HARLEX

# Inline filter with filter element according to DIN 24550

## Type 445LEN0040 to 1000

- Sizes according to **DIN 24550**: 0040 to 1000
- Nominal pressure 450 bar *[6527 psi]*
- Connection up to 2”, SAE 2 1/2”, SAE 24
- Operating temperature: –10 °C ... +100 °C *[+14 °F ... +212 °F]*

### Features

Inline filters are used in hydraulic systems for separating solid materials from fluids and lubricating oils. They are intended for attachment in pipelines.

They distinguish themselves by the following:

- Filters for inline installation
- Size 1000 with divided filter bowl
- Special highly efficient filter materials
- Filtration of very fine particles and high dirt holding capacity across a broad pressure differential range
- High collapse resistance of the filter elements
- By default equipped with mechanical optical maintenance indicator with memory function
- Available as an option with different electronic switch-ing elements, modular design
- Optional bypass valve integrated in the filter housing
- Optional measuring port
- High filtration performance due to the tangential cyclone-effect flow path

# Ordering codes filter element

| 01 | 02 | 03 | | 04 | 05 | | 06 | | 07 | | 08 | | 09 | | 09 | | 09 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **445LE** | **N** | | – | | | – | | – | | – | | – | | – | | – | | |

**Series**

| | | |
|---|---|---|
| 01 | Inline filter 450 bar *[6527 psi]* | **445LE** |

**Filter element**

| | | |
|---|---|---|
| 02 | With filter element according to **DIN 24550** | **N** |

**Nominal size**

| | | |
|---|---|---|
| 03 | LEN...<br>(with filter element according to **DIN 24550**) | **0040**<br>**0063**<br>**0100**<br>**0160**<br>**0250**<br>**0400**<br>**0630**<br>**1000** |

**Filter rating in µm**

| | | | |
|---|---|---|---|
| 04 | **Absolute (ISO 16889 ; $\beta_x(c) \geq 200$)** | Glass fiber material, not cleanable | **H3XL**<br>**H6XL**<br>**H10XL**<br>**H20XL** |
| | **Nominal** | Stainless steel wire mesh, cleanable | **G10**<br>**G25**<br>**G40**<br>**G60**<br>**G100** |

**Pressure differential**

| | | |
|---|---|---|
| 05 | Max. admissible pressure differential of the filter element 30 bar *[435 psi]* (**with** bypass valve | **A00** |
| | Max. admissible pressure differential of the filter element 330 bar *[4786 psi]* (**without** bypass valve | **B00** |

**Maintenance indicator**

| | | |
|---|---|---|
| 06 | Maintenance indicator, mech./optical, switching pressure 5.0 bar *[72.5 psi]* – bypass cracking pressure 7 bar *[101.53 psi]* | **V5,0** |
| | Maintenance indicator, mech./optical, switching pressure 8.0 bar *[116 psi]* – **without** bypass valve | **V8,0** |

**Seal**

| | | |
|---|---|---|
| 07 | NBR seal | **M** |
| | FKM seal | **V** |

**Connection**

| 08 | **Frame size** | **0040** | **0063-0100** | **0160-0400** | **0630-1000** | |
|---|---|---|---|---|---|---|
| | **Connection** | | | | | |
| | G1/2 | ● | X | | | **R2** |
| | G3/4 | X | X | | | **R3** |
| | G1 | X | ● | | | **R4** |
| | G1 1/2 | | | ● | | **R6** |
| | G2 | | | | ● | **R8** |
| | SAE 1 1/2” | | | X | | **S6** |
| | SAE 2” | | | X | X | **S8** |
| | SAE 2 1/2” | | | | X | **S9** |
| | 7/8-14 UNF-2B | X | | | | **U3** |
| | 1 1/16-12 UN-2B *[SAE 12]* | | X | | | **U4** |
| | 1 7/8-12 UN-2B | | | X | | **U6** |
| | | ● Standard connection<br>X Alternative connection | | | | |

## Ordering codes filter element

| 01 | 02 | 03 | | 04 | 05 | | 06 | | 07 | | 08 | | 09 | | 09 | | 09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 445LE | N | | – | | | – | | – | | – | | – | | – | | – | |

**Supplementary information** (for configuration options, see chapter “**Version options**”)

| | | |
|---|---|---|
| 09 | Outlet top, outlet opposite, inlet closed (only with size 0160 - 1000) [1] | **7** |
| | Filter rotated 180°, filter bowl can be unscrewed to the top (only with size 0160 - 1000)<br>Bleed function in the filter bowl, drain in the filter head | **9** |
| | Additional threaded couplings G 1/4, on the side (only with size 0160 - 1000), not possible with 7 or 9 | **M** |
| | Maintenance indicator on the right (only with size 0160 - 1000), not possible with M | **V3** |
| | Maintenance indicator on the left (only with size 0160 - 1000), not possible with M | **V9** |
| | Manufacturer's inspection certificate M according to DIN 55350 T18 Z1 | **Z1** |

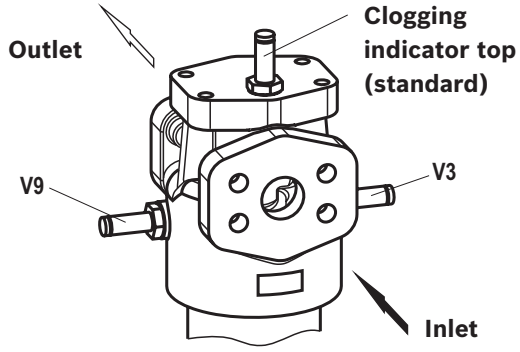
[1] The option can only be configured with SAE flange connection

**Order example:**
**445LEN0100-H3XLA00-V5,0-M-R4**

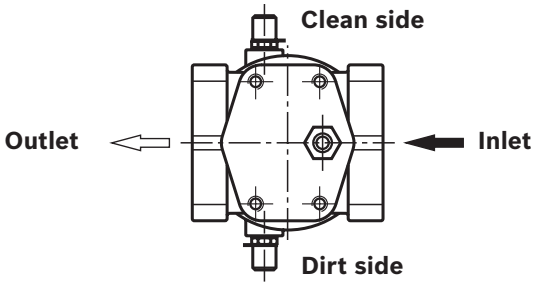
**Further versions (filter materials, connections) are available on request.**

## Version options

**Possible positions of the mechanical optical maintenance indicator**

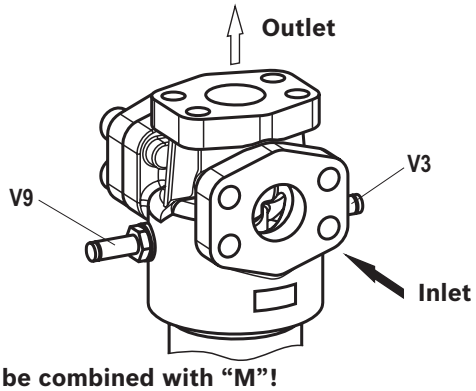



**2 additional Minimess connections on the clean and dirt side**




**Cannot be combined with “7”, “9”, “V3” and “V9”**

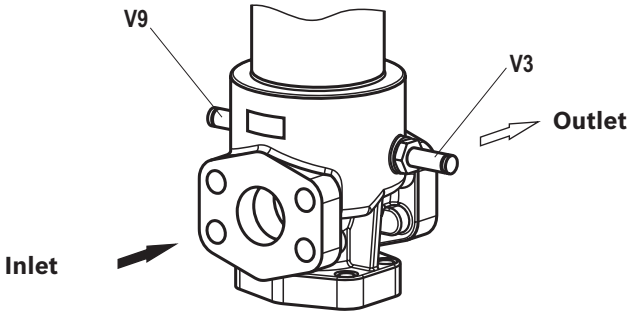
**Outlet top – order option “7”**
**Outlet opposite inlet closed**




**Cannot be combined with “M”!**
**Always specify the position of the clogging indicator (“V3” or “V9”)**

In this version, the filter has no mounting possibility. The pipe mounting elements must be positioned close to the filter so that the filter weight can be held.

**Filter rotated 180° – order option “9”**
**Filter bowl can be unscrewed from the top**




**Cannot be combined with “M”!**
**Always specify the position of the clogging indicator (“V3” or “V9”)**

## Preferred types

### 445LEN preferred types, NBR seal, flow specification for 30 mm²/s *[142 SUS]*

#### Inline filter with bypass, filter rating 3 µm

| Type | Flow in l/min *[gpm]* at $\Delta p$ = 1.5 bar *[21.8 psi]* [1] | Filter | | |
|---|---|---|---|---|
| 445LEN0040-H3XLA00-V5,0-M-.. | 26 *[6.87]* | ..R2 | | ..U3 |
| 445LEN0063-H3XLA00-V5,0-M-.. | 36 *[9.51]* | ..R4 | | ..U4 |
| 445LEN0100-H3XLA00-V5,0-M-.. | 46 *[12.15]* | ..R4 | | ..U4 |
| 445LEN0160-H3XLA00-V5,0-M-.. | 126 *[33.29]* | ..R6 | | ..U6 |
| 445LEN0250-H3XLA00-V5,0-M-.. | 212 *[56.01]* | ..R6 | | ..U6 |
| 445LEN0400-H3XLA00-V5,0-M-.. | 258 *[68.16]* | ..R6 | | ..U6 |
| 445LEN0630-H3XLA00-V5,0-M-.. | 325 *[85.86]* | ..R8 | | ..S8 |
| 445LEN1000-H3XLA00-V5,0-M-.. | 486 *[128.40]* | ..R8 | | ..S8 |

#### Inline filter with bypass, filter rating 6 µm

| Type | Flow in l/min *[gpm]* at $\Delta p$ = 1.5 bar *[21.8 psi]* [1] | Filter | | |
|---|---|---|---|---|
| 445LEN0040-H6XLA00-V5,0-M-.. | 33 *[8.72]* | ..R2 | | ..U3 |
| 445LEN0063-H6XLA00-V5,0-M-.. | 55 *[14.53]* | ..R4 | | ..U4 |
| 445LEN0100-H6XLA00-V5,0-M-.. | 69 *[18.23]* | ..R4 | | ..U4 |
| 445LEN0160-H6XLA00-V5,0-M-.. | 175 *[46.23]* | ..R6 | | ..U6 |
| 445LEN0250-H6XLA00-V5,0-M-.. | 253 *[66.84]* | ..R6 | | ..U6 |
| 445LEN0400-H6XLA00-V5,0-M-.. | 298 *[78.73]* | ..R6 | | ..U6 |
| 445LEN0630-H6XLA00-V5,0-M-.. | 406 *[107.26]* | ..R8 | | ..S8 |
| 445LEN1000-H6XLA00-V5,0-M-.. | 505 *[133.42]* | ..R8 | | ..S8 |

#### Inline filter with bypass, filter rating 10 µm

| Type | Flow in l/min *[gpm]* at $\Delta p$ = 1.5 bar *[21.8 psi]* [1] | Filter | | |
|---|---|---|---|---|
| 445LEN0040-H10XLA00-V5,0-M-.. | 37 *[9.77]* | ..R3 | | ..U3 |
| 445LEN0063-H10XLA00-V5,0-M-.. | 70 *[18.49]* | ..R4 | | ..U4 |
| 445LEN0100-H10XLA00-V5,0-M-.. | 78 *[20.60]* | ..R4 | | ..U4 |
| 445LEN0160-H10XLA00-V5,0-M-.. | 211 *[55.75]* | ..R6 | | ..U6 |
| 445LEN0250-H10XLA00-V5,0-M-.. | 280 *[73.98]* | ..R6 | | ..U6 |
| 445LEN0400-H10XLA00-V5,0-M-.. | 325 *[85.86]* | ..R6 | | ..U6 |
| 445LEN0630-H10XLA00-V5,0-M-.. | 460 *[121.53]* | ..R8 | | ..S8 |
| 445LEN1000-H10XLA00-V5,0-M-.. | 515 *[136.06]* | ..R8 | | ..S8 |

[1] An appropriate differential pressure via the filter and measuring device according to ISO 3968. The differential pressure measured on the maintenance indicator is lower.

## Ordering code accessories
(dimensions in mm *[inch]*)

## Electronic switching element for maintenance indicators

| 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**

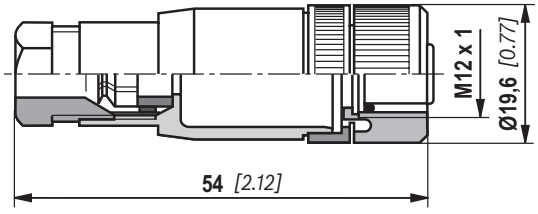
| | | |
|---|---|---|
| 03 | Round plug-in connection M12 x 1, 4-pole | **M12 x 1** |
| | Rectangular plug-in connection, 2-pole, design A according to EN-175301-803 | **EN175301-803** |

### Material numbers of the electronic switching elements

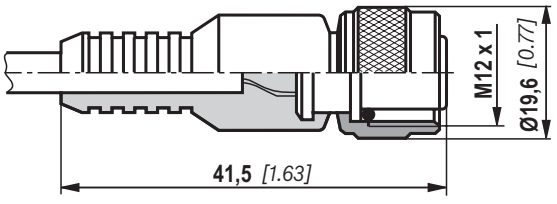
| Type | Signal | Switching points | Connector | LED |
|---|---|---|---|---|
| WE-1SP-M12 x 1 | Changeover | 1 | M12 x 1 | without |
| WE-2SP-M12 x 1 | Normally open (at 75%) / normally closed contact (at 100%) | 2 | | 3 pieces |
| WE-2SPSU-M12 x 1 | | | | |
| WE-1SP-EN175301-803 | Normally closed contact | 1 | EN 175301-803 | without |

## Mating connectors
for electronic switching element with round plug-in connection M12 x 1

Mating connector suitable for K24 4-pole, M12 x 1with screw connection, cable gland Pg9.




Mating connector suitable for K24-3m 4-pole, 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



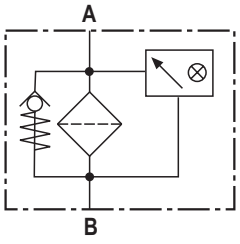

For more round plug-in connections and technical data refer to data sheet.

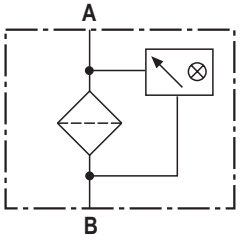
**Order example:**
Inline filter with mechanical optical maintenance indicator for $p_{Nominal}$ = 450 *[6527 psi]* with bypass valve, Size 0160, with filter element 10 µm and electronic switching element M12 x 1 with 1 switching point.

| | |
|---|---|
| **Filter with mech. optical maintenance indicator:** | 445LEN0160-H10XLA00-V5,0-M-R6 |
| **Switching element:** | WE-1SP-M12 x 1 |
| **Mating connector:** | Mating connector suitable for K24 4-pole, M12 x 1 with screw connection, Cable gland Pg9. |

## Symbols

**Inline filter** with bypass and mechanical indicator

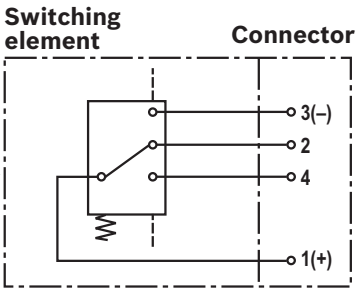


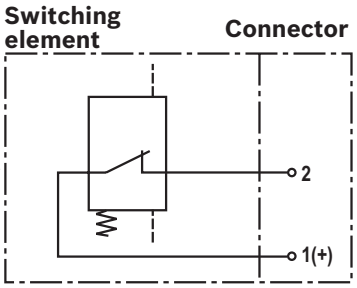

**Inline filter** without bypass and with mechanical indicator

**electronic switching element**

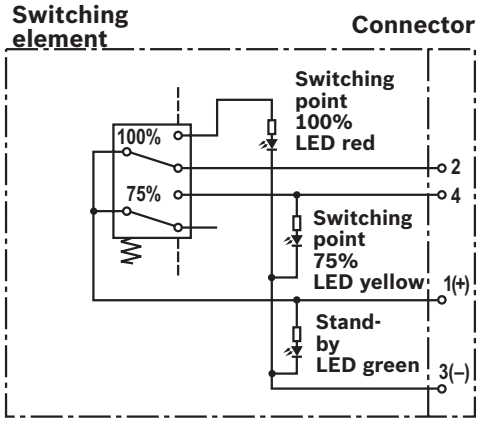
**for maintenance indicator**




**WE-1SP-M12 x 1**

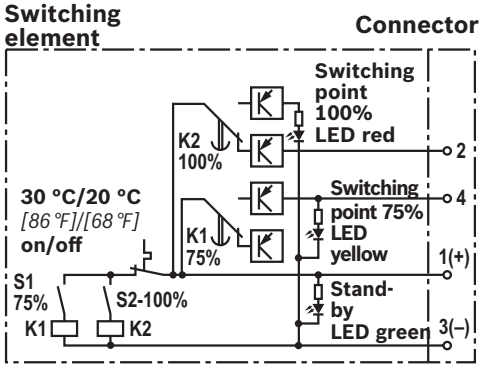



**WE-1SP-EN175301-803**




**WE-2SP-M12 x 1**

Circuit diagram drawn in plugged condition (operating state)

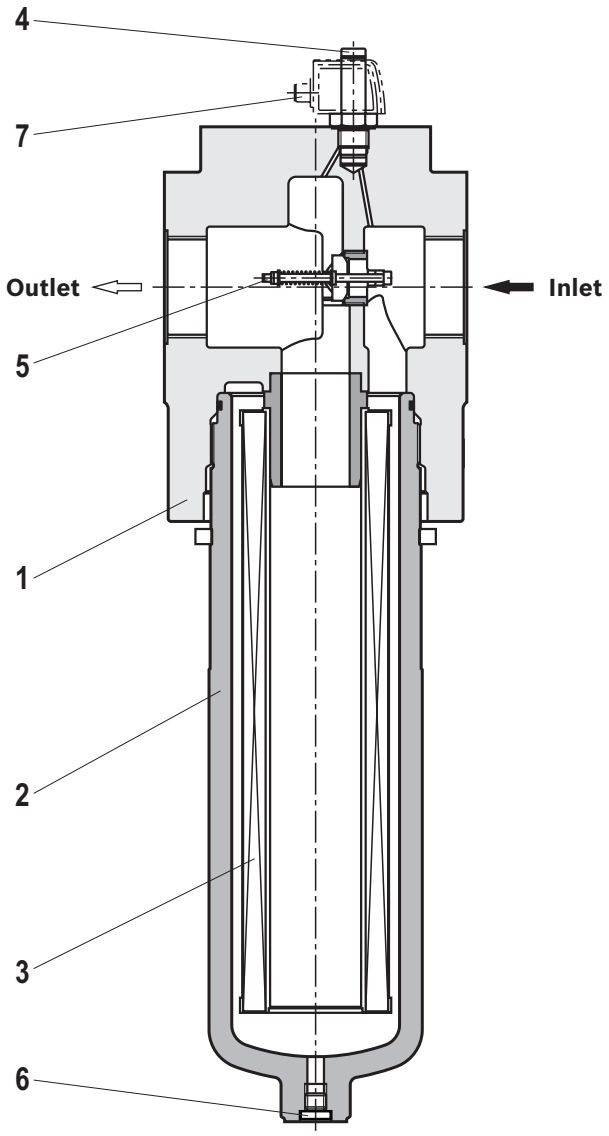



**WE-2SPSU-M12 x 1**

Circuit diagram drawn in plugged condition at temperature > 30 °C [86 °F] (operating state)

## Function, section

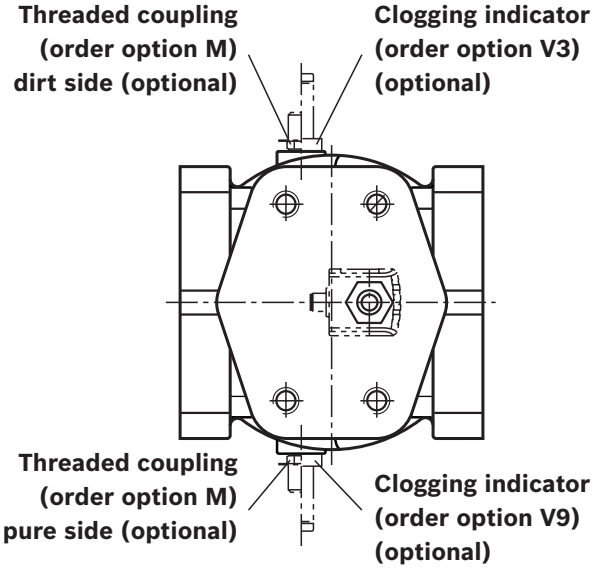
The inline filter 445LEN is suitable for installation in pressure lines.
It basically consists of filter head (1), a screwable filter bowl (2) (size 1000 filter pipe with filter cover), filter element (3) as well as a mechanical optical maintenance indicator (4). In case of filters with low-pressure-differential-stable filter elements (= code letter pressure differential A), there is also an assembled bypass valve (5).
Via the inlet, the hydraulic fluid reaches the filter element (3) where it is cleaned. The dirt particles filtered out settle 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 quantity - can be securely absorbed.
As of size 0160, the standard equipment comprises a drain screw (6). With the size 1000, the filter bowl has a two-part design. The filter pipe is secured against twisting in the filter head.
By default, the filter is equipped with mechanical optical maintenance indicator (4). The electronic switching element (7) which has to be ordered separately is attached to the mechanical optical maintenance indicator (4) and held by means of a locking ring.
The electronic switching elements with 1 or 2 switching points are connected via a mating connector according to IEC-60947-5-2 or via a cable connection according to EN17301-803.




### Variants

- **Order option supplementary information -7**
  The standard outlet is closed with a SAE blind flange. The outlet is mounted upwards, which means that the direction of flow is angled upwards by 90°.
- **Order option supplementary information -9**
  The bleeding is on the hexagon of the filter bowl. The drain function is located on the side of the filter head opposite the clogging indicator.

| Type | Assembly position | | |
|---|---|---|---|
| 445LEN... | Maintenance indicator | Bleeding | Draining |
| **0160-1000...9-V3** | V3 | On the filter bowl, top, G1/4 | Opposite maintenance indicator |
| **0160-1000...9-V9** | V9 | | |




☞ **Notice:**
Configuration options see version options on page 3

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

| General | | | | | | |
|---|---|---|---|---|---|---|
| Installation position | | | vertical | | | |
| Ambient temperature range | | °C *[°F]* | –10 ... +65 *[+14 ... +149]*; (briefly to –30 *[–22]*) | | | |
| Storage conditions | – NBR seal | °C *[°F]* | –40 ... +65*[–40 ... +149]*; max. relative air humidity 65 % | | | |
| | – FKM seal | °C *[°F]* | –20 ... +65*[–4 ... +149]*; max. relative air humidity 65 % | | | |
| Weight | – Filters | NS | **0040** | **0063** | **0100** | **0160** |
| | | kg *[lbs]* | 4.4 *[9.7]* | 5 *[11.1]* | 5.9 *[13.1]* | 24 *[53.2]* |
| | | NS | **0250** | **0400** | **0630** | **1000** |
| | | kg *[lbs]* | 26 *[57.7]* | 30 *[66.5]* | 60 *[133.1]* | 104 *[230.7]* |
| | – Filter bowl | NS | **0040** | **0063** | **0100** | **0160** |
| | | kg *[lbs]* | 1.33 *[2.93]* | 1.33 *[2.93]* | 2.1 *[4.63]* | 5.52 *[12.17]* |
| | | NS | **0250** | **0400** | **0630** | **1000** |
| | | kg *[lbs]* | 8.02 *[17.68]* | 12.21 *[26.91]* | 21.36 *[47.08]* | 45.34 *[99.93]* |
| Volume | | NS | **0040** | **0063** | **0100** | **0160** |
| | | l *[US gal]* | 0.25 *[ 0.06]* | 0.35 *[0.09]* | 0.52 *[0.13]* | 1.4 *[0.36]* |
| | | NS | **0250** | **0400** | **0630** | **1000** |
| | | l *[US gal]* | 1.95 *[0.51]* | 3.1 *[0.81]* | 5.0 *[1.32]* | 6.5 *[1.71]* |
| Material | – Filter head | | GGG | | | |
| | – Filter bowl | | Steel | | | |
| | – Optical maintenance indicator | | Brass | | | |
| | – Electronic switching element | | Plastic PA6 | | | |
| | – Bypass valve | | Steel/POM | | | |
| | – Seals | | NBR or FKM | | | |

| Hydraulic | | | | |
|---|---|---|---|---|
| Maximum operating pressure | bar *[psi]* | 450 *[6527]* | | |
| 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 | > $10^6$ 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]* | 5.0 ± 0.5 *[72.5 ± 7.3]* | 7,0 ± 0,5 *[101.5 ± 7.3]* | |
| | | 8.0 ± 0.8 *[116 ± 11.6]* | without bypass valve | |
| Filtration direction | | From the outside to the inside | | |

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

| **Electric** (electronic switching element) | | | | | | |
|---|---|---|---|---|---|---|
| Electrical connection | | | Round plug-in connection M12 x 1, 4-pole | | | Standard connection EN 175301-803 |
| | | Version | WE-1SP-M12 x 1 | WE-2SP-M12 x 1 | WE-2SPSU-M12 x 1 | WE-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 | | | 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 | kg *[lbs]* | 0,1 *[0.22]* | | | |

| **Filter element** | | | | |
|---|---|---|---|---|
| **Glass fiber material H.XL** | | | Single-use element on the basis of inorganic fiber | |
| | | | Filtration ratio according to ISO 16889 up to $\Delta p$ = 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 | – A00 | bar *[psi]* | 30 *[435]* | |
| | – B00 | bar *[psi]* | 330 *[4785]* | |

## Compatibility with permitted hydraulic fluids

| **Hydraulic fluid** | | **Classification** | **Suitable sealing materials** | **Standards** |
|---|---|---|---|---|
| Mineral oil | | HLP | NBR | DIN 51524 |
| Biodegradable | – insoluble in water | HETG | NBR | VDMA 24568 |
| | | HEES | FKM | |
| | – soluble in water | HEPG | FKM | VDMA 24568 |
| Flame-resistant | – water-free | HFDU, HFDR | FKM | VDMA 24317 |
| | – containing water | HFAS | NBR | DIN 24320 |
| | | HFAE | NBR | |
| | | HFC | NBR | VDMA 24317 |

☞ **Important information on hydraulic fluids:**
- For more information and data on the use of other hydraulic fluids, please refer to data sheet or contact us!
- **Flame-resistant – containing water**: due to possible chemical reactions with materials or surface coatings of machine and system components, the service life with these hydraulic fluids may be less than expected.

Filter materials made of filter paper P may not be used, filter elements with glass fiber material have to be used instead.
- **Biodegradable:** If filter materials made of filter paper are used, the filter life may be shorter than expected due to material incompatibility and swelling.

## Characteristic curves

**H3XL**

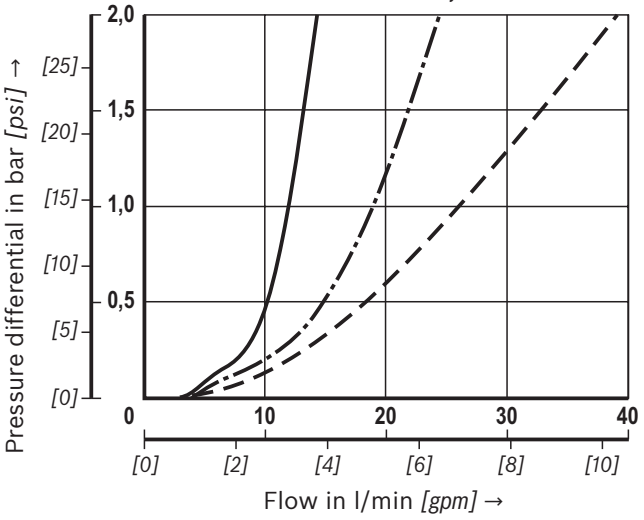
(measured with mineral oil HLP46 according to ISO 3968)

Spec. weight: < 0.9 kg/dm³

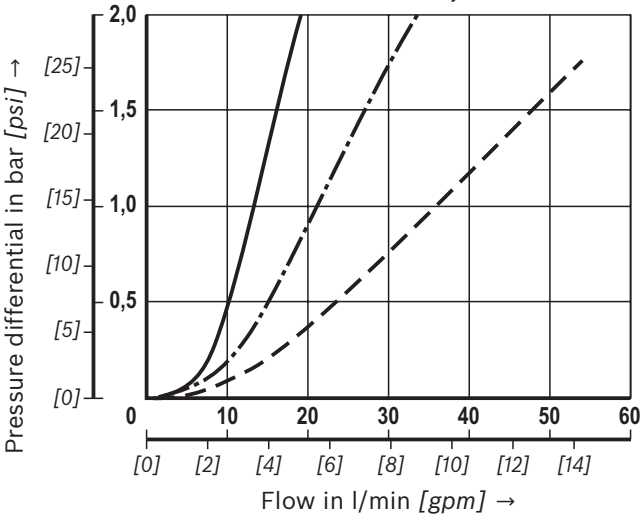
Δ*p*-Q-characteristic curves for complete filters recommended initial Δ*p* for version = 1.5 bar *[21.8 psi]*

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[143 SUS]*

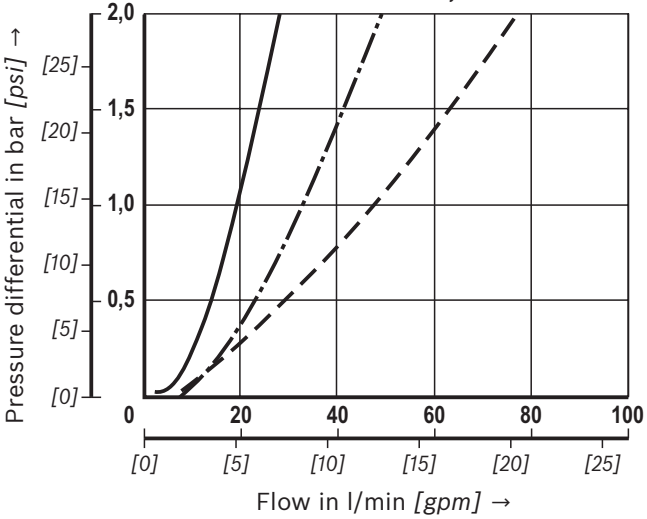
**445LEN0040-H3XLA00-V5,0-M-R2**



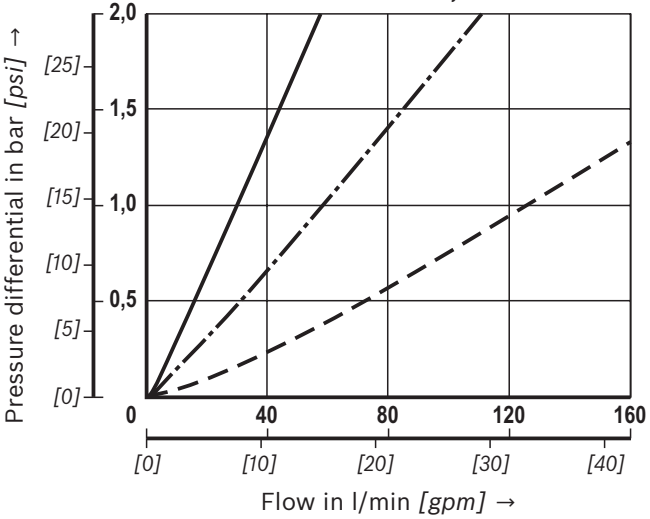

**445LEN0063-H3XLA00-V5,0-M-R4**




**445LEN0100-H3XLA00-V5,0-M-R4**




**445LEN0160-H3XLA00-V5,0-M-R6**



## Characteristic curves

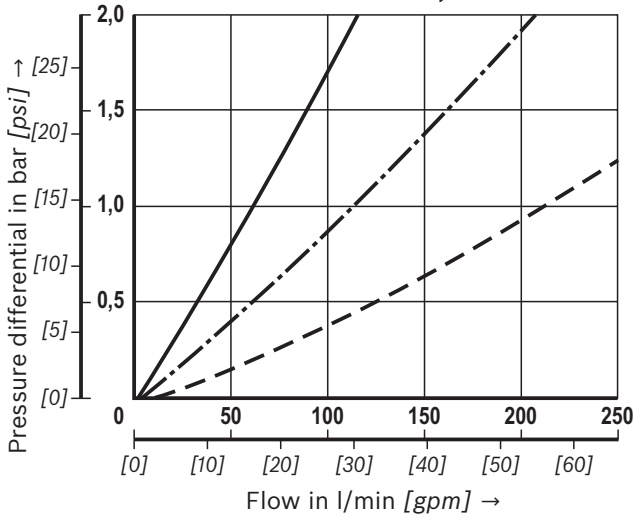
**H3XL**

(measured with mineral oil HLP46 according to ISO 3968)

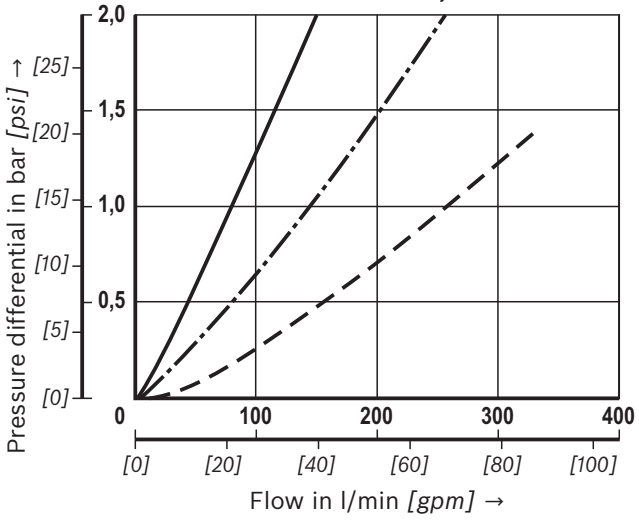
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q-characteristic curves for complete filters recommended initial Δ*p* for version = 1.5 bar *[21.8 psi]*

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[143 SUS]*

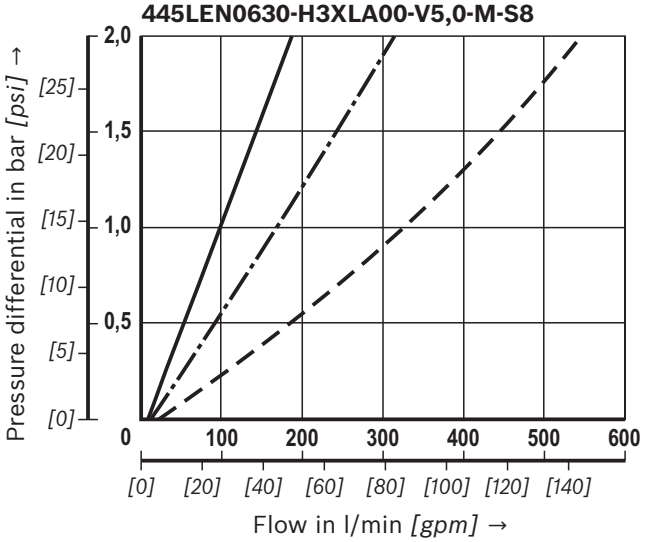
**445LEN0250-H3XLA00-V5,0-M-R6**



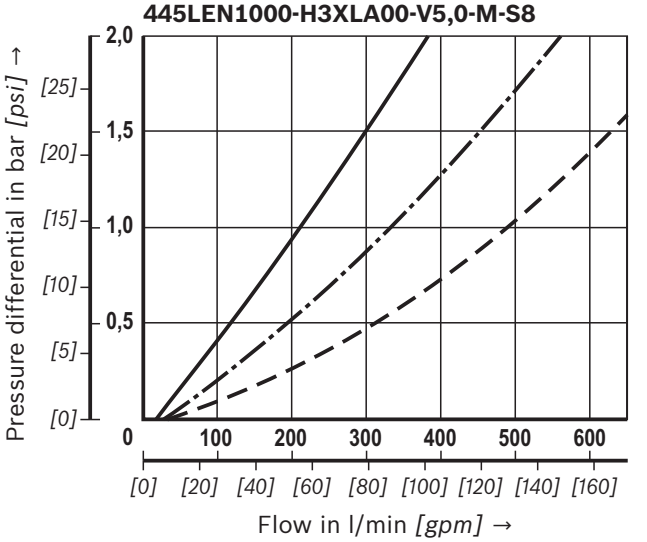

**445LEN0400-H3XLA00-V5,0-M-R6**




**445LEN0630-H3XLA00-V5,0-M-S8**




**445LEN1000-H3XLA00-V5,0-M-S8**



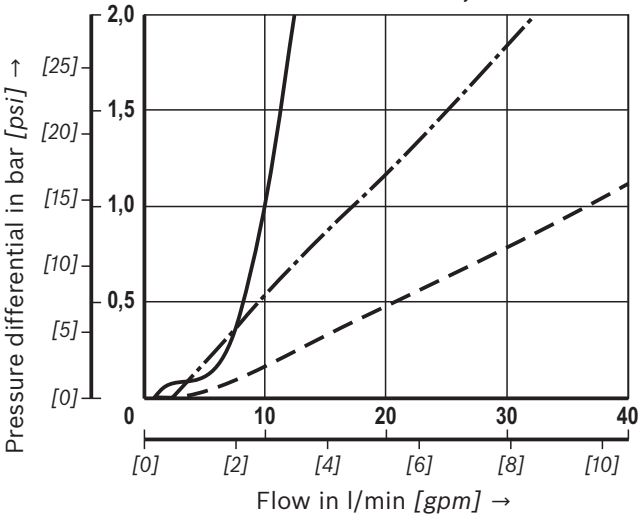
## Characteristic curves
(measured with mineral oil HLP46 according to ISO 3968)

**H10XL**

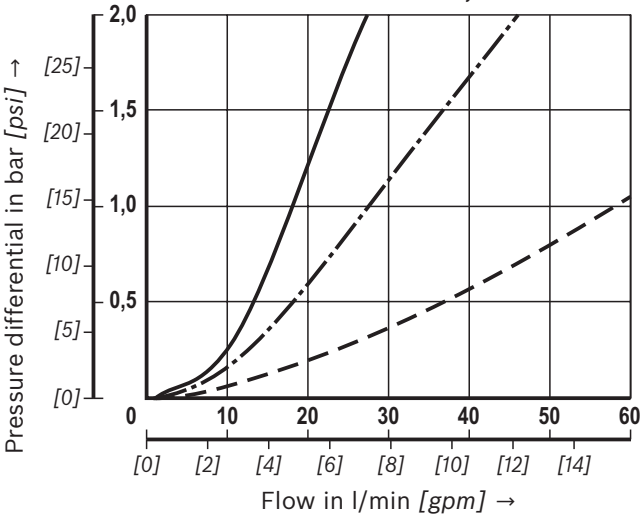
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q-characteristic curves for complete filters recommended initial Δ*p* for version = 1.5 bar *[21.8 psi]*

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[143 SUS]*

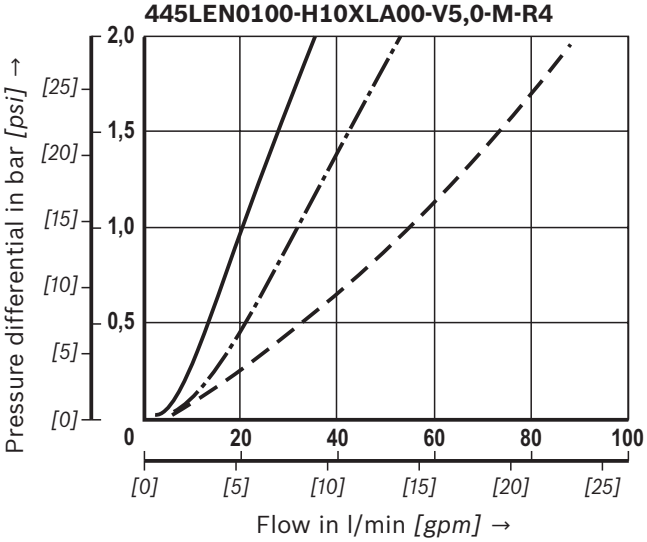
**445LEN0040-H10XLA00-V5,0-M-R2**



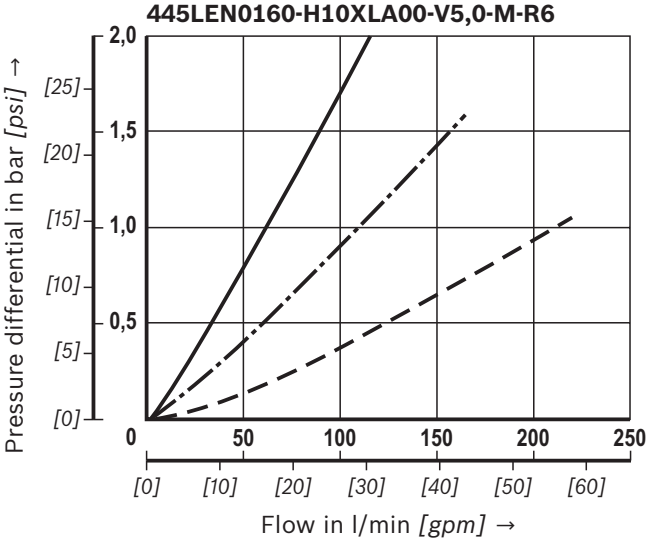

**445LEN0063-H10XLA00-V5,0-M-R4**




**445LEN0100-H10XLA00-V5,0-M-R4**




**445LEN0160-H10XLA00-V5,0-M-R6**



## Characteristic curves

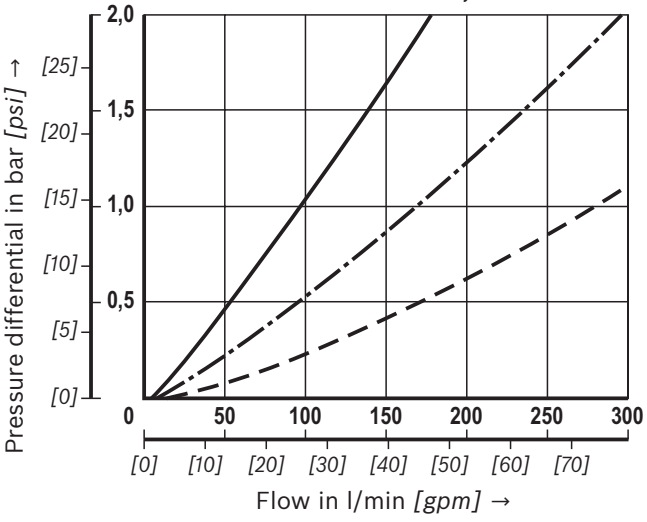
**H10XL**

(measured with mineral oil HLP46 according to ISO 3968)

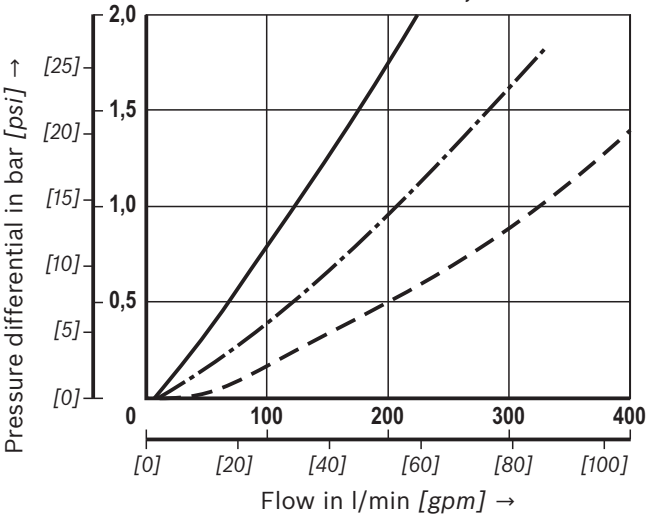
Spec. weight: < 0.9 kg/dm³
Δ*p*-Q-characteristic curves for complete filters recommended initial Δ*p* for version = 1.5 bar *[21.8 psi]*

Oil viscosity:
- **140 mm²/s** *[649 SUS]*
- **68 mm²/s** *[315 SUS]*
- **30 mm²/s** *[143 SUS]*

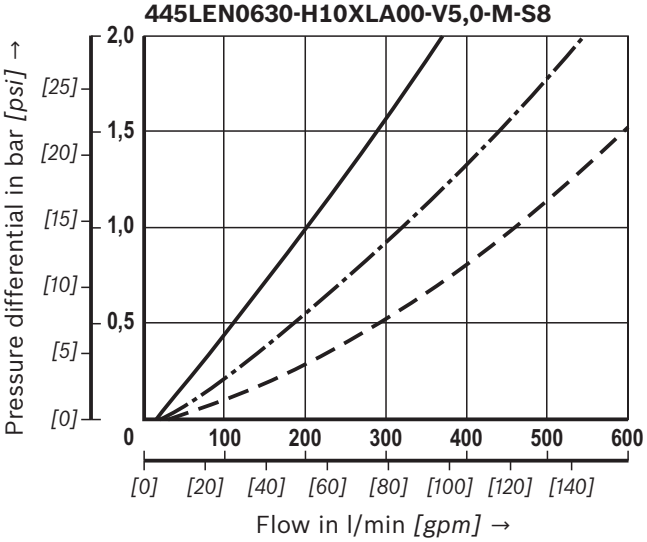
**445LEN0250-H10XLA00-V5,0-M-R6**



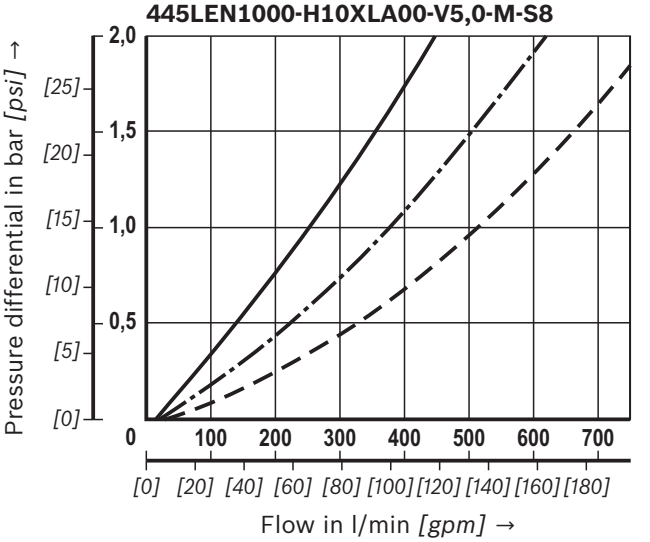

**445LEN0400-H10XLA00-V5,0-M-R6**




**445LEN0630-H10XLA00-V5,0-M-S8**

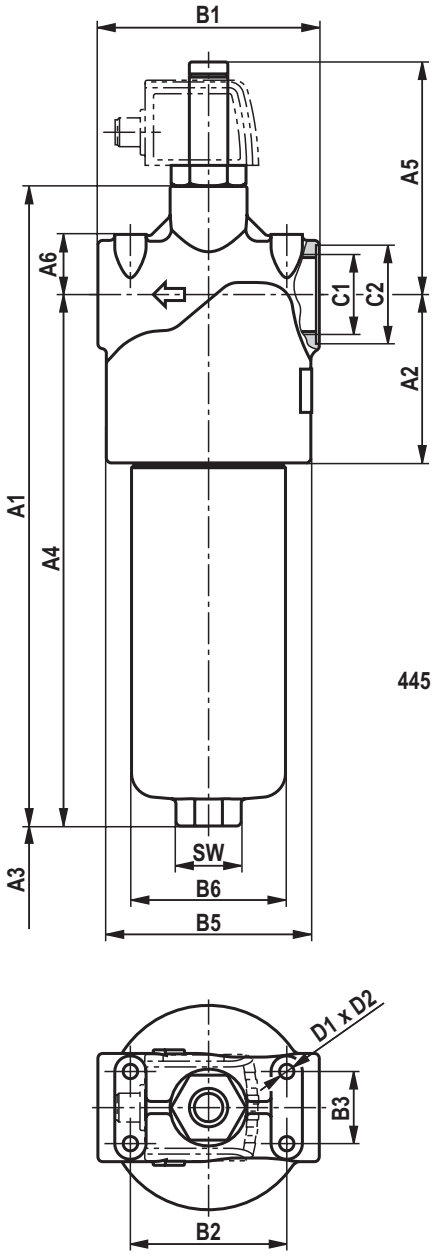



**445LEN1000-H10XLA00-V5,0-M-S8**



## Dimensions: Size 0040 ... NG1000
(dimensions in mm *[inch]*)

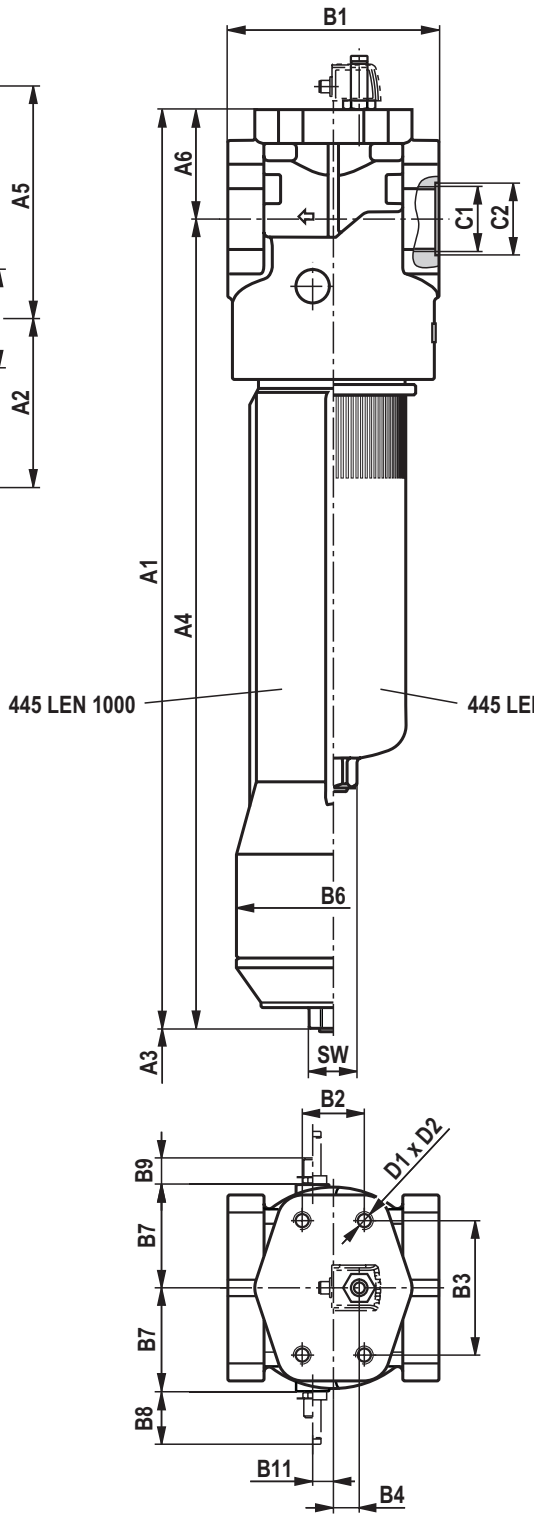
**445LEN0040 ... 0100**

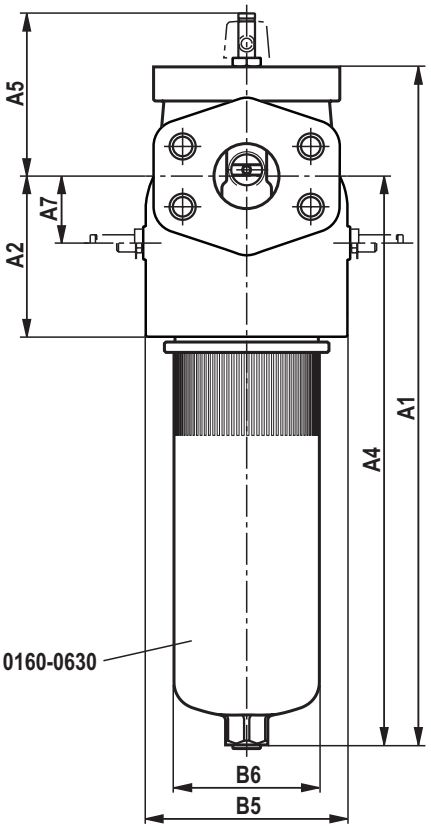






**445LEN0160 ... 1000**



## Dimensions: Size 0040 ... NG1000
(dimensions in mm *[inch]*)

| 445LEN... | A1 | A2 | A3 [1] | A4 | A5 | A6 | A7 |
|---|---|---|---|---|---|---|---|
| **0040** | 203 *[7.99]* | 70 *[2.76]* | 80 *[3.15]* | 158 *[6.22]* | 96.7 *[3.81]* | 25 *[0.98]* | – |
| **0063** | 266 *[10.47]* | | | 221 *[8.70]* | | | |
| **0100** | 356 *[14.02]* | | | 311 *[12.24]* | | | |
| **0160** | 344 *[13.54]* | 110 *[4.33]* | 120 *[4.72]* | 262 *[10.31]* | *133.7 [5.26]* | *82 [3.23]* | *46 [1.81]* |
| **0250** | 434 *[17.09]* | | | 352 *[13.86]* | | | |
| **0400** | 584 *[22.99]* | | | 502 *[19.76]* | | | |
| **0630** | 656 *[25.83]* | 155 *[6.10]* | 160 *[6.30]* | 550 *[21.65]* | *157.7 [6.21]* | *106 [4.17]* | *65 [2.56]* |
| **1000** | 893.5 *[35.18]* | | 630 *[24.80]* | 787.5 *[31.00]* | | | |

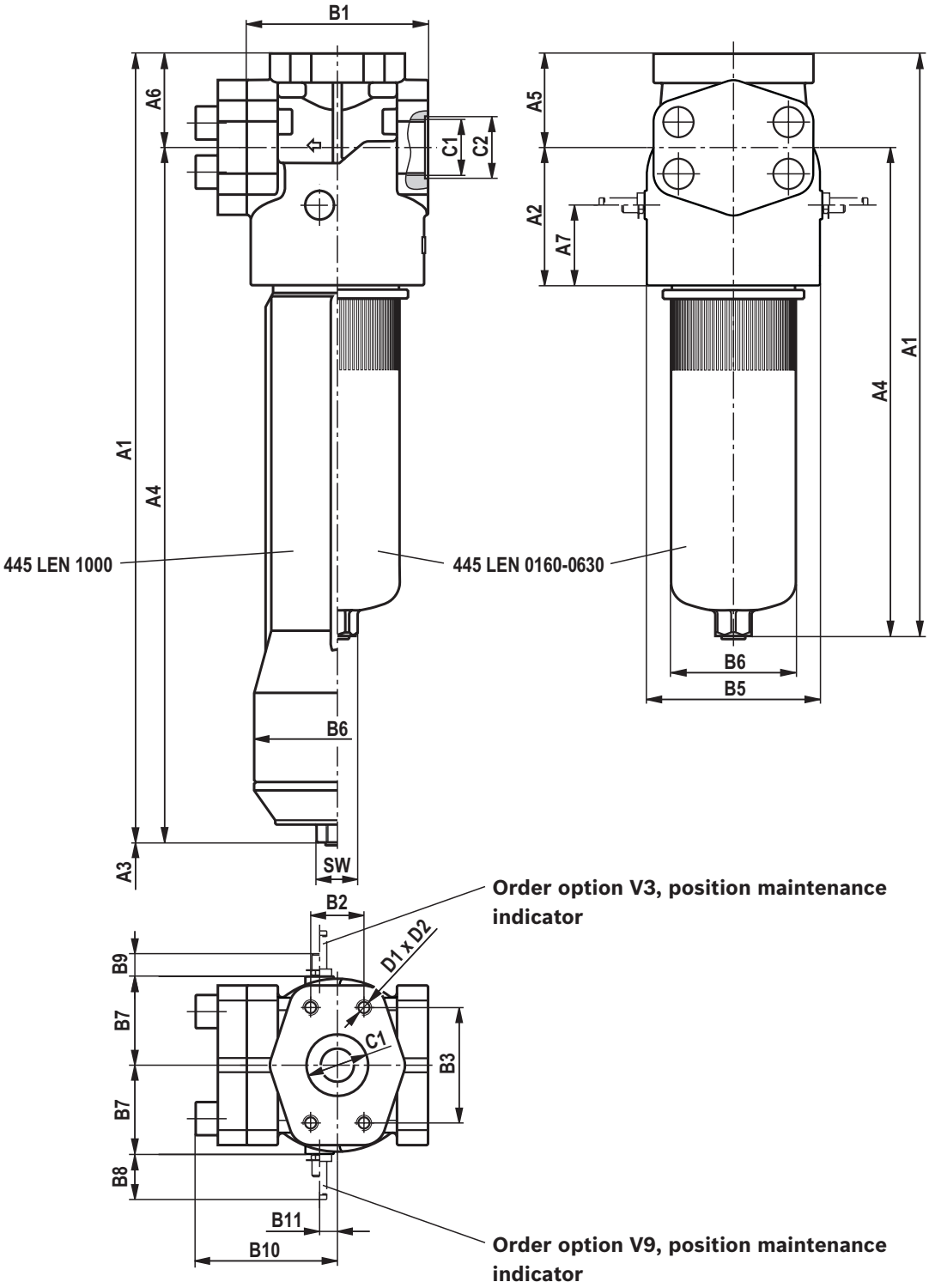
| 445LEN... | B1 | B2 | B3 | B4 | ØB5 | ØB6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0040** | 92 *[3.62]* | 65 *[2.56]* | 30 *[1.18]* | – | 85 *[3.35]* | 64 *[2.52]* | – | – | – | – | – |
| **0063** | | | | | | | | | | | |
| **0100** | | | | | | | | | | | |
| **0160** | 164 *[6.46]* | 55 *[2.17]* | 105 *[4.13]* | 30 *[1.18]* | 150 *[5.91]* | 114 *[4.49]* | 80 *[3.15]* | 51.7 *[2.04]* | 29.3 *[1.15]* | 128 *[5.04]* | 20 *[0.79]* |
| **0250** | | | | | | | | | | | |
| **0400** | | | | | | | | | | | |
| **0630** | 200 *[7.87]* | 60 *[2.36]* | 130 *[5.12]* | 25 *[0.98]* | 195 *[7.68]* | 140 *[5.51]* | 100 *[3.94]* | | | 169 *[6.65]* | |
| **1000** | | | | | | 188 *[7.40]* | | | | | |

| 445LEN... | C1 connection | | | | | | D1 | D2 | SW |
|---|---|---|---|---|---|---|---|---|---|
| | Standard R... | ØC2 | Optional U... | ØC2 | Optional S... | ØC2 | | | |
| **0040** | G1/2 | 28 *[1.10]* | 7/18-14 UNF-2B | 34 *[1.34]* | – | | M6 | 8 *[0.31]* | 24 *[0.94]* |
| **0063** | G1 | 41 *[1.61]* | 1 1/16 UN-2B | 41 *[1.61]* | | | | | |
| **0100** | | | | | | | | | |
| **0160** | G1 1/2 | 56 *[2.20]* | 1 7/8-12 UN-2B | 65 *[2.56]* | SAE 1 1/2” | 38 *[1.50]* | M12 | 28 *[1.10]* | 32 *[1.26]* |
| **0250** | | | | | SAE 2” | 51 *[2.01]* | | | |
| **0400** | | | | | | | | | |
| **0630** | G2 | 72 *[2.83]* | – | – | | | M16 | 33 *[1.30]* | 41 *[1.61]* |
| **1000** | | | | | SAE 2 1/2” | *63 [2.48]* | | | |

[1] Servicing height for filter element exchange.

## Dimensions: Size 0160 ... Size 1000 version 7
(dimensions in mm *[inch]*)

**445LEN0160 ... 1000 version 7**
**Outlet top, outlet opposite inlet closed**



## Dimensions: Size 0160 ... Size 1000 version 7
(dimensions in mm *[inch]*)

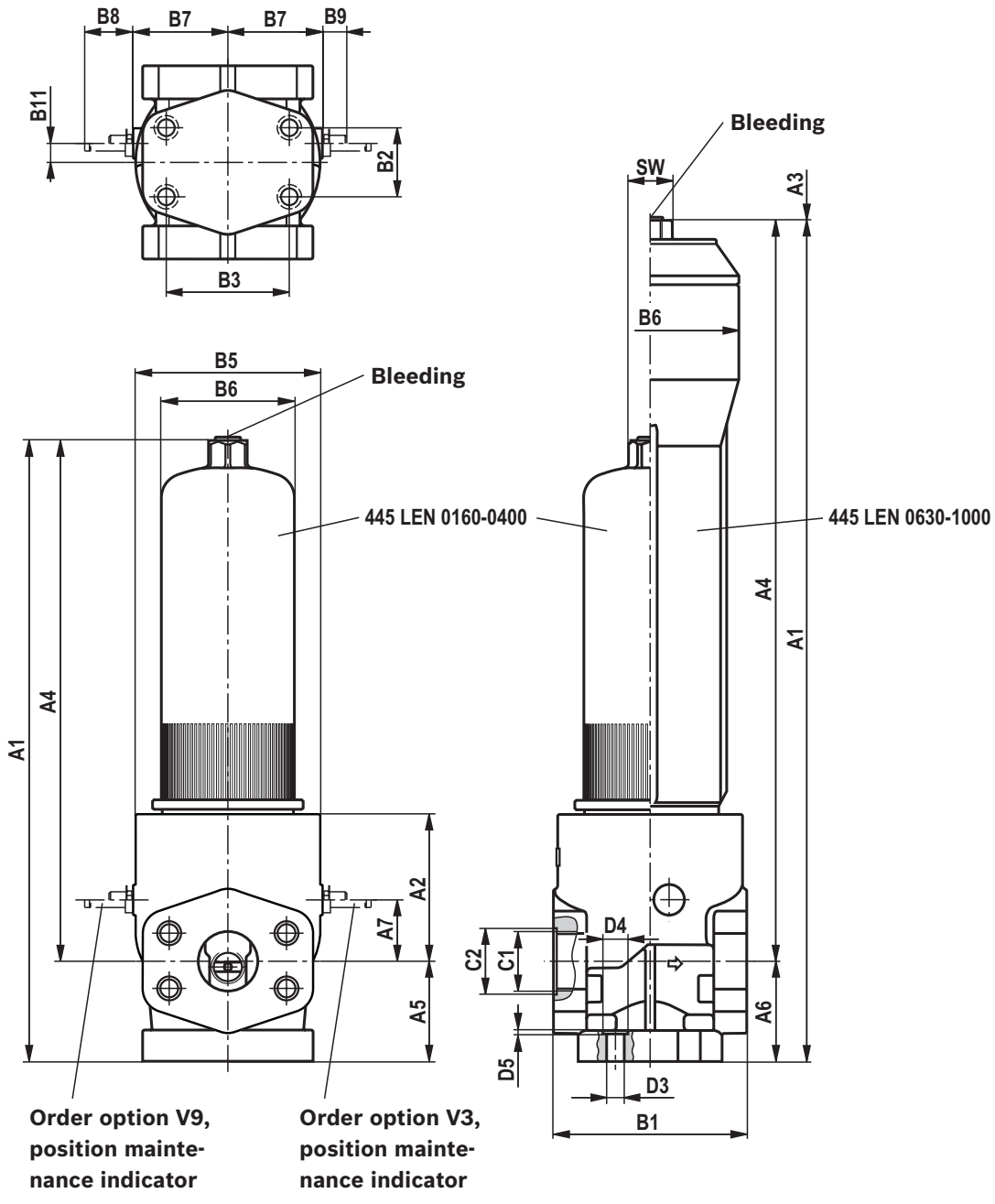
| 445LEN... | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|---|---|---|---|---|---|---|---|
| **0160...7** | 344 *[13.54]* | 110 *[4.33]* | 120 *[4.72]* | 262 *[10.31]* | 82 *[3.23]* | 82 *[3.23]* | 46 *[1.81]* |
| **0250...7** | 434 *[17.09]* | | | 352 *[13.86]* | | | |
| **0400...7** | 584 *[22.99]* | | | 502 *[19.76]* | | | |
| **0630...7** | 656 *[25.83]* | 155 *[6.10]* | 160 *[6.30]* | 550 *[21.65]* | 106 *[4.17]* | 106 *[4.17]* | 65 *[2.56]* |
| **1000...7** | 893.5 *[35.18]* | | 630 *[24.80]* | 787.5 *[31.00]* | | | |

| 445LEN... | B1 | B2 | B3 | B4 | ØB5 | ØB6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0160...7** | 164 *[6.46]* | 55 *[2.17]* | 105 *[4.13]* | 30 *[1.18]* | 150 *[5.91]* | 114 *[4.49]* | 80 *[3.15]* | 51.7 *[2.04]* | 29.3 *[1.15]* | 128 *[5.04]* | 20 *[0.79]* |
| **0250...7** | | | | | | | | | | | |
| **0400...7** | | | | | | | | | | | |
| **0630...7** | 200 *[7.87]* | 60 *[2.36]* | 130 *[5.12]* | 25 *[0.98]* | 195 *[7.68]* | 140 *[5.51]* | 100 *[3.94]* | | | 169 *[6.65]* | |
| **1000...7** | | | | | | 188 *[7.40]* | | | | | |

| 445LEN... | C1 connection | | | | | | D1 | D2 | SW |
|---|---|---|---|---|---|---|---|---|---|
| | Standard R... | ØC2 | Optional U... | ØC2 | Optional S... | ØC2 | | | |
| **0160...7** | G1 1/2 | 56 *[2.20]* | 1 7/8-12 UN-2B | 65 *[2.56]* | – | | M12 | 28 *[1.10]* | 32 *[1.26]* |
| **0250...7** | | | | | | | | | |
| **0400...7** | | | | | | | | | |
| **0630...7** | – | – | – | – | SAE 2” | 51 *[2.01]* | M16 | 33 *[1.30]* | 41 *[1.61]* |
| **1000...7** | | | | | SAE 2 1/2” | 63 *[2.48]* | | | |

## Dimensions: Size 0160 ... Size 1000 version 9
(dimensions in mm *[inch]*)

**445LEN0160 ... 1000 version 9**
**Filter rotated 180°, filter bowl can be unscrewed to the top**




| Type | Assembly position | | |
|---|---|---|---|
| | Maintenance indicator | Bleeding | Draining |
| **445LEN0160-1000...9-V3** | V3 | On the filter bowl, top, G1/4 | Opposite maintenance indicator |
| **445LEN0160-1000...9-V9** | V9 | | |

## Dimensions: Size 0160 ... Size 1000 version 9
(dimensions in mm *[inch]*)

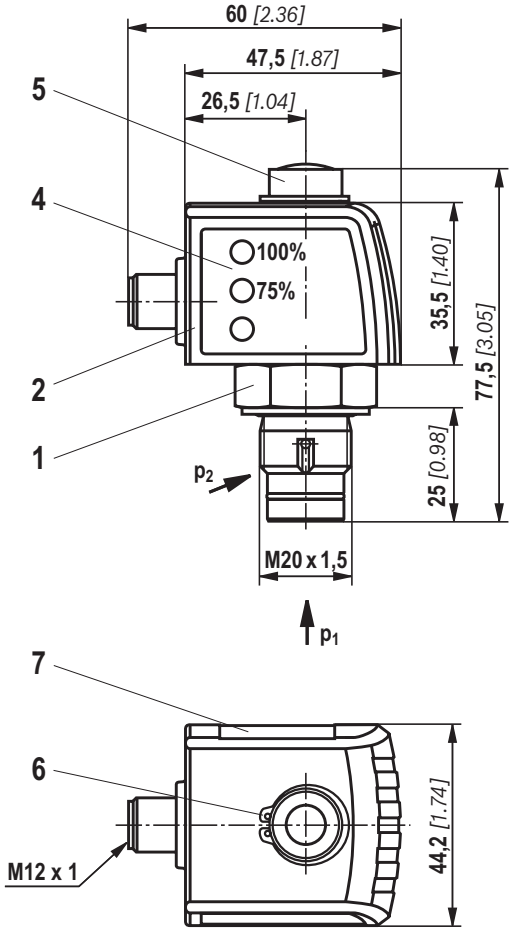
| 445LEN... | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|---|---|---|---|---|---|---|---|
| **0160...9** | 344 *[13.54]* | 110 *[4.33]* | 160 *[6.30]* | 262 *[10.31]* | 82 *[3.23]* | 82 *[3.23]* | 46 *[1.81]* |
| **0250...9** | 434 *[17.09]* | | 250 *[9.84]* | 352 *[13.86]* | | | |
| **0400...9** | 584 *[22.99]* | | 400 *[15.75]* | 502 *[19.76]* | | | |
| **0630...9** | 656 *[25.83]* | 155 *[6.10]* | 160 *[6.30]* | 550 *[21.65]* | 106 *[4.17]* | 106 *[4.17]* | 65 *2.56]* |
| **1000...9** | 893.5 *[35.18]* | | 630 *[24.80]* | 787.5 *[31.00]* | | | |

| 445LEN... | B1 | B2 | B3 | B4 | ØB5 | ØB6 | B7 | B8 | B9 | B10 | B11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0160...9** | 164 *[6.46]* | 55 *[2.17]* | 105 *[4.13]* | 30 *[1.18]* | 150 *[5.91]* | 114 *[4.49]* | 80 *[3.15]* | 51.7 *[2.04]* | 29.3 *[1.15]* | 128 *[5.04]* | 20 *[0.79]* |
| **0250...9** | | | | | | | | | | | |
| **0400...9** | | | | | | | | | | | |
| **0630...9** | 200 *[7.87]* | 60 *[2.36]* | 130 *[5.12]* | 25 *[0.98]* | 195 *[7.68]* | 140 *[5.51]* | 100 *[3.94]* | | | 169 *[6.65]* | |
| **1000...9** | | | | | | 188 *[7.40]* | | | | | |

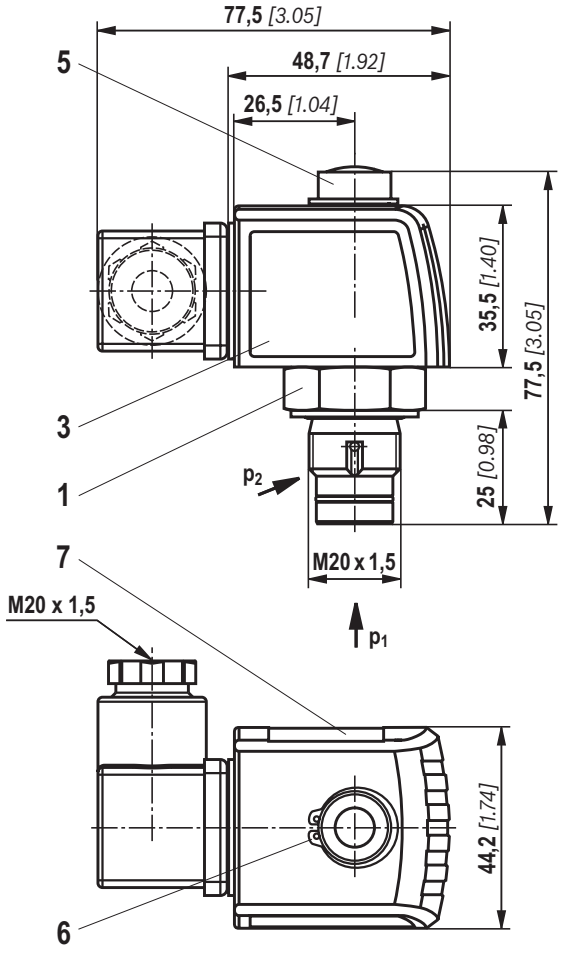
| 445LEN... | C1 connection | | | | | | ØD3 | ØD4 | D5 | SW |
|---|---|---|---|---|---|---|---|---|---|---|
| | Standard R... | ØC2 | Optional U... | ØC2 | Optional S... | ØC2 | | | | |
| **0160...9** | G1 1/2 | 56 *[2.20]* | 1 7/8-12 UN-2B | 65 *[2.56]* | – | | 14 *[0.55]* | 20 *[0.79]* | 1 *[0.04]* | 32 *[1.26]* |
| **0250...9** | | | | | | | | | | |
| **0400...9** | | | | | | | | | | |
| **0630...9** | – | – | – | – | SAE 2” | 51 *[2.01]* | 18 *[0.71]* | 26 *[1.02]* | | 41 *[1.61]* |
| **1000...9** | | | | | SAE 2 1/2” | 63 *[2.48]* | | | | |

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

**Pressure differential indicator with mounted switching element M12 x 1**




**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 electrical maintenance indicator (rotatable by 360°);round plug-in connection M12 x 1, 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: 24V =
green: Stand-by
yellow: Switching point 75%
red: Switching point 100%

**5** Visual indicator bistable

**6** Locking ring DIN 471-16 x 1

**7** Name plate

☞ **Notices:**
Representation contains mechanical optical maintenance indicator (1) and electronic switching element (2) (3).

# Ordering code spare parts

## Filter element

| 01 | 02 | 03 | | 04 | | 05 | | 06 |
|---|---|---|---|---|---|---|---|---|
| **2.** | | | **–** | | **–** | **0** | **–** | |

**Filter element**

| | | |
|---|---|---|
| 01 | Design | **2.** |

**Nominal size**

| | | |
|---|---|---|
| 02 | LEN...<br>(with filter element according to **DIN 24550**) | **0040**<br>**0063**<br>**0100**<br>**0160**<br>**0250**<br>**0400**<br>**0630**<br>**1000** |

**Filter rating in µm**

| | | | |
|---|---|---|---|
| 03 | **Absolute (ISO 16889 ; $\beta_x(c) \geq 200$)** | Glass fiber material, not cleanable | **H3XL**<br>**H6XL**<br>**H10XL**<br>**H20XL** |
| | **Nominal** | Stainless steel wire mesh, cleanable | **G10**<br>**G25**<br>**G40**<br>**G60**<br>**G100** |

**Pressure differential**

| | | |
|---|---|---|
| 04 | Max. admissible pressure differential of the filter element 30 bar *[435 psi]* – filter **with** bypass valve | **A00** |
| | Max. admissible pressure differential of the filter element 330 bar *[4786 psi]* – filter **without** bypass valve | **B00** |

**Bypass valve**

| | | |
|---|---|---|
| 05 | **without** bypass valve | **0** |

**Seal**

| | | |
|---|---|---|
| 06 | NBR seal | **M** |
| | FKM seal | **V** |

**Order example:**
**2.0100 H3XL-A00-0-M**
**For detailed information on filter elements please refer to data sheet.**

## Preferred program replacement filter element

| Replacement filter element 3 micron | Replacement filter element 6 micron | Replacement filter element 10 micron |
|---|---|---|
| 2.0040 H3XL-A00-0-M | 2.0040 H6XL-A00-0-M | 2.0040 H10XL-A00-0-M |
| 2.0063 H3XL-A00-0-M | 2.0063 H6XL-A00-0-M | 2.0063 H10XL-A00-0-M |
| 2.0100 H3XL-A00-0-M | 2.0100 H6XL-A00-0-M | 2.0100 H10XL-A00-0-M |
| 2.0160 H3XL-A00-0-M | 2.0160 H6XL-A00-0-M | 2.0160 H10XL-A00-0-M |
| 2.0250 H3XL-A00-0-M | 2.0250 H6XL-A00-0-M | 2.0250 H10XL-A00-0-M |
| 2.0400 H3XL-A00-0-M | 2.0400 H6XL-A00-0-M | 2.0400 H10XL-A00-0-M |
| 2.0630 H3XL-A00-0-M | 2.0630 H6XL-A00-0-M | 2.0630 H10XL-A00-0-M |
| 2.1000 H3XL-A00-0-M | 2.1000 H6XL-A00-0-M | 2.1000 H10XL-A00-0-M |

# Ordering code spare parts

## Mechanical optical maintenance indicator

| 01 | 02 | | 03 | | 04 | | 05 | | 06 |
|---|---|---|---|---|---|---|---|---|---|
| **W** | **O** | **–** | **D01** | **–** | | **–** | | **–** | **450** |

| | | |
|---|---|---|
| 01 | **Maintenance indicator** | **W** |
| 02 | **Mechanical optical indicator** | **O** |

**Version**

| | | |
|---|---|---|
| 03 | Pressure differential, modular design | **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. operating pressure**

| | | |
|---|---|---|
| 06 | Switching pressure 5.0 bar *[72.5 psi]*, 450 bar *[6527 psi]* | **450** |
| | Switching pressure 8.0 bar *[116.0 psi]*, 450 bar *[6527 psi]* | **450** |

| Mechanical optical maintenance indicator |
|---|
| WO-D01-5.0-M-450 |
| WO-D01-5.0-V-450 |
| WO-D01-8.0-M-450 |
| WO-D01-8.0-V-450 |

# Ordering code spare parts

## Seal kit

| 01 | 02 | 03 | | 04 |
|---|---|---|---|---|
| **D** | **350/445LEN** | | **–** | |

| | | |
|---|---|---|
| 01 | **Seal kit** | **D** |

| | | |
|---|---|---|
| 02 | **Series 445LEN** | **350/445LEN** |

**Nominal size**

| | | |
|---|---|---|
| 03 | Size 0040-0100 | **0040-0100** |
| | Size 0160-0400 | **0160-0400** |
| | Size 0630 | **0630** |
| | Size 1000 | **1000** |

**Seal**

| | | |
|---|---|---|
| 04 | NBR seal | **M** |
| | FKM seal | **V** |

| Seal kit |
|---|
| D350/445LEN0040-0100-M |
| D350/445LEN0040-0100-V |
| D350/445LEN0160-0400-M |
| D350/445LEN0160-0400-V |
| D350/445LEN0630-M |
| D350/445LEN0630-V |
| D350/445LEN1000-M |
| D350/445LEN1000-V |

## Assembly, commissioning, maintenance

### Installation

- The max. operating pressure of the system must not exceed the max. admissible operating pressure of the filter (see type plate).
- During assembly of the filter (see also chapter “Tightening torque”) the flow direction (direction arrows) and the required servicing height of the filter element (see chapter “Dimensions”) must be taken into account.
- Easy filter element exchange is guaranteed in the installation position filter bowl vertically downwards. For filters with order option - supplementary information 9 - the installation position of the filter bowl is vertically upwards. The maintenance indicator must be arranged in a well visible way.
- Remove the plastic plugs in the filter inlet and outlet.
- Ensure that the system is assembled without tension stress.
- The optional electronic maintenance indicator is connected via the electronic 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.

### Commissioning

Commission the system.

☞ **Notice:**
There is no bleeding provided at the filter.
However, some sizes or variants have optional threaded couplings which may also be used for bleeding.

### Maintenance

- If at operating temperature, the red indicator pin reaches out of the mechanical optical maintenance indicator and/or if the switching process in the electronic switching element is triggered, the filter element is contaminated and needs to be replaced and cleaned respectively. More details see data sheet
  The material number of the corresponding replacement filter element is indicated on the name plate of the complete filter. It must comply with the material number on the filter element.
- Decommission the system.
- The operating pressure is to be built up on the system side.

☞ **Notice:**
There is no bleeding provided at the filter.
However, some sizes or variants have optional threaded couplings which may also be used for bleeding.

- Via the drain screw (from size 0160 fitted by default), the oil on the dirt side can be drained.
- Unscrew filter bowl (or base with size 1000).
- Remove the filter element from the spigot by rotating it slightly.
- Clean the filter components, if necessary.
- Check the seals at the filter bowl for damage and renew them, if necessary.
  For suitable seal kits refer to chapter “Spare parts”.
- Filter elements made of wire mesh can be cleaned. For detailed cleaning instructions refer to data sheet.
- Install the new or cleaned filter element on the spigot again by slightly rotating it.
- The filter is to be assembled in reverse order. **Please note:**
  Screw in the filter bowl to the stop, unscrew the filter bowl again by 1/8 to 1/2 rotation so that the filter bowl does not get stuck due to the pressure pulsation and can be loosened easily during maintenance work.
- The torque specifications (“Tightening torques” chapter) are to be observed.
- Commission the system and bleed the filter for order option - supplementary information 9

**⚠ WARNING!**

- Only with order option - supplementary information 9 - upwards installation position of the filter bowl is permitted. This variant guarantees safe bleeding.

## Assembly, commissioning, maintenance

**⚠ WARNING!**

- Assembly and disassembly only with depressurized system!
- Filter is under pressure!
- Remove the filter bowl only if it is not under pressure!
- Do not exchange the mechanical-optical maintenance indicator while the filter is under pressure!
- If the flow direction is not considered during assembly, the filter element will be destroyed. Particles get in system and damage the following components.

☞ **Notices:**

- All works at the filter only be trained specialists.
- Functioning and safety are only guaranteed if original filter elements and spare parts are used.
- Warranty becomes void if the delivered item is changed by the ordering party or third parties or improperly mounted, installed, maintained, repaired, used or exposed to environmental condition that do not comply with the installation conditions.

## Tightening torques
(dimensions in mm *[inch]*)

### Mounting

| **Series 445LEN...** | **0040** | **0063** | **0100** | **0160** | **0250** | **0400** | **0160** | **0250** |
|---|---|---|---|---|---|---|---|---|
| Screw/tightening torque with $\mu_{total}$ = 0.14 | M6 / 10.4 Nm ± 10 % | | | M12 / 37 Nm ± 10 % | | | M16 / 90 Nm ± 10 % | |
| Quantity | 4 | | | | | | | |
| Recommended property class of screw | 8.8 | | | | | | | |
| Minimum screw-in depth | 6 mm + 2 mm *[0.24 + 0.08]* | | | 18 mm + 4 mm *[0.7 + 0.16]* | | | 24 mm + 4 mm *[0.94 + 0.16]* | |

### Filter bowl and maintenance indicator

| **Series 445LEN...** | **0040** | **0063** | **0100** | **0160** | **0250** | **0400** | **0160** | **0250** |
|---|---|---|---|---|---|---|---|---|
| Tightening torque filter bowl | Screw in the filter bowl to the stop, unscrew the filter bowl again by 1/8 to 1/2 rotation | | | | | | | |
| Tightening torque maintenance indicator | Max. 50 Nm | | | | | | | |
| Tightening torque cubic connector screw switching element EN-175301-803 | M3/0.5 Nm | | | | | | | |

## Directives and standardization

### Classification according to the Pressure Equipment Directive

The inline filters for hydraulic applications according to are pressure holding equipment according to arti-cle 1, section 2.1.4 of the Pressure Equipment Direc-tive 97/23/EC (PED). However, on the basis of the excep-tion 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).
The fluids from the chapter “Compatibility with approved pressure fluids” were considered for the classification.
They do not receive a CE mark.

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

The inline filters according to are no equipment or components in the sense of directive 94/9/EC and are not provided with a CE mark. It has been proven with the ignition risk analysis that these inline filters do not have own ignition sources acc. to DIN EN 13463-1:2009.

According to DIN EN 60079-11:2012, electronic maintenance indicators with a switching point:
WE-1SP-M12 x 1
WE-1SP-EN175301-803
are simple, electronic operating equipment that do not have an own voltage source. This simple, electronic operating equipment may - according to DIN EN 60079-14:2012 - in intrinsically safe electric circuits (Ex ib) be used in systems without marking and certification.
The inline filters and the electronic maintenance indicators described here can be used for the following explosive areas

| | zone suitability | |
|---|---|---|
| Gas | 1 | 2 |
| Dust | 21 | 22 |

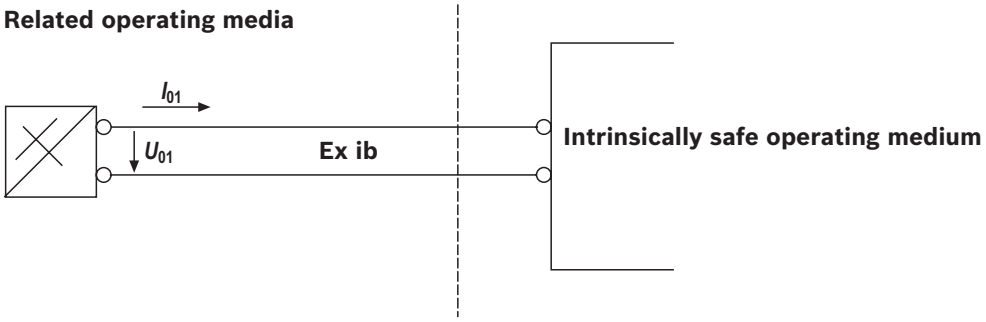
| **Complete filter with mech./opt. Maintenance indicator** | | | | |
|---|---|---|---|---|
| | | **Use /assignment** | **Gas 2G** | **Dust 2D** |
| Assignment | | | Ex II 2G c IIC TX | Ex II 2D c IIC TX |
| Conductivity of the medium | pS/m | min | 300 | |
| Dust accumulation | | max | – | 0.5 mm |

| **Electronic switching element in the intrinsically safe electric circuit** | | | | |
|---|---|---|---|---|
| | | **Use /assignment** | **Gas 2G** | **Dust 2D** |
| Assignment | | | Ex II 2G Ex ib IIB T4 Gb | Ex II 2D Ex ib IIIC T100°C Db |
| perm. intrinsically safe electric circuits | | | Ex ib IIC, Ex ic IIC | Ex ib IIIC |
| **Technical data** | | | **Values only for intrinsically safe electric circuit** | |
| Switching voltage | Ui | max | 150 V AC/DC | |
| Switching current | Ii | max | 1.0 A | |
| Switching power | Pi | max | 1.3 W T4 $T_{max}$ 40 ℃ | 750 mW $T_{max}$ 40 ℃ |
| | | max | 1.0 W T4 $T_{max}$ 80 ℃ | 550 mW $T_{max}$ 100 ℃ |
| Surface temperature [1)] | | max | – | 100 ℃ |
| inner capacity | Ci | | negligible | |
| inner inductivity | Li | | negligible | |
| Dust accumulation | | max | – | 0.5 mm |

[1)] The temperature depends on the temperature of the medium in the filter and must not exceed the value specified here.

## Directives and standardization

Possible circuit according to DIN EN 60079-14




**⚠ WARNING!**

- Explosion hazard due to high temperature!
  The temperature depends on the temperature of the medium in the hydraulic circuit and must not exceed the value specified here. Measures are to be taken so that in the potentially explosive area, the max. admissible ignition temperature is not exceeded.
- When using the inline filters in accordance with in potentially explosive areas, appropriate equipoten-tial bonding has to be ensured. The filter is preferably to be earthed via the mounting screws. It has to be noted in this connection that paintings and oxidic protective layers are not electrically conductive.
- During filter element exchanges, the packaging material is to be removed from the replacement element outside the potentially explosive area

☞ **Notices:**

- Maintenance only by specialists, instruction by the machine end-user acc. to DIRECTIVE 1999/92/EC appendix II, section 1.1
- Functional and safety warranty only applicable when using genuine spare parts