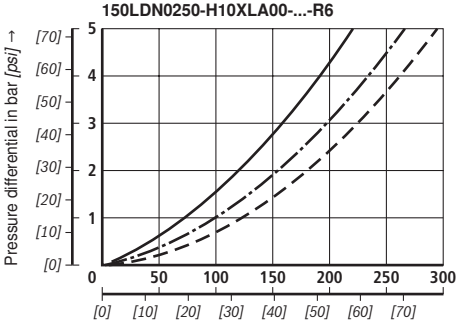
150LD0150-H10XLA00-...-R5



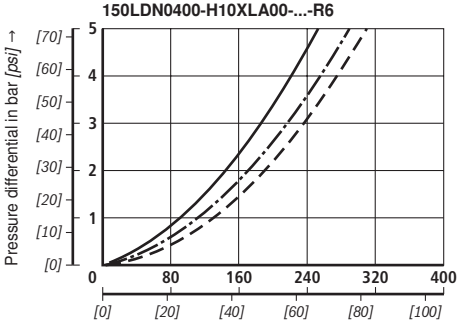
150LDN0160-H10XLA00-...-R6



150LDN0250-H10XLA00-...-R6

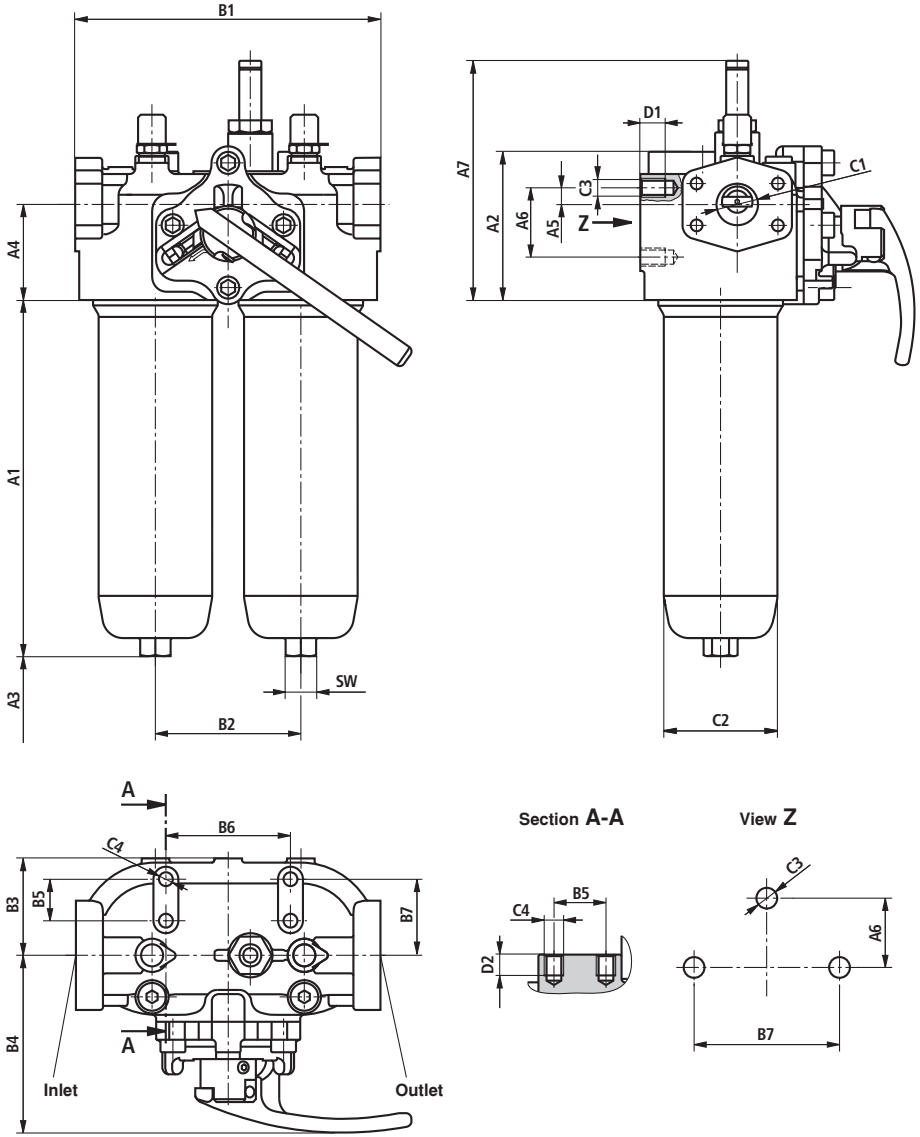


150LDN0400-H10XLA00-...-R6



5

Unit dimensions size 0040 to size 0400 (dimensions in mm *[inch]*)



Unit dimensions size 0040 to size 0400 (dimensions in mm *[inch]*)

Filter housing for filter elements according to DIN 24550 and according to Rexroth standard

Type	A1	A2	A3 [1]	A4	A5	A6	A7	B1	B2	B3	B4	B5
150 LDN 0040	115 *[4.53]*	108 *[4.25]*	80 *[3.15]*	70 *[2.76]*	9 *[0.35]*	50 *[1.97]*	170 *[6.71]*	170 *[6.69]*	80 *[3.15]*	57 *[2.24]*	127 *[5.00]*	30 *[1.18]*
150 LDN 0063	179 *[7.05]*											
150 LDN 0100	269 *[10.59]*											
150 LD 0130	213 *[8.39]*	107 *[4.21]*	140 *[5.51]*	69 *[2.72]*	14 *[0.55]*	50 *[1.97]*	173 *[6.82]*	220 *[8.66]*	105 *[4.13]*	70 *[2.76]*	128 *[5.04]*	30 *[1.18]*
150 LD 0150	263 *[10.35]*											
150 LDN 0160	184 *[7.24]*	122 *[4.80]*	140 *[5.51]*	80 *[3.15]*	25 *[0.98]*	55 *[2.17]*	184 *[7.25]*	270 *[10.63]*	134 *[5.28]*	103 *[4.06]*	152 *[5.98]*	30 *[1.18]*
150 LDN 0250	274 *[10.79]*											
150 LDN 0400	425 *[16.73]*											

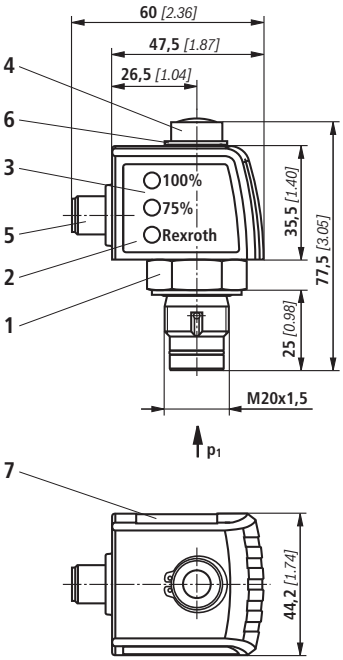
Type	B6	B7	C1 connection			Ø C2	C3	C4	D1	D2	SW
			R Standard	U (SAE J1926)	S (SAE flange 3000 psi)						
150 LDN 0040	90 *[3.54]*	30 *[1.18]*	G1	SAE 12 1 1/16-12UN-2B	–	55 *[2.17]*	M10	M8	15 *[0.59]*	15 *[0.59]*	19 *[0.75]*
150 LDN 0063											
150 LDN 0100											
150 LD 0130	90 *[3.54]*	55 *[2.17]*	G1 1/4	–	SAE 1 1/4"	77 *[3.03]*	M12	M8	18 *[0.71]*	12 *[0.47]*	24 *[0.94]*
150 LD 0150											
150 LDN 0160	130 *[5.12]*	65 *[2.56]*	G1 1/2	–	SAE 1 1/2"	98 *[3.86]*	M16	M10	22 *[0.87]*	15 *[0.59]*	27 *[1.06]*
150 LDN 0250											
150 LDN 0400											

[1] Servicing height for filter element replacement

5

Maintenance indicator (dimensions in mm *[inch]*)

Electronic switching element M12x1



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); plug-in connection M12x1

3 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

4 Optical indicator bistable

5 Round connector M12x1, 4-pin

6 Locking ring DIN 471-16x1, **Material no. R900003923**

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2).

Switching elements with increased switching power at request.

Spare parts

Electronic switching element

W	O	–	D01	–		–	

Maintenance indicator **= W**

Mechanical optical indicator **= O**

Design pressure differential M20x1.5 **= D01**

Switching pressure

2.2 bar *[31.9 psi]* **= 2,2**

5.0 bar *[72.5 psi]* **= 5,0**

Max. nominal pressure

Switching pressure 2.2 bar *[31.9 psi]*

160 = 160 bar *[2321 psi]*

Switching pressure 5.0 bar *[72.5 psi]*

450 = 450 bar *[6527 psi]*

Seal

M = NBR seal

V = FKM seal

Mechanical optical maintenance indicator	Material no.
WO-D01-2,2-M-160	**R901025312**
WO-D01-5,0-M-450	**R901025313**

Seal kit

D	150LD		

Seal kit **= D**

Series **= 150LD**

Size

Size 0040-0100 **= N0040-0100**

Size 0130-0150 **= 0130-0150**

Size 0160-0400 **= N0160-0400**

Seal

M = NBR seal

V = FKM seal

Seal kit	Material no.
D50/150LDN0040-0100-M	**R928039376**
D50/150LD0130-0150-M	**R928039377**
D50/150LDN0160-0400-M	**R928039378**

5

Installation, commissioning and maintenance

Installation of the filter

Verify operating overpressure with name plate information.

Screw the filter head (item 1) to the fastening device considering flow direction (direction arrows) and servicing height of the filter element (item 3).

Remove the plugs from filter inlet and outlet, screw filter in pipeline without tension stress.

Bring the switching lever (item 6) into central position in order to fill both filter sides. Switch on system pump. Bleed filter by opening the screws / valves (item 8 or 9); close them again when operating liquid escapes. Switch the filter into the operating position. While doing so, the conical handle (item 6) must rest against the stop.

Switch-over lever is on the filter side that is out of order.

Connection of the electronic maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

After initial start-up of the system, the filter element is to be exchanged.

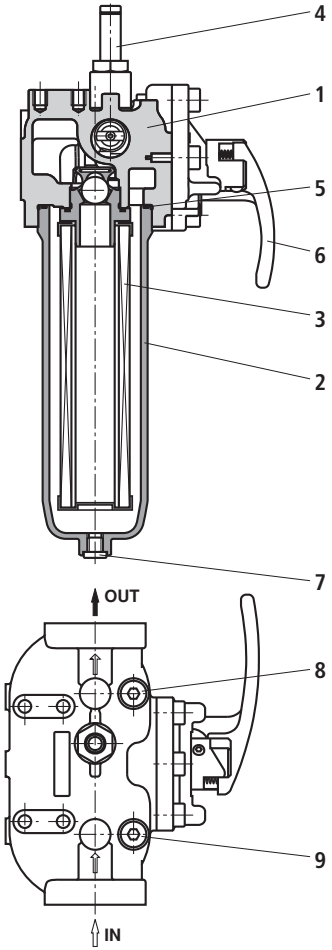
Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electric signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively.

The filter element should be replaced or cleaned after max. 6 months.

Element exchange

- Pull the switch-over lever and switch over to the second filter.
- Open the bleed screw or bleeding valve (item 8 or 9) at the decommissioned filter side and reduce the pressure.
- Unscrew the filter bowl (item 2) and remove the filter element (item 3) from the centering spigot on the filter head (item 1) by turning it slightly.
- Check the filter head for cleanliness and clean if necessary.
- Replace filter element, clean filter element with material G....
- The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the pressure differential after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G… element also needs to be replaced.
- Install cleaned or replaced filter element by slightly turning it back on its spigot.
- Check seal ring (item 5) in the filter bowl and replace when damaged or worn.
- Attach filter bowl and tighten at the hexagon using a suitable tool.
- Pull switch-over lever for pressure compensation. Bleed filter by opening the bleed screw (item 8 or 9); close it again when operating liquid escapes.
- Lower switch-over lever in basic position.

Technical modifications reserved!



Quality and standardization

The duplex filters for hydraulic applications according to 51446 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

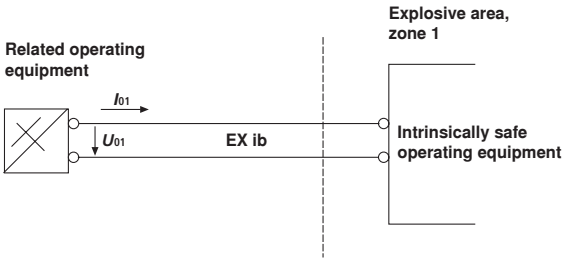
Use in explosive areas according to directive 94/9/EC (ATEX)

The duplex filters according to 51446 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the duplex filters according to 51446 in explosive areas, potential equalization has to be ensured.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



The manufacturer's declaration according to DIN EN 13463 is available for this filter separately, with Material no. R928028899

Notes

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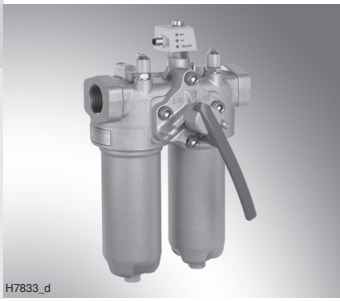
documentation@boschrexroth.de
www.boschrexroth.de

Rexroth
Bosch Group

Duplex filter with filter element according to DIN 24550

RE 51453/08.11 1/18

Type 50LDN0040 to 0400; 50LD0130, 0150


H7833_d

Size according to **DIN 24550**: 0040 to 0400
additional sizes: 0130, 0150
Nominal pressure 50 bar *[725 psi]*
Connection up to SAE 1 1/2" 6000 psi
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F];*
shortly –30 °C *[–22 °F]*

Table of contents

Features

Duplex filters are used in hydraulic systems for separating solid materials from the hydraulic fluids and lubricating oils. They are intended for installation into piping. They allow for the exchange of the filter element without operational interruption.

They distinguish themselves by the following:

- Special highly efficient filter media
- Absorption of very fine particles across a broad pressure differential range
- High dirt holding capacity across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter surface
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Continuous operating mode due to duplex filter design

Ordering code

of the filter **50LD** [ ] [ ] – **A00**–**V2,2**– [ ] [ ]

Series
Duplex filter 50 bar *[725 psi]* **= 50LD**

Filter element
with filter element according to DIN 24550 (only with size 0040-0100 + 0160-0400) **= N**

Size
LDN… **= 0040 0063 0100 0160 0250 0400**
LD… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute(ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
max. admissible pressure differential of the filter element
30 bar *[435 psi],* with bypass valve **= A00**

Maintenance indicator
Maintenance indicator, mechanical optical
Switching pressure 5.0 bar *[72.5 psi]* **= V5,0**
Switching pressure 2.2 bar *[31.9 psi]* **= V2,2**
Switching pressure 1.5 bar *[21.8 psi]* **= V1,5**

Seal
NBR seal **= M**
FKM seal **= V**

Supplementary information
M = Additional Minimess connections G1/4 at the top
E = Bleed valve instead of bleed screw
NB = without bypass valve

Port

	Port	Frame size 0040-0100	0130-0150	0160-0400	
R4 =	G1	•			Pipe thread according to ISO 228
R5 =	G1 1/4		•		
R6 =	G1 1/2			•	
U4 =	SAE 12	x			Pipe thread according to SAE J1926
S5 =	SAE 1 1/4"		x		SAE flange 3000 psi
S6 =	SAE 1 1/2"			x	

• = Standard port
x = Additional connection possibility

Order example:
50LDN0160-H3XLA00-V2,2-M-R6

Further versions (filter materials, connections,...) are available at request.

of the filter element **2.** [ ] **–A00–0–** [ ]

Filter element
Design **= 2.**

Size
LDN… **= 0040 0063 0100 0160 0250 0400**
LD… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Order example:
2.0100 H3XL-A00-0-M

Pressure differential
max. admissible pressure differential of the filter element
A00 = 30 bar *[435 psi]*

Bypass valve
0 = with filter element always 0

Seal
M = NBR seal
V = FKM seal

Preferred types

50LD(N) preferred types, NBR seal, flow information for 30 mm²/s *[143 SUS]*

Duplex filter, filtration rating 3 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
50LDN0040-H3XLA00-V2,2-M-..	25 *[6.60]*	..R4	**R928039371**	..U4	**R928047695**	**R928006645**
50LDN0063-H3XLA00-V2,2-M-..	35 *[9.25]*	..R4	**R928039373**	..U4	**R928047699**	**R928006699**
50LDN0100-H3XLA00-V2,2-M-..	42 *[11.10]*	..R4	**R928039375**	..U4	**R928047703**	**R928006753**
50LD0130-H3XLA00-V2,2-M-..	62 *[16.38]*	..R5	**R928039367**	..S5	**R928047728**	**R928022274**
50LD0150-H3XLA00-V2,2-M-..	80 *[21.13]*	..R5	**R928039369**	..S5	**R928047736**	**R928022283**
50LDN0160-H3XLA00-V2,2-M-..	85 *[22.45]*	..R6	**R928039359**	..S6	**R928047762**	**R928006807**
50LDN0250-H3XLA00-V2,2-M-..	100 *[26.42]*	..R6	**R928039361**	..S6	**R928044767**	**R928006861**
50LDN0400-H3XLA00-V2,2-M-..	125 *[33.02]*	..R6	**R928039363**	..S6	**R928039365**	**R928006915**

50LD(N) preferred types, NBR seal, flow information for 30 mm²/s *[143 SUS]*

Duplex filter, filtration rating 6 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
50LDN0040-H6XLA00-V2,2-M-..	30 *[7.93]*	..R4	**R928047698**	..U4	**R928047696**	**R928006646**
50LDN0063-H6XLA00-V2,2-M-..	39 *[10.30]*	..R4	**R928047702**	..U4	**R928047700**	**R928006700**
50LDN0100-H6XLA00-V2,2-M-..	49 *[12.94]*	..R4	**R928047706**	..U4	**R928047704**	**R928006754**
50LD0130-H6XLA00-V2,2-M-..	79 *[20.87]*	..R5	**R928047735**	..S5	**R928047729**	**R928022275**
50LD0150-H6XLA00-V2,2-M-..	92 *[24.30]*	..R5	**R928047739**	..S5	**R928047737**	**R928022284**
50LDN0160-H6XLA00-V2,2-M-..	101 *[26.68]*	..R6	**R928047753**	..S6	**R928047764**	**R928006808**
50LDN0250-H6XLA00-V2,2-M-..	115 *[30.38]*	..R6	**R928047766**	..S6	**R928047768**	**R928006862**
50LDN0400-H6XLA00-V2,2-M-..	131 *[34.61]*	..R6	**R928047771**	..S6	**R928047770**	**R928006916**

50LD(N)preferred types NBR seal, flow information for 30 mm²/s *[143 SUS]*

Duplex filter, filtration rating 10 µm

Type	Flow in l/min *[US gpm]* with Δp = 1 bar *[14.5 psi]* [1]	Material no. Filter				Material no. Replacement element
50LDN0040-H10XLA00-V2,2-M-..	33 *[8.72]*	..R4	**R928039370**	..U4	**R928047697**	**R928006647**
50LDN0063-H10XLA00-V2,2-M-..	41 *[10.83]*	..R4	**R928039372**	..U4	**R928047701**	**R928006701**
50LDN0100-H10XLA00-V2,2-M-..	53 *[14.00]*	..R4	**R928039374**	..U4	**R928047705**	**R928006755**
50LD0130-H10XLA00-V2,2-M-..	90 *[23.78]*	..R5	**R928039366**	..S5	**R928047734**	**R928022276**
50LD0150-H10XLA00-V2,2-M-..	100 *[26.42]*	..R5	**R928039368**	..S5	**R928047738**	**R928022285**
50LDN0160-H10XLA00-V2,2-M-..	112 *[29.59]*	..R6	**R928039358**	..S6	**R928047765**	**R928006809**
50LDN0250-H10XLA00-V2,2-M-..	125 *[33.02]*	..R6	**R928039360**	..S6	**R928047769**	**R928006863**
50LDN0400-H10XLA00-V2,2-M-..	135 *[35.66]*	..R6	**R928039362**	..S6	**R928039364**	**R928006917**

[1] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

WE – – –

Maintenance indicator
electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression up to 30°C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pin
EN175301-803 = Rectangular plug-in connector, 2-pin design A according to EN-175301-803

Material numbers of the electronic switching elements

Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally opened contact (at 75%) / normally closed contact (at 100%)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed	1	EN 175301-803	No

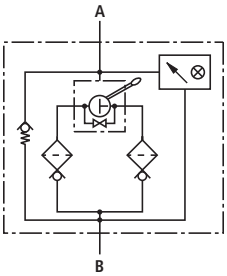
Order example: Duplex filter with mechanical optical maintenance indicator for $p_{Nominal}$ = 50 bar *[725 psi]* with bypass valve, size 0160, with filter element 3 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

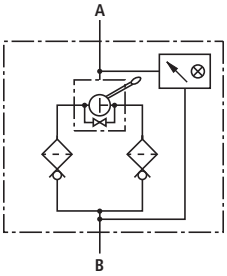
Filter:	**50LDN0160-H3XLA00-V2,2-M-R6**	**Material no. R928039359**
Maintenance indicator:	**WE-1SP-M12x1**	**Material no. R928028409**

For round plug-in connections refer to data sheet 08006

Symbols

Duplex filter
with bypass and
mechanical indicator

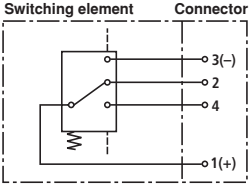




Duplex filter
without bypass and
mechanical indicator

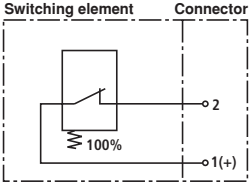
electronic switching element
for maintenance indicator

Switching element Connector



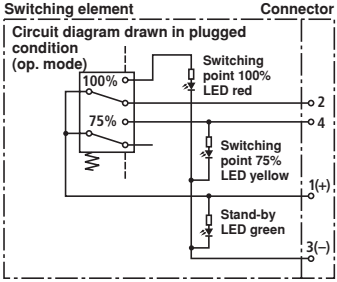
WE-1SP-M12x1

Switching element Connector



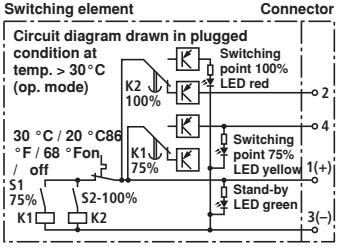
WE-1SP-EN175301-803

Switching element Connector



WE-2SP-M12x1

Switching element Connector



WE-2SPSU-M12x1

5

Function, section

The 50LD(N) duplex filters are suitable for direct installation into pressure lines. They are mostly installed upstream open-loop or closed-loop control units to be protected.

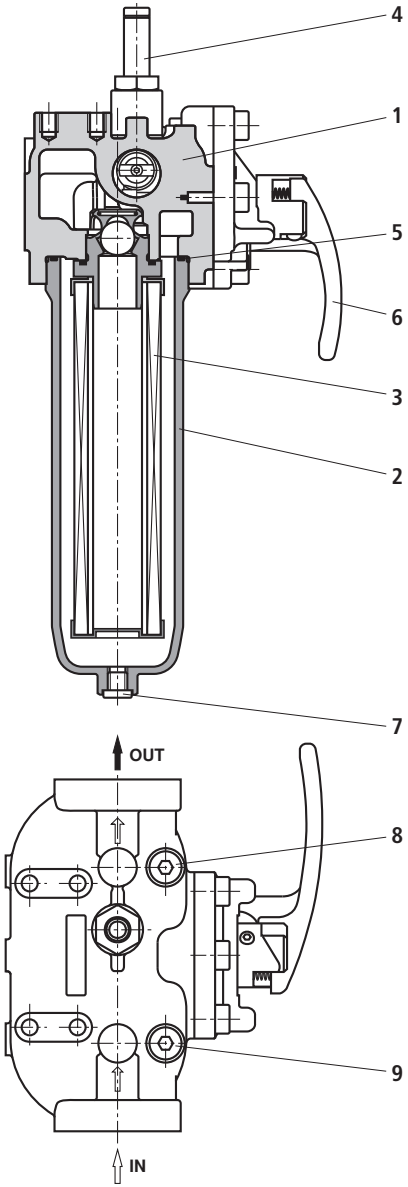
They basically consist of filter head (1) with switch-over fitting (6), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4).

Via port IN, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port OUT, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks – as they may e.g. occur in case of abrupt opening of large control valves due to the accelerated fluid weight – can be securely absorbed.

As of size 0160, the standard equipment comprises an oil drain plug (7).

Via the bleed screws and/or bleed valves – supplementary information E – (8, 9), the filter side to be maintained can be bled.



Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical			
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*			
Weight		Size	**0040**	**0063**	**0100**	**0130**
		kg *[lbs]*	6.8 *[15.0]*	7.2 *[15.8]*	8.5 *[18.7]*	11.5 *[25.3]*
		Size	**0150**	**0160**	**0250**	**0400**
		kg *[lbs]*	14.6 *[32.1]*	19.0 *[41.8]*	20.0 *[44.0]*	21.5 *[47.3]*
Volume		Size	**0040**	**0063**	**0100**	**0130**
		l *[US gal]*	2 x 0.35 2 x *[0.09]*	2 x 0.45 2 x *[0.12]*	2 x 0.7 2 x *[0.18]*	2 x 0.82 2 x *[0.22]*
		Size	**0150**	**0160**	**0250**	**0400**
		l *[US gal]*	2 x 0.98 2 x *[0.26]*	2 x 1.25 2 x *[0.33]*	2 x 1.95 2 x *[0.51]*	2 x 2.9 2 x *[0.77]*
Material	Filter head		GGG			
	Filter bowl		Aluminum			
	Optical maintenance indicator	V1,5; V2,2	Aluminum			
		V5,0	Brass			
	Electronic switching element		Plastic PA6			

hydraulic

Maximum operating pressure		bar *[psi]*	50 *[725]*	
Hydraulic fluid temperature range		°C *[°F]*	–10 to +100 *[+14 to +212]* (shortly –30 *[–22]*)	
Fatigue strength according to ISO 10771		Load cycles	> 10^6 at max. operating pressure	
Cracking pressure of the bypass valve		bar *[psi]*	Not available	
Type of pressure measurement of the maintenance indicator			Pressure differential	
Assignment: Response pressure of the maintenance indicator / cracking pressure of the bypass valve			Response pressure of the maintenance indicator	Cracking pressure of the bypass valve
		bar *[psi]*	1.5 ± 0.2 *[21.8 ±2.9]*	2.5 ± 0.25 *[36.3 ±3.6]*
			2.2 ± 0.3 *[31.9 ± 4.4]*	3.5 ± 0.35 *[50.8 ±5.1]*
			5.0 ± 0.5 *[72.5 ±7.3]*	7.0 ± 0.5 *[101.5 ±7.3]*

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Technical data (For applications outside these parameters, please consult us!)

of the electronic switching element

Electrical connection			Round plug-in connection M12x1, 4-pin			Standard connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. switching power with resistive load		W	20			70
Switching type	75% signal		–	Normally open contact		–
	100% signal		Changeover	Normally closed contact		Normally closed contact
	2SPSU				Signal switching through at 30 °C *[86 °F]*, return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Filter element

Glass fiber paper H..XL		Single-use element on the basis of inorganic fiber	
		Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
	H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
	H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
	H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
	H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential A	bar *[psi]*	30 *[435]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

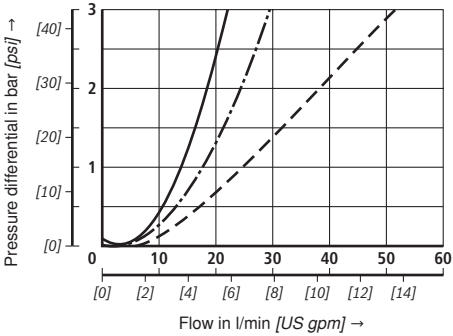
Characteristic curves (measured with mineral oil HLP46 according to ISO 3968) H3XL

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 0.5 bar *[7.2 psi]*

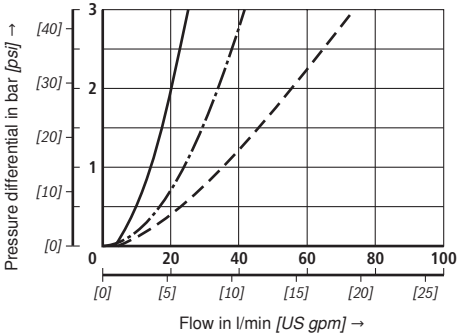
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s *[649 SUS]*, 68 mm²/s *[315 SUS]*, 30 mm²/s *[143 SUS]*

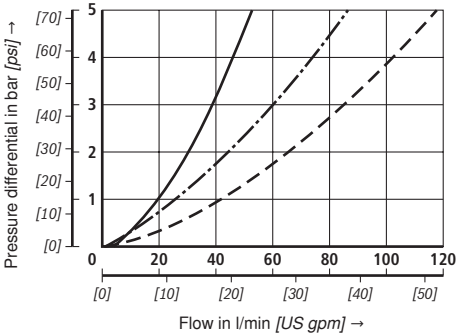
50LDN0040-H3XLA00-...-R4



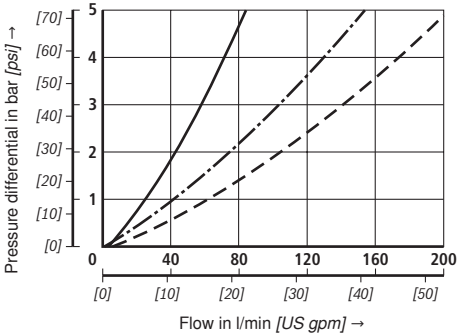
50LDN0063-H3XLA00-...-R4



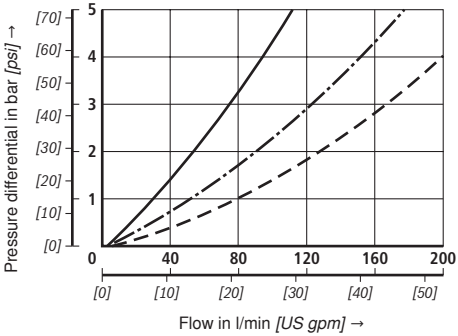
50LDN0100-H3XLA00-...-R4



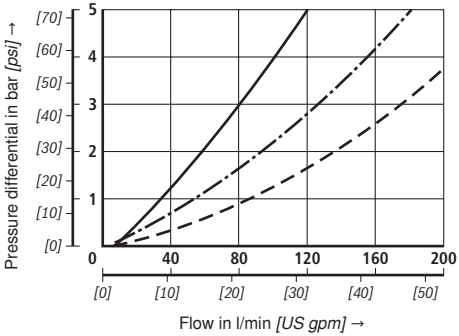
50LD0130-H3XLA00-...-R5



50LD0150-H3XLA00-...-R5



50LDN0160-H3XLA00-...-R6



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Characteristic curves (measured with mineral oil HLP46 according to ISO 3968) **H3XL; H10XL**

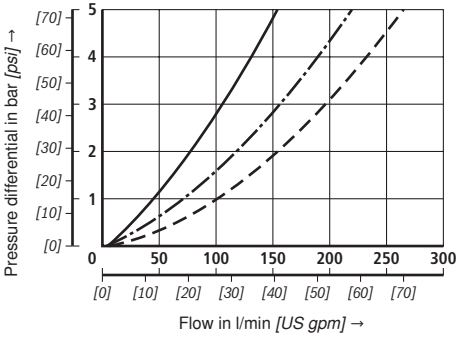
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 0.5 bar *[7.2 psi]*

A proper filter design is enabled by our computer program "BRFilterSelect".

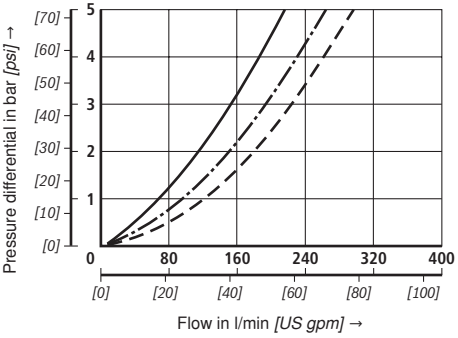
Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[143 SUS]*

H3XL

50LDN0250-H3XLA00-...-R6

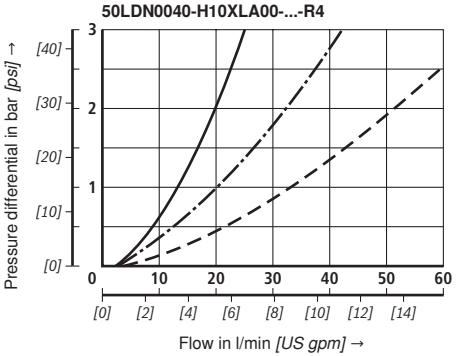


50LDN0400-H3XLA00-...-R6

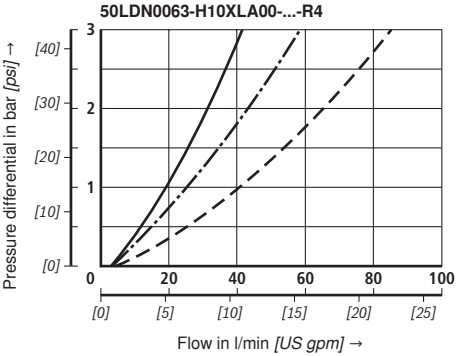


H10XL

50LDN0040-H10XLA00-...-R4



50LDN0063-H10XLA00-...-R4



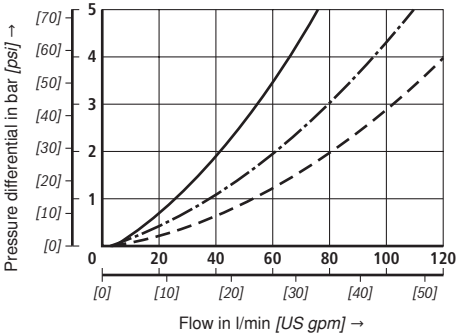
Characteristic curves (measured with mineral oil HLP46 according to ISO 3968) H10XL

Spec. weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 0.5 bar *[7.2 psi]*

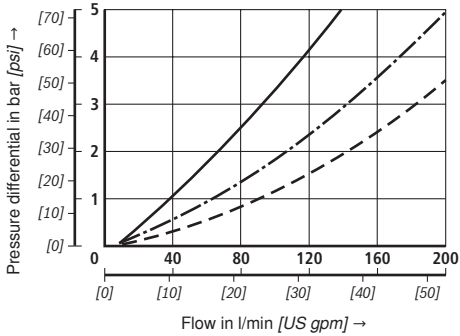
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s *[649 SUS]*
68 mm²/s *[315 SUS]*
30 mm²/s *[143 SUS]*

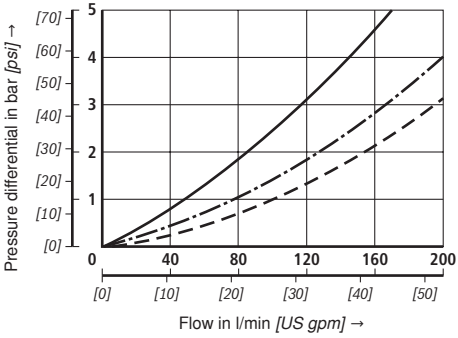
50LDN0100-H10XLA00-...-R4



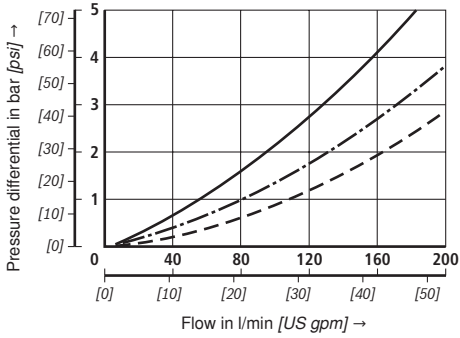
50LD0130-H10XLA00-...-R5



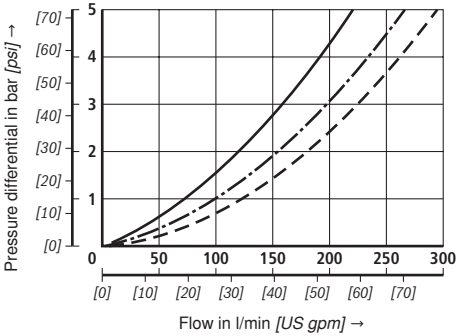
50LD0150-H10XLA00-...-R5



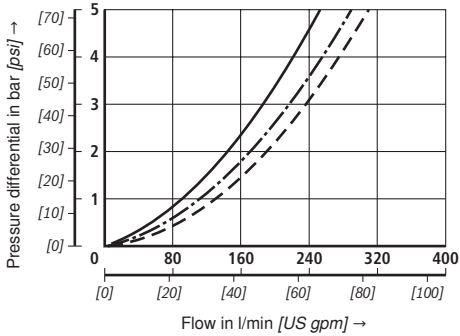
50LDN0160-H10XLA00-...-R6



50LDN0250-H10XLA00-...-R6

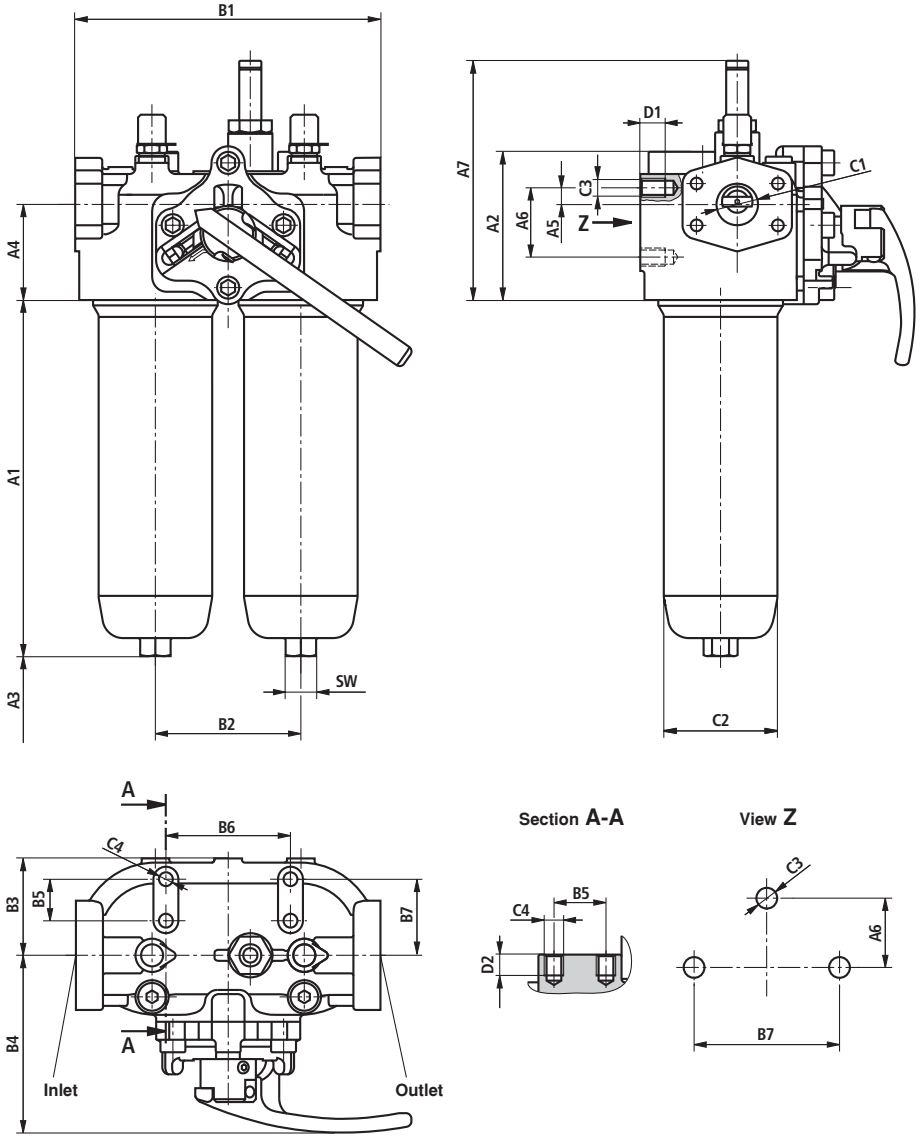


50LDN0400-H10XLA00-...-R6



5

Unit dimensions size 0040 - size 0400 (dimensions in mm *[inch]*)



Unit dimensions size 0040 - size 0400 (dimensions in mm *[inch]*)

Filter housing for filter elements according to DIN 24550 and according to Rexroth standard

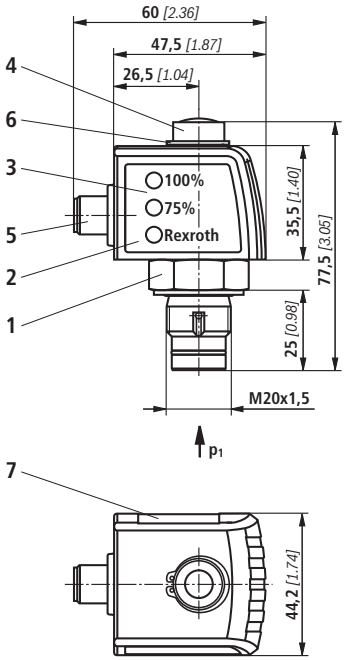
Type	A1	A2	A3 [1]	A4	A5	A6	A7	B1	B2	B3	B4	B5
50 LDN 0040	115 *[4.53]*	108 *[4.25]*	80 *[3.15]*	70 *[2.76]*	9 *[0.35]*	50 *[1.97]*	170 *[6.71]*	170 *[6.69]*	80 *[3.15]*	57 *[2.24]*	127 *[5.00]*	30 *[1.18]*
50 LDN 0063	179 *[7.05]*											
50 LDN 0100	269 *[10.59]*											
50 LD 0130	213 *[8.39]*	107 *[4.21]*	140 *[5.51]*	69 *[2.72]*	14 *[0.55]*	50 *[1.97]*	173 *[6.82]*	220 *[8.66]*	105 *[4.13]*	70 *[2.76]*	128 *[5.04]*	30 *[1.18]*
50 LD 0150	263 *[10.35]*											
50 LDN 0160	184 *[7.24]*	122 *[4.80]*	140 *[5.51]*	80 *[3.15]*	25 *[0.98]*	55 *[2.17]*	184 *[7.25]*	270 *[10.63]*	134 *[5.28]*	103 *[4.06]*	152 *[5.98]*	30 *[1.18]*
50 LDN 0250	274 *[10.79]*											
50 LDN 0400	425 *[16.73]*											

Type	B6	B7	C1 connection			ØC2	C3	C4	D1	D2	SW
			R Standard	U (SAE J1926)	S (SAE flange 3000 psi)						
50 LDN 0040	90 *[3.54]*	30 *[1.18]*	G1	SAE 121 1/16-12UN-2B	–	55 *[2.17]*	M10	M8	15 *[0.59]*	15 *[0.59]*	19 *[0.75]*
50 LDN 0063											
50 LDN 0100											
50 LD 0130	90 *[3.54]*	55 *[2.17]*	G1 1/4	–	SAE 1 1/4"	77 *[3.03]*	M12	M8	18 *[0.71]*	12 *[0.47]*	24 *[0.94]*
50 LD 0150											
50 LDN 0160	130 *[5.12]*	65 *[2.56]*	G1 1/2	–	SAE 1 1/2"	98 *[3.86]*	M16	M10	22 *[0.87]*	15 *[0.59]*	27 *[1.06]*
50 LDN 0250											
50 LDN 0400											

[1] Servicing height for filter element replacement

Maintenance indicator (dimensions in mm *[inch]*)

Electronic switching element M12x1



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); plug-in connection M12x1

3 Housing with three LEDs: 24 V =

green: Stand-by
yellow: Switching point 75%
red: Switching point 100 %

4 Optical indicator bistable

5 Round connector M12x1, 4-pin

6 Locking ring DIN 471-16x1, **Material no. R900003923**

7 Name plate

Notices:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2).

Switching elements with increased switching power at request.

Spare parts

Electronic switching element

W | O – D01 – – |

Maintenance indicator = W
Mechanical optical indicator = O
Design pressure differential M20x1.5 = D01

Switching pressure
2.2 bar *[31.9 psi]* = 2.2
5.0 bar *[72.5 psi]* = 5.0

Max. nominal pressure
160 = Switching pressure 2.2 bar *[31.9 psi]* 160 bar *[2321 psi]*
450 = Switching pressure 5.0 bar *[72.5 psi]* 450 bar *[6527 psi]*

Seal
M = NBR seal
V = FKM seal

Mechanical optical maintenance indicator	Material no.
WO-D01-2,2-M-160	**R901025312**
WO-D01-5,0-M-450	**R901025313**

Seal kit

D | 50LD | | |

Seal kit = D
Series = 50LD
Size
Size 0040-0100 = N0040-0100
Size 0130-0150 = 0130-0150
Size 0160-0400 = N0160-0400

Seal
M = NBR seal
V = FKM seal

Seal kit	Material no.
50LDN0040-0100-M	**R928047783**
50LD0130-0150-M	**R928047784**
50LDN0160-0400-M	**R928047785**

5

Installation, commissioning and maintenance

Installation of the filter

Verify operating overpressure with name plate information.

Screw the filter head item 1 to the fastening device considering flow direction (direction arrows) and servicing height of the filter element item 3.

Remove the plugs from filter inlet and outlet, screw filter in pipeline without tension stress.

Bring the switching lever item 6 into central position in order to fill both filter sides. Switch on system pump. Bleed the filter by opening the screws / valves item 8 or item 9; close them again when operating liquid escapes. Switch the filter into the operating position. While doing so, the conical handle item 6 must rest against the stop.

Switch-over lever is on the filter side that is out of order.

Connection of the electronic maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

After initial start-up of the system, the filter element is to be exchanged.

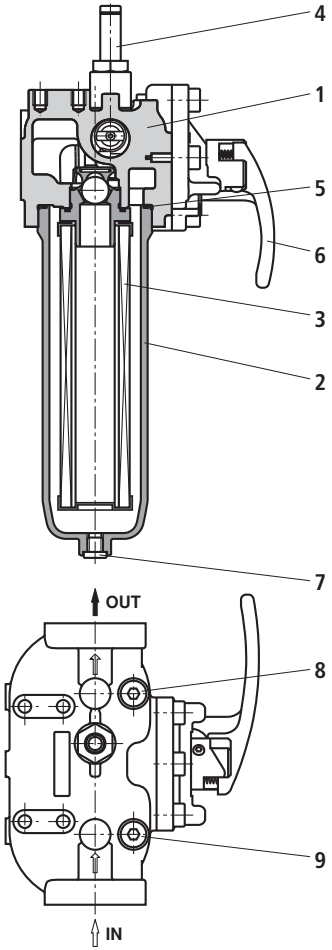
Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electric signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively.

The filter element should be replaced or cleaned after max. 6 months.

Element exchange

- Pull the switch-over lever and switch over to the second filter.
- Open the bleed screw or bleed valve item 8 or item 9 at the decommissioned filter side and reduce the pressure.
- Screw off the filter head item 2 and pull off the filter element item 3 from the spigot in the filter head item 1 by turning it slightly.
- Check the filter head for cleanliness and clean if necessary.
- Replace filter element, clean filter element with material G... .
- The efficiency of the cleaning process depends on the type of dirt and the amount of the pressure differential before the filter element exchange. If the pressure differential after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G… element also needs to be replaced.
- Install cleaned or replaced filter element by slightly turning it back on its spigot.
- Check seal ring item 5 in the filter bowl and replace when damaged or worn.
- Attach filter bowl and tighten at the hexagon using a suitable tool.
- Pull switch-over lever for pressure compensation. Bleed filter by opening the bleed screw item 8 or item 9; close them again when operating liquid escapes.
- Lower switch-over lever in basic position.

Technical modifications reserved!



Quality and standardization

The duplex filters for hydraulic applications according to 51453 are pressure holding equipment according to article 1, section 2.1.4 of the Pressure Equipment Directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

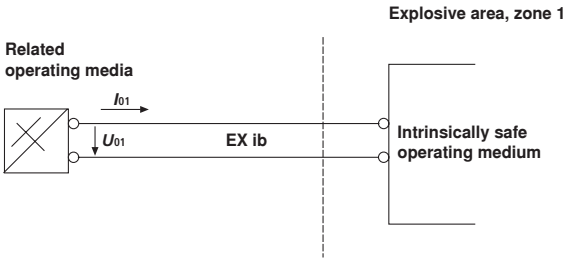
Use in explosive areas according to directive 94/9/EC (ATEX)

The duplex filters according to 51453 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the duplex filters according to 51453 in explosive areas, equipotential bonding has to be ensured.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



The manufacturer's declaration according to DIN EN 13463 is available for this filter separately, with material no. R928028899

Notes

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Fax +49 (0) 93 52 / 18-23 58
documentation@boschrexroth.de
www.boschrexroth.de

Block mounting filters

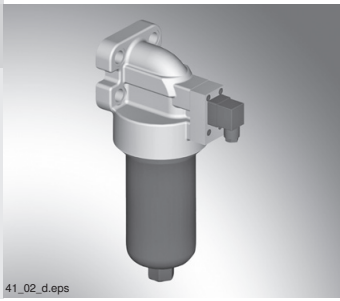
Designation	Type	Size	q_{Vmax} in l/min	p_{max} in bar	Data sheet	Page
Block mounting filter, for lateral flange-mounting	250/450 FE(N)	0040 ... 1000	600	250/450	51405	395
Block mounting filter, for vertical flange-mounting	450 PBF(N)	0040 ... 1000	500	450	51417	411
Block mounting filter, for lateral flange-mounting	245 PSF(N)	0040 ... 0400	400	250	51418	429
Block mounting filter, for lateral flange-mounting	350 PSF(N)	0040 ... 1000	600	350	51419	447
Block mounting filter, for sandwich plate mounting	320 PZR	0025 ... 0125	33	320	51427	465

Rexroth
Bosch Group

Block mounting filter, lateral flange-mounting possible

RE 51405/12.10 1/16
Replaces: 02.09

Types 250/450 FEN 0040 to 1000; 250/450 FE 0003, 0015, 0018


41_02_d.eps

Nominal sizes **according to DIN 24550**: 0040 to 1000
Nominal sizes according to BRFS: 0003, 0015, 0018
Nominal pressures 250, 450 bar
Connections up to SAE 2 1/2“
Operating temperature -10 °C to +100 °C

Table of contents

Application

- Filtration of pressure fluids and lubricants.
- Filtration of fluids and gases.
- Direct installation into pipelines.
- Direct wear protection of downstream components and systems.

Features

- Flow-optimized design due to 3D computer-supported design.
- Low pressure drop.
- Special highly efficient filter media

Design

Filter head with inlet, outlet and filter element centering spigot. Filter bowl is unscrewed downwards.
Materials: See spare parts list in this brochure.

Further design variants available on request.

Filter element

Pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the "FILTER" system in view of the prolonged life and the wear protection of the systems.

The most important criteria for selection are the required degree of cleanliness of the operating medium, the initial pressure differential and the contamination retention capacity.

For further detailed information please refer to our brochure "Filter Elements".

Accessories

Clogging indicator

Basically, the filter is equipped with mechanical optical clogging indicator. The electronic clogging indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical clogging indicator and held by means of a locking ring.

Characteristic curves

An optimum filter selection is made possible by our "BRFilterSelect" software, see download area http://www.eppensteiner.de.

Additional characteristic curves for the filters in this catalogue can be found in the BRFS filter calculation program.

Quality and standardization

The development, manufacture, and assembly of BRFS industrial filters and BRFS filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The pressure filters for hydraulic applications according to 51405 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (DGRL). However, on the basis of the exception in article 1, section 3.6 of the DGRL, hydraulic filters are exempt from the DGRL if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering details

of the filter

				–	B	–	0	0	V5,0	–	00		0	

Pressure
250 bar **= 250**
450 bar **= 450**

Design
Flange filter with filter element according to DIN 24550 **= FEN**
Flange filter with filter element according to BRFS standard **= FE**

Nom. size
FEN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
FE… **= 0003** [1] **0015 0018**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable:
G10, G25 **=G…**
Paper, non-cleanable
P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable
H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
330 bar **= B**

Element model
Standard adhesive T = 100 °C **= 0…**
Standard material **= …0**
chemically nickel-plated **= …D** [2]

Solenoid
without **= 0**

Complementary details
0 = without
Z [3] **=** Certificate

Material
0 = Standard

Seal
M = NBR seal
V = FKM seal

Connection
00 = Standard

Clogging indicator
V5,0 = clogging indicator, optical state switching pressure 5.0 bar

Bypass valve
0 = without

Ordering example:
450 FEN 0063 H10XL-B00-00V5,0-00M00

of the filter element

2.		–	B	–	0 –

Filter element
Design **= 2.**

Nom. size
FEN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
FE… **= 0004** [1] **0015 0018**

Filtration rating in µm
nominal
Stainless steel wire mesh, cleanable: G10, G25 **=G…**
Paper, non-cleanable: P10 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable: H3XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
330 bar **= B**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = without

Element model
0… = Standard adhesive T = 100 °C
…0 = Standard material
…D [2] **=** chemically nickel-plated

Ordering example:
2.0063 H10XL-B00-0-M

[1] For filter element 2.0004

[2] Only in connection with FKM seal

[3] Manufacturer's inspection certificate M according to DIN 55350 T18

Preferred types

Line filter with lateral flange-mounting possibility, without bypass, filtration rating 10 µm and nominal pressure 250 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 1 bar	Material number
250 FE 0003 H10XL-B00-00V5,0-00M00	43	**R928001090**
250 FEN 0040 H10XL-B00-00V5,0-00M00	49	**R928001084**
250 FEN 0063 H10XL-B00-00V5,0-00M00	70	**R928001085**
250 FEN 0100 H10XL-B00-00V5,0-00M00	90	**R928001086**
250 FE 0015 H10XL-B00-00V5,0-00M00	153	**R928001091**
250 FE 0018 H10XL-B00-00V5,0-00M00	175	**R928001092**
250 FEN 0160 H10XL-B00-00V5,0-00M00	215	**R928001087**
250 FEN 0250 H10XL-B00-00V5,0-00M00	258	**R928001088**
250 FEN 0400 H10XL-B00-00V5,0-00M00	330	**R928001089**

Line filter with lateral flange-mounting possibility, without bypass, filtration rating 3 µm and nominal pressure 250 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 1 bar	Material number
250 FE 0003 H3XL-B00-00V5,0-00M00	18	**R928001081**
250 FEN 0040 H3XL-B00-00V5,0-00M00	21	**R928001075**
250 FEN 0063 H3XL-B00-00V5,0-00M00	33	**R928001076**
250 FEN 0100 H3XL-B00-00V5,0-00M00	50	**R928001077**
250 FE 0015 H3XL-B00-00V5,0-00M00	74	**R928001082**
250 FE 0018 H3XL-B00-00V5,0-00M00	95	**R928001083**
250 FEN 0160 H3XL-B00-00V5,0-00M00	115	**R928001078**
250 FEN 0250 H3XL-B00-00V5,0-00M00	160	**R928001079**
250 FEN 0400 H3XL-B00-00V5,0-00M00	230	**R928001080**

Line filter with lateral flange-mounting possibility, without bypass, filtration rating 10 µm and nominal pressure 450 bar

Type	Flow in L/min at ν = 30 mm²/s and Δp = 1 bar	Material number
450 FE 0003 H10XL-B00-00V5,0-00M00	43	**R928001148**
450 FEN 0040 H10XL-B00-00V5,0-00M00	49	**R928001140**
450 FEN 0063 H10XL-B00-00V5,0-00M00	70	**R928001141**
450 FEN 0100 H10XL-B00-00V5,0-00M00	90	**R928001142**
450 FE 0015 H10XL-B00-00V5,0-00M00	153	**R928001149**
450 FE 0018 H10XL-B00-00V5,0-00M00	175	**R928001150**
450 FEN 0160 H10XL-B00-00V5,0-00M00	215	**R928001143**
450 FEN 0250 H10XL-B00-00V5,0-00M00	258	**R928001144**
450 FEN 0400 H10XL-B00-00V5,0-00M00	330	**R928001145**
450 FEN 0630 H10XL-B00-00V5,0-00M00	495	**R928001146**
450 FEN 1000 H10XL-B00-00V5,0-00M00	610	**R928001147**

Preferred types

Line filter with lateral flange-mounting possibility, without bypass, filtration rating 3 µm and nominal pressure 450 bar

Type	Flow in L/min at $\nu = 30\ mm^2/s$ and $\Delta p = 1$ bar	Material number
450 FE 0003 H3XL-B00-00V5,0-00M00	18	**R928001137**
450 FEN 0040 H3XL-B00-00V5,0-00M00	21	**R928001129**
450 FEN 0063 H3XL-B00-00V5,0-00M00	33	**R928001130**
450 FEN 0100 H3XL-B00-00V5,0-00M00	50	**R928001131**
450 FE 0015 H3XL-B00-00V5,0-00M00	74	**R928001138**
450 FE 0018 H3XL-B00-00V5,0-00M00	95	**R928001139**
450 FEN 0160 H3XL-B00-00V5,0-00M00	115	**R928001132**
450 FEN 0250 H3XL-B00-00V5,0-00M00	160	**R928001133**
450 FEN 0400 H3XL-B00-00V5,0-00M00	230	**R928001134**
450 FEN 0630 H3XL-B00-00V5,0-00M00	290	**R928001135**
450 FEN 1000 H3XL-B00-00V5,0-00M00	400	**R928001136**

Ordering details: electronic switching element for clogging indicator

ABZ | F | V – | –1X/ | –DIN

Rexroth power unit accessories

Filter

Clogging indicator

electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

electronic switching element with 2 switching points (normally open/normally closed), 75%, 100%, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

electronic switching element with 2 switching points (normally open/ normally closed), 75%, 100%, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Identification for DIN and SAE models

Unit series

1X = unit series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Ordering example: Pressure filter with mechanical optical clogging indicator for $p_{nom.}$ = 450 bar *[6530 psi]* with bypass valve,
nominal size 63, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for pressure liquid mineral oil HLP according to DIN 51524.

Filter: **450 FEN 0063 H10XL-B00-00V5,0-00M00** **Material number: R928001141**

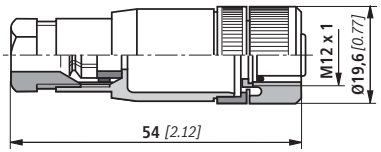
Clogging indicator: **ABZFV-E1SP-M12X1-1X/-DIN** **Material number: R901025339**

Plug-in connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12 x 1

Plug-in connector for K24 4-pin, M12 x 1 with screwed connection, cable fitting Pg9.

Material no. R900031155



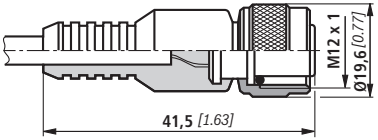
Plug-in connector for K24-3m 4-pin, M12 x 1 with molded in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

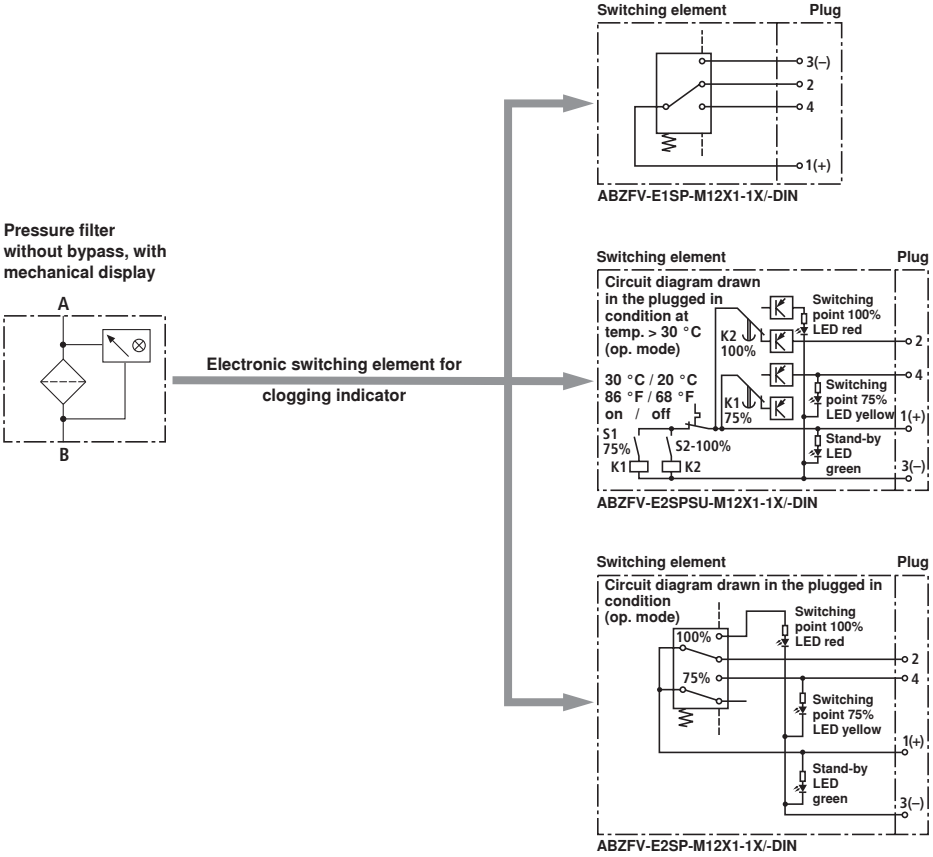
1 brown
2 white
3 blue
4 black

Material no. R900064381



For additional round plug-in connections, see data sheet 08006.

Symbols


Switching element
Plug
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Pressure filter
without bypass, with
mechanical display
A
B
Electronic switching element for
clogging indicator
Switching element
Plug
Circuit diagram drawn
in the plugged in
condition at
temp. > 30 °C
(op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug
Circuit diagram drawn in the plugged in
condition
(op. mode)
100%
75%
Switching
point 100%
LED red
Switching
point 75%
LED yellow
Stand-by
LED
green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

6

Technical data (for applications outside these parameters, please consult us!)

Electronic (electric switching element)

Electrical connection		Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage	A	Max. 1
Voltage range	E1SP-M12x1 V DC/AC	Max. 150
	E2SP V DC	10 to 30
Max. switching capacity with ohmic loads		20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1	Changeover
	E2SP-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure
	E2SPSU-M12x1	Normally open at 75% of the response pressure, Normally closed at 100% of the response pressure Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...		Stand-by (LED green); 75% switching point (LED yellow) 100% switching point (LED red)
Type of protection according to EN 60529		IP 65
For direct voltage above 24 V a spark suppression is to be provided to protect the switching contacts.		
Weight electronic switching element: – with round plug-in connection M12 x 1	kg *[lbs]*	0.1 *[0.22]*

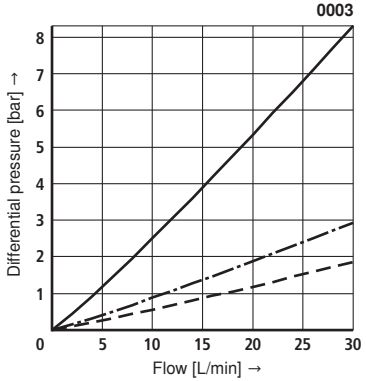
Characteristic curves

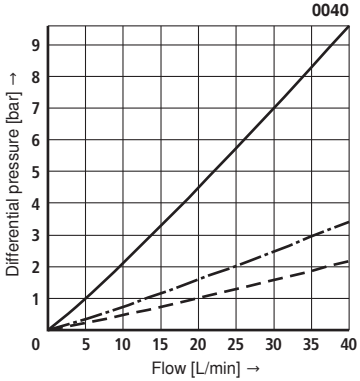
H3XL…

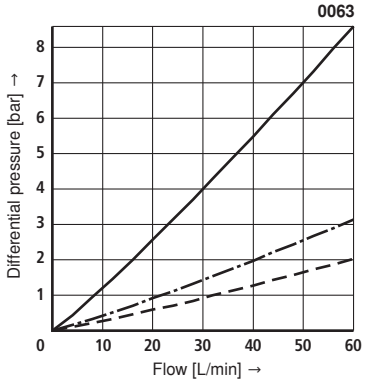
Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended initial D*p* for design = 1 bar

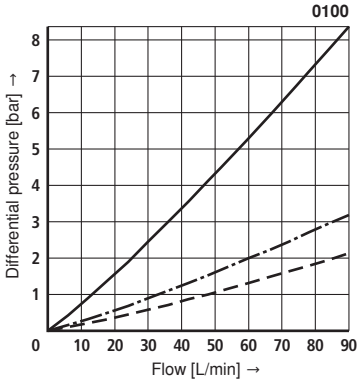
An optimum filter selection is made possible by our computer program "BRFilterSelect".

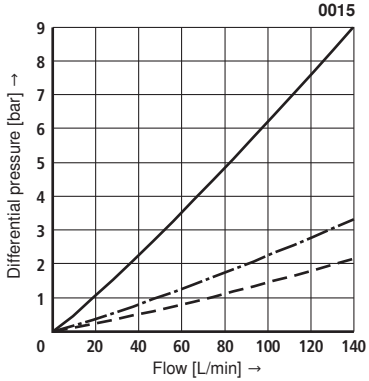
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

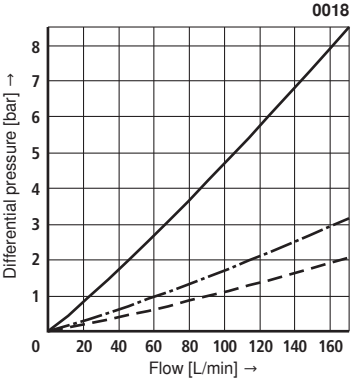












6

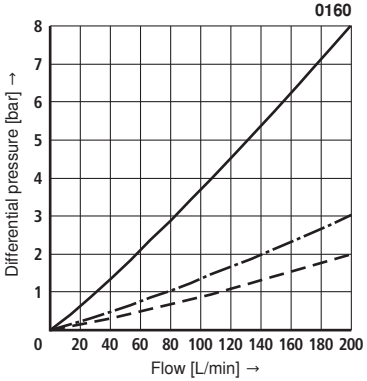
Characteristic curves

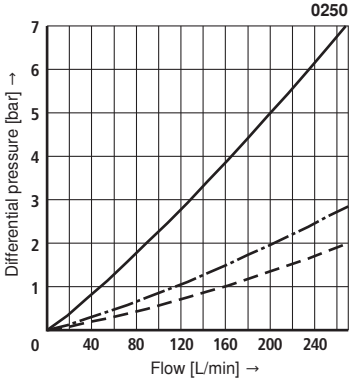
H3XL…

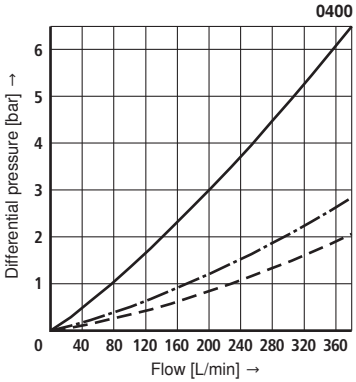
Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended
initial D*p* for design = 1 bar

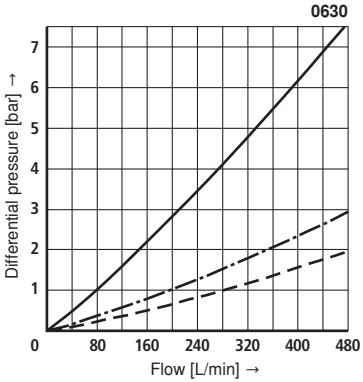
An optimum filter selection is made possible by our computer program "BRFilterSelect".

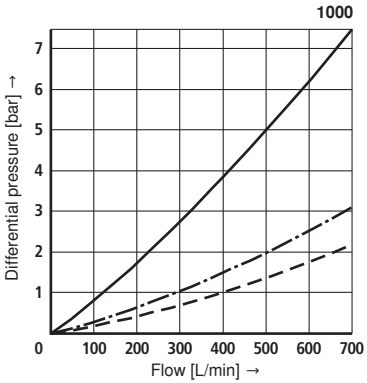
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s











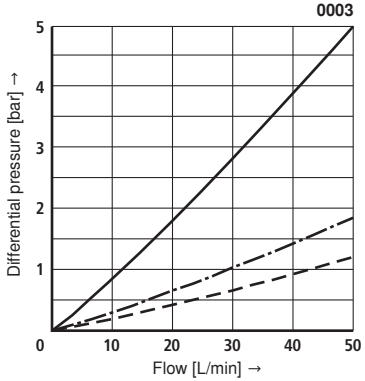
Characteristic curves

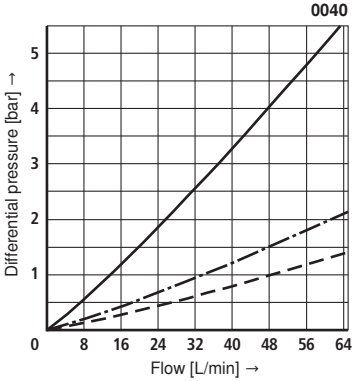
H10XL...

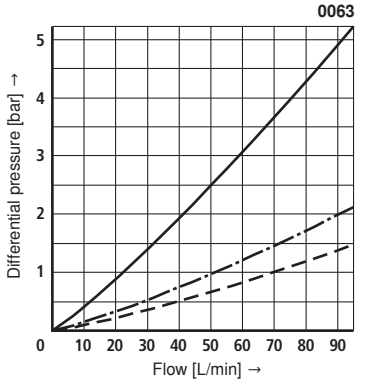
Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended
initial D*p* for design = 1 bar

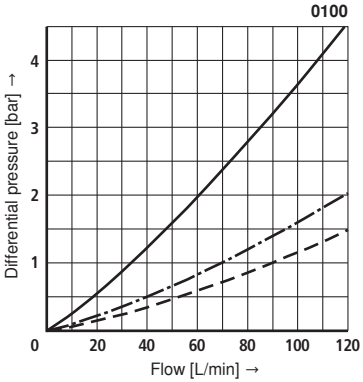
An optimum filter selection is made possible by our computer program "BRFilterSelect".

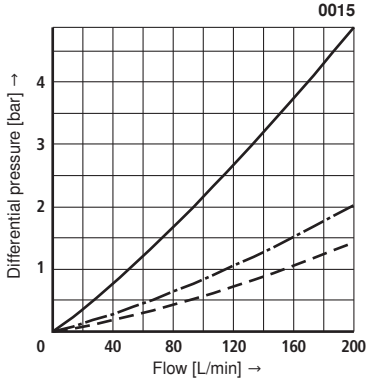
Oil viscosity: 120 mm²/s, 46 mm²/s, 30 mm²/s

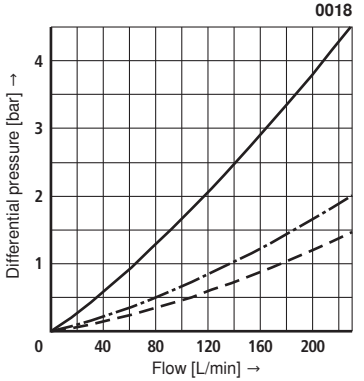












6

Characteristic curves

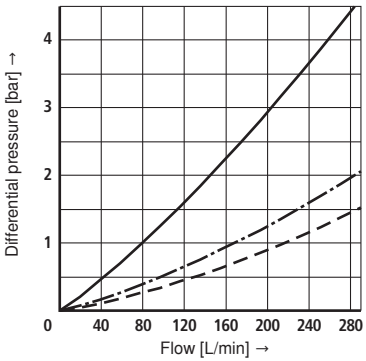
H10XL…

Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended
initial D*p* for design = 1 bar

An optimum filter selection is made possible by our computer program "BRFilterSelect".

Oil viscosity: —— 120 mm²/s, –·– 46 mm²/s, – – – 30 mm²/s

0160



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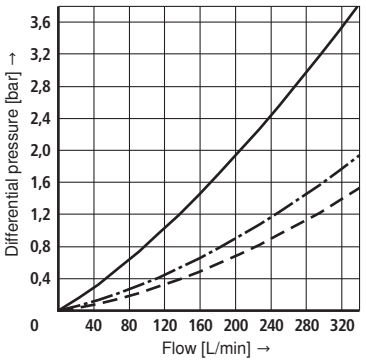

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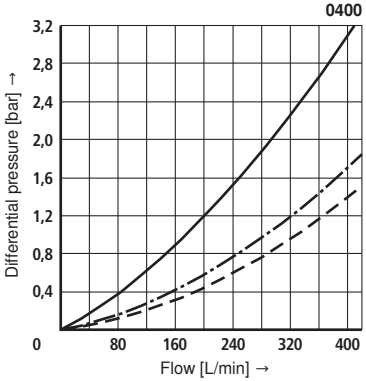

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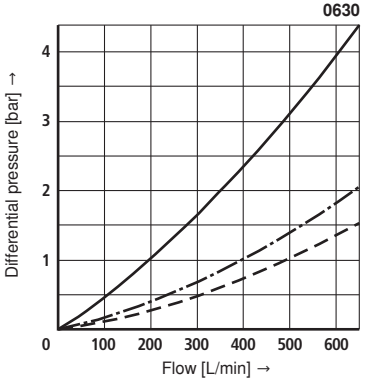
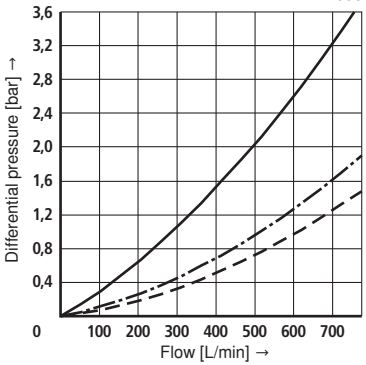
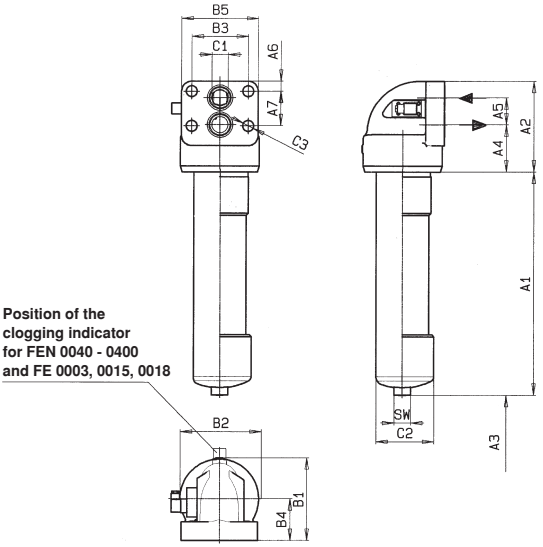


1000



Unit dimensions (dimensions in mm)



Filter housing for filter elements in accordance with DIN 24550

Type	Content in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	A6	A7	B1	B2	B3	B4	B5	C1	C2	C3	SW
250/450 FEN 0040	0.2	4.6	98	112	110	56	28	12	45	95	88	57	48	80	Ø 14	Ø 64	Ø 14	24
250/450 FEN 0063	0.3	5.9	161															
250/450 FEN 0100	0.5	6.1	251															
250/450 FEN 0160	1.3	16.5	167	160	150	79.5	52	22.5	60	156	150	95	80	140	Ø 32	Ø 114	Ø 23	32
250/450 FEN 0250	1.9	19.2	257															
250/450 FEN 0400	3.0	24.1	407															
450 FEN 0630	4.5	47.5	421	225		117	67	25	86	199	195	140	99	190	Ø 50	Ø 140	Ø 27	41
450 FEN 1000	6.2	67.5	641													Ø 160		

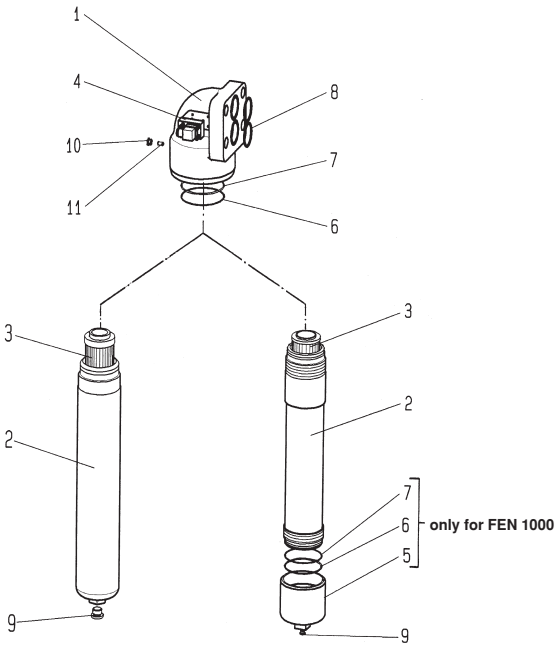
Filter housing for filter elements according to BRFS standard

Type 250/450 FE…	Content in L	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	A6	A7	B1	B2	B3	B4	B5	C1	C2	C3	SW
0003	0.2	4.6	98	112	100	56	28	12	45	95	88	57	48	80	Ø 14	Ø 64	Ø 14	24
0015	0.9	11.0	188	150	130	80	35	20	55	130	125	72	65	110	Ø 18	Ø 92	Ø 18	32
0018	1.1	12.7	239															

[1] Weight including standard filter element and clogging indicator. [2] Withdrawal dimension for filter element replacement.

6

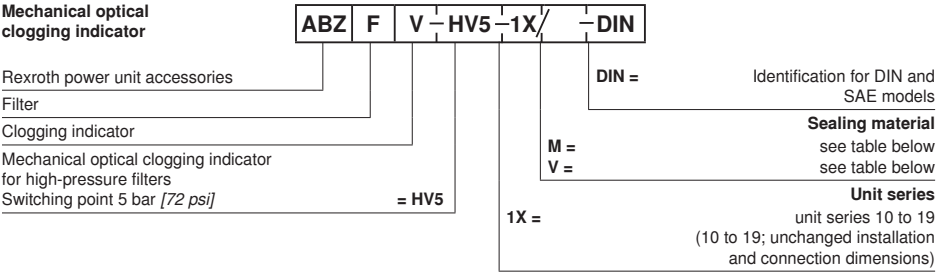
Spare parts list



		Size FEN			0040	0063	0100			0160	0250	0400	0630	1000
		Size FE		0003				0015	0018					
Part	**Piece**	**Description**	**Material**											
1	1	Filter head	GGG50	Please indicate ordering information “Filter”										
2	1	Filter bowl	Steel	Please indicate ordering information “Filter”										
3	1	Filter element	various	Please indicate ordering information “Filter Element”										
3.1	1	Seal ring	NBR / FKM	Please indicate ordering information “Filter”										
4	1	Clogging indicator	various	See ordering information "Clogging indicator"										
5	1	Bottom	Steel	–										Part No. 4374
6	2	Support ring	PTFE	Please indicate ordering information “Filter”										
7	2	Seal ring	NBR / FKM	Please indicate ordering information “Filter”										
8	2	Seal ring	NBR / FKM	Please indicate ordering information “Filter”										
9	1	Plug	Steel	Part No. 778										
10	1	Plug	Steel	–										Part No. 771
11	1	Set screw with hexagon socket	5.8	–										Part No. 4371

All part numbers BRFS specific.

Spare parts (insert for DIN and SAE filters)



Mechanical optical clogging indicator	Material no.
ABZFV-HV5-1X/M-DIN	R901025313

The ordering details for filter elements can be found on page 3.

Sealing kits must be ordered by stating the complete part key.

Sealing material and surface coating for pressure fluids

		Ordering details	
Mineral oils		Sealing material	Element model
Mineral oil	HLP according to DIN 51524	M	...0
Fire-resistant hydraulic fluids			
Emulsions	HFA-E according to DIN 24320	M	...0
Synthetic water solutions	HFA-S according to DIN 24320	M	...D
Water solutions	HFC according to VDMA 24317	M	...D
Phosphate esters	HFD-R according to VDMA 24317	V	...D
Organic esters	HFD-U according to VDMA 24317	V	...D
Hydraulic fluids that are fast biodegradable			
Triglycerides (rape seed oil)	HETG according to VDMA 24568	M	...D
Synthetic esters	HEES according to VDMA 24568	V	...D
Polyglycoles	HEPG according to VDMA 24568	V	...D

Installation, commissioning and maintenance

Installation

Verify operating pressure with name plate information.

Remove the plugs from the filter inlet and outlets. Fit the filter into the pipe work, ensuring that it is fitted free of tension and considering the flow direction (direction arrows) and the withdrawal height of the filter element (pos.3).

⚠ Warning!

Assemble and disassemble the filter only when system is depressurized!

Vessel is under pressure!

When disassembling the filter, please note that the filter inlet and the filter outlet need to be emptied separately!

Remove the filter bowl only if it is not pressurized!

Do not replace the clogging indicator while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personnel!

Commissioning

Switch on system pump.

Maintenance

If at operating temperature, the red indicator pin shows out of the clogging indicator (pos. 4) so far that it contacts the plastic cap and/or if the switching process in the electric display is triggered, the filter element is clogged and needs to be replaced or cleaned respectively.

Filter element replacement

Switch off the system pump and depressurize the system.

Unscrew the filter bowl (pos. 2) and/or the bottom (pos. 5) (only with FEN 1000) of the filter bowl (pos. 2) and remove the filter element (pos. 3) from the centering spigot on the filter head (pos. 1) by turning it lightly.

Check the filter head for cleanliness and clean if necessary.

Replace filter elements H...-XL and P..., clean the filter element with material G … .

The efficiency of the cleaning process depends on the type of contamination and the value of the pressure differential before the filter element was exchanged. If the pressure differential after replacing the filter element is more than 50% of the value before replacing the filter element then the G…. element also needs to be replaced.

Install the cleaned or new filter element with light turning movements back on to the centering spigot.

Check the seal ring (pos. 7) in the filter bowl for damage or wear and replace if necessary.

Screw on the filter bowl (pos. 2) and tighten via the hexagon using a suitable tool.

Carry out commissioning as described above.

Technical modifications reserved!

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Fax +49 (0) 62 02 / 6 03-1 99
brfs-support@boschrexroth.de
www.eppensteiner.de

Rexroth
Bosch Group

Block mounting filter, for vertical flange-mounting

RE 51417/12.10 1/18
Replaces: 07.10

Type 450PBFN0040 to 1000; 450PBF0130, 0150


Filter_75_d

Size according to **DIN 24550**: 0040 to 1000
Additional sizes: 0130, 0150
Nominal pressure 450 bar *[6530 psi]*
Connection up to DN 40
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

- Special highly efficient filter media
- Adsorption of very fine particles across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized design due to 3D computer-supported design

Ordering code

of the filter

450	PBF		–		00 – V5,0 –	

Pressure
450 bar *[6530 psi]* **= 450**

Block mounting filter,
For vertical flange-mounting **= PBF**

Filter element
According to DIN 24550 **= N**

Size
PBFN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
PBF… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Element design
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Complementary details
without = No complementary details
–A1 = Connection nominal width 32 (size 0630 – 1000)

Seal
M = NBR seal
V = FKM seal

Maintenance indicator
V5,0 = Maintenance indicator, optical
specify switching pressure 5.0 bar *[72.5 psi]*

Order example:
450PBFN0063-H3XLB00-V5,0-M
Material no.: R928023332

Further versions (filter materials, connections,...) are available at request.

of the filter element

2.		–	– 0 –	

Filter element
Design **= 2.**

Size
PSFN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
PSF… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Element design
0… = Standard adhesive T = 100 °C *[212 °F]*
…0 = Standard material

Order example:
2.0063 H3XL-B00-0-M0
Material no.: R928006708

Standard types

NBR seal, without bypass, flow specifications for ν = 30 mm²/s

Block mounting filter 450PFB(N), filter rating **3 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1.5 bar *[21.8 psi]* [1)]	Material no. Filter	Material no. Replacement element
450PBFN0040-H3XLB00-V5,0-M	28 *[7.4 gpm]*	R928023331	R928006654
450PBFN0063-H3XLB00-V5,0-M	37 *[9.8 gpm]*	R928023332	R928006708
450PBFN0100-H3XLB00-V5,0-M	42 *[11.1 gpm]*	R928023333	R928006762
450PBF0130-H3XLB00-V5,0-M	80 *[21.1 gpm]*	R928023334	R928022310
450PBF0150-H3XLB00-V5,0-M	94 *[24.8 gpm]*	R928023335	R928022319
450PBFN0160-H3XLB00-V5,0-M	160 *[42.3 gpm]*	R928023336	R928006816
450PBFN0250-H3XLB00-V5,0-M	225 *[59.4 gpm]*	R928023337	R928006870
450PBFN0400-H3XLB00-V5,0-M	260 *[68.7 gpm]*	R928023338	R928006924
450PBFN0630-H3XLB00-V5,0-M	350 *[92.5 gpm]*	R928023339	R928006978
450PBFN1000-H3XLB00-V5,0-M	380 *[100.4 gpm]*	R928023340	R928007032

Block mounting filter 450PFB(N), filter rating **6 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1.5 bar *[21.8 psi]* [1)]	Material no. Filter	Material no. Replacement element
450PBFN0040-H6XLB00-V5,0-M	38 *[10.0 gpm]*	R928023411	R928006655
450PBFN0063-H6XLB00-V5,0-M	43 *[11.4 gpm]*	R928023412	R928006709
450PBFN0100-H6XLB00-V5,0-M	48 *[12.7 gpm]*	R928023413	R928006763
450PBF0130-H6XLB00-V5,0-M	100 *[26.4 gpm]*	R928023414	R928022311
450PBF0150-H6XLB00-V5,0-M	115 *[30.4 gpm]*	R928023415	R928022320
450PBFN0160-H6XLB00-V5,0-M	210 *[55.5 gpm]*	R928023416	R928006817
450PBFN0250-H6XLB00-V5,0-M	250 *[66.0 gpm]*	R928023417	R928006871
450PBFN0400-H6XLB00-V5,0-M	270 *[71.3 gpm]*	R928023418	R928006925
450PBFN0630-H6XLB00-V5,0-M	380 *[100.4 gpm]*	R928023419	R928006979
450PBFN1000-H6XLB00-V5,0-M	420 *[111.0 gpm]*	R928023420	R928007033

Block mounting filter 450PFB(N), filter rating **10 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1.5 bar *[21.8 psi]* [1)]	Material no. Filter	Material no. Replacement element
450PBFN0040-H10XLB00-V5,0-M	43 *[11.4 gpm]*	R928023491	R928006656
450PBFN0063-H10XLB00-V5,0-M	48 *[12.7 gpm]*	R928023492	R928006710
450PBFN0100-H10XLB00-V5,0-M	52 *[13.7 gpm]*	R928023493	R928006764
450PBF0130-H10XLB00-V5,0-M	110 *[29.1 gpm]*	R928023494	R928022312
450PBF0150-H10XLB00-V5,0-M	125 *[33.0 gpm]*	R928023495	R928022321
450PBFN0160-H10XLB00-V5,0-M	240 *[63.4 gpm]*	R928023496	R928006818
450PBFN0250-H10XLB00-V5,0-M	260 *[68.7 gpm]*	R928023497	R928006872
450PBFN0400-H10XLB00-V5,0-M	280 *[74.0 gpm]*	R928023498	R928006926
450PBFN0630-H10XLB00-V5,0-M	400 *[105.7 gpm]*	R928023499	R928006980
450PBFN1000-H10XLB00-V5,0-M	450 *[118.9 gpm]*	R928023500	R928007034

[1)] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

ABZ	F	V –	–1X /	–DIN

Rexroth plant construction accessories

Filter

Maintenance indicator

Electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

Electronic switching element with 2 switching points (normally open/ normally closed), 75 %, 100 %, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

Electronic switching element with 2 switching points (normally open/ normally closed), 75 %, 100 %, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Mark for DIN version

Component series

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Order example: Block mounting filter with mechanical optical maintenance indicator for $p_{nom.}$ = 450 bar *[6527 psi]* without bypass valve, size 0063, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

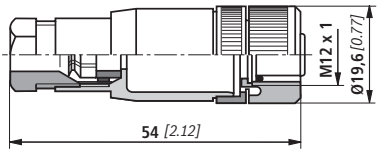
Filter:	**450PBFN0063-H10XLB00-V5,0-M**	**Material number: R928023492**
Maintenance indicator:	**ABZFV-E1SP-M12X1-1X/-DIN**	**Material number: R901025339**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12 x 1

Mating connector for K24 4-pin, M12 x 1 with screw connection, cable gland Pg9.

Material no. R900031155



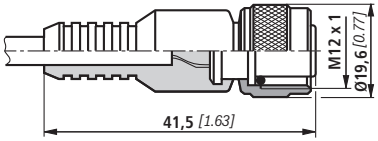
Mating connector for K24-3m 4-pin, M12 x 1 with potted-in PVC cable, 3 m long.

Line diameter: 4 x 0.34 mm²

Core marking:

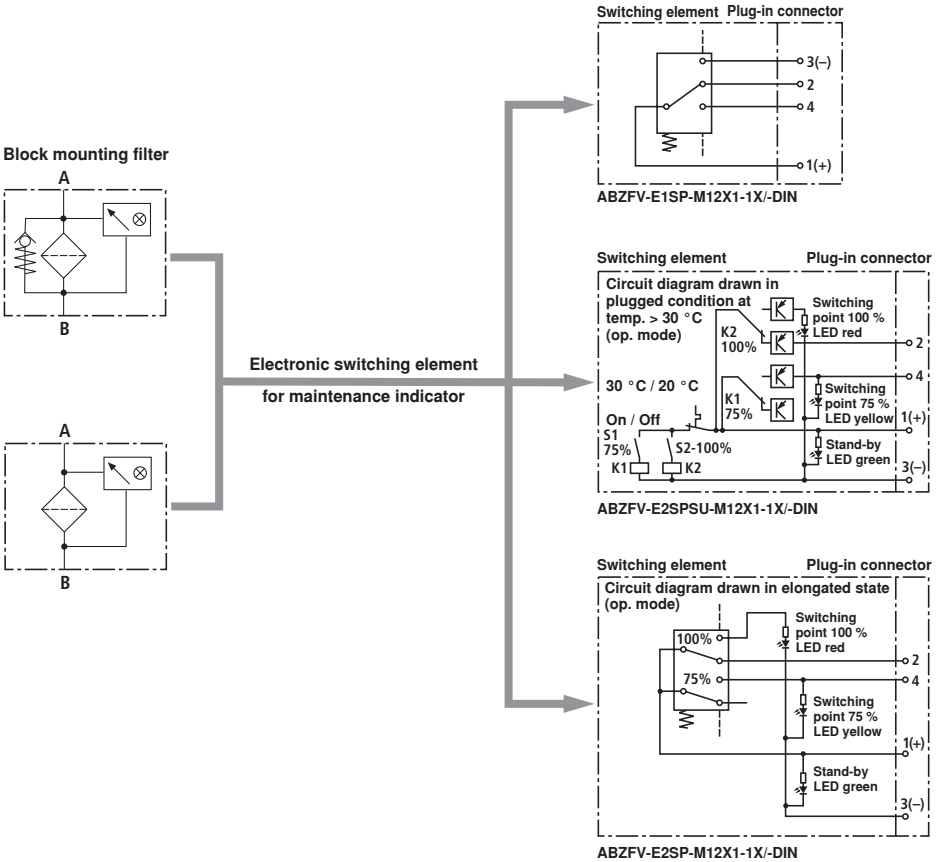
1	Brown
2	White
3	Blue
4	Black

Material no. R900064381



For more round plug-in connections, see data sheet 08006.

Symbols


Block mounting filter
A
B
A
B
Electronic switching element
for maintenance indicator
Switching element
Plug-in connector
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn in plugged condition at temp. > 30 °C (op. mode)
K2
100%
Switching point 100 % LED red
2
4
30 °C / 20 °C
K1
75%
Switching point 75 % LED yellow
1(+)
On / Off
S1
75%
S2-100%
K1
K2
Stand-by LED green
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn in elongated state (op. mode)
100%
Switching point 100 % LED red
2
75%
4
Switching point 75 % LED yellow
1(+)
Stand-by LED green
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

Function, section

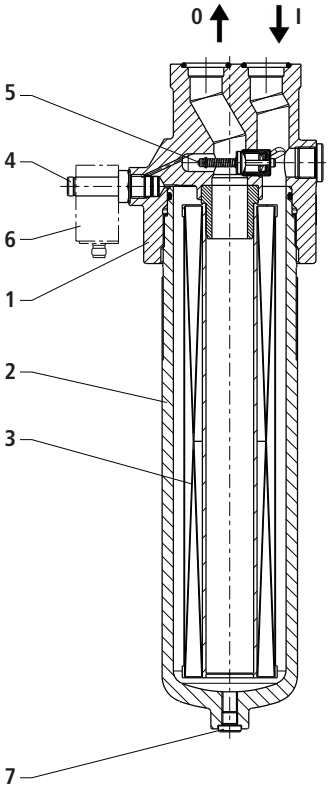
Block mounting filters are suitable for direct attachment in pump blocks and manifolds. They are installed upstream control units or controllers to be protected.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of the abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (7). With size 1000, the filter bowl has a two-part design.

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points (6), which has to be ordered separately. The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.



Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Vertical				
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*				
Weight		Size	**0040**	**0063**	**0100**	**0130**	**0150**
		kg *[lbs]*	5 *[11]*	5.5 *[12.1]*	6.4 *[14.1]*	11.9 *[26.2]*	12.9 *[28.4]*
Weight		Size	**0160**	**0250**	**0400**	**0630**	**1000**
		kg *[lbs]*	15.9 *[35.1]*	16.5 *[36.3]*	19.9 *[43.8]*	37.5 *[82.5]*	48 *[106]*
Material	Filter head		GGG				
	Filter bowl		Steel				
	Optical maintenance indicator		Brass				
	Electronic switching element		Plastic PA6				

hydraulic

Maximum operating pressure	bar *[psi]*	450 *[6530]*
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]* (shortly –30 *[–22]*)
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	7 ± 0.5 *[100 ± 7]*
Type of pressure measurement of the maintenance indicator		Differential pressure
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage		A	max. 1
Voltage range	E1SP-M12x1	V DC/AC	max. 150
	E2SP	V DC	10 to 30
Max. switching power with resistive load			20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1		Changeover
	E2SP-M12x1		Normally open contact at 75 % of the response pressure, normally closed contact at 100 % of the response pressure
	E2SPSU-M12x1		Normally open contact at 75 % of the response pressure, normally closed contact at 100 % of the response pressure Signal interconnection at 30 °C *[86 °F]*, return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...			Stand-by (LED green); 75 % switching point (LED yellow); 100 % switching point (LED red)
Protection class according to EN 60529			IP 65
For direct voltage above 24 V, a spark extinguishing is to be planned to protect the switching contacts.			
Weight Electronic switching element: – with round plug-in connection M12 x 1		kg *[lbs]*	0.1 *[0.22]*

6

Technical data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4786]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

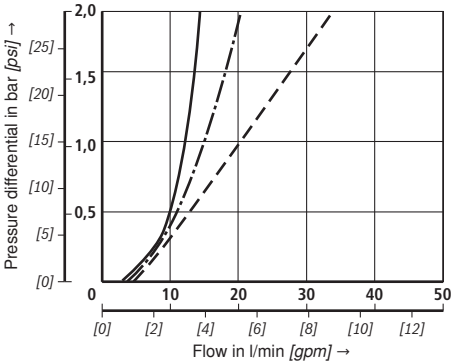
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 1.5 bar

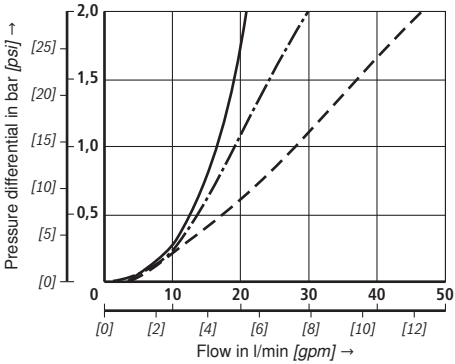
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]
68 mm²/s [315 SUS]
30 mm²/s [139 SUS]

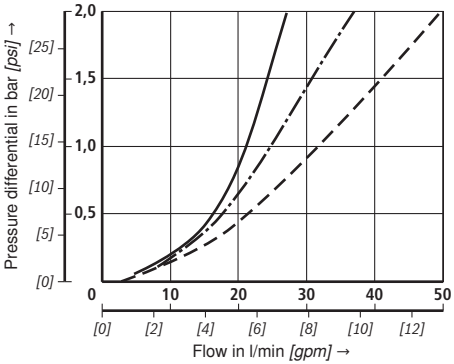
Size 0040



Size 0063



Size 0100



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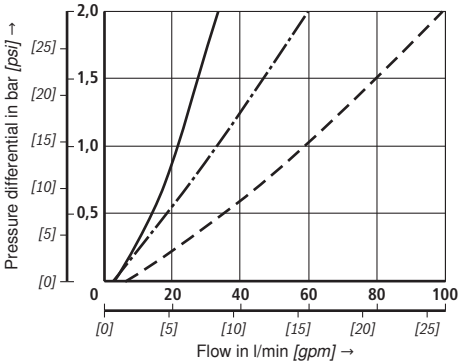

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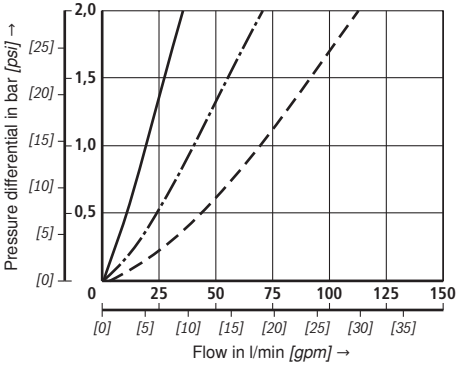
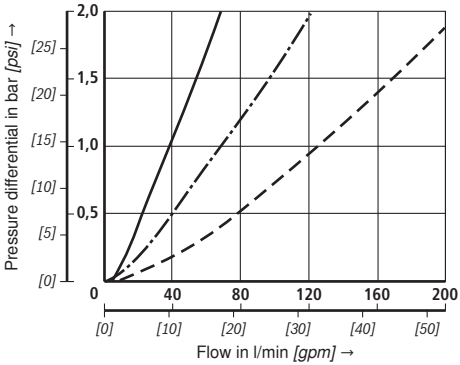


Size 0160



6

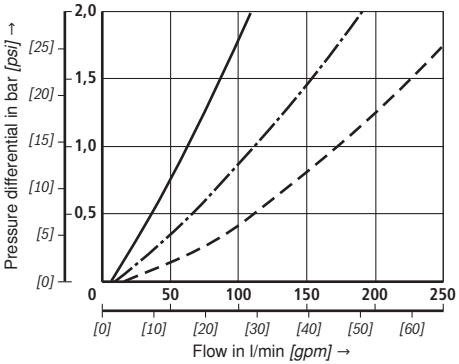
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 1.5 bar

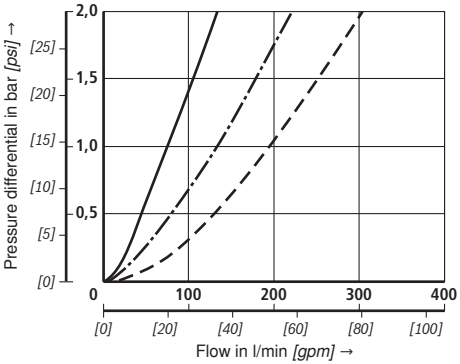
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]; 68 mm²/s [315 SUS]; 30 mm²/s [139 SUS]

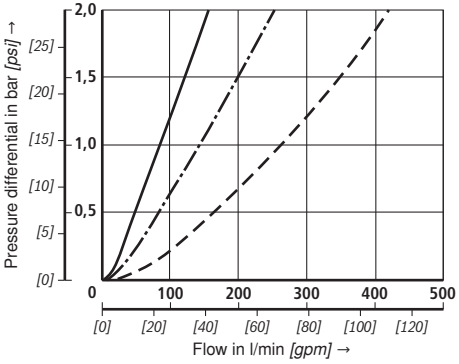
Size 0250



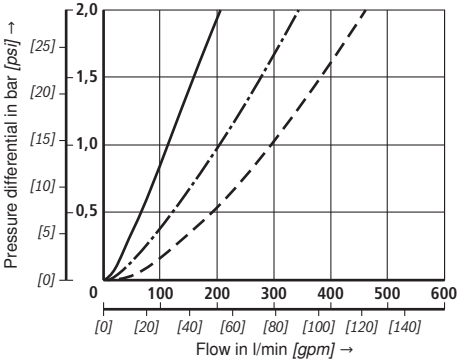
Size 0400



Size 0630



Size 1000



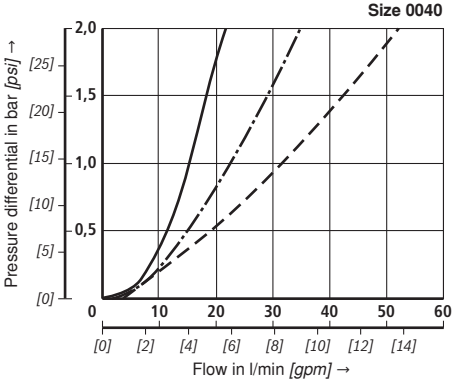
Characteristic curves (measured with HLP46, according to ISO 3968) H10XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters
recommended initial Δ*p* for design = 1.5 bar

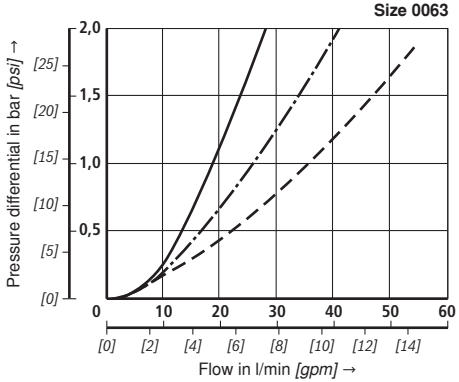
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]
68 mm²/s [315 SUS]
30 mm²/s [139 SUS]

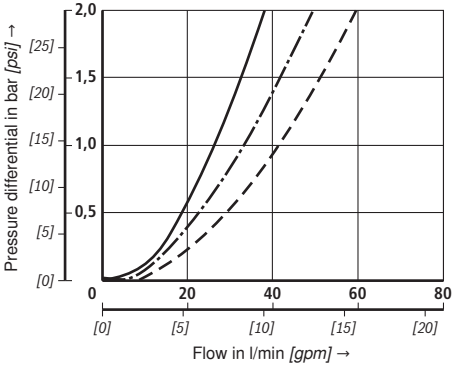
Size 0040



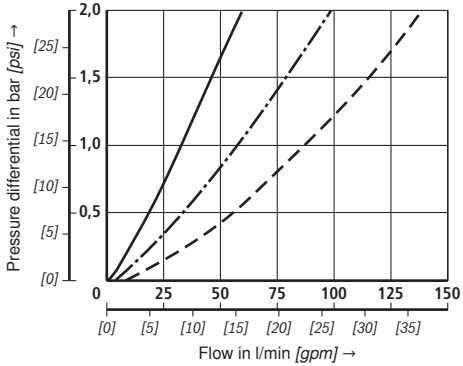
Size 0063



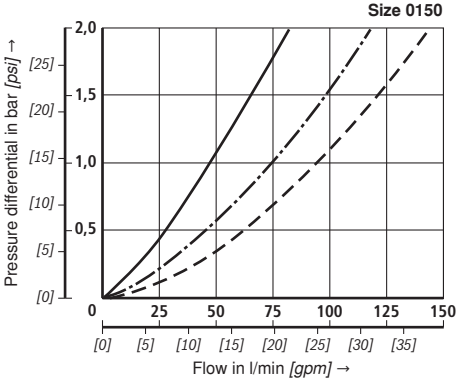
Size 0100



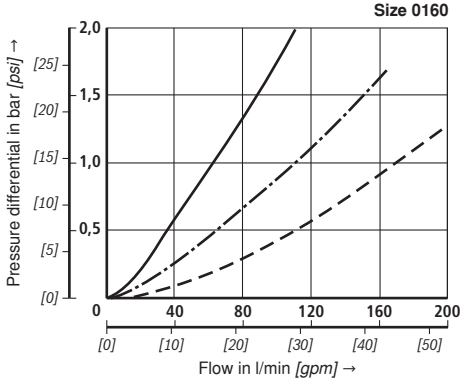
Size 0130



Size 0150



Size 0160



6

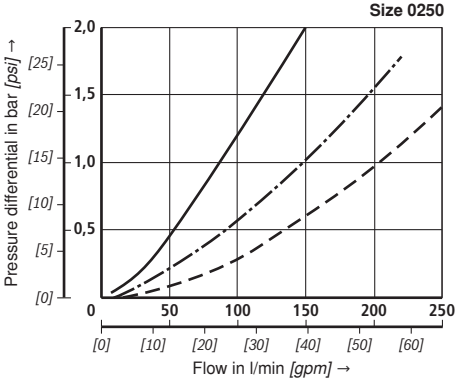
Characteristic curves (measured with HLP46, according to ISO 3968) **H10XL...**

Specific weight: < 0.9 kg/dm³
Δ***p***-Q characteristic curves for complete filters
recommended initial Δ***p*** for design = 1.5 bar

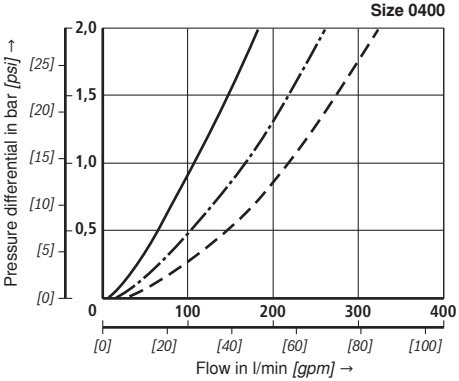
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s *[649 SUS]*; 68 mm²/s *[315 SUS]*; 30 mm²/s *[139 SUS]*

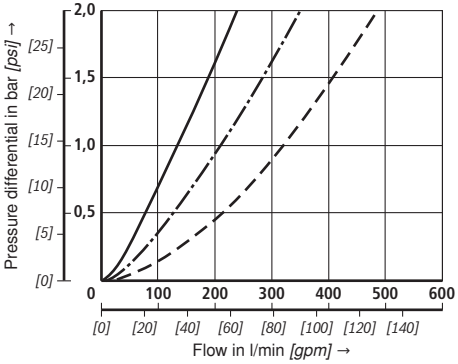
Size 0250



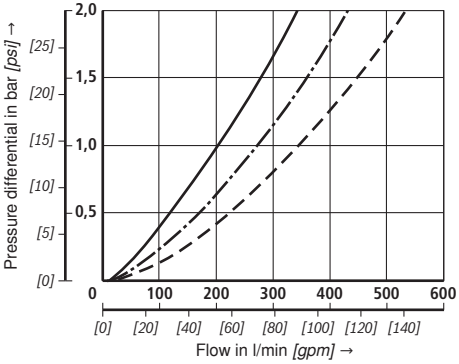
Size 0400



Size 0630

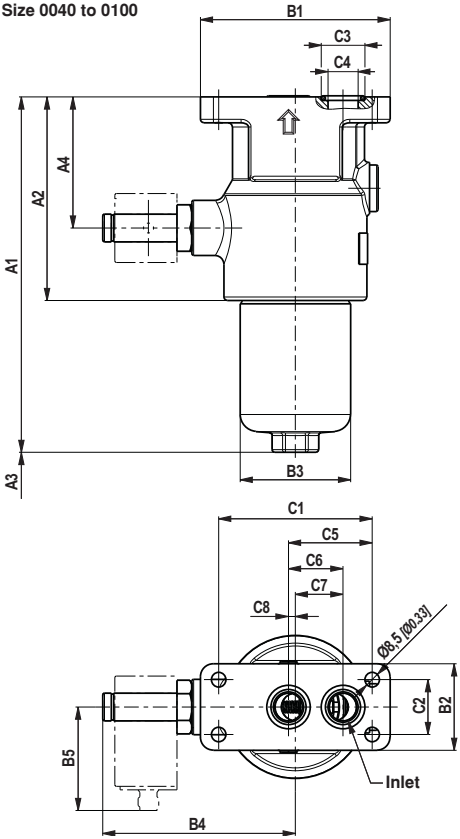


Size 1000

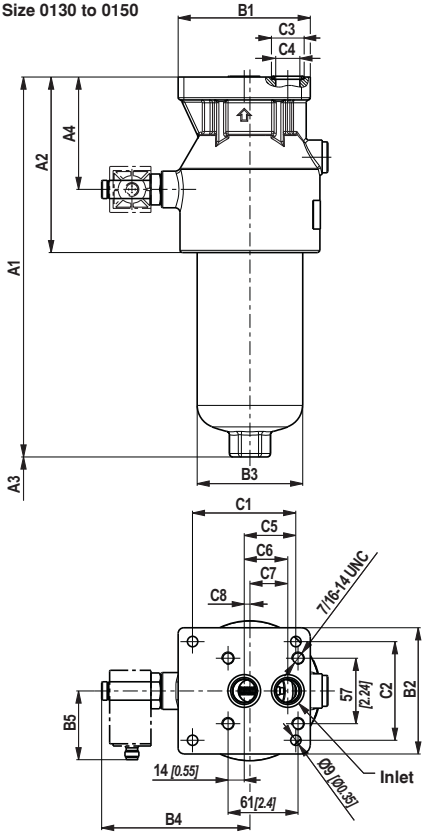


Unit dimensions size 0040 to size 0150 (dimensions in mm *[inch]*)

Size 0040 to 0100



Size 0130 to 0150



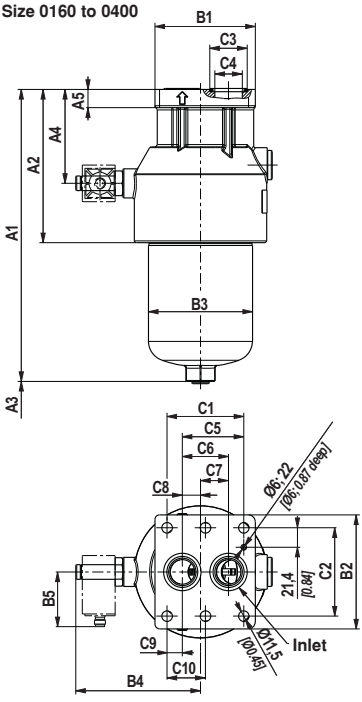
Type 450 PBF(N)…	Content in l *[US gal]*	A1	A2	A3 [1]	A4	B1	B2	B3 Ø	B4
0040	0.25 *[0.06]*	206 *[8.11]*	118 *[4.65]*	100 *[3.94]*	76 *[2.99]*	110 *[4.33]*	50 *[1.97]*	64 *[2.52]*	112 *[4.41]*
0063	0.36 *[0.09]*	270 *[10.6]*							
0100	0.55 *[0.14]*	360 *[14.2]*							
0130	0.95 *[0.25]*	331 *[13.0]*	153 *[6.03]*	120 *[4.72]*	98 *[3.86]*	115 *[4.53]*	110 *[4.33]*	92 *[3.62]*	129 *[5.08]*
0150	1.15 *[0.30]*	382 *[15.0]*							

Type 450 PBF(N)…	B5	C1	C2	C3 Ø	C4 Ø	C5	C6	C7	C8
0040	60 *[2.36]*	89 *[3.50]*	31.8 *[1.25]*	25.3 *[0.99]*	17.5 *[0.69]*	48.5 *[1.91]*	31.6 *[1.24]*	27.6 *[1.09]*	4 *[0.16]*
0063									
0100									
0130		90 *[3.54]*	86 *[3.39]*	28.6 *[1.13]*	21 *[0.83]*	45 *[1.77]*	38 *[1.50]*	33 *[1.30]*	5 *[0.20]*
0150									

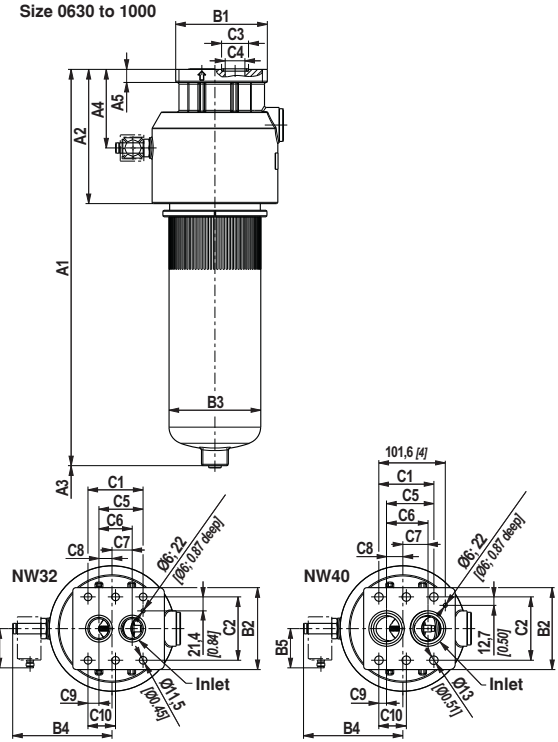
[1] Servicing height for filter replacement

Unit dimensions size 0160 to size 1000 (dimensions in mm *[inch]*)

Size 0160 to 0400



Size 0630 to 1000



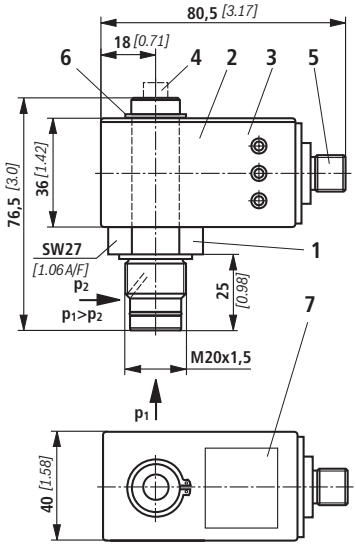
Filter housing for filter elements in accordance with DIN 24550 and according to BR standard

Type 450 PBF(N)…	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	B1	B2	B3	B4	B5
0160	1.6 *[0.42]*	320 *[12.6]*	168 *[6.61]*	120 *[4.72]*	103 *[4.06]*	22 *[0.87]*	110 *[4.33]*	125 *[4.92]*	114 *[4.49]*	137 *[5.39]*	60 *[2.36]*
0250	2.2 *[0.58]*	410 *[16.1]*									
0400	3.5 *[0.92]*	560 *[22.05]*									
0630	5.0 *[1.32]*	605 *[23.82]*	205 *[8.07]*	160 *[6.30]*	120 *[4.72]*		140 *[5.51]*		140 *[5.51]*	152 *[5.98]*	
1000	6.5 *[1.72]*	843 *[33.20]*		650 *[25.6]*					190 *[7.48]*		
A1 0630	5.0 *[1.32]*	605 *[23.82]*		160 *[6.30]*					140 *[5.51]*		
A1 1000	6.5 *[1.72]*	843 *[33.20]*		650 *[25.6]*					190 *[7.48]*		

Type 450 PBF(N)…	C1	C2	C3 Ø	C4 Ø	C5	C6	C7	C8	C9	C10
0160	84.1 *[3.31]*	96.8 *[3.81]*	41 *[1.61]*	30 *[1.18]*	67.4 *[2.65]*	50.7 *[1.99]*	30.7 *[1.21]*	20 *[0.79]*	16.7 *[0.66]*	42.05 *[1.66]*
0250										
0400										
0630			54.3 *[2.14]*	40 *[1.57]*	72.4 *[2.85]*	63.5 *[2.50]*	38.5 *[1.52]*	25 *[0.98]*	11.7 *[0.46]*	
1000										
A1 0630			41 *[1.61]*	30 *[1.18]*	67.4 *[2.65]*	50.7 *[1.99]*	30.7 *[1.21]*	20 *[0.79]*	16.7 *[0.66]*	
A1 1000										

[1] Servicing height for filter replacement

Maintenance indicator (dimensions in mm)



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (can be rotated by 360°); Plug-in connection M12x1 or according to DIN EN 175201-804

3 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

4 Optical indicator bistable

5 Round connector M12x1, 4-pin

6 Locking ring

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2).

Round plug-in connection M12x1 (5)
For connection e.g. to ABZFV-E1SP-M12x1-1X/-DIN (see page 17).

Switching elements with increased switching power at request.

6

Spare parts

Mechanical optical maintenance indicator

ABZ | F | V – HV5 – 1X / – DIN

Rexroth plant construction accessories

Filter

Maintenance indicator

Mechanical optical maintenance indicator for high-pressure filters switching point 5 bar *[72 psi]* **= HV5**

DIN = Mark for DIN and SAE version

Seal material

M = NBR seal
V = FKM seal

Component series

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Mechanical optical maintenance indicator	Material no.
ABZFV-HV5-1X/M-DIN	**R901025313**

Seal kit

D | 450PBF | | |

Seal kit

Type 450PBF

Size

Size 0040-0100	**= N0040-0100**
Size 0130-0150	**= 0130-0150**
Size 0160-0400	**= N0160-0400**
Size 0630	**= N0630**
Size 1000	**= N1000**
Size 0630, port A1	**= N0630-A1**
Size 1000, port A1	**= N1000-A1**

Seal

M = NBR seal
V = FKM seal

Seal kit	Material no.
SEAL KIT D450PBFN0040-0100-M	**R961005214**
SEAL KIT D450PBF0130-0150-M	**R961005212**
SEAL KIT D450PBFN0160-0400-M	**R961005216**
SEAL KIT D450PBFN0630-M	**R961005218**
SEAL KIT D450PBFN1000-M	**R961005220**

Installation, commissioning and maintenance

Installation of the filter

Verify operating pressure with name plate information. Remove blanking plugs from filter inlet and outlet, mount filter at the manifold without tension stress considering flow direction (direction arrows) and servicing height of the filter element. The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electrical maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element (6) with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element (6). Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) or the floor (size 1000) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the centering spigot in the filter head by turning it slightly
- Check the seal ring and the support ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H…XL, clean the filter element with material G….
- The efficiency of the cleaning process depends on the characteristics of contamination and the final pressure drop prior to servicing / cleaning the filter element. If the pressure differential after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl or floor to stop. Then turn out the filter bowl by 1/8 to 1/2 turn so that the filter bowl is not stuck due to the pressure pulsation and can be easily loosened in case of maintenance works.

Quality and standardization

The block mounting filters for hydraulic applications according to 51417 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PED, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

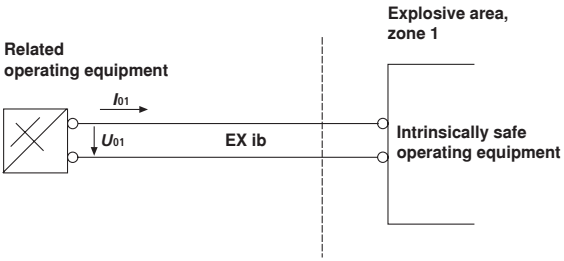
Use in explosive areas according to directive 94/9/EC (ATEX)

The block mounting filters according to 51417 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the block mounting filters according to 51417 in explosive areas, potential equalization has to be ensured.

According to DIN EN 50020, the electrical maintenance indicators are simple, electrical operating equipment not having own voltage sources. This simple, electrical operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib] be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



With electrical maintenance indicators with two switching points, switching units with two intrinsically safe input circles must be used.

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Rexroth
Bosch Group

Block mounting filter, for lateral flange-mounting

RE 51418/12.10 1/18
Replaces: 01.10

Type 245PSFN0040 to 0400; 245PSF0130, 0150


Filter_82_d

Size according to **DIN 24550**: 0040 to 0400
Additional sizes: 0130, 0150
Nominal pressure 250 bar *[3626 psi]*
Connection up to DN 40
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

- Special highly efficient filter media
- Adsorption of very fine particles across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized design due to 3D computer-supported design

Ordering code

Of the filter

245	PSF		–		00	–	V5,0	–	

Pressure
250 bar *[3626 psi]* **= 245**

Block mounting filter,
for lateral flange-mounting **= PSF**

Filter element
according to DIN 24550 **= N**

Size
PSFN… **= 0040 0063 0100 0160 0250 0400**
PSF… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Element design
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Complementary details
without = No additional details
– M = size 0040 – 150
1 Minimess connection
(on the dirt side)
size 0160 – 400
2 Minimess connections

Seal
M = NBR seal
V = FKM seal

Maintenance indicator
V5,0 = Maintenance indicator, optical specify switching pressure 5.0 bar *[72.5 psi]*

Order example:
245PSFN0063-H10XLB00-V5,0-M
Material no.: R928024393

Further versions (filter materials, ...) available at request

Of the filter element

2.		–		–	–

Filter element
Design **= 2.**

Size
PSFN… **= 0040 0063 0100 0160 0250 0400**
PSF… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
Absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]* **= A**
330 bar *[4786 psi]* **= B**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Element design
0… = Standard adhesive T = 100 °C *[212 °F]*
…0 = Standard material

Order example:
2.0063 H3XL-B00-0-M0
Material no.: R928006708

Standard types

NBR seal, without bypass, flow specifications for ν = 30 mm²/s

Block mounting filter 245 PSF(N), filter rating **3 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1.5 bar *[21.8 psi]* [1)]	Material no. Filter	Material no. Replacement element
245PSFN0040-H3XLB00-V5,0-M	28	**R928024264**	**R928006654**
245PSFN0063-H3XLB00-V5,0-M	50	**R928024265**	**R928006708**
245PSFN0100-H3XLB00-V5,0-M	68	**R928024266**	**R928006762**
245PSF0130-H3XLB00-V5,0-M	104	**R928024267**	**R928022310**
245PSF0150-H3XLB00-V5,0-M	130	**R928024268**	**R928022319**
245PSFN0160-H3XLB00-V5,0-M	150	**R928024269**	**R928006816**
245PSFN0250-H3XLB00-V5,0-M	250	**R928024270**	**R928006870**
245PSFN0400-H3XLB00-V5,0-M	305	**R928024271**	**R928006924**

Block mounting filter 245 PSF(N), filter rating **6 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1.5 bar *[21.8 psi]* [1)]	Material no. Filter	Material no. Replacement element
245PSFN0040-H6XLB00-V5,0-M	35	**R928024328**	**R928006655**
245PSFN0063-H6XLB00-V5,0-M	55	**R928024329**	**R928006709**
245PSFN0100-H6XLB00-V5,0-M	72	**R928024330**	**R928006763**
245PSF0130-H6XLB00-V5,0-M	135	**R928024331**	**R928022311**
245PSF0150-H6XLB00-V5,0-M	175	**R928024332**	**R928022320**
245PSFN0160-H6XLB00-V5,0-M	200	**R928024333**	**R928006817**
245PSFN0250-H6XLB00-V5,0-M	280	**R928024334**	**R928006871**
245PSFN0400-H6XLB00-V5,0-M	325	**R928024335**	**R928006925**

Block mounting filter 245 PSF(N), filter rating **10 µm**

Type	Flow in l/min *[gpm]* with Δ*p* = 1.5 bar *[21.8 psi]* [1)]	Material no. Filter	Material no. Replacement element
245PSFN0040-H10XLB00-V5,0-M	50	**R928024392**	**R928006656**
245PSFN0063-H10XLB00-V5,0-M	70	**R928024393**	**R928006710**
245PSFN0100-H10XLB00-V5,0-M	75	**R928024394**	**R928006764**
245PSF0130-H10XLB00-V5,0-M	180	**R928024395**	**R928022312**
245PSF0150-H10XLB00-V5,0-M	220	**R928024396**	**R928022321**
245PSFN0160-H10XLB00-V5,0-M	260	**R928024397**	**R928006818**
245PSFN0250-H10XLB00-V5,0-M	310	**R928024398**	**R928006872**
245PSFN0400-H10XLB00-V5,0-M	350	**R928024399**	**R928006926**

[1)] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Codification: Electronic switching element for maintenance indicator

ABZ | F | V – | –1X/ | –DIN

Rexroth plant construction accessories

Filter

Maintenance indicator

Electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

Electronic switching element with 2 switching points (normally open/ normally closed), 75 %, 100 %, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

Electronic switching element with 2 switching points (normally open/ normally closed), 75 %, 100 %, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

–DIN = Mark for DIN model

Component series

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Order example: Block mounting filter with mechanical optical maintenance indicator for $p_{nom.}$ = 250 bar *[3626 psi]* without by-pass valve, size 0063, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

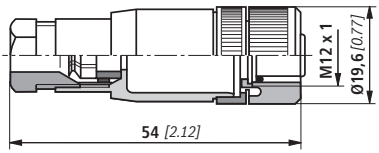
Filter:	**245PSFN0063-H10XLB00-V5,0-M**	**Material number: R928024393**
Maintenance indicator:	**ABZFV-E1SP-M12X1-1X/-DIN**	**Material number: R901025339**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12 x 1

Mating connector for K24 4-pin, M12 x 1 with screw connection, cable gland Pg9.

Material no. R900031155



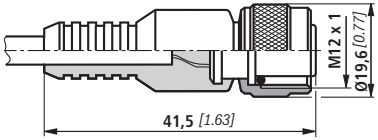
Mating connector for K24-3m 4-pin, M12 x 1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

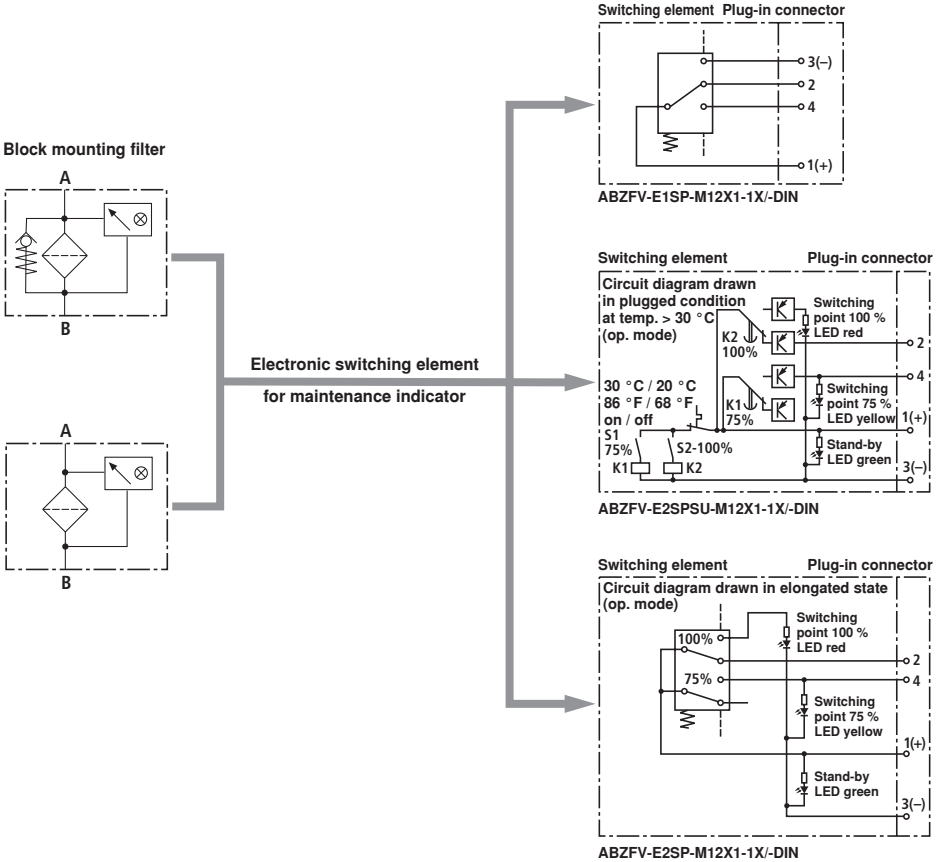
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For more round plug-in connections, see data sheet 08006.

Symbols


Block mounting filter
A
B
A
B
Electronic switching element
for maintenance indicator
Switching element
Plug-in connector
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn
in plugged condition
at temp. > 30 °C
(op. mode)
K2
100%
Switching
point 100 %
LED red
2
4
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K1
75%
Switching
point 75 %
LED yellow
1(+)
Stand-by
LED green
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn in elongated state
(op. mode)
100%
75%
Switching
point 100 %
LED red
2
4
Switching
point 75 %
LED yellow
1(+)
Stand-by
LED green
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

6

Function, section

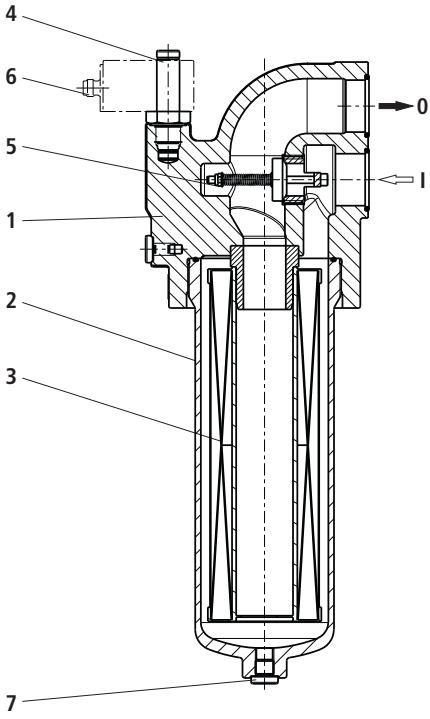
Block mounting filters are suitable for direct attachment to pump and control blocks. They are installed upstream open-loop or closed-loop control units to be protected.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the pump or control block and thus the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks – as they may e.g. occur in case of the abrupt opening of large control valves due to the accelerated fluid weight – can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (7).

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points (6), which has to be ordered separately. The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.



Technical data (For applications outside these parameters, please consult us!)

general

Installation position			Lateral			
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*			
Weight [1]		Size	**0040**	**0063**	**0100**	**0130**
		kg *[lbs]*	4.6 *[10.14]*	5.0 *[11.02]*	5.8 *[12.78]*	8.8 *[19.40]*
Weight [1]		Size	**0150**	**0160**	**0250**	**0400**
		kg *[lbs]*	9.2 *[20.28]*	13.5 *[29.76]*	14.3 *[31.52]*	16.0 *[35.26]*
Material	Filter head		GGG			
	Filter bowl		Steel			
	Optical maintenance indicator		Brass			
	Electronic switching element		Plastic PA6			

hydraulic

Maximum operating pressure	bar *[psi]*	250 *[3626]*
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]*
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with Max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	7 ± 0.5 *[100 ± 7]*
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage		A	Max. 1
Voltage range	E1SP-M12x1	V DC/AC	Max. 150
	E2SP	V DC	10 to 30
Max. switching power with resistive load			20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1		Changeover
	E2SP-M12x1		Normally open contact at 75 % of the response pressure, Normally closed contact at 100 % of the response pressure
	E2SPSU-M12x1		Normally open contact at 75 % of the response pressure, Normally closed contact at 100 % of the response pressure Signal interconnection at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...			Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)
Protection class according to EN 60529			IP 65
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.			
Weight Electronic switching element: – with round plug-in connection M12 x 1		kg *[lbs]*	0.1 *[0.22]*

[1] Weight including standard filter element and maintenance indicator

6

Technical Data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4786]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluid			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

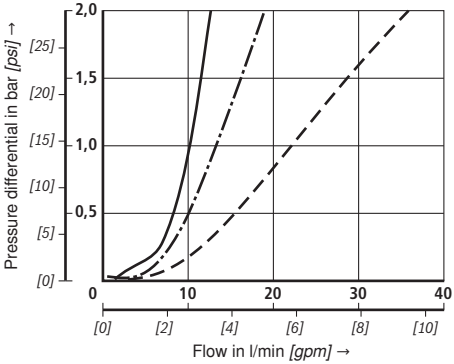
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended
initial Δ*p* for design = 1.5 bar

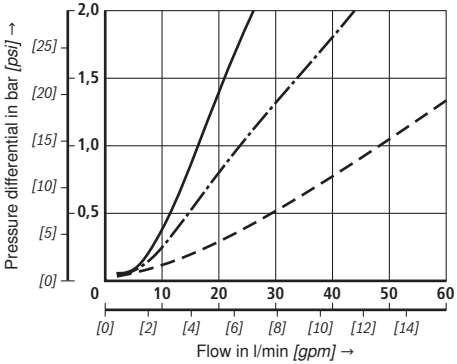
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]
68 mm²/s [315 SUS]
30 mm²/s [142 SUS]

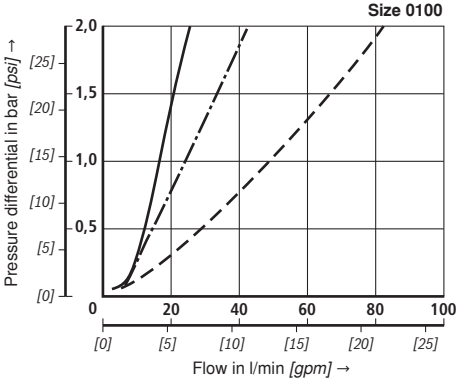
Size 0040



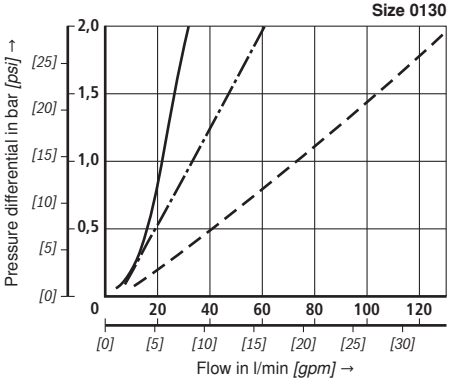
Size 0063



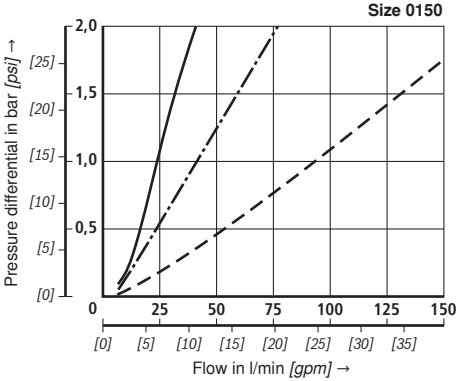
Size 0100



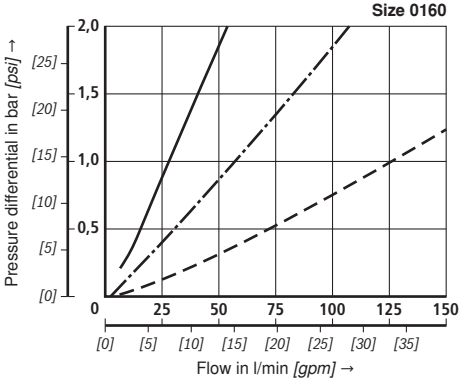
Size 0130



Size 0150



Size 0160



6

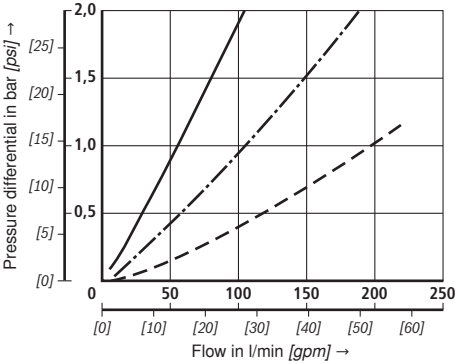
Characteristic curves (measured with HLP46, according to ISO 3968) **H3XL…**

Specific weight: < 0.9 kg/dm³
Δ***p***-Q characteristic curves for complete filters recommended initial Δ***p*** for design = 1.5 bar

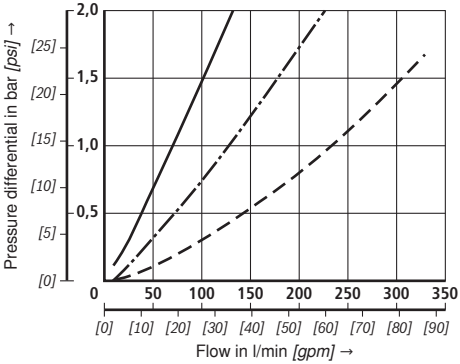
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: **140 mm²/s** *[649 SUS]*, **68 mm²/s** *[315 SUS]*, **30 mm²/s** *[142 SUS]*

Size 0250



Size 0400



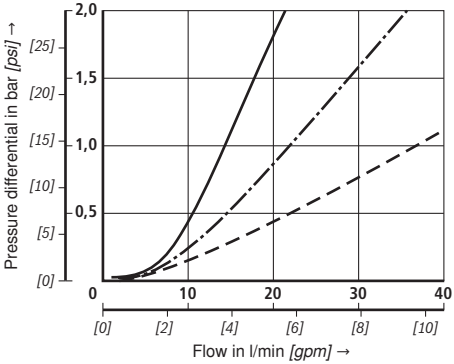
Characteristic curves (measured with HLP46, according to ISO 3968) H10XL...

Specific weight: < 0.9 kg/dm³
Δ*p*-Q characteristic curves for complete filters recommended
initial Δ*p* for design = 1.5 bar

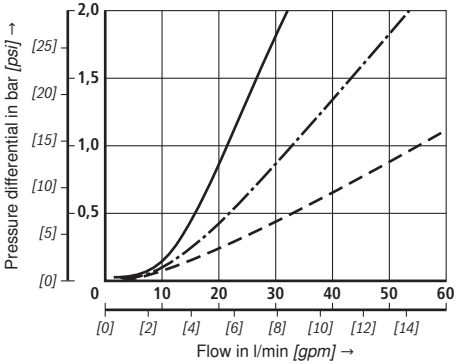
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]; 68 mm²/s [315 SUS]; 30 mm²/s [142 SUS]

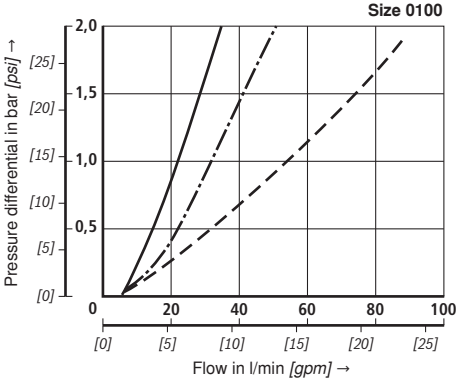
Size 0040



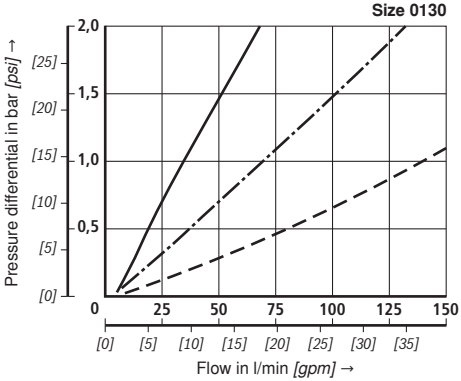
Size 0063



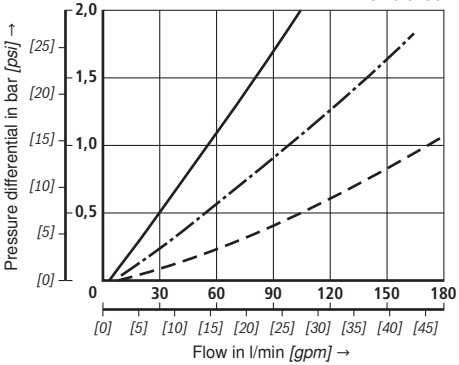
Size 0100



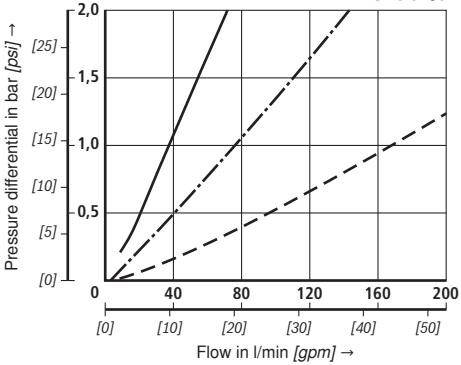
Size 0130



Size 0150



Size 0160



6

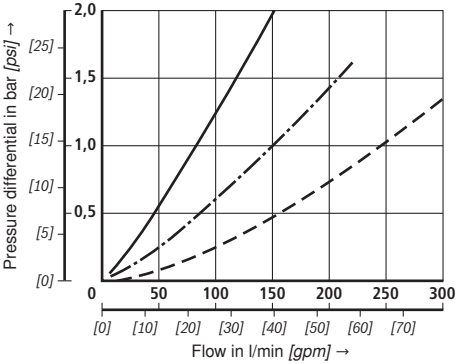
Characteristic curves (measured with HLP46, according to ISO 3968) **H10XL…**

Specific weight: < 0.9 kg/dm³
Δ***p***-Q characteristic curves for complete filters recommended initial Δ***p*** for design = 1.5 bar

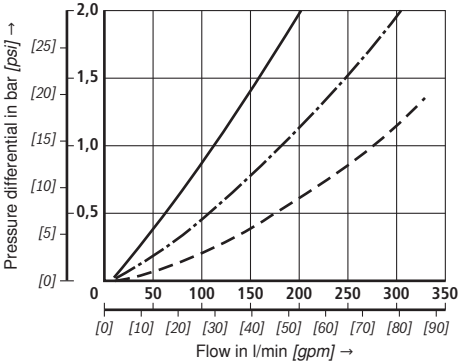
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[142 SUS]*

Size 0250

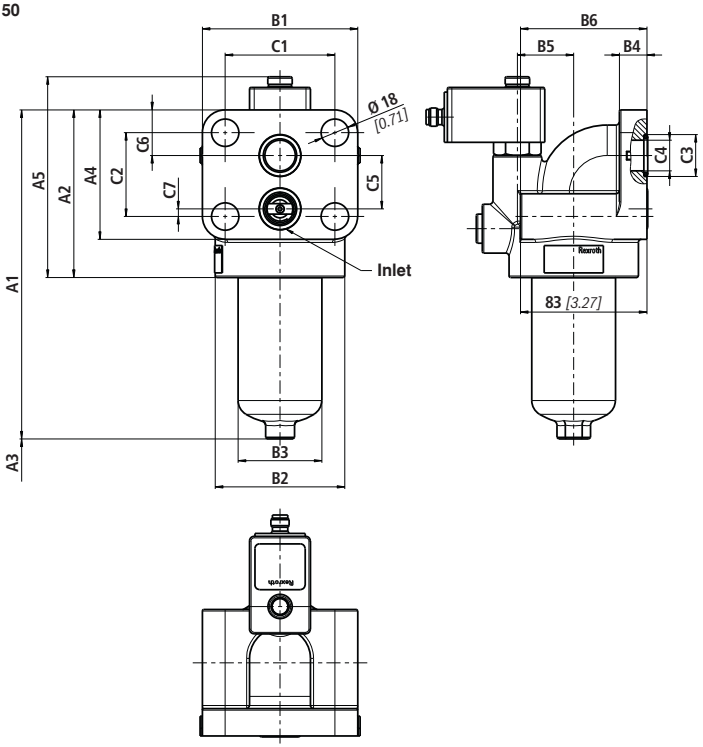


Size 0400



Unit dimensions size 0040 to size 0150 (dimensions in mm *[inch]*)

Size 0040 to 0150



Filter housing for filter elements in accordance with DIN 24550 and according to BRFS standard

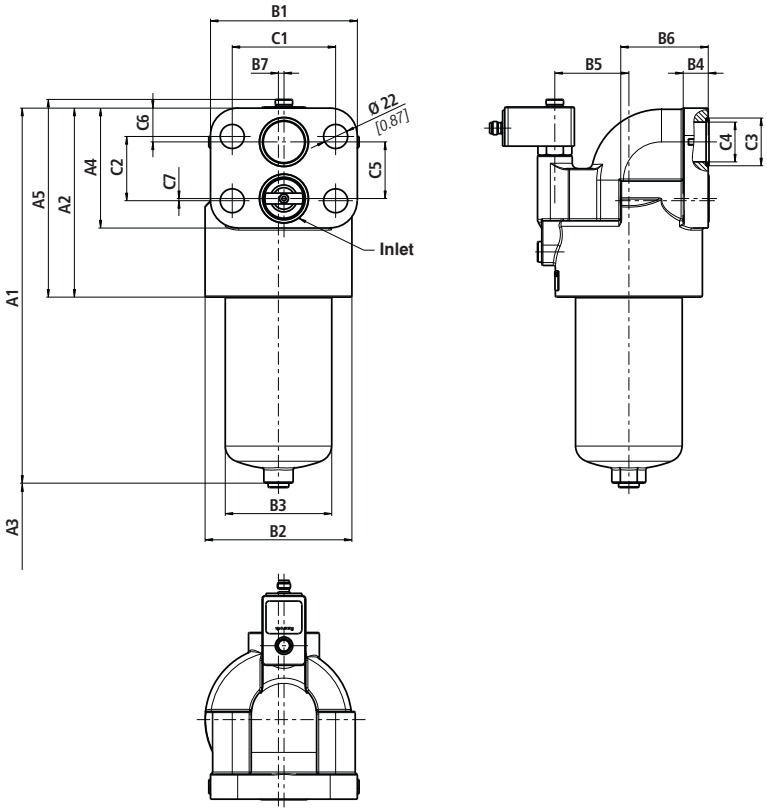
Type 245 PSF(N)...	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	B1	B2	B3
0040	0.25 *[0.07]*	216 *[8.50]*	110 *[4.33]*	100 *[3.94]*	85 *[3.35]*	132 *[5.20]*	102 *[4.02]*	Ø85 *[3.35]*	Ø55 *[2.17]*
0063	0.4 *[0.11]*	280 *[11.02]*							
0100	0.6 *[0.16]*	370 *[14.57]*							
0130	0.8 *[0.21]*	349 *[13.74]*	146 *[5.75]*	120 *[4.72]*	110 *[4.33]*	147 *[5.79]*	135 *[5.31]*	Ø116 *[4.57]*	Ø77 *[3.03]*
0150	0.98 *[0.26]*	399 *[15.71]*							

Type 245 PSF(N)...	B4	B5	B6	C1	C2	C3	C4	C5	C6	C7
0040	18 *[0.71]*	37 *[1.46]*	83 *[3.27]*	72 *[2.83]*	55 *[2.17]*	Ø27.5 *[1.08]*	Ø20 *[0.79]*	35 *[1.38]*	30 *[1.18]*	5 *[0.20]*
0063										
0100										
0130	20 *[0.79]*	52.5 *[2.07]*	75 *[2.95]*	95 *[3.74]*	59 *[2.32]*	Ø40 *[1.57]*	Ø32 *[1.26]*	52 *[2.05]*	31 *[1.22]*	2 *[0.08]*
0150										

[1] Servicing height for filter element replacement

Unit dimensions size 0160 to size 0400 (dimensions in mm *[inch]*)

Size 0160 to 0400



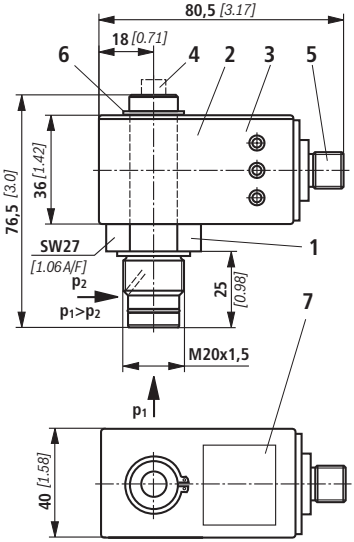
Filter housing for filter elements in accordance with DIN 24550 and according to BRFS standard

Type 245 PSF(N)...	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	B1	B2	B3
0160	1.5 *[0.40]*	345 *[13.58]*	174 *[6.85]*	120 *[4.72]*	110 *[4.33]*	182 *[7.17]*	135 *[5.31]*	Ø135 *[5.31]*	Ø98 *[3.86]*
0250	2.1 *[0.55]*	433 *[17.05]*							
0400	3.2 *[0.85]*	583 *[22.95]*							

Type 245 PSF(N)...	B4	B5	B6	B7	C1	C2	C3	C4	C5	C6	C7
0160	23 *[0.91]*	68 *[2.68]*	80.5 *[3.17]*	5 *[0.20]*	95 *[3.74]*	59 *[2.32]*	Ø45 *[1.77]*	Ø38 *[1.5]*	52 *[2.05]*	31 *[1.22]*	2 *[0.08]*
0250											
0400											

[1] Servicing height for filter element replacement

Maintenance indicator (dimensions in mm *[inch]*)



1 Mechanical optical maintenance indicator; Max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (can be rotated by 360°); plug-in connection M12x1 or according to DIN EN 175201-804

3 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

4 Optical indicator bistable

5 Round connector M12x1, 4-pin

6 Locking ring

7 Nameplate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2).

Round plug-in connection M12x1 (5)
For connection e.g. to ABZFV-E1SP-M12x1-1X/-DIN (see page 17).

Switching elements with increased switching power at request.

6

Spare parts

Mechanical optical maintenance indicator

Rexroth plant construction accessories

Filter

Maintenance indicator

Mechanical optical maintenance indicator for high-pressure filters switching point 5 bar *[72 psi]* **= HV5**

DIN = Mark for DIN model

Seal material

M = NBR seal
V = FKM seal

Component series

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Mechanical optical maintenance indicator	Material no.
ABZFV-HV5-1X/M-DIN	R901025313

Seal kit

Seal kit

Type 245PSF

Size

Size 0040-0100 **= N0040-0100**
Size 0130-0150 **= 0130-0150**
Size 0160-0400 **= N0160-0400**

Seal

M = NBR seal
V = FKM seal

Seal kit	Material no.
D245PSFN0040-0100-M	R928028217
D245PSF0130-0150-M	R928028216
D245PSFN0160-0400-M	R928028215

Installation, commissioning and maintenance

Installation of the filter

Verify operating pressure with name plate information. Remove dust protection plugs from filter inlet and outlet, mount filter at the control block without tension stress considering flow direction (direction arrows) and servicing height of the filter element. The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electrical maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element (6) with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element (6). Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the centering spigot in the filter head by turning it slightly
- Check the seal ring and the support ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H…XL, clean the filter element G….
- The efficiency of the cleaning process depends on the characteristics of contamination and the amount of the pressure differential before the filter element exchange. If the differential pressure after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the nameplate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl or floor to stop. Then turn out the filter bowl by 1/8 to 1/2 turn so that the filter bowl is not stuck due to the pressure pulsation and can be easily loosened in case of maintenance works.

Quality and standardization

The pressure filters for hydraulic applications according to 51418 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED) However, on the basis of the exception in article 1, section 3.6 of the PED hydraulic filters are exempt from the PED, if there are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

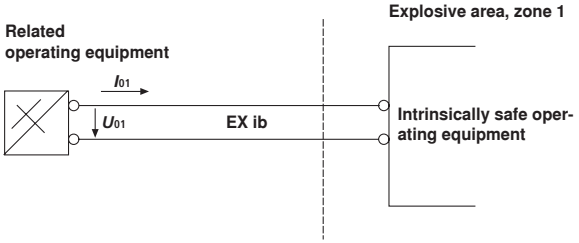
Use in explosive areas according to directive 94/9/EC (ATEX)

The pressure filters according to 51418 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the pressure filters according to 51418 in explosive areas, potential equalization has to be ensured.

According to DIN EN 50020, the electrical maintenance indicators are simple, electrical operating equipment not having own voltage sources. This simple, electrical operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib] be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



With electrical maintenance indicators with two switching points, switching units with two intrinsically safe input circles must be used.

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Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
Fax +49 (0) 93 52 / 18-23 58
documentation@boschrexroth.de
www.boschrexroth.de

Rexroth
Bosch Group

Block mounting filter, for lateral flange-mounting

RE 51419/02.10 1/18

Type 350PSFN0040 to 1000; 350PSF0130, 0150

350PSFN_d

Size according to **DIN 24550**: 0040 to 1000
Additional sizes: 0130, 0150
Nominal pressure 350 bar *[5079 psi]*
Port up to Ø 38
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

- Special highly efficient filter media
- Adsorption of very fine particles across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized design due to 3D computer-supported design

Ordering code

of the filter

350	PSF		–		00	–	V5,0	–	

Pressure
350 bar *[5079 psi]* **= 350**

Block mounting filter
For lateral flange-mounting **= PSF**

Filter element
According to DIN 24550 **= N**

Size
PSFN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
PSF… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Element design
Standard adhesive T = 100 °C *[212 °F]* **= 0…**
Standard material **= …0**

Complementary details
No code = No complementary details
– M = 2 Minimess connections (Size 0130 – 1000)

Seal
M = NBR seal
V = FKM seal

Maintenance indicator
V5,0 = Maintenance indicator, optical specify switching pressure 5.0 bar *[72.5 psi]*

Order example:
350PSFN0063-H10XLB00-V5,0-M
Material no.: R928026491

Further versions (filter materials, connections, ...) are available at request.

of the filter element

2.		–	–	0	–

Filter element
Design **= 2.**

Size
PSFN… **= 0040 0063 0100 0160 0250 0400 0630 1000**
PSF… **= 0130 0150**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G100 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
30 bar *[435 psi]*, with bypass valve 7 bar *[102 psi]* **= A**
330 bar *[4786 psi]*, without bypass valve **= B**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Element design
0… = Standard adhesive T = 100 °C *[212 °F]*
…0 = Standard material

Order example:
2.0063 H10XL-B00-0-M
Material no.: R928006710

Standard types

NBR seal, without bypass, flow specifications for 30 mm²/s

Block mounting filter 350PSF(N), filter rating **3 µm**

Type	Flow in l/min *[gpm]* with Δp = 1.5 bar *[21.8 psi]* [1]	Material no. Filter	Material no. Replacement element
350PSFN0040-H3XLB00-V5,0-M	32 *[8.5 gpm]*	**R928026330**	**R928006654**
350PSFN0063-H3XLB00-V5,0-M	47 *[12.4 gpm]*	**R928026331**	**R928006708**
350PSFN0100-H3XLB00-V5,0-M	61 *[16.1 gpm]*	**R928026332**	**R928006762**
350PSF0130-H3XLB00-V5,0-M	108 *[28.5 gpm]*	**R928026333**	**R928022310**
350PSF0150-H3XLB00-V5,0-M	137 *[36.2 gpm]*	**R928026334**	**R928022319**
350PSFN0160-H3XLB00-V5,0-M	185 *[48.9 gpm]*	**R928026335**	**R928006816**
350PSFN0250-H3XLB00-V5,0-M	272 *[71.9 gpm]*	**R928026336**	**R928006870**
350PSFN0400-H3XLB00-V5,0-M	341 *[90.1 gpm]*	**R928026337**	**R928006924**
350PSFN0630-H3XLB00-V5,0-M	390 *[103.0 gpm]*	**R928026338**	**R928006978**
350PSFN1000-H3XLB00-V5,0-M	470 *[124.2 gpm]*	**R928026339**	**R928007032**

Block mounting filter 350PSF(N), filter rating **6 µm**

Type	Flow in l/min *[gpm]* with Δp = 1.5 bar *[21.8 psi]* [1]	Material no. Filter	Material no. Replacement element
350PSFN0040-H6XLB00-V5,0-M	44 *[11.6 gpm]*	**R928026410**	**R928006655**
350PSFN0063-H6XLB00-V5,0-M	59 *[15.6 gpm]*	**R928026411**	**R928006709**
350PSFN0100-H6XLB00-V5,0-M	68 *[18.0 gpm]*	**R928026412**	**R928006763**
350PSF0130-H6XLB00-V5,0-M	158 *[41.7 gpm]*	**R928026413**	**R928022311**
350PSF0150-H6XLB00-V5,0-M	196 *[51.8 gpm]*	**R928026414**	**R928022320**
350PSFN0160-H6XLB00-V5,0-M	233 *[61.6 gpm]*	**R928026415**	**R928006817**
350PSFN0250-H6XLB00-V5,0-M	318 *[84.0 gpm]*	**R928026416**	**R928006871**
350PSFN0400-H6XLB00-V5,0-M	369 *[97.5 gpm]*	**R928026417**	**R928006925**
350PSFN0630-H6XLB00-V5,0-M	428 *[113.1 gpm]*	**R928026418**	**R928006979**
350PSFN1000-H6XLB00-V5,0-M	482 *[127.3 gpm]*	**R928026419**	**R928007033**

Block mounting filter 350PSF(N), filter rating **10 µm**

Type	Flow in l/min *[gpm]* with Δp = 1.5 bar *[21.8 psi]* [1]	Material no. Filter	Material no. Replacement element
350PSFN0040-H10XLB00-V5,0-M	52 *[13.7 gpm]*	**R928026490**	**R928006656**
350PSFN0063-H10XLB00-V5,0-M	67 *[17.7 gpm]*	**R928026491**	**R928006710**
350PSFN0100-H10XLB00-V5,0-M	72 *[19.0 gpm]*	**R928026492**	**R928006764**
350PSF0130-H10XLB00-V5,0-M	189 *[49.9 gpm]*	**R928026493**	**R928022312**
350PSF0150-H10XLB00-V5,0-M	241 *[63.7 gpm]*	**R928026494**	**R928022321**
350PSFN0160-H10XLB00-V5,0-M	265 *[70.0 gpm]*	**R928026495**	**R928006818**
350PSFN0250-H10XLB00-V5,0-M	349 *[92.2 gpm]*	**R928026496**	**R928006872**
350PSFN0400-H10XLB00-V5,0-M	380 *[100.4 gpm]*	**R928026497**	**R928006926**
350PSFN0630-H10XLB00-V5,0-M	460 *[121.5 gpm]*	**R928026498**	**R928006980**
350PSFN1000-H10XLB00-V5,0-M	490 *[129.4 gpm]*	**R928026499**	**R928007034**

[1] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

ABZ	F	V –	–1X /	–DIN

ABZ: Rexroth plant construction accessories

F: Filter

V: Maintenance indicator

Electronic switching element with 1 switching point (changeover) round plug-in connection M12x1 **= E1SP-M12X1**

Electronic switching element with 2 switching points (normally open/normally closed), 75 %, 100 %, round plug-in connection M12x1, 3 LED **= E2SP-M12X1**

Electronic switching element with 2 switching points (normally open/ normally closed), 75 %, 100 %, signal suppression until 30 °C round plug-in connection M12x1, 3 LED **= E2SPSU-M12X1**

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Component series

–DIN = Mark for DIN version

Electronic switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341

Order example: Block mounting filter with mechanical optical maintenance indicator for $p_{nom.}$ = 350 bar *[5079 psi]* without by-pass valve, size 0063, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

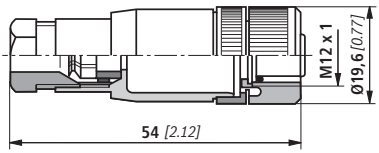
Filter:	**350PSFN0063-H10XLB00-V5,0-M**	**Material no.: R928026491**
Maintenance indicator:	**ABZFV-E1SP-M12X1-1X/-DIN**	**Material no.: R901025339**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

for electronic switching element with round plug-in connection M12 x 1

Mating connector for K24 4-pin, M12 x 1 with screw connection, cable gland Pg9.

Material no. R900031155



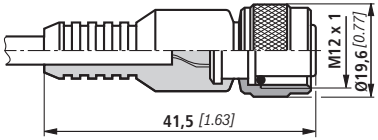
Mating connector for K24-3m 4-pin, M12 x 1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

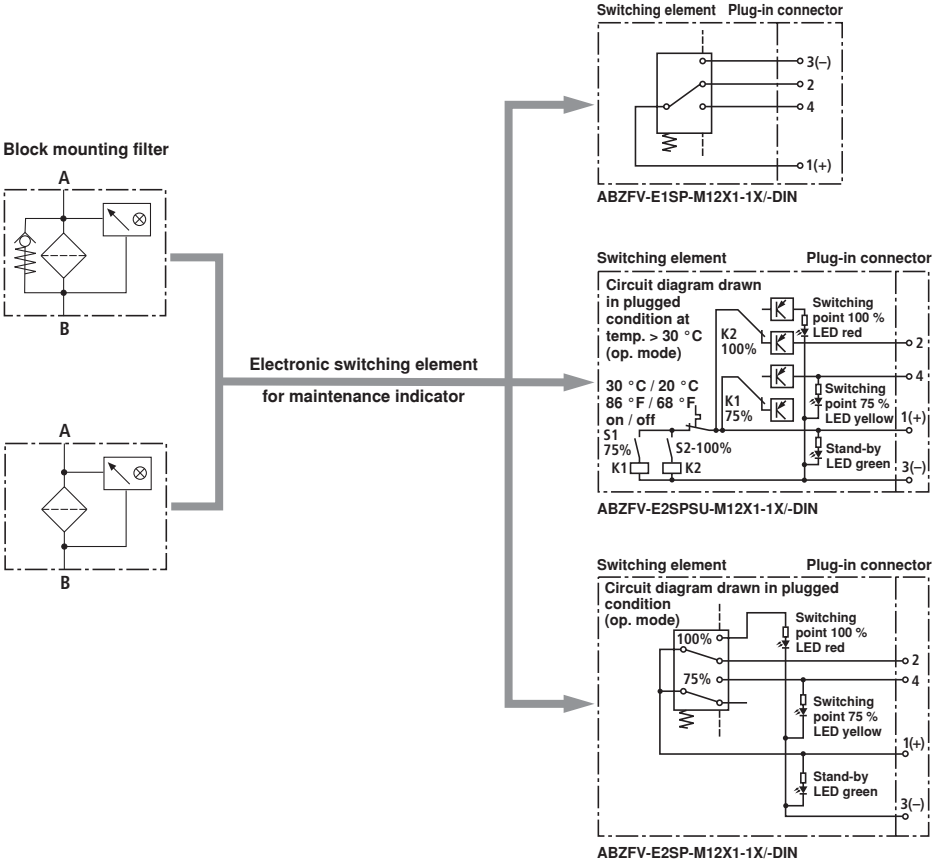
1	Brown
2	White
3	Blue
4	Black

Material no. R900064381



For more round plug-in connections, see data sheet RE 08006.

Symbols


Block mounting filter
A
B
A
B
Electronic switching element
for maintenance indicator
Switching element
Plug-in connector
3(–)
2
4
1(+)
ABZFV-E1SP-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn in plugged condition at temp. > 30 °C (op. mode)
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
K2
100%
K1
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
ABZFV-E2SPSU-M12X1-1X/-DIN
Switching element
Plug-in connector
Circuit diagram drawn in plugged condition
(op. mode)
100%
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Stand-by LED green
2
4
1(+)
3(–)
ABZFV-E2SP-M12X1-1X/-DIN

6

Function, section

Block mounting filters are suitable for direct attachment to pump and control blocks. They are installed upstream open-loop or closed-loop control units to be protected.

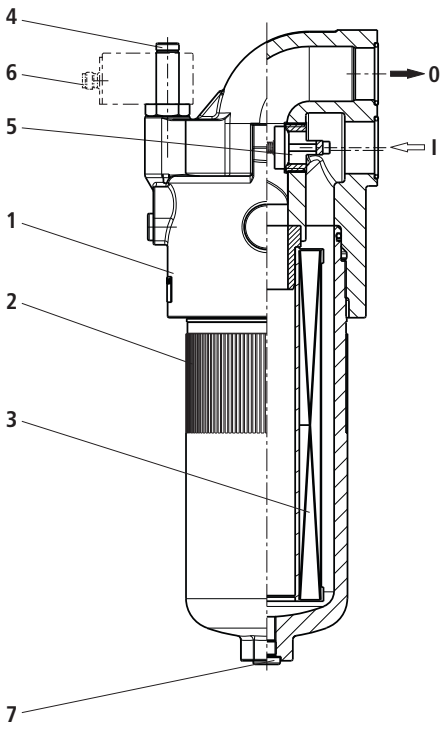
They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).

Via port I, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via port 0, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of the abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed. As of size 0160, the standard equipment comprises an oil drain plug (7). With size 1000, the filter bowl has a two-part design.

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points (6), which has to be ordered separately. The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.

As of size 0130, 2 minimess connections can be ordered via supplementary information in the type key.



Technical Data (For applications outside these parameters, please consult us!)

general

Installation position			Lateral				
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*				
Weight		Size	**0040**	**0063**	**0100**	**0130**	**0150**
		kg *[lbs]*	5.5 *[12.1]*	6.2 *[13.6]*	7.0 *[15.4]*	13.0 *[28.6]*	13.9 *[30.6]*
Weight		Size	**0160**	**0250**	**0400**	**0630**	**1000**
		kg *[lbs]*	18.5 *[40.7]*	20.5 *[45.1]*	24.5 *[53.9]*	41.2 *[90.6]*	87.0 *[191.4]*
Material	Filter head		GGG				
	Filter bowl		Steel				
	Optical maintenance indicator		Brass				
	Electronic switching element		Plastic PA6				

hydraulic

Maximum operating pressure	bar *[psi]*	350 *[5079]*
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]* (shortly –30 *[–22]*)
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Cracking pressure of the bypass valve	bar *[psi]*	7 ± 0.5 *[100 ± 7]*
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12 x 1, 4-pin
Contact load, direct voltage		A	max. 1
Voltage range	E1SP-M12x1	V DC/AC	max. 150
	E2SP	V DC	10 to 30
Max. switching power with resistive load			20 VA; 20 W; (70 VA)
Switching type	E1SP-M12x1		Changeover
	E2SP-M12x1		Normally open contact at 75 % of the response pressure Normally closed contact at 100 % of the response pressure
	E2SPSU-M12x1		Normally open contact at 75 % of the response pressure Normally closed contact at 100 % of the response pressure Signal interconnection at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...			Stand-by (LED green); 75 % switching point (LED yellow); 100 % switching point (LED red)
Protection class according to EN 60529			IP 65
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.			
Weight Electronic switching element: – with round plug-in connection M12 x 1		kg *[lbs]*	0.1 *[0.22]*

6

Technical Data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	A	bar *[psi]*	30 *[435]*	
	B	bar *[psi]*	330 *[4786]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

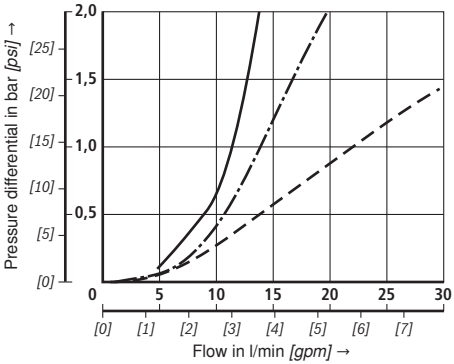
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL...

Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended
initial D*p* for design = 1.5 bar

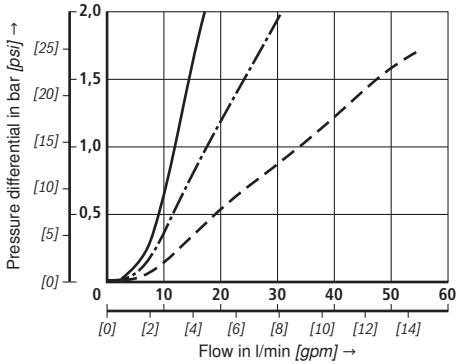
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]
68 mm²/s [315 SUS]
30 mm²/s [139 SUS]

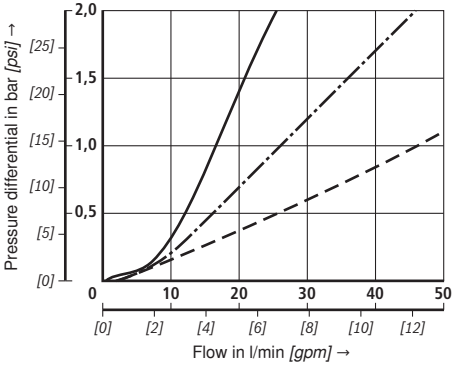
Size 0040



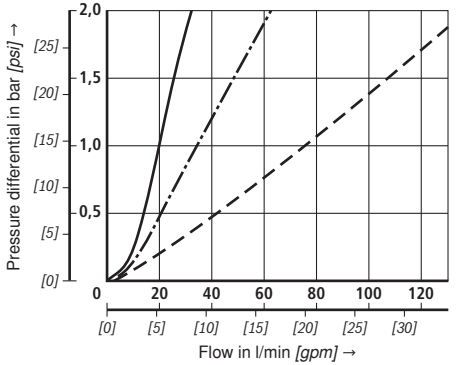
Size 0063



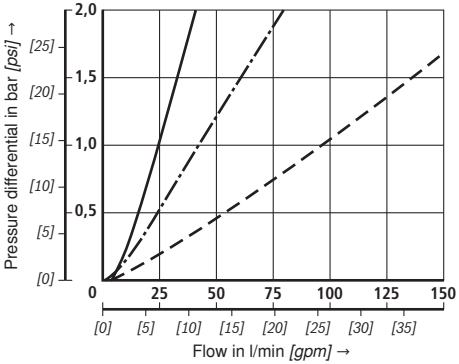
Size 0100



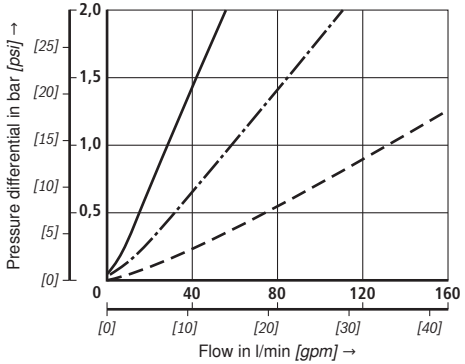
Size 0130



Size 0150



Size 0160



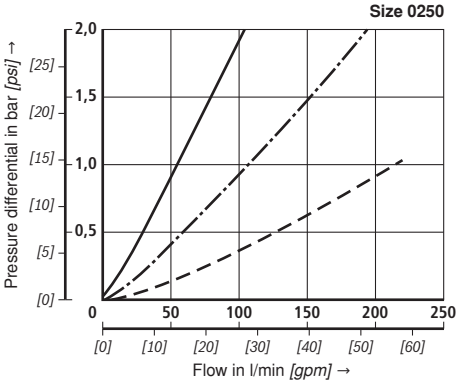
6

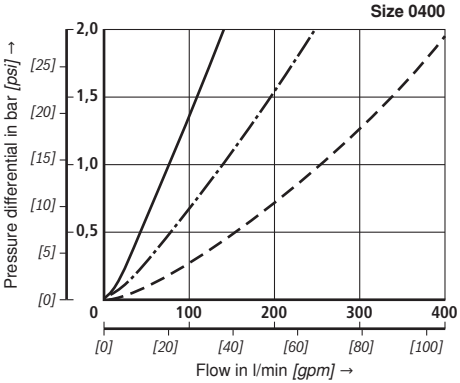
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL...

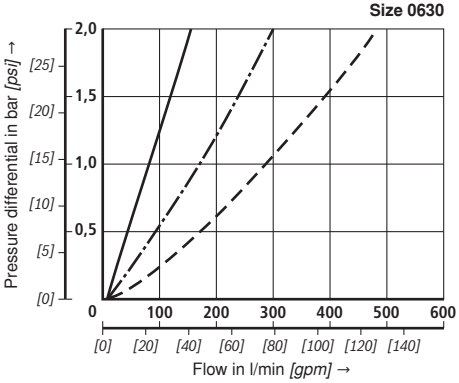
Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended
initial D*p* for design = 1.5 bar

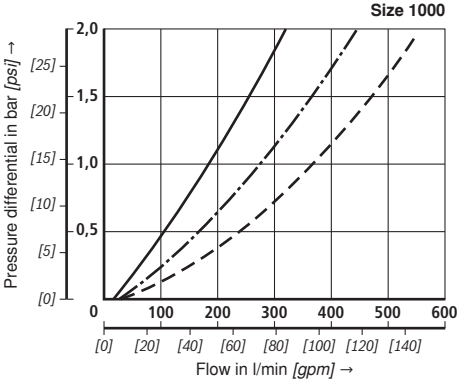
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]
68 mm²/s [315 SUS]
30 mm²/s [139 SUS]









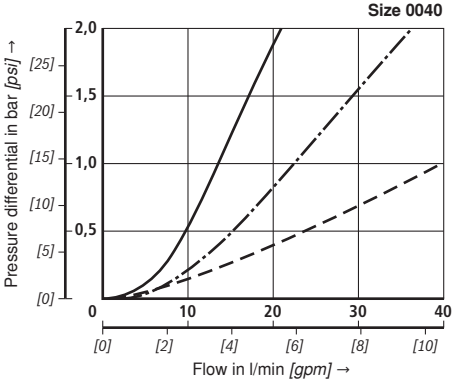
Characteristic curves (measured with HLP46, according to ISO 3968) H10XL...

Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended
initial D*p* for design = 1.5 bar

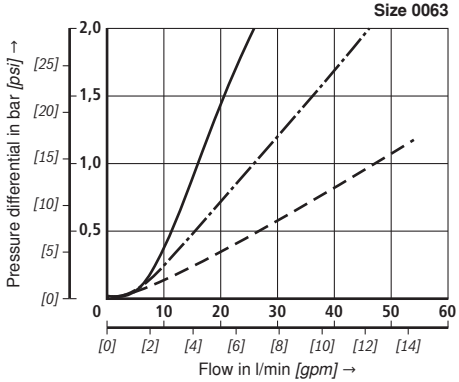
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: 140 mm²/s [649 SUS]
68 mm²/s [315 SUS]
30 mm²/s [139 SUS]

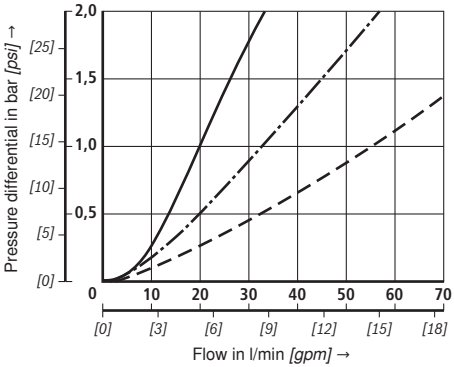
Size 0040



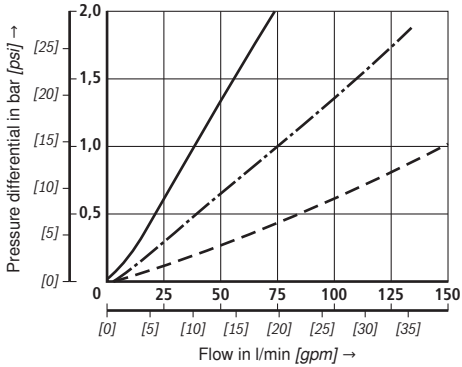
Size 0063



Size 0100



Size 0130



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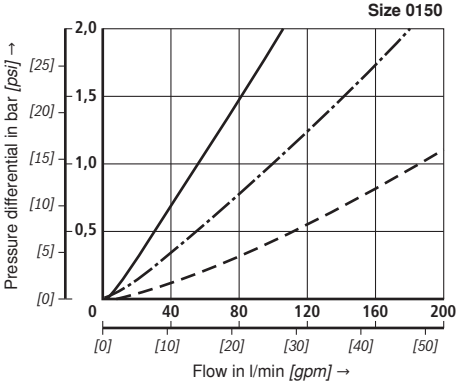
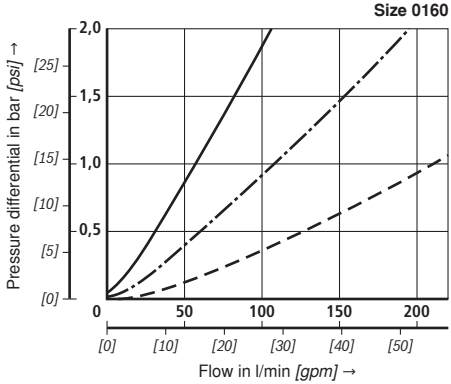


Size 0160



6

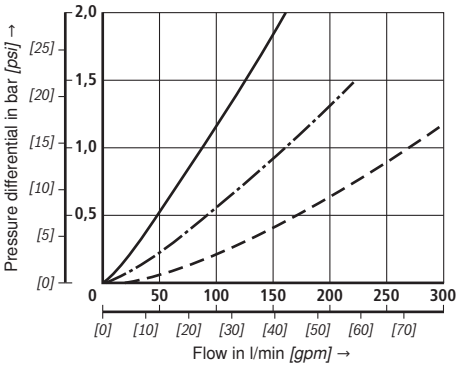
Characteristic curves (measured with HLP46, according to ISO 3968) **H10XL...**

Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended initial D*p* for design = 1.5 bar

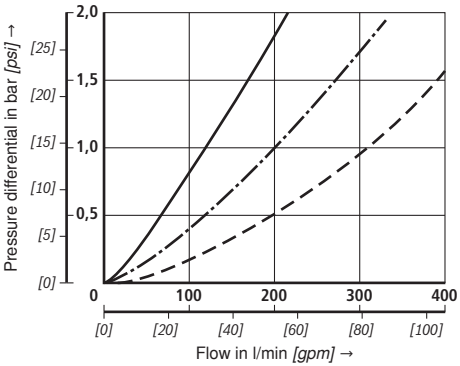
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity: **140 mm²/s** *[649 SUS]*, **68 mm²/s** *[315 SUS]*, **30 mm²/s** *[139 SUS]*

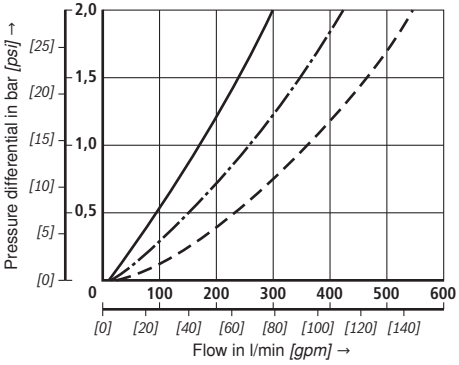
Size 0250



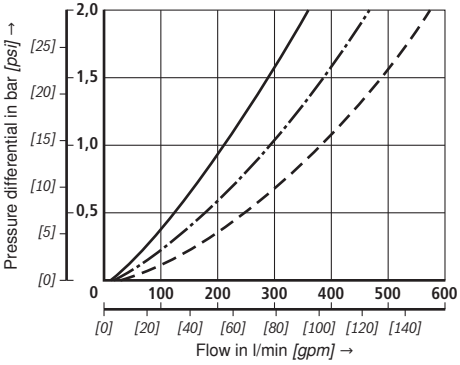
Size 0400



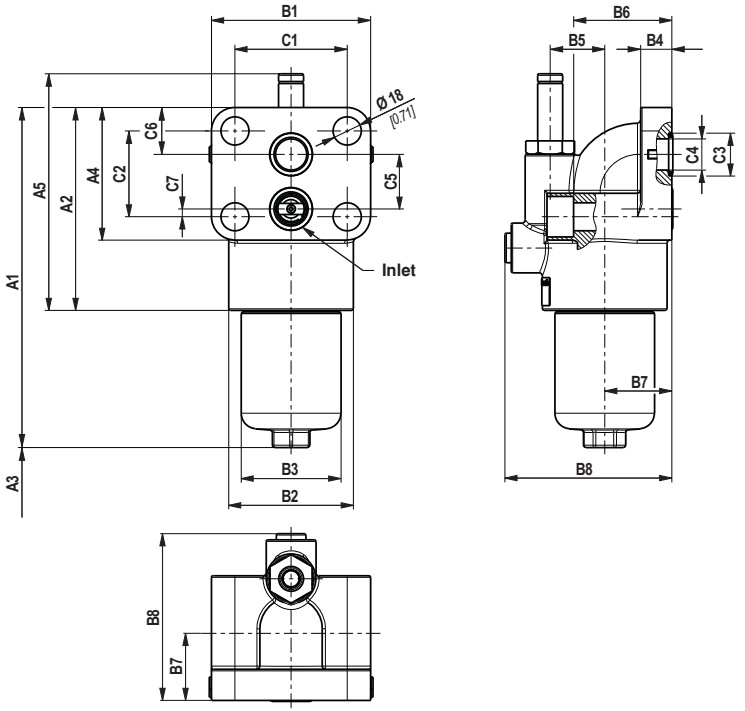
Size 0630



Size 1000



Unit dimensions size 0040 to size 0100 (dimensions in mm *[inch]*)



Filter housing for filter elements in accordance with DIN 24550

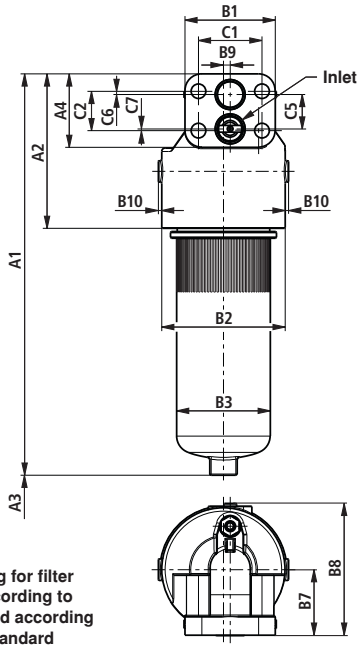
Type 350PSF(N)	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	B1	B2 Ø	B3 Ø	B4
0040	0.3 *[0.08]*	218 *[8.58]*	130 *[5.12]*	120 *[4.72]*	85 *[3.35]*	152 *[5.98]*	102 *[4.02]*	80 *[3.15]*	64 *[2.52*	20 *[0.79]*
0063	0.45 *[0.12]*	281 *[11.06]*								
0100	0.65 *[0.17]*	371 *[14.61]*								

Type 350PSF(N)	B5	B6	B7	B8	C1	C2	C3 Ø	C4 Ø	C5	C6	C7
0040	35 *[1.38]*	63 *[2.48]*	43 *[1.69]*	107 *[4.21]*	72 *[2.83]*	55 *[2.17]*	27.5 *[1.08]*	20 *[0.79]*	35 *[1.38]*	30 *[1.18]*	5 *[0.20]*
0063											
0100											

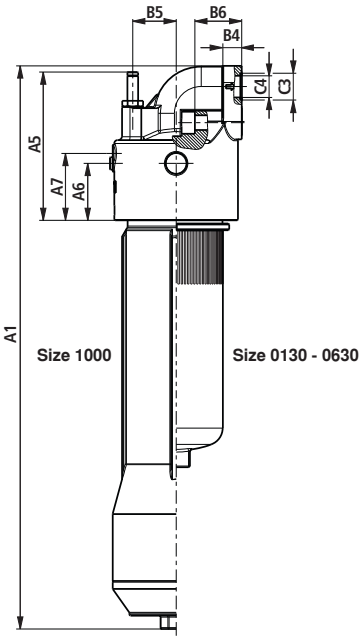
[1] Servicing height for filter element replacement

6

Unit dimensions size 0130 to size 1000 (dimensions in mm *[inch]*)



Filter housing for filter elements according to DIN 24550 and according to Rexroth standard



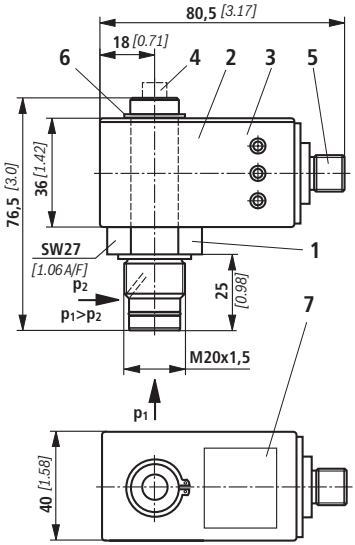
Type 350PSF(N)	Content in l *[US gal]*	A1	A2	A3 [1]	A4	A5	A6	A7	B1	B2 Ø	B3 Ø	B4	B5
0130	0.9 *[0.24]*	366 *[14.41]*	188 *[7.40]*	120 *[4.72]*	110 *[4.33]*	172 *[6.77]*	55 *[2.17]*	–	135 *[5.31]*	118 *[4.65]*	92 *[3.62]*	20 *[0.79]*	70 *[2.76]*
0150	1.1 *[0.29]*	417 *[16.42]*											
0160	1.65 *[0.44]*	355 *[13.98]*	203 *[7.99]*			194 *[7.64]*	64 *[2.52]*	80 *[3.15]*		140 *[5.51]*	114 *[4.49]*	28 *[1.10]*	
0250	2.1 *[0.55]*	445 *[17.52]*											
0400	3.2 *[0.85]*	595 *[23.43]*											
0630	4.4 *[1.16]*	626 *[24.65]*	231 *[9.09]*	160 *[6.30]*		222 *[8.74]*	85 *[3.35]*	100 *[3.94]*		185 *[7.28]*	140 *[5.51]*		95 *[3.74]*
1000	6.3 *[1.66]*	864 *[34.02]*		555 *[21.85]*							190 [2] *[7.48]*		

Type 350PSF(N)	B6	B7	B8	B9	B10	C1	C2	C3 Ø	C4 Ø	C5	C6	C7
0130	55 *[2.17]*	60 *[2.36]*	134 *[5.28]*	–	16 *[0.63]*	95 *[3.74]*	59 *[2.32]*	40 *[1.57]*	32 *[1.26]*	52 *[2.05]*	31 *[1.22]*	2 *[0.08]*
0150												
0160	68 *[2.68]*	78 *[3.07]*	162 *[6.38]*	5 *[0.20]*	15 *[0.59]*			45 *[1.77]*	38 *[1.50]*			
0250												
0400												
0630	70 *[2.76]*	98 *[3.86]*	197 *[7.76]*	10 *[0.39]*	5 *[0.20]*							
1000												

[1] Servicing height for filter element replacement

[2] With size 1000, the filter bowl has a two-part design.

Maintenance indicator (dimensions in mm *[inch]*)



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (can be rotated by 360°); plug-in connection M12x1 or according to DIN EN 175201-804

3 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

4 Optical indicator bistable

5 Round connector M12x1, 4-pin

6 Locking ring

7 Nameplate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2).

Round plug-in connection M12x1 (6)
For connection e.g. to ABZFV-E1SP-M12x1-1X/-DIN
(see page 17).

Switching elements with increased switching power at request.

Spare parts

Mechanical optical maintenance indicator

Rexroth plant construction accessories

Filter

Maintenance indicator

Mechanical optical maintenance indicator for high-pressure filters switching point 5 bar *[72 psi]* **= HV5**

DIN = Mark for DIN version

Seal material

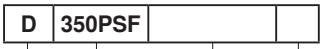
M = NBR seal
V = FKM seal

Component series

1X = Component series 10 to 19 (10 to 19; identical installation and connection dimensions)

Mechanical optical maintenance indicator	Material no.
ABZFV-HV5-1X/M-DIN	**R901025313**

Seal kit



Seal kit

Type 350PSF

Size

Size 0040-0100 **= N0040-0100**
Size 0130-0150 **= 0130-0150**
Size 0160-0400 **= N0160-0400**
Size 0630 **= N0630**
Size 1000 **= N1000**

Seal

M = NBR seal
V = FKM seal

Seal kit	Material no.
D350PSFN0040-0100-M	**R928028535**
D350PSF0130-0150-M	**R928028541**
D350PSFN0160-0400-M	**R928028543**
D350PSFN0630-M	**R928028546**
D350PSFN1000-M	**R928028547**

Installation, commissioning and maintenance

Installation of the filter

Verify operating pressure with nameplate information. Remove plug screws in the filter inlet and outlet, mount filter at the control block without tension stress considering flow direction (direction arrows) and servicing height of the filter element. The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

Connection of the electrical maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element (6) with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element (6). Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively after the end of the shift.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) or the floor (size 1000) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the centering spigot in the filter head by turning it slightly
- Check the seal ring and the support ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H...XL and P..., clean the filter element with material G ….
- The efficiency of the cleaning process depends on the characteristics of contamination and the amount of the pressure differential before the filter element exchange. If the differential pressure after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the nameplate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl or floor to stop. Then turn out the filter bowl by 1/8 to 1/2 turn so that the filter bowl is not stuck due to the pressure pulsation and can be easily loosened in case of maintenance works.

Quality and standardization

The block mounting filters for hydraulic applications according to RE 51419 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED).
However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

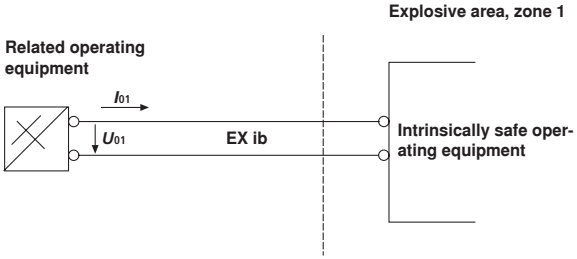
Use in explosive areas according to directive 94/9/EC (ATEX)

The block mounting filters according to RE 51419 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the block mounting filters according to RE 51419 in explosive areas, potential equalization has to be ensured.

According to DIN EN 50020, the electrical maintenance indicators are simple, electrical operating equipment not having own voltage sources. This simple, electrical operating equipment may - according to DIN EN 60079-14 in intrinsically safe electrical circuits (EEx ib] be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



With electrical maintenance indicators with two switching points, switching units with two intrinsically safe input circles must be used.

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Rexroth
Bosch Group

Block mounting filter, for sandwich plate mounting

RE 51427/01.11 1/16

Type 320PZR025, 075, 125

Size according to **DIN 24550**: 025 to 125
Nominal pressure 320 bar *[4641 psi]*
Port according to ISO4401 size 6 and size 10
Operating temperature –10 °C to 100 °C *[14 °F to 212 °F]*

Table of contents

Features

- Adsorption of very fine particles and high dirt holding capacity across a broad pressure differential range
- High dirt holding capacity thanks to large specific filter area
- Good chemical resistance of the filter elements
- High collapse resistance of the filter elements (e.g. in case of cold start)
- Filter ratings of 3 µm to 100 µm
- By default equipped with mechanical optical maintenance indicator with memory function
- Flow-optimized design due to 3D computer-supported design
- Porting pattern according to ISO 4401-03-02-0-05 (size 6) or ISO 4401-05-04-0-05 (size 10).

Ordering code

of the filter

320 | PZ | R | — | B00 — | —

Pressure
320 bar *[4641 psi]* **= 320**

Sandwich plate filter
Single **= PZ**

Filter element
Right design **= R**

Size
PZR… **= 025 075 125**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Seal
M = NBR seal
V = FKM seal

Maintenance indicator
Maintenance indicator, optical
specify switching pressure
V5,0 = 5.0 bar *[72.5 psi]*
V8,0 = 8.0 bar *[116 psi]*

Pressure differential
B00 = Max. admissible pressure differential of the filter element 330 bar *[4786 psi]*

Further versions (filter materials, ...) available at request

Order example:
320PZR125-H10XLB00-V8,0-M
Material no.: R928028008

of the filter element

2.Z | | — B | 00 — 0 —

Filter element
Design **= 2.Z**

Size
PZR… **= 025 075 125**

Filter rating in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25 **= G…**
absolute (ISO 16889)
Micro glass, not cleanable
H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
Max. admissible pressure differential of the filter element
330 bar *[4786 psi]* **= B**

Seal
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Element design
0… = Standard adhesive T = 100 °C *[212 °F]*
…0 = Standard material

Further versions (filter materials, ...) available at request

Order example:
2.Z125 H10XL-B00-0-M
Material no.: R928036959

Standard types

NBR seal, without bypass, flow specifications for 30 mm²/s *[142 SUS]*

Inline filter 320 PZR, filter rating **3 µm**

Type	Flow in l/min *[gpm]* with Δp = 1.5 bar *[21.75 psi]* [1)]	Material no. Filter	Material no. Replacement element
320PZR025-H3XLB00-V8,0-M	12 *[3.2]*	**R928023891**	**R928036957**
320PZR075-H3XLB00-V8,0-M	26 *[6.9]*	**R928037151**	**R928037243**
320PZR125-H3XLB00-V8,0-M	30 *[7.9]*	**R928037152**	**R928037244**

Inline filter 320 PZR, filter rating **6 µm**

Type	Flow in l/min *[gpm]* with Δp = 1.5 bar *[21.75 psi]* [1)]	Material no. Filter	Material no. Replacement element
320PZR025-H6XLB00-V8,0-M	14 *[3.7]*	**R928025345**	**R928036956**
320PZR075-H6XLB00-V8,0-M	29 *[7.7]*	**R928037153**	**R928037245**
320PZR125-H6XLB00-V8,0-M	32 *[8.5]*	**R928037154**	**R928037246**

Inline filter 320 PZR, filter rating **10 µm**

Type	Flow in l/min *[gpm]* with Δp = 1.5 bar *[21.75 psi]* [1)]	Material no. Filter	Material no. Replacement element
320PZR025-H10XLB00-V8,0-M	15 *[4.0]*	**R928022664**	**R928036955**
320PZR075-H10XLB00-V8,0-M	30 *[6.9]*	**R928028007**	**R928036958**
320PZR125-H10XLB00-V8,0-M	33 *[8.7]*	**R928028008**	**R928036959**

[1)] Measured pressure differential across filter and measuring equipment according to ISO 3968. The measured pressure differential at the maintenance indicator is lower.

Ordering code: Electronic switching element for maintenance indicator

W	E	–		M12x1

Maintenance indicator **= W**

Electronic switching element **= E**

Signal type design

with 1 switching point (changeover) **= 1SP**

with 2 switching points, 3 LED (normally closed/normally open), 75 %, 100 % **= 2SP**

with 2 switching points, 3 LED (normally closed/normally open), 75 %, 100 %, signal suppression until 30 °C *[86 °F]* **= 2SPSU**

Plug-in connector variant

M12x1 = Round plug-in connection M12x1

Electronic switching element	Material no.
WE-1SP-M12x1	**R928028409**
WE-2SP-M12x1	**R928028410**
WE-2SPSU-M12x1	**R928028411**

Order example: Block mounting filter for sandwich plate mounting with mechanical optical maintenance indicator for $p_{nom.}$ = 320 bar *[4641 psi]* without bypass valve, size 125, with filter element 10 µm and electronic switching element M12x1 with 1 switching point for hydraulic fluid mineral oil HLP according to DIN 51524.

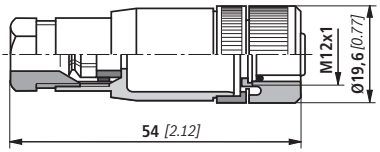
Filter with mech.-opt. maintenance indicator:	**320PZR125-H10XLB00-V5,0-M**	**Material no. R928028008**
Electr. switching element:	**WE-1SP-M12x1**	**Material no. R928028409**

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12x1

Mating connector suitable for K24 4-pin, M12x1 with screw connection, cable gland Pg9.

Material no. R900031155



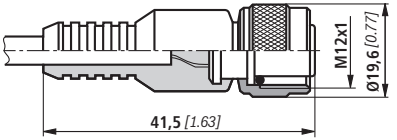
Mating connector suitable for K24-3m 4-pin, M12x1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:

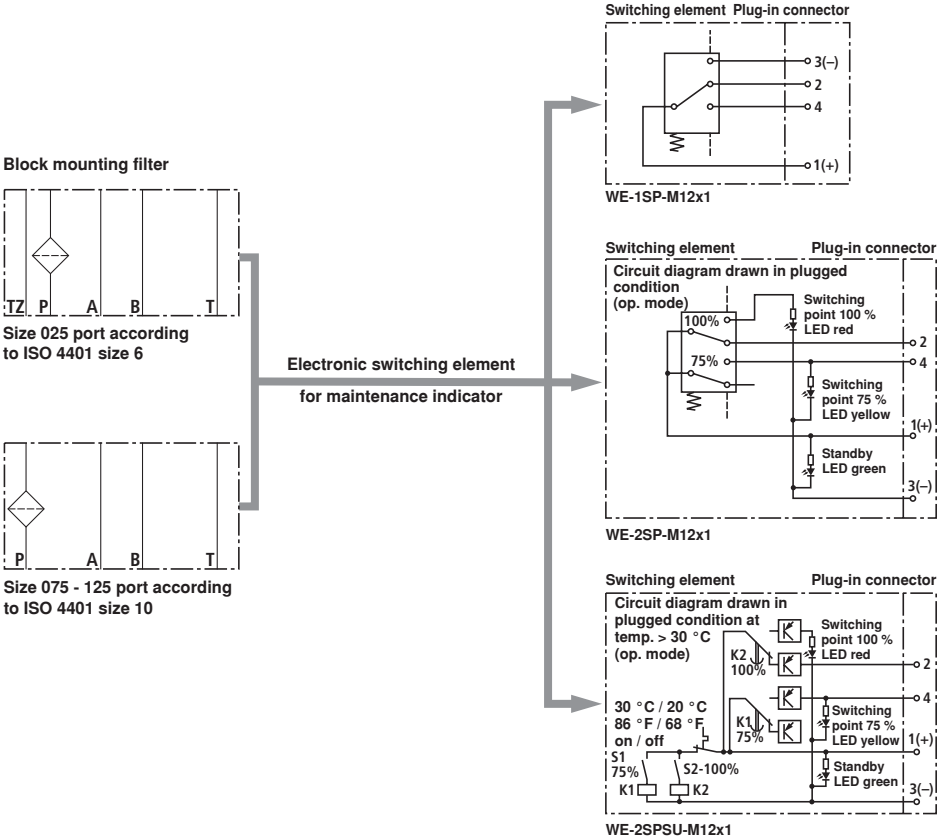
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381



For more round connectors refer to data sheet 08006.

Symbols


Block mounting filter
TZ P A B T
Size 025 port according to ISO 4401 size 6
P A B T
Size 075 - 125 port according to ISO 4401 size 10
Electronic switching element for maintenance indicator
Switching element Plug-in connector
3(–)
2
4
1(+)
WE-1SP-M12x1
Switching element Plug-in connector
Circuit diagram drawn in plugged condition (op. mode)
100%
75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Standby LED green
2
4
1(+)
3(–)
WE-2SP-M12x1
Switching element Plug-in connector
Circuit diagram drawn in plugged condition at temp. > 30 °C (op. mode)
K2 100%
K1 75%
Switching point 100 % LED red
Switching point 75 % LED yellow
Standby LED green
30 °C / 20 °C
86 °F / 68 °F
on / off
S1
75%
K1
S2-100%
K2
2
4
1(+)
3(–)
WE-2SPSU-M12x1

6

Function, section

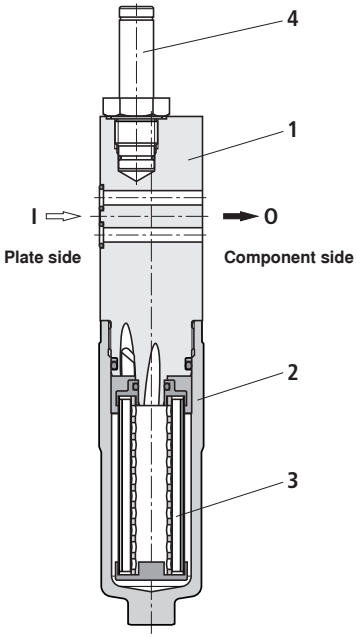
Block mounting filter for sandwich plate mounting are intended for installation in vertical stackings.

They basically consist of filter head (1), a screwable filter bowl (2), filter element (3) as well as mechanical optical maintenance indicator (4).

Via the inlet bore on the plate side, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle in the filter bowl (2) and in the filter element (3). Via the outlet bore on the device side, the filtered hydraulic fluid enters the hydraulic circuit.

The filter housing and all connection elements are designed so that pressure peaks - as they may e.g. occur in case of abrupt opening of large control valves due to the accelerated fluid weight - can be securely absorbed.

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the electronic switching element with 1 or 2 switching points, which has to be ordered separately. The electronic switching element is attached to the mechanical optical maintenance indicator and held by means of a locking ring.



Technical Data (For applications outside these parameters, please consult us!)

general

Installation position			Sandwich plate mounting		
Ambient temperature range		°C *[°F]*	–30 to +100 *[–22 to +212]*		
Weight [1]		Size	**025**	**075**	**125**
		kg *[lbs]*	3.5 *[7.7]*	6.5 *[14.4]*	7.2 *[15.9]*
Volume		l *[US gal]*	*0.14 [0.037]*	*0.35 [0.092]*	*0.48 [0.127]*
Material	Filter head		GGG		
	Filter bowl		Steel		
	Optical maintenance indicator		Brass		
	Electronic switching element		Plastic PA6		

hydraulic

Maximum operating pressure	bar *[psi]*	320 *[4644]*
Hydraulic fluid temperature range	°C *[°F]*	–10 to +100 *[+14 to +212]*
Minimum conductivity of the medium	pS/m	300
Fatigue strength according to ISO 10771	Load cycles	> 10^6 with max. operating pressure
Type of pressure measurement of the maintenance indicator		Pressure differential
Response pressure of the maintenance indicator	bar *[psi]*	5 ± 0.5 *[72 ± 7]* alternatively 8 ± 0.8 *[115 ± 12]*

electrical (electronic switching element)

Electrical connection			Round plug-in connection M12x1, 4-pin		
		Version	1SP-M12x1	2SP-M12x1	2SPSU-M12x1
Contact load, direct voltage		A	Max. 1		
Voltage range		V	Max. 150 (AC/DC)	Max. 10-30 (DC)	
Max. switching power with resistive load		W	20		
Switching type	75 % signal		–	Normally open contact	
	100 % signal		Changeover	Normally closed contact	
	2SPSU				Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*
Display via LEDs in the electronic switching element E2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)	
Protection class according to EN 60529			IP 67		
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*		
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.					
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*		

[1] Weight including standard filter element and maintenance indicator

6

Technical Data (For applications outside these parameters, please consult us!)

Filter element

Glass fiber paper H..XL			Single-use element on the basis of inorganic fiber	
			Filtration ratio according to ISO 16889 up to Δp = 5 bar *[72.5 psi]*	Achievable oil cleanliness according to ISO 4406 *[SAE-AS 4059]*
		H20XL	$\beta_{20}(c) \geq 200$	19/16/12 – 22/17/14
		H10XL	$\beta_{10}(c) \geq 200$	17/14/10 – 21/16/13
		H6XL	$\beta_{6}(c) \geq 200$	15/12/10 – 19/14/11
		H3XL	$\beta_{5}(c) \geq 200$	13/10/8 – 17/13/10
Admissible pressure differential	B	bar *[psi]*	330 *[4786]*	

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluids			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

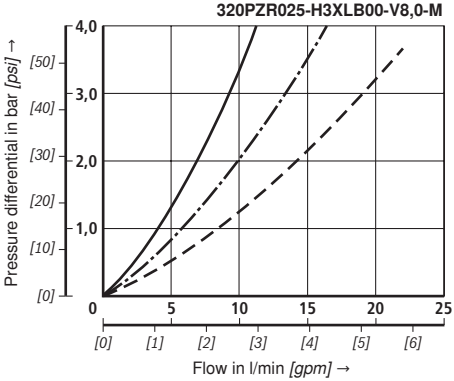
Characteristic curves (measured with HLP46, according to ISO 3968) H3XL...

Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended
initial D*p* for design = 1 bar

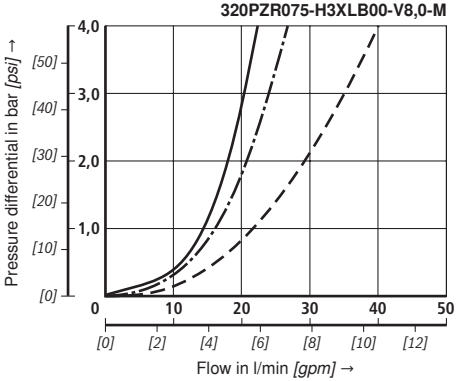
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- 140 mm²/s [649 SUS]
- 68 mm²/s [315 SUS]
- 30 mm²/s [142 SUS]

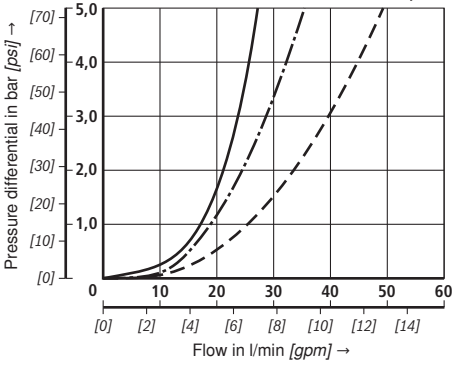
320PZR025-H3XLB00-V8,0-M



320PZR075-H3XLB00-V8,0-M



320PZR125-H3XLB00-V8,0-M



6

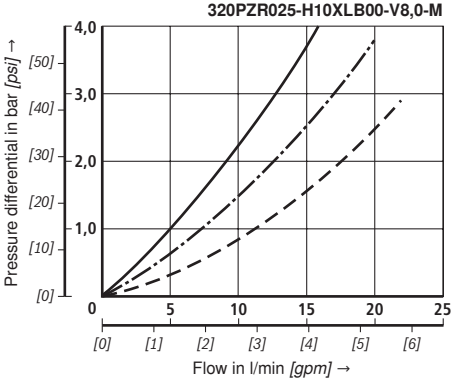
Characteristic curves (measured with HLP46, according to ISO 3968) **H10XL…**

Specific weight: < 0.9 kg/dm³
D*p*-Q characteristic curves for complete filters recommended initial D*p* for design = 1 bar

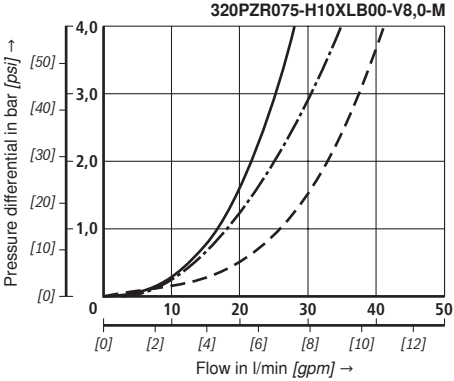
A proper filter design is enabled by our computer program "BRFilterSelect".

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[142 SUS]*

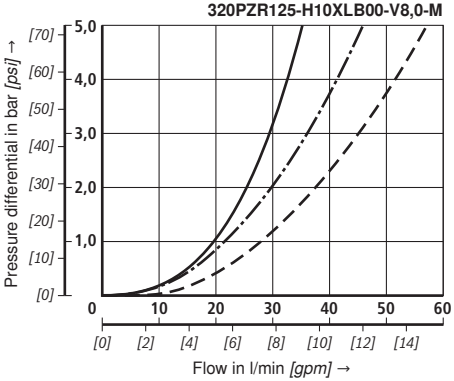
320PZR025-H10XLB00-V8,0-M



320PZR075-H10XLB00-V8,0-M

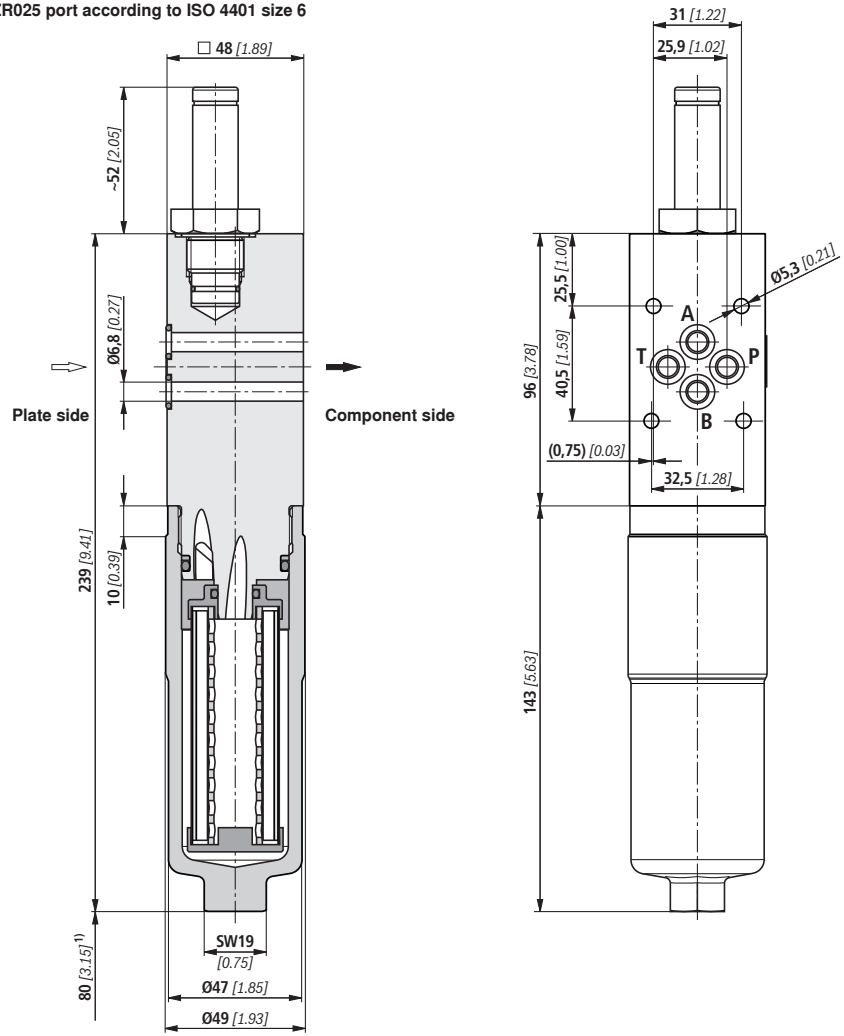


320PZR125-H10XLB00-V8,0-M



Unit dimensions size 025 (dimensions in mm *[inch]*)

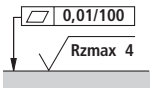
320PZR025 port according to ISO 4401 size 6



1) Servicing height for filter element replacement

Porting pattern according to ISO 4401-03-02-0-05
no locating pin

Sandwich plate HSZ 06 A007-3X/M00 (dimension 65 mm x 44 mm x 20 mm) is available under the **material no. R900516530**. For more sandwich plates please refer to the data sheet 48050.



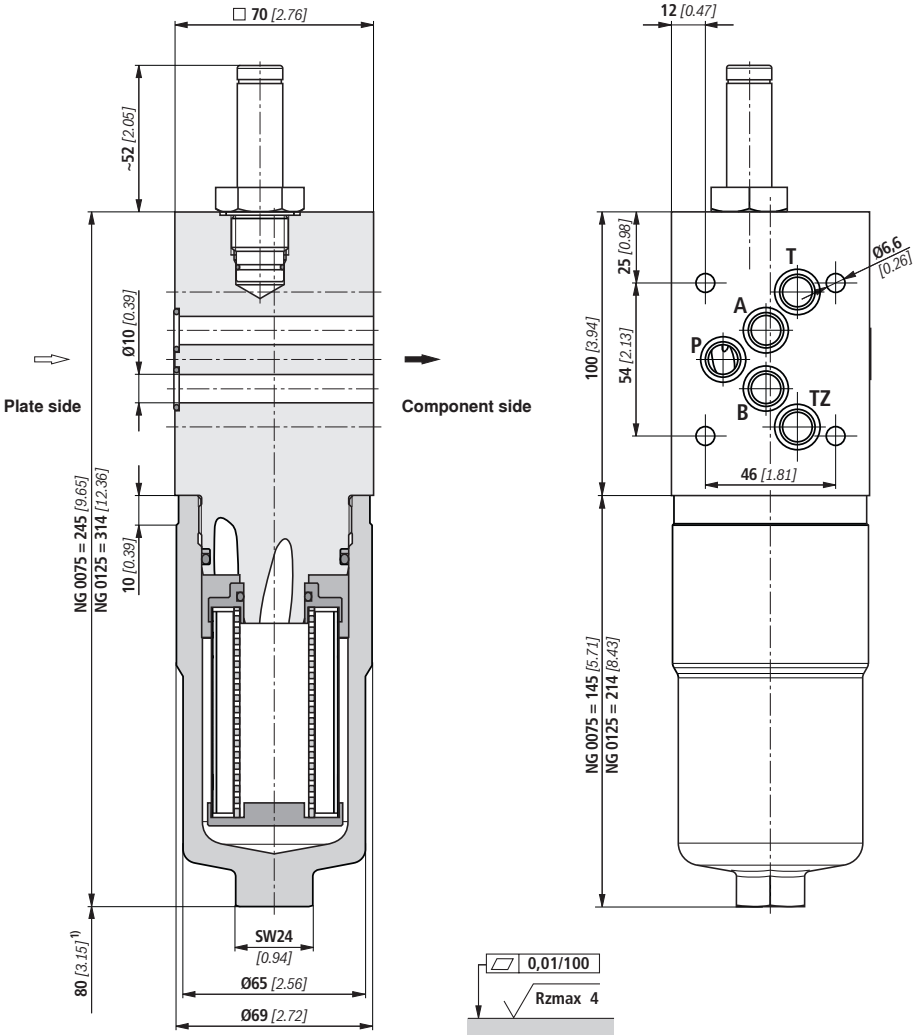
Required surface quality of the valve mounting face

Tolerances:

– General tolerances ISO 2768-m

Unit dimensions size 075 - size 125 (dimensions in mm *[inch]*)

320PZR075 - 320PZR125 port according to ISO4401 size 10



1) Servicing height for filter element replacement

Required surface quality of the valve mounting face

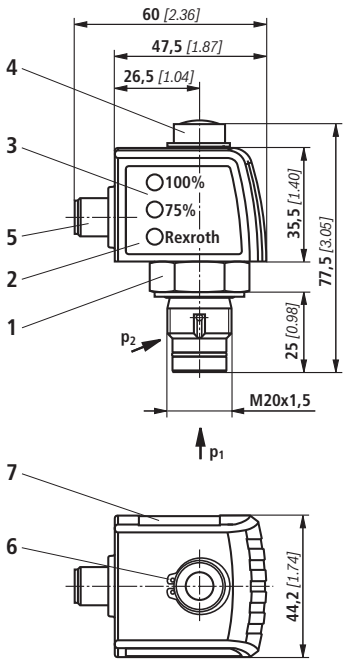
Tolerances:

– General tolerances ISO 2768-m

Porting pattern according to ISO 4401-05-04-0-05
no locating pin

Maintenance indicator (dimensions in mm *[inch]*)

Electronic switching element M12x1



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); plug-in connection M12x1

3 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

4 Optical indicator bistable

5 Round connector M12x1, 4-pin

6 Locking ring DIN 471-16x1,
material no. R900003923

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2).

Switching elements with increased switching power at request.

Spare parts

Mechanical optical maintenance indicator

W | O – D01 – – | 450

Maintenance indicator **= W**
Mechanical optical indicator **= O**
Design pressure differential M20x1.5 **= D01**
Switching pressure
5.0 bar **= 5.0**
8.0 bar **= 8.0**

Max. nominal pressure
450 = 450 bar

Seal
M = NBR seal
V = FKM seal

Mechanical optical maintenance indicator	Material no.
WO-D01-8,0-M-450	**R928038785**
WO-D01-8,0-V-450	**R928038784**

Seal kit

D | 320PZR | | |

Seal kit **= D**
Series **= 320PZR**
Size
Size 025 **= 025**
Size 075 - 125 **= 075-125**

Seal
M = NBR seal
V = FKM seal

Seal kit	Material no.
D320PZR025-M	R928037155
D320PZR075-125-M	R928037156

Installation, commissioning and maintenance

Installation of the filter

Verify operating overpressure with name plate information. Remove the blanking plugs in the filter inlet and outlet. Screw the filter head (1) to the fastening device, considering flow direction (direction arrows) and servicing height of the element.

Make sure that the components are assembled in a stress-less form.

The filter must preferably be installed with the filter bowl (2) downward. The maintenance indicator must be arranged in a well visible way.

The housing must be grounded.

Connection of the electrical maintenance indicator

Basically, the filter is equipped with mechanical optical maintenance indicator (4). The electronic maintenance indicator is connected via the switching element with 1 or 2 switching points, which is attached to the mechanical optical maintenance indicator and held by means of the locking ring.

When must the filter element be exchanged or cleaned respectively?

- The filter element is to be exchanged after the initial commissioning of the system.
- Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electrical signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively.
- The filter element should be replaced or cleaned after max. 6 months.

Element exchange

- Switch off the system and discharge the filter on the pressure side.
- Screw off the filter bowl (2) by anticlockwise rotation. Clean the filter housing in a suitable medium.
- Remove the filter element (3) from the centering spigot in the filter head by turning it slightly
- Check the seal ring and the support ring in the filter bowl for position and damage. If necessary, these parts are to be renewed.
- Replace filter elements H…XL, clean the filter element G….
- The efficiency of the cleaning process depends on the characteristics of contamination and the amount of the pressure differential before the filter element exchange. If the pressure differential after the filter element exchange exceeds 50 % of the value before the filter element exchange, the G… element also needs to be replaced.
- Check whether the type designation or material number on the replacement element corresponds to the type designation/material number on the name plate of the filter.
- Install replaced or cleaned filter element on the spigot again by slightly turning it.
- Now screw in the filter bowl to stop. Then turn out the filter bowl by 1/8 to 1/2 turn so that the filter bowl is not stuck due to the pressure pulsation and can be easily loosened in case of maintenance works.

Quality and standardization

The block mounting filters for hydraulic applications according to 51427 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

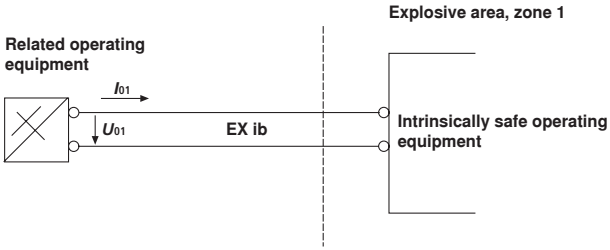
Use in explosive areas according to directive 94/9/EC (ATEX)

The inline filters according to 51427 are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark.

When using the block mounting filters according to 51427 in explosive areas, potential equalization has to be ensured.

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

Possible circuit according to DIN EN 60079-14



The declaration of incorporation according to DIN EN 13463 is available for this filter separately, with material no. R928028899.

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www.boschrexroth.de

Suction and spin on filters

Designation	Type	Size	q_{Vmax} in l/min	p_{max} in bar	Data sheet	Page
Replacement cartridge filter	7SL, 7 SLS, 50 SL	30 ... 260	300 / 120	7 / 50	51426	483

Replacement cartridge filter

RE 51426/01.10 1/12

Type 7 SL 30 to 260; 7 SLS 90 to 260; 50 SL 30 to 80 D


filter_29_d

Size 7 SL: 30 to 260
7 SLS: 90 to 260
50 SL: 30 to 80 D
Nominal pressure 7 and/or 50 bar
Port up to G 1 1/4, SAE 1 1/2" (3000 psi), SAE 20
Operating temperature –10 °C to +100 °C (shortly down to –30 °C)

Table of contents

Application

– Filtration of mineral oils (hydraulic and lubricating oils).
– Direct installation into pipelines.
– Direct wear protection for downstream components and systems.
– Optimized design for use in mobile hydraulics.

Features

– Filters for inline installation
– Optimized for mobile hydraulics
– Installation in suction, pressure and return lines possible
– 7 SLS version with return flow block, patented and environmentally friendly
– Flow-optimized version due to 3D computer-supported design
– Low pressure drop
– Special highly efficient filter media

Structure

Filter head with inlet and outlet as well as holder for one or two replacement cartridges. The filter element is firmly integrated into the tank of the replacement cartridge.

7 SLS:
Patented version with integrated isolator valve in the filter head for a leakage-free replacement of the replacement cartridge.

Replacement cartridge

Replacement cartridge with filter element in pleated design with optimized pleat density and various filter media.

The filter element is the most important component of the “FILTER” system in view of prolonged life and wear protection of the system.

The required cleanliness of the operating medium, the initial pressure differential and the dirt holding capacity are the most important criteria for selection.

For more information on the filter material please refer to our “Filter Elements” brochure.

Accessories

Maintenance indicators
They serve the monitoring of the degree of contamination of the replacement cartridge and are available as optical and optical / electronic indicator, with one or two switching points.

Bypass valve
To protect the replacement cartridge during startup and exceedance of the pressure differential due to contamination.

Characteristic curves

Our software “BRFilterSelect” 1)makes it possible to optimise filter selection, see download area
http://www.boschrexroth.com/filter.

Quality and standardization

The development, manufacture and assembly of Rexroth industrial filters and Rexroth filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

The replacement cartridge filters for hydraulic applications according to RE 51426 are pressure holding equipment according to article 1, section 2.1.4 of the pressure equipment directive 97/23/EC (PED). However, on the basis of the exception in article 1, section 3.6 of the PEG, hydraulic filters are exempt from the PED if they are not classified higher than category I (guideline 1/19). They do not receive a CE mark.

Ordering code

of the filter

				–	S	–	0			–		0	

Pressure
7 bar **= 7**
50 bar **= 50**

Design
Suction and pressure line filter **= SL**
Suction and pressure line filter with isolator valve **= SLS**

Size
7 SL… **= 30/20, 30/21, 45/20, 45/21, 60/20, 60/21, 90, 130, 180 [1], 260 [2]**
7 SLS… **= 90, 130, 180 [1], 260 [2]**
50 SL… **= 30, 30 D, 45, 45 D, 60, 60 D, 80, 80 D**

Filter rating in µm
nominal
Paper, non-cleanable: P5, P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable: H1XL, H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
max. admissible pressure differential of the filter element
Standard 5 bar, with version 7 SL(S), and 8 bar, with version 50 SL **= S**

Element model
Standard adhesive T = 100 °C **= 0…**
Special adhesive T = 170 °C **= H…**
Standard material **= …0**

Solenoid
Without **= 0**

Amending information
0 = Without
R = Check valve in outlet (only with 7 SLS without bypass valve)
Z = Certificates (on request)

Housing material
0 = Standard material according to dimension sheet

Seal
M = NBR
V = FKM

Port
R0 = Pipe thread
S0 = SAE flange
U0 = UNF thread

Maintenance indicator
0 = without
A = Pressure gauge 0…6 bar
C = Vacuum meter –1…0.6 bar
F0,2 = Vacuum switch normally open contact
G0,2 = Vacuum switch normally closed contact
H1,5 = Pressure switch normally open contact
J1,5 = Pressure switch normally closed contact
L… = Integr. maintenance indicator opt. (only for 50 SL)
Specify switching pressure
M… = Integr. maintenance indicator elecr. (only for 50 SL)
Specify switching pressure
P1,5 = Pressure differential indicator opt./ electr. with connector (only for 7 SL 90 - 260)

Bypass valve
0 = without
1 = 0.3 bar
2 = 0.8 bar
3 = 1.5 bar
4 = 2.0 bar
5 = 2.5 bar
6 = 3.0 bar

Order example:

7 SL 45/21 P10-S00-00H1,5-R0M00

Further versions (filter materials, ports, switching pressures, etc.) are available at request.

[1] The filter 7 SL(S) 180 contains two replacement cartridges of size 90 (see unit dimensions on page 10).

[2] The filter 7 SL(S) 260 contains two replacement cartridges of size 130 (see unit dimensions on page 10).

Ordering code

of the replacement cartridge

		– **S**		–	–	

Design
7 SL 30/20 - 130 **= 80.**
7 SLS 90 - 130 **= 81.**
50 SL 30 - 80 D **= 82.**

Size
7 SL… **= 30/20, 30/21, 45/20, 45/21, 60/20, 60/21, 90, 130**
7 SLS… **= 90, 130**
50 SL… **= 30, 30 D, 45, 45 D, 60, 60 D, 80, 80 D**

Filter rating in µm
nominal
Paper, non-cleanable: P5, P10, P25 **= P…**
absolute (ISO 16889)
Micro glass, non-cleanable:
H1XL, H3XL, H6XL, H10XL, H20XL **= H…XL**

Pressure differential
max. admissible pressure differential of the filter element
standard 5 bar, with version 7 SL(S),
and 8 bar, with version 50 SL **= S**

Seal
M = NBR
V = FKM

Bypass valve
0 = without
1 = 0.3 bar
2 = 0.8 bar
3 = 1.5 bar
4 = 2.0 bar
5 = 2.5 bar

Element model
0… = Standard adhesive T = 100 °C
H… = Special adhesive T = 170 °C
…0 = Standard material

Order example:
80.45/21 P10-S00-0-M

Please note that when ordering replacement cartridges for filters of size 180 or 260, two replacement cartridges of size 90 or 130 must be ordered per filter (see unit dimensions on page 10).

Standard types

Bypass valve, cracking pressure 2.0 bar	No	Yes	No	Yes
Pressure gauge, version M010, 0…6 bar	No	No	Yes	Yes
Related type code characteristics	**** = 00**	**** = 40**	**** = 0A**	**** = 4A**

Replacement cartridge filter, nominal pressure 7 bar, filter material and rating micro glass 10 µm

Type	Flow in l/min	Material no.			
7 SL 45/21 H10XL-S0-0**R0M00	40	**R928028291**	**R928019208**	**R928028293**	**R928028294**
7 SL 90 H10XL-S0-0**R0M00	140	**R928028290**	**R928019206**	**R928028295**	**R928027821**
7 SL 130 H10XL-S0-0**R0M00	150	**R928028287**	**R928019211**	**R928028298**	**R928025538**
7 SL 180 H10XL-S0-0**R0M00	240	**R928028288**	**R928019985**	**R928028299**	**R928028301**
7 SL 260 H10XL-S0-0**R0M00	260	**R928028289**	**R928028292**	**R928028300**	**R928028302**

Replacement cartridge filter, nominal pressure 7 bar, filter material and rating paper, 10 µm

Type	Flow in l/min	Material no.			
7 SL 45/21 P10-S0-0**R0M00	45	**R928019765**	**R928028305**	**R928028306**	**R928028307**
7 SL 90 P10-S0-0**R0M00	185	**R928019769**	**R928028308**	**R928028309**	**R928028310**
7 SL 130 P10-S0-0**R0M00	190	**R928028303**	**R928028311**	**R928028312**	**R928028313**
7 SL 180 P10-S0-0**R0M00	300	**R928019774**	**R928028314**	**R928028315**	**R928028316**
7 SL 260 P10-S0-0**R0M00	300	**R928028304**	**R928028317**	**R928028318**	**R928028319**

Replacement cartridge filter with return flow block, nominal pressure 7 bar, filter material and rating micro glass, 10 µm

Type	Flow in l/min	Material no.			
7 SLS 90 H10XL-S0-0**R0M00	135	**R928028320**	**R928028321**	**R928028322**	**R928028323**
7 SLS 130 H10XL-S0-0**R0M00	150	**R928028324**	**R928028338**	**R928028339**	**R928028340**

Replacement cartridge filter with return flow block, nominal pressure 7 bar, filter material and rating paper, 10 µm

Type	Flow in l/min	Material no.			
7 SLS 90 P10-S0-0**R0M00	185	**R928028341**	**R928028342**	**R928028343**	**R928028344**
7 SLS 130 P10-S0-0**R0M00	190	**R928028345**	**R928028346**	**R928028347**	**R928028348**

Replacement cartridge filter, nominal pressure 50 bar, filter material and rating micro glass, 10 µm

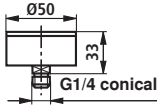
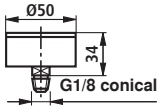
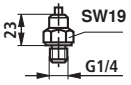
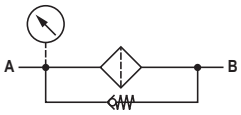
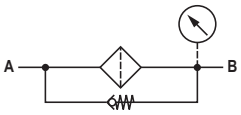
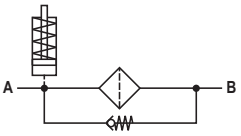
Type	Flow in l/min	Material no.			
50 SL 30D H10XL-S0-0**R0M00	25	**R928028349**	**R928028350**	**R928028351**	**R928028352**
50 SL 45D H10XL-S0-0**R0M00	40	**R928028353**	**R928028354**	**R928028355**	**R928028356**
50 SL 60D H10XL-S0-0**R0M00	90	**R928028357**	**R928028358**	**R928028359**	**R928028360**
50 SL 80D H10XL-S0-0**R0M00	100	**R928028361**	**R928028362**	**R928028363**	**R928028364**

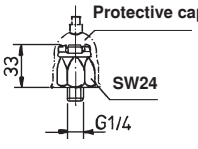
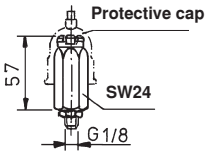
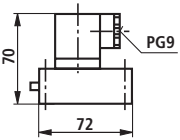
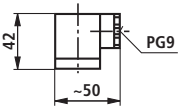
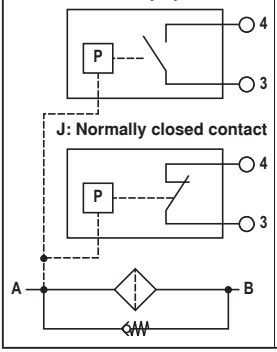
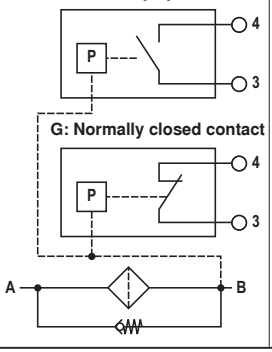
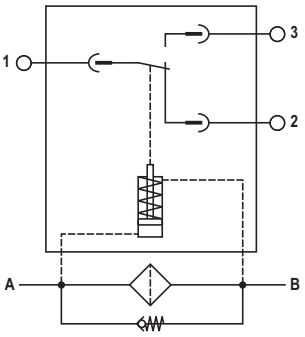
Replacement cartridge filter, nominal pressure 50 bar, filter material and rating paper, 10 µm

Type	Flow in l/min	Material no.			
50 SL 30D P10-S0-0**R0M00	30	**R928028365**	**R928028366**	**R928028367**	**R928028368**
50 SL 45D P10-S0-0**R0M00	45	**R928028369**	**R928028370**	**R928028371**	**R928028372**
50 SL 60D P10-S0-0**R0M00	110	**R928028373**	**R928028374**	**R928028375**	**R928028376**
50 SL 80D P10-S0-0**R0M00	120	**R928028377**	**R928028378**	**R928028379**	**R928028380**

Maintenance indicator

Maintenance indicators serve the monitoring of the degree of contamination of the replacement cartridge. They are available as optical, electronic or optical / electronic indicators. Technical data see “Maintenance indicator” brochure

		
Backpressure gauge M 010	**Vacuum gauge M 070**	**Opt.-mech. indicator P1,5**
Material number: R928019224	Material number: R928025266	Material number: R928019225
Ordering information in the type code: A	Ordering information in the type code: C	Ordering information in the type code: D
		

			
Pressure switch Normally open contact H1,5 HS 32 00M* Normally closed contact H1,5 HA 32 00M*	**Vacuum switch** Normally open contact I0,2 HS 32 00M* Normally closed contact I0,2 HA 32 00M*	For 7 SL(S): **Pressure differential indicator optical/electric** with connector F1,5 GW 02 00M*	For 50 SL: **Pressure differential indicator electric** with connector W... GW 02 00M*
Material number: R928019219 (normally open contact) R928036128 (normally closed contact)	Material number: R928035839 (normally open contact) R928034711 (normally closed contact)	Material number: R928019336	Material number: Various, depending on the switching pressure
Ordering information in the type code: Normally open contact: H1,5 Normally closed contact: J1,5	Ordering information in the type code: Normally open contact: F0,2 Normally closed contact: G0,2	Ordering information in the type code: P1,5	Ordering information in the type code: M... (Specify switching pressure)
H: Normally open contact **J: Normally closed contact** 	**F: Normally open contact** **G: Normally closed contact** 		

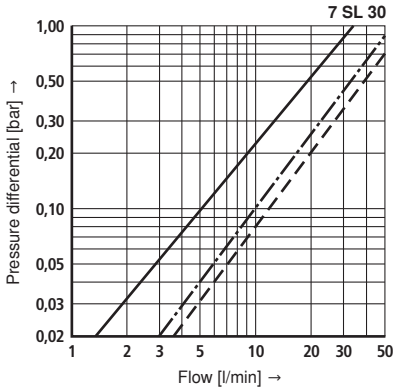
* M = NBR seal, alternatively V = FKM seal

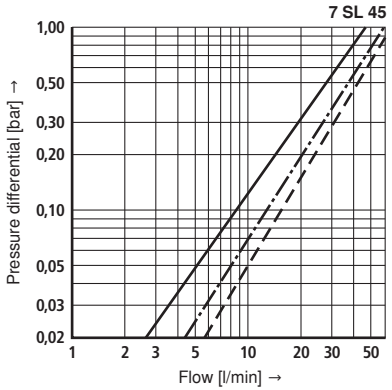
Characteristic curves

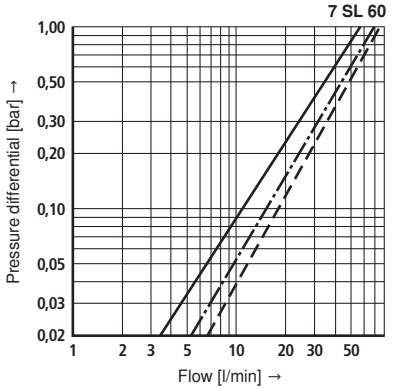
Specific weight: < 0.9 kg/dm³
Oil viscosity 30 mm²/s
D*p* Q characteristic curves for complete filters

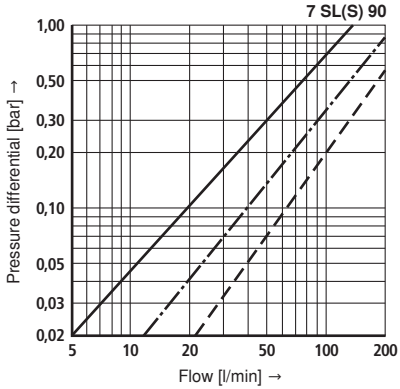
recommended initial D*p* for design = 0.5 bar
recommended max. flow velocity = 3 m/s

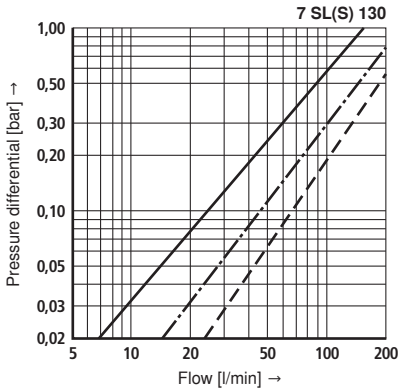
H3XL — H10XL — P10

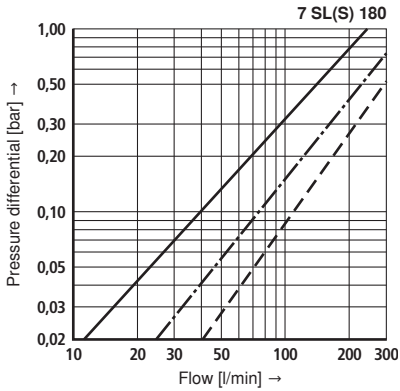












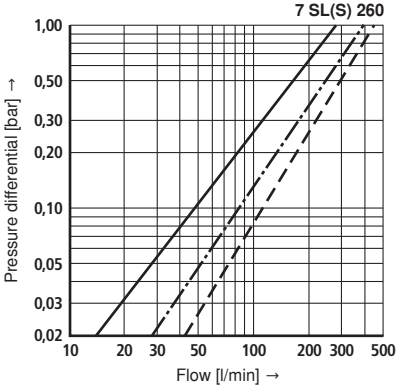
Characteristic curves

Specific weight: < 0.9 kg/dm³
Oil viscosity 30 mm²/s
D*p* Q characteristic curves for complete filters

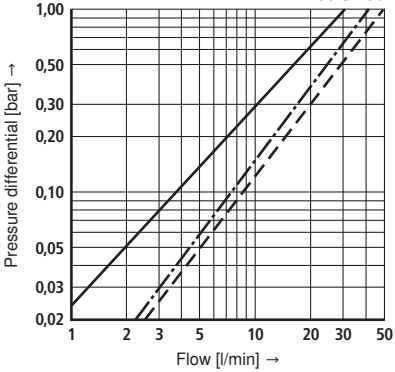
recommended initial D*p* for design = 0.5 bar
recommended max. flow velocity = 3 m/s

——— **H3XL** —·— **H10XL** – – – **P10**

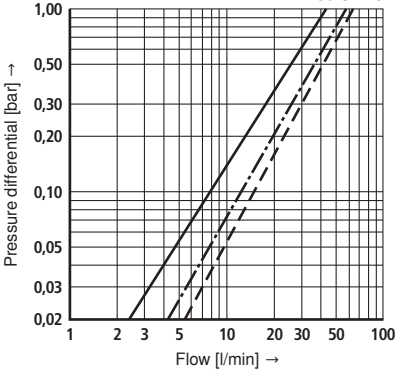
7 SL(S) 260



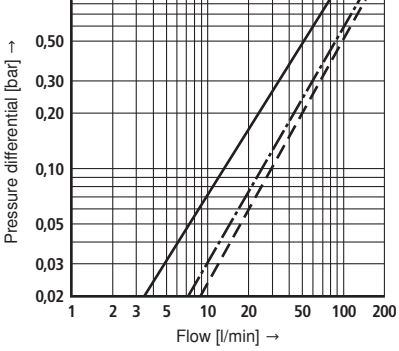
50 SL 30



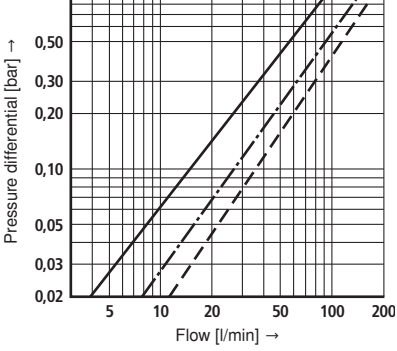
50 SL 45



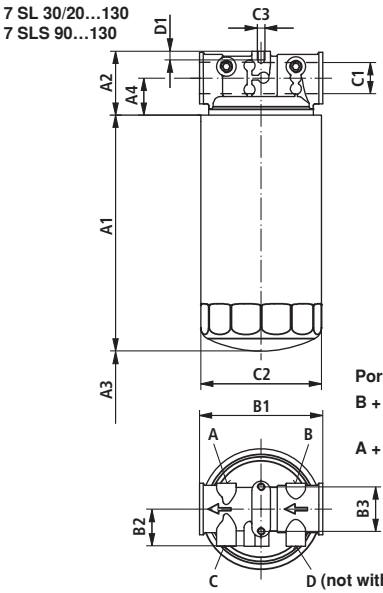
50 SL 60



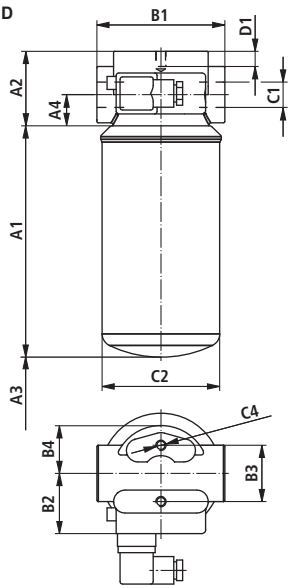
50 SL 80



Unit dimensions: 7 SL 30/20…130, 7 SLS 90…130, 50 SL 30…80 D (dimensions in mm)



Port for:
B + D = Pressure gauge or pressure switch
A + C = Vacuum meter or vacuum switch

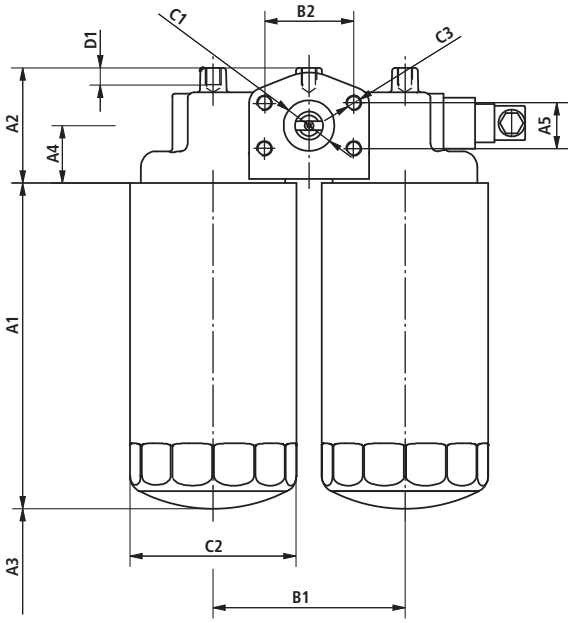


Frame size	Replacement cartridge port	Volume in l	Weight in kg [1]	A1	A2	A3 [2]	A4	B1	B2	B3	B4	C1 R0	C1 S0	C1 U0	C2	C3	D1
7 SL 30/20	SAE 8 (UNF 3/4"-16)	0.5	0.8	95	41	20	20	95	22	38	22	G3/4	–	–	Ø 92	M 8	15
7 SL 30/21	G3/4																
7 SL 45/20	SAE 8 (UNF 3/4"-16)	0.5	0.9	146													
7 SL 45/21	G3/4																
7 SL 60/20	UNF 1"-12	1.2	1.1	205													
7 SL 60/21	G3/4																
7 SL 90	G1 1/4	2.0	1.6	183	69	20	40	133	40	48	28	G1 1/4	–	SAE 20 (1 5/8-12 UN)	Ø 128		
7 SL 130		2.7	1.9	231													
7 SLS 90	M 42 x 2	2.0	1.8	183					39		27						16
7 SLS 130		2.7	2.1	231													
50 SL 30	UNF 1"-12	0.6	1.1	113	60		25	100	47	44	38	G3/4	–	SAE 10 (7/8-14 UNF)	Ø 92		10
50 SL 30 D	UNF 1 3/8"-12																
50 SL 45 D		0.9	1.3	149													
50 SL 45	UNF 1"-12																
50 SL 60		1.3	1.4	215								G1					
50 SL 60 D	UNF 1 3/8"-12																
50 SL 80 D		1.5	1.5	240													
50 SL 80	UNF 1"-12																

[1] Weight including standard replacement cartridge and maintenance indicator

[2] Servicing height for replacement cartridge

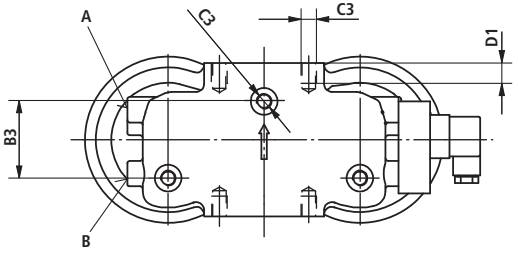
Unit dimensions: 7 SL 180…260, 7 SLS 180…260 (dimensions in mm)



Port for:

A = Vacuum meter or vacuum switch

B = Pressure gauge or pressure switch



Frame size	Replacement cartridge port	Volume in l	Weight in kg [1]	A1	A2	A3 [2]	A4	A5	B1	B2	B3	C1			C2	C3	D1
												R0	S0	U0			
7 SL 180	G1 1/4	2.0	3.0	183	90	20	45	35.7	150	69.9	60	G1 1/2	SAE 1 1/2" 3000 psi	–	Ø 128	M 12	15
7 SL 260		2.7	3.2	231													
7 SLS 180	M 42 x 2	2.0	3.3	183	85		40										
7 SLS 260		2.7	3.5	231													

[1] Weight including standard replacement cartridge and maintenance indicator

[2] Servicing height for replacement cartridge

Installation, commissioning and maintenance

Filter installation

Verify operating pressure with nameplate information.

Screw the filter head (item 1) to the fastening devices, considering flow direction (direction arrows) and servicing height of the replacement cartridge.

Remove dust protection plugs from filter inlet and outlet, screw filter in pipeline without tension stress.

Connection of the electronic maintenance indicator

Establish the connection using a three-wire cable, observe the switching power on the nameplate of the maintenance indicator.

Connection versions:
1. Normally open contact: 1 (sw) + 3 (bl)
2. Normally closed contact: 1 (sw) + 2 (br)
3. Changeover contact: 1 (sw) + 2 (br) + 3 (bl)

⚠ Warning!

Assemble and disassemble filter only when system is depressurized!

Tank is under pressure!

Do not replace the maintenance indicator while the filter is under pressure!

Functional and safety warranty only applicable when using genuine Rexroth spare parts!

Service filter only by trained personal!

Commissioning

Switch on system pump.

Maintenance

If the red indicator pin reaches out of the maintenance indicator and/or if the switching process in the electronic display is triggered, the maintenance indicator has reached the pressure value and the replacement cartridge has to be renewed.

Exchange of the replacement cartridge

Switch of the operating pump.

Screw off the replacement cartridge and replace it with a new cartridge.

When doing so, use the seal / seal ring of the new cartridge.

Manually tighten the cartridges of pressure rating 7 bar (7 SL…, / 7 SLS…).

For assembling the cartridge of pressure rating 50 bar (50 SL...), an assembly line can be used. In this connection, do not overtighten the cartridge as there is the risk of damaging the sheet tank.

Perform the commissioning as described above.

Technical modifications reserved!

Notes

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brfs-support@boschrexroth.de
www.eppensteiner.de

Filter systems

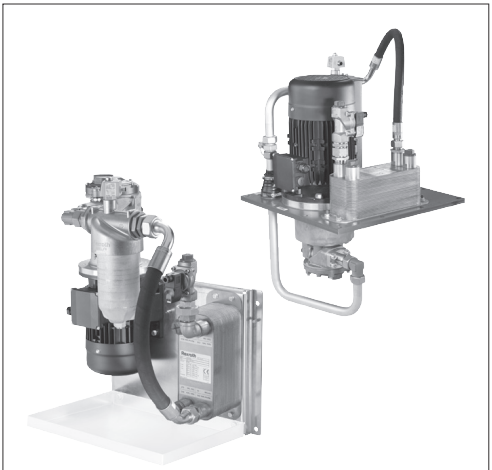
Designation	Type	Size	Series	p_{max} in bar	Data sheet	Page
Filter cooler unit with inline filter according to DIN24550	ABUKG		4X	10	50125	497
Fluid Manager with breather filter, level and temperature monitor, return flow filter with clogging indicator, feature for taking samples of hydraulic fluid in the tank	ABZMF		1X	10	50230	515

Rexroth
Bosch Group

Filter cooler unit
with inline filter according to DIN24550

Type ABUKG

RE 50125
Edition: 2013-04
Replaces: 50126



H7992+7993

Features

- Compact unit with pump, installed low-pressure filter and plate heat exchanger
- Modular design
- Mounting as required on a console or on installation plate
- Low-noise versions available
- Component series 4X
- With gerotor pump, external gear pump SILENCE PLUS or screw spindle pump
- With electric motors sizes 90 S to 132 S
- With low-pressure inline filter according to DIN 24550
- With plate heat exchanger
- Maximum operating pressure 10 bar

Contents

Features (continued)

Application range

Any hydraulic system, in which heat is generated through power losses, requires active cooling during continuousy operation.

The dissipation capacity of the tank is often not sufficient to ensure a stable heat balance during long duty cycles.

Due to their compact design, these units can be mounted to the tank walls, on top of the tank or on other machine components.

The basic element is the gerotor pump. Low-noise versions are based on external gear pumps (SILENCE PLUS) or screw spindle pumps, low-pressure filters and plate heat exchangers.

General information

The units are fitted with a low-pressure filter. Electrical maintenance indicators signal when an element has to be changed.

The water consumption depends on the utilization of the power unit and the inlet temperature difference.

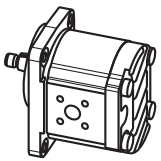
The water supply for cooling purposes is regulated by an electrically operated water valve.

Circulation units of version ABUKG-..K are optionally fitted with a collecting pan for collecting oil that is spilled during filter exchanges.

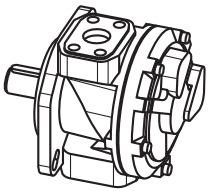
Noise guide values

	Base	Noise-optimized
Cooling power in kW [1]	**Sound pressure level in dB(A)**	
	External gear pump SILENCE PLUS	
4	59	
7.5	59	
	Gerotor pump	**Screw spindle pump**
11	64	59
15	64	59
22	66	60
30	68	62
37	70	63
45	69	63
55	72	65
75	74	66

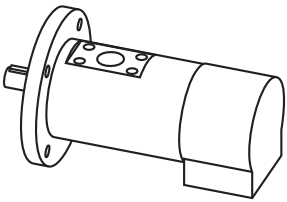
External gear pump SILENCE PLUS



Gerotor pump



Screw spindle pump



Noise levels are measured according to DIN EN ISO 11202
Accuracy class 3
Measuring distance 1 m;
Measured at 1450 min^{-1};
with an operating temperature of v = 50 °C;
Hydraulic fluid: Mineral oil HLP according to DIN 51524, part 2 [1] (Characteristic curves see page 7)

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
ABUKG	**–**			**–**	**4X**	**/**		**K**		**/**			**/**			**4**	**5**	**/**			**HOY**

01	Filter cooler unit	**ABUKG**

Cooling power with inlet temperature difference 35 K

02	4 ... 75 kW (characteristic curves see page 7)	**04 ... 75**

Design principle

03	Console mounting	**K**
	Tank top mounting	**V**

04	Component series 40 to 49 (40 to 49: Unchanged installation and connection dimensions)	**4X**

Heat exchanger

05	Size	**0**
06	Version	**K**
07	Number of plates	**48**

Pump

08	**Displacement** (in l/min with 1450 min^{-1})	
	116 l/min	**116**
09	**Noise behavior**	
	Base	**B**
	Noise-optimized	**G**

Electric motor

10	**Motor power** (in kW)	
	3 kW	**3.00**
11	**Rated voltage**	
	230/400V - 50 Hz	**CA**
	400/690V - 50 Hz	**CB**
12	**Number of pole pairs**	
	4-pole	**4**
13	**Rated frequency**	
	50 Hz	**5**

Filter

14	Size, inline filter DIN 24550 according to data sheet 51447	**160**

Oil pan

15	Without oil pan	–
	With oil pan	**T**

Motor supplier

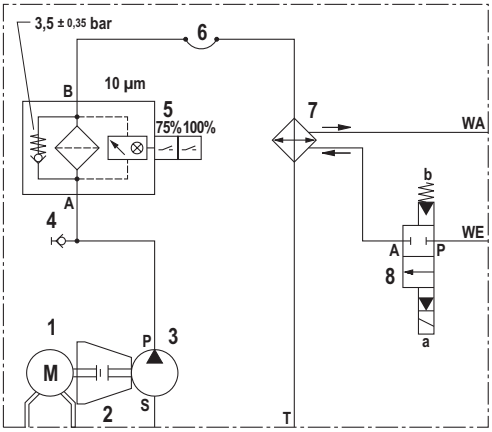
16	Hoyer Motors	**HOY**

Order example:

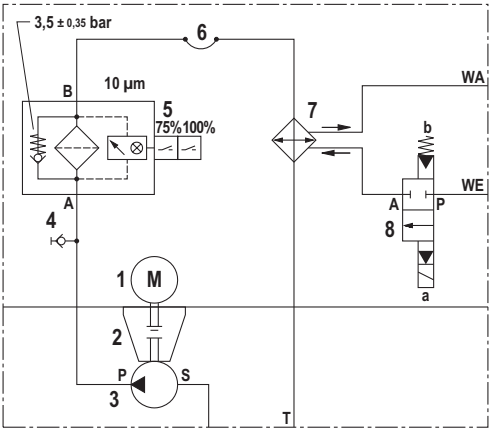
ABUKG-37K-4X/0K48/116B/3,0CA45/160 HOY

Circuit diagram

Type ABUKG-..K...



Type ABUKG-..V...



1 Electric motor
2 Pump carrier + coupling
3 Displacement pump
4 Pressure measuring port
5 Inline filter with maintenance indicator
6 Hose line
7 Oil-water heat exchanger
8 Electrically operated water valve

Selection table of standard/preferred types ABUKG 4X

Console mounting

Frequency	50 Hz 1450 min^{-1}		Electric motor frame size	Power in kW	Pump	ABUKG-...K... material no (console mounting)	MKZ [2]	Weight in kg
Cooling power in kW [1]	$q_{v\,max}$ in l/min	$p_{max.}$ in bar						
4.0	17	10	90S	1.10	External gear pump SILENCE PLUS	R901337662	A2	38
7.5	23	10	90S	1.10		R901337663	A2	39
11.0	28	10	90L	1.50	Gerotor pump (base)	R901355119	A3	60
15.0	46	10	100L	2.20		R901337655	A3	62
22.0	71	10	100L	2.20		R901337656	A3	61
30.0	88	10	100L	3.00		R901337657	A3	63
37.0	116	10	100L	3.00		R901337658	A3	67
45.0	88	10	100L	3.00		R901337659	A3	83
55.0	144	10	112M	4.00		R901337660	A3	85
75.0	186	10	132S	5.50		R901337661	A3	118
11.0	29	10	90S	1.10	Screw spindle pump (noise-optimized)	R901355118	A2	48
15.0	38	10	90S	1.10		R901337664	A2	51
22.0	74	10	100L	2.20		R901337665	A2	67
30.0	89	10	100L	3.00		R901337666	A3	73
37.0	105	10	100L	3.00		R901337667	A3	73
45.0	105	10	100L	3.00		R901337668	A3	89
55.0	105	10	112M	4.00		R901337669	A3	90
75.0	166	10	132S	5.50		R901337670	A3	133

Tank top mounting

Frequency	50 Hz 1450 min^{-1}		Electric motor frame size	Power in kW	Pump	ABUKG-...V... material no (tank top mounting)	MKZ [2]	Weight in kg
Cooling power in kW [1]	$q_{v\,max}$ in l/min	$p_{max.}$ in bar						
4.0	17	10	90S	1.10	External gear pump SILENCE PLUS	R901338099	A3	47
7.5	23	10	90S	1.10		R901338103	A3	47
11.0	28	10	90L	1.50	Gerotor pump (base)	R901355121	A3	75
15.0	46	10	100L	2.20		R901338092	A3	79
22.0	71	10	100L	2.20		R901338093	A3	77
30.0	88	10	100L	3.00		R901338094	A3	82
37.0	116	10	100L	3.00		R901338095	A3	86
45.0	88	10	100L	3.00		R901338096	A3	101
55.0	144	10	112M	4.00		R901338097	A3	117
75.0	186	10	132S	5.50		R901338098	A3	141
11.0	29	10	90S	1.10	Screw spindle pump (noise-optimized)	R901355120	A3	60
15.0	38	10	90S	1.10		R901338104	A3	63
22.0	74	10	100L	2.20		R901338105	A3	80
30.0	89	10	100L	3.00		R901338106	A3	92
37.0	105	10	100L	3.00		R901338107	A3	91
45.0	105	10	100L	3.00		R901338108	A3	108
55.0	105	10	112M	4.00		R901338109	A3	132
75.0	166	10	132S	5.50		R901338111	A3	156

1) Cooling power with inlet temperature difference of approx. 35 K (characteristic curves see page 7)

2) MKZ = material mark

A2 = Preferred delivery range

A3 = Standard delivery range

Technical data

(for applications outside these parameters, please consult us!)

Line connections (see page 17)	▶ Oil side			Connection thread according to ISO 1179 Pipe connections according to DIN 2353 / ISO 8434 Flanges according to ISO 6162
	▶ Water side			Thread according to ISO 228/1
Type of piping				Fitting according to DIN 2353 light / heavy series For ABUKG-V: Precision steel pipes According to DIN 2391/C, DIN EN ISO 1127
Hydraulic fluids				Mineral oil HLP46 according to DIN 51524, part 2 (other hydraulic fluids upon request) **Please observe our specifications and data sheet 90220.**
Hydraulic fluid temperature range			°C	25 ... 80; for other temperatures please consult us
Installation position				Vertical
Coolant				Potable, process, stream and river water (filtration recommended) Min. cooling water need: $V_K = 0.5 \times V_{oil}$ [l/min] (min. 0.1 bar at water valve) Heating (H_2O): $\Delta v = 14 \times$ power loss (kW) / V_K [°K]
Adm. operating pressures at inlet (absolute)	▶ Oil side	– Gerotor pump	bar	0.7 ... 2 (short-time, upon start 0.5 bar)
		– Screw spindle pump	bar	0.3 ... 4
		– External gear pump SILENCE PLUS	bar	0.7 ... 3
		– p_{max}	bar	10
	▶ Water side		bar	16 (at least 3 ... 5 bar)
Motor voltage /	▶ 4 ... 45 kW cooling power (motor 90S-100L)			230/400 V – 50 Hz
frequency	▶ 55 ... 75 kW cooling power (motor 112M-132S)			400/690 V – 50 Hz
Direction of rotation of pump				Clockwise
Water valve				Type ABZAW-G1-G24K4 according 50235 (included in the scope of delivery)
Cleanliness classes according to ISO code				Maximum admissible degree of contamination of the hydraulic fluid according to ISO 4406 (c) and according to the pump type used. At least cleanliness class 20/18/15 must be achieved.
Filter rating			µm	10 (further ratings on request)
Surface protection				By default, all steel components and components are at least provided with temporary corrosion protection (e.g. for transport).

For assembly, commissioning and maintenance of oil hydraulic systems please observe the data sheet 07900!

Further data sheets:
- **AB 32-12 Heat exchanger oil/water system: Plate heat exchanger**
- **51447 Inline filter with filter element according to DIN 24550**
- **10545 Gerotor pump PGZ**
- **10094 External gear pump SILENCE PLUS**

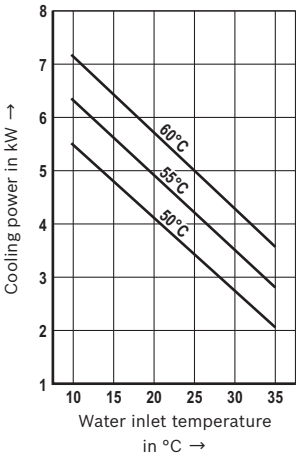
The units are designed and manufactured in accordance with the harmonized EN standards / specifications.

Cooling power characteristic curves

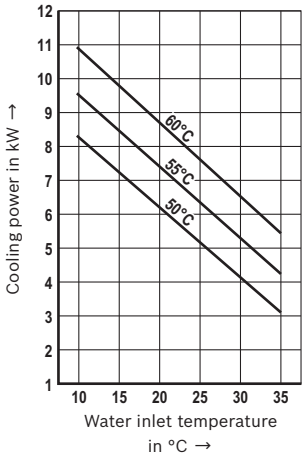
The cooling powers of the individual units differ depending on the water and oil inlet temperatures.

The selected oil inlet temperatures were 50, 55 and 60 °C.

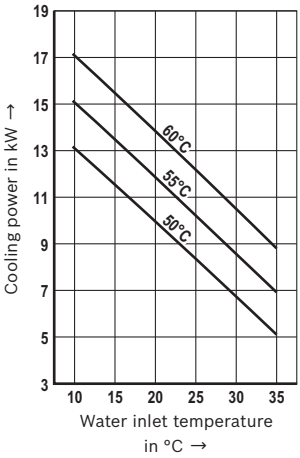
ABUKG 4 kW



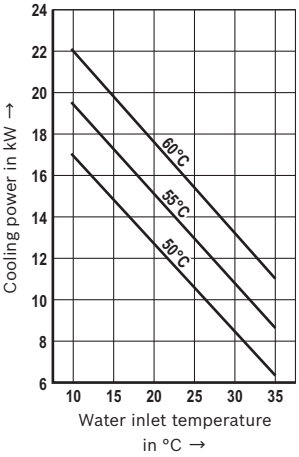
ABUKG 7.5 kW



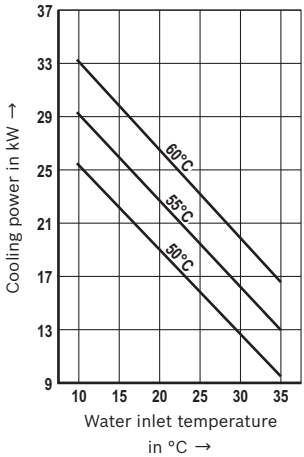
ABUKG 11 kW



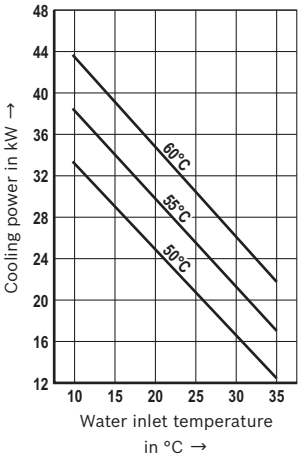
ABUKG 15 kW



ABUKG 22 kW



ABUKG 30 kW



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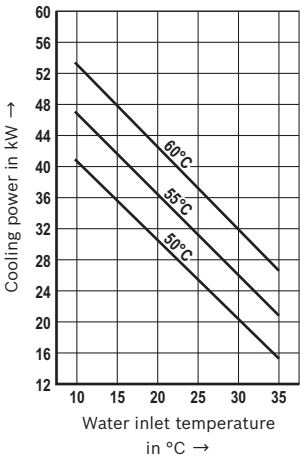
Cooling power characteristic curves

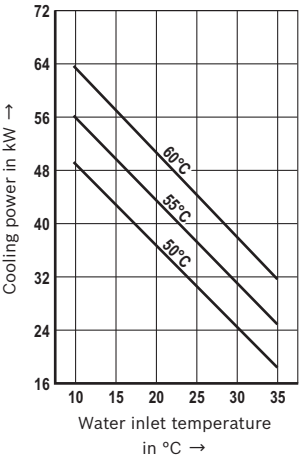
The cooling powers of the individual units differ depending on the water and oil inlet temperatures.

The selected oil inlet temperatures were 50, 55 and 60 °C.

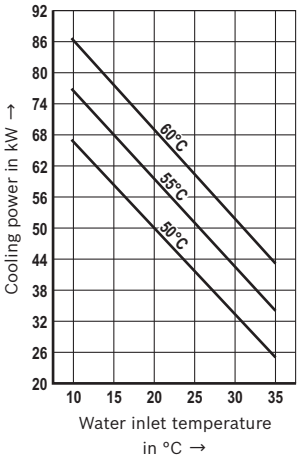
ABUKG 37 kW



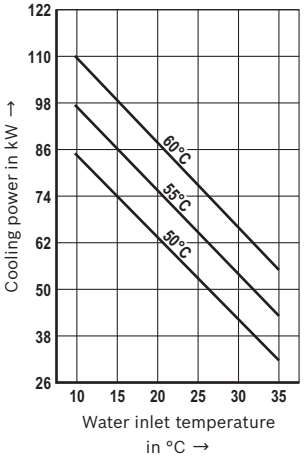
ABUKG 45 kW



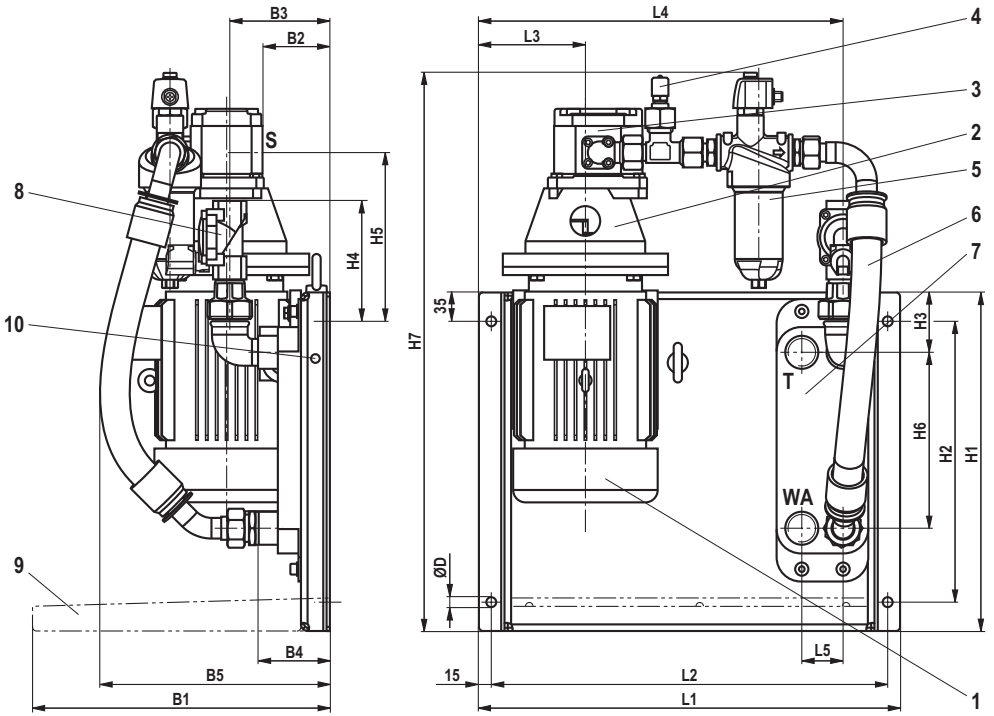
ABUKG 55 kW



ABUKG 75 kW



Dimensions: Type ABUKG-..K... 4 and 7.5 kW (dimensions in mm)



1 Electric motor
2 Pump carrier + coupling
3 Silence Plus pump
4 Pressure measuring port
5 Inline filter with maintenance indicator
6 Hose line
7 Oil-water heat exchanger
8 Electrically operated water valve
9 Oil pan (optional)
10 Equipotential bonding

8

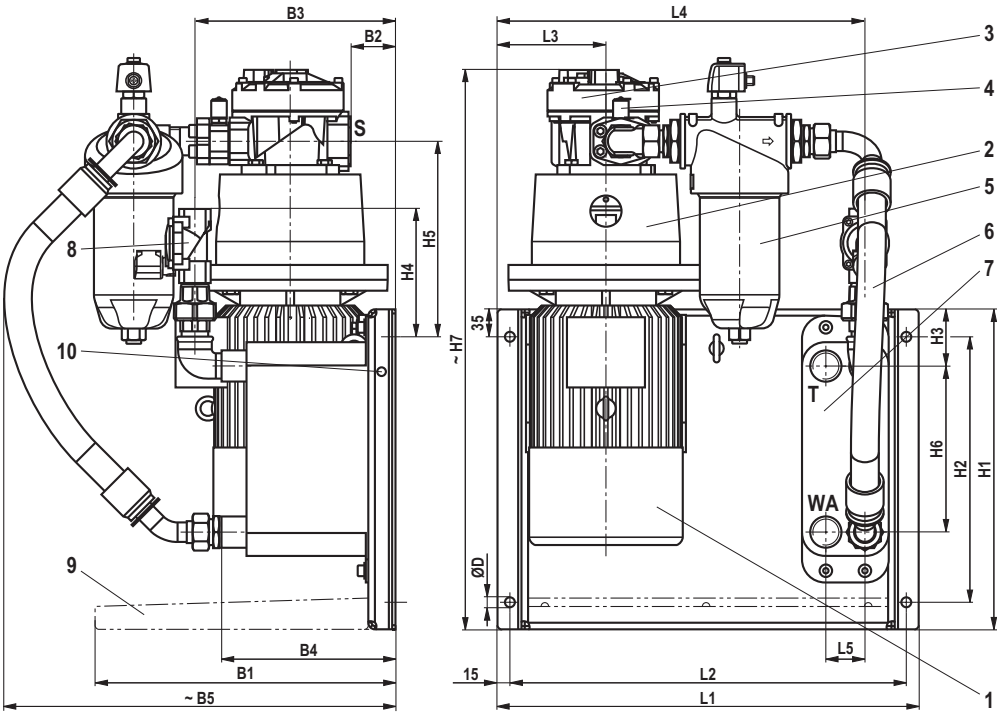
Cooling power in kW	Dimensions																	
	L1	L2	L3	L4	L5	B1	B2	B3	B4	B5	H1	H2	H3	H4	H5	H6	H7	D1
4	510	480	129	441	50	385	81.5	118	87	300	410	340	72.5	146	205	213	700	12
7.5	510	480	129	441	50	385	81.5	122	111	350	410	340	72.5	146	209	213	700	12

Port sizes S, T, WE and WA see page 17 bottom.

Tolerances according to:

- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

Dimensions: Type ABUKG-..K... base (dimensions in mm)



1 Electric motor
2 Pump carrier + coupling
3 Gerotor pump
4 Pressure measuring port
5 Inline filter with maintenance indicator
6 Hose line
7 Oil-water heat exchanger
8 Electrically operated water valve
9 Oil pan (optional)
10 Equipotential bonding

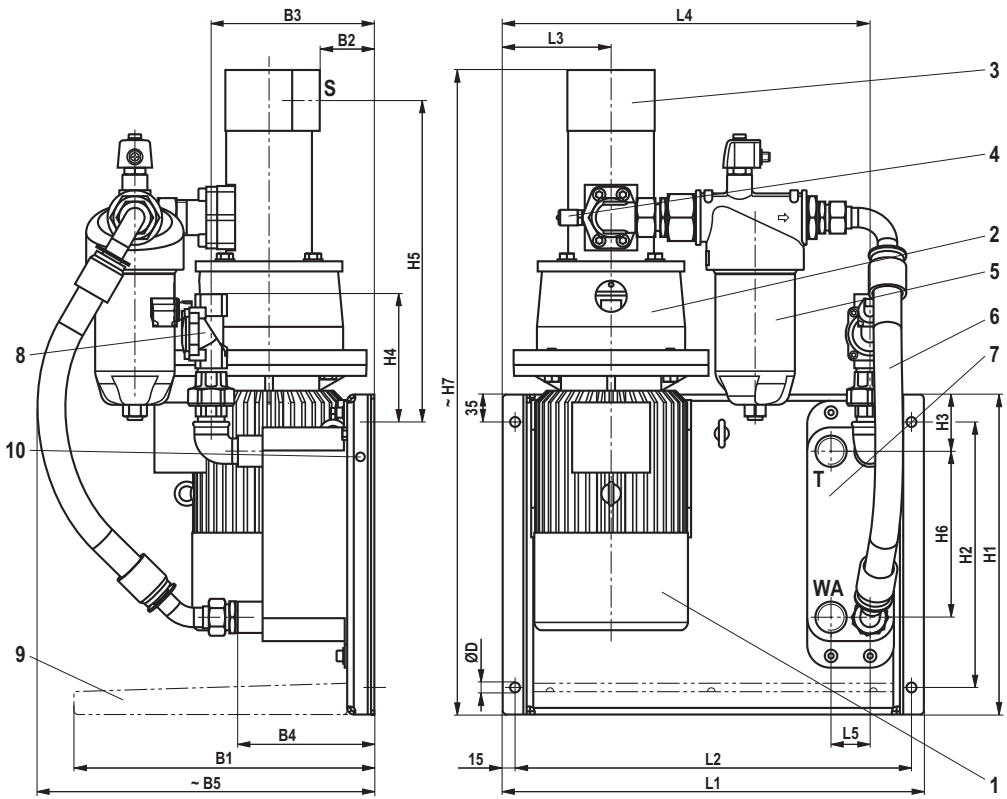
Cooling power in kW	Dimensions																	
	L1	L2	L3	L4	L5	B1	B2	B3	B4	B5	H1	H2	H3	H4	H5	H6	H7	D1
11	510	480	129	471	50	385	58	195	159	500	410	340	72.5	146	250.5	213	740	12
15	510	480	129	441	50	385	58	226	191	500	410	340	72.5	146	250.5	213	740	12
22	540	510	139	471	50	385	58	210	175	500	410	340	72.5	164	250.5	213	740	12
30	540	510	139	471	50	385	58	258	223	550	410	340	72.5	164	250.5	213	740	12
37	540	510	139	471	50	385	58	258	223	550	410	340	72.5	164	250.5	213	740	12
45	710	680	144	630	94	395	70	297	247	600	550	480	79	159	235.5	309	850	14
55	710	680	149	630	94	395	84	317	271	600	550	480	79	159	242.5	309	870	14
75	710	680	172	630	94	395	105	345	295	650	550	480	79	159	282.5	309	920	14

Port sizes S, T, WE and WA see page 17 bottom.

Tolerances according to:

- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

Dimensions: Type ABUKG-..K... noise-optimized (dimensions in mm)



1 Electric motor
2 Pump carrier + coupling
3 Screw spindle pump
4 Pressure measuring port
5 Inline filter with maintenance indicator
6 Hose line
7 Oil-water heat exchanger
8 Electrically operated water valve
9 Oil pan (optional)
10 Equipotential bonding

8

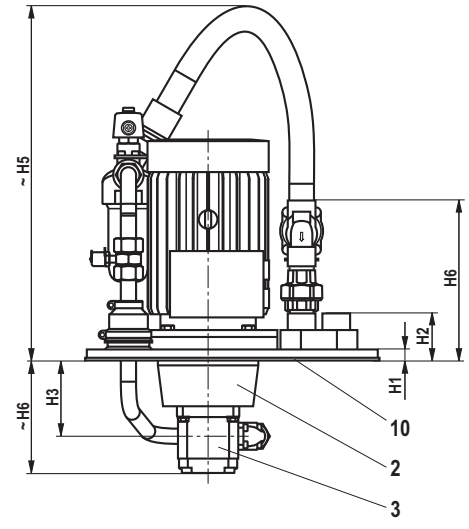
Cooling power in kW	Dimensions																	
	L1	L2	L3	L4	L5	B1	B2	B3	B4	B5	H1	H2	H3	H4	H5	H6	H7	D1
11	510	480	129	471	50	385	70	195	159	500	410	340	72.5	146	360	213	770	12
15	540	480	129	441	50	385	70	226	191	500	410	340	72.5	164	360	213	770	12
22	540	510	139	471	50	385	70	210	175	500	410	340	72.5	164	412.5	213	827	12
30	540	510	139	471	50	385	50	258	223	550	410	340	72.5	164	486.5	213	907	12
37	540	510	139	471	50	385	51.5	258	223	550	410	340	72.5	164	486	213	907	12
45	710	680	144	630	94	395	61.5	297	247	600	550	480	79	159	471	309	1032	14
55	710	680	149	630	94	395	73.5	317	271	600	550	480	79	159	478	309	1039	14
75	710	680	172	630	94	395	82	345	295	650	550	480	79	159	539.5	309	1007	14

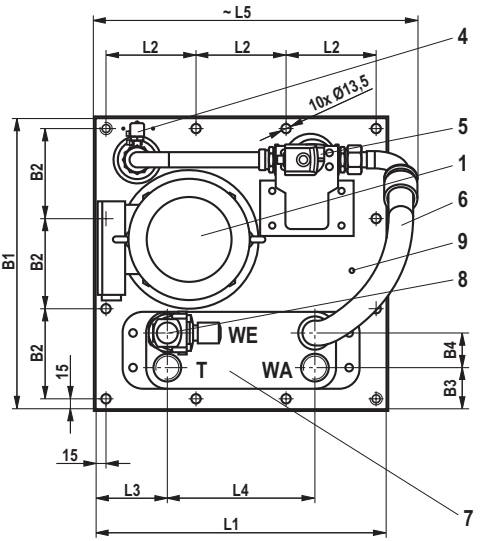
Port sizes S, T, WE and WA see page 17 bottom.

Tolerances according to:

- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

Dimensions: Type ABUKG-..V... 4 and 7.5 kW (dimensions in mm)





1 Electric motor
2 Pump carrier + coupling
3 Silence Plus pump
4 Pressure measuring port
5 Inline filter with maintenance indicator
6 Hose line
7 Oil-water heat exchanger
8 Electrically operated water valve
9 Equipotential bonding
10 Cork seal according to AB03333

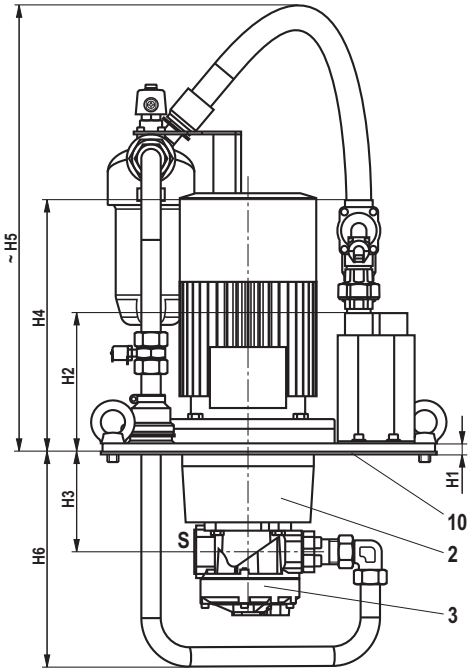
Cooling power in kW	Dimensions														
	L1	L2	L3	L4	L5	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6
4	420	130	103.5	213	500	420	130	60	50	16	68	109.5	231	550	163
7.5	420	130	103.5	213	500	420	130	60	50	16	92	113.5	255	600	170

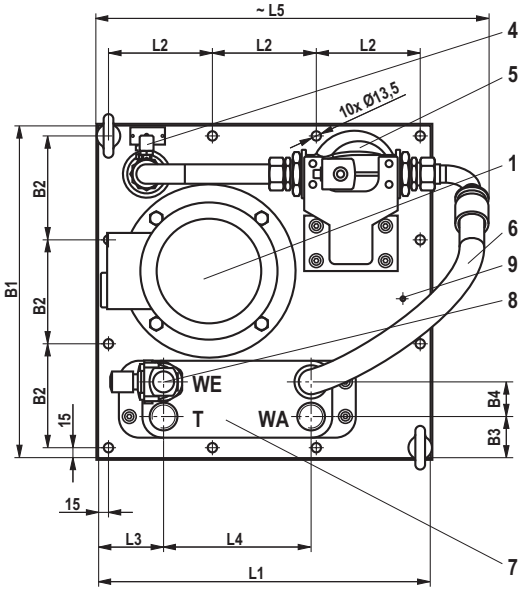
Port sizes S, T, WE and WA see page 17 bottom.

Tolerances according to:

- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

Dimensions: Type ABUKG-..V... base (dimensions in mm)





1 Electric motor
2 Pump carrier + coupling
3 Gerotor pump
4 Pressure measuring port
5 Inline filter with maintenance indicator
6 Hose line
7 Oil-water heat exchanger
8 Electrically operated water valve
9 Equipotential bonding
10 Cork seal according to AB03333

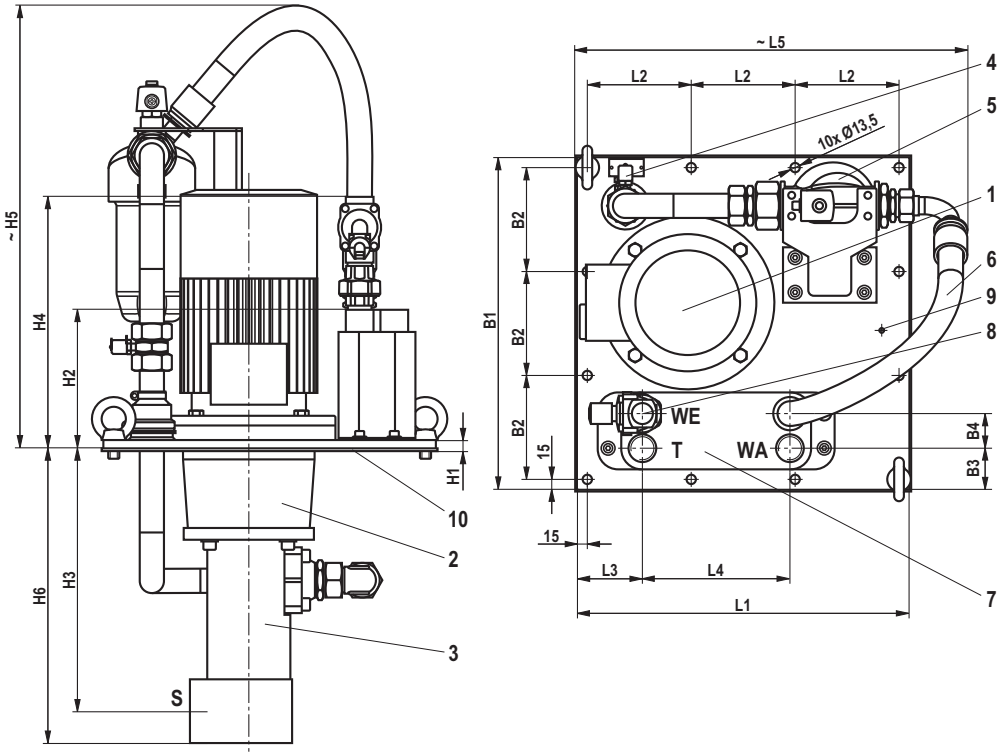
Cooling power in kW	Dimensions														
	L1	L2	L3	L4	L5	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6
11	420	130	103.5	213	550	420	130	60	50	16	172	140.5	335	650	320
15	420	130	103.5	213	550	420	130	60	50	16	172	140.5	335	650	320
22	480	150	94.5	213	600	480	150	60	50	16	156	140.5	318	650	320
30	480	150	94.5	213	600	480	150	60	50	16	204	140.5	367	650	320
37	480	150	94.5	213	600	480	150	60	50	16	244	140.5	407	750	320
45	570	180	116	309	700	570	180	64	94	16	194	140.5	372	750	320
55	570	180	116	309	700	570	180	64	94	16	242	140.5	420	850	350
75	630	200	126	309	700	630	200	71	94	16	266	159.5	444	950	400

Port sizes S, T, WE and WA see page 17 bottom.

Tolerances according to:

- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

Dimensions: Type ABUKG-..V... noise-optimized (dimensions in mm)

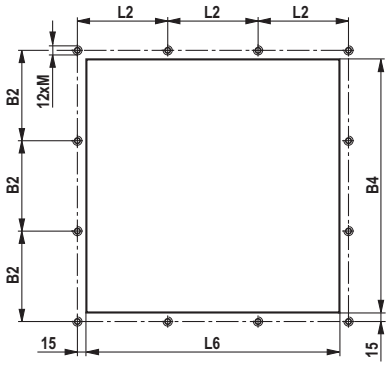


1 Electric motor
2 Pump carrier + coupling
3 Screw spindle pump
4 Pressure measuring port
5 Inline filter with maintenance indicator
6 Hose line
7 Oil-water heat exchanger
8 Electrically operated water valve
9 Equipotential bonding
10 Cork seal according to AB03333

Cooling power in kW	Dimensions														
	L1	L2	L3	L4	L5	B1	B2	B3	B4	H1	H2	H3	H4	H5	H6
11	420	130	103.5	213	550	420	130	60	50	16	172	260	335	650	294
15	420	130	103.5	213	550	420	130	60	50	16	172	260	335	650	294
22	480	150	94.5	213	600	480	150	60	50	16	156	302	318	650	341
30	480	150	94.5	213	600	480	150	60	50	16	204	376.5	367	650	421.5
37	480	150	94.5	213	600	480	150	60	50	16	244	376	407	750	421.5
45	570	180	116	309	700	570	180	64	94	16	194	376	372	750	421.5
55	570	180	116	309	700	570	180	64	94	16	242	376	420	850	421.5
75	630	200	126	309	700	630	200	71	94	16	266	419.5	444	950	469

Dimensions: Type ABUKG-..V... noise-optimized (dimensions in mm)

Recommended tank break-through for ABUKG-..V-...



Port sizes S, T, WE and WA see page 17 bottom.

Tolerances according to:

- General tolerances ISO 2768-mK
- Tolerancing principle ISO 8015

Cooling power in kW	Dimensions				
	L2	L6	B2	B5	M
4 / 7.5 / 11 / 15 [1]	130	360	130	360	M12
15 [2] **/ 22 / 30 / 37**	150	420	150	420	M12
45 / 55	180	510	180	510	M12
75	200	570	200	570	M12

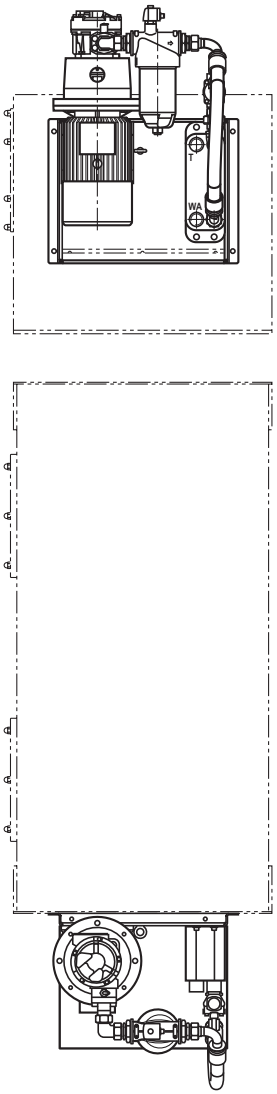
[1] Noise-optimized

[2] Base

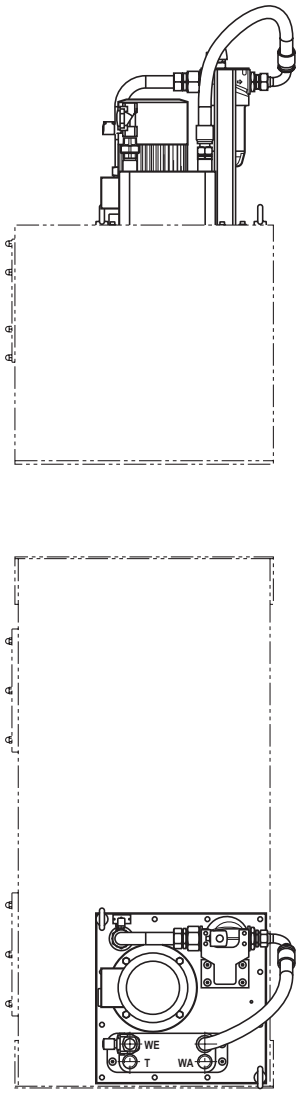
8

Mounting option

The filter cooler unit version **ABUKG-..K-...** is to **be mounted preferably to the side** of a hydraulic tank.
It may also be mounted separately.



The filter cooler unit version **ABUKG-..V-...** is to **be mounted preferably on top** of a hydraulic tank.
It cannot be mounted separately without an appropriate bracket.

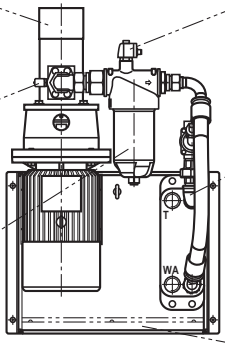


Optional accessories and spare parts

Suction port
Flange connections for suction line
(see page 18)

Measuring port
Pressure gauge data sheet 50205
DC-FS measurement technology data sheet 51501

Filters and filter elements
(included in the scope of delivery)
Data sheet 51447



Maintenance indicator
Electronic switching element
Data sheet 51450 (included in the scope of delivery)
Mating connectors data sheet 08006

Water on
Pressure gauge data sheet 50205
DC-FS measurement technology data sheet 51501
Isolator valve data sheet 50235
(included in the scope of delivery)
Dirt trap AB 42-25

Oil pan

4 - 15 [1] kW	R901343957
15 [2] - 37 kW	R901343958
45 - 75 kW	R901343959

Port sizes for flanges and fittings

Cooling power in kW	Type ABUKG-.. base				Type ABUKG-.. noise-optimized			
	Suction port S	Oil outlet T	Water on WE	Water off WA	Suction port S	Oil outlet T	Water on WE	Water off WA
4	–	–	–	–	Square flange 20X40 M6x13	G1	G1	G1
7.5	–	–	–	–				
11	SAE 1 1/2"	G1	G1	G1	SAE 1 1/4"			
15								
22					SAE 1 1/2"			
30					SAE 2"			
37								
45		G1 1/2	G1 1/2	G1 1/2		G1 1/2	G1 1/2	G1 1/2
55	SAE 2"							
75					SAE 2 1/2"			

[1] Noise-optimized
[2] Base

Flange connections for suction line (dimensions in mm)

Figure 1

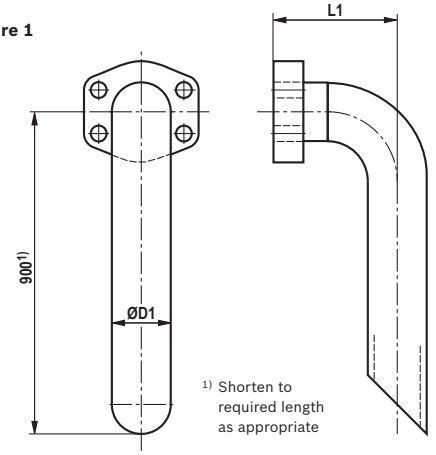


Figure 2

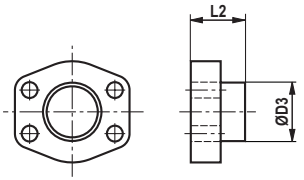
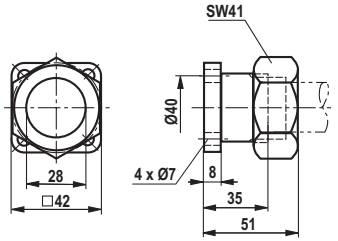


Figure 3



ABUKG-..K-...

Cooling power in kW	Base			Noise-optimized			Figure
	Material no.	L1	ØD1	Material no.	L1	ØD1	
4	R900323237	–	–	–			3
7.5							
11	R900026561	103.5	48.3	R900722888	100	42	1
15							
22				R900026561	103.5	48.3	
30				R900026562	123	60.3	
37							
45							
55	R900026562	123	60.3				
75				R900026563	147	76.1	

ABUKG-..V-...

Cooling power in kW	Base			Noise-optimized			Figure
	Material no.	L2	ØD2	Material no.	L2	ØD2	
4	R900323237	–		–			3
7.5							
11	R900013501	57	42	R900012341	41	42	2
15							
22				R900013501	57	42	
30				R901013502	42	60.3	
37							
45							
55	R900013502	42	60.3				
75				R901013503	50	77	

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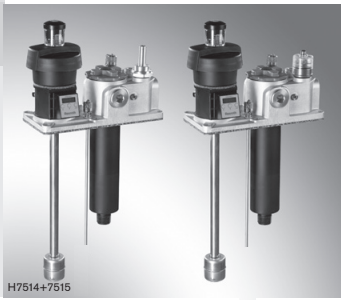
documentation@boschrexroth.de
www.boschrexroth.de

Fluid Manager

RE 50230/12.07 1/14

with breather filter, level and temperature monitor, return flow filter with clogging indicator,
feature for taking samples of hydraulic fluid in the tank

Type ABZMF


H7514+7515

Component series 1X
Maximum operating pressure 10 bar *[145 psi]*

Table of contents

Features

The Fluid Manager integrates the following functions:
- Breather filter
- Level and temperature monitoring
- Return flow filter with clogging indicator
- Sample-taking of hydraulic fluid in the tank

The following ports are available:
- T1 Port G1 to return flow filter
- T2/T3 Plug screw G1 (alternative connections for return flow filter – port T1)
- X1 Pressure measurement connection M16 x 2 (with stud end connector G1/8) with mounted tube for sample-taking in the tank
- X2 Pressure measurement connection M16 x 2 (with stud end connector G1/8) for sample-taking upstream of the return flow filter
- X3 Plug screw G1/8 (alternative port to X1)
- D Clogging indicator RV2 or E2SPP

Further features:
- Return flow filter with filter element to DIN 24550
- Standardized flange pattern to DIN 24557, part 2, for float switch
- Low space requirement
- Low installation cost
- Modular design

Ordering code

ABZMF – – – / 100 – –1X /

Power unit accessories
Fluid Manager measuring instruments = **ABZMF**

Functions
Breather filter,
level and temperature monitoring
Return flow filter [1); 2)] = **NTR**
Return flow filter [2)] = **R**

Length of float switch [3)]
L = 370 mm = **370**

Function of float switch [3)]
Level: with two switching contacts (normally closed/normally open)
Temperature: with two switching outputs,
with temperature indicator and control device = **M**
Level: with resistance measuring chain
(analog output 4-20 mA)
Temperature: with resistance thermometer
(analog output 4-20 mA) = **R**

Size of return flow filter
with filter element to DIN 24550
Size 100 = **100**

Series
1X = Component series 10 to 19
(10 to 19: unchanged installation and connection dimensions)

Filter element of return flow filter
10 = Filtration rating 10 µm (standard)
03 = Filtration rating 3 µm

[4)] **Function of clogging indicator**
RV2 = Mechanical-visual
E2SPSS = Electronic

Order example:

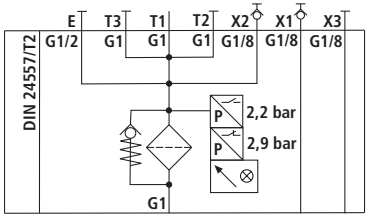
Fluid Manager with breather filter, with temperature indicator and control device, with two switching contacts (level and temperature),
electrical connection for circular plug M12 x 1,
return flow filter with mechanical-visual clogging indicator:

ABZMF-NTR-0370-M/100-10-1X/RV2
Material no. **R901186566**

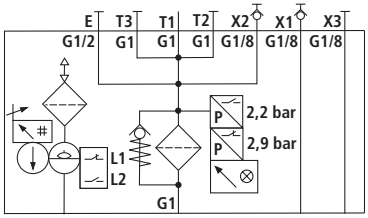
1) For further information, see data sheet RE 50216
2) For further information, see data sheet RE 50088
3) Not required for variant "R"
4) See also pages 10 and 11

Symbols

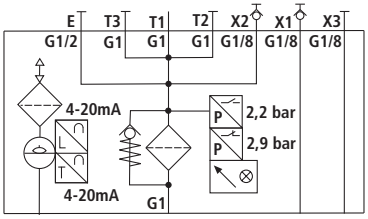
With return flow filter and electronic clogging indicator:
ABZMF-R/100-..-1X/E2SPSS



With level and temperature monitoring with 2 switching contacts, with return flow filter and electronic clogging indicator:
ABZMF-NTR-0370-M/100-..-1X/E2SPSS



With level and temperature monitoring with resistance measuring chain, with return flow filter and electronic clogging indicator: **ABZMF-NTR-0370-R/100-..-1X/E2SPSS**

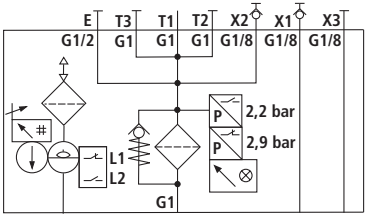


Selection table

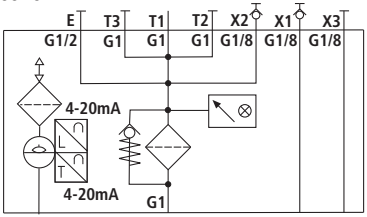
Type	Material no.
ABZMF-NTR-370-M/100-10-1X/E2SPSS	R901177245
ABZMF-NTR-370-M/100-10-1X/RV2	R901186566
ABZMF-NTR-370-R/100-10-1X/E2SPSS	R901186629
ABZMF-NTR-370-R/100-10-1X/RV2	R901186627
ABZMF-R/100-10-1X/E2SPSS	R901186638
ABZMF-R/100-10-1X/RV2	R901186637

Symbols

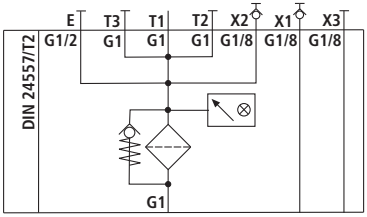
With level and temperature monitoring with 2 switching contacts, with return flow filter and mechanical-visual clogging indicator: **ABZMF-NTR-0370-M/100-..-1X/RV2**



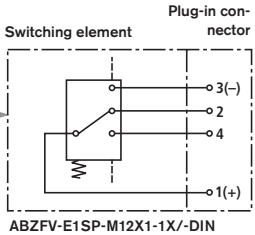
With level and temperature monitoring with resistance measuring chain, with return flow filter and mechanical-visual clogging indicator: **ABZMF-NTR-0370-R/100-..-1X/RV2**



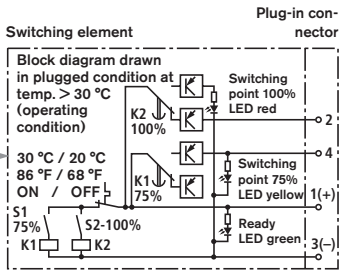
With return flow filter and mechanical-visual clogging indicator: **ABZMF-R/100-..-1X/RV2**



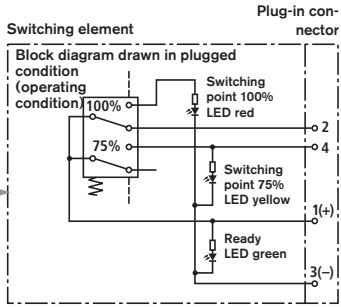
Optional: Electrical switching element for clogging indicator



ABZFV-E1SP-M12X1-1X/-DIN



ABZFV-E2SPSU-M12X1-1X/-DIN



ABZFV-E2SP-M12X1-1X/-DIN

Function

The Fluid Manager integrates the functions of a breather filter, level and temperature monitors, and a return flow filter.

The constructive design provides for flexible fitting of equipment, which allows the device to be adjusted to suit the requirements of the application at hand.

The Fluid Manager consists of a cast base plate, into which the filter head of the return flow filter is integrated.

The filter head is provided with three threaded ports, which are offset by 90°, for the variable connection of the return line.

The sample-taking port can be optionally mounted to ports X1 or X3.

In addition, a port X2 is provided in the return flow line.

The base plate is fitted with a connecting flange to DIN 24550/T2. Variant NTR includes a breather filter with level and temperature monitor. On function variant R, a breather filter or float switch can optionally connected to this connecting flange.

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Technical data: Fluid Manager
(for applications outside these parameters, please consult us!)

General

Hydraulic fluid temperature range		°C *[°F]*	–20 to 80 *[–4 to 176]*
Ambient temperature range		°C *[°F]*	–20 to 80 *[–4 to 176]*
Installation position			Vertical ±20 °
Material	– Base plate		GK-AlSi12
	– Base plate seal		GI cork
	– Plug screw		Galvanized steel, Cr-6-free
Weight (with basic equipment)		kg *[lbs]*	ca. 3.5 *[7.7]*

Hydraulic

Maximum operating pressure		bar *[psi]*	10 *[145]*		
Hydraulic fluid					
– Resistance					
• Mineral oils			Mineral oil	HLP	to DIN 51524 / Resistant
• Hardly inflammable hydraulic fluids			Emulsions	HFA-E	to DIN 24320 / Resistant
			Watery solutions	HFC	to VDMA 24317 / **Not** resistant
			Phosphate esters	HFD-R	to VDMA 24317 / **Not** resistant
			Organic esters	HFD-U	to VDMA 24317 / **Not** resistant
• Fast bio-degradable hydraulic fluids			Triglycerides (rape oil)	HETG	to VDMA 24568 / Resistant
			Synthetic esters	HEES	to VDMA 24568 / Resistant
			Polyglycols	HEPG	to VDMA 24568 / Resistant

Electrical

Type of protection to DIN EN 60529	IP 65

Technical data: Float switch – breather filter, level and temperature monitoring
(for applications outside these parameters, please consult us!)

General

Material	– Sliding tube		CU alloy
	– Float		1.4571
	– Filter housing and flange		PA
Seal material			FKM
Switching points L1, L2		mm *[inch]*	L1 = 220 *[8.66]*; L2 = 140 *[5.51]* preset; they must be adjusted according to the operating conditions during commissioning (see data sheet RE 50216)
Hydraulic fluid	– Density	g/cm³	> 0.8

Electrical

Plug-in connection	M12x1; 4-pin (material: metal)

Reed contacts of float switches with component plug M12 x 1; 4-pin

Switching voltage range	VDC	10 to 30
Max. switching current	A	0.5
Max. switching power	W	10

Technical data: Float switch – breather filter, level and temperature monitoring
(for applications outside these parameters, please consult us!)

Breather filter

Indicating range		bar	to 0.035 = 100 %
Filtration rating		µm	3 absolute
Air flow rate		l/min	650
Material:	– Housing		PA
	– Filter element		Paper

Temperature display

Temperature indicating range	°C *[°F]*	ca. –20 to +120 *[4 to 248]*
Alarm temperature adjustment range	°C *[°F]*	0 to +99 *[32 to 178]*
Max. programmable switching points		2
Housing design		PA, IP 65
Display		4-digit, 7-segment LED display
Switch-on current consumption		ca. 140 mA over 100 ms
Current consumption during operation	mA	ca. 30 to 50
Supply voltage	VDC	24 ±10 %
Output		PNP
Accuracy		1% of displayed value
Resolution	°C *[°F]*	1 *[2]*
Operation		By means of 3 keys
Temperature sensor		PT 100

Resistance measuring chain and resistance thermometer with component plug M12 x 1; 4-pin

Switching voltage range	VDC	10 to 30
Output	mA	4 to 20
Resolution of resistance measuring chain	mm	7.5
Max. load Ω		R = *UB* – 7.5 V (0.02 A)
Residual ripple content	%	1
Temperature measuring range	°C *[°F]*	0 to 100 *[32 to 212]*

8

Technical data: Return flow filter
(for applications outside these parameters, please consult us!)

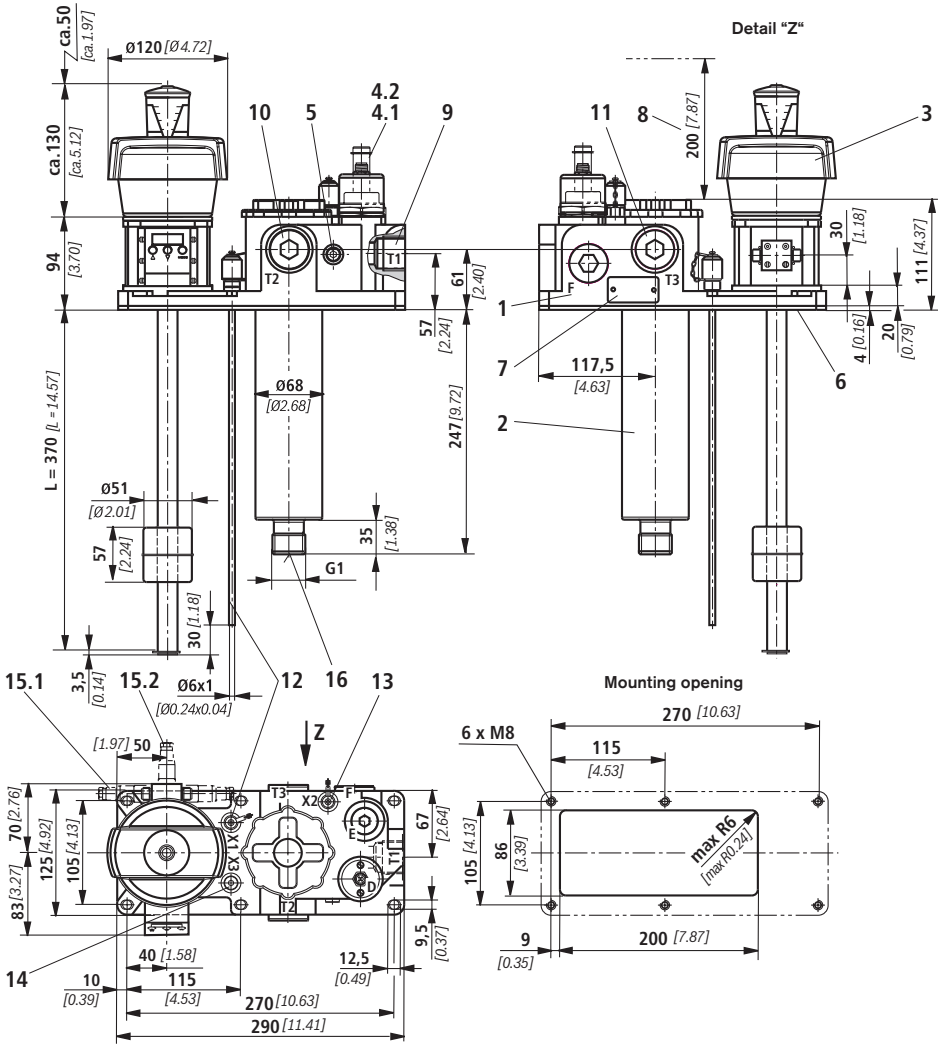
General

Direction of flow			Inlet at the side, outlet vertically downwards
Size		Size	100
Material	– Filter head		Aluminum
	– Filter bowl		Plastic
	– Filter cover		Plastic
	– Visual clogging indicator		Aluminum
	– Electrical switching element		Plastic PA6

Hydraulic

Maximum operating pressure	bar *[psi]*	10 *[145]*
Cracking pressure of by-pass valve	bar *[psi]*	3.5 ±0.35 *[50.7 ±5]*

Unit dimensions: Variant ..NTR.. (dimensions in mm *[inch]*)



1 Base plate

2 Return flow filter with filter element to DIN 24550

3 Float switch with breather filter, 2 adjustable switching contacts for level and temperature monitoring; with temperature indicator and control device, circular plug-in connection M12 x 1

4.1 Mechanical-visual clogging indicator RV2 (see page 10)

4.2 Electronic clogging indicator E2SPSS (see page 11)

5 Connection bore with plug screw G1/8

6 GI cork seal

7 Nameplate

8 Minimum space required to change element

9 Port T1 (return flow filter) G1

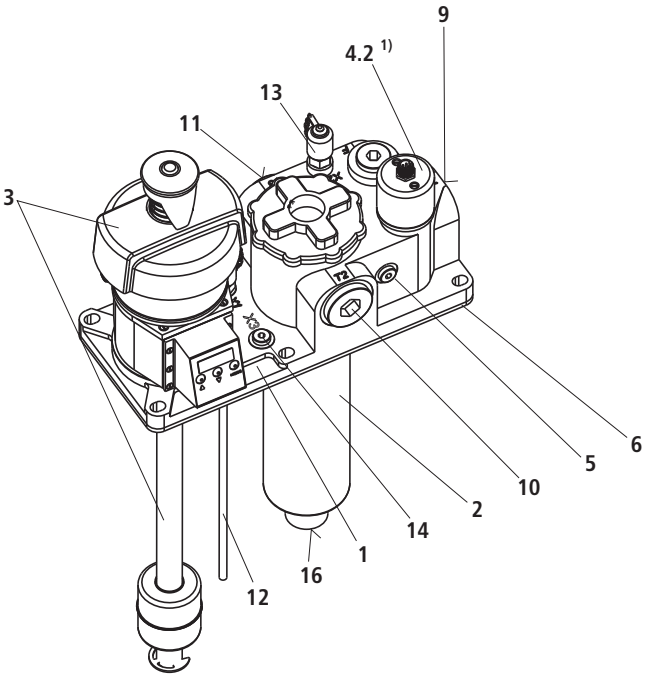
For items 10 to 16, see page 7

Unit dimensions: Variant ..NTR..

Ports

D	= Port M30 x 1.5 for clogging indicator
E	= Plug screw G1/2
F	= Plug screw M27 x 2
T1	= Free port G1 to return flow filter
T2 / T3	= Plug screw G1 (alternative ports for return flow filters – port T1)
X1	= Pressure measuring port M16 x 2 (with screwed end G1/8) with tube mounted for taking samples in the tank
X2	= Pressure measuring port M16 x 2 (with screwed end G1/8) for sample-taking upstream of the return flow filter
X3	= Plug screw G1/8 (alternative port for X1)

Ports X1 and X3 can be used individually!



10 Port T2 with plug screw G1 (alternative port to T1)

11 Port T3 with plug screw G1 (alternative port to T1)

12 X1 pressure measuring port M16 x 2 (with screwed end G1/8) with sample-taking tube

13 X2 pressure measuring port M16 x 2 (with screwed end G1/8) upstream of return flow filter

14 Port X3 with plug screw G1/8 (alternative port to X1)

15.1 Mating connector – 2 pcs for variant “M“

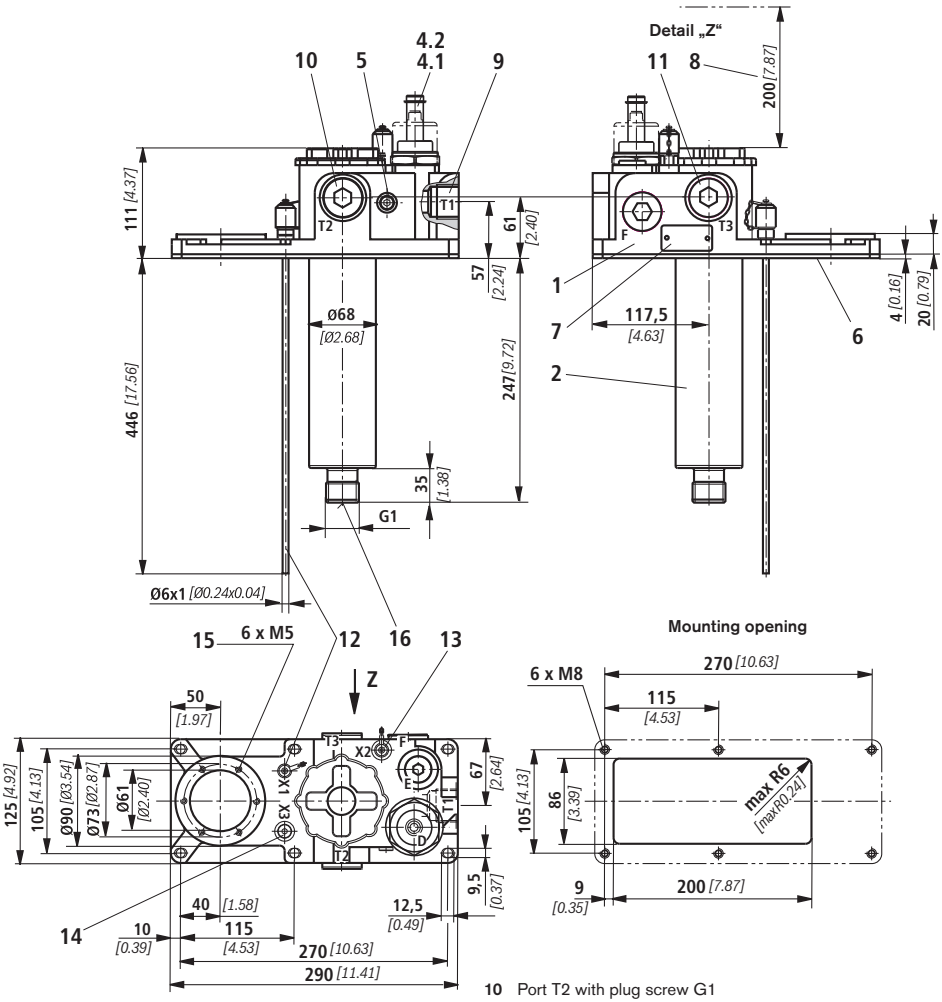
15.2 Mating connector – 1 pc for variant “R”

16 Oil outlet of return flow filter

1) Drawing shows clogging indicator E2SPSS

8

Unit dimensions: Variant ..R.. (dimensions in mm *[inch]*)



1 Base plate

2 Return flow filter for filter element and installation dimensions to DIN 24550

4.1 Mechanical-visual clogging indicator RV2

4.2 Electronic clogging indicator E2SPSS

5 Connection bore with plug screw G1/8

6 GI cork seal

7 Nameplate

8 Minimum space required to change element

9 Port T1 (return flow filter) G1

10 Port T2 with plug screw G1 (alternative port to T1)

11 Port T3 with plug screw G1 (alternative port to T1)

12 X1 pressure measuring port M16 x 2 (with screwed end G1/8) with sample-taking tube

13 X2 pressure measuring port M16 x 2 (with screwed end G1/8) upstream of the return flow filter

14 Port X3 with plug screw G1/8 (alternative port to X1)

15 Porting pattern to DIN 24557, part 2

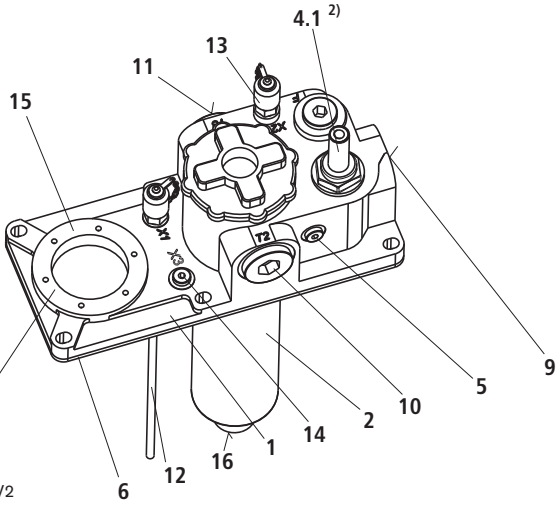
16 Oil outlet of return flow filter

Unit dimensions: Variant ..R..

Ports

D	= Port M30 x 1.5 for clogging indicator
E	= Plug screw G1/2
F	= Plug screw M27 x 2
F	= Plug screw M27 x 2
T1	= Free port G1 to return flow filter
T2 / T3	= Plug screw G1 (alternative ports for return flow filter – port T1)
X1	= Pressure measuring port M16 x 2 (with screwed end G1/8) with mounted tube for sample-taking in the tank
X2	= Pressure measuring port M16 x 2 (with screwed end G1/8) for sample-taking upstream of the return flow filter
X3	= Plug screw G1/8 (alternative port for X1)

Ports X1 and X3 can be used individually!



Porting pattern DIN 24557/T2 for optional equipment, e.g. breather filter to RE 50070, float switch to RE 50214 or float switch to RE 50216

2) Drawing shows clogging indicator RV2

8

Clogging indicator type ..RV2.. (dimensions in mm *[inch]*)

Mechanical-visual clogging indicator to data sheet RE 50088

ABZ | F | V – RV2 – 1X / M – DIN

Rexroth plant construction accessories

Filter

Clogging indicator

Mechanical-visual clogging indicator for return flow filter
Switching point 2.2 bar *[31.9 psi]* **= RV2**

DIN = Identification for DIN variant

Seal material

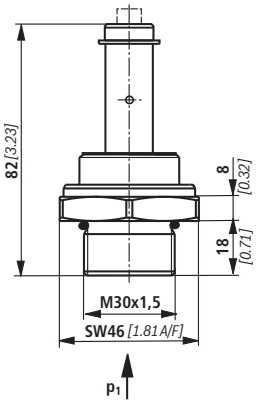
M = See hydraulic fluid table (page 4)

Component series

1X = Component series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Mechanical-visual clogging indicator	Material no
ABZFV-RV2-1X/M-DIN	R901025310

Response pressure of clogging indicator
2.2 ±0.35 bar *[31.9 ±3.6 psi]*



Electrical switching element for clogging indicator RV2 to data sheet RE 50088 (optional)

ABZ | F | V – – 1X / – DIN

Rexroth plant construction accessories

Filter

Clogging indicator

Electrical switching element with 1 switching point (changeover contact) circular plug-in connection M12 x 1 **= E1SP-M12X1**

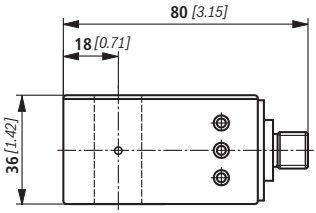
Electrical switching element with 2 switching points (normally closed/normally open, 75%, 100%) Circular plug-in connection M12 x 1, 3 LED **= E2SP-M12X1**

Electrical switching element with 2 switching points (normally closed/normally open, 75%, 100%) Signal suppression up to 30 °C circular plug-in connection M12 x 1. 3 LED **= E2SPSU-M12X1**

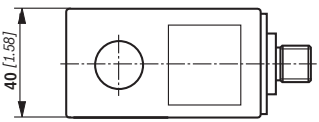
–DIN = Identification for DIN variant

Component series

1X = Component series 10 to 19 (10 to 19; unchanged installation and connection dimensions)



Electrical switching element	Material no.
ABZFV-E1SP-M12X1-1X/-DIN	R901025339
ABZFV-E2SP-M12X1-1X/-DIN	R901025340
ABZFV-E2SPSU-M12X1-1X/-DIN	R901025341



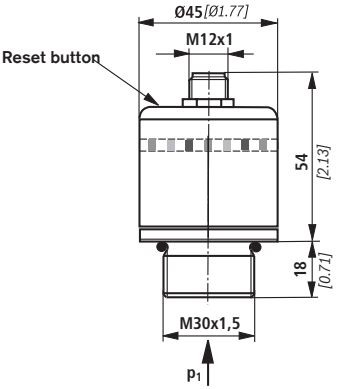
Clogging indicator type ..E2SPSS.. (dimensions in mm *[inch]*)

Electronic clogging indicator

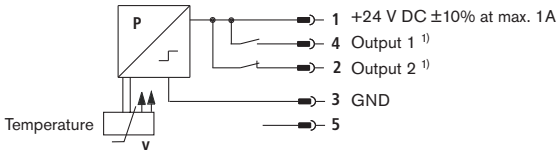
ABZ | F | V – E2SPSS – 1X / M – DIN

- ABZ: Rexroth plant construction accessories
- F: Filter
- V: Clogging indicator
- E2SPSS: Electronic clogging indicator for return flow filter, 1st switching point 2.2 bar *[31.9 psi]*, 2nd switching point 2.9 bar *[42 psi]*
- 1X: Component series 10 to 19 (10 to 19; unchanged installation and connection dimensions)
- M: Seal material — See hydraulic fluid table (page 4)
- DIN: Identification for DIN variant

Electronic clogging indicator	Material no.
ABZFV-E2SPSS-1X/M-DIN	R901187314



Pinout



1) Output 1 = pre-warning at 2.2 bar ≙ 75 % (normally open contact for rising pressure)
Output 2 = shutdown at 2.9 bar ≙ 100 % (normally closed contact for rising pressure)

Clogging indicator type E2SPSS is a microprocessor-controlled pressure sensor. As the filter is increasingly clogged, the rising backpressure upstream of the filter element is measured.
The pressure sensor is fitted with 2 switching outputs for pre-warning at 75 % (4 yellow LEDs) and maximum clogging at 100 % (4 red LEDs).

In order to avoid false alarms due to high viscosity during the cold start phase, a temperature sensor measures the oil temperature.

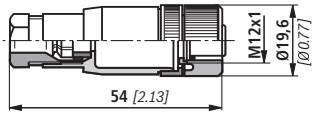
The device is ready at a temperature > 30 °C (4 green LEDs).

Features:

- Two switching outputs
- Signal suppression during the cold start phase and for brief pressure peaks
- Visual / electrical display
- Self-monitoring (a fault is indicated by flashing of the red LEDs and switching output 2 is activated)
- Illuminated LED circle visible all around
- Display of status and fault messages
- Circular plug-in connection M12 x 1
- Reset function

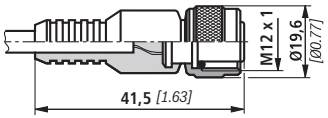
Mating connectors (dimensions in mm *[inch]*) – for detailed information, see RE 08006

Mating connector for connector plug K24



Designation	Material no.
LEITUNGSDOSE 4P Z24 SPEZ	R900031155

Mating connector for connector plug K24 with molded-on PVC cable, 3 m long



Designation	Material no.
LEITUNGSDOSE 4P Z24M12X1 +3MSPEZ	R900064381

Spare parts

Filter element
to data sheet RE 50088

ABZ | F | E – R | 0100 – | –1X/ | M – | DIN

Rexroth plant construction accessories
Filter
Filter element
Filter element for return flow filter **= R**

Size
Size 100 **= 0100**

DIN = DIN 24550

Seal material
M = See hydraulic fluid table (page 4)

Component series
1X = Component series 10 to 19 (10 to 19; unchanged installation and connection dimensions)

Filtration rating
10 = 10 µm [1)]
03 = 3 µm [1)]

[1)] The separation capacity is measured in accordance with ISO 16889
10 µm element ≙ $\beta_{10\,(c)} > 200$
3 µm element ≙ $\beta_{5\,(c)} > 200$

Filter element, 10 µm	Material no.
ABZFE-R0100-10-1X/M-DIN	R901025293

Filter element, 3 µm	Material no.
ABZFE-R0100-03-1X/M-DIN	R901025278

Seal kit for Fluid Manager, complete

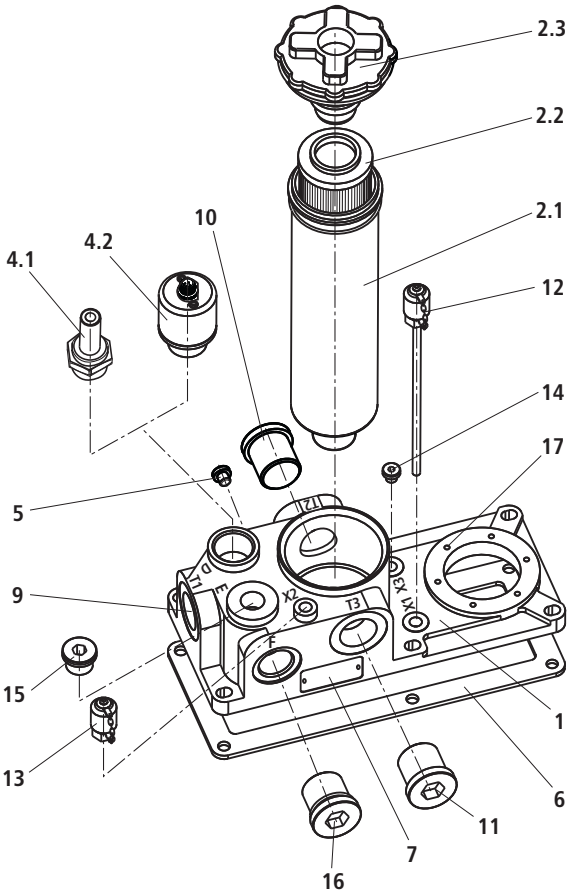
Seal kit	Material no.
DICHTUNGSSATZ ABZMF-D-1X/M	R901187367

The seal kit includes the seals E1 to E8 (see page 13).

GI cork seal for base plate

Seal	Material no.
DICHTUNG 4,0X290X125- 6X 9.5 &	R901187368

Spare parts



Seals		
E1	GI cork seal	Base plate Fluid Manager
E2	O-ring	Filter cover of return flow filter
E3	O-ring	Filter cylinder of return flow filter
E4	O-ring	Port D (RV2 or E2SPSS)
E5	ED Eolastic seal G1/8	Ports X1, X2, X3 and plug screw next to port T2
E6	ED Eolastic seal G1/2	Port E
E7	ED Eolastic seal G1	Ports T2 and T3
E8	O-ring	Port F

1 Base plate
2.1 Filter cylinder with O-ring E3
2.2 Filter element
2.3 Filter cover with O-ring E2
4.1 Port D, mechanical-visual clogging indicator RV2 with O-ring E4
4.2 Port D, electronic clogging indicator E2SPSS with O-ring E4
5 Connection bore fitted with VSTI-G1/8 plug screw, seal E5
6 GI cork seal E1
7 Nameplate
9 Port T1, free port G1 to return flow filter fitted with protective cap
10 Port T2, plug screw VSTI-G1, seal E7
11 Port T3, plug screw VSTI-G1, seal E7
12 X1 pressure measuring port M16 x 2 (with screwed end G1/8) with sample-taking tube, seal E5
13 X2 pressure measuring port M16 x 2 (with screwed end G1/8), seal E5
14 Port X3, plug screw VSTI-G1/8, seal E5
15 Port E, plug screw VSTI-G1/2, seal E6
16 Port F, plug screw M27x2 with O-ring E8
17 Mounting bore pattern to DIN 24557, part 2

Installation notes

– Ensure sufficient distance to the tank wall and components
– Ensure free access to ports for the return flow filter, sample-taking and port E
– Make sure that there is sufficient space upwards for changing the filter elements
– The return flow filter can be connected to T1, T2 or T3
– The pressure measuring fitting with the sample-taking tube can be connected to X1 or X3

Electrical connections:

– Electrical connections may only be established by specialist personnel
– Before working on electrical components, interrupt the power supply
– After having connected the circular plug-in connection M12 x 1 tighten it my means of screws
– Only connect the circular plug-in connection M12 x 1 when disconnected from the power supply
– Do not overload contacts (see Technical data)
– In the case of inductive load, provide protective circuit!

Commissioning

Before commissioning, check that

– all connections fit properly and do not show any defects,
– the base plate was mounted stress-free on the tank,
– a filter element was inserted in the return flow filter,
– a tank breather filter or a level / temperature measuring device is installed.

Port D – variants with clogging indicator:

The technical connection data for clogging indicator type ..RV2.. and
type ..E2SPSS.. can be found on pages 5, 10 and 11, and data sheet RE 50088.

Note

The electronic clogging indicator is provided with an illuminated circle of LEDs which is visible from all directions. These LEDs signal, apart from usual status messages, additional fault messages.

Green LED permanently ON	Supply voltage is applied and device is ready
Yellow LED permanently ON	Switching output 1 is closed (alarm at 2.2 bar)
Red LED permanently ON	Switching output 2 is open (alarm at 2.9 bar)
Green LED flashes about 2x per second (_ _ ■ _ _ ■ _ _)	Temperature < 30 °C (switching outputs not enabled)
Red LED flashes about 2x per second (_ ■ _ ■ _ ■ _)	Pressure or temperature sensor defective, switching output 2 is open.

If the switching outputs were activated due to excessive pressure, they can only be deactivated by switching the system off or when the hydraulic fluid temperature falls again below 20 °C.

To trigger a switching process, the pressure must have exceeded the corresponding limit value (2.2 or 2.9 bar) without any interruption. This prevents the alarm from being triggered by brief pressure peaks.

☞ **Press the reset key after each filter change!**

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Filter elements

Designation	Type	Size	Collapse pressure resistance in bar	Filter rating	Data sheet	Page
Filter elements	1., 2.	0003 ... 1000	330	1 ... 1500	51420	531

Filter elements

RE 51420/10.10 1/14

Type 1. and 2. elements

Sizes according to **DIN 24550**: 0040 to 1000
According to Rexroth standard: 0003 to 0270
Collapse pressure resistance up to 330 bar *[up to 4786 psi]*
Filter rating: 1 to 1500 µm
Filter area: up to 4.8 m² *[up to 7440 in²]*
Filtration quotient: up to $\beta_{x(c)} \geq 1000$
Operating temperature: –10 °C to 100 °C *[14 °F to 212 °F]*

filter_53_gruppe

Table of contents

Features

- Filter media for a number of applications
- Made of micro glass, filter paper, wire mesh, fleece material and metal fiber fleece
- Cleanable filter media
- Attainable oil cleanliness up to ISO 12/8/3 (ISO 4406)
- Filtration quotient up to $\beta_{x(c)} \geq 1000$ (ISO 16889)
- High contamination retention through multi-layer fiberglass technology
- Low initial pressure differential (ISO 3968)
- Complete range according to DIN 24550
- Worldwide sales
- Product and user support by fluid and filter analysis (residue analysis)

Ordering code

of filter element type 1.

1.		—	— 0 —

Filter element
Design **= 1.**

Size
according to DIN 24550
= 0040, 0063, 0100, 0160, 0250, 0400, 0630, 1000
according to Rexroth Standard
= 0130, 0150, 0045, 0055, 0120, 0200, 0270

Reusable (cleanable)

Filtration rating [1] in µm
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G60, G100, G250, **= G…**

absolute (ISO 16889)
Metal fiber fleece, cleanable to a limited extent
M5, M10, M15 **= M…**

One-way (not cleanable)

nominal
Filter paper
P10, P25 **= P…**
Fleece material
VS25, VS40, VS60 **= VS…**

absolute (ISO 16889)
Micro glass
H1XL, H3XL, H6XL, H10XL, H20XL **= H…XL**
Resistance to cooling agents **= H…XLK**

water absorbing
AS3, AS6, AS10, AS20 **= AS…**

Seal [2]
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Element model
0… = Standard adhesive T_{max} = 100 °C *[212 °F]*
H… = Adhesive resistant to cooling agents T_{max} = 160 °C *[320 °F]*

…0 = Standard material
…V = Stainless steel 1.4571

Pressure differential
Max. admissible pressure differential of the filter element
C = 160 bar *[2321 psi]*
A = 30 bar *[435 psi]*

Order example:
1.0040 H10XL-A00-0-M
Material no.: R928005837

[1] Other filtration ratings upon request

[2] Other seal materials upon request

Standard types

Filter element type 1. Standard types, NBR seal

	Material no. of filter element, filtration rating in µm		
Type	**H10XL**	**H6XL**	**H3XL**
1.0040 H..XL-A00-0-M	**R928005837**	**R928005836**	**R928005835**
1.0063 H..XL-A00-0-M	**R928005855**	**R928005854**	**R928005853**
1.0100 H..XL-A00-0-M	**R928005873**	**R928005872**	**R928005871**
1.0130 H..XL-A00-0-M	**R928037180**	**R928045104**	**R928037178**
1.0150 H..XL-A00-0-M	**R928037183**	**R928037182**	**R928037181**
1.0160 H..XL-A00-0-M	**R928005891**	**R928005890**	**R928005889**
1.0250 H..XL-A00-0-M	**R928005927**	**R928005926**	**R928005925**
1.0400 H..XL-A00-0-M	**R928005963**	**R928005962**	**R928005961**
1.0630 H..XL-A00-0-M	**R928005999**	**R928005998**	**R928005997**
1.1000 H..XL-A00-0-M	**R928006035**	**R928006034**	**R928006033**

Ordering code

of filter element type 2.

2. [ ] — — **0** —

Filter element
Design **= 2.**

Size
according to DIN 24550
= 0040, 0063, 0100, 0160, 0250, 0400, 0630, 1000
according to Rexroth Standard
= 0004 [1] **0130, 0150**

Reusable (cleanable)

Filtration rating [2] **in µm**
nominal
Stainless steel wire mesh, cleanable
G10, G25, G40, G60, G100, G200, **= G…**

absolute (ISO 16889)
Metal fiber fleece, cleanable to a limited extent
M5, M10, M15 **= M…**

One-way (not cleanable)

nominal
Filter paper
P10, P25 **= P…**
Fleece material
VS25, VS40, VS60 **= VS…**

absolute (ISO 16889)
Micro glass
H1XL, H3XL, H6XL,
H10XL, H20XL **= H…XL**
Resistance to cooling agents **= H…XLK**

water absorbing
AS3, AS6, AS10, AS20 **= AS…**

Seal [3]
M = NBR seal
V = FKM seal

Bypass valve
0 = at filter element always 0

Element model
0… = Standard adhesive T_{max} = 100 °C *[212 °F]*
H… = Adhesive resistant to cooling agents T_{max} = 160 °C *[320 °F]*

…0 = Standard material
…V = Stainless steel 1.4571

Pressure differential
Max. admissible pressure differential of the filter element
B = 330 bar *[4786 psi]*
A = 30 bar *[435 psi]*

Order example:
2.0040 H10XL-A00-0-M
Material no.: R928006647

[1] Filter size 0003 = filter element size 0004

[2] Other filtration ratings upon request

[3] Other seal materials upon request

Standard types

Filter element type 2. Standard types, NBR seal

Type	Material no. of filter element, filtration rating in µm		
	H10XL	H6XL	H3XL
2.0040 H..XL-A00-0-M	**R928006647**	**R928006646**	**R928006645**
2.0063 H..XL-A00-0-M	**R928006701**	**R928006700**	**R928006699**
2.0100 H..XL-A00-0-M	**R928006755**	**R928006754**	**R928006753**
2.0130 H..XL-A00-0-M	**R928022276**	**R928022275**	**R928022274**
2.0150 H..XL-A00-0-M	**R928022285**	**R928022284**	**R928022283**
2.0160 H..XL-A00-0-M	**R928006809**	**R928006808**	**R928006807**
2.0250 H..XL-A00-0-M	**R928006863**	**R928006862**	**R928006861**
2.0400 H..XL-A00-0-M	**R928006917**	**R928006916**	**R928006915**
2.0630 H..XL-A00-0-M	**R928006971**	**R928006970**	**R928006969**
2.1000 H..XL-A00-0-M	**R928007025**	**R928007024**	**R928007023**

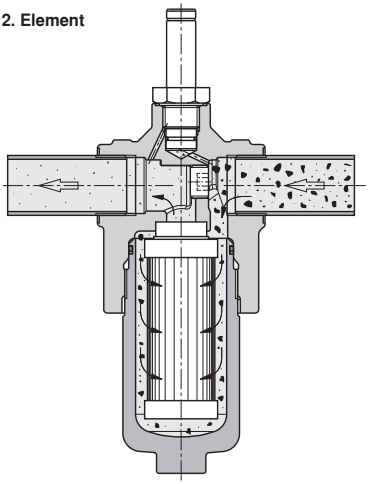
Assignment of filter element to current filter series

Element design (type)	Series	Application	Data sheet no. [1]
1.	40FLE(N)	Inline filter	51401
	100FLE(N)		51402
	40FLD(N)	Duplex filter	51408
	100FLD(N)		51409
	40FLDK(N)		51407
	10TE(N)	Tank mounted return line filter	51424
	10FRE(N)		51425
2.	40 / 100LE(N)	Inline filter	51400
	245LE(N)		51421
	350LE(N)		51422
	445LE(N)		51423
	16FE		51403
	40 / 160LD(N)	Duplex filter	51406
	400LD(N)		51429
	16FD		51410
	250 / 450FE(N)	Block mounting filter	51405
	245PSF(N)		51418
	350PSF(N)		51419
	450PBF(N)		51417

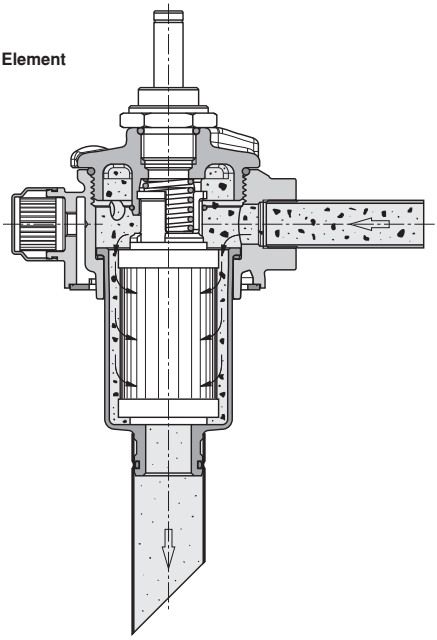
[1] For further information, please refer to the according data sheet.

Schematic illustration of flow and filtration process

2. Element



1. Element



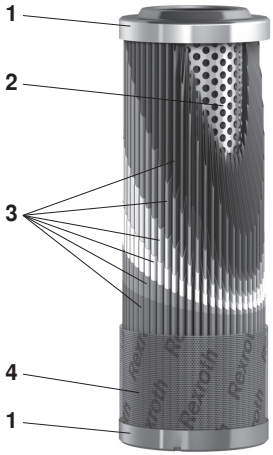
Function, structure

The filter element is the central part of industrial filters. The actual filtration process takes part in the filter element. The applied filter elements and the filter media used in the filter elements determine the major filter characteristics such as retention capacity, contamination retention and pressure loss. Rexroth filter elements are used for the filtration of hydraulic fluids in the hydraulic system as well as for the filtration of lubricants, industrial fluids and gases.

Filter elements consist of a combination of radially pleated filter media (3) which are laid around a perforated supporting tube (2). The filter element is vertically sealed by means of a 2-component adhesive. A perforated protective cage (4) is laid around the filter mat (depending on the model). Supporting tube and filter mat are glued to both end discs (1). The protective cage allows for a continuous fluid flow around the filter mat and, at the same time, provides mechanical protection against external damage. Seal rings and/or profile seals are provided between the filter element and the filter housing as a sealing.

All filter elements of the Rexroth standard product range are made of zinc-free parts thus preventing the formation of zinc soap, in particular if water-containing fluids (HFA/HFC) and synthetic oils are used. Moreover, many manufacturers of construction and agricultural machinery stipulate the use of zinc-free machine elements for rapidly biodegradable hydraulic oils.

With regard to the aforementioned fluids, the use of zinc-free filter elements prevents early "element blocking", thus considerably increasing the lifetime of the elements. Therefore, Rexroth filter elements can be used universally for typical hydraulic fluids and lubricants.



Filter characteristics

Filtration rating and attainable oil cleanliness

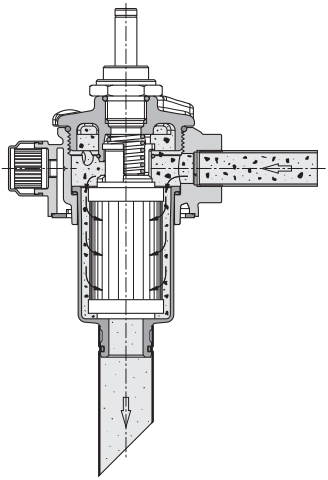
The main goal when using industrial filters is not only the direct protection of machine components but to attain the required oil cleanliness. Oil cleanliness is defined on the basis of oil purity classes which classify how the amount of particles of the existing contamination is distributed in the operating fluid.

Filter capacity

Filtration quotient $\beta_{x(c)}$ (β value)

The retention capacity of hydraulic filters with regard to contamination in a hydraulic system is characterized by the so-called filtration quotient $\beta_{x(c)}$. This variable thus represents the major performance feature of hydraulic filters. This variable is measured within the framework of the multipass test, and is the average value of the determined initial and final differential pressure according to ISO 16889 using ISOMTD test dust.

The filtration quotient $\beta_{x(c)}$ is defined as the quotient of the number of particles larger than the viewed particle size before/after filtration.



Contamination retention

It is also measured using the multipass test and determines the amount of test dust ISOMTD which is fed to the filter medium until a certain pressure increase has been reached.

Pressure loss (also differential pressure or delta p)

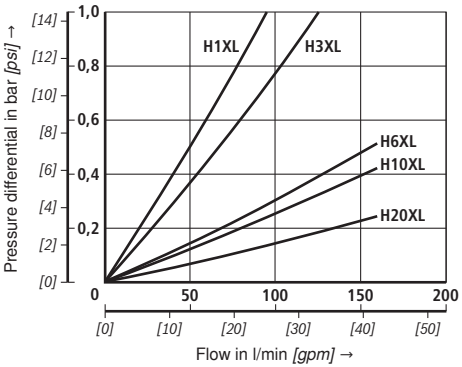
The pressure loss of the filter element is the major variable for the determination of the filter size. The variables are recommended values of the filter manufacturer or specifications of the filter user. This variable depends on many factors including: the rating of the filter medium, its geometry and arrangement in the filter element, filter area, the operational viscosity of fluids and flow.

The term "delta p" is often also expressed with the symbol "Δp".

When dimensioning the filter, an initial pressure loss is determined which must not be exceeded by the new filter element on the basis of the aforementioned conditions.

Upon request you will be provided with the program "BOSCH REXROTH FILTERSELECT". With this program you can easily determine the dimensions of the Rexroth filter element and the complete filter by means of initial Δp or pressure loss.

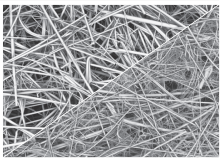
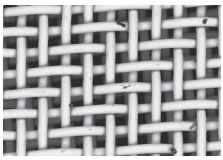
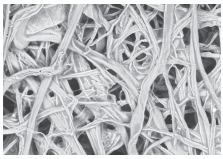
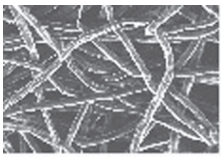
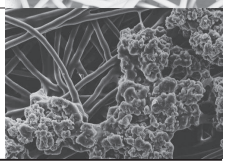
The following diagram shows the typical pressure loss behavior of filter elements with different filter media at different flow for a viscosity of 30 mm²/s *[150 SUS]*.



Filter media

Overview

Depending on the application and requirements, different filter media in different filtration ratings are used for the separation of particles.

Filter medium/ design	Filter rating/ mesh size	Application	Filter medium-rating [1] in µm	Electron microscope image
H...XL, micro glass Depth filter, combination of inorganic micro glass filter medium High degree of contamination retention due to multi-layer technology.	Filter rating: 1/3/6/10/20 µm "absolute". Test according to ISO 16889.	For highest pureness demands in hydraulic fluids and lubricants. Not cleanable.	H1XL H3XL H6XL H10XL H20XL	
G..., stainless steel wire mesh material 1.4401 or 1.4571 Surface filter made of stainless steel wire mesh with supporting tissue.	Mesh size: 10-1000 µm.	For protection, surface, coarse and pre-filtration. Cleanable, with backwash mechanism.	G10 G100 G25 G250 G40 G500 G60 G800	
P..., filter paper Inexpensive depth filter made of filter paper with supporting tissue. Made of specially impregnated cellulose fiber preventing humidity and swelling.	Nominal filter rating: 10/25 µm.	For coarse filtration and pre-filtration. Not cleanable.	P10 P25	
M..., metal fiber fleece material 1.4404 Depth filter made of stainless steel fibers with supporting mesh.	Filter rating: 5/10/15 µm "absolute" according to ISO 16889.	For highest cleanliness requirements for aggressive industrial and chemical fluids subjected to high operating temperatures. Not cleanable.	M5 M10 M15	
VS..., fleece material Surface filter made of extremely solid fiber composite in the form of polyethylene-covered polypropylene fibers.	Filter rating: 25/40/60 µm nominal.	Surface, coarse and pre-filtration, in particular recommended for cooling lubricants. Not cleanable.	VS25 VS40 VS60	
AS..., water-absorbing Depth filter, fleece material with water-absorbing material, combined with micro glass filter media.	Filter rating: 1/3/6/10/20 µm "absolute" according to ISO 16889.	Dehumidification of hydraulic oil, lubricating oil and air. Not cleanable.	AS1 AS3 AS6 AS10 AS20	

[1] Other filtration ratings upon request

9

Filter media

Technical data

Micro glass, H...XL

If professionally dimensioned and applied, the Rexroth micro glass filter medium achieves a high degree of pureness for hydraulic fluids, lubricants as well as for chemical and industrial fluids. Due to its defined retention capacity (ISO 16889), it offers a highly effective protection for machines and system components which are sensitive to contamination.

- Micro glass depth filter made of inorganic glass fiber material (micro glass)
- Absolute filtration / defined retention capacity according to ISO 16889
- High degree of contamination retention due to multi-layer construction
- One-way filter (not cleanable due to the depth filtration effect)
- Attainable oil pureness classes according to ISO 4406 up to ISO code 12/8/3 and better

Filtration rating and attainable oil cleanliness

The following table provides recommendations for the selection of a filter medium in dependency of the application and indicates the average oil cleanliness class attainable according to ISO 4406 or SAE-AS 4059.

Application	Recommended oil cleanliness according to ISO 4406 [SAE-AS 4059]	Recommended filter medium
Systems with components which are very sensitive to contamination, and with high availability. **Filling of servo systems**	≤ 16/12/9 (3)	H1XL
Systems with components which are very sensitive to contamination, and with very high availability. **Servo valve technology**	≤ 18/13/10 (5)	H3XL
Systems with **proportional valves**	≤ 19/14/11 (6)	H6XL
Modern industrial hydraulic systems **directional valves**	≤ 20/16/13 (8)	H10XL
Industrial hydraulic systems with major tolerances and minor sensitivity to contamination	≤ 21/17/14 (10)	H20XL

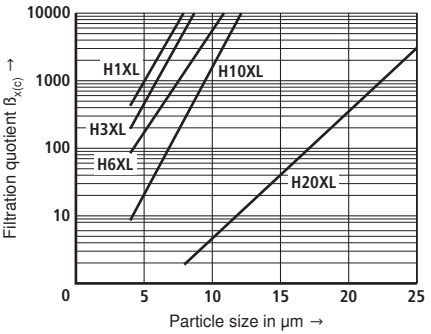
Filtration quotient $\beta_{x(c)}$ (β value)

Typical β values up to 2.2 bar *[31.9 psi]* Δ*p* pressure increase at the filter element [1)]

Filter medium	Particle size "x" for different β values, measurement according to ISO 16889		
	$\beta_{x(c)} \geq 75$	$\beta_{x(c)} \geq 200$	$\beta_{x(c)} \geq 1000$
H1XL	< 4.0 µm(c)	< 4.0 µm(c)	< 4.0 µm(c)
H3XL	4.0 µm(c)	< 4.5 µm(c)	5.0 µm(c)
H6XL	4.8 µm(c)	5.5 µm(c)	7.5 µm(c)
H10XL	6.5 µm(c)	7.5 µm(c)	9.5 µm(c)
H20XL	18.5 µm(c)	20.0 µm(c)	22.0 µm(c)

[1)] Filtration quotient $\beta_{x(c)}$ for other filter media upon request

Filtration quotient $\beta_{x(c)}$ depending on particle size µm(c)



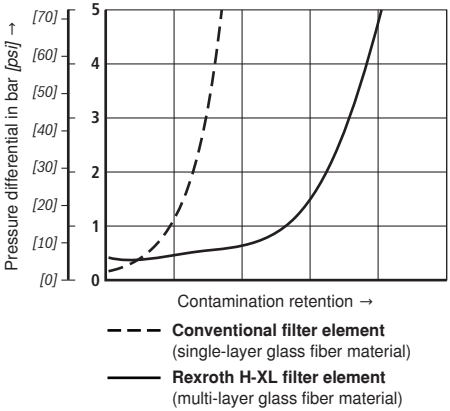
Filter media

Further information with regard to the Rexroth filter element technology as well as to contamination and oil cleanliness control can be found in our publications or specific brochures.

Contamination retention

Compared to conventional filter media with insertion technology, the Rexroth H-XL micro glass features a high degree of contamination retention because it is made of two separate filter layers connected in series.

Superior contamination retention of H-XL filter elements



Stainless steel wire mesh, G...

There is a comprehensive field of applications for wire mesh filter media. Not only pre-filtration is possible, but also the filtration of lubricating oils, hydraulic oils, coolants and water-like fluids.

Wire mesh G10 - G40

As surface filters, these materials are generally cleanable. Due to their fine mesh, however, cleaning is more difficult than with coarser filter mesh. Therefore, we recommend cleaning the filters in an ultrasonic bath.

Wire mesh G60 - G800

Due to their coarser mesh size, the cleaning of these filters is easier.

- Surface filter made of stainless steel wire mesh
- Reusable, cleanable
- Star-like folded design: Single-layer or two- or three-layer design
- Supporting mesh: Epoxy-coated wire mesh or stainless steel wire mesh

Filter medium	Version	Mesh size	Attainable oil cleanliness [1]
G10	Special Dutch weave	10 µm nom.	nom. 20/18/13...21/20/15
G25	Woven roving	25 µm nom.	No details, only suitable for coarse filtration (particle size ≥ 25 µm)
G40	Woven roving	40 µm nom.	
G60 – G800	Plain woven tissue	no details	

[1] According to ISO 4406 for particles ≥ 4 µm(c), ≥ 6 µm(c) and ≥ 14 µm(c)

Metal fiber fleece, M...

With metal fiber fleece you can attain high cleanliness for special fluids or at high operating temperatures. Due to its absolute filtration according to ISO 16889, metal fiber fleece also offers effective protection for machinery parts which are sensitive to contamination. As metal fiber fleece consists of firmly meshed and bound stainless steel fibers, it is also classified as depth filter medium and is thus not cleanable.

- Absolute filtration according to ISO 16889
- Depth filter made of stainless steel fibers
- One-way filter
- Oil cleanliness according to ISO 4406 up to an ISO cleanliness class of 15/13/10 and better
- Star-like folded design: Two- or three-layer design
- Supporting mesh: Epoxy or stainless steel wire mesh

Filter medium	Particle size for filtration ratio > 75 [1]	Attainable oil cleanliness [2]
M5	5 µm	16/13/10...20/15/11
M10	10 µm	18/14/10...21/17/13
M15	15 µm	19/16/12...21/18/14

[1] According to ISO 16889

[2] According to ISO 4406

Filter media

Cleaning of filter elements

Cleaning or replacement

Before cleaning a G or M element, you must first dismantle the filter element and then check whether it makes sense to clean the element. If the tissue of M materials or materials finer than G40 contains e.g. much fibrous substances, effective and complete cleaning is not possible in many cases. Filter mesh which has visible defects due to frequent cleaning must be replaced. In general: The finer the mesh, the thinner the wire. Therefore, especially fine mesh must be cleaned gently to protect the material. You must avoid cracks in the folds of the wire mesh and the metal fiber fleece. Otherwise, the filter capacity will be insufficient.

Cleaning frequency

Experience has shown that filter elements made of G10, G25 and G40 can be cleaned up to ten times.

Filter mesh > 60 µm can usually be reused more than ten times. Reusability, however, very much depends on the type of contamination as well as on pressure load (final Δp before dismantling the filter element).

For maximum reusability, we therefore recommend replacing in particular the fine mesh and the M material at a final Δp of 2.2 bar *[31.9 psi]* at the latest. Due to the given reasons, the aforementioned values must be regarded as reference values for which we do not assume any liability.

Recommendations for cleaning

Manual and simple cleaning method for G... elements

Approach	Wire mesh G10, G25, G40	Wire mesh G60 - G800
Chemical pre-cleaning	Let the filter element drain for approx. 1 hour after disassembly. Bathe in solvent afterwards.	
Mechanical pre-cleaning	Remove rough dirt with a brush or scrubber. Do not use hard or pointed objects which could damage the filter medium.	
Mechanical/ chemical main cleaning	Put pre-cleaned element in an ultrasonic bath with special solvent. Clean the element in the ultrasonic bath until any visible contamination is removed.	Evaporate with hot washing solution (water with anticorrosive agent)
Test	Visually check the material for damage. Replace the filter element if you identify obvious damages.	
Preservation	After drying, you must spray the cleaned element with preservatives and store it sealed against dust in a plastic foil.	

Automated cleaning for G... elements

Approach	Wire mesh G10, G25, G40, G60 – G800
Chemical pre-cleaning	Let the filter element drain for approx. 1 hour after disassembly. Bathe in solvent afterwards.
Mechanical/ chemical main cleaning	By means of special cleaning systems for filter elements. Most of these systems are provided with a fully automated and combined cleaning mechanism including ultrasound as well as mechanical and chemical cleaning processes. This allows for best possible cleaning results with gentle cleaning processes.

Filter media

Filter paper, P...

Filter paper is used for the filtration of lubricating oil and for pre-filtration. Filter paper has the following characteristics:

- Depth filter made of cellulose fibers
- Specially impregnated against swelling caused by moisture
- Star-like folded design: Single-layer or two- or three-layer design
- Supporting mesh: Epoxy-coated wire mesh

Filter medium	Filtration ratio β values [1]	Retention rate [1]	Attainable oil cleanliness [2]
P10	$\beta_{10(c)} > 2.0$	50 %	20/19/14...22/20/15
P25	$\beta_{10(c)} > 1.25$	20 %	21/20/15...22/21/16

[1] According to ISO 16889

[2] According to ISO 4406

Fleece material, VS...

The VS fleece material allows for the filtration of cooling lubricants as well as of water and water media. Moreover, this filter medium can be used for the filtration of emulsions or in general for pre-filtration.

- Depth filter material made of polyolefin fibers
- Binder-free
- Heat-set
- Extremely tearproof
- Cleanable and reusable in accordance with the type of filtered contamination
- Not cleanable in case of fibrous contamination.
- Star-like folded design: One- or two-layer design
- Supporting mesh: Epoxy-coated or stainless steel wire mesh.

Filter medium	Nominal filter rating
VS 25	25 µm
VS 40	40 µm
VS 60	60 µm

Water-absorbing, AS...

Rexroth Aquasorb filter elements absorb free water from hydraulic fluids and lubricating oils, and dehumidify air. Even in low concentrations above the saturation point of oil, water may accelerate oil aging due to oxidation resulting in increased corrosion and wear. Together with certain oil additives, water may also change the characteristics of oil or cause the formation of solid, slime-like substances which will result in the premature blockage of the pores of the applied filters. The combination of glass fiber filter media additionally allows for the highly efficient separation of contamination.

- ISO 16889 absolute filtration
- Surface filter made of water-absorbing filter fleece
- Combined with micro glass filter medium
- One-way filter
- Star-like folded design: Multi-layer design
- Supporting mesh: Epoxy-coated or stainless steel wire mesh

Filter medium	Particle size $\beta_{x(c)} = 200$ [1]	Particle size $\beta_{x(c)} = 1000$ [1]	Attainable oil cleanliness [2]
AS3	4.5 µm(c)	5.0 µm(c)	13/10/8...17/13/10
AS6	5.5 µm(c)	7.5 µm(c)	15/12/10...19/14/11
AS10	7.5 µm(c)	9.5 µm(c)	17/14/10...21/16/13
AS20	20 µm(c)	22 µm(c)	19/16/12...22/17/14

[1] According to ISO 16889

[2] According to ISO 4406

Filter media

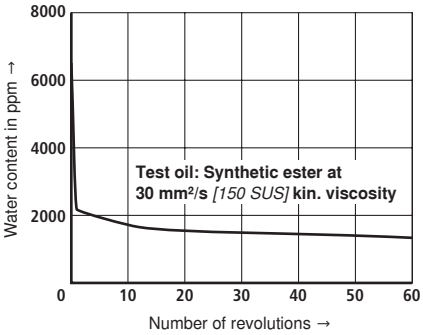
Functional principle

Equally to Rexroth industrial filter elements, Rexroth Aquasorb filter elements are star-like folded. However, they contain a fleece material layer with water-binding substances in the form of fine granulates. Depending on filtration rating, the appropriate glass fiber filter medium (1 µm - 20 µm) is mounted behind this fleece material.

Efficiency

The efficiency of Rexroth Aquasorb elements has been proven by internal tests and scientific studies at an independent institute. Upon request, we can provide the test results at any time. The water content (free water) can be reduced down to the saturation point of the oil. Efficiency and the degree of water absorption depend on the load on the filter surface, oil viscosity and oil temperature. Below you can find values for water absorption and how they change at higher viscosity.

Reduction of the water content of hydraulic oils with AS filter elements



Typical water absorption for a range of Rexroth filter elements

Filter element	Rated flow[1] in l/min *[US gal/min]*	Water absorption [2] in ml *[US gal]*
1.0400	40 *[10.6]*	511 *[0.13]*
1.0270	267 *[70.7]*	3454 *[0.91]*
2.0400	28 *[7.4]*	365 *[0.09]*

[1] Maximum recommended flow

[2] Water absorption of free, unbound waterat ≤ 15 mm²/s *[0.023 in²/s]* and the specified rated flow

Dimensioning and application

Rexroth Aquasorb elements must be dimensioned so that an initial pressure loss of 0.2 bar *[2.9 psi]* is not exceeded. Preferably, they must be used as bypass filters in the low pressure range of < 5 bar *[72.5 psi]*. Filter elements must be replaced at a differential pressure of max. 2.2 bar *[31.9 psi]*.

You can also use the dimensioning program "BOSCH REXROTH FILTERSELECT" for the dimensioning of Rexroth Aquasorb filter elements.

Water absorption in dependence of oil viscosity

Oil viscosity in mm²/s *[in²/s]*	Water absorption
15 [1] *[0.023]*	100% (= reference point)
30 *[0.047]*	70 %
46 *[0.071]*	58 %
120 *[0.186]*	38 %

[1] Reference viscosity

Compatibility with hydraulic fluids

Seal material for hydraulic fluids

Mineral oil			Ordering code
Mineral oil	HLP	according to DIN 51524	M
Flame-resistant hydraulic fluids			Ordering code
Emulsions	HFA-E	according to DIN 24320	M
Synthetic water solutions	HFA-S	according to DIN 24320	M
Water solutions	HFC	according to VDMA 24317	M
Phosphoric acid esters	HFD-R	according to VDMA 24317	V
Organic esters	HFD-U	according to VDMA 24317	V
Fast biodegradable hydraulic fluid			Ordering code
Triglycerides (rape seed oil)	HETG	according to VDMA 24568	M
Synthetic esters	HEES	according to VDMA 24568	V
Polyglycols	HEPG	according to VDMA 24568	V

Installation, operating and maintenance instructions

When must the filter element be exchanged or cleaned respectively?

As soon as the dynamic pressure or the pressure differential set at the maintenance indicator is reached, the red button of the opto-mechanical maintenance indicator pops out. If an electronic switching element is provided, an electric signal will sound. In this case, the filter element must be replaced or cleaned.

Filter elements should be replaced or cleaned after max. 6 months.

Note:

Depending on the dimensioning of the filter size, the maintenance indicator can reach the set dynamic pressure or pressure differential already during start-up. In this case, the opto-mechanical indicator must be manually acknowledged. The electric signal will stop after the operating temperature has been reached.

If the maintenance indicator is disregarded, the disproportionally increasing pressure differential may damage the filter element (collapse).

Filter element replacement

- For single filters:
  Switch off the system and discharge the filter on the pressure side.
- For inserted double filter systems with diversion switch:
  See relevant maintenance instructions according to the data sheet.

Warning:

Filters are containers under pressure. Before opening the filter housing, you must check whether the system pressure on the filter has decreased to ambient pressure. Only then may the filter housing be opened for maintenance.

Detailed instructions with regard to the replacement of filter elements can be found on the data sheet of the relevant filter series.

Quality and standards

Rexroth filter elements are tested and quality-monitored according to different ISO test standards:

Filter performance test (multipass test)	ISO 16889
Δp (pressure loss) characteristic curves	ISO 3968
Compatibility with hydraulic liquid	ISO 2943
Collapse pressure test	ISO 2941

The development, manufacture and assembly of Rexroth industrial filters and Rexroth filter elements is carried out within the framework of a certified quality management system in accordance with ISO 9001:2000.

Notes

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documentation@boschrexroth.de
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Filter accessories

Designation	Type	p_{Nenn} in bar	Data sheet	Page
Maintenance indicator for filters	WE, WO	10, 160, 450	51450	547

Rexroth
Bosch Group

Maintenance indicator for filters

RE 51450/03.11 1/8

Type WE and WO

Pressure differential indicators WO for filters in pressure lines
Backpressure indicators WO for return line filters
Electronic switching elements WE

Nominal pressure 10, 160 and 450 bar *[145, 2321 and 6527 psi]*
Operating temperature WO –30 °C to +100 °C *[–22 °F to 212 °F]*
Operating temperature WE –30 °C to +85 °C *[–22 °F to 185 °F]*

Table of contents

Features

Maintenance indicators serve the monitoring of filters by indicating the exceedance of a pressure differential and/or a backpressure in the filter.

They distinguish themselves by the following:

- Modular structure
- Mechanical-optical indicators WO with one switching point and memory function
- Electronic switching elements WE with one or two switching points
- Possibility to suppress the signal during cold start

Ordering code

of the mechanical optical maintenance indicator

WO — — — — —

Maintenance indicator
Mechanical optical **= WO**

Design
Backpressure, connection M30x1.5 **= S01**
Pressure differential, connection M20x1.5 **= D01**

Switching pressure

bar	S01	S01 (PA)	D01 (160 bar)	D01 (450 bar)	
0,8	X		X		**= 0.8**
1.5	X		X		**= 1.5**
2.2	X	X	X	X	**= 2.2**
5.0				X	**= 5.0**
8.0				X	**= 8.0**

Seal
M = NBR seal
V = FKM seal

Max. operating pressure
S01
10 = 10 bar *[145 psi]*
D01
160 = 160 bar *[2321 psi]*
450 = 450 bar *[6527 psi]*

Complementary details
without = No complementary details
-PA = Backpressure indicator mode of plastic (only with S01-2.2)

Material numbers of the mechanical optical maintenance indicators - Pressure differential

Material no.	Type	Switching pressure in bar *[psi]*	Tolerance in bar *[psi]*	Material	Maximum operating pressure in bar *[psi]*
R901025313	WO-D01-5,0-M-450	5,0 *[72.5]*	±0,5 *[7.3]*	Brass	up to 450 *[6527]*
R901066235	WO-D01-5,0-V-450				
R928038785	WO-D01-8,0-M-450	8,0 *[116]*	±0,8 *[11.6]*		
R928038784	WO-D01-8,0-V-450				
R928038783	WO-D01-2,2-M-450	2.2 *[31.9]*	±0.3 *[4.4]*		
R928038782	WO-D01-2,2-V-450				
R901025312	WO-D01-2,2-M-160	2.2 *[31.9]*	±0.3 *[4.4]*	Aluminum	up to 160 *[2321]*
R901066233	WO-D01-2,2-V-160				
R928038781	WO-D01-1,5-M-160	1.5 *[21.8]*	±0.2 *[2.9]*		
R928038780	WO-D01-1,5-V-160				
R928038779	WO-D01-0,8-M-160	0.8 *[11.6]*	±0.15 *[2.2]*		
R928038778	WO-D01-0,8-V-160				

Material numbers of the mechanical optical maintenance indicators - Backpressure

Material no.	Type	Switching pressure in bar *[psi]*	Tolerance in bar *[psi]*	Material	Maximum operating pressure in bar *[psi]*
R901025310	WO-S01-2,2-M-10	2.2 *[31.9]*	±0.3 *[4.4]*	Aluminum	up to 10 *[145]*
R901066232	WO-S01-2,2-V-10				
R928038776	WO-S01-1,5-M-10	1.5 *[21.8]*	±0.2 *[2.9]*		
R928038774	WO-S01-1,5-V-10				
R928038773	WO-S01-0,8-M-10	0.8 *[11.6]*	±0.15 *[2.2]*		
R928038772	WO-S01-0,8-V-10				
R928038771	WO-S01-2,2-M-10-PA	2.2 *[31.9]*	±0.44 *[6.4]*	PA6.6	up to 10 *[145]*
R928038769	WO-S01-2,2-V-10-PA		±0.3 *[4.4]*		

Ordering code

of the electronic switching element

WE – –

Maintenance indicator
Electronic switching element **= WE**

Type of signal
1 switching point **= 1SP**
2 switching points, 3 LED **= 2SP**
2 switching points, 3 LED and signal suppression at 30 °C *[86 °F]* **= 2SPSU**

Connector
M12x1 = Round plug-in connection M12x1, 4-pin
EN 175301-803 = Rectangular plug-in connection, 2-pin design A according to EN-175301-803

Material numbers of the mechanical optical maintenance indicators

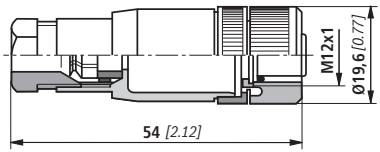
Material no.	Type	Signal	Switching points	Connector	LED
R928028409	WE-1SP-M12x1	Changeover	1	M12x1	No
R928028410	WE-2SP-M12x1	Normally open (at 75 %) / normally closed contact (at 100 %)	2		3 pieces
R928028411	WE-2SPSU-M12x1				
R928036318	WE-1SP-EN175301-803	Normally closed contact	1	EN 175301-803	No

Mating connectors according to IEC 60947-5-2 (dimensions in mm *[inch]*)

For electronic switching element with round plug-in connection M12x1

Mating connector suitable for K24 4-pin, M12x1 with screw connection, cable gland Pg9.

Material no. R900031155

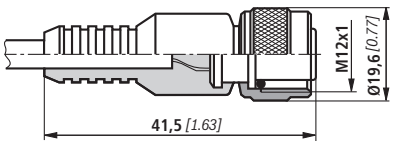


Mating connector suitable for K24-3m 4-pin, M12x1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm²

Core marking:
1 Brown
2 White
3 Blue
4 Black

Material no. R900064381

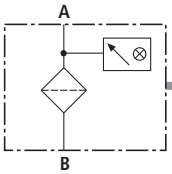


For more round plug-in connections refer to data sheet 08006.

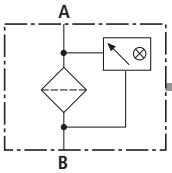
10

Symbols

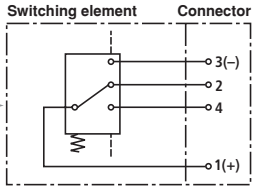
Mechanical optical backpressure indicator
with a return line filter without bypass



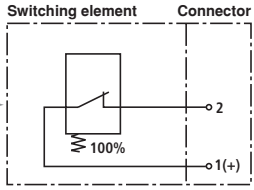
Mechanical optical pressure differential indicator
with a line filter without bypass



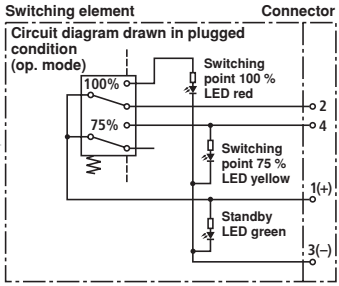
Electronic switching element
for maintenance indicator



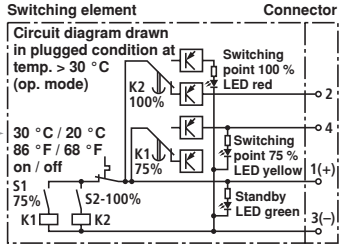
WE-1SP-M12x1



WE-1SP-EN175301-803



WE-2SP-M12x1



WE-2SPSU-M12x1

Function, section

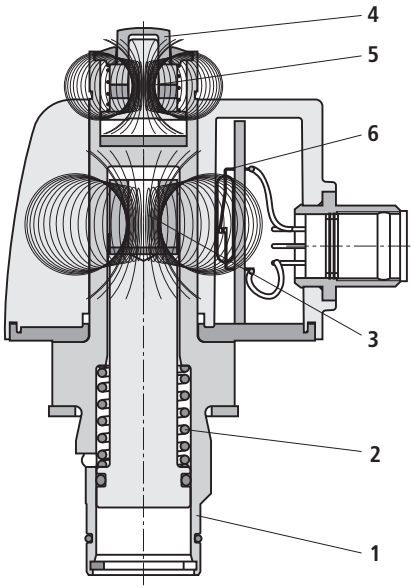
By default, the Rexroth filters are supplied with a mechanical optical maintenance indicator (WO). The electronic switching element (WE) is available as accessory and compatible with the mechanical optical maintenance indicator. The electronic switching element is attached to the optical maintenance indicator and fixed by means of a locking ring. The electronic maintenance indicator is not dependent on the nominal filter pressure.

The increasing backpressure and/or pressure difference pushes a spool (1) against a spring (2) upwards. The solenoid (3) mounted on the spool is moved together with the spool. The optical pin (4) can take two valid positions. If the position of the spool (1) with solenoids (3) is below the nominal pressure of the maintenance indicator, the optical pin remains in retracted "rest position". If the nominal pressure is exceeded for the first time, the position of the optical pin (5) is changed suddenly into the second possible "on condition" by repulsion of the solenoid of pin (5) to the solenoid of the spool (3). The pin will remain visible in this extended position on a permanent basis, even after the machine has been switched off (or after pressure drop or cold start) (memory function). It has to be acknowledged.

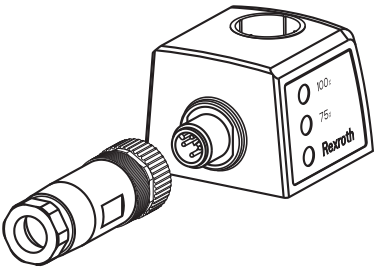
The reed contact (6) integrated in the switching element is operated by the magnetic field change. In case of two switching points, two reed contacts are installed.

For the electronic switching element WE-2SPSU, the temperature for the temperature suppression is dissipated via the housing of the mechanical optical maintenance indicator.

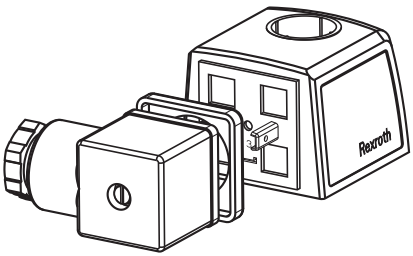
The electronic switching element WE-2SPSU is not suitable for the mechanical optical maintenance indicator made of polyamide (WO-S01-2,2-...-PA).



WE-2SP-M12x1
with mating connector (not included in the delivery)



WE-1SP-EN175301-803
with plug-in connection



Technical Data (For applications outside these parameters, please consult us!)

of the mechanical optical maintenance indicator

Material	Version	D01 (450 bar)	D01 (160 bar)	S01	S01 (PA)
	Material	Brass	Aluminum	Aluminum	PA6.6

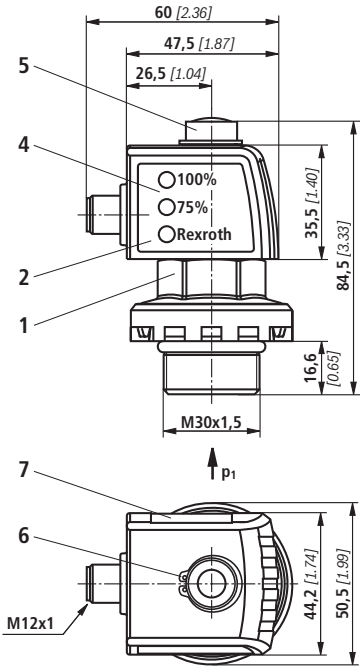
Sealing material		NBR	FKM
Temperature range	°C *[°F]*	–30…+100 *[–22…212]*	–20…+120 *[–4…248]*

of the electronic switching element

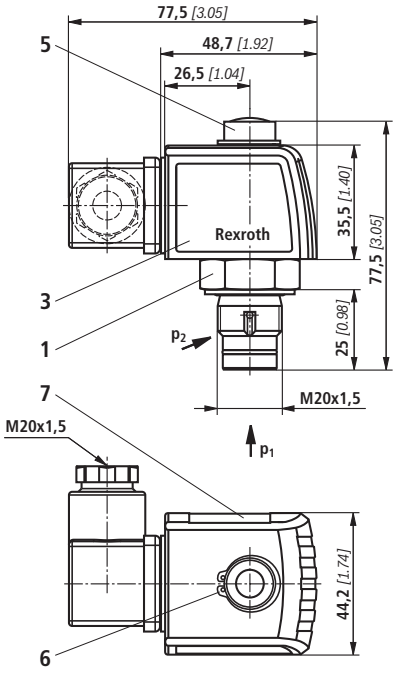
Electrical connection			Round plug-in connection M12x1, 4-pin			Rectangular plug-in connection EN 175301-803
		Version	1SP-M12x1	2SP-M12x1	2SP-M12x1	1SP-EN175301-803
Contact load, direct voltage		$A_{max.}$	1			
Voltage range		$V_{max.}$	150 (AC/DC)	10-30 (DC)		250 (AC) / 200 (DC)
Max. switching power with resistive load		W	20			70
Switching type	75 % signal		–	Normally open contact		–
	100 % signal		Change-over	Normally closed contact		Normally closed contact
	2SPSU				Signal switching through at 30 °C *[86 °F]*, Return switching at 20 °C *[68 °F]*	
Display via LEDs in the electronic switching element 2SP...				Stand-by (LED green); 75 % switching point (LED yellow) 100 % switching point (LED red)		
Protection class according to EN 60529			IP 67			IP 65
Ambient temperature range		°C *[°F]*	–25 to +85 *[–13 to +185]*			
For direct voltage above 24 V, spark extinguishing is to be provided for protecting the switching contacts.						
Weight Electronic switching element: – with round plug-in connection M12x1		kg *[lbs]*	0.1 *[0.22]*			

Maintenance indicator (dimensions in mm *[inch]*)

Backpressure indicator with assembled switching element



Backpressure indicator with assembled switching element



1 Mechanical optical maintenance indicator; max. tightening torque $M_{A\,max}$ = 50 Nm *[36.88 lb-ft]* tightening torque for backpressure indicator in PA6.6 $M_{A\,max}$ = 35 Nm *[25.82 lb-ft]*

2 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); round plug-in connection M12x1, 4-pin

3 Switching element with locking ring for electrical maintenance indicator (rotatable by 360°); rectangular plug-in connection EN175301-803

4 Housing with three LEDs: 24 V =
Green: Stand-by
Yellow: Switching point 75 %
Red: Switching point 100 %

5 Optical indicator bistable

6 Locking ring DIN 471-16x1, **Material no. R900003923**

7 Name plate

Notes:

Presentation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

Switching elements with increased switching power at request.

Installation, operating and maintenance instructions

Connection of the electronic switching elements

By default, the filter is equipped with a mechanical optical maintenance indicator WO (4). The electronic switching element (2) is attached to the mechanical optical maintenance indicator (1) and fixed by means of a locking ring (6).

The following must generally be observed with Rexroth filters:

- Make sure that the components are assembled in a stress-less form.
- The filter housing must always be grounded.

When must the filter element be exchanged or cleaned respectively?

- After initial start-up of the system, the filter element is to be exchanged.
- Upon start-up in cold condition, the red pushbutton of the optical maintenance indicator (4) may jump out and an electrical signal is output via the switching element. Only push the red pushbutton in again after the operating temperature has been reached. If it jumps out again immediately or if the electric signal has not gone out at operating temperature, the filter element must be exchanged or cleaned respectively.
- The filter element should be replaced or cleaned after max. 6 months.

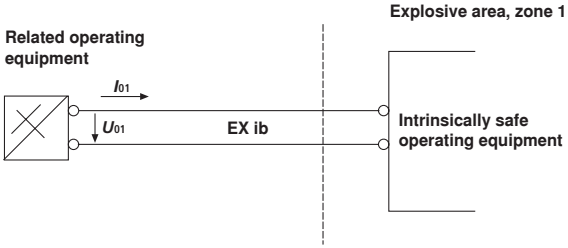
Quality and standardization

Use in explosive areas according to directive 94/9/EC (ATEX)

According to DIN EN 60079-11, the electronic maintenance indicators WE-1SP-M12x1 are simple, electronic operating equipment not having an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14 - in intrinsically safe electrical circuits (EEx ib) be used in systems for device group II, category 2G (zone 1) and category 3G (zone 2) without marking and certification. The operating equipment is assigned to explosion group II B and temperature class T5.

When using Rexroth filters in explosive areas, potential equalization must always be ensured.

Possible circuit according to DIN EN 60079-14



The declaration of incorporation according to DIN EN 13463 is available for this filter separately, with **Material no. R928028899**.

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documentation@boschrexroth.de
www.boschrexroth.de

Oil measurement technology

Designation	Type	Measurement range in µm(c)	Data sheet	Page
Mobile Particle Counter	MPC 4614	4 ... 21	51430	557

Rexroth
Bosch Group

Mobile Particle Counter

RE 51430/02.12 1/6

Type MPC4614

MPC4614

Nominal pressure max. 315 bar
Nominal flow 300 ml/min
Operating temperature max. 40 °C

Table of contents

Information on available spare parts:
www.boschrexroth.com/spc

Features

- Visual particle counter for non-continuous recording of the solid particle contamination in hydraulic and lubrication systems
- Light extinction method, for particles ≥ 4 µm(c) equivalent diameter.
- max. 40,000 particles/ml
- According to ISO 4406 and SAE AS4059 for particles > 4 µm(c), 6 µm(c), 14 µm(c) and 21 µm(c).
- LC display with backlighting
- One switch, two menu buttons for changeover of the classification type.
- Printer and data interface RS 232 C
- Data memory non-volatile, sufficient for approx. 30 hours measuring time
- Installed battery for approx. 15 hours measuring time
- Charging device 230 V, 50 Hz / 12 V, 600 mA for charging socket
- Accuracy ±0.5 classes

Ordering code

MPC4614 — — —

mobile particle counter **= MPC4614**

no selection **= 0**
Transport case **= T**
Software (see page 6) **= S**

No selection **= 0**
Printer (see page 5) **= D**
Printer and transport case (see page 5) **= DT**

0 = No selection
P = Pump (see page 5)
PT = Pump and transport case (see page 5)

DE = German
EN = English
PT = Portuguese

Order example:
MPC4614-0-00-DE

Preferred types and accessories

	DE	EN	PT
MPC4614-0-00-	**R928019566**	**R928019611**	**R928019650**
MPC4614-T-00-	**R928019567**	**R928019612**	**R928019651**
MPC4614-S-00-	**R928019568**	**R928019613**	**R928019652**
MPC4614-TS-00-	**R928019569**	**R928019614**	**R928019653**
MPC4614-T-0PT-	**R928019570**	**R928019615**	**R928019654**
MPC4614-TS-0PT-	**R928019571**	**R928019616**	**R928019655**
MPC4614-0-DP-	**R928019572**	**R928019617**	**R928019656**
MPC4614-S-DP-	**R928019573**	**R928019618**	**R928019657**
MPC4614-0-DPT-	**R928019574**	**R928019619**	**R928019658**
MPC4614-S-DPT-	**R928019575**	**R928019620**	**R928019659**
MPC4614-T-DT0-	**R928019576**	**R928019621**	**R928019660**
MPC4614-TS-DT0-	**R928019577**	**R928019622**	**R928019661**
MPC4614-T-DTPT-	**R928019578**	**R928019623**	**R928019662**
MPC4614-TS-DTPT-	**R928019579**	**R928019624**	**R928019663**
ZMPC-D-	**R928019602**	**R928019647**	**R928019686**
ZMPC-P-	**R928019603**	**R928019648**	**R928019687**
ZMPC-S-	**R928019604**	**R928019649**	**R928019688**
ZMPC-VC		**R928019605**	
ZMPC-VD		**R928019606**	
ZMPC-VU		**R928019607**	
ZMPC-KM		**R928019608**	
ZMPC-KD		**R928019609**	
ZMPC-KP		**R928019610**	
ZMPC-PAP		**R928036934**	
ZMPC-FBD		**R928039830**	
ZMPC Minimess		**R928039909**	
ZMPC-SCHL		**R928039910**	
ZMPC-STOP6		**R928039911**	
ZMPC-STOP4		**R928039912**	

Function, view

The MPC4614 particle counter is a visual particle counter which is used for the non-continuous recording of the solid particle contamination in hydraulic and lubrication systems.

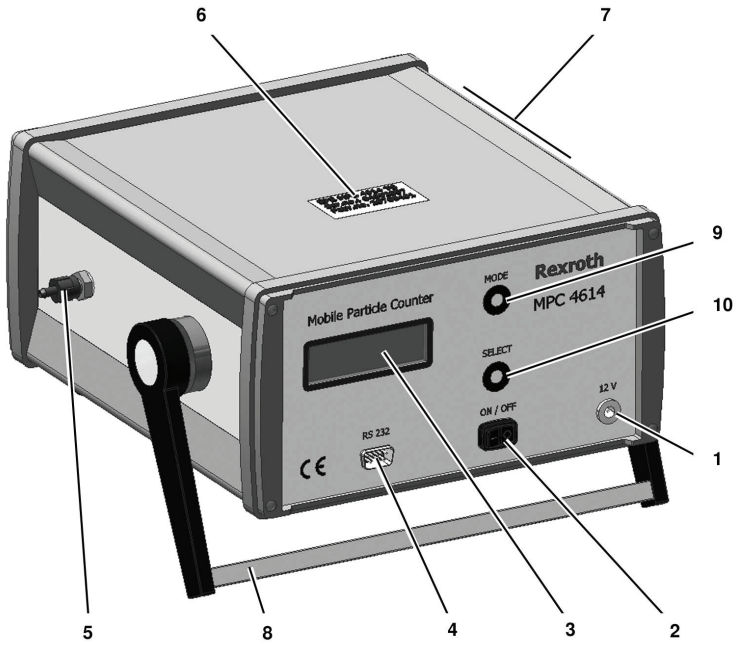
It works according to the light extinction principle. With the fluid flow, particles run through a miniature light barrier and interrupt the light beam. They cast a shadow. The particle size determines the size of the shadow. The particle size is defined as the diameter of a coextensive circle. From the number of shadows, one determines the number of particles.

The sensor detects particles the equivalent diameter of which is greater than / equal to four micrometer (4 µm(c)). By means of a flow conditioning unit, the sensor flow is kept constant within the application limits.

An individual measurement takes one minute. The progress of the measurement process is displayed in the two-digit LC display by means of a second counter running backwards. The degree of the solid particle contamination is calculated according to the classification types ISO 4406 and SAE AS4059 with regard to 4 µm(c), 6 µm(c), 14 µm(c) and 21 µm(c) equivalent diameter.

During the measurements, the results can be output on a printer. Irrespective of the measurement value output (on the display and/or the printer), the results are written to a non-volatile data memory in the device (data logger function).

After completion of all measurements, the results can be printed out or transferred to a PC.



1 Socket 12 V voltage supply
2 On/Off switch
3 LC display
4 RS232C plug-in connector
5 Media output (low-pressure connection DN4)
6 Name plate
7 Media input (Minimess M16 x 2)
8 Handle/base, rotatable
9 MODE button
10 SELECT button

Technical data (For applications outside these parameters, please consult us!)

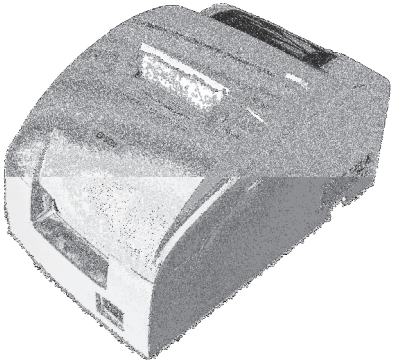
Device data		
Measurement technology		Visual particle counter for non-continuous recording of the solid particle contamination in hydraulic and lubrication systems
Measuring principle		Light extinction method, for particles ≥ 4 µm(c) equivalent diameter.
Max. particle concentration	Particle/ml	40,000
Measurement results		According to ISO 4406 and SAE AS4059 for particles > 4 µm(c), 6 µm(c), 14 µm(c) and 21 µm(c).
Display		LC display with backlighting, 2*16 characters
Operating controls		On switch, two menu buttons for changeover of the classification type.
Printer and data interface		RS 232 C
Data memory		Non-volatile, sufficient for approx. 30 hours measuring time
Real-time clock		Recording of date and time at the beginning of the measurement
Auxiliary energy		Installed battery for approx. 15 hours measuring time
Charging device		230 V, 50 Hz / 12 V, 600 mA for charging socket
Calibration		Comparative measurement with test oil
Accuracy	Classes	±0.5
Hydraulic data		
Operating pressure	bar	12 to 315
Media temperature	°C	5 to 70
Temperature range for applications	°C	5 to 40 / non-condensing atmosphere
Temperature range for storage	°C	5 to 40
Nominal flow	ml/min	Approx. 300
Admissible medium		Hydraulic and lubricating oils on mineral base
Parts contacting the medium		Glass, brass, aluminum, steel, NBR
Considered standards and directives		
Directive 89/336 EEC		"Electromagnetic compatibility" (EMC directive)
DIN EN 61010-1		"Safety requirements for electrical equipment for measurement, control and laboratory use" part 1: General requirements

Accessories

Printer ZMPC-D-...

For recording the measuring values of the MPC4614 particle counter, the latter can be connected to a printer.

The printer is available with and without transport case.



Auxiliary pump ZMPC-P-...

The application range of the MPC is designed for measurements at high pressure hydraulic lines with 12 to 315 bar pressure (see "Hydraulic data" page 4).

If the pressure is higher, a pressure reducing valve must be installed upstream.

If the measurement is to be carried out at pressures ≤ 12 bar or from a tank (self-priming), a corresponding pump must be installed upstream. This pump is available as accessory.

The pump is available with and without transport case.

Connection cable

ZMPC-VC-...

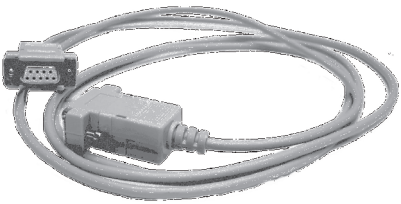
Connection cable serial PC
Connection cable RS232 to connect the MPC with the PC

ZMPC-VD-...

Connection cable printer
Connection cable to connect the MPC with the printer

ZMPC-VU-...

Connection cable USB PC
Connection cable for PC with USB connection



Software ZMPC-S-…

HyperTerminal

The data from the MPC4614 is transmitted into a text file on the PC using the "HyperTerminal" program.
This program is already pre-installed on most PCs with MS Windows®.

Chartmaker tool

The "Chartmaker tool" program is used to analyze and graphically present the data in MS Excel® from version 2000 (10.0).

Accessories

Case	
ZMPC-KM-… Transport case tailored to measuring device	
ZMPC-KD-… Transport case tailored to printer	
ZMPC-KP-… Transport case tailored to pump	
Paper rolls for printer	
ZMPC-PAP-… Replacement paper rolls for printer	
Color rolls for printer	
ZMPC-FBD-… Replacement ribbon for printer	
Minimess hose	
ZMPC Minimess-… Minimess hose for connecting the pressure port with the MPC	
Return flow hose	
ZMPC-SCHL-… Hose for return into the tank	
End cap	
ZMPC-STOP6 End cap for closing the hoses for transport	
ZMPC-STOP4 End cap for closing the hose connection of the MPC	

Related documents

You can find these operating instructions as well as the related documentation in the media directory under
www.boschrexroth.com/various/utilities/mediadirectory/.

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www.boschrexroth.com/contact

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Material no.: R999000310
Versions no.: 2013-08
Replaces: RE 00112-05_2008-11