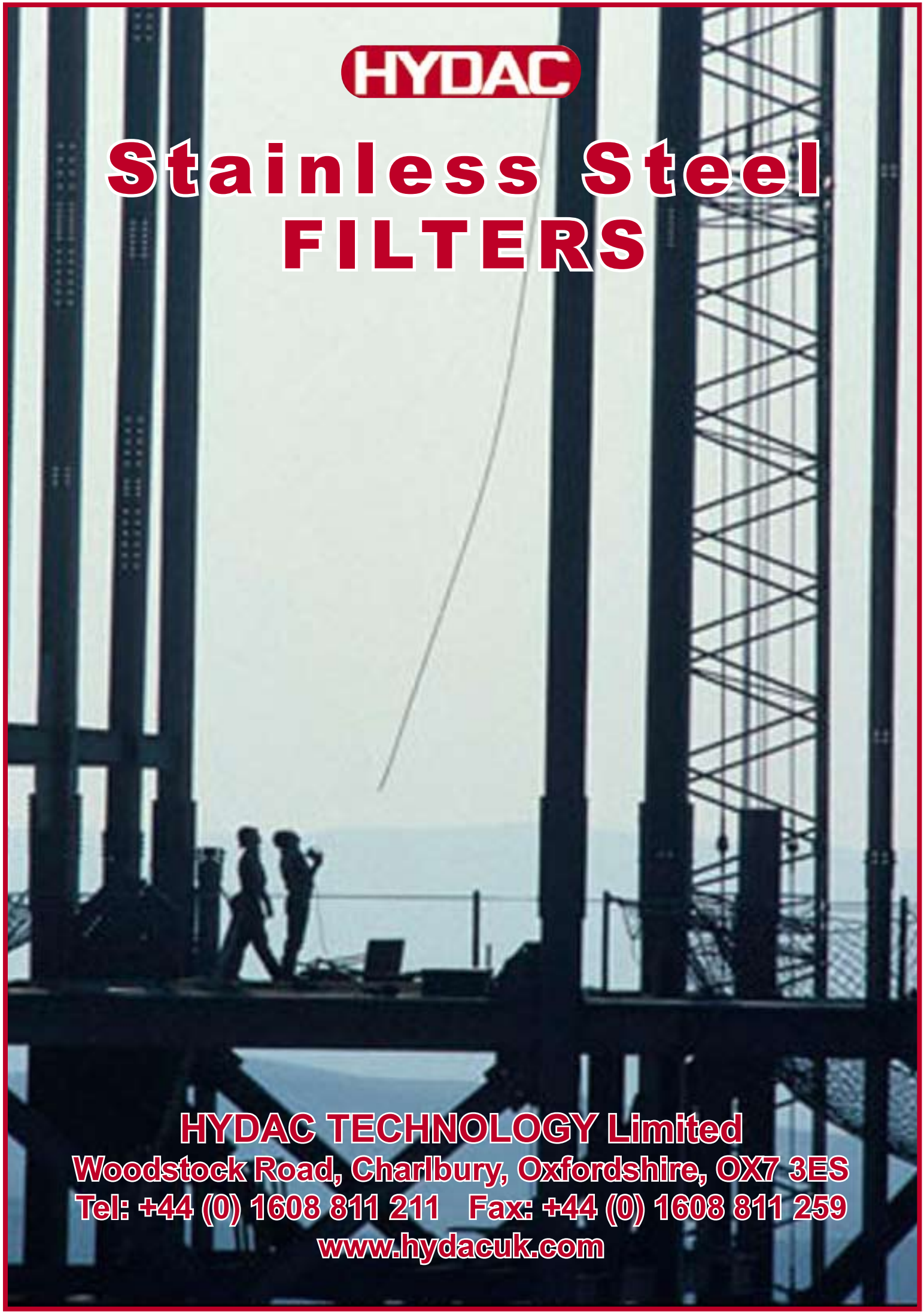

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Brochure HPI 070/1.48/06-2006

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Brochure HPI 070/3.48/06-2006 Section I

I. Stainless Steel Pressure Filters

Working pressure up to 1000 bar

- HYDAC Stainless Steel High Pressure Filter types MPSSF 450, HPSSF 700 and ACSSF 1000 are designed for filtering contaminants from offshore hydraulics, chemical and industrial process engineering systems.

- Port connections are available in BSP, NPT and Autoclave thread forms.
  Sub-plate mounted versions are also available.
  Special versions such as ANSI/DIN flange and Gray-lock available on request.

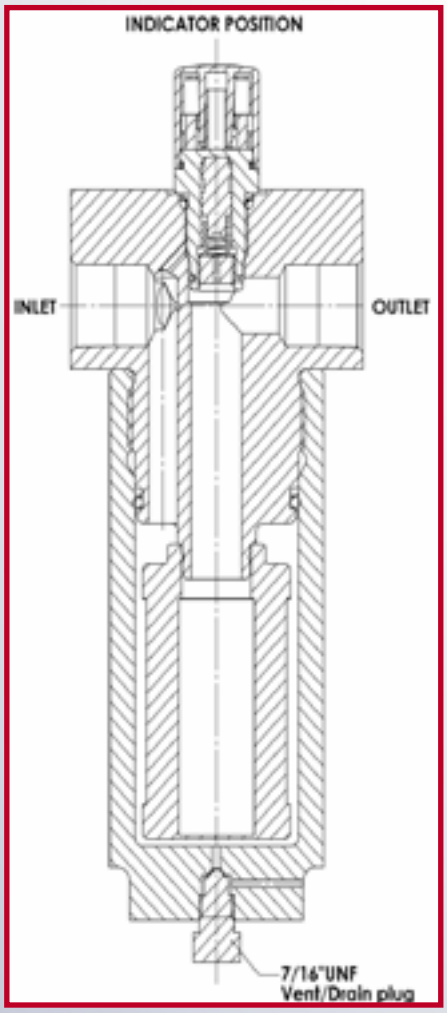
- Filters are available with and without indicators (single, dual, electrical & visual feedback) plus single bypass, reverse and triple bypass options.

1. DESCRIPTION

1.1. FILTER HOUSING

1.1.1. Basic design

The pressure filters consist of two main sections: the filter head and the screw-on filter bowl.
The standard model is available with and without a bypass valve and all units have a pressure vent plug.
The connection for a clogging indicator is available for the complete range.



1.1.2. Materials

Filter head: 316 S11 S/S
Filter bowl: UNS 318.03 DUPLEX

1.1.3. Seals

FPM (Viton 75˚) (Standard)
NBR (Perbunan 70˚)

1.1.4. Special models

For other seals, please contact our technical sales department. For flange connections and other thread forms, please contact our technical sales department.

1.1.5. Accessories

Visual clogging indicator
Electrical clogging indicator

The clogging indicators must be tightened to the recommended torque:

70Nm + 10Nm VDUK 450 bar
100Nm + 10Nm VDHP 700 bar
120Nm + 10Nm VDAC 1000 bar
(See indicator section)

1.2. FILTER ELEMENTS

BN3HC elem.] see Filter Element
BH3HC elem.] brochure no 7.200

D elem.] see point 2.3 of
M elem.] this section

1.2.1. Cleaning of elements Please note:

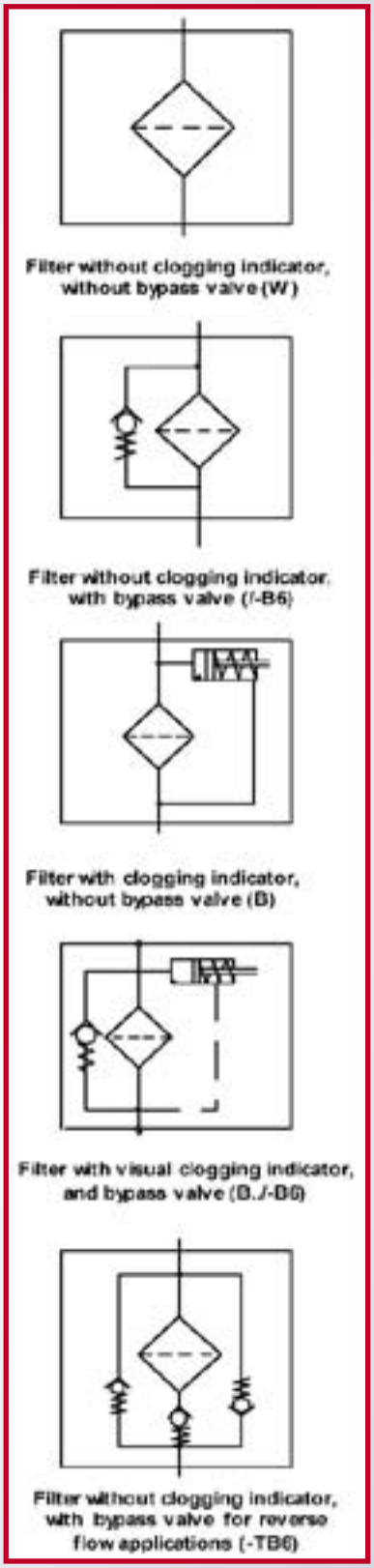
The following elements can be cleaned
wire mesh - (WHC)
metal fibre - (D)

The following filter elements cannot be cleaned
Betamicron® - (BN3HC, BH3HC)
Chemicron® - (M)

2. TECHNICAL SPECIFICATIONS

2.1. GENERAL

2.1.1 Designation and hydraulic symbol



2.1.2 Type of construction
Inline filter

2.1.3 Mounting method
4 mounting holes in filter head

2.1.4 Mounting position
Vertical

2.1.5 Flow direction (inline)
Inlet: side connection
Outlet: side connection

2.1.6 Flow direction (manifold mounting)
Inlet and outlet connections in top face.

2.2. HYDRAULIC DATA

2.2.1 Operating pressure
Pressures stated below are working pressures. All units are proof tested to 1.5 times their working pressure (TP = 1.5 x WP)

MPSSF:	450 bar max.
HPSSF:	700 bar max.
ACSSF:	1000 bar max.

2.2.2 Permissible Δp across element

Betamicron®-H (BH3HC)	210 bar
Betamicron®-N (BN3HC)	25 bar
Metal fibre (M)	210 bar
Wire mesh (DH)	210 bar

2.2.3 Temperature range
-20°C to +100°C using Viton seals (FPM)
-30°C to +100°C using Nitrile seals (NBR)
-40°C to +100°C using Nitrile low temp (NLT)
-30°C to +100°C using EPDM seals

Please note max temp may be increased in units without indicator, or if indicator is piped separately from the filter. (Up to 125°C)

2.2.4 Compatibility with hydraulic media
Mineral oils:
test criteria to ISO 2943
Lubricating oils:
test criteria to ISO 2943

For use with water, non-flam fluids, synthetic oils and rapidly biodegradable oils etc., please contact our Technical Sales department.

2.2.5 Flow fatigue limit to ISO 3724
High fatigue limit resistance due to solid filter material supports and high inherent stability of filter materials.

2.2.6 Pressure setting of clogging indicator
pa = 2 or 5 bar - 10%

2.2.7 Cracking pressure of bypass valve
po = 3 or 6 bar + 10%

Others on request!

2.3. MODEL CODE FOR PROCESS STAINLESS STEEL SPARE ELEMENT (also order example)

060 - DH - 100 - D - V

Size
015 / 030
060 / 110
160 / 240 / 280
other sizes on request

Type of element
DH

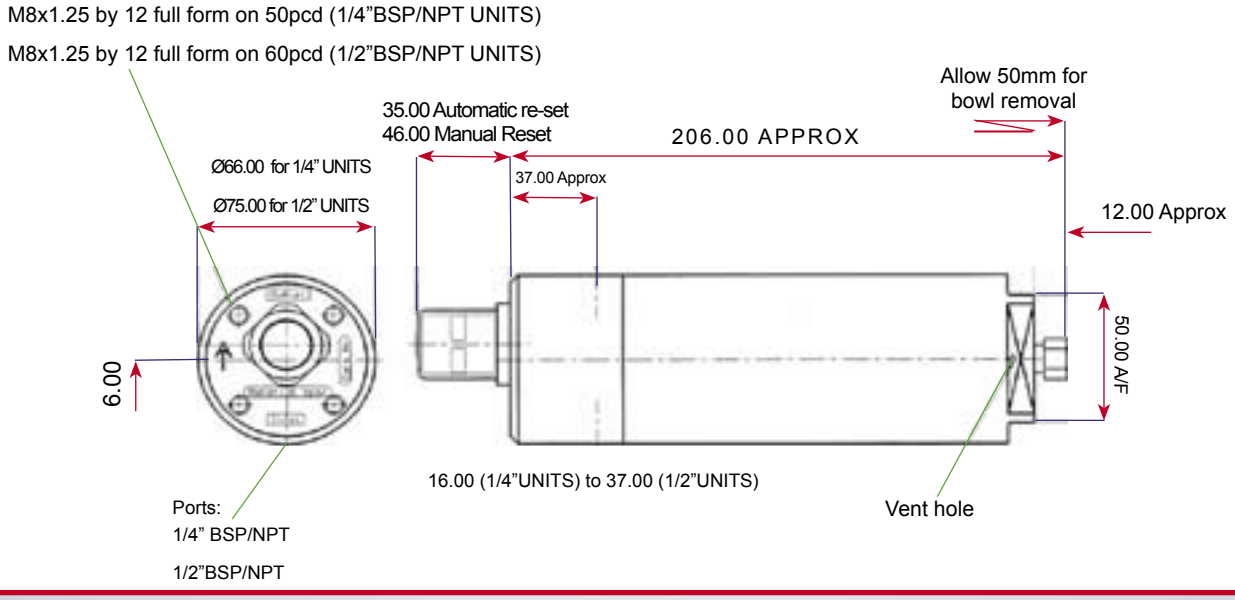
Filtration rating in µ
1, 3, 5, 10, 20 (Chemicron®)
25, 40, 60, 100, 150, 200, 250 (wire mesh)

Filter material of element
M = Chemicron® (1 - 20 µ absolute)
D = Wire mesh (25 - 250 µ nominal)

Seals
V = FPM (Viton) (Standard)
N = NBR (Perbunan)

3. DIMENSIONS

3.1 DRAWING OF INLINE FILTER MPSSF 450, HPSSF 700, SIZE 30



NOTE: Approximate dimensions ONLY shown above!
For a specific installation drawing of a particular model, please contact our sales dept.

4. MPSSF 450 Filter

4.1. MODEL CODE

MPSSF450 BH/HC 60 N2 005 B X / -V

Filter type

MPSSF 450	Pressures up to 450 BAR or 6,500 PSI

Filter element material

BH/HC	Betamicron®-H3HC element	]	absolute *(see brochure no 7.200)*
BN/HC	Betamicron®-N3HC element	]	filtration
M	Metal fibre Chemicron® S/S element	]	
WHC	Wire mesh element	]	nominal filtration
D	Wire mesh S/S element	]	

Size

30	Up to 15 l/min max	]	The flows stated are nominal flow
60	Up to 30 l/min max	]	rates, for detailed performance graphs
110	Up to 55 l/min max	]	of the housings see point 7 on p.14
160	Up to 80 l/min max	]	
240	Up to 120 l/min max	]	NOTE: Element Δp to be added
280	Up to 130 l/min max	]	to housing Δp.

The values listed above are based on ISO VG30 mineral oil @ 40˚C and are dependent on the temperature, and the media/micron rating of the element. For sizing please contact our sales department

Type of connection

AVAILABLE IN SIZE	PORT	CODE
30	¼" BSP	BO
30	1/4" NPT	NO
30, 60, 110, 160, 240, 280	½" BSP	B2
30, 60, 110, 160, 240, 280	1/2" NPT	N2
60, 110, 160, 240, 280	3/4" BSP	B3
60, 110, 160, 240, 280	3/4" NPT	N3
160, 240, 280	1" BSP	B4
160, 240, 280	1" NPT	N4

NOTE: Special threaded connections not listed are available, please contact our sales dept for further information.

Filtration rating in µm

3, 5, 10, 20	Betamicron®-H (BH3HC)	]	
	Betamicron®-N (BN3HC)	]	absolute filtration
	Betamicron®-SS - SO361 (Suitable for water glycol)	]	
1, 3, 5, 10, 20	Metal fibre Chemicron® S/S (M)	]	
25, 40, 50, 60, 100, 150, 200, 250	Wire mesh S/S (W/HC) (DH)	]	nominal filtration

Type of clogging indicator

A	-	without clogging indicator (plugged cavity)
W	-	no indicator port/cavity
B	-	with visual clogging indicator (automatic re-set)
BM	-	with visual clogging indicator (manual re-set)
C	-	with electrical clogging indicator
D	-	with visual/electrical clogging indicators
E	-	1/4"NPT gauge ports for external piping of differential indicators (Not available for size 30 units)

(See separate brochure no 7.050)

Modification number

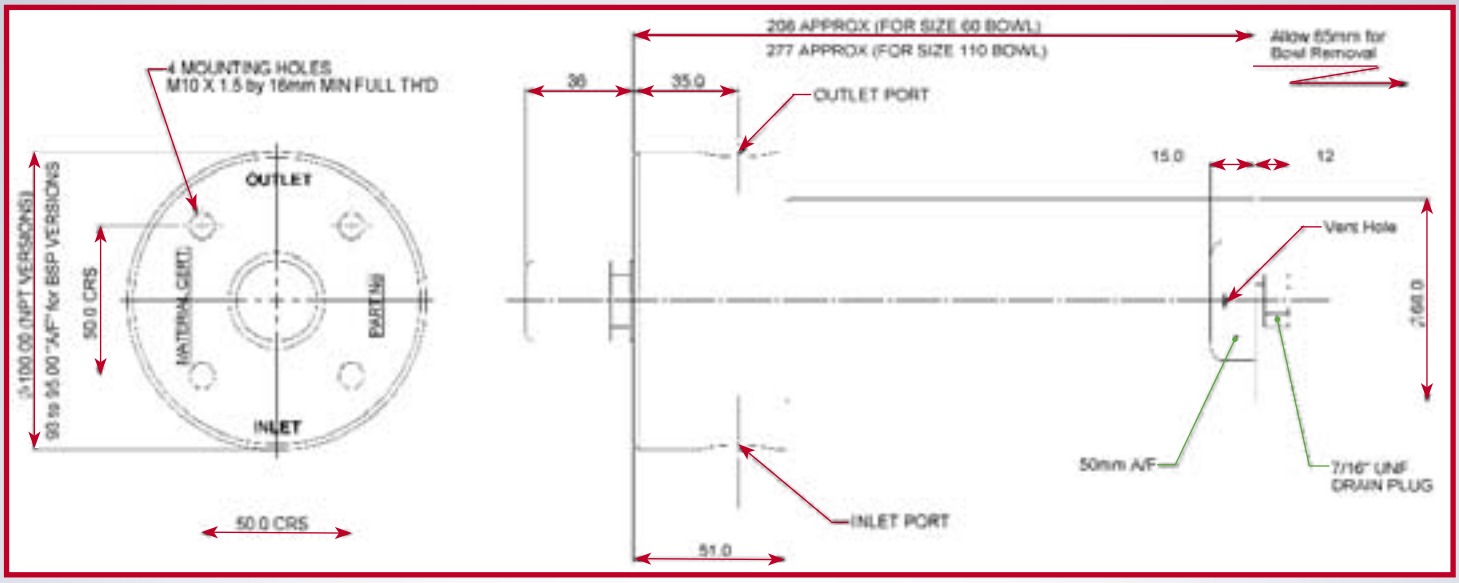
X	-	the latest version is always supplied

Supplementary details

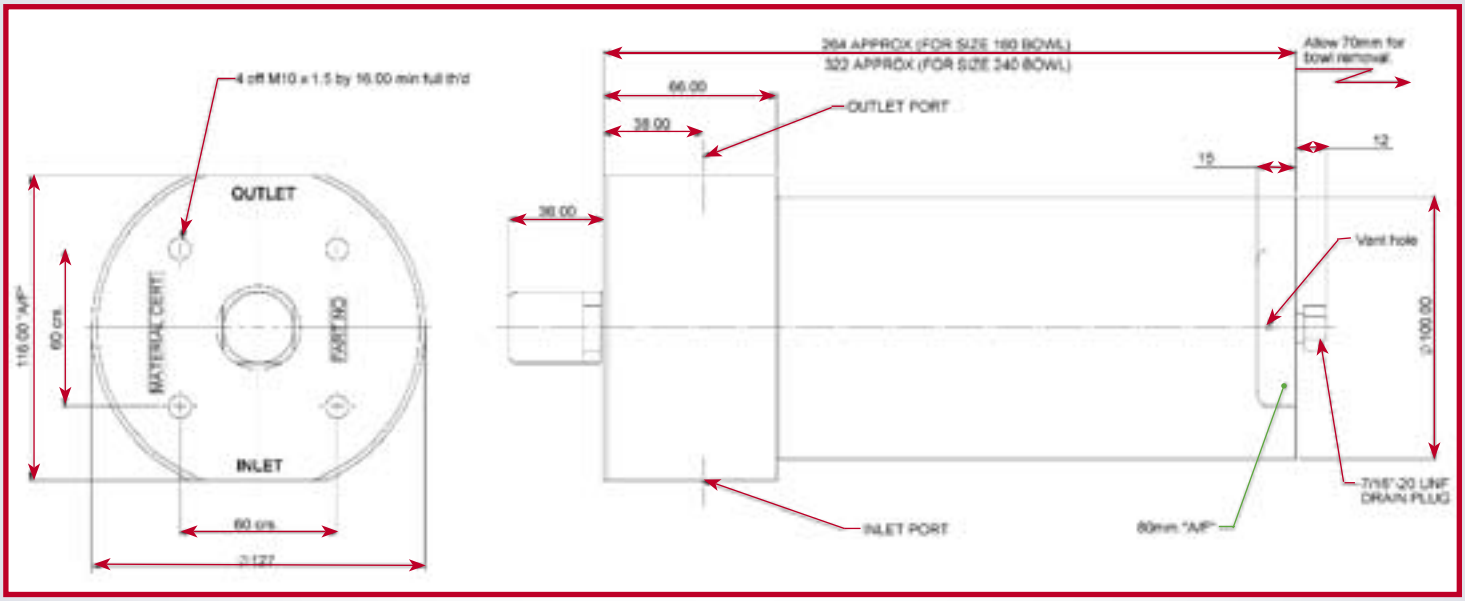
V	-	FPM (Viton) seals (standard)
N	-	NBR (Nitrile) seals
W	-	stainless steel HC elements (water glycol fluids)
B6	-	with bypass valve set to 6 bar (Standard)
B3	-	with bypass valve set to 3 bar
TB6	-	with triple bypass valve (Not available for size 30 units)
RC	-	with reverse flow check (Not available for size 30 units)
EX	-	Eexd 11C T6 explosion proof electrical indicator with flying lead (3 metre standard)
EX/ENC	-	Eexd 11C T6 explosion proof electrical indicator (c/w IP66 Terminal Box with M20x1.5 cable entry)
IS	-	Intrinsically safe electrical indicator with flying lead (3 metre standard) (Simple apparatus)
IS/ENC	-	Intrinsically safe electrical indicator with IP66 junction box (M20x1.5 cable entry)
IS2GBC	-	Intrinsically safe electrical indicator with gold connections (Hirschmann type plug to DIN 43650)

4.2 INSTALLATION DRAWINGS

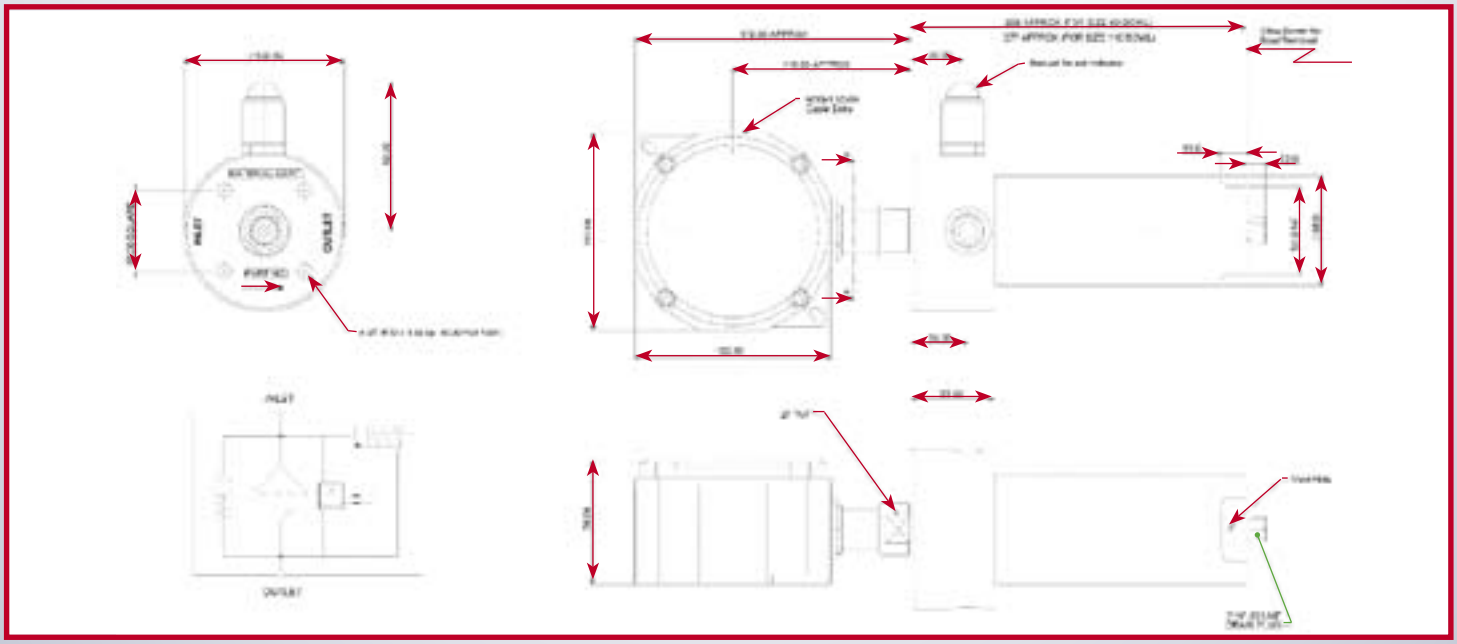
4.2.1 Typical assembly of MPSSF inline filter size 60 to 110 (For size 30 see p.5)



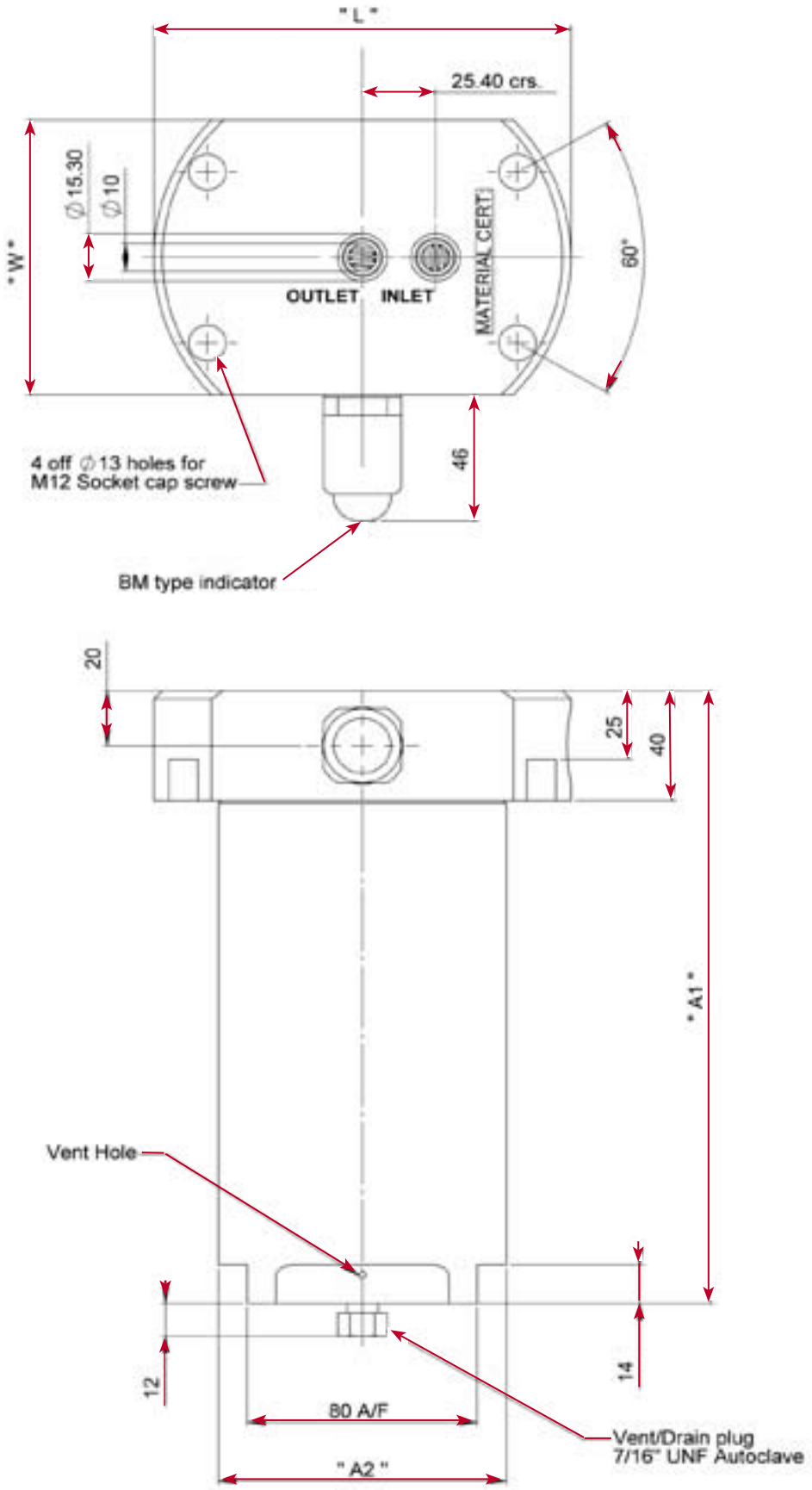
4.2.2 Typical general assembly of MPSSF inline filter size 160-240



4.2.3 Typical general assembly of MPSSF inline filter size 60 - 110 with bypass & dual indicator (for visual & electrical clogging indication) 'EX' & 'IS' options available.



4.2.4 Typical general assembly of manifold mounted MPSSF … P / HPSSF … P / ACSSF … P



Type	A1	A2	W	L	pcd	Approx.weight in kg
MPSSF 60P	201	70	88	100	76.2	7.50
HPSSF 160P	204	100	100	145	124.5	13.35
ACSSF 240P	261	100	100	145	124.5	14.00

5. HPSSF FILTERS

5.1. HPSSF 600 MODEL CODE

HPSSF600 BH/HC 60 B2 005 B X /-V

Filter type

HPSSF 600	Pressures up to 600 bar or 8,700 PSI (limited by BSP ports)

Filter element material

BH/HC	Betamicron®-H3HC element	]	absolute filtration
BN/HC	Betamicron®-N3HC element	]	*(see brochure 7.200)*
M	Metal fibre Chemicron® S/S element	]	
WHC	Wire mesh element	]	nominal filtration
D	Wire mesh S/S element	]	

Size

30	Up to 15 l/min max	]	The flows stated are nominal flow rates,
60	Up to 25 l/min max	]	for detailed performance graphs
110	Up to 55 l/min max	]	of the housings see point 7 on p 14
160	Up to 80 l/min max	]	
240	Up to 120 l/min max	]	NOTE: Element Δp to be added
280	Up to 130 l/min max	]	to housing Δp

The values listed above are based on ISO VG30 mineral oil @ 40°C and are dependent on the temperature and the media/micron rating of the element. For sizing please contact our sales department

Type of connection

AVAILABLE IN SIZE	PORT	CODE
30	¼" BSP	BO
30, 60, 110, 160, 240, 280	½" BSP	B2
60, 110, 160, 240, 280	3/4" BSP	B3
160, 240, 280	1" BSP	B4

Filtration rating in µm

3, 5, 10, 20	Betamicron®-H (BH3HC)	]	
	Betamicron®-N (BN3HC)	]	absolute filtration
	Betamicron®-SS - SO361 (Suitable for water glycol)	]	
1, 3, 5, 10, 20	Metal fibre Chemicron® S/S (M)	]	
25, 40, 60, 100, 150, 200, 250	Wire mesh S/S (WHC) (DH)	]	nominal filtration

Type of clogging indicator

A	-	without clogging indicator (plugged cavity)
W	-	without indicator port/cavity
B	-	with visual clogging indicator (automatic re-set) *(See separate brochure 7.050)*
BM	-	with visual clogging indicator (manual re-set)
C	-	with electrical clogging indicator
D	-	with visual/electrical clogging indicators
E	-	1/4"NPT gauge ports for external piping of differential indicators (not available for size 30 units)

Modification number

X	-	the latest version is always supplied

Supplementary details

V	-	FPM (Viton) seals (standard)
N	-	NBR (Nitrile) seals
W	-	stainless steel HC elements
B6	-	with bypass valve set to 6 bar (Standard)
B3	-	with bypass valve set to 3 bar
TB6	-	with triple bypass valve (Not available for size 30 units)
RC	-	with reverse flow check (Not available for size 30 units)
EX	-	Eexd 11C T6 explosion proof electrical indicator with flying lead (3 metre standard)
EX/ENC	-	Eexd 11C T6 explosion proof electrical indicator (c/w IP66 Terminal Box, M20x1.5 cable entry)
IS	-	Intrinsically safe electrical indicator with flying lead (3 metre standard) (Simple apparatus)
IS/ENC	-	Intrinsically safe electrical indicator with IP66 junction box, (M20x1.5 cable entry)
IS2GBC	-	Intrinsically safe electrical indicator with gold connections, (Hirschmann type plug to DIN 43650)

5.2. HPSSF 700

5.2.1 Model code

HPSSF700 BH/HC 60 N2 005 B X /-V

Filter type

HPSSF 700	Pressures up to 700 BAR or 10,150 PSI

Filter element material

BH/HC	Betamicron®-H3HC element	]	absolute filtration
BN/HC	Betamicron®-N3HC element	]	*(see brochure 7.200)*
M	Metal fibre Chemicron® S/S element	]	
WHC	Wire mesh element	]	nominal filtration
D	Wire mesh S/S element	]	

Size

30	Up to 15 l/min max	]	The flows stated are nominal flow rates,
60	Up to 25 l/min max	]	for detailed performance graphs of
110	Up to 55 l/min max	]	the housings see point 7 on p14
160	Up to 80 l/min max	]	
240	Up to 120 l/min max	]	NOTE: Element Δp to be added
280	Up to 130 l/min max	]	to housing Δp.

The values listed above are based on ISO VG30 mineral oil @ 40°C and are dependent on the temperature and the media/micron rating of the element. For sizing please contact our sales department

Type of connection

AVAILABLE IN SIZE	PORT	CONNECTION TYPE	CODE
30	¼" NPT		NO
30, 60, 110, 160, 240, 280	1/2"NPT		N2
60, 110, 160, 240, 280	3/4"NPT		N3
160, 240, 280	1" NPT		N4
30	7/16"-20	SF250CX20	AA
30, 60, 110	9/16"-18	SF375CX20	A0
60, 110, 160, 240, 280	13/16"-16	SF562CX20	A1
60, 110, 160, 240, 280	3/4"-14	SF750CX20	A2
160, 240, 280	1-3/8"-12	SF1000CX20	A3

Filtration rating in µm

3, 5, 10, 20	Betamicron®-H (BH3HC)	]	
	Betamicron®-N (BN3HC)	]	absolute filtration
	Betamicron®-SS - SO361 (Suitable for water glycol)	]	
1, 3, 5, 10, 20	Metal fibre Chemicron® S/S (M)	]	
25, 40, 50, 60, 100, 150, 200, 250	Wire mesh S/S (WHC) (DH)	]	nominal filtration

Type of clogging indicator

A	-	without clogging indicator
W	-	without indicator port/cavity
B	-	with visual clogging indicator (automatic re-set) *(see separate brochure 7.050)*
BM	-	with visual clogging indicator (manual re-set) .
C	-	with electrical clogging indicator
D	-	with visual/electrical clogging indicators (not available for size 30 units)
E	-	1/4"NPT gauge ports for external piping of differential indicators (not available for size 30 units)

Modification number

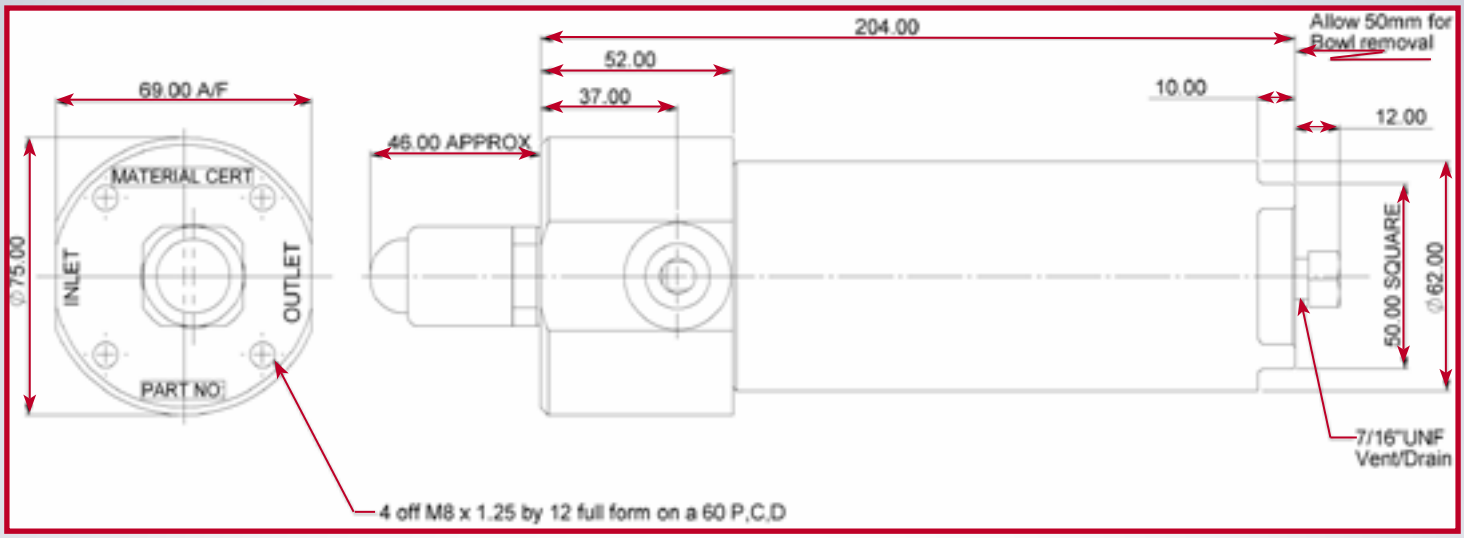
X	-	the latest version is always supplied

Supplementary details

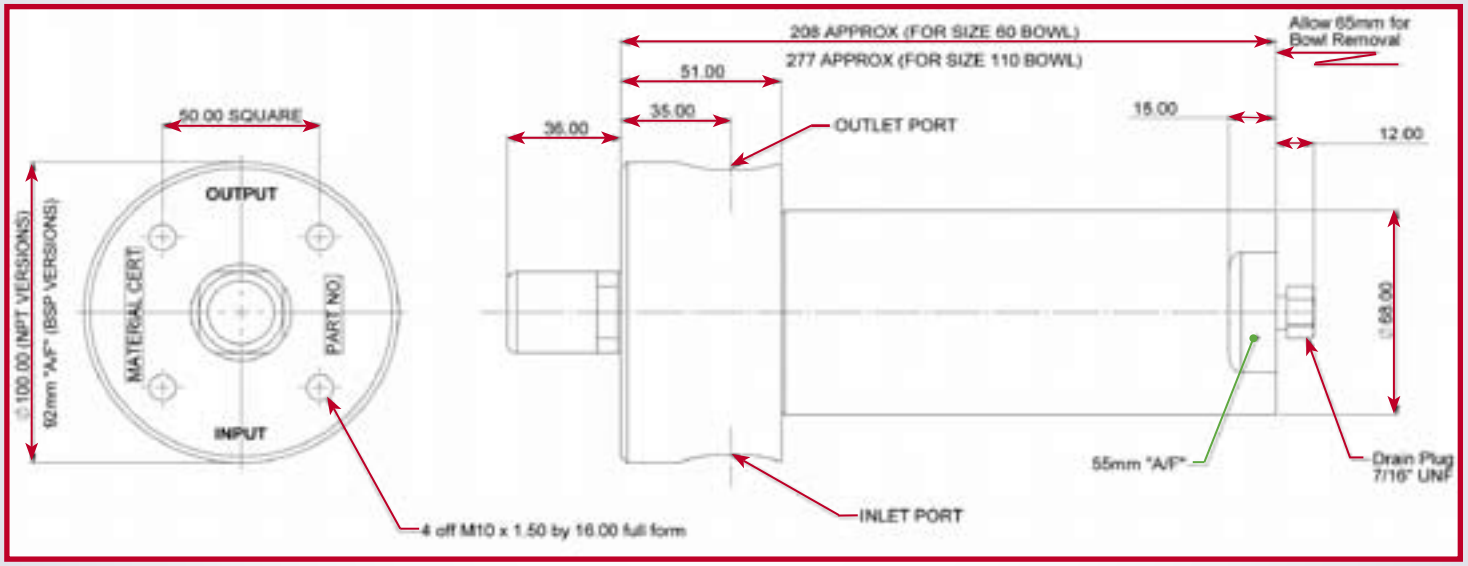
V	-	FPM (Viton) seals (standard)
N	-	NBR (Nitrile) seals
EPDM	-	EPDM (Ethylene-propylene-diene monomer)
W	-	stainless steel HC elements
B6	-	with bypass valve set to 6 bar (Standard)
B3	-	with bypass valve set to 3 bar
TB6	-	with triple bypass valve (not available for size 30 units)
RC	-	with reverse flow check (not available for size 30 units)
EX	-	Eexd 11C T6 explosion proof electrical indicator with flying lead (3 metre standard)
EX/ENC	-	Eexd 11C T6 explosion proof electrical indicator (c/w IP66 Terminal Box with M20x1.5 cable entry)
IS	-	Intrinsically safe electrical indicator with flying lead (3 metre standard) (Simple apparatus)
IS/ENC	-	Intrinsically safe electrical indicator with IP66 junction box, (M20x1.5 cable entry)

5.3. INSTALLATION DRAWINGS

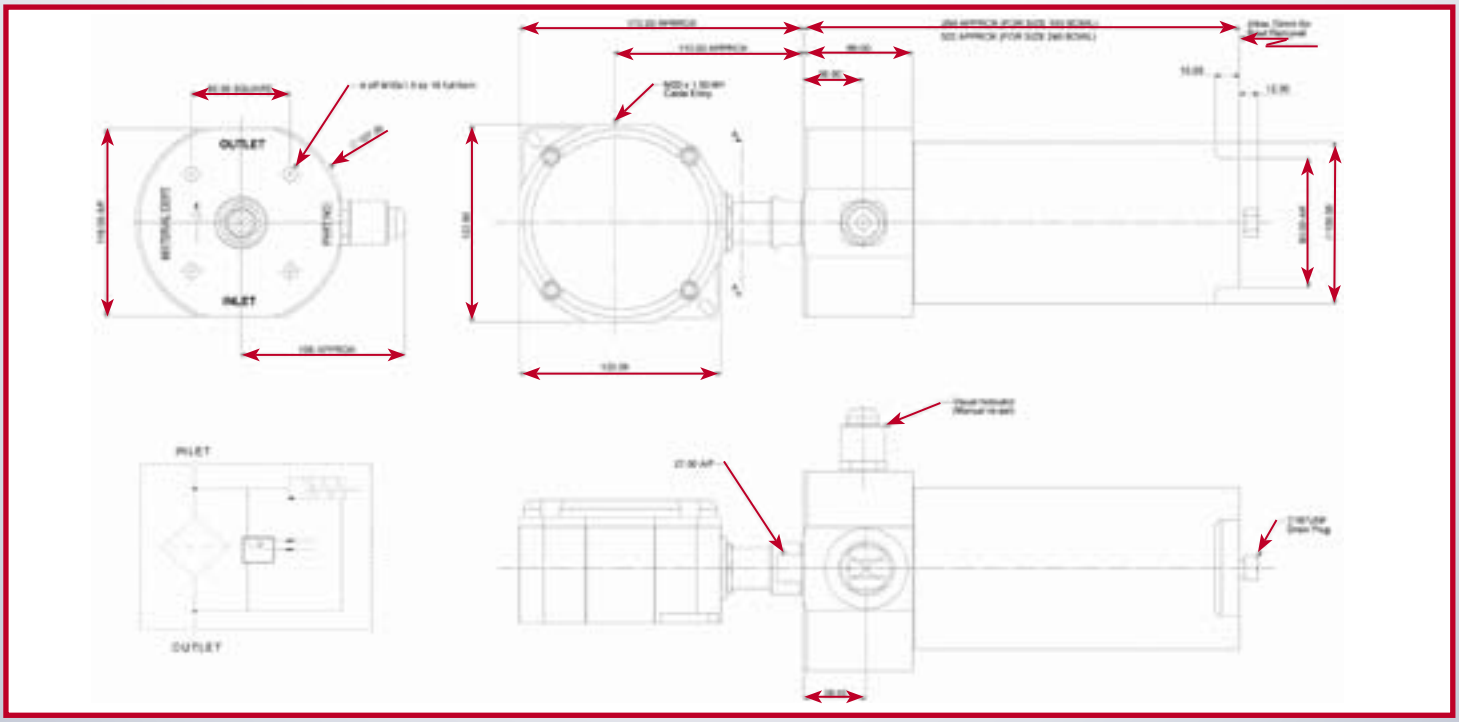
5.3.1 Typical general assembly of HPSSF 600 inline filter size 30 (For HPSSF 700 size 30 see p 5 point 3.1) (Shown with manual reset indicator)



5.3.2 Typical general assembly of HPSSF 600/700 inline filter size 60 - 110 (Shown with automatic re-set indicator)



5.3.3 Typical general assembly of HPSSF 600/700 inline filter size 160 - 240 with dual indicator (for visual & electrical clogging indication) 'EX' & 'IS' options available.



6. ACSSF 1000 FILTER

6.1. ACSSF 1000 MODEL CODE

ACSSF1000 BH/HC 60 A0 005 B.X /-V

Filter type

ACSSF 1000	Pressure up to 1000 BAR or 14,500 PSI

Filter element material

BH/HC	Betamicron®-H3HC element	]	absolute filtration
BN/HC	Betamicron®-N3HC element	]	*(see brochure 7.200)*
M	Metal fibre Chemicron® S/S element	]	
WHC	Wire mesh element	]	nominal filtration
D	Wire mesh S/S element	]	

Size

30	Up to 15 l/min max	]	The flows stated are nominal flow rates,
60	Up to 25 l/min max	]	for detailed performance graphs
110	Up to 55 l/min max	]	of the housings see point 7 on p 14
160	Up to 100 l/min max	]	
240	Up to 140 l/min max	]	NOTE: Element Δp to be added
280	Up to 140 l/min max	]	to housing Δp.

The values listed above are based on ISO VG30 mineral oil @ 40°C and are dependent on the temperature and the media/micron rating of the element. For sizing please contact our sales department

Type of connection

AVAILABLE IN SIZE	PORT	CONNECTION TYPE	CODE
30, 60, 110	9/16”-18	SF375CX20	A0
60, 110, 160, 240, 280	13/16”-16	SF562CX20	A1
160, 240, 280	3/4”-14	SF750CX20	A2
160, 240, 280	1-3/8”-12	SF1000CX20	A3

Filtration rating in µm

3, 5, 10, 20	Betamicron®-H (BH3HC)	]	
	Betamicron®-N (BN3HC)	]	absolute filtration
	Betamicron®-SS - SO361 (Suitable for water glycol)	]	
1, 3, 5, 10, 20	Metal fibre Chemicron® S/S (M)	]	
25, 40, 50, 60, 100, 150, 200, 250	Wire mesh S/S (WHC) (DH)	]	nominal filtration

Type of clogging indicator

A	-	without clogging indicator (plugged cavity)
W	-	no indicator port/cavity
B	-	with visual clogging indicator (automatic re-set) *(see separate brochure no 7.050)*
BM	-	with visual clogging indicator (manual re-set)
C	-	with electrical clogging indicator
E	-	9/16”UNF Autoclave ports for external piping of differential indicators (not available for size 30 units)

Modification number

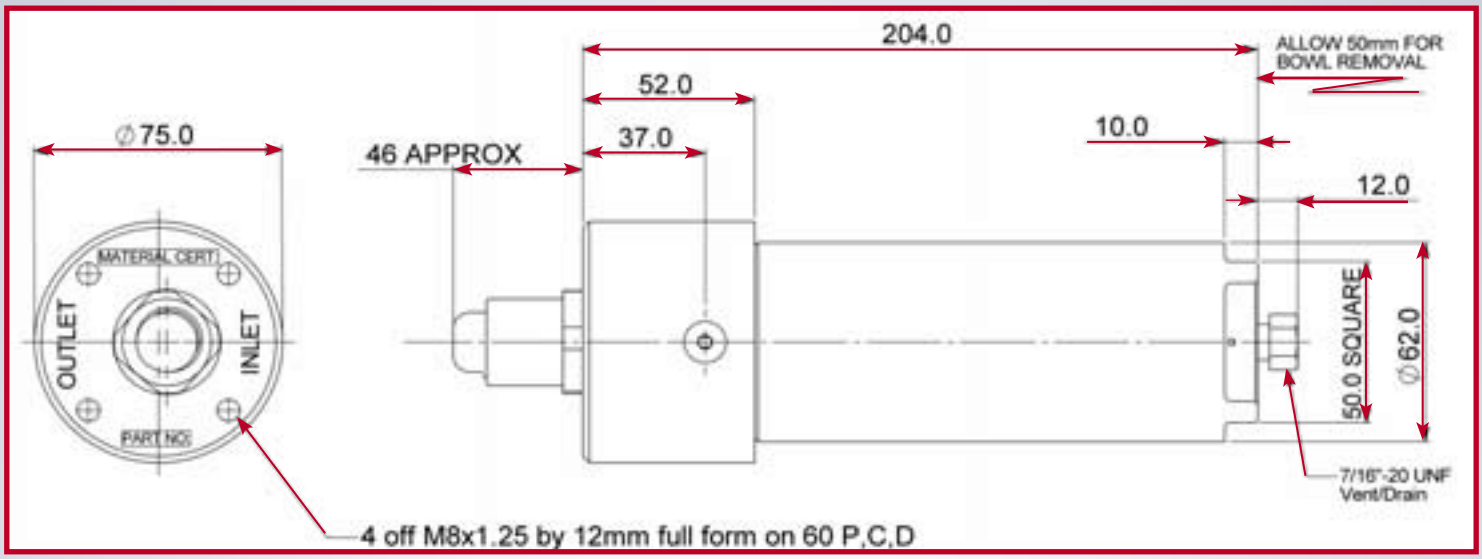
X	-	The latest version is always supplied

Supplementary details

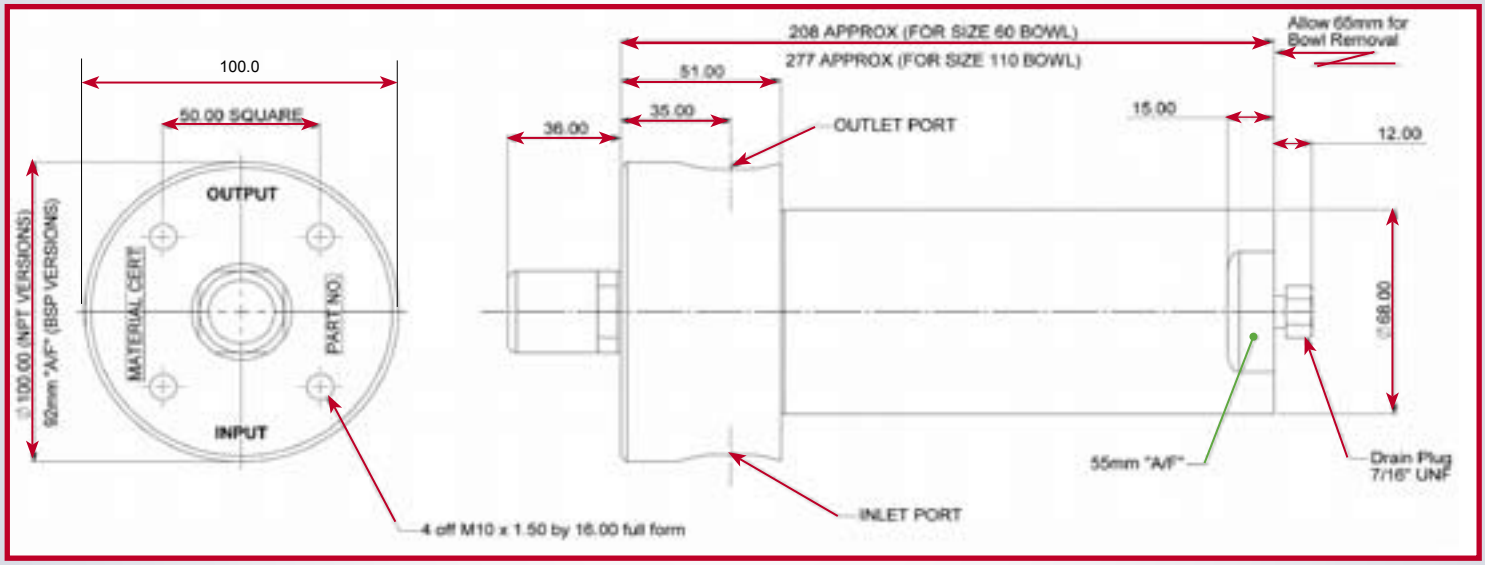
V	-	FPM (Viton) seals (standard)
N	-	NBR (Nitrile) seals
W	-	stainless steel HC elements
B6	-	with bypass valve set to 6 bar
B3	-	with bypass valve set to 3 bar (not available for size 30 units)
EX	-	Eexd IIC T6 explosion proof electrical indicator with flying lead (3 metres standard)
EX/ENC	-	Eexd IIC T6 explosion proof electrical indicator (c/w IP66 Terminal Box, M20x1.5 cable entry)
IS	-	Intrinsically safe electrical indicator with flying lead (3 metres standard) (simple apparatus)
IS/ENC	-	Intrinsically safe electrical indicator (c/w IP66 Terminal box, M20x1.5 cable entry)

6.2 INSTALLATION DRAWINGS

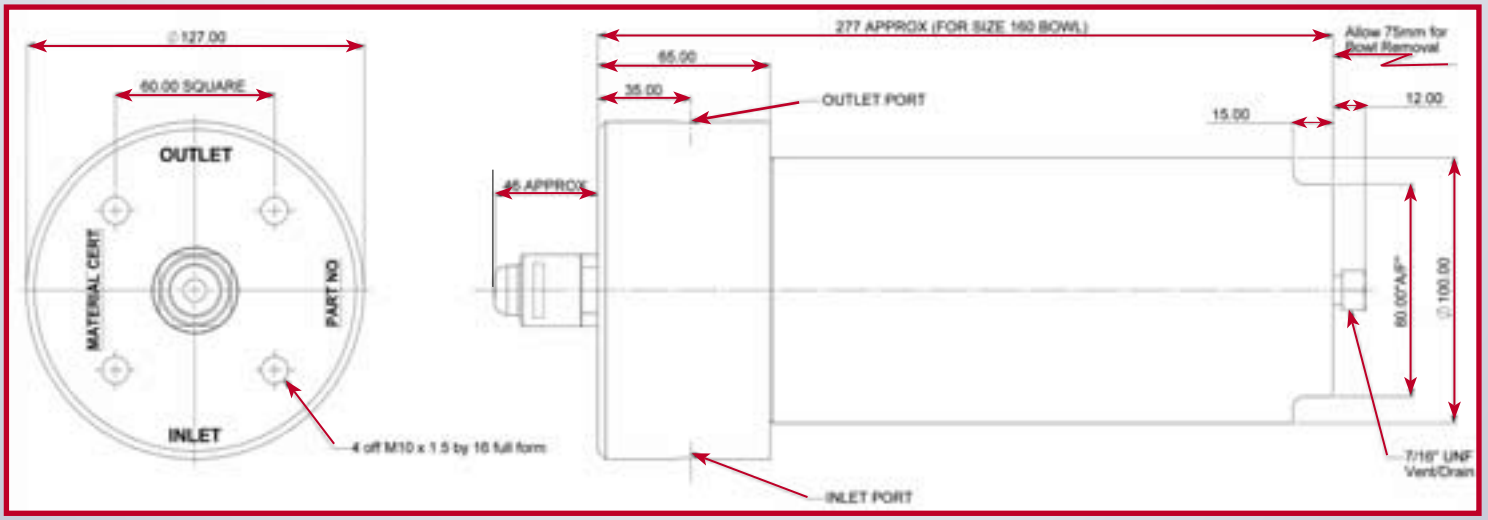
6.2.1 Typical general assembly of ACSSF 1000 inline filter size 30 (Shown with manual reset indicator)



6.2.2. Typical general assembly of ACSSF 1000 inline filter size 60/110 (Shown with manual reset indicator)

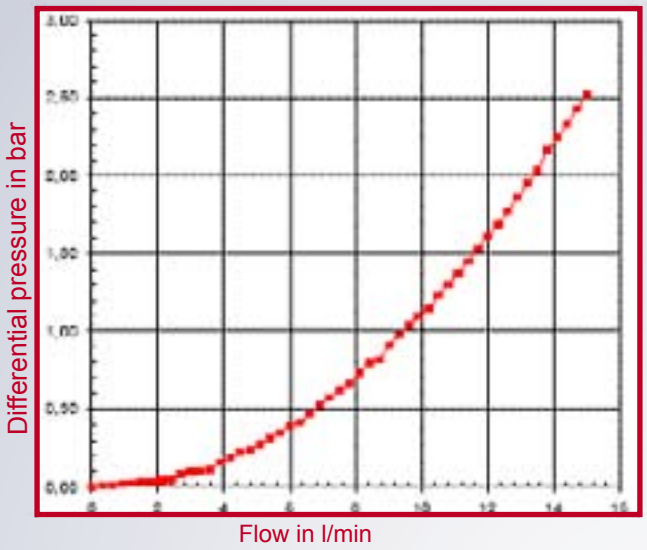


6.2.3. Typical general assembly of ACSSF 1000 inline filter size 160 (Shown with manual reset indicator)

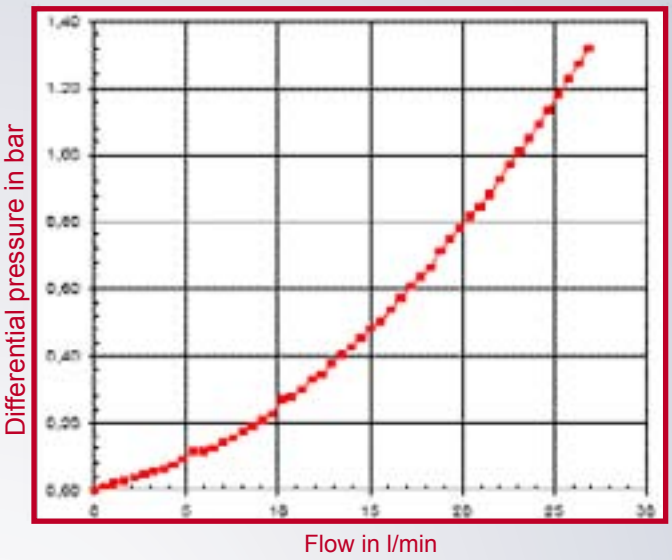


7. PERFORMANCE GRAPHS FOR COMPLETE RANGE MPSSF/HPSSF (ACSSF SIZE 30 ONLY) (Delta P curves in accordance with ISO 3968)

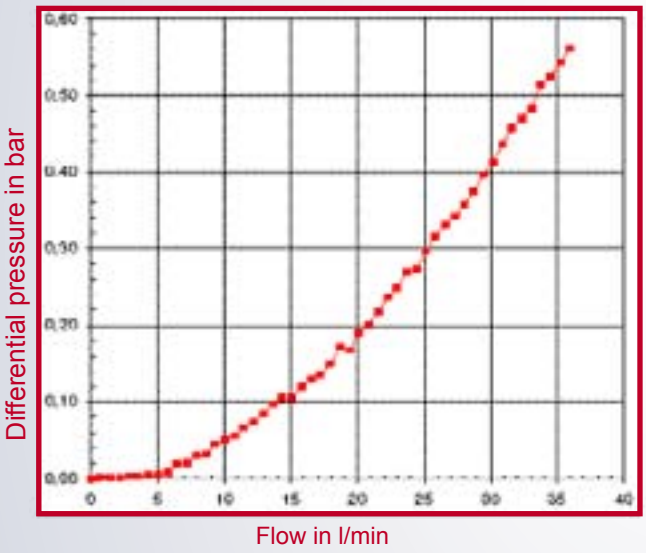
MP/HPSSF SIZE 30 9/16UNF 1/4"BSP/NPT PORTING



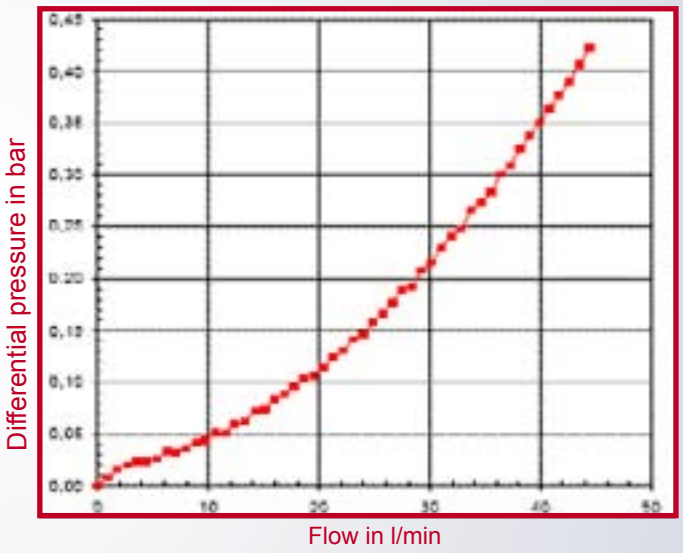
MP/HPSSF SIZE30 1/2"BSP/NPT PORTING



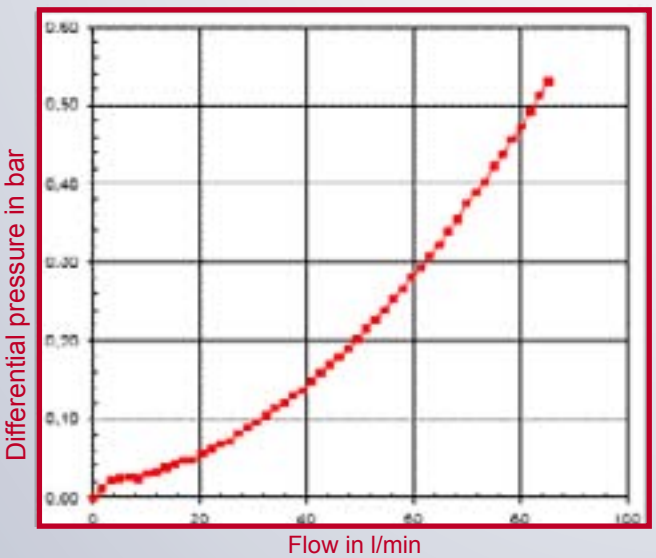
MP/HPSSF SIZE 60-110 1/2"BSP/NPT PORTING



MP/HPSSF SIZE 60-110 3/4"BSP/NPT PORTING



MP/HPSSF SIZE 160-240 1"BSP/NPT PORTING

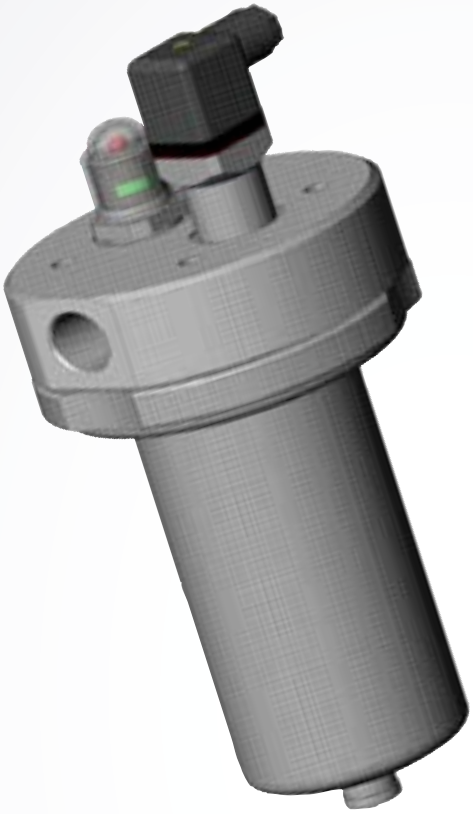


IMPORTANT NOTE:

The graphs shown on this data sheet were produced using ISO VG 32 mineral oil at a temperature of 40°C.

These ΔP graphs represent the housings only, the filter element's ΔP figure will have to be added to these values.

II. Low Pressure Filter LPSSF



Developed for

Offshore Oil & Gas Applications

- **Stainless steel housing**
- **40 bar (580 psi) working pressure**
- **Threaded port options (BSP & NPT)**
- **Size 110 pressure filter elements**
- **Multi indicator options**
- **Suitable for mineral oil, water glycol and water applications**
- **Flow rates up to 60 l/min (15 US gallon/min)**
- **Suitable for recirculation and return lines.**

1. DESCRIPTION

1.1 FILTER HOUSING

1.1.1 Basic design

The pressure filters consist of two main sections: the filter head and filter bowl, which are connected by a screw-on retaining ring. The standard model is available with and without a bypass valve and all units have a pressure vent plug situated at the base of the bowl for safe and easy pressure release and draining operations.

1.1.2 Special models

For alternative seals and thread forms not listed in this brochure, please contact our technical sales department.

1.1.3 Accessories

- Visual clogging indicator
- Electrical clogging indicator
- Visual/electrical clogging indicators
- Bypass functions with pressure settings of 3 & 6 bar are available (0.2 bar for suction filters)

(Please refer to separate offshore clogging indicator section V on page 30)

1.2 FILTER ELEMENT

Please refer to filter element brochure no 7.200

2. TECHNICAL SPECIFICATIONS

2.1 HYDRAULIC DATA

2.1.1 Permissible operating pressure

The pressure stated below is a working pressure, all units are proof tested to 1.5 times their working pressure (TP = 1.5 X WP)
LPSSF = 40 bar max. (580 PSI)

2.1.2 Temperature range for various seals

-20˚C to + 100˚C using Viton (FPM) (standard)
-30˚C to + 100˚C using Nitrile (NBR)
-40˚C to + 100˚C using Nitrile low temp (NLT)
-30˚C to + 100˚C using EPDM

The temperature of the operating fluid must be below the permissible surface temperature of the clogging indicator. Higher temperature applications can be achieved *(i.e.: above 100˚C)* if the indicator is piped separately from the filter unit. *(See "Adaptors for clogging indicators" at point 8 on page 37).*

2.1.3 Viscosity range

1/380mm²/sec

2.1.4 Cracking pressure of the bypass valve

ΔP = 6 bar +0.5 bar

ΔP = 3 bar +0.5 bar

ΔP = 0.2 bar + 10%

2.1.5 Hydraulic media

Mineral oils: test criteria to ISO 2943
Lubricating oils: test criteria to ISO 2943

For use with water, non-flam fluids, synthetic oils and biodegradable oils etc., please contact our technical sales department.

2.2. GENERAL

2.2.1 Material exposed to fluid

316 S11 Stainless Steel

2.2.2 Torque ratings

The clogging indicators must be tightened to the recommended torque of 70+10Nm.

The use of torque seal is recommended

The 1/4”BSP pressure release plug at base of bowl requires a torque of 30Nm +3Nm

2.2.3 Mounting information

Vertical mounting required, 4 off M10x1.5 by 16 full form fixing holes are situated in the top face of the filter, 60.00mm square centres
(4 off fixing bolts are not supplied with filters)

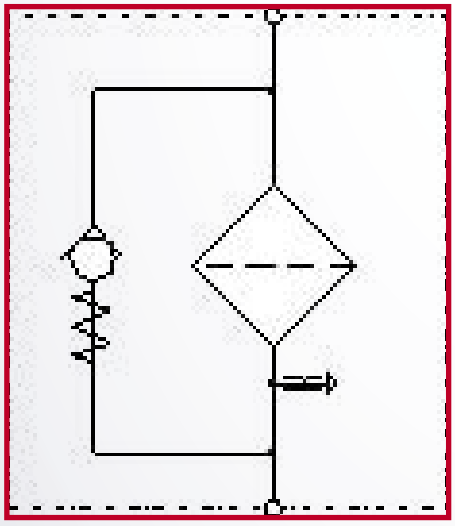
2.2.4 Weight (dry)

Approx 7 kg dependent on model

2.2.5. Volume of filter housing

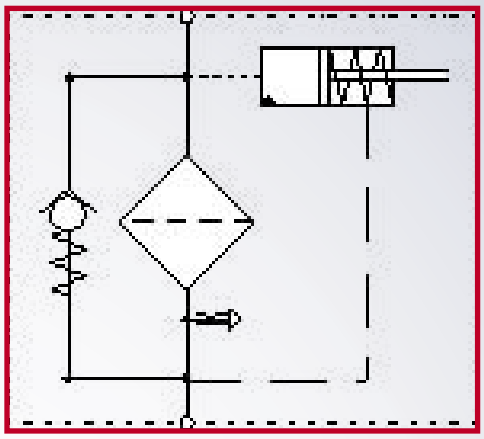
Without element = Approx 1 litre

2.2.6 Circuit diagrams - typical options



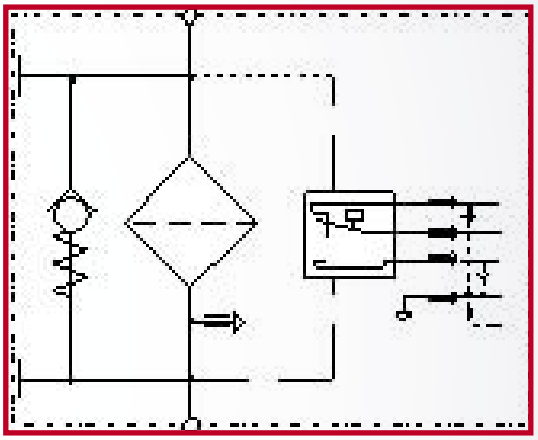
CIRCUIT EXAMPLE:

Filter with bypass, complete with vent/drain.



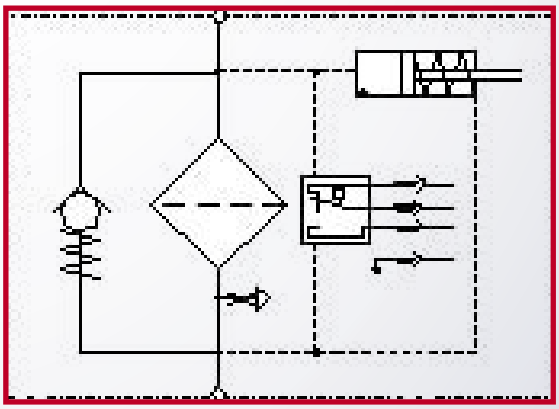
CIRCUIT EXAMPLE:

Filter with bypass, visual indicator, complete with vent/drain.



CIRCUIT EXAMPLE:

Filter with bypass, differential ports, electrical clogging indicator, complete with vent/drain.



CIRCUIT EXAMPLE:

Filter with bypass, visual & electrical clogging indicators complete with vent/drain. (Represents unit at point 4 of this brochure)

3. MODEL CODE FOR LPSSF

LPSSF40 BNHC 110N3 003 B. X/B3/V

Working pressure

LPSSF 40	Pressures up to 40 bar or 580 psi

Element type

BNHC	(Betamicron, max ΔP = 25 bar)
BHHC	(Betamicron high collapse, max ΔP = 210 bar)
ECO	(Ecomicron max ΔP 10 bar)
W/HC	(Wire mesh, max ΔP = 30 bar)

Size 110 and port type

B3	3/4" BSP	Up to 60 l/min max]	*See pressure drop*
N3	3/4" NPT	Up to 60 l/min max]	*graph, Point 5*

The values listed above are based on ISO VG30 mineral oil @ 40°C and are dependent on the temperature and the media/micron rating of the element.
For sizing please contact our sales department.

Micron rating

3, 10	(Betamicron / Ecomicron)
25 - 200	(Wire mesh)

Clogging indicator type

A	-	Without clogging indicator (plugged cavity)
B	-	Visual indication (automatic re-set)
BM	-	Visual indication (manual re-set)
C	-	Electrical indication
D	-	Visual/electrical indication

Modification number

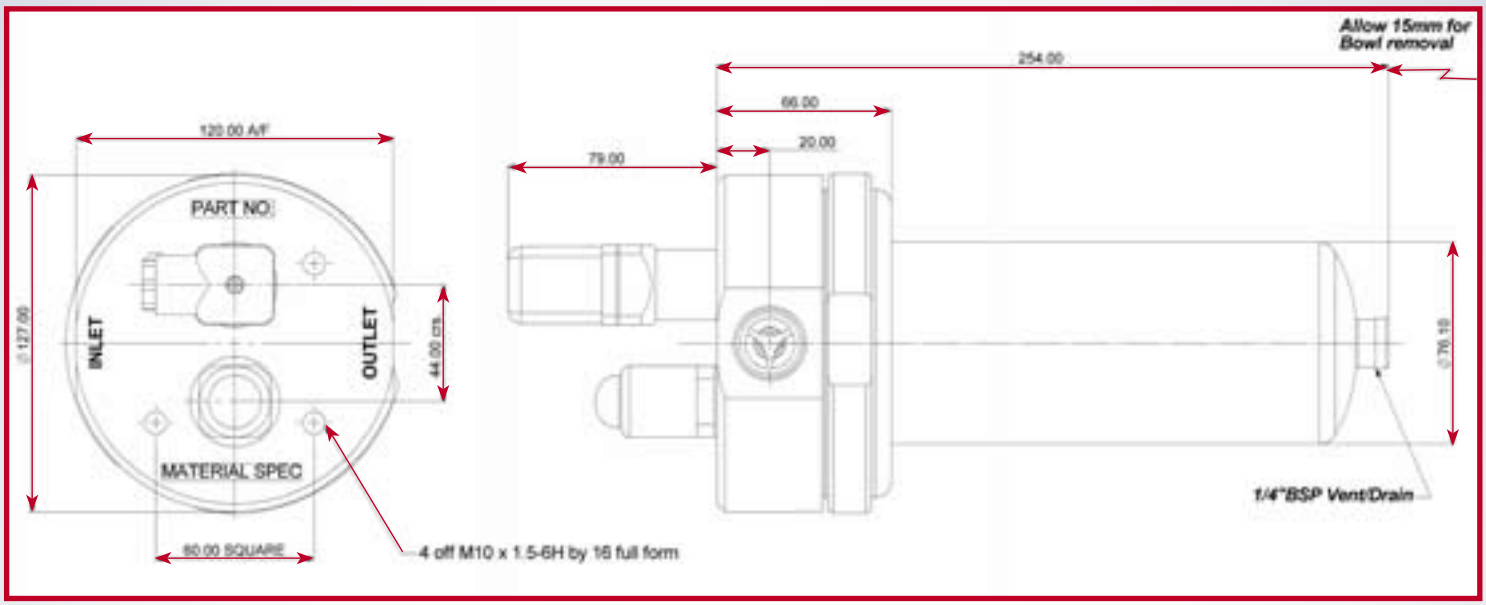
X	-	the latest version is always supplied

Supplementary details

V	-	FPM (Viton) (standard)
N	-	NBR (Nitrile)
W	-	stainless steel HC elements
B0.2	-	with bypass valve, set to 0.2 bar
B3	-	with bypass valve, set to 3 bar
B6	-	with bypass valve, set to 6 bar
EX	-	Eexd 11C T6 explosion proof electrical indicator with 1m flying lead
EX/ENC	-	Eexd 11C T6 explosion proof electrical indicator incl. IP66 Terminal Box, M20x1.5 cable entry
IS	-	intrinsically safe electrical indicator with 1m flying lead (Simple apparatus)
IS/ENC	-	intrinsically safe electrical indicator incl. IP66 junction box, M20x1.5 cable entry
IS2GBC	-	intrinsically safe electrical indicator with gold connections, (Hirschmann type plug to DIN 43650)

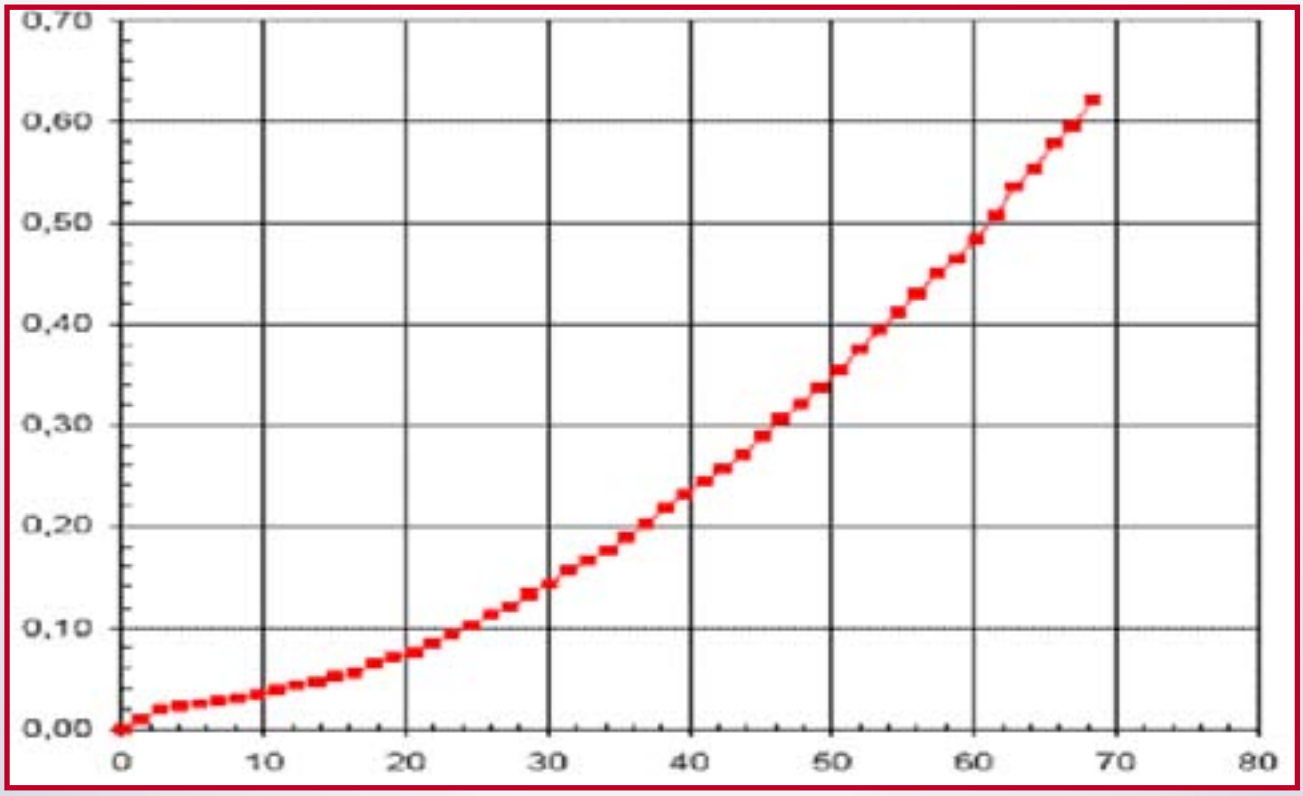
4. DIMENSIONS

TYPICAL INSTALLATION DRAWING OF LPSSF FILTER WITH PORTED CONNECTIONS (BSP/NPT)



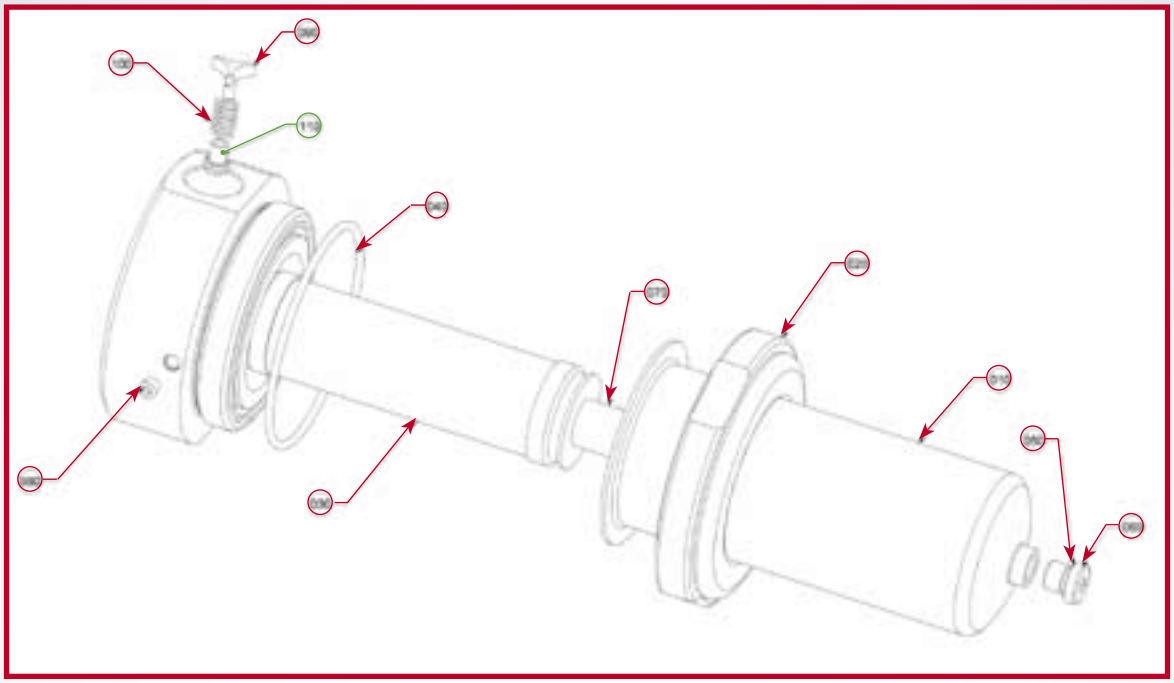
5. HOUSING PRESSURE DROP GRAPH

LPSSF B3/N3 (3/4"BSP/NPT) FILTER
ΔP Graph based on ISO VG 32 mineral oil at 40˚C (housing only)



Flow in l/min

6. SPARE PARTS / MAINTENANCE



ITEM	DESCRIPTION	HYDAC PART NO.	MATERIAL
010	BOWL 110	1347309	316 S11 ST/ST
020	RETAINING NUT	1347310	316 S11 ST/ST
030	*See Element Brochure*	*See Element Brochure*	*See Element Brochure*
040	O-RING 85.32 x 3.53	1200094308	Viton (FPM)
	O-RING 85.32 x 3.53	1200002381	Nitrile (NBR)
050	1/4” VSTI SEAL	1200093235	Viton (FPM)
	1/4” VSTI SEAL	1200094608	Nitrile (NBR)
060	14” BSP VSTI PLUG	1200093121	316 S11 ST/ST
070	ELEMENT SPACER	1200001464	316 S11 ST/ST
080	1/16” LEVEL SEAL	1200091009	316 S11 ST/ST
090	BYPASS RETAINER	282854	316 S11 ST/ST
100	3 BAR BYPASS SPRING	1200001467	ST/ST
	6 BAR BYPASS SPRING	1200094470	ST/ST
110	BYPASS POPPET	1200094225	416 S21 ST/ST
Not illustrated	SEAL KIT *	1200002034	Viton
Not illustrated	SEAL KIT *	1200002036	NBR

* Replacement seals for filter assy. & clogging indicators

III. Inline Low Pressure Return, Recirculation Filter in Stainless Steel EMLF

Developed for
Offshore Oil & Gas Applications

- **AISI 316 stainless steel housing**
- **10 bar (150 psi) working pressure**
- **Threaded & flanged port options**
- **Multi indicator options**
- **Suitable for mineral oil, water glycol and water applications**

1. DESCRIPTION

1.1. FILTER HOUSING

1.1.1 Basic design

The pressure filters consist of two main sections: the filter head and the bolt-on filter bowl. The standard model is available with and without a bypass valve and all units have a pressure vent plug situated at the base of the bowl for safe and easy pressure release and draining procedures.

1.1.2 Special models

- For seal compounds not listed in this brochure, please contact our technical sales department.
- For flange connections and other thread forms, please contact our technical sales department.

1.1.3 Accessories

- Visual clogging indicator (Automatic re-set & manual re-set options)
- Electrical clogging indicator (Ex and IS options available, also Atex 9001 also available).
- Visual/electrical indicators
- Vacuum gauge, input/output pressure take off points (Differential ports)
- Bypass function with standard pressure settings of 3 & 6 bar are available (0.2 bar for suction filters)

2. TECHNICAL SPECIFICATIONS

2.1. HYDRAULIC DATA

2.1.1 Permissible operating pressure

Pressure stated below is a working pressure, all units are proof tested to 1.5 times their working pressure.
(TP = 1.5 X WP)
EMLF = 10 bar max. (150 PSI)

2.1.2 Temperature range for various seals

-20˚C to + 100˚C using Viton seals (FPM) *(standard*
-30˚C to + 100˚C using Nitrile seals (NBR)
-40˚C to + 100˚C using Nitrile Low Temp (NLT)
-30˚C to + 100˚C using EPDM seals.

The temperature of the operating fluid must be below the permissible surface temperature of the clogging indicator. Higher temperature applications can be achieved (i.e.: above 100˚C) if the indicator is piped separately from the filter unit.

(See "Adaptors for clogging indicators" in Clogging Indicator point 8, page 39).

2.1.3 Viscosity range

1/380mm²/sec

2.1.4 Hydraulic media

Mineral oils: test criteria to ISO 2943
Lubricating oils: test criteria to ISO 2943
For use with water, non-flam fluids, synthetic oils and biodegradable oils etc., please contact our technical sales department.

2.2. GENERAL

2.2.1 Material exposed to fluid

316 S11 Stainless Steel

2.2.2 Torque rating

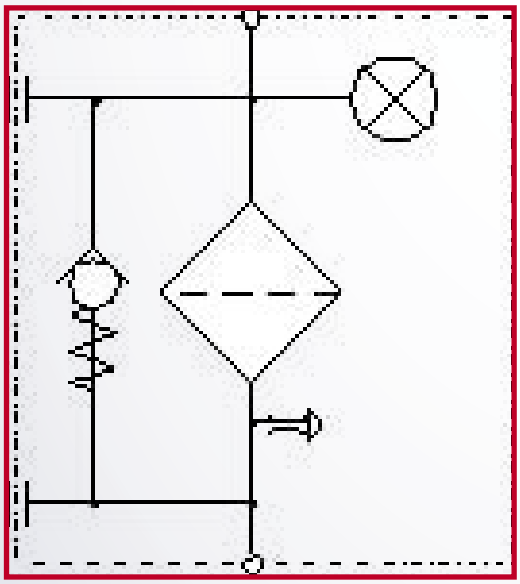
- The clogging indicators must be tightened to the recommended torque of 70+10Nm.
- The use of torque seal is recommended
- The pressure release plug at base of bowl requires a torque of 27Nm +10Nm

2.2.3 Mounting information

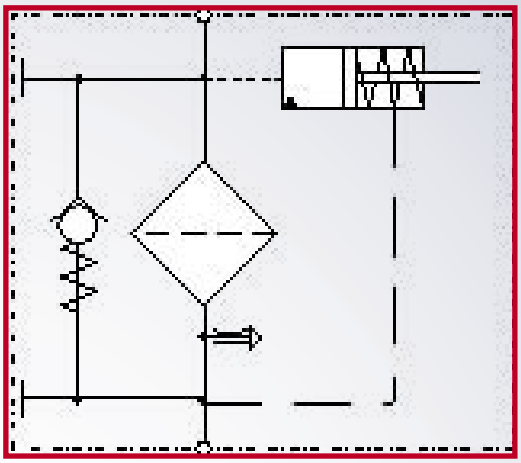
Vertical mounting required, 4 off M10x1.5 by 16 full form fixing holes are situated in the top face of the filter unit equi-spaced on 125mm PCD. *(4 off fixing bolts are not supplied with filters)*

Single indicator ported heads have 1/4”NPT differential ports (as standard)

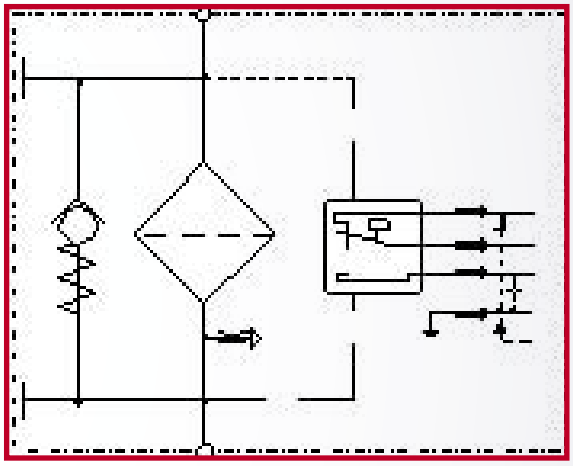
2.2.4 Hydraulic circuits - options



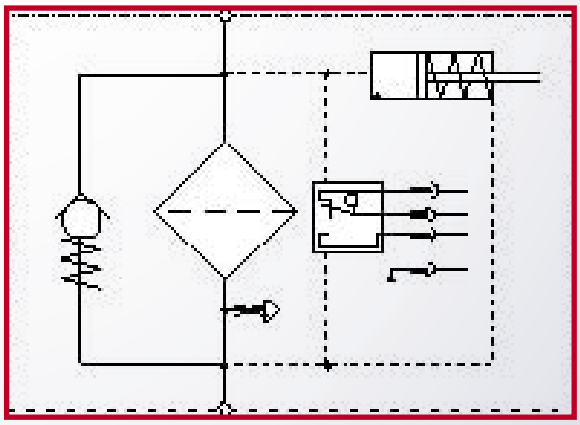
CIRCUIT EXAMPLE:
Filter with bypass, differential ports, vacuum gauge, c/w vent/drain



CIRCUIT EXAMPLE:
Filter with bypass, differential ports, visual clogging indicator, c/w vent/drain.



CIRCUIT EXAMPLE:
Filter with bypass, differential ports, electrical clogging indicator, c/w vent/drain.



CIRCUIT EXAMPLE:
Filter with bypass, differential ports, visual & electrical clogging indicators, c/w vent/drain.

3. IN LINE LOW PRESSURE FILTER IN STAINLESS STEEL

3.1. MODEL CODE

EMLF10 BNHC 660N4 003 B. X/B3/V

Working pressure

EMLF 10	Pressures up to 10 bar or 150 psi

Element type

BNHC	(Betamicron)
ECO	(Ecomicron)
BNAM	(Betamicron /Aquamicron)
W/HC	(Wire Mesh)

Size and port type

330mm and 660mm (bowl size)

B4	1” BSPP	Up to 100 l/min max	]
N4	1” NPT	Up to 100 l/min max	] *See Δ P graphs*
F32	SAE 32 – 3000 psi	Up to 250 l/min max	]

The values listed above are based on ISO VG32 mineral oil @ 40˚C
and are dependent on the temperature and the media/micron rating of the element.
For sizing please contact our sales department

Micron rating

3, 10	(Betamicron / Ecomicron)
25 - 200	(Wire Mesh)

Clogging indicator type

A	-	Without clogging indicator (plugged cavity)
B	-	Visual indication (automatic re-set)
BM	-	Visual indication (manual re-set)
C	-	Electrical indication
D	-	Visual/electrical indication
UE	-	Vacuum gauge

Modification number

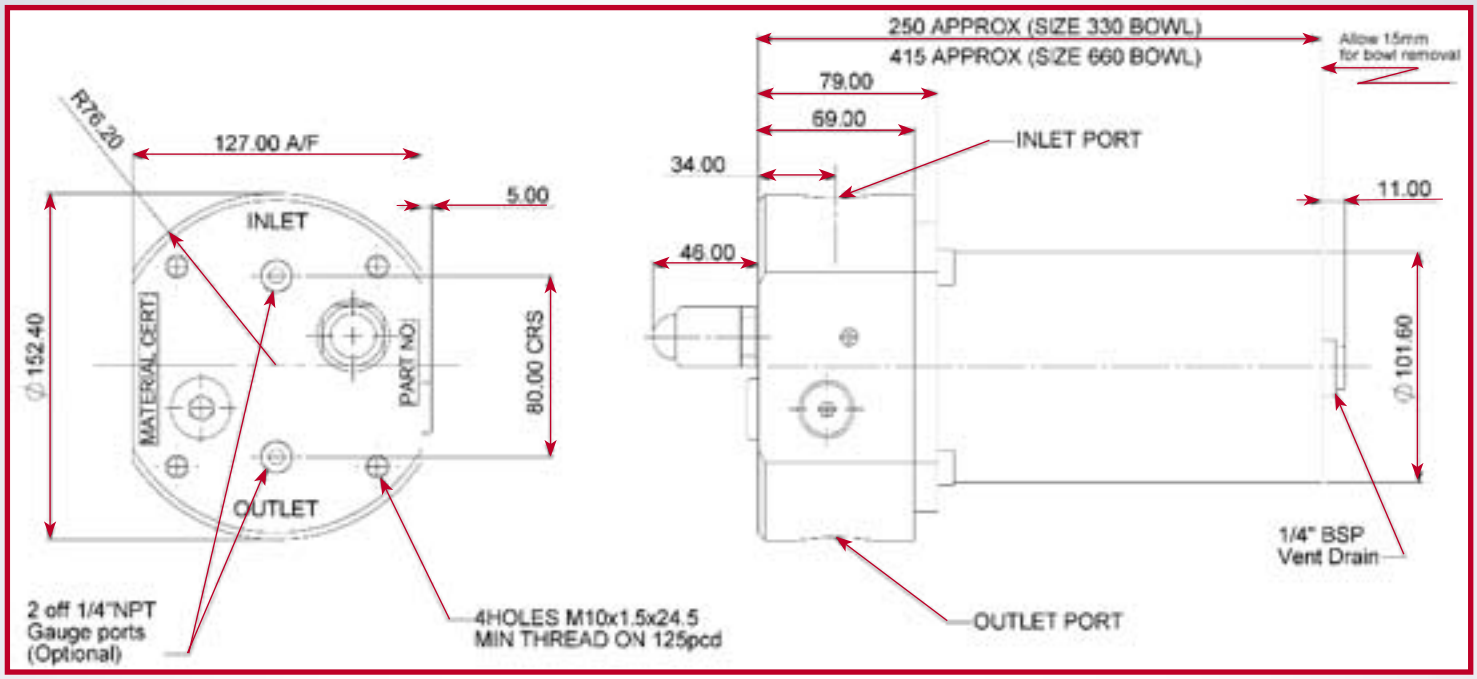
X	-	The latest version is always supplied

Supplementary details

V	-	FPM (Viton) seals (Standard)
N	-	NBR (Nitrile) seals (Non standard)
W	-	stainless steel HC elements
B6	-	with bypass valve set to 6 bar
B3	-	with bypass valve set to 3 bar
B0.2	-	with bypass valve set to 0.2 bar
EX	-	Eexd 11C T6 explosion proof electrical indicator with 1m flying lead
EX/ENC	-	Eexd 11C T6 explosion proof electrical indicator c/w IP66 Terminal Box, M20x1.5 cable entry
IS	-	Intrinsically safe electrical indicator with 1m flying lead (Simple apparatus)
IS/ENC	-	Intrinsically safe electrical indicator c/w IP66 junction box, M20x1.5 cable entry
IS2GBC	-	Intrinsically safe electrical indicator with gold connections, (Hirschmann type plug to DIN 43650)

4. INSTALLATION DRAWINGS

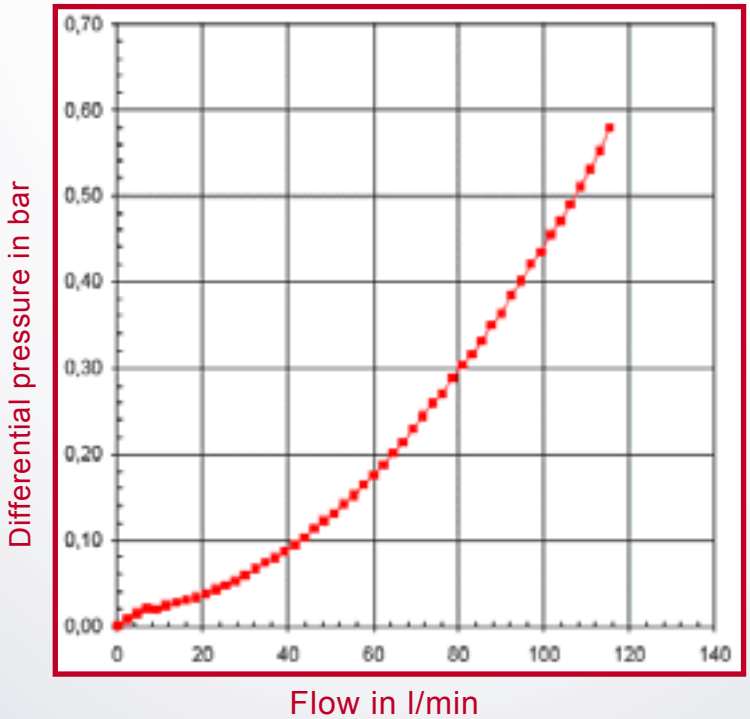
4.1. TYPICAL GENERAL ASSEMBLY OF EMLF FILTER WITH PORTED CONNECTIONS (BSP/NPT)



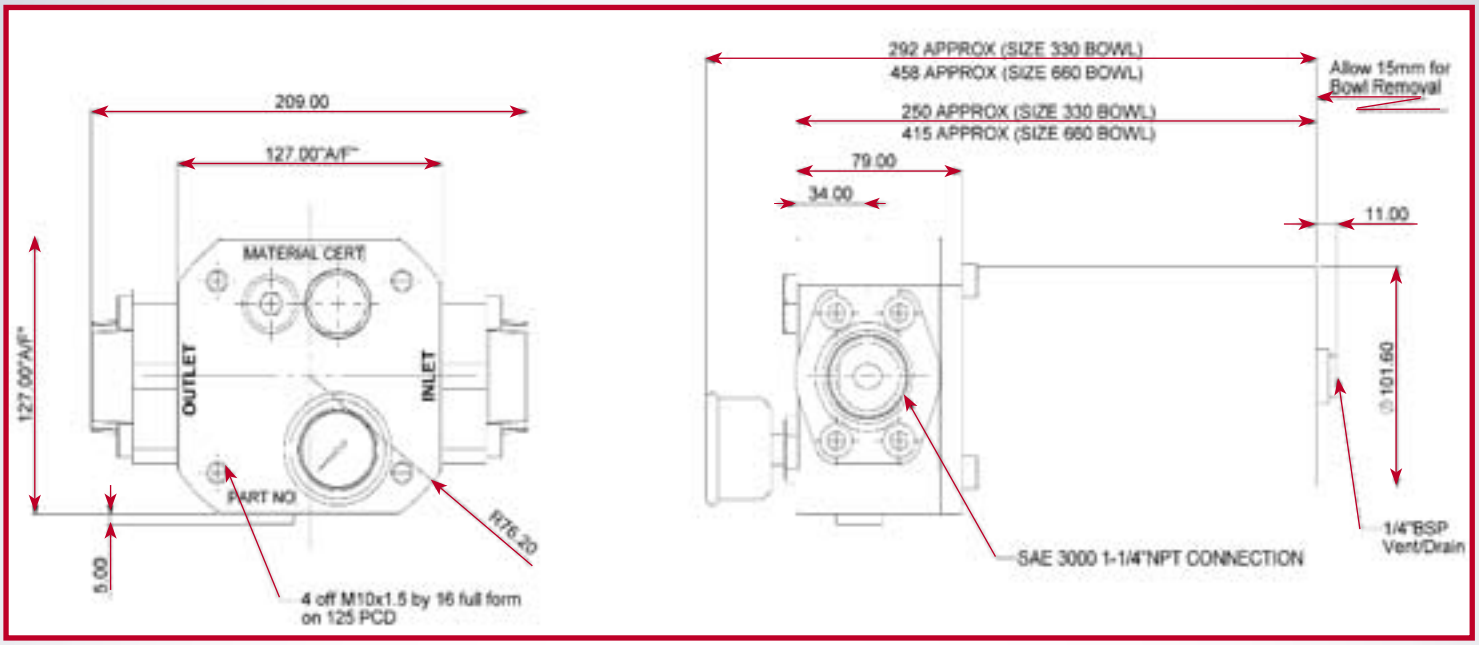
4.1.1. Housing pressure drop graphs

ΔP graphs shown below based on ISO VG 32 mineral oil at 40˚C (housing only)

EMLF B4/N4 (1") FILTER ΔP CURVE

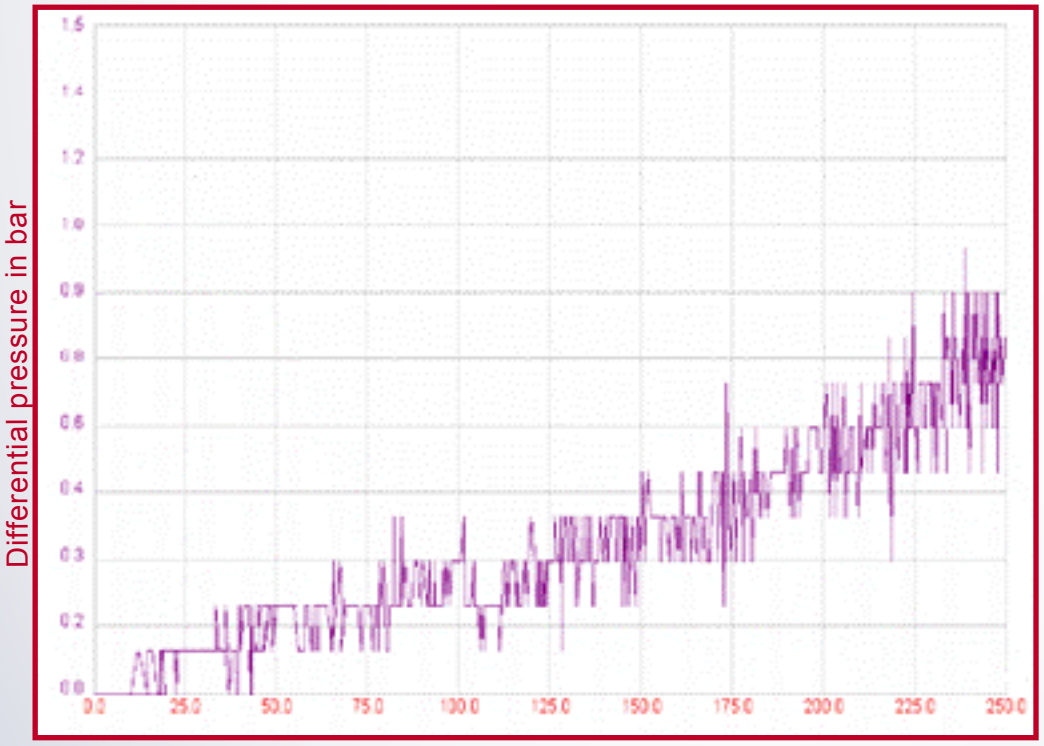


4.2. TYPICAL GENERAL ASSEMBLY OF EMLF FILTER WITH FLANGE CONNECTIONS (1-1/4”SAE3000)

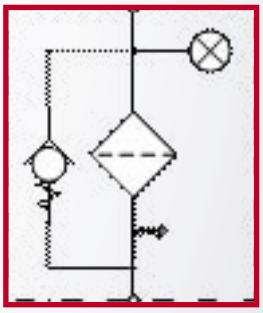


4.2.1 Housing pressure drop graph

Suction filter with 0.2 bar bypass, 100 µm element with vacuum gauge
ΔP graph shown below based on ISO VG 32 mineral oil at 40˚C (housing only)



F 32



HYDRAULIC CIRCUIT FOR MODEL SHOWN ABOVE

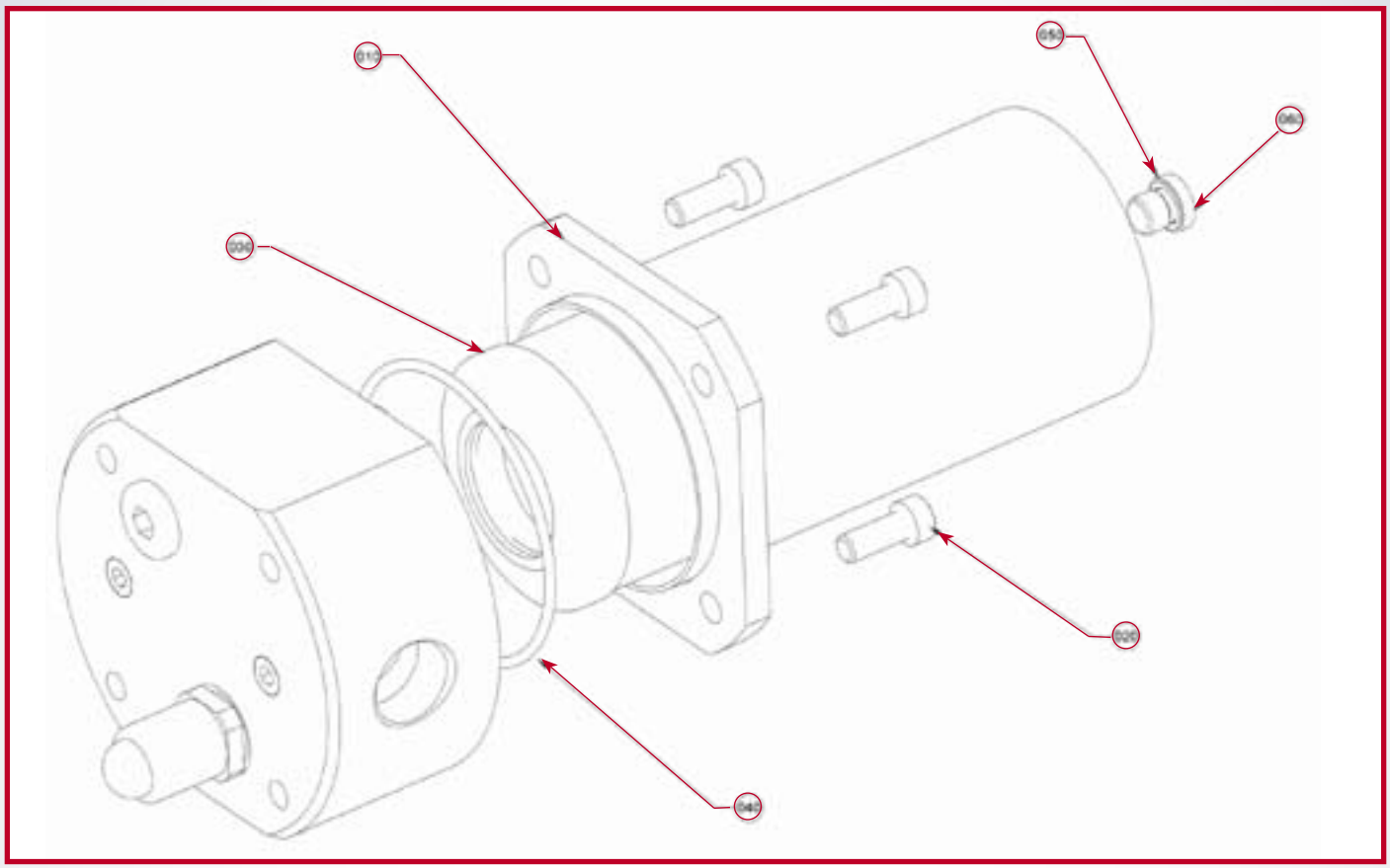
5. ACCESSORIES

- Mounting brackets are available for EMLF filters: Please contact our technical sales dept.
- Optional gauge ports (1/4”NPT) for differential pressure readings

HYDAC SUPPLY:

1/4” NPT Male St/Stl level seals (Loctite 542 is required to seal)

6. SPARE PARTS/MAINTENANCE



ITEM	DESCRIPTION	HYDAC PN:	MATERIAL
010	BOWL 330	1200098456	316 S11 S/Stl
	BOWL 660	1200094033	316 S11 S/Stl
020	M10 X 25 S, H, C, S	1200094845	316 S11 S/Stl
030	*See element spares table*	N/A	
040	O-ring 101.2 x 3.53	1200099530	Viton (FPM)
050	1/4" VSTI SEAL	1200093235	Viton (FPM)
060	1/4" VSTI PLUG	1200093121	316 S11 S/Stl
Not illustrated: comprises 1x item 40 (O-ring) + 2 off replacement seals for the clogging indicator	SEAL KIT Complete service for unit requires replacement of main filter O-ring & indicator seals	1200002557	Viton

IV. Tank-Top Mounted Stainless Steel Return Line filter - ERFM/EDRFM

- Flow rates up to 80 l/min
- Pressure range up to 6.5 bar
- Material: Stainless steel / polyamide
- Designed to be mounted directly onto tank tops

1. DESCRIPTION

1.1. FILTER HOUSING

1.1.1 Basic design

The ERFM filter consists of a stainless steel filter head with a polyamide bowl and a polyamide screw-on cover plate.
It is supplied with a connection for a clogging indicator or twin clogging indicators. (Pressure gauge option also available)

1.1.2 Seals

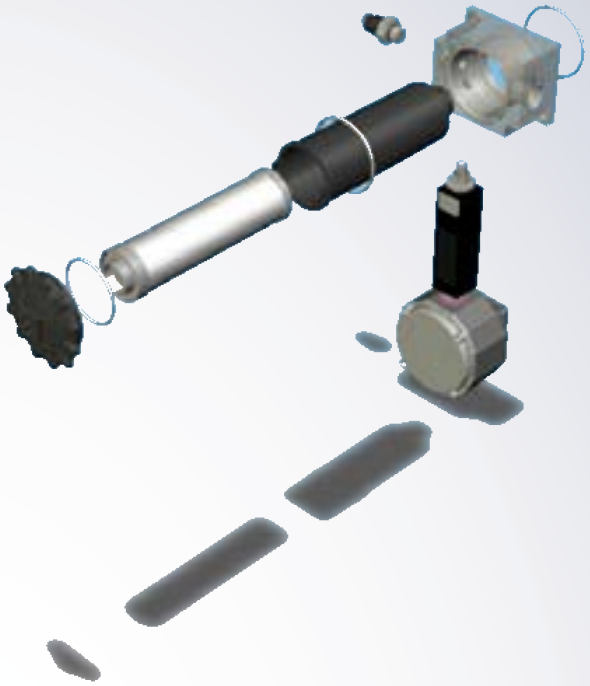
FPM (Viton 75")(Standard)
NBR (Perbunan 70")

1.1.3 Special Models

For seal compounds not listed or other options on request, please contact our technical sales team.

1.1.4 Accessories

Visual clogging indicator
Electrical clogging indicator
Pressure gauge



2. MODEL CODE FOR ERFM

ERFM BN/HC 165N3 003 B. 1/V

Filter Type

ERFM	Single
EDRFM	Duplex change over

Element Type

BN/HC	(Betamicron media)
ECO	(Ecomicron)
W/HC	(Stainless steel wire mesh)

Size 165 Port Type

N2	½" NPT
N3	¾" NPT
B2	½" BSPP
B3	¾" BSPP
F22	¾" SAE 3000

Micron Rating

3, 5, 10, 20	(BN/HC)
3, 10	(ECO)
25, 50, 100	(W/HC)
40,	(AM)

Clogging Indicator Type

A	Plugged indicator cavity
B	Visual (VR2B.0/S0224)
E	Pressure gauge (100PSI)
C	Electrical

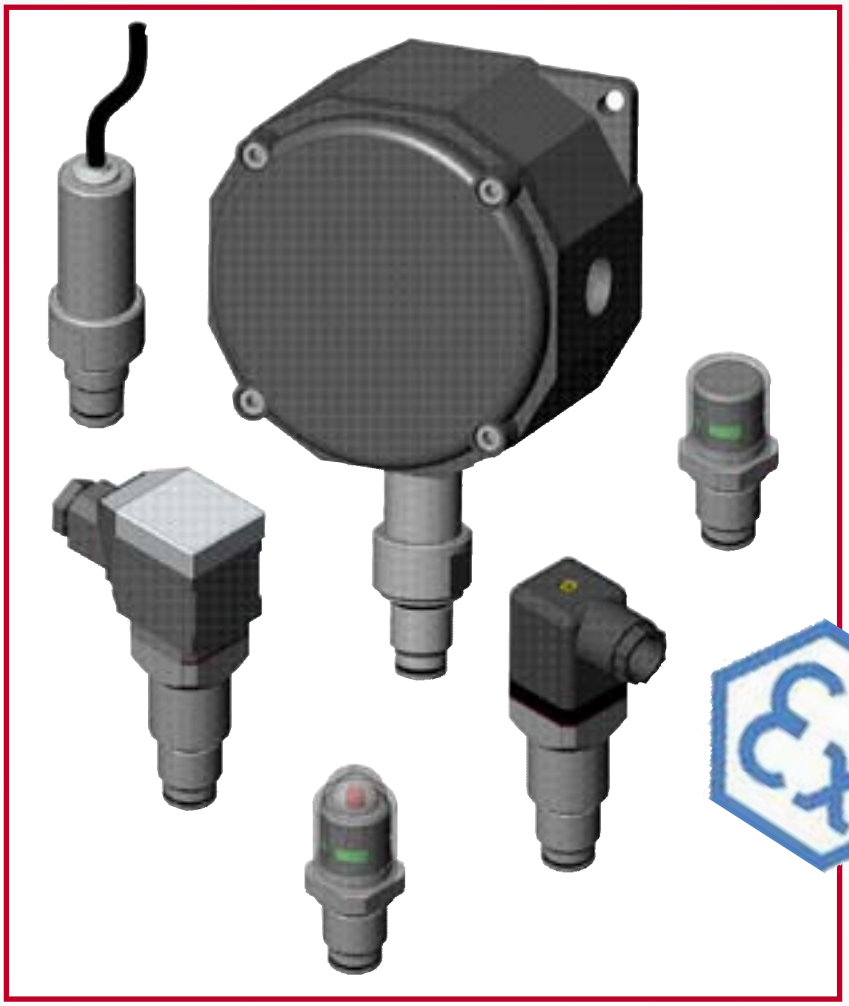
Modification No.

Supplementary Details

V	FKM Viton seals (standard)
N	NBR Nitrile seals
KB	Blocked bypass
EX/ENC	EEXD indicator c/w IP66 junction box, ½"NPT & M20 cable entries)
IS/ENC	EEXIA Indicator c/w IP66 junction box,½"NPT & M20 cable entries)

V. Stainless Steel Clogging Indicators

WORKING PRESSURE UP TO 1000 BAR



- HYDAC stainless steel and titanium differential pressure clogging indicators in AISI 316 S11 St/St & Ti-6AL-4v material
- These pressure difference indicators can be built on to all pressure filters
- As the filter element becomes increasingly clogged, the difference between the inflow pressure and the outflow pressure of the filter will become greater. Types VDUK 450 bar, VDHP 700 bar and VDAC 1000 bar are designed to indicate to users when a filter has become clogged and therefore requires replacement
- Designed for use in offshore, chemical and industrial process systems
- Port connections are available as standard in 1/2” BSP (450 bar) and M20 x 1.5 (700 and 1000 bar units)
- EX and IS options are available

1. DESCRIPTION

HYDAC differential pressure indicators are used for all inline filters and react to the increasing pressure differential caused by rising contamination of the filter element. The operational safety of a system and the efficient utilisation of a filter element can only be guaranteed if clogging indicators are used.
Important: Before installing a clogging indicator into a filter, ensure that the permissible operating pressure of the system does not exceed that of the clogging indicator (see model code). The filter must be depressurised before commencing the installation.

1.1 HYDRAULIC DATA

1.1.1 Permissible operating pressures & relevant cavities

Pressures stated are working pressures, all units are proof-tested to 1.5 times their working pressure (TP = 1.5 X WP)

VD	=	up to 450 bar max	Cavity ref:	=	83031L	Thread type: 1/2"BSP
VDUK	=	up to 450 bar max	Cavity ref:	=	83031	Thread type: 1/2"BSP
VDHP	=	up to 700 bar max	Cavity ref:	=	97178	Thread type: M20 x 1.5
VDAC	=	up to 1000 bar max	Cavity ref:	=	83031ay	Thread type: M20 x 1.5

1.1.2 Temperature ranges

-20˚C to +100˚C	using	Viton seals (FPM)	(Standard)
-30˚C to +100˚C	using	Nitrile seals (NBR)	(Non Standard)
-40˚C to +100˚C	using	Nitrile Low Temp (NLT)	(Non Standard)
-30˚C to +100˚C	using	EPDM seals	(Non Standard)

The temperature of the operating fluid must be below the permissible surface temperature of the clogging indicator. Higher temperature applications can be achieved (i.e.: above 100˚C),when the indicator is piped up separately from the filter unit.
(See "Adaptors for clogging indicators", point 8 page 37).

1.1.3 Viscosity range

1/380mm²/sec

1.1.4 Hydraulic media

Mineral oils: test criteria to ISO 2943
Lubricating oils: test criteria to ISO 2943

For use with water, non-flam fluids, synthetic oils and biodegradable oils etc., please contact our technical sales department.

1.1.5 Pressure settings of clogging indicators

Δp = 2 or 5 bar-10%, (Standard) or 8 bar ±10% (Non standard)
(Other settings on request)

1.1.6 Torque ratings for all types (unless otherwise stated)

70 + 10Nm. VD to 450 bar
70 + 10Nm. VDUK to 450 bar
100 + 10Nm. VDHP to 700 bar
120 + 10Nm. VDAC to 1000 bar *(Vibration proof sealant to be used on top two threads)*

NOTE: The use of torque seal is recommended!

1.1.7 Material exposed to fluid

316 S11 Stainless Steel for 450 & 700 bar units (main body material)
Ti-6AL-4v Aerospace grade titanium for 1000 bar units (main body material)

1.1.8 Designed in accordance with BS ISO 10771-1:2002

ISO 10771-1 D\\INDICATOR BODY (Ti-6AL-4V, TITANIUM)\\100/5Mpa(1000/5bar)\\0.33Hz/1000ms\\$10^5$

FOR ELECTRICAL DETAILS & INFORMATION OF IS/EX & IS2GBC INDICATORS, PLEASE SEE POINT 4 OF THIS BROCHURE!

2. ‘B’ TYPE MECHANICAL INDICATORS (VISUAL INDICATION)

2.1. MODEL CODE

VD 5 BM . X V

Type of indicator

VD	Differential pressure indicator 450 bar
VDHP	Differential pressure indicator 700 bar
VDAC	Differential pressure indicator 1000 bar

Pressure setting

2	2 bar setting pressure
5	5 bar setting pressure
	(Other settings on request)

Indicator type

B	Automatic re-set
BM	Manual re-set

Modification number

X	Latest version is always supplied

Supplement details

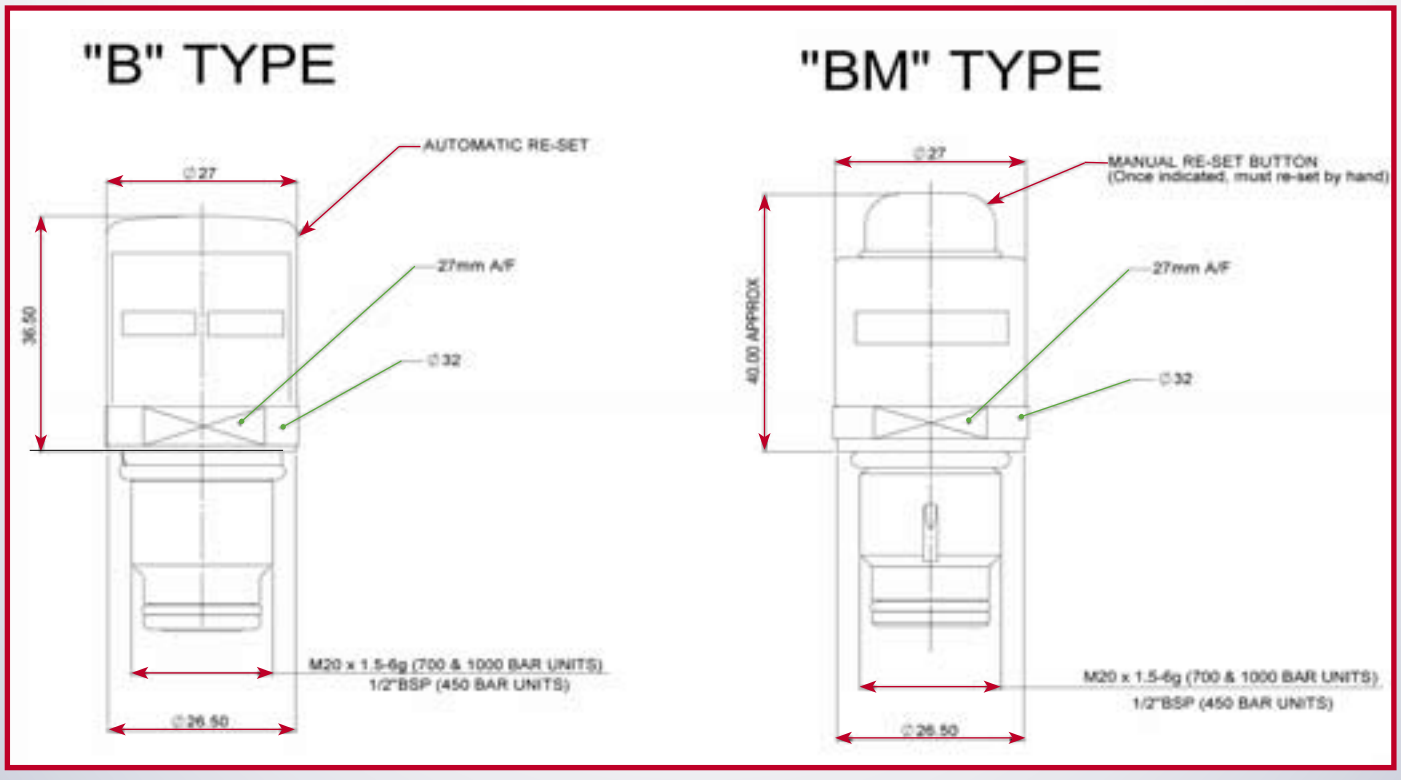
V	FKM (Viton) seal, indicator suitable for phosphate ester (HFD-R) and biodegradable oils (standard)
N	NBR seals
NLT	Nitrile low temp seals
EPDM	EPDM seals
W	Indicator suitable for oil-water emulsion (HFA, HFC)

B TYPE

BM TYPE

2.2. DIMENSIONS

Typical installation drawing of “B” and “BM” type clogging indicators



3. "C" TYPE ELECTRICAL INDICATORS (FOR ELECTRONIC INDICATION)

3.1. MODEL CODE

VD/HP 5 C.X / V / EX/ENC

Type of indicator

VDUK	450 bar
VDHP	700 bar
VDAC	1000 bar

Pressure setting

2	2 bar ΔP
5	5 bar ΔP
	(others on request)

Indicator type

C	electrical

Modification number

X	Latest version always supplied

Seals

V	FPM seals - standard
N	NBR seals
EPDM	EPDM Seals

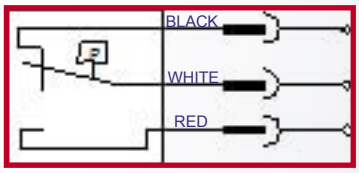
Supplementary details

EX	EEXD IIc T6 Explosion proof
EX/ENC	As EX but with IP66 enclosure
IS	Simple apparatus function
IS/ENC	As IS but with IP66 enclosure
FL	Flying lead version (EX & IS types) (3 metres standard)

MODEL SHOWING
'IS' & 'EX ENC' VERSIONS

3.2. ELECTRICAL DETAILS FOR 'EX' PROXIMITY SWITCH

Contacts:	S.P.C.O (switchable NO/NC)
Supply options:	5-250v AC or 5-150v DC
Max s/w current:	110vAC 180mA or 24v DC 830 mA or 230v AC 80mA
Max power watts:	20W VA
Ingress protection	IP68
Certificate of Conformity to EExd IIC T6	
EC certificate no:	ISSeP03ATEX081



WIRING DIAGRAM

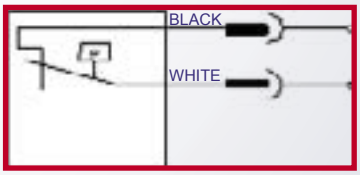
3.2.1 'EX' Enclosure details

Ingress protection:	IP66
Enclosure Material:	Glass Reinforced Polyester, (G.R.P)
Terminals:	1-BK3 (up to 4.00mm sq.)
Sira certified:	Certificate of Conformity to EExe II T6
SCS No.:	Ex94C3025

3.3. ELECTRICAL DETAILS FOR 'IS' PROXIMITY SWITCH

Electrical-Simple Apparatus
Intrinsically safe when supplied through a certified barrier

Contacts:	Normally closed
Max supply voltage:	110V AC or 150v DC
Max power:	10 w VA
Max switching current:	24v DC 400mA 110v AC 90mA



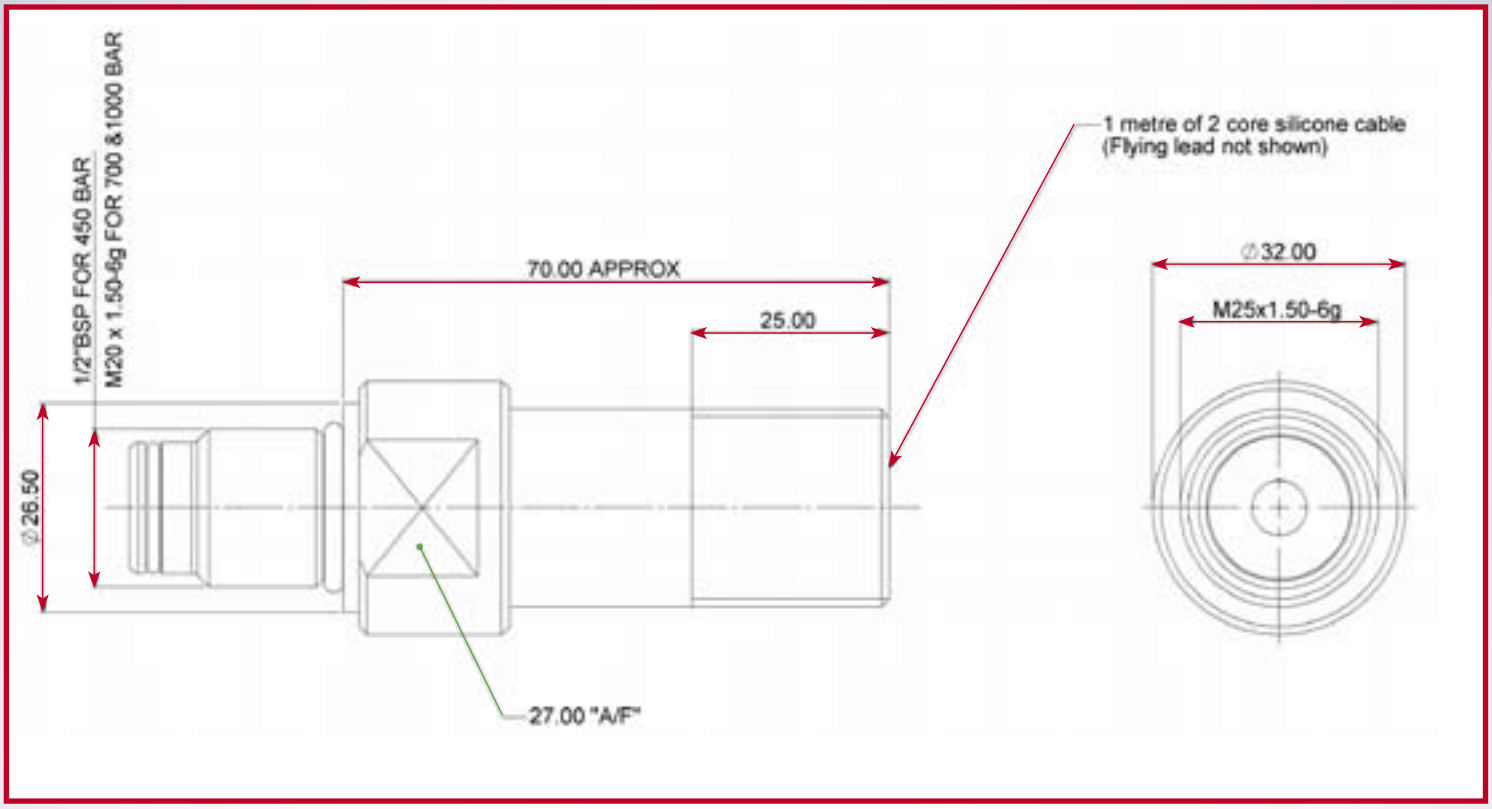
WIRING DIAGRAM

3.3.1 'IS' non-certified enclosure details

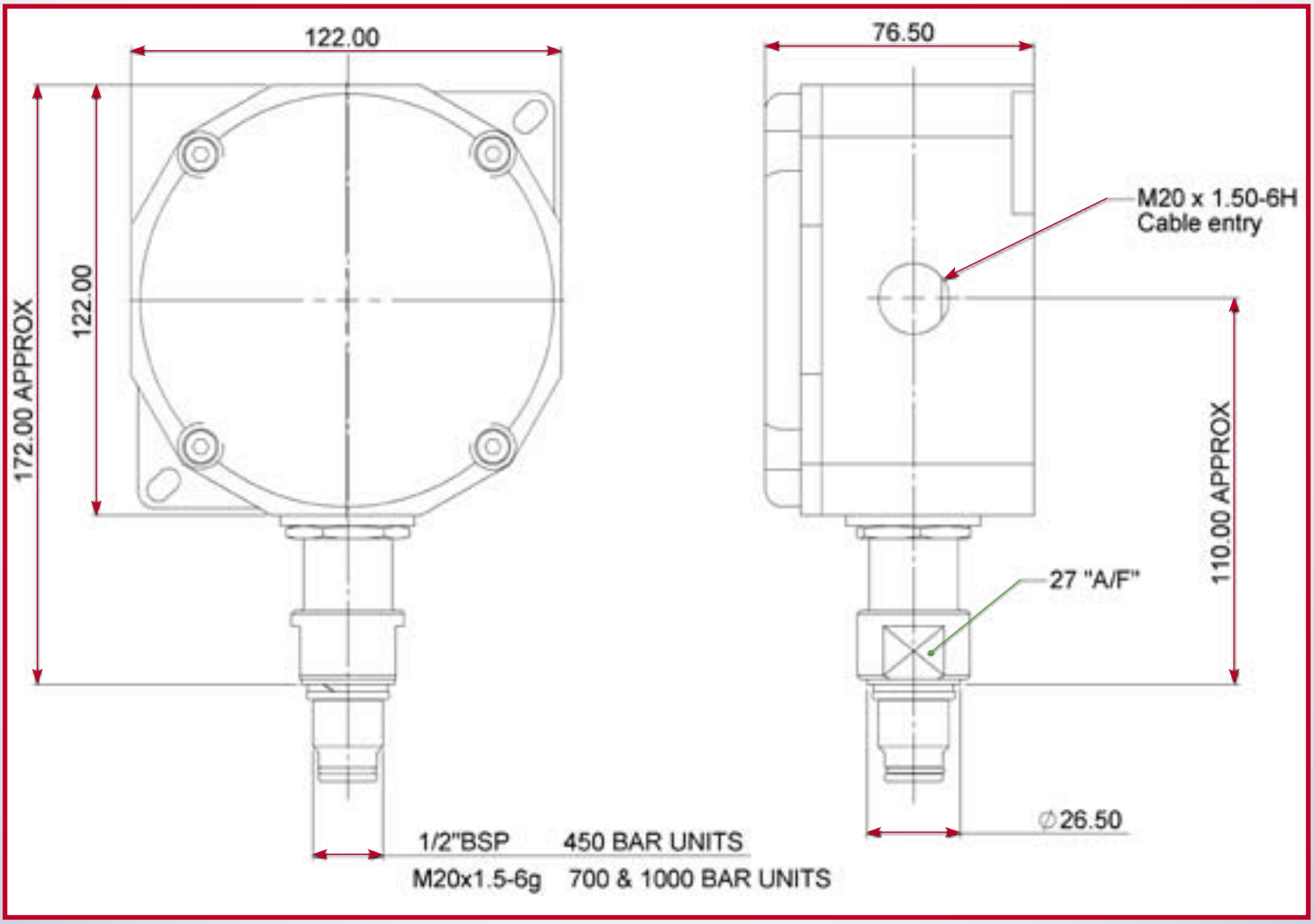
Ingress protection:	IP66
Enclosure material:	Glass Reinforced Polyester (G.R.P)
Terminals:	1-BK3 (up to 4.00mm sq.)

This enclosure has no IS certification as it is not required

3.4. TYPICAL INSTALLATION DRAWING FOR 'EX' & 'IS' FLYING LEAD INDICATORS



3.5. TYPICAL INSTALLATION DRAWING FOR 'EX' & 'IS' ENCLOSED INDICATORS



4. ATEX CERTIFIED 'C' TYPE INDICATORS (IS 2GBC INDICATORS)

Compliant with Directive 94/9EC and EN 50020 for use in Group II, Zone 1

4.1 GENERAL

4.1.1 Appropriate use

The clogging indicator is a simple device in accordance with EN 60079-14 and must only be used in intrinsically safe electrical circuits (VDE 0165-1).

4.1.2 Fluids which are suitable to DIN ISO 2943

Hydraulic oils H to HLPD DIN 51524
Lubrication oils DIN 51517, APJ, ACEA, DIN 51515, ISO 6743
Compressor oils DIN 51506
Rapidly biodegradable fluids to VDMA 24568,
HETG, HEES, HEPG
Non-flam fluids HFB and HFD

4.2. TECHNICAL SPECIFICATIONS

4.2.1 General

Type of indicator	-	electrical switch
Weight	-	220 g
Seal material	-	NBR and PTFE (item 1, fig. 2) FPM and PTFE respectively (item 1, fig. 2) on V-version
Permiss. temperature range	-	-30°C to + 100°C The temperature of the operating fluid must be below the permissible surface temperature of the clogging indicator.
Pressure setting	-	2 or 5 bar -10%
Permiss. operating pressure	-	450 bar

4.2.2 Electrical

Switching type	-	N/C or N/O (change-over contact) switching contacts gold plated
Max. switching voltage	-	230 VAC or 110 VDC
Electrical connection	-	Plug connector PG9, connection to ISO 4400
Max. electrical rating	-	**Direct current L/R 5ms** 50 mAmp. at 110 VDC 50 mAmp. at 60 VDC 100 mAmp. at 24 VDC 250 mAmp. at 12 VDC 250 mAmp. at 6 VDC **Alternating current** Ohmic or cosΦ 0.95 50 mAmp. at 220 VAC 50 mAmp. at 110 VAC 50 mAmp. at 60 VAC 100 mAmp. at 24 VAC 250 mAmp. at 12 VAC 250 mAmp. at 6 VAC **Switching output** 10 mAmp. at 6 VAC 10 mAmp. at 6 VDC 100 mAmp. at 1.2 VDC **Max. number of operations** 200 per minute

The inductivity and the capacity of the assembly switch, wiring and connector is negligible.

Life expectancy	-	10 million cycles
Protection class EN 60529	-	IP 65 (only if the connector is wired and fitted correctly)

4.3. ATEX ‘C’ TYPE ELECTRICAL ‘IS 2GBC’ INDICATORS (UP TO 450 BAR)

4.3.1 MODEL CODE

VD 5 C . X /-V -2GBC

Type of indicator

VD Differential pressure indicator (450 bar)

Pressure setting

2 2 bar setting pressure
5 5 bar setting pressure

Indication type

C Electrical indicator

Modification number

X Latest version is always supplied

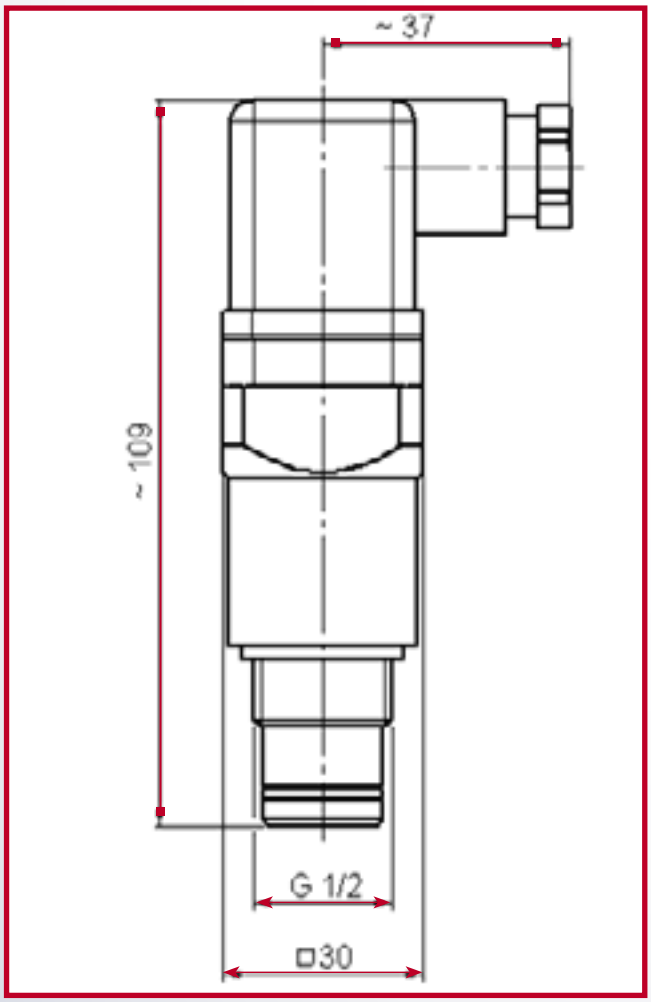
Supplementary details

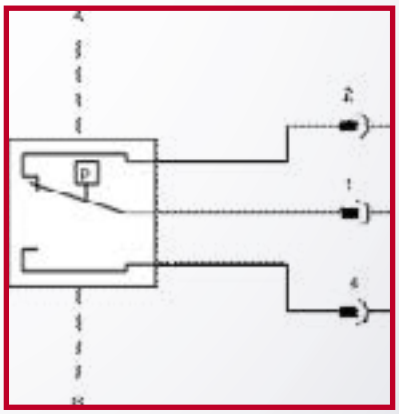
V (standard) FPM (Viton) seal, indicator suitable for phosphate ester (HFD-R) and rapidly biodegradable oils

W Indicator suitable for oil-water emulsion (HFA, HFC)

2GBC Indicator suitable in intrinsically safe electrical circuits in zone 1 (category 2)
Gas atmosphere category ib (intrinsic safety),
Explosion sub-group II C according to ATEX-directive 94/9 EC

SO135 Indicator suitable for PLC controls (gold contacts)





WIRING DIAGRAM

FOR TORQUE RATINGS, SEE POINT 9 SPARE PARTS

5. 'D' TYPE VISUAL/ELECTRICAL INDICATORS

VD 5 D . X /-V -SO135

Type of indicator

VD	Differential pressure indicator 450 bar
VDHP	Differential pressure indicator 700 bar

Pressure setting

2	2 bar setting pressure
5	5 bar setting pressure
8	8 bar setting pressure

(other settings on request)

Indication type

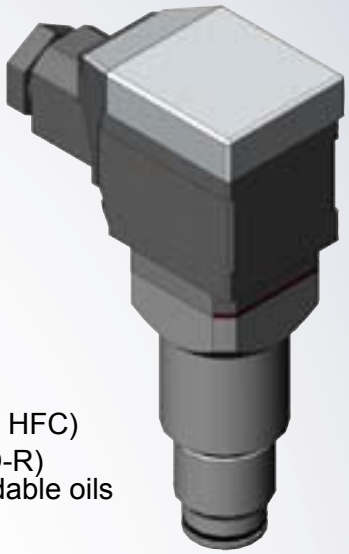
D	Visual/electrical indicator

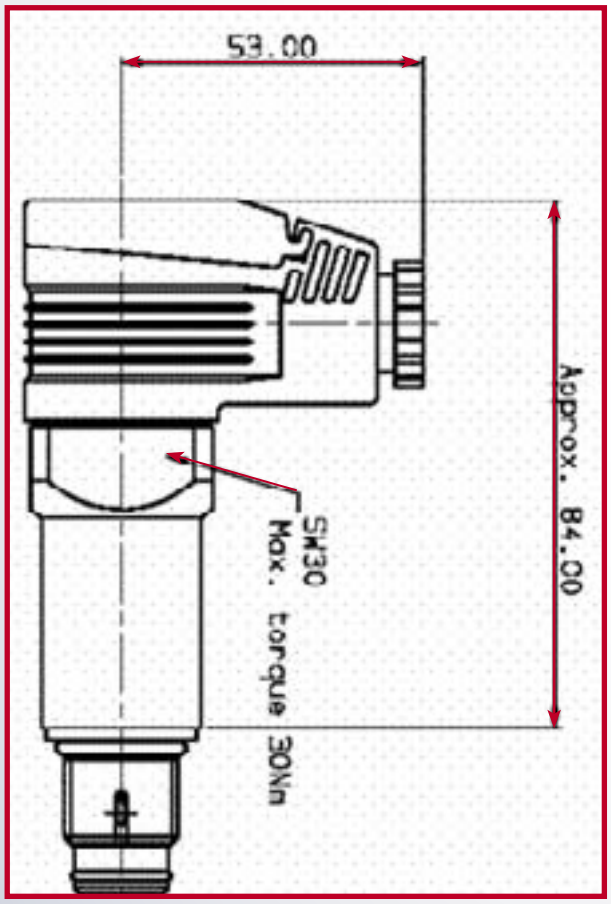
Modification number

X	Latest version is always supplied

Supplementary details

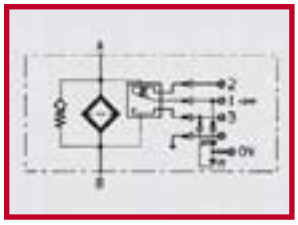
W	Indicator suitable for water glycol, & oil-water emulsion (HFA, HFC)	
V(standard)	FPM (Viton) seal, indicator suitable for phosphate ester (HFD-R) and biodegradable oils	
L24	Light with 24 Volt supply]	Only for model "D"
L48	Light with 48 Volt supply]	
L110	Light with 110 Volt supply]	
L220	Light with 220 Volt supply]	
LED	2 light emitting diodes up to 24 Volt supply]	
30C	Cold start suppression of switching outputs up to 30˚C ± 5˚C DC supply voltage only; contacts must be wired normally open only	
SO135	Indicator suitable for PLC controls (via gold cross point contacts)	



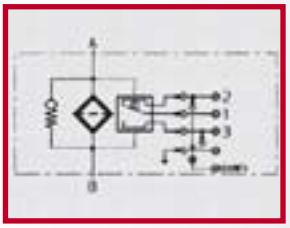


NOTE: High voltage peaks sometimes occur when inductances are switched off.Therefore the use of protection diodes should be considered.

**LED TYPE INDICATOR SHOWN CONNECTED TO A FILTER WITH BYPASS FUNCTION



*L TYPE INDICATOR SHOWN CONNECTED TO A FILTER WITH BYPASS FUNCTION



6. TECHNICAL SPECIFICATIONS

6.1. GENERAL

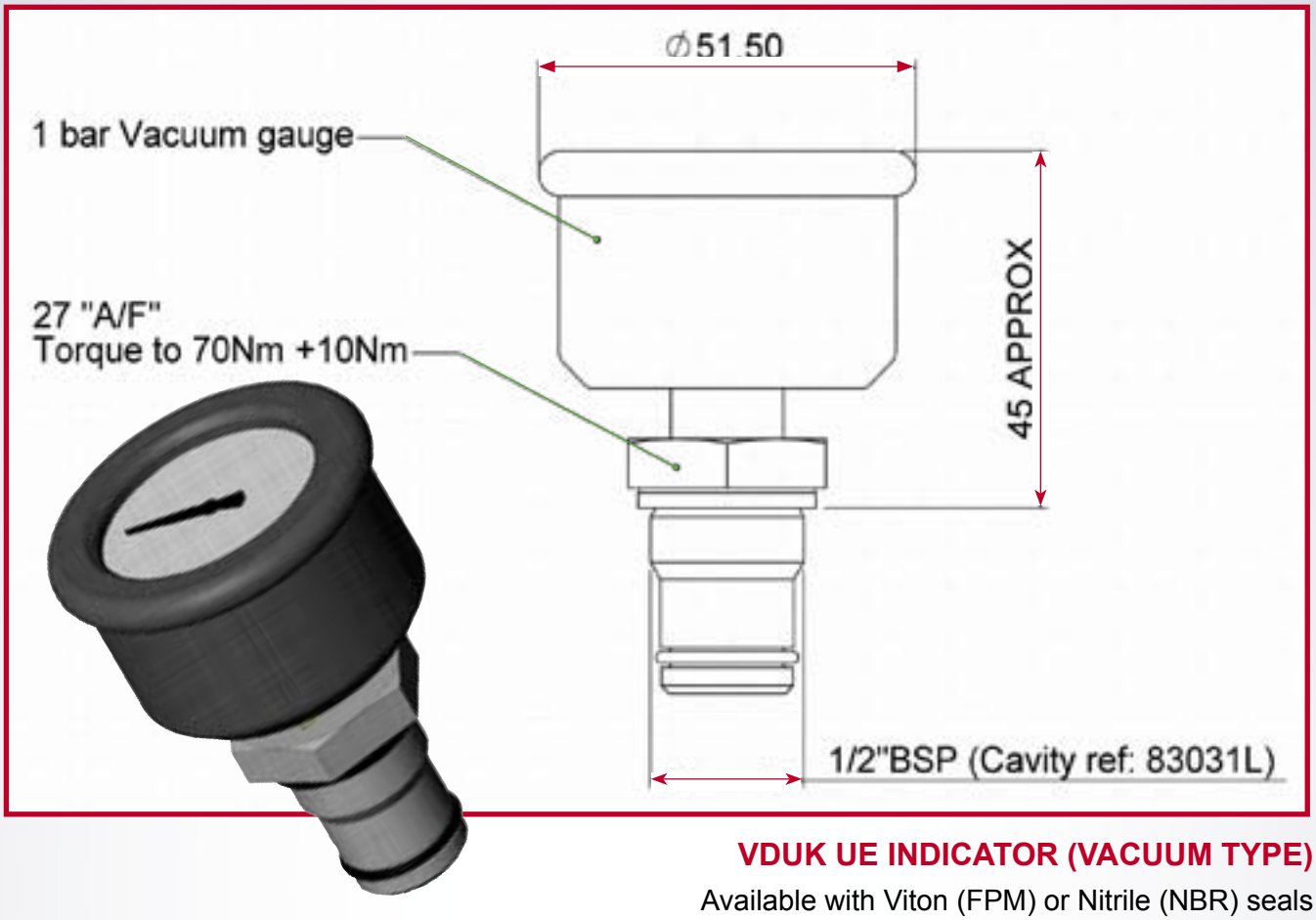
Type of indication	-	Visual/electrical
Weight	-	250g approx

6.2 ELECTRICAL INFORMATION

Switching type (*L type)	N/O or NC contacts (Switchable contacts)
Switching type (**LED type)	N/O contact only
Max switching voltages	See above for light and voltage variants
Electrical connection	Plug connection, PG 11, socket to DIN 43650
Max switching output at resistive load	100VA/60 W
Switching capacity (*L type)	ohmic 3 A at 24 V = ohmic 5 A at 220 V ~
Switching capacity (**LED type)	ohmic 3 A at 24 V =
Safety class (to DIN 40050)	IP65 (Only if plug is wired & fitted correctly)

7. NON-STANDARD INDICATORS (SPECIALS ON REQUEST)

7.1. 1 BAR VACUUM GAUGES (UE TYPE) FOR USE ON SUCTION FILTERS

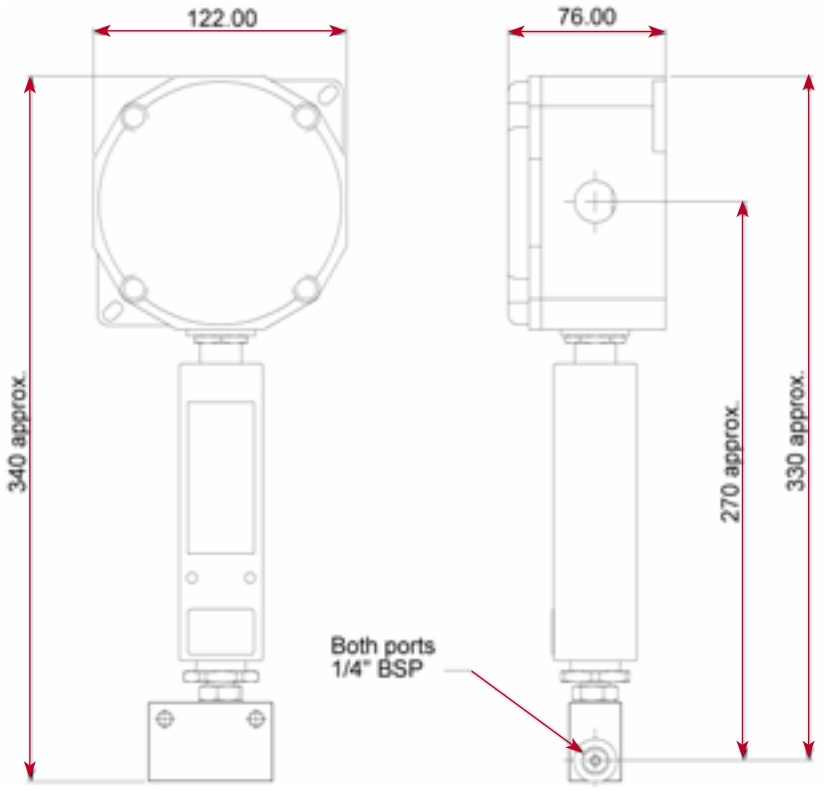


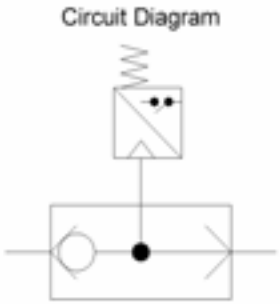
VDUK UE INDICATOR (VACUUM TYPE)

Available with Viton (FPM) or Nitrile (NBR) seals

Model code: VDUK-UE-1 Part number: 1200003012 Material: 316 S11 S/Stl

7.2. SHUTTLE TYPE EExd & EExIA INDICATORS FOR USE WITH RETURN LINE TANK-TOP FILTERS





Technical Details

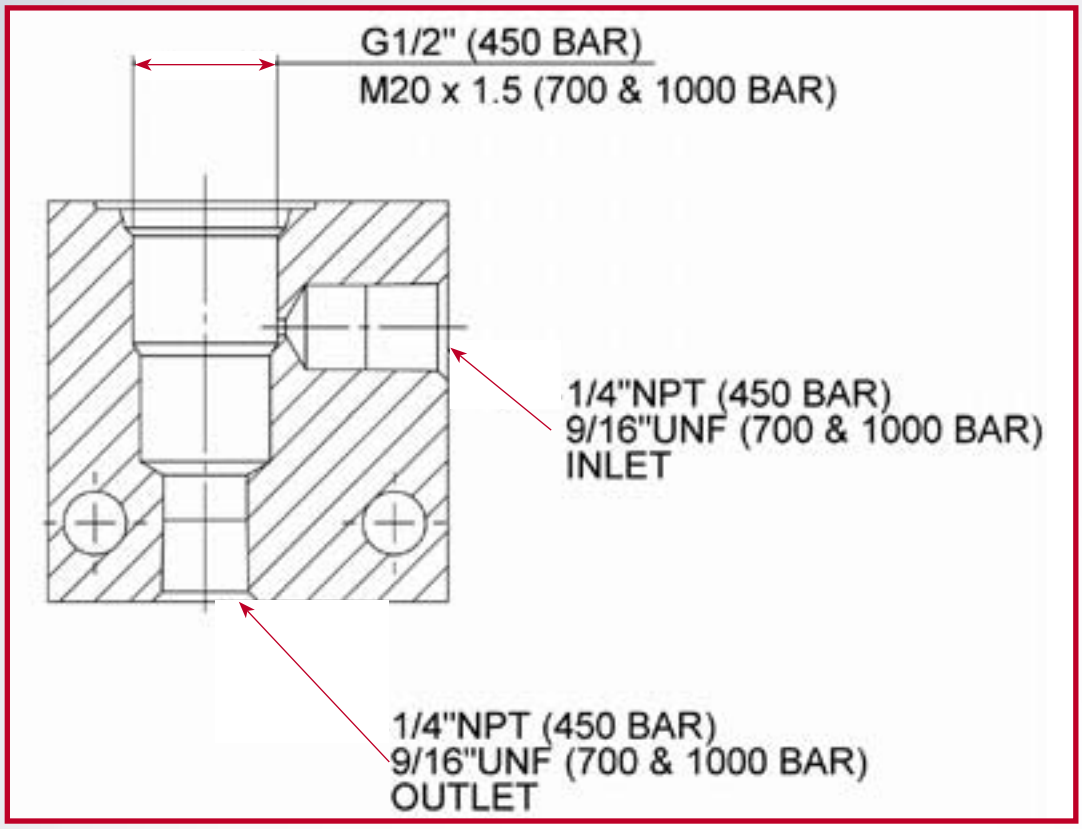
Nominal Pressure = 40 Bar
Ambient Temp. Range -20ºC to 50ºC
System Temp.Range -20ºC to 150ºC
Viscosity Range 5/380 mm²/s

Electrical Details

Pressure Switch = EExd & EExdia
Enclosure = EExe II T6
Contacts: Switchable NO/NC
Elec. Conn.: Typ BK3 3 Terminals
Max switching current: 5A @ 250Vac / 3A @ 30Vdc

8. ADAPTORS FOR CLOGGING INDICATORS

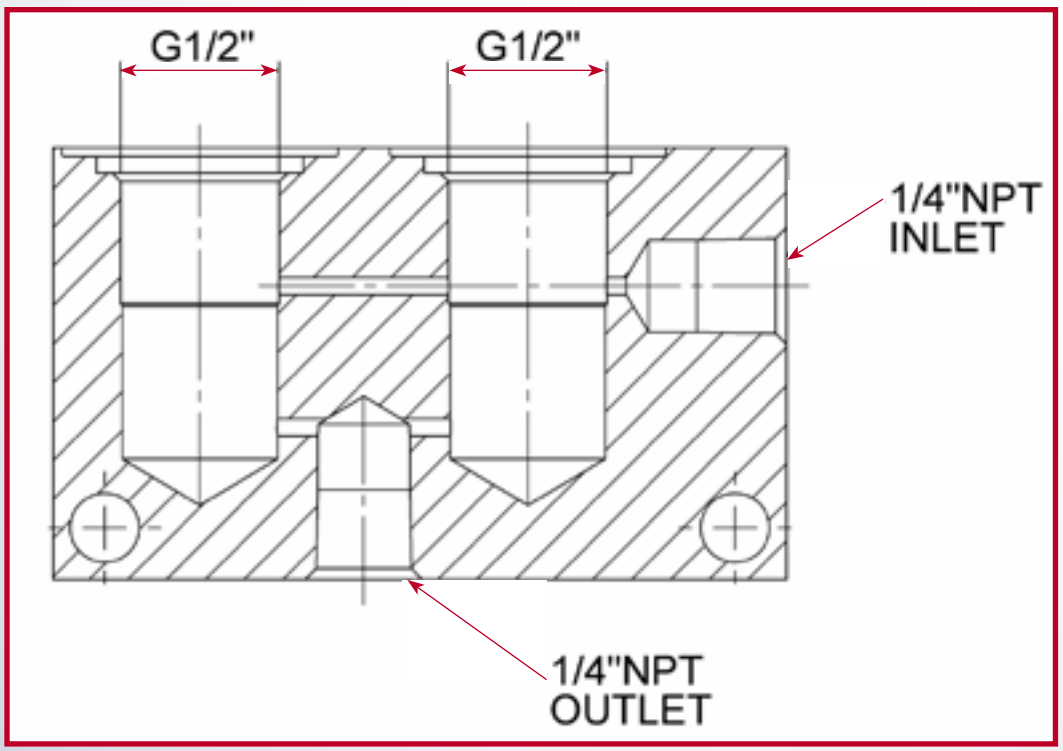
8.1. SINGLE INDICATOR BLOCK: 450, 700 & 1000 BAR APPLICATIONS



Up to 450 bar = P/N: 3171723
Up to 700 bar = P/N: 3265205
Up to 1000 bar = P/N: 3265208

MATERIAL = 316 S11 ST/ST

8.2. DUAL INDICATOR BLOCK: 450 BAR ONLY



Up to 450 bar = P/N: 3171820

MATERIAL = 316 S11 ST/ST

Specials are available on request. Please contact our technical sales department.

9. REPLACEMENT SEALS & SPARE PARTS

9.1 REPLACEMENT SEALS

ITEM NUMBER ELASTOMER		450 BAR	700 BAR	1000 BAR
ITEM1	VITON	610433	1200097307	1200097307
ITEM1	NITRILE	1200086174	1200097182	1200097182
ITEM1	NLT	1200086174	1200097182	1200097182
ITEM1	EPDM	3274394	1200099192	1200099192
ITEM2	VITON	413429	1200097308	3218024
ITEM2	NITRILE	411600	1200090383	3277296
ITEM2	NLT	411600	1200090383	3277296
ITEM2	EPDM	4116001202776	1200099191	3277295
ITEM3	PEEK	Not Applicable	Not Applicable	3167217

9.2. TORQUE VALUES ('IS 2GBC' indicators)

Torque value square 30
100 Nm (for non-preformed seal, item 1, fig. 2)
50 Nm (for preformed seal, item 1, fig. 2)

Torque value hex 17
1.5 – 2.5 Nm

Torque value
item 3a, fig. 2
0.5 – 0.6 Nm

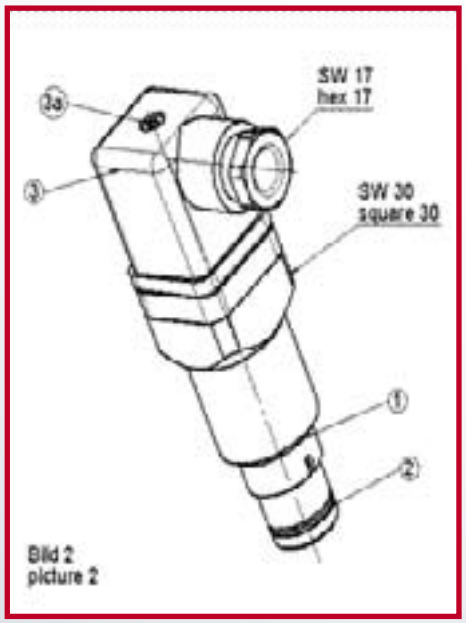
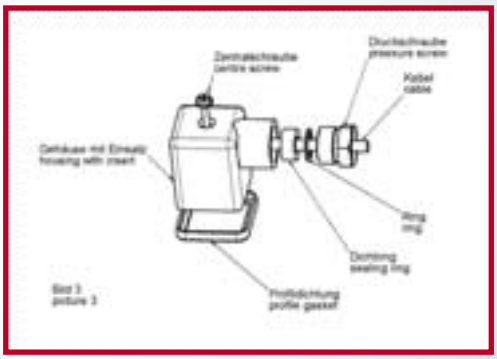


Bild 2
picture 2



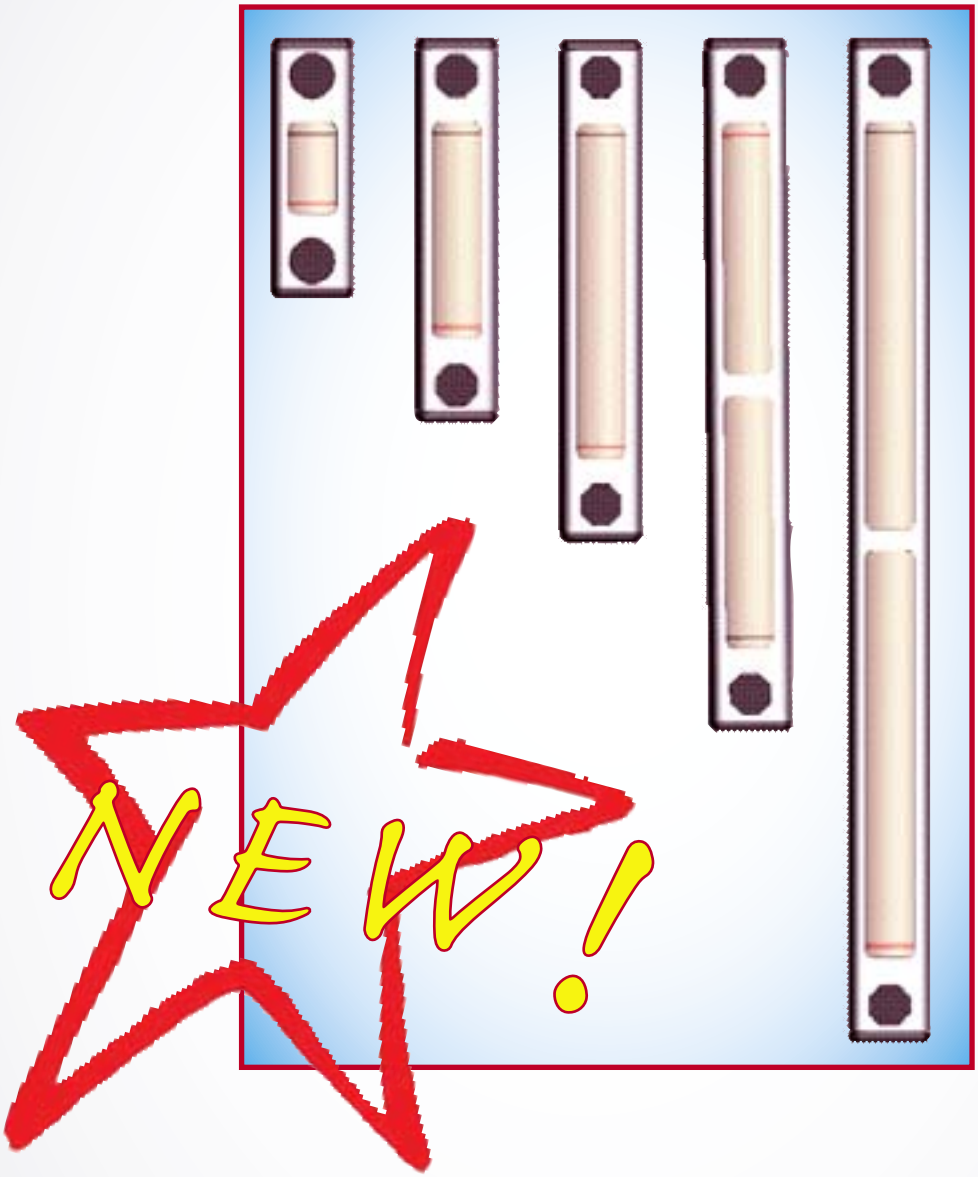
9.3 SPARE PARTS ('IS2GBC' indicators)

Connection plug
(E C.O/-2GBC) = 01285305
Seal kit-E VD = 00319648
Seal kit-E VD /-V = 00319638

Profile seal ring VD
O-ring 15x1.5

VI. Fluid Level Gauge FSA

PATENTED DESIGN



BENEFITS

- Cost competitive
- Lighter weight
- Improved view of oil levels

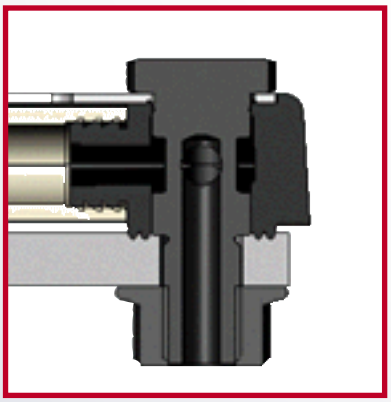
NEW FEATURES

- ABS housing
- Single length tubes

Features

- Housings in Aluminium, Stainless Steel & high grade Nylon
- M12 x 1.75 Connection
- Compatibility with all mineral oils used in the field of industrial and mobile hydraulics
- For use with other special fluids please contact HYDAC
- Temperature range: -30ºC to + 100ºC
- Special compound rubber end caps
- Recommended torque tightening: 10Nm
- Optional with customer logos incorporated
- Available in sizes 76mm (3”), 127mm (5”), 176mm (7”), 254mm (10”) and 381mm (15”) centres
- Will withstand pressures of up to 0.5 bar
- Fully integrated sealing arrangement enables easy installation
- Low cost high quality product
- Other options available

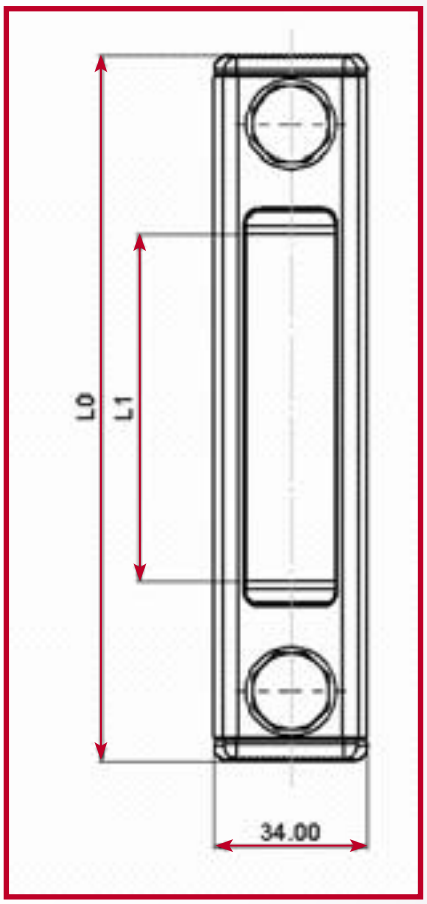
Twin shot injection moulded end caps



Improved sealing capabilities

Advantages

- Increased resistance to oils compared to the polyamide design used previously
- Anti - corrosion
- Increased sealing areas and flexible design to account for uneven surfaces
- No O-ring seals are required (Integral to design)
- Metal to metal shoulder butts on fixings eliminate overtightening problems.



Industrial & mobile applications

SIZE - CENTRE DISTANCE OF BOLTS	L0	L1	L2	WEIGHT
076	108	34	76	0.15kg
127	159	76	127	0.17kg
176	208	125	176	0.18kg
254	286	203	254	0.20kg
381	413	330	381	0.23kg

1. TECHNICAL DETAILS

1.1 MATERIALS

End caps, tube and housings in high quality synthetic material.
Bolts, nuts and washers in steel (plated).

1.2 NOMINAL PRESSURE Max. 1 bar

1.3 OPERATING FLUIDS

Mineral oil to DIN 51524, part 1 and 2, water-oil emulsions and synthetic fluids, such as hydraulic fluids based on phosphate ester (NOT water glycol).

For other fluids, please contact our technical sales department.

1.4 TEMPERATURE OF OPERATING FLUIDS

-20ºC to +80ºC

1.5 MOUNTING POSITION

Vertical on the tank wall.

1.6 MODEL CODE FOR FSA

FSA - 076 - 2 . 2 / - / 12

Fluid Level Gauge

Size

Centre distance of bolts

076
127
176
254
381

Material of Seals

2 - Viton (FKM)
1 - Perbunan (NBR)

Series

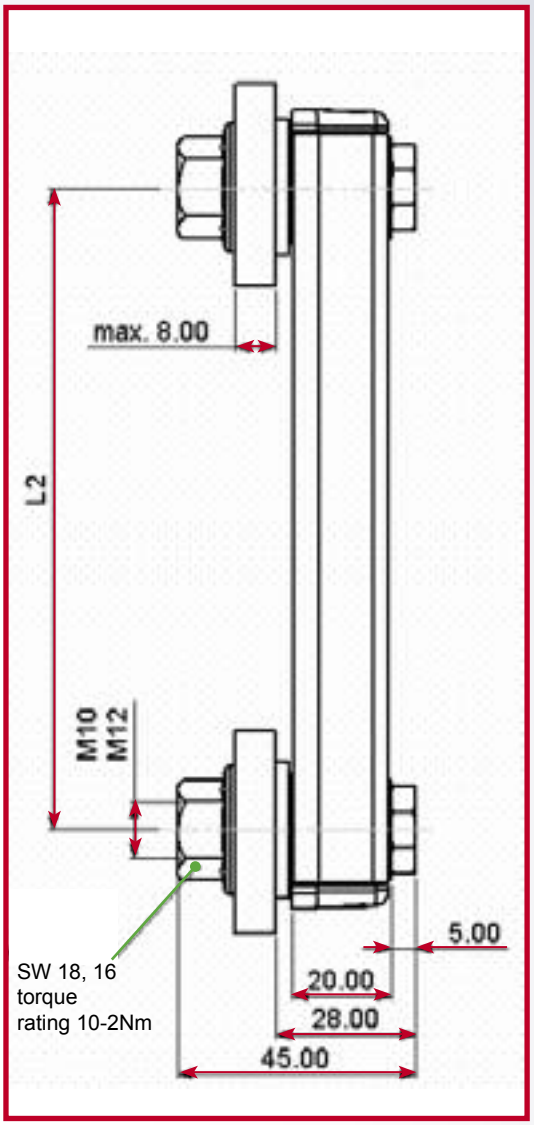
Thermometer – T / Temperature Gauge – FT

Mounting M10 / M12

2. FLUID LEVEL GAUGES (with So 14 Option)

2.1. DESCRIPTION

- Fluid level gauges are available in five sizes with the option of built-in thermometer or temperature gauge for use on hydraulic tanks, lubrication, cooling, cutting oil tanks and gear boxes.
- Suitable for use with all mineral oils and synthetic fluids such as phosphate esters. For other fluids, such as water glycols and emulsions, please contact our sales/technical department.
- On fluid level gauges with thermometer, the oil temperature is shown in degrees Centigrade and degrees Fahrenheit.



2.2 MOUNTING

Two banjo bolts M10 or M12. The mounting holes can either be tapped M10 or M12 or clearance holes drilled to 11 or 13 mm diameter. Tightening torque of the screws is max. 10 Nm (1mkp)

3. HYDRAULIC DETAILS

3.1 TEMPERATURE RANGE

-20°C - +80°C (nitrile)
-20°C - +100°C (FKM)

3.2 PERMISSIBLE TANK PRESSURE

1 bar

3.3 TEMPERATURE GAUGE RANGE

Thermometer model T +20°C - +80°C
Thermometer model FT 0°C - +100°C

4. MODEL CODE

FSA 76 1.X/T/12/So14

Fluid Level Gauge

Size

76
127
176
254
381
Size - centre distance of bolts

Material of Seals

1 - nitrile
2 - fluorocarbon elastomer (FKM)

Modification Number

The latest version is always supplied

Thermometer

T - in the sight glass
FT200 - temperature gauge 200 mm long
FT300 - temperature gauge 300 mm long

Banjo Bolt Thread

M 12
M 10

Special Features

So 14 - Glass tube & steel housing
So 08 - Stainless steel nuts & bolts only (all sizes)
So 07 - Glass tube Stainless steel cover and nuts & bolts (size 127, 254 & 381 only)

5. FSA - SPECIAL LIST (Offshore)

SO No.	Type/Description	Special Part	Stock No.	Design Type (A) old (N) new	Status
7	FSA-XXX-X.X/0/X/XX (Housing, Fixing bolt is stainless steel valid for old design)	Bolt M10 in stainless steel Bolt M12 in stainless steel Hex. nut M10 - **ISO 4032 A4** Hex. nut M12 - **ISO 4032 A4** *Housing in stainless steel*	391119 388611 602217 602218 -	A	Valid
70	FSA-XXX-X.X/X/XX	Special T label	-	N	Valid
71	FSA/K-381-X.X/X/XX (Housing, Fixing bolt in stainless steel valid for old designs)	Bolt M10 in stainless steel Bolt M12 in stainless steel Hex. nut M10 - **ISO 4032 A4** Hex. nut M12 - **ISO 4032 A4** *Housing in stainless steel*	391119 388611 602217 602218 9443	A/N	Valid
72	FSA/K-XXX-X.X/X/XX	Nitrile O rings Viton Seal ring	- -	A/N	Valid
75	FSA/K-XXX-X.X/X/XX	Steel washer	01689	A/N	Standard on all .1&2's
76	FSA/K-XXX-X.X/X/12	M12 High Flow Bolt	01233	A/N	Valid

NOTE

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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Brochure HPI 070/46.48/06-2006

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Brochure HPI 070/48.46/06-2006