



Filters . Accumulators

# Duplex Return Line Filter

Tank top mounting

Type : 10-FRD

## Technical Data

Design : Duplex Tanktop mounting  
 Max. Pressure (PS) : 10 bar [145 psi]  
 Test Pressure (PT) : 1.43 x PS (as per CE/PED)  
                           1.3 x PS (as per ASME)  
 Temperature range : -20°C to +100°C (Standard)  
                           -4°F to +212°F (Standard)  
 Connection : Upto 1-1/2" BSP(F)/ SAE-20  
 Element design : EPE standard

### Material of Construction

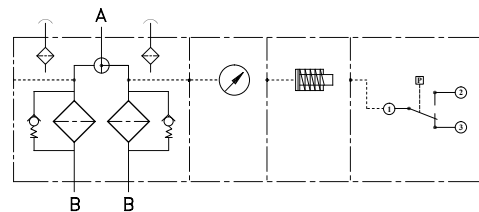
Head : Aluminium Alloy.  
 Cover : Carbon Reinforced Plastic.  
 Bowl : Carbon Reinforced Plastic.  
 Seals : Nitrile / Viton / EPDM.

### Flow Capacity

0005	50 lpm [13 gpm]
0008	80 lpm [20 gpm]
0013	130 lpm [35 gpm]
0015	150 lpm [40 gpm]
0018	180 lpm [45 gpm]



## Hydraulic Symbol



## Description

The 10-FRD series Filters are used for tank top mounting in the return line of the system for continuous operation and provide protection for tank and operating pumps as a result of filtering out dirt from the installation runback. These filters are a combination of two simplex return line filters connected by at 3-way ball valve. The 3-way ball valve - which is outside the tank - functions as a common inlet for both the filter housings while the individual outlets at the bottom of the filter bowls discharge into the tank.

The filter bowl has an element locating spigot. The top cover is used for holding the element and is unscrewed for maintenance. The filters are also provided with an optional integral breather for additional protection of the system.

## Accessories

Maintenance indicator - for monitoring the filter element contamination status. Available in various designs including

- Optical (pop-up version & gauge version).
- Electrical - NO, NC & switch-over.
- Optical-Electrical.

Bypass valve - to protect the filter element during start-up and over pressurisation due to clogging.

Breather - for enabling easy inflow / outflow of the air into the tank during functioning.

## Filter Element

The Filter Element is of star-pleated design with optimised pleat density for providing prolonged life.

The filter element is of Out-to-In design and the contaminant is retained outside the filter element and collected in the filter bowl.

The elements are available in various media options and selected based on the required oil cleanliness, initial pressure drop and dirt holding capabilities.

Media options for the filter element include  
 SS Wire Mesh - Cleanable, Nominal filtration.  
 Paper - Non-cleanable, Nominal filtration.  
 Non-woven - Non-cleanable, Nominal filtration.  
 Inorganic glass fibre - Non-cleanable, Absolute filtration acc. to ISO-16889.  
 Aquasorb - Water absorbing media, Non-cleanable.

For special applications / fluids the filter elements are supplied with SS hardware (end caps & inner tube) and / or different adhesives.

Technical specifications subject to change.

## Ordering Code - Filter

1 2 3 4 5 6ab 7 8 9ab 10 11 12 13  
**10 - FRD - 0013N - H10XP - A - 0 P - 0 - 0 - D2.5 - G06 - P - 0 - 0 /**

1	<b>Max. working pressure</b>	10 bar [145 psi]	= <b>10</b>
2	<b>Filter type</b>	Duplex Return Line - EPE Standard Element	= <b>FRD</b>
3	<b>Nominal Size</b>	Filter type FRD without Bypass Valve  Filter type FRD with Bypass Valve	= <b>0005N 0008N 0013N 0018N 0015N 0018N 0005B 0008B 0013B 0018B</b>
4	<b>Filtering Media &amp; Filtration Grade</b>	<u>Nominal Filtration Grade</u> SS Wire Mesh   Cleanable with additional epoxy layer upstream for 10/25/40µm	= <b>G10 G25 G40 G60 G80 G100</b> Others on request
		Paper   Non-cleanable with epoxy mesh	= <b>P5 P10 P25</b>
		Non-Woven   Non-cleanable with epoxy mesh	= <b>VS10 VS25 VS40 VS60</b>
		<u>Absolute Filtration Grade (ISO16889)</u> Glass Fibre   Non-cleanable with epoxy mesh	= <b>H1XL H3XL H6XL H10XL H16XL H20XL</b>
		Long Life Glass Fibre   Non-cleanable with plastic mesh & outer sleeve	= <b>H3XP H5XP H10XP H15XP H20XP</b>
		Long Life Glass Fibre   Non-cleanable with epoxy mesh	= <b>H3XE H5XE H10XE H15XE H20XE</b>
		Glass Fibre - Electrically Conductive Non-cleanable with epoxy mesh	= <b>H3XC H5XC H10XC H15XC H20XC</b>
		Glass Fibre - Water Absorbing Non-cleanable with epoxy mesh	= <b>AS1 AS3 AS6 AS10 AS20</b>
		SS Fibre   Cleanable with SS mesh	= <b>M5 M10 M15</b>
5	<b>Differential Pressure of Element</b>	<u>Maximum allowed differential pressure</u> 30 Bar [435 psid]	= <b>A</b> (standard)
6a	<b>Element Adhesive</b>	Standard Adhesive T=100°C [212°F] Epoxy Adhesive (for fuels) High Temp. Adhesive T=160°C [320°F]	= <b>0</b> (standard) = <b>1</b> = <b>E</b>
6b	<b>Element Hardware (End Caps + Inner Tube)</b>	Carbon Steel + Carbon Steel Polyamide + Carbon Steel Stainless Steel + Stainless Steel Nickel Coated CS + Nickel Coated CS	= <b>C</b> = <b>P</b> (standard) = <b>X</b> = <b>D</b>
7	<b>Magnet</b>	Without	= <b>0</b> (standard)

\* Before ordering, check for availability.

## Ordering Code - Filter

1 2 3 4 5 6ab 7 8 9ab 10 11 12 13  
**10 - FRD - 0013N - H10XP - A - 0 P - 0 - 0 - D2.5 - G06 - P - 0 - 0 /**

8	<b>Bypass Valve #</b>	Without bypass valve With Bypass Valve - 3.5 Bar [50.7 psid] Others - on request	= <b>0</b> (std for ....N) = <b>7</b> (std for ....B)
9a	<b>Maintenance Indicator - type</b>	Without Optical-Manometer:0-6 kg/cm <sup>2</sup> [0-85 psi] Optical-Manometer:0-25 kg/cm <sup>2</sup> [0-350 psi] Optical - Pop-up Electrical - Pressure Switch - Closer - NO Electrical - Pressure Switch - Opener - NC Electrical - Pressure Switch - Switch-over Optical+Electrical - Switch-over+lamp Special	= <b>0</b> (standard) = <b>A</b> = <b>B</b> = <b>C..</b> = <b>D..</b> = <b>F..</b> = <b>G..</b> = <b>K..</b> = <b>SP</b>
9b	<b>Maintenance Indicator - cracking pressure</b>	N/A 2.5 Bar [36.2 psid] Other pressure (in Bar)	= - (standard) = <b>..2.5</b> (std for C,D,F,G,K) = ..... as applicable
10	<b>Inlet connection</b> (Refer C1 on pg.5)	BSP Thread (ISO-228) - 3/4" BSP(F) BSP Thread (ISO-228) - 1" BSP(F) BSP Thread (ISO-228) - 1-1/4" BSP(F) BSP Thread (ISO-228) - 1-1/2" BSP(F) SAE Straight Thread O'Ring Boss (J1926) With adaptor	= <b>G05</b> (for 0005-13) = <b>G06</b> (for 0005-13) = <b>G07</b> (for 0015-18) = <b>G08</b> (for 0015-18) = <b>S**</b> (refer pg.5) = <b>RA0</b> (to be specified)
11	<b>Seal Material</b>	Nitrile Viton EPDM Neoprene	= <b>P</b> (standard) = <b>V</b> = <b>E</b> = <b>N</b>
12	<b>Housing Material</b>	Standard - as per catalogue Special	= <b>0</b> = <b>SP</b>
13	<b>Other Options</b> (multiple options possible)	Without With 1/4" air vent port - duly plugged With 1/4" BSP Air Vent Valve With breather filter	= <b>0</b> = <b>EP</b> (for w/o indicator) = <b>E</b> (for w/o indicator) = <b>F</b>

\* Before ordering, check for availability

# Bypass Valve assembled in the element

### Ordering Code - Filter Element

**1. 0013N - H10XP - A - 0 P - 0 - P**  
 3 4 5 6ab 8 11

### Ordering Code - Seal Kit

**D - 10 - FRD - 0013N - D - G06 - P - 0**  
 1 2 3 9a 10 11

### Ordering Code - Breather Element

**7. 0003 - P10 - 0 - 00 - 0 - 0**

# Maintenance Indicators

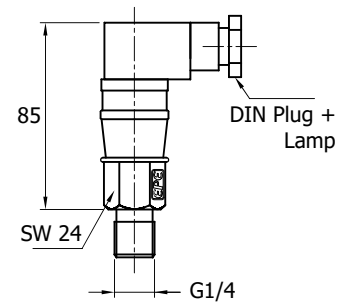
<p>A = Optical (Manometer) 0-6 kg/cm<sup>2</sup></p>	<p>B = Optical (Manometer) 0-25 kg/cm<sup>2</sup></p>	<p>C = Optical (Pop-up)</p>
<p>Ordering Code <b>A = M010</b></p>	<p>Ordering Code <b>B = M040</b></p>	<p>Ordering Code <b>C = Pxx</b></p>
<p>D = Normally Open - NO Electrical Closer/Maker</p>	<p>F = Normally Closed - NC Electrical Opener/Breaker</p>	<p>G = Electrical - Switch-over</p>
<p>Ordering Code <b>D = Hxx-HA-32-00-P</b></p>	<p>Ordering Code <b>F = Hxx-HS-32-00-P</b></p>	<p>Ordering Code <b>G = Hxx-GW-33-00-P</b></p>

## Maintenance Indicator functioning

Pressure indicators are used in the return line filters to ascertain the condition of the filter. These measure the pressure upstream of the filter element & operate when a preset pressure is reached.

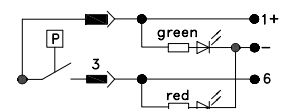
The needle of the manometer indicates the pressure. In the pop-up version a red indicator pin pops out in the housing chamber thereby indicating the state.

The Electrical Indicators are triggered when the set pressure is reached and activate by opening /closing the circuit as designed. The Optical-Electrical version (type K) has additional green & red LEDs to indicate the state.



K = Electrical Switch-over + Lamp

Ordering Code  
**K = Hxx-GS-34-00-P**



## Tightening Torque Values : Nm [ft/lbs] ±10%

Type	Inlet Port - BSP		Top Cover Torque	Mounting Holes	
	Size	Torque		Size	Torque
10 FRD 0005-0013	G 3/4"	70 [52]	Hand tighten. If required, tighten slightly with open-ended spanner.	M10	15 [11]
	G 1"	70 [52]		M10	15 [11]
10 FRD 0015-0018	G 1-1/4"	80 [59]		M10	15 [11]
	G 1-1/2"	80 [59]		M10	15 [11]

# Dimensions

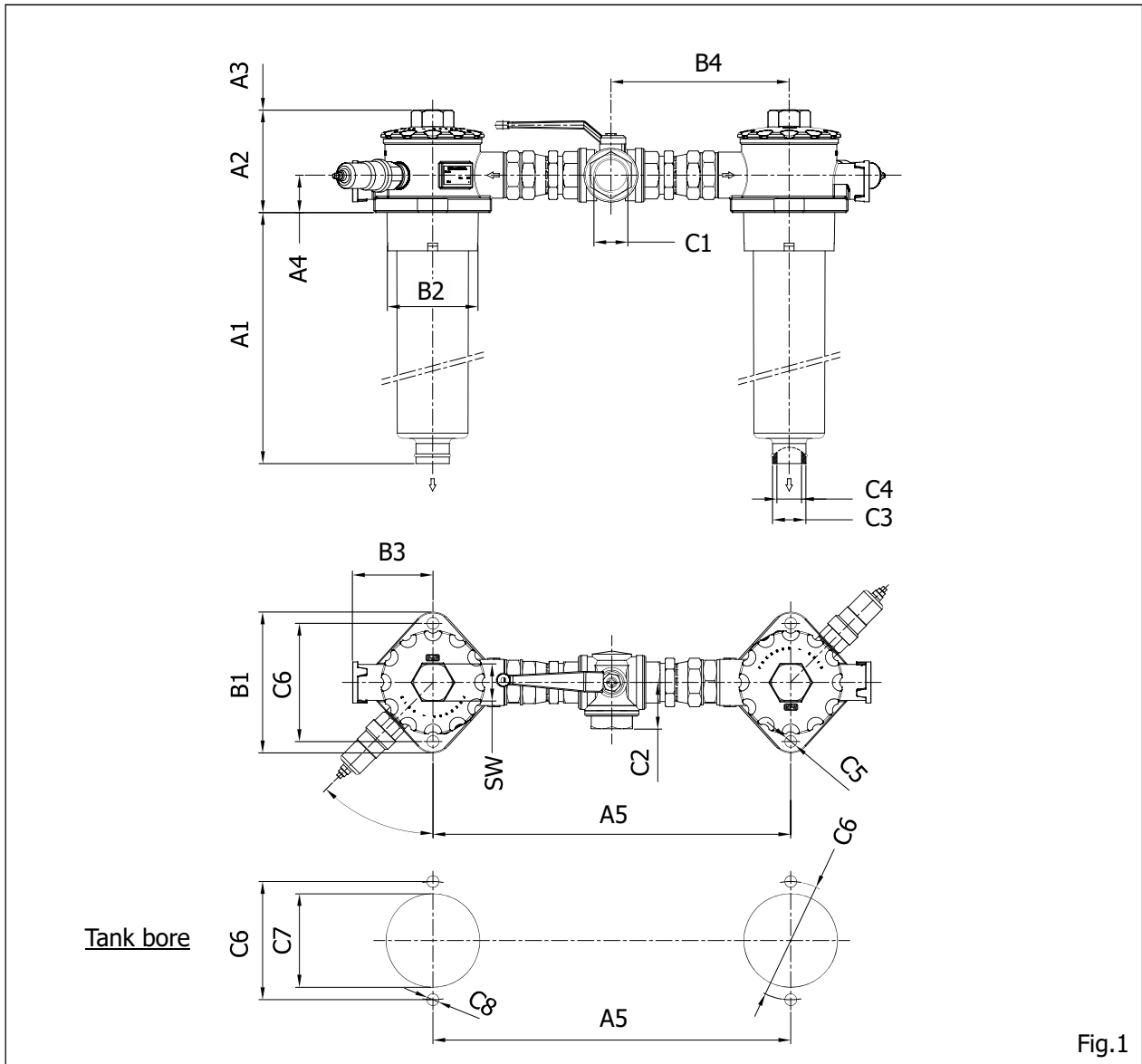


Fig.1

Type	Capacity ltr [gal]	Weight kg [lbs] <sup>1)</sup>	A1	A2	A3 <sup>2)</sup>	A4	A5	B1	B2 (tapered)	B3	B4
10 FRD 0005	2 x 0.6 [2 x 0.16]	4.6 [10.14]	93 [3.66]	98.5 [3.88]	100 [3.94]	34 [1.34]	375 [14.76]	137 [5.39]	Ø88.1 [Ø3.47]	70 [2.76]	187.5 [7.38]
10 FRD 0008	2 x 0.8 [2 x 0.21]	5.0 [11.02]	155 [6.10]		160 [6.30]						
10 FRD 0013	2 x 1.2 [2 x 0.32]	5.8 [12.79]	245 [9.65]		250 [9.84]						
10 FRD 0015	2 x 1.7 [2 x 0.45]	9.2 [20.28]	160 [6.30]	125 [4.92]	164 [6.46]	45.5 [1.79]	440 [17.32]	162 [6.38]	Ø108 [Ø4.25]	85 [3.35]	220 [6.66]
10 FRD 0018	2 x 2.2 [2 x 0.58]	10.0 [22.05]	253 [9.96]		254 [10.00]						

Type	Connections (C1 & C2)	C3	C4	C5	C6 (PCD)	C7 (Tank Bore)	C8	SW
10 FRD 0005	G05 : G3/4"-16dp (C1) with 38 [1.50] (C2) G06 : G1"-19dp (C1) with 46.5 [1.83] (C2) - popular S12 : 1-1/16-12UN 2B - SAE J1926/1 (C1) with adaptor	Ø32.5 [Ø1.28]	Ø24.1 [Ø0.95]	Ø11.5 [Ø0.45]	115 [4.53]	Ø91.2 [Ø3.59]	M10	36 [1.42]
10 FRD 0008								
10 FRD 0013								
10 FRD 0015	G07 : G1-1/4"-21dp (C1) with 54 [2.13] (C2) G08 : G1-1/2"-21dp (C1) with 63 [2.48] (C2) - popl. S20 : 1-5/8-12UN 2B - SAE J1926/1 (C1) with adaptor	Ø45 [Ø1.77]	Ø35.6 [Ø1.40]	Ø11.5 [Ø0.45]	142 [5.59]	Ø111.6 [Ø4.39]	M10	40 [1.57]
10 FRD 0018								

<sup>1)</sup> = Weight including standard filter element and maintenance indicator  
<sup>2)</sup> = Servicing height for filter element replacement

Dimensions in mm [inch]

# Spare parts list

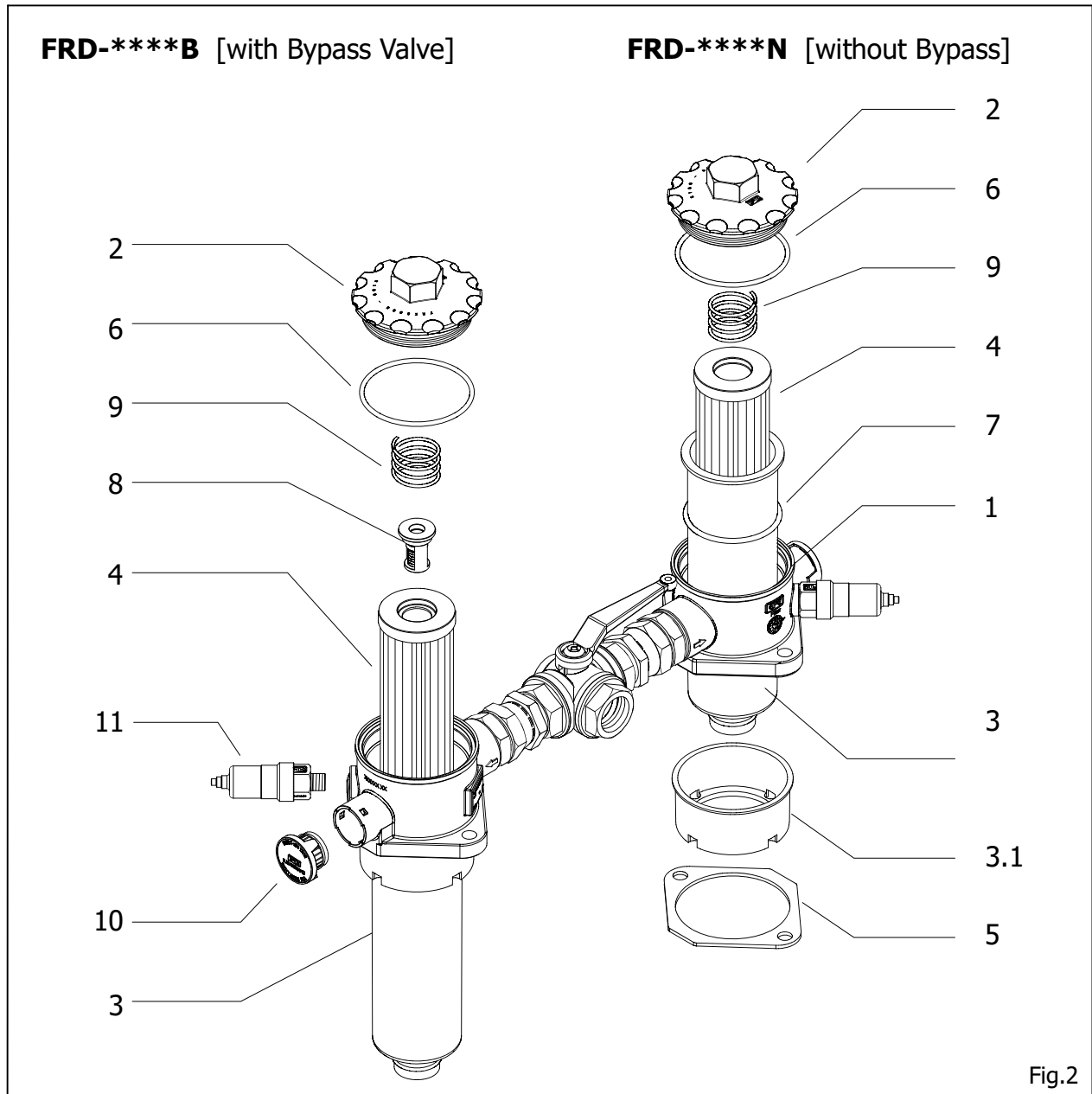


Fig.2

## Spare Parts List

		Size FRD		0005	0008	0013	0015	0018
Item #	Qty.	Description	Material					
1	2	Filter Head	Aluminium			-		
2	2	Top Cover	Plastic			-		
3	3	Filter Bowl	Plastic			-		
3.1	2	Support Cup	Plastic			-		
4	2	Filter Element	Various	As per "Ordering Code - Filter Element"				
5	2	Gasket	Buna N/Viton	Sold as kit - "Ordering Code - Seal Kit"				
6	2	Cover O-Ring	Buna N/Viton	Sold as kit - "Ordering Code - Seal Kit"				
7	2	Housing O-Ring	Buna N/Viton	Sold as kit - "Ordering Code - Seal Kit"				
8	2	Bypass Valve	Plastic	BYP-FRE-01/**			BYP-FRE-02/**	
9	2	Compression Spring	Spring Steel	CSP-FRE-01/**			CSP-FRE-02/**	
10	2	Breather Element	Various	As per "Ordering Code - Breather Element"				
11	2	Indicator	Various	As per section "Maintenance Indicator"				

xx - Cracking pressure (bar)

## Installation

Before installation, conduct a visual check to ensure that the filter has not suffered any damage during shipping / handling.

Verify that the requested type matches with what stamped on the nameplate.

Check that the pressure rating of the filter is suitable for the system in which it is being installed.

During assembly of the filter the tightening torques (refer page 4), the flow direction (inlet on top and outlet below the bowl) and the required service height (A3 in fig.1) for removing the filter element (4) and the filter bowl (3) are to be considered.

Before the assembly, the hole pattern of the tank must be compared to the tank bore dimensions in fig.1. Check that the installation opening for assembling the filter in the tank cover is not too large so that unobjectionable sealing is guaranteed.

Remove the inlet & outlet plugs. Also remove the cable ties used for holding the gasket (5), if any.

Locate the support cups (3.1) in the openings in the tank.

Make sure the optical part of the indicators are visible and/or the electricals connected appropriately. If the maintenance indicator is ignored the bypass valve, if available, will open when the pressure differential increases thereby bypassing the filter element and contaminated fluid will pass to the clean side of the filter outlet thereby compromising the filtration effectiveness.

Ensure that the gaskets (5) are correctly located and screw the filter mounting bolts to specified torques (page 4), taking care to avoid any stress on the components.

Connect the inlet piping ensuring the filter is not subjected to any abnormal forces / transmission of vibrations. Tighten the inlet connection to the specified torques.

We recommend using a suitable safety relief valve in the system to ensure the user and equipment are protected against possible damage caused by pressure surges.

The filter is designed with a three-part housing. These filters must be installed in vertical position into the tank with the filter bowls downward.

It is recommended to lead drain pipes of a length of upto 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.

**Handle of 3-way valve always points to the housing in operation.**

## Connecting electrical indicator

Connect indicator using the three wired cable.

Verify electrical ratings on the indicator (11) name plate.

Careless disposal of the filter, filter element and the residual fluid contained therein can cause environmental pollution.

Connection settings:

Normally Open 1 (black) + 2 (brown)

Normally Closed 1 (black) + 3 (blue)

Switch-Over 1 (black) + 2 (brown) + 3 (blue)

## Starting Operation

Switch on the service pump.

Monitor the static-up pressure on the servicing display of the return filter and return pipe, respectively.

If the static-up pressure before the return filter is more than 1 bar, check the volume flow of the pump and the dimensional layout of the return filter.

## Maintenance

The filter element (4) is clogged and must be renewed or cleaned when the manometer reading has reached the marked value, the visual pointer extends from the maintenance indicator at operating temperature and/or the switching process on the electrical indicator is triggered.

## Filter element service

Move handle of the 3-way valve to the opposite direction till it stops. The housing pointed by the handle is now under use while the other housing under isolation.

Unscrew the top cover (2) of the housing not in operation with the compression spring (9).

Pull out the filter bowl (3) with filter element (4) and detach filter element from the spigot.

Check and, if necessary clean the filter bowl (3).

Filter element of type H..-XL, H..-XP, H..-XE, H..-XC, AS..., P.. and VS ... is to be replaced.

Filter element with G... media is cleanable. The effectiveness of cleaning depends on the type of dirt and the level of the differential pressure at the time of changing the filter element. If the differential pressure after the filter element's cleaning process exceeds more than 50% of the pre-service value the G...filter element also needs to be replaced.

Remove the safety packing from the new filter element before installing in the filter.

Replace filter element by slightly turning it back on its locator. Check Housing O-Ring (7) and Cover O-Ring (6), replace in case of damage or wear. For filters with bypass insert the bypass valve (8) into the element (4). Screw the top cover (2) and tighten to the specified torque (page 4).

Operate filter as described above.

## Pressure Directives

Return Line Filters for hydraulic application are pressure holding equipment according to Article 2 Section 5 of the Pressure Equipment Directive 2014/68/EU. However, on the basis of the exception in Article 1, Section 2(f) of the PED the pressure line filters are exempt from the PED if they are not classified higher than category I (Guideline A-19) & do not receive any CE mark.

## Disposal / Environmental Protection

Careless disposal of the filter, filter element and the residual fluid contained therein can cause environmental pollution.

Dispose the filter / filter element in accordance with provisions applicable in the country of use.

Fluid residues are to be disposed according to the respective safety data sheets valid for the specific hydraulic fluids.

# Performance Curves (Flow rate Vs Pressure Drop) - for complete filters

Oil Viscosity : 30 mm<sup>2</sup>/s [143 SUS]  
 Specific gravity < 0.9 kg/dm<sup>3</sup>  
 Recommended initial Pressure Drop ( $\Delta P$ ) for assembly = 0.8 bar [11.6 psid]

