



HYDAC INTERNATIONAL

Breathers and Filler Breathers

Your Professional Partner for Breathers and Filler Breathers.

HYDAC Quality.

HYDAC filtration technology is the culmination of rigorous laboratory testing as well as practical field-testing. It offers a complete range of filters for liquid and gaseous media. The HYDAC Filter Division manufactures products tailored to market requirements and to the highest quality standards, backed by modern machinery and a large production capacity. HYDAC Filtration Technology is based on intensive basic research, technical problem solving, specific customer requirements, and international standardization.

HYDAC Products.

Our wide range of products, combined with our expertise in development, manufacturing, sales and service enables the widest range of requirements to be met worldwide.

Our quality and environment certification to ISO 9001/2000 and ISO 14001 denote first class quality and responsible management of our resources.

System solutions.

One supplier. One contact.

Wherever you need us, we are there to help you find the most effective solution – for every application, from components to a complete system.

HYDAC is represented in all industries.

For more than 40 years and with over 5,000 employees, 40 overseas subsidiaries and over 500 sales and service partners worldwide, we are in close contact with our customers, providing engineering advice, production, installation and service. Core industries include:

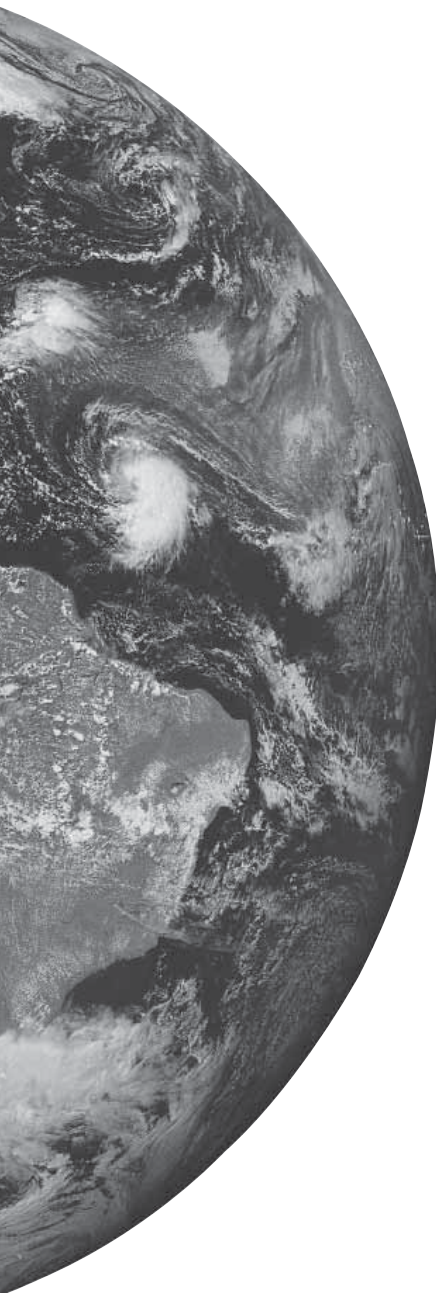
Mobile Hydraulics:

- Construction Machinery
- Agricultural Machinery
- Municipal Machines
- Fork Lifts
- Mining Machinery

Industrial Hydraulics:

- Machine Tools
- Injection Moulding Machines
- Paper Industry
- Power Plant Technology
- Mining
- Automotive Industry
- Iron/Steel/Metal Production
- Oil and Gas Industry
- Wind Energy





The importance of top quality air filters.

Air filters are an essential component of every hydraulic system. They guarantee that the air drawn into the tank as a result of fluctuations in the oil level is filtered reliably.

Very often too little attention is paid to air filters, with disastrous consequences.

They are seen as mass-produced items and are selected purely on price. This misapprehension can lead to inefficiency in the system and even to failure of components.

By using first class, cost-effective HYDAC breather filters, contamination is prevented from entering the system from the air – which means:

Longer life expectancy and availability for the whole system.

Top quality filter elements.

HYDAC air filter elements consist of high quality phenolic resin impregnated paper and provide a low-cost, yet very efficient protection against airborne contamination.

In contrast to the foam material elements, phenolic resin impregnated paper is resistant to water and therefore also ensures optimum component protection when water is drawn in.

HYDAC paper elements for air filters have a filtration rating of $3\ \mu\text{m}$ at a separation value of $\beta = 500$. This corresponds to a retention rate of 99.5 % for particles of $2\ \mu\text{m}$ and 100 % for particles of $3\ \mu\text{m}$.

Recommendations.

Higher specifications for cleanliness of the operating fluid result in increased demands on the filtration concept used. Accordingly, HYDAC recommends selecting an air filter that has at least the same filtration rating as the finest system filter in the hydraulic circuit.

The following changing intervals are recommended:

For air breathers without clogging indicator:

Please change your air filter every 6 months or at every service interval.

For air breathers with clogging indicators:

Please change your air filter at 0.2 pressure drop since a higher pressure drop could lead to cavitation at the pump.

Special features of the filter housing.

The durable HYDAC air filter housings are made from strong metal or glass fibre reinforced polyamide (PA6). They are particularly appropriate for the punishing demands of mobile applications.

Options:

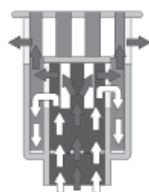
HYDAC's unique anti-splash feature prevents oil from splashing out of the tank via the breather filter (e.g. when the mobile machine is driving mode) (not available for BF 8 and 9 or BF/ELF 3 and 4).

Visual clogging indicator (available for BF 7, 8 and 9)

Dipstick (only on BF 10, 30)

Integrated check/bypass valve for pressurized tanks (not for BF/ELF 10, 30 and 5)

Custom thread (available on BF 7, 10 and 30) and cap with company logo (available for BF/ELF 7, 10 and 30)



Anti-splash protection



Visual clogging indicator



BF 10
with dipstick



Cap with company name /
company logo



Custom thread

Breather filters and dryers.

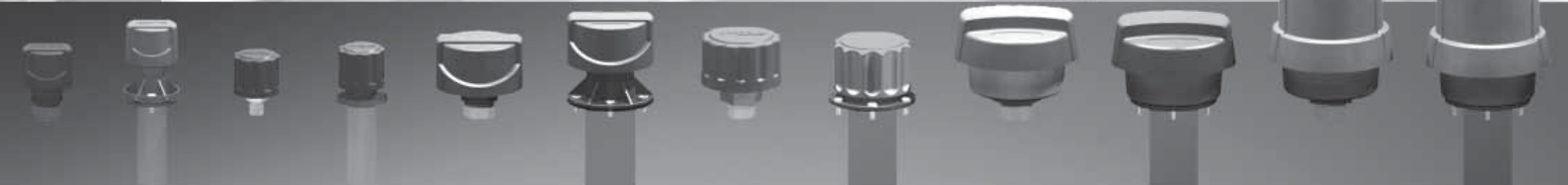
Drymicron breather filters and dryers prevent contamination particles and water vapour from entering the tank (see "Breather Dryer BDL/BDM" and "BDE" sections of the Filter Catalogue).



BDL / BDM



BDE

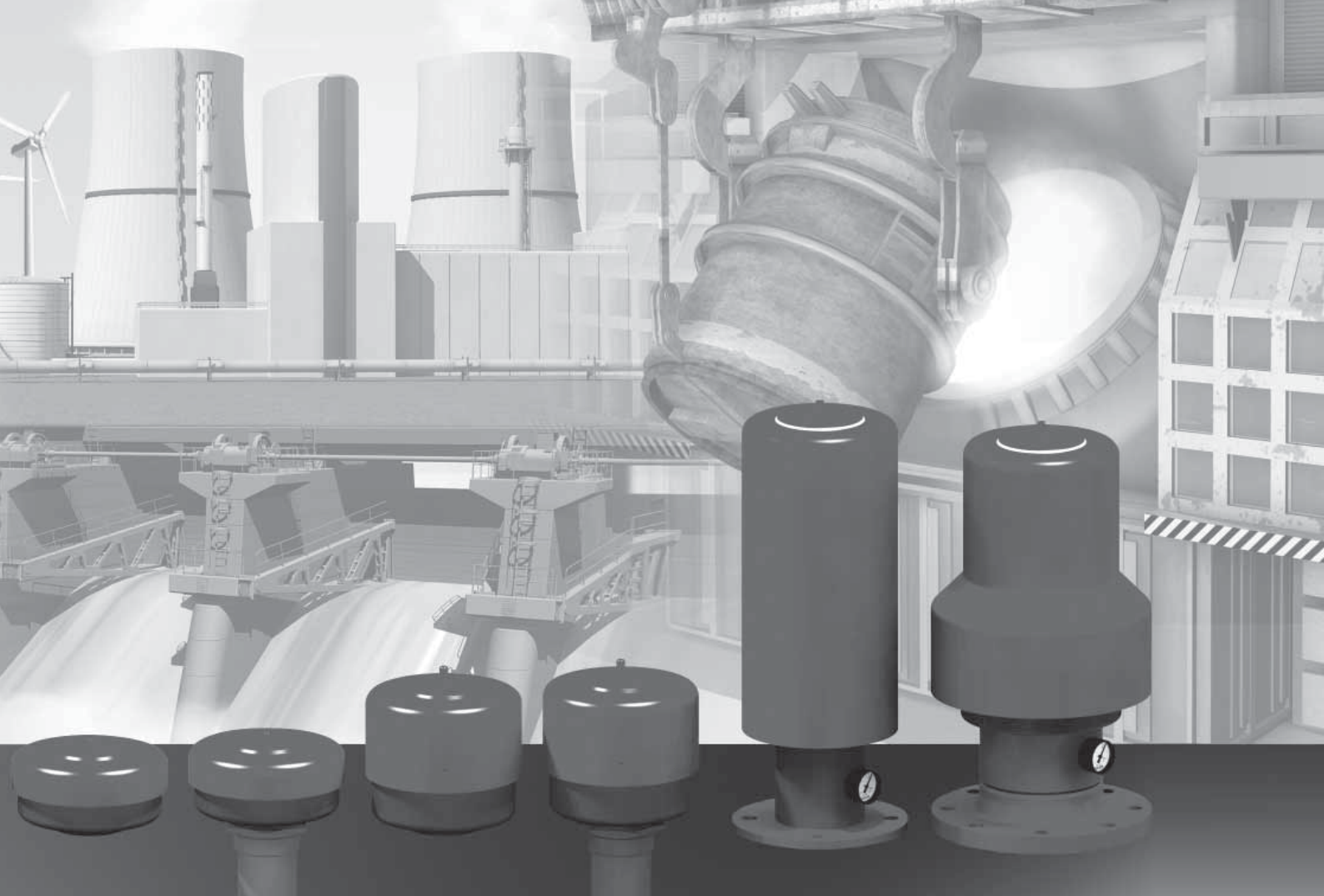


BF 10 ELF 10 BF 4 ELF 4 BF 30 ELF 30 BF 3 ELF 3 BF 7 ELF 7 BF 72 ELF 72

Technical Details	BF 10	ELF 10	BF 4	ELF 4	BF 30	ELF 30	BF 3	ELF 3	BF 7	ELF 7	BF 72	ELF 72
Litres/min (at $\Delta p = 0.01$ bar)	200	200	125	125	400	400	400	400	1000	1000	1200	1200
Litres/min (at $\Delta p = 0.04$ bar)	380	380	340	340	880	880	880	880	1800	1800	2100	2100
Connection type	Thread	Flange	Thread	Flange	Thread	Flange	Thread	Flange	Thread	Flange	Thread	Flange
Connection size	1/2 NPT, G1/4, M22x1.5, G3/8, SAE-12 male	3 hole flange	G 1/4 male	3 hole flange	G3/4, 3/4 NPT, M30x1.5, SAE-12, M42x2	6 hole flange	G3/4, G1/2 G3/8 male	6 hole flange	3/4 NPT, G1 male, 1 5/16-12 UN	6 hole flange	3/4 NPT, G1 male, 1 5/16-12 UN	6 hole flange
Element media	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper	3 μ m paper
Replaceable element	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Material of cap	Polyamide	Polyamide	Steel	Steel	Polyamide	Polyamide	Steel	Steel	Polyamide	Polyamide	Polyamide	Polyamide
Material of strainer	–	Polyamide	–	Polyamide	–	Polyamide	–	Polyamide	–	Polyamide	–	Polyamide
Clogging indicator	–	–	–	–	–	–	–	–	Optional	Optional	Optional	Optional

Options	BF 10	ELF 10	BF 4	ELF 4	BF 30	ELF 30	BF 3	ELF 3	BF 7	ELF 7	BF 72	ELF 72
Check valve	Optional	Optional	–	–	Optional	Optional	Optional	Optional	–	–	–	–
Anti-splash	Optional	Optional	–	–	Optional	Optional	–	–	Optional	Optional	Optional	Optional
Dipstick	Optional	Optional	–	–	Optional	Optional	Optional	Optional	–	–	–	–

For sizes BF/ELF 10 to BF/ELF 72, we recommend sizing the filters according to differential pressure ($\Delta p = 0.01$ bar)!



BF 5 ELF 5 BF 52 ELF 52 BF 8 BF 9

Technical Details	BF 5	ELF 5	BF 52	ELF 52	BF 8	BF 9
Litres/min (at $v = 20 \text{ m/s}$)	2600	2600	3600	3600	5500	9700
Litres/min (at $\Delta p = 0.01 \text{ bar}$)	3000	3000	5000	5000	10000	15000
Connection type	Thread	Thread	Thread	Thread	Flange	Flange
Connection size	G2 1/2 female	G2 1/2, G3 male	G2 1/2 female	G2 1/2, G3 male	DN93, 4 hole flange	DN125 8 hole flange
Element media	3 μm paper	3 μm paper	3 μm paper	3 μm paper	1 μm , 2 μm Betamicron	2 μm Betamicron
Replaceable element	Yes	Yes	Yes	Yes	Yes	Yes
Material of cap	Steel	Steel	Steel	Steel	Steel	Aluminium
Material of strainer	—	Steel	—	Steel	—	—
Clogging indicator	—	—	—	—	Optional	Optional

Options	BF 5	ELF 5	BF 52	ELF 52	BF 8	BF 9
Check valve	Optional	Optional	Optional	Optional	—	—
Anti-splash	—	—	—	—	—	—
Dipstick	—	—	—	—	—	—

For sizes BF 5 to BF 9, we recommend sizing the filters according to flow velocity ($v = 20 \text{ m/s}$)!

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

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Tank Breather Filter BF up to 11000 l/min



1. TECHNICAL SPECIFICATIONS

1.1 FILTER HOUSING

Construction

Breather filter sizes 4, 10, 3 and 30 consist of a housing which is screwed onto the oil tank, and a built-in filter element.

Sizes 5, 52, 7 and 72 have housings which are screwed onto the oil tank and have one or two exchangeable filter element(s).

BF 5 and 52 are fitted with a built-in oil mist trap as standard.

Sizes 8 and 9 consist of a flange for mounting to the tank, an exchangeable element and a cap. The BF 9 also has an oil mist trap which allows the oil to be drained via an oil drain plug.

1.2 FILTER ELEMENTS

HYDAC filter elements are validated and their quality is constantly monitored according to the following standards:

- ISO 2941
- ISO 2942
- ISO 2943
- ISO 3724
- ISO 3968
- ISO 11170
- ISO 16889

Contamination retention capacities in g

	Paper
BF	3 µm
4	2.9
10	2.9
3	6.2
30	6.2
7	26.1
72	52.2
5	85.1
52	170.2

The filter elements are made from phenolic resin impregnated paper and cannot therefore be cleaned.

1.3 FILTER SPECIFICATIONS

Temperature range	-30 °C to +100 °C
Material of housing	Steel, zinc-plated/plastic coated (BF 4, 3), Steel (BF 5, 52) Steel, galvanized (BF 8) Aluminium (BF 9) Glass fibre reinforced plastic (BF 10, 30, 7, 72)
Type of clogging indicator	VMF (pressure gauge)
Pressure setting of clogging indicator	0.6 bar K pressure gauge 0.035 bar UBM indicator (others on request)

1.4 SEALS

NBR (= Perbunan) on filter
Polyurethane on element
Cardboard on mounting flange

1.5 SPECIAL MODELS AND ACCESSORIES

- with check/bypass valve to support the suction characteristics of the pump
Not 100% air-tight or leakage-free!
(only BF 10 (except for G $\frac{1}{4}$), 3, 30, 5 and 52)
- with anti-splash device
(only BF 10, 3, 30, 7, 72)
- with connection for a clogging indicator
(only BF 7, 72, 8, 9)
- with manual pressure release
(= BFPR; only BF 10)

1.6 SPARE PARTS

See Original Spare Parts List

1.7 CERTIFICATES, APPROVALS, STANDARDS

BF 7, 72 to Renault standard;
others on request

1.8 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

The standard models are suitable for use with mineral and lubrication oils. For fire-resistant and biodegradable oils, see tables:

Fire-resistant fluids

BF	HFA	HFC	HFD-R
4, 3, 5, 52	—	—	—
10, 30, 7, 72	●	●	—
8, 9	●	●	●

- HFA oil in water emulsion (H₂O content \geq 80%)
- HFC water polyglycol solution (H₂O content 35-55%)
- HFD-R synthetic, water-free phosphate ester

Biodegradable fluids

BF	HTG	HE	PAG	HPG	PRG
4, 10, 3, 30,	+	+	●	●	●
7, 72, 5, 52	+	+	●	●	●
8, 9	+	+	●	●	●

+ suitable for all

● contact our Technical Sales Department

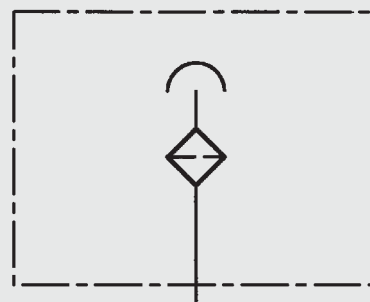
— not suitable

- HTG vegetable oil based hydraulic fluids
- HE ester-based synthetic hydraulic fluids
- HPG polyglycol-based synthetic hydraulic fluids
- PAG sub-group HPG: polyalkylene glycol
- PEG sub-group HPG: polyethylene glycol

1.9 CHANGING INTERVALS

The filter elements or filters must be replaced as frequently as the fluid filters, but at least every 12 months.

Symbol



2. MODEL CODE (also order example)

2.1 COMPLETE FILTER

2.1.1 BF 4 and 3

Filter type _____ **BF**
Filter material _____ **P** Paper
Size of filter _____ **BF 4, 3**
Type and size of connection _____ **BF P 3 G 3 W 4 . X /-RV**

Des.	Type	Connection	Filter size	
			BF4	BF3
G	Thread	G ¼	•	
	ISO 228	G ½		•
		G ¾		•
		G 3/8		•

Filtration rating in µm _____
P 3 (absolute)

Type of clogging indicator _____
W without port, no clogging indicator

Type code (TKZ) _____

Size	Code	Connection	Δp [bar]
BF 3	1.X	G ¾	-
BF 3	2.X	G 3/8	-
BF 3	3.X	G ½	-
BF 3../-RV	4.X	G ¾	0.4
BF 3../-RV	5.X	G ¾	0.7
BF 3../-RV	6.X	G ¾	0.2
BF 3../-RV	7.X	G ¾	1.0
BF 4	1.X	G ¼	-

Modification number _____
X the latest version is always supplied

Supplementary details _____
RV check/bypass valve (not for BF 4)

2.1.2 BF 10 and 30

Filter type _____ **BF**
Filter material _____ **P** Paper
Size _____ **BF 10, 30**
Type and size of connection _____ **BF P 30 G 3 W 1 . X /-RV**

Des.	Type	Connection	Filter size	
			BF10	BF30
G	Thread	G ¼	•	
	ISO 228	G ⅜	•	
		G ¾		•
M	metr. connection	M 42x2		•
		M 30x1.5		•
		M 22x1.5	•	
N	NPT thread	½	•	
		¾		•
U	UNF thread	1 1/16-12UN-2A	•	•

Filtration rating in µm _____
P 3 (absolute)

Type of clogging indicator _____
W without port, no clogging indicator

Type code (TKZ) _____

Size	Code	Connection
BF 30 G...	1.X	G ¾
BF 30 M...	1.X	M 42x2
BF 30 M...	2.X	M 30x1.5
BF 30 N...	1.X	NPT ¾
BF 30 U...	1.X	1 1/16-12UN-2A
BF 10 G...	1.X	G ¼
BF 10 G...	2.X	G ⅜
BF 10 M...	1.X	M 22x1.5
BF 10 N	1.X	NPT ½

Modification number _____
X the latest version is always supplied

Supplementary details _____
AS anti-splash without check/bypass valve
RV0.2 valve with relevant pressure setting
RV0.4 (not for BF 10 with G 1/4)
RV0.7

2.1.3 BF 7 and 72

Filter type _____ **BF**
Filter material _____ **P** Paper
Size _____ **BF 7, 72**
Type and size of connection _____ **BF P 72 G 3 W 1 . X /-AS**

Des.	Type	Connection	Filter size	
			7	72
G	Thread	G 1	•	•
	ISO 228			
N	NPT-Thread	¾	•	•
U	UNF-Thread	G 1 5/16-12UN	•	•

Filtration rating in µm _____
P 3 (absolute)

Type of clogging indicator _____
W without port, no clogging indicator
K pressure gauge (measuring range -1 to +0.6 bar) (not for BF 72)

UBM visual/analogue vacuum gauge with manual reset (pressure setting: -0.035 bar)

Type code (TKZ) _____
1

Modification number _____
X the latest version is always supplied

Supplementary details _____
AS anti-splash device (not for model with K pressure gauge)

2.1.4 BF 5 and 52

Filter type _____ **BF**
Filter material _____ **P** Paper
BN Betamicon®
Size _____ **BF 5, 52**
Type and size of connection _____ **BF P 52 G 3 W 1 . X /-RV0.4**

Des.	Type	Conn.	Filter size	
			5	52
G	Thread	G 2½	•	•
	ISO 228			

Filtration rating in µm _____
BN 3, 10 (absolute)
P 3 (absolute)

Type of clogging indicator _____
W without port, no clogging indicator

Type code (TKZ) _____
1

Modification number _____
X the latest version is always supplied

Supplementary details _____
RV0.4 check/bypass valve with 0.4 bar pressure setting
SO479 filter suitable for HFC fluids

2.1.5 BF 8 and 9

Filter type _____ **BF BN 8 F 1 W 1 . X**

Filter material _____

BN Betamicon®

BN/AM Betamicon®/Aquamicon®

Size _____

BF 8, 9

Type and size of connection _____

Des.	Type	Filter size	
		8	9
F	Flange	•	•

Filtration rating in µm _____

BN 1, 2 for BF 8

BN 2 for BF 9

BN/AM 1 for BF 8

Type of clogging indicator _____

A blanking plug in indicator port

K pressure gauge (measuring range -1 to +0.6 bar)

Type code (TKZ) _____

1

Modification number _____

X the latest version is always supplied

2.2 REPLACEMENT ELEMENT

Size _____ **0005 L 003 P**

0005 for BF 5, 52 (on BF 52: 2 x 0005 L...)

0007 for BF 7

0072 for BF 72

0008 for BF 8

0009 for BF 9

Type _____

L

Filtration rating in µm _____

P: 003 (BF 5, 52, 7, 72)

BN: 001, 002 (BF 8)

BN: 002 (BF 9)

BN: 003, 010 (BF 5, 52)

BN4AM:001 (BF 8)

Filter material _____

P Paper (BF 5, 52, 7, 72)

BN Betamicon® (BF 5, 52, 8, 9)

BN4AM Betamicon®/Aquamicon® (BF 8)

Replacement elements cannot be ordered for BF 4, 10, 3, 30.

These filters are only available complete!

2.3 REPLACEMENT CLOGGING INDICATOR

Type _____ **VMF 0.6 K . X**

VMF Return line indicator

Pressure setting _____

0.6 -1 to +0.6 bar

0.035 -0.035 bar

Type _____

A blanking plug in indicator port

K pressure gauge (pressure setting -1 to +0.6 bar)

UBM visual-analogue vacuum gauge with manual reset (pressure setting: -0.035 bar)

Modification number _____

X the latest version is always supplied

2.4 MODEL CODE FOR BF 7 AND 72 TO RENAULT SPECIFICATION

BF P 7 F 3 UBM 0 . X

Size _____
 7 Tank volume from 20 to 400 litre
 72 Tank volume over 400 litre

Type and size of connection _____

Des.	Type	Filter size	
		7	72
G	with threaded adapter	•	•
F	with flange adapter	•	•
S	with weld adapter	•	•

Type of clogging indicator _____

UBM visual analogue vacuum pressure gauge with manual reset, measuring range 0 to +0.035 bar

Type code (TKZ) _____

- 0 without adapter (basic model)
- 2 incl. adapter with male thread G $\frac{3}{4}$
- 3 incl. adapter with female thread 1½-16 UNC
- 4 incl. adapter with female thread G $\frac{3}{4}$
- 5 incl. flange adapter (1½-16 UNC)
- 6 incl. flange adapter (G $\frac{3}{4}$)
- 7 incl. weld adapter (1½-16 UNC)
- 8 incl. weld adapter (G $\frac{3}{4}$)
- 9 incl. adapter with male thread G 1¼

Modification number _____

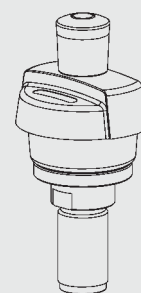
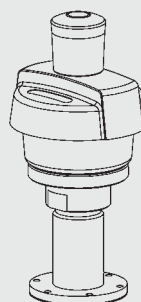
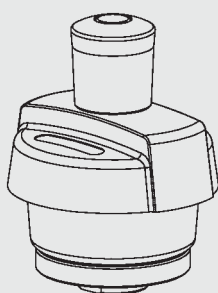
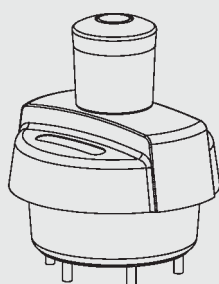
- X the latest version is always supplied
- EFS Filling protection

Basic model

With threaded adapter

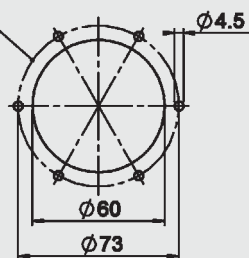
With flange adapter

With weld adapter

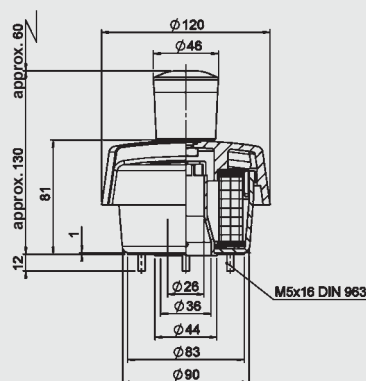


Dimensions BF 7/72 to RENAULT specification

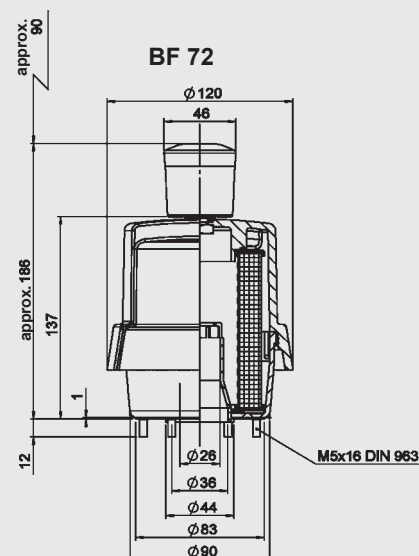
Interface to
DIN 24557/Pt 2



BF 7

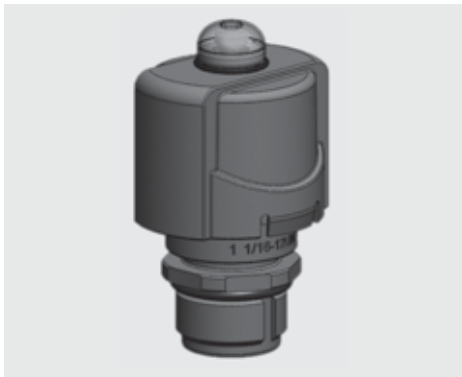


BF 72



For further information on the BF7/72 to Renault specification please contact HYDAC!

2.5 BREATHER FILTER WITH MANUAL PRESSURE RELEASE BFPR



TECHNICAL DESCRIPTION

Breather filters with manual pressure release "BFPR" consist of a housing which is screwed onto the oil tank and which has an integrated air filter element.

An integrated valve allows the oil tank to be pressurized to different pressures, for example to support the pump during start-up, thereby avoiding cavitation of the pump.

The manual pressure release function enables complete pressure release which is initiated when the pressure release button is pressed. This pressure release is required for example before carrying out maintenance on the tank and connecting pipes or hoses, to prevent potential accidents or injury by opening a pressurized system.

This filter must not be used as safety valve!

Max. flow rate: 200 l/min

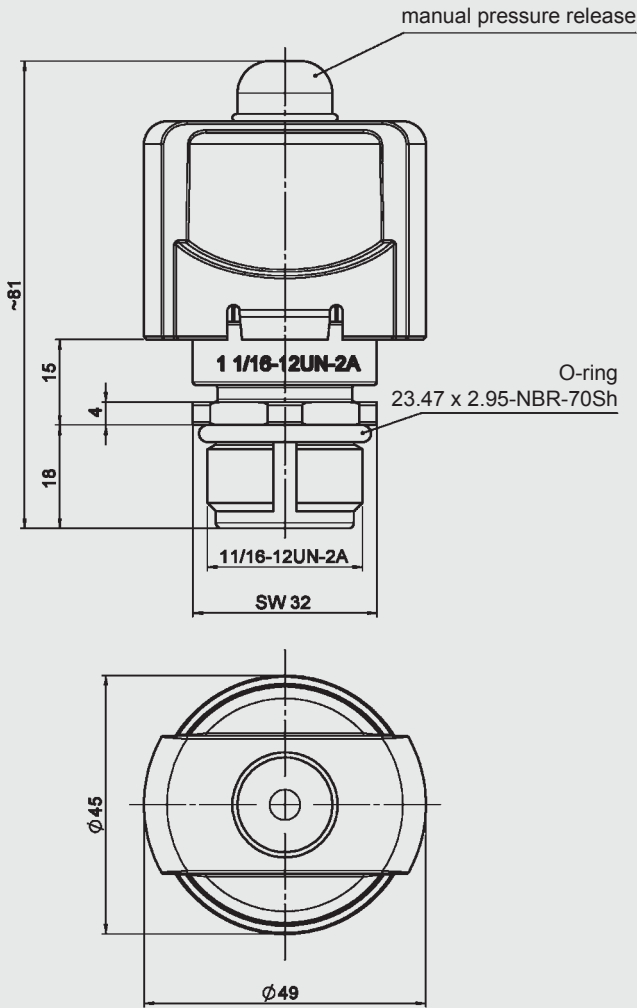
Weight: 0.22 kg

Curves and further information on request!

MODEL CODE

Type	Filter material	Size	Type of connection	Filtration rating (µm)	Type of clogging indicator	Type code	Modification number	Supplementary details
BFPR	P = phenolic resin impregnated paper	10	U = 1 1/16-12UN-2A others on request	3	W = without port (no clogging indicator)	1	.x = The latest version is always supplied	RV0.35 = pre-charge pressure 0.35 bar RV0.7 = pre-charge pressure 0.7 bar RV1.15 = pre-charge pressure 1.15 bar Required information!

DIMENSIONS



3. FILTER CALCULATION / SIZING

3.1 SINGLE PASS FILTRATION PERFORMANCE DATA FOR AIR FILTER ELEMENTS

The following separation values were established under real-life simulated conditions.

This means that the selected velocity of the flow against the filter mesh-pack was 20 cm/s and the contamination added was 40 mg/m³ of ISO MTD test dust.

Filtration rating	Retention value d...	For particle size	Filter material
3 µm	d 80	0.74 µm	Paper
	d 100	2.64 µm	
10 µm	d 80	0.25 µm	BN
	d 100	0.84 µm	

The d 80 value refers to the particle size which is filtered out at a rate of 80% during the retention test.

The particle size determined by this method is called the nominal filtration rating of the air filter. The d 100 value therefore refers to the particle size which is filtered out at a rate of 100% during the single pass test.

The particle size determined by this method is called the absolute filtration rating of the air filter.

Table of average dust concentrations in real life:

Urban regions with a low level of industry	3-7 mg/m ³ air
General mechanical engineering	9-23 mg/m ³ air
Construction industry (wheeled vehicles)	8-35 mg/m ³ air
Construction industry (tracked vehicles)	35-100 mg/m ³ air
Heavy industry	50-70 mg/m ³ air

3.2 DIFFERENTIAL PRESSURE ACROSS BREATHER FILTER

The differential pressure (with clean element) for the various filter sizes is shown in the graphs under Point 3.4.

3.3 SIZING GUIDELINES

The rate at which contamination enters a hydraulic system can be considerably reduced by using efficient tank breather filtration.

CAUTION:

Incorrectly sized tank breather filters can place additional strain on the system and reduce the service life of hydraulic filter elements.

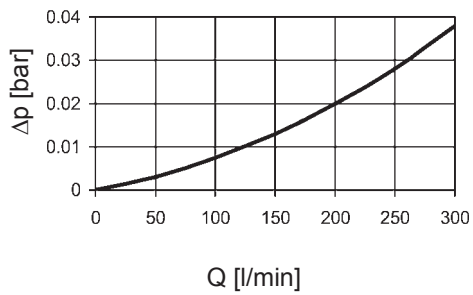
For optimum sizing the following should therefore be observed:

- Filtration rating of breather filter ≤ filtration rating of hydraulic filter
- Only use breather filters with an absolute retention rate ($d_{100} \leq x \text{ µm}$; x = given filtration rating)
- Max. permitted initial pressure loss: 0.05 bar, optionally 0.01 bar (with a clean filter element and calculated air flow rate)
- Determining the calculated air flow:
 $Q_A = f5 \times Q_p$
 Q_A = calculated air flow in l_N/min
 $f5$ = factor for operating conditions
 Q_p = max. flow rate of the hydraulic pump in l/min

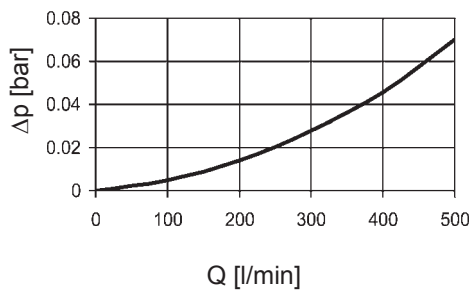
Ambient conditions	Factor f5
Low dust concentration; filter fitted with clogging indicator; continuous monitoring of the filter	1-2
Average dust concentration; filter without clogging indicator; intermittent monitoring of the filter	3-6
High dust concentration; filter without clogging indicator; infrequent or no monitoring of the filter	7-10

3.4 AIR FLOW RATE

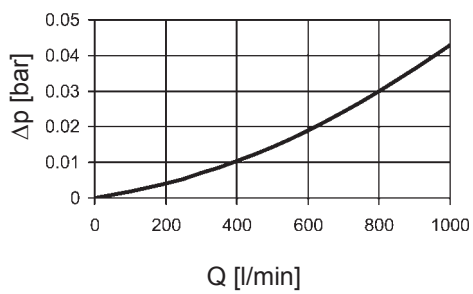
BF 4



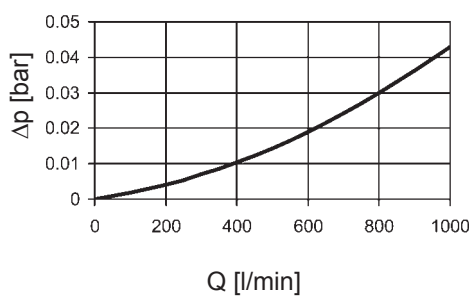
BF 10



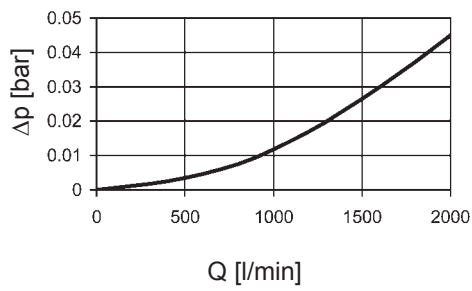
BF 3



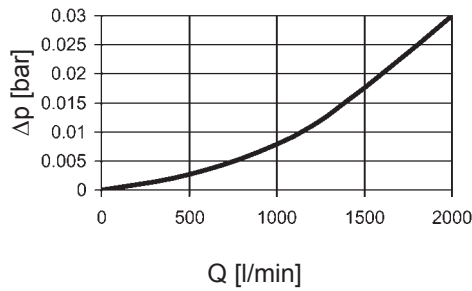
BF 30



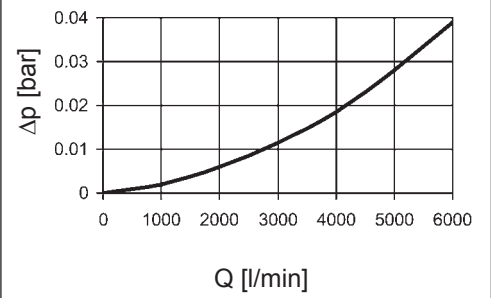
BF 7



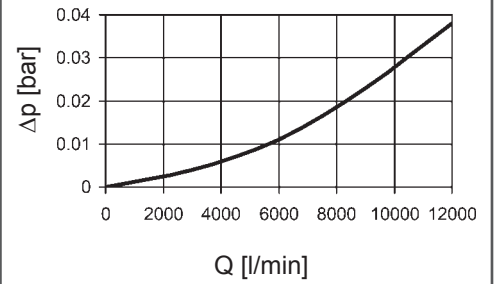
BF 72



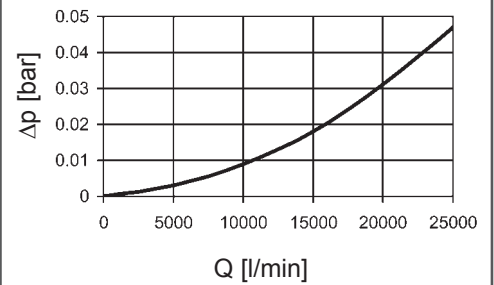
BF 5



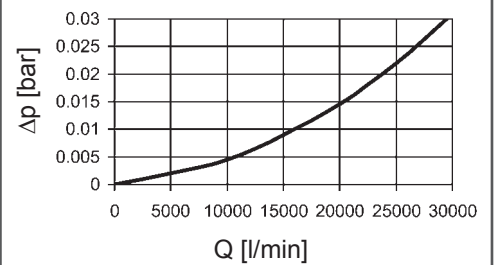
BF 52



BF 8



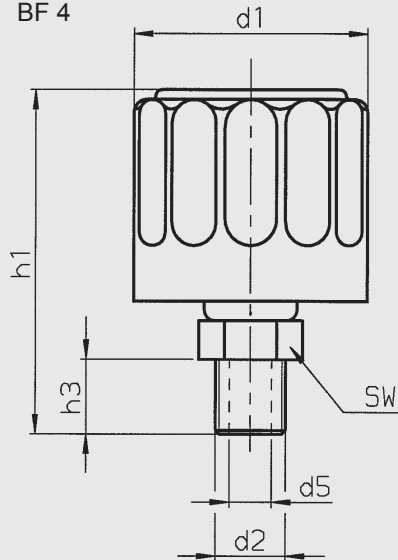
BF 9



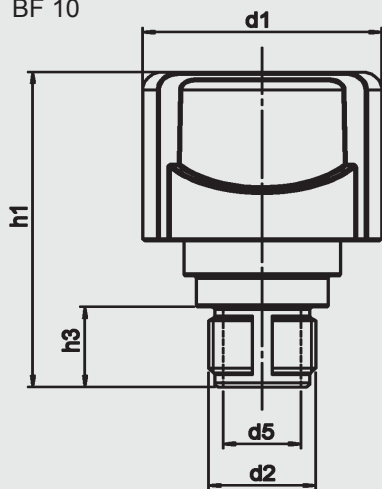
Pressure drop curves for BF filters with check/bypass valve (version /-RV...) on request.

4. DIMENSIONS

BF 4



BF 10

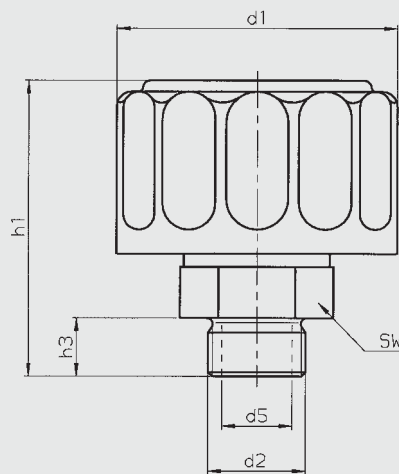


Type	BF 4...
d1	44
d2	G 1/4
d5	8
h1	62
h3	13.5
SW	17
Weight	0.08 kg

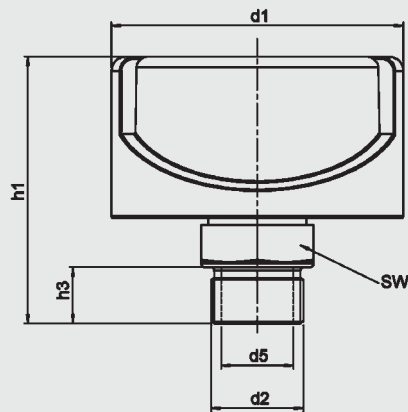
Type	BF 10 "G"...	BF 10 "M"...
d1	49	49
d2	G 1/4	M22x1.5
d5	7	16
h1	64	71
h3	13.5	18
Weight	0.047 kg	0.052 kg

Type	BF 10 "U"...	BF 10 "N"...
d1	49	49
d2	1 1/16-12 UN	NPT 1/2
d5	16	14
h1	71	71
h3	18	18
Weight	0.059 kg	0.049 kg

BF 3



BF 30

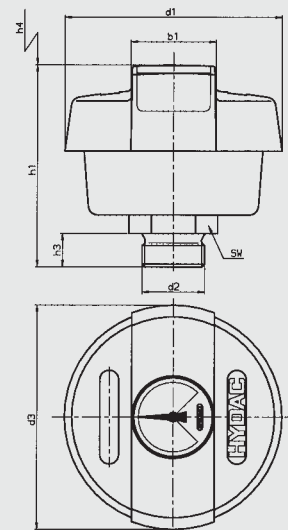


Type	BF 3...1.X	BF 3...2.X	BF 3...3.X
d1	76	76	76
d2	G 3/4	BSP 3/8"	G 1/2
d5	19	12	15
h1	79	72	76
h3	16	12	14
SW	36	22	27
Weight	0.33 kg		

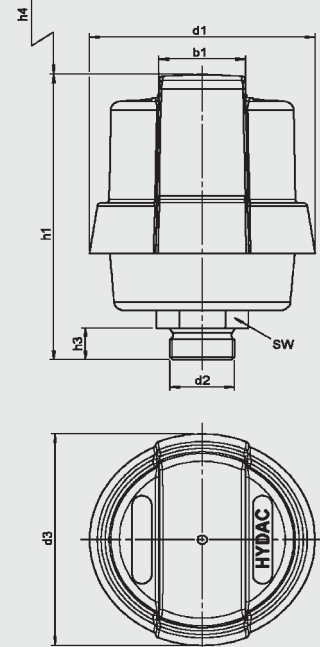
Type	BF 30 "G"...1.X	BF 30 "M"...1.X	BF 30 "M"...2.X
d1	83	83	83
d2	G 3/4	M42x2	M30x1.5
d5	20.5	34.5	20.5
h1	76	76	76
h3	16	16	16
SW	32	46	32
Weight	0.12 kg	0.13 kg	0.12 kg

Type	BF 30 "N"...1.X	BF 30 "U"...1.X
d1	83	83
d2	NPT 3/4	1 1/16-12 UN
d5	20.5	20.5
h1	76	76
h3	16	16
SW	32	32
Weight	0.12 kg	

BF 7



BF 72

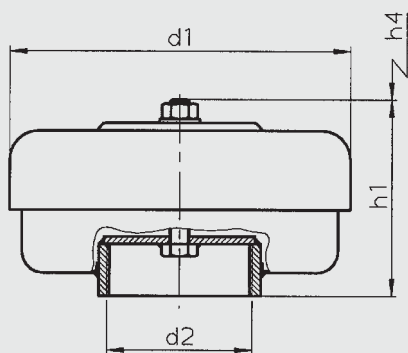


Type	BF 7 "G"	BF 72 "G"
d1	116	116
d2	G 1	G 1
d3	120	120
h1	110	162
h3	18	18
h4	60	90
b1	44	44
SW	41	41
Weight	0.40 kg	0.65 kg

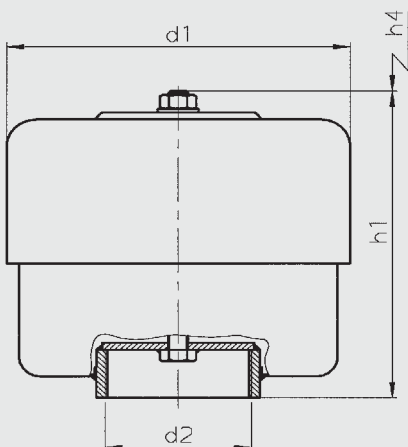
Type	BF 7 "N"	BF 72 "N"
d1	116	116
d2	NPT 3/4	NPT 3/4
d3	120	120
h1	110	162
h3	18	18
h4	60	90
b1	44	44
SW	32	32
Weight	0.40 kg	0.65 kg

Type	BF 7 "U"	BF 72 "U"
d1	116	116
d2	1 5/16-12 UN	1 5/16-12 UN
d3	120	120
h1	110	162
h3	18	18
h4	60	90
b1	44	44
SW	41	41
Weight	0.40 kg	0.65 kg

BF 5

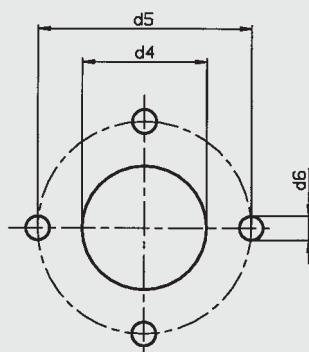
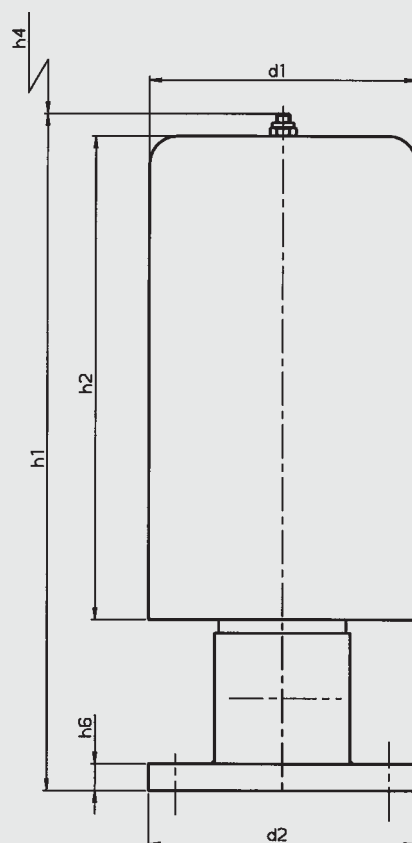


BF 52



Type	BF 5...	BF 52...
d1	177	177
d2	G 2½	G 2½
h1	107	173
h4	90	90
Weight	2.00 kg	2.60 kg

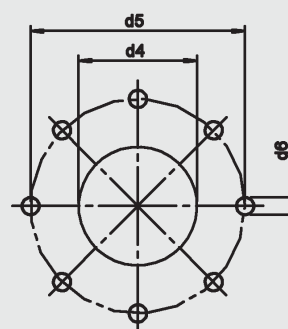
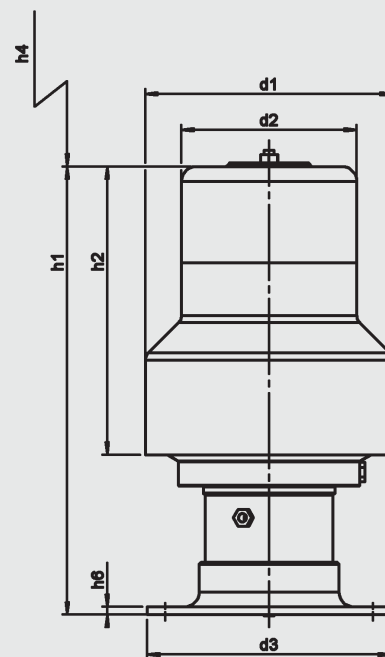
BF 8



Interface

Type	BF 8...
d1	200
d2	200
d4	93
d5	160
d6	18
h1	510
h2	365
h4	400
h6	20
Weight	12.4 kg

BF 9



Interface

Type	BF 9...
d1	250
d2	177
d3	246
d4	116
d5	210
d6	17
h1	455
h2	290
h4	330
h6	8
Weight	6.2 kg

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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E-Mail: filter@hydac.com



Tank Breather Filter with Filler Strainer ELF up to 5500 l/min



1. TECHNICAL SPECIFICATIONS

1.1 FILTER HOUSING Construction

Tank breather filters size 4, 10, 3 and 30 consist of an air filter top, which is connected to the mounting flange by a bayonet plate or a threaded boss, and a filler strainer.

Sizes 5 and 52 consist of a two-part threaded air filter top, with built-in oil mist trap, one or two exchangeable filter element(s) and a filler strainer.

Sizes 7 and 72 consist of a two-part flanged filter top, an exchangeable filter element and a filler strainer.

1.2 FILTER ELEMENTS

Contamination retention capacities in g

	Paper
ELF	3 µm
4	2.9
10	2.9
3	6.2
30	6.2
7	26.1
72	52.2
5	85.1
52	170.2

The filter elements are made from phenolic resin impregnated paper and cannot therefore be cleaned.

1.3 FILTER SPECIFICATIONS

Temperature range	-30 °C to +100 °C
Material of housing	Steel, zinc-plated/plastic coated (ELF 4, 3), steel (ELF 5, 52) glass fibre reinforced synthetic material (ELF 10, 30, 7, 72)
Material of filler strainer	Synthetic: ELF 10, 4, 30, 3, 7, 72 Metal: ELF 5, 52
Type of clogging indicator	VMF (return line indicator)
Pressure setting of clogging indicator	0.6 bar K pressure gauge 0.035 bar UBM indicator (others on request)

1.4 SEALS

NBR (= Perbunan) on filter
NBR / Polyurethane on element
Cardboard on mounting flange

1.5 SPECIAL MODELS AND ACCESSORIES

- lockable model (only ELFL 3)
- with check/bypass valve to support the suction characteristics of the pump
Not 100% air-tight or leakage-free!
(only ELF 10, 3, 30, 5 and 52)
- with anti-splash device
(only ELF 10, 3, 30, 7, 72)
- with connection for a clogging indicator
(only ELF 7, 72)
- with filler adapter for automotive applications
(only ELF 7 and 72) - see Point 5.

1.6 SPARE PARTS

See Original Spare Parts List

1.7 CERTIFICATES AND APPROVALS

On request

1.8 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

The standard models are suitable for use with mineral and lubrication oils.
For fire-resistant and biodegradable oils, see tables:

Fire-resistant fluids

ELF	HFA	HFC	HFD-R
4, 3, 5, 52	-	-	-
10, 30, 7, 72	●	●	-

- HFA oil in water emulsion (H₂O content ≥ 80%)
- HFC water polyglycol solution (H₂O content 35-55%)
- HFD-R synthetic, water-free phosphate ester

Biodegradable fluids

ELF	HTG	HE	HPG	PRG
all sizes	+	+	●	●

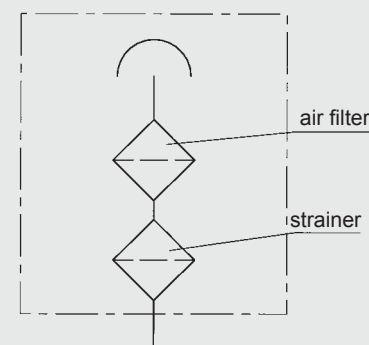
- + suitable for all
- contact our Technical Sales Department
- nicht einsetzbar

- HTG vegetable oil based hydraulic fluids
- HE ester-based synthetic hydraulic fluids
- HPG polyglycol-based synthetic hydraulic fluids
- PAG sub-group HPG: polyalkylene glycol
- PEG sub-group HPG: polyethylene glycol

1.9 CHANGING INTERVALS

The filter elements or filters must be replaced as frequently as the fluid filters, but at least every 12 months.

Symbol



2. MODEL CODE (also order example)

2.1 COMPLETE FILTER

2.1.1 ELF 4, 10, 3, 30 and ELFL 3

Filter type _____ **ELF P 30 F 3 W 1 . X /-RV0.4**

Filter type _____

ELF

ELFL (lockable)

Filter material _____

P Paper

Size _____

ELF 4, 10, 3, 30

ELFL 3

Type and size of connection _____

	Filter size			
	4	10	3	30
F = Flange	●	●	●	●

Filtration rating in μm _____

P 3 (absolute)

Type of clogging indicator _____

W without port, no clogging indicator

Type code (TKZ) _____

Filter size	Code	Δp [bar]
ELF 4	1.X	-
ELF 10	1.X	-
ELF 3	1.X	-
ELF 3.../-RV	4.X	0.4
ELF 3.../-RV	5.X	0.7
ELF 3.../-RV	6.X	0.2
ELF 3.../-RV	7.X	1.0
ELF 30	1.X	-

Modification number _____

X the latest version is always supplied

Supplementary details _____

AS anti-splash without check/bypass valve (not ELF 3 & 4)

RV check/bypass valve (not ELF 4)

RV0.2 } valve with relevant cracking pressure
RV0.4 } (only ELF 10 and 30)
RV0.7 }

SO148 metal filler strainer, 200 mm long (only ELF 3 and 30)

SO175 metal filler strainer, 100 mm long (only ELF 3 and 30)

2.1.2 ELF 7 and 72

Filter type _____ **ELF P 72 F 3 W 1 . X /-SO148**

Filter type _____

ELF

Filter material _____

P Paper

Size _____

ELF 7, 72

Type and size of connection _____

	Filter size	
	7	72
F = Flange DIN 24557/Pt 2	●	●

Filtration rating in μm _____

P 3 (absolute)

Type of clogging indicator _____

W without port, no clogging indicator
K pressure gauge (measuring range
-1 to +0.6 bar) (not for ELF 72)

UBM visual/analogue vacuum gauge
with manual reset
(pressure setting: -0.035 bar)

Type code (TKZ) _____

0 for type UBM

1 for types W and K

Modification number _____

X the latest version is always supplied

Supplementary details _____

AS anti-splash without check/bypass valve
(only ELF 7, 72 without check/bypass valve)

SO148 metal filler strainer, 200 mm long

SO175 metal filler strainer, 100 mm long

SO394 ELF filter without strainer

2.1.3 ELF 5 and 52

Filter type _____ **ELF P 52 G 3 W 2 . X /-RV0.4**

Filter type _____

ELF

Filter material _____

P Paper

BN Betamicon®

Size _____

ELF 5, 52

Type and size of connection _____

		Filter size	
		5	52
G = Thread	G1 1/2	●	●
	G2	●	●
	G2 1/2	●	●
	G3	●	●

Filtration rating in μm _____

P 3 (absolute)

BN 3 (absolute)

Type of clogging indicator _____

W without port, no clogging indicator

Type code (TKZ) _____

Code Connection

2.X G 2½

3.X G 3

4.X G 2

5.X G 1½

Modification number _____

X the latest version is always supplied

Supplementary details _____

RV0.4 check/bypass valve with 0.4 bar pressure setting

SO479 filter suitable for HFC fluids

2.2 REPLACEMENT ELEMENT

Size _____ **0005 L 003 P**

Size _____

0005 for ELF 5, 52

0007 for ELF 7

0072 for ELF 72

Type _____

L

Filtration rating in μm _____

P 003

BN 003 (only for 0005)

Filter material _____

P Paper

BN Betamicon®

Replacement elements cannot be ordered for ELF 4, 10, 3, 30 and ELFL 3. These filters are only available complete!

2.3 REPLACEMENT CLOGGING INDICATOR

Type _____ **VMF 0.6 K . X**

Type _____

VMF Return line indicator

Pressure setting _____

0.6 -1 to +0.6 bar

0.035 -0.035 bar

Type _____

(see Point 2.1.2)

Modification number _____

X the latest version is always supplied

3. FILTER CALCULATION / SIZING

3.1 SINGLE PASS FILTRATION PERFORMANCE DATA FOR AIR FILTER ELEMENTS

The following separation values were established under real-life simulated conditions.

This means that the selected velocity of the flow against the filter mesh-pack was 20 cm/s and the contamination added was 40 mg/m³ of ISO MTD test dust.

Filtration rating	Retention value d...	For particle size	Filter material
3 µm	d 80	0.74 µm	Paper
	d 100	2.64 µm	

The d 80 value refers to the particle size which is filtered out at a rate of 80% during the retention test.

The particle size determined by this method is called the nominal filtration rating of the air filter. The d 100 value therefore refers to the particle size which is filtered out at a rate of 100% during the single pass test.

The particle size determined by this method is called the absolute filtration rating of the air filter.

Table of average dust concentrations in real life:

Urban regions with a low level of industry	3-7 mg/m ³ air
General mechanical engineering	9-23 mg/m ³ air
Construction industry (wheeled vehicles)	8-35 mg/m ³ air
Construction industry (tracked vehicles)	35-100 mg/m ³ air
Heavy industry	50-70 mg/m ³ air

3.2 DIFFERENTIAL PRESSURE ACROSS BREATHER FILTER

The differential pressure (with clean element) for the various filter sizes is shown in the graphs under Point 3.4.

3.3 SIZING GUIDELINES

The rate at which contamination enters a hydraulic system can be considerably reduced by using efficient tank breather filtration.

CAUTION:

Incorrectly sized tank breather filters can place additional strain on the system and reduce the service life of hydraulic filter elements.

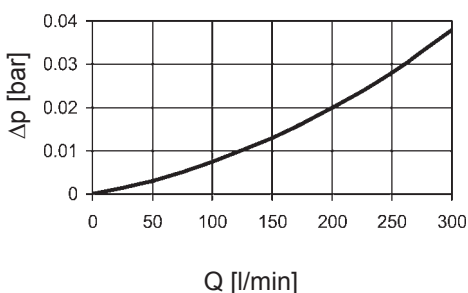
For optimum sizing the following should therefore be observed:

- Filtration rating of breather filter ≤ filtration rating of hydraulic filter
- Only use breather filters with an absolute retention rate ($d_{100} \leq x \mu\text{m}$; x = given filtration rating)
- Max. permitted initial pressure drop: 0.01 bar (with a clean filter element and at calculated air flow)
- Determining the calculated air flow:
 $Q_A = f_5 \times Q_p$
 Q_A = calculated air flow in l_N/min
 f_5 = factor for operating conditions
 Q_p = max. flow rate of the hydraulic pump in l/min

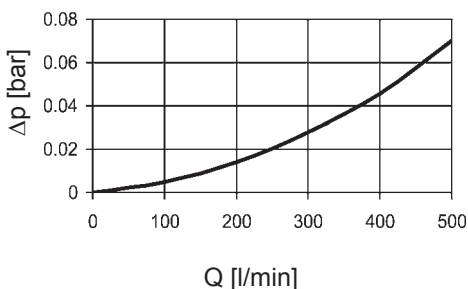
Ambient conditions	Factor f5
Low dust concentration; filter fitted with clogging indicator; continuous monitoring of the filter	1-2
Average dust concentration; filter without clogging indicator; intermittent monitoring of the filter	3-6
High dust concentration; filter without clogging indicator; infrequent or no monitoring of the filter	7-10

3.4 AIR FLOW RATE

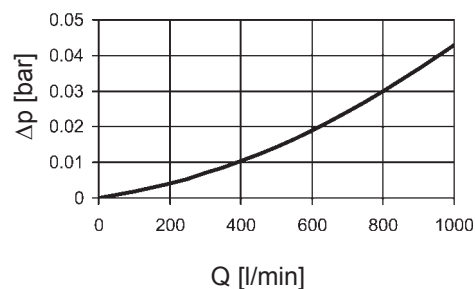
ELF 4



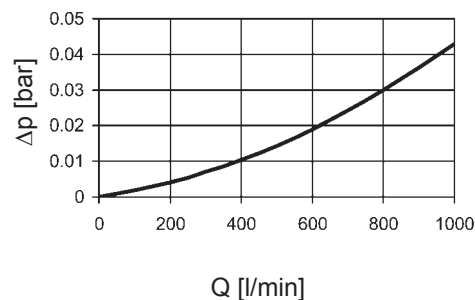
ELF 10



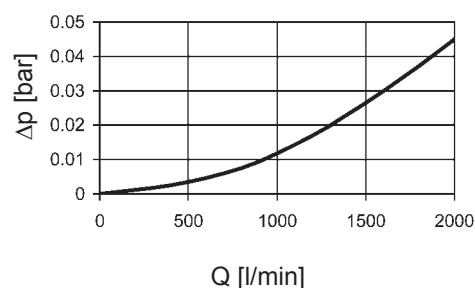
ELF 3



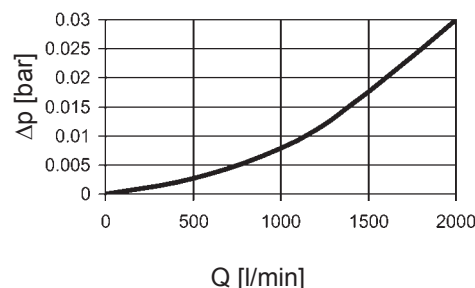
ELF 30



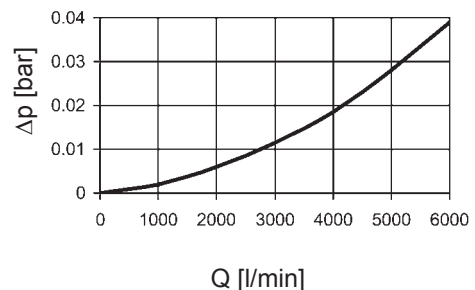
ELF 7



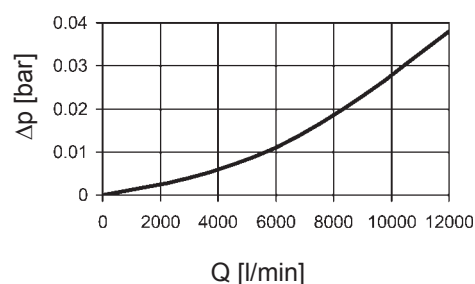
ELF 72



ELF 5

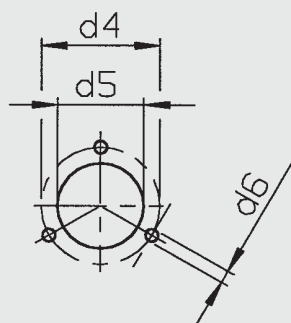
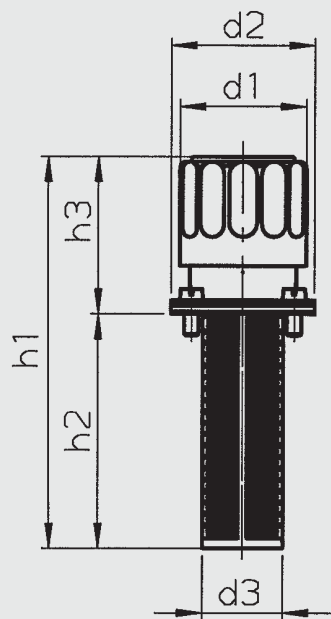


ELF 52



4. DIMENSIONS

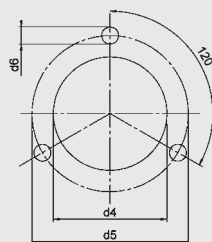
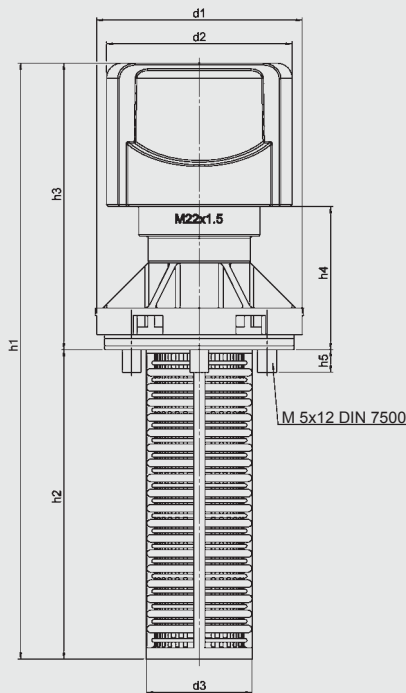
ELF 4



Interface

	ELF 4...
d1	44
d2	50
d3	28
d4	41.3
d5	30
d6	4.5
h1	135
h2	81.5
h3	53.5
Weight	0.20 kg

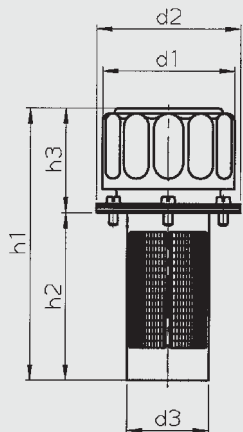
ELF 10



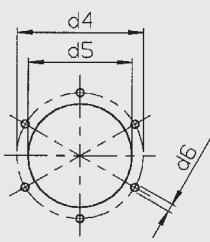
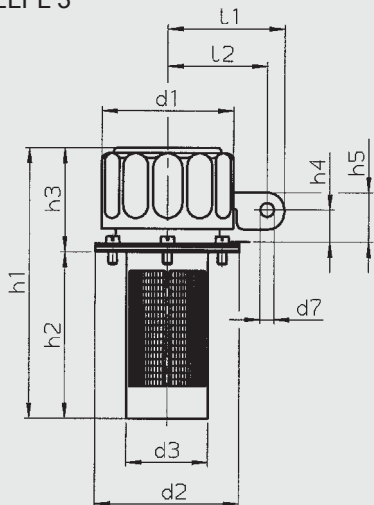
Interface

	ELF 10...
d1	54
d2	49
d3	28
d4	30
d5	41.3
d6	4.5
h1	158
h2	82
h3	76
h4	38
h5	6
Weight	0.08 kg

ELF 3



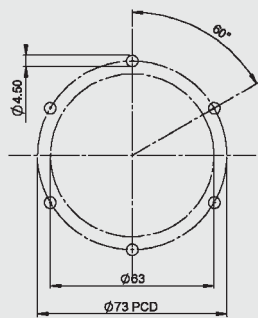
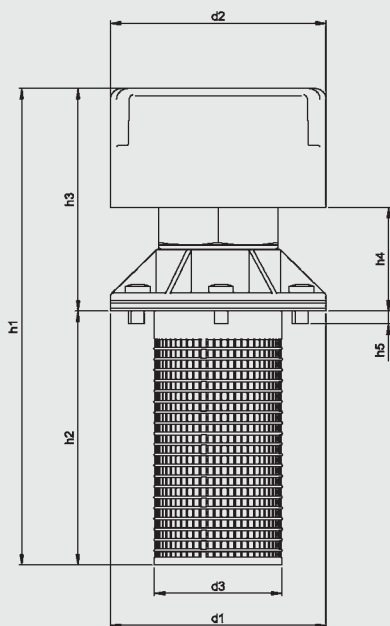
ELFL 3



Interface to DIN 24557/Part 2

	ELF 3.../ELFL 3...
d1	76
d2	83
d3	49
d4	73
d5	60
d6	4.5
d7	8
h1	159
h2	96.5
h3	61.5
h4	21
h5	31
L1	67.5
L2	57.5
Weight	0.25 kg

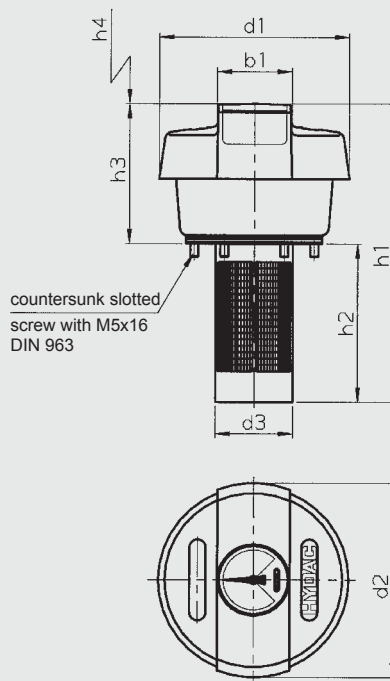
ELF 30



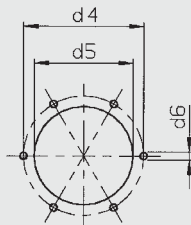
Interface to DIN 24557/Part 2

ELF 30...	
d1	83
d2	83
d3	49
h1	185
h2	100
h3	85
h4	40
h5	5
Weight	0.23 kg

ELF 7



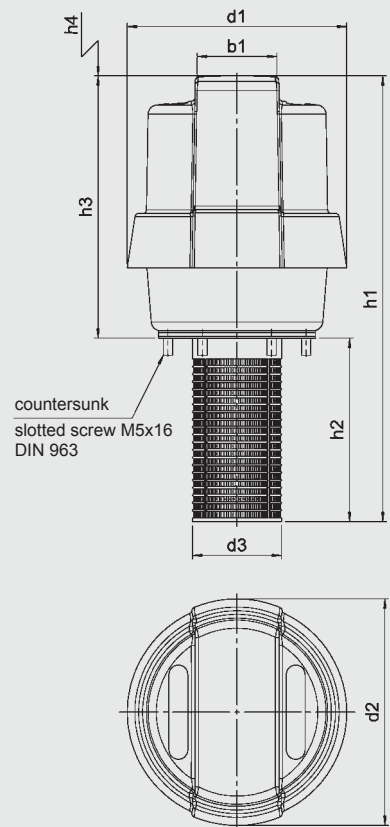
countersunk slotted screw with M5x16 DIN 963



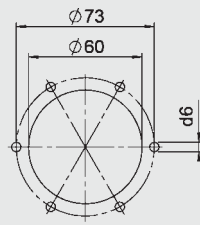
Interface to DIN 24557/Part 2

ELF 7...	
d1	116
d2	120
d3	47
d4	73
d5	60
d6	M5
h1	181
h2	97
h3	84
h4	60
b1	44
Weight	0.38 kg

ELF 72



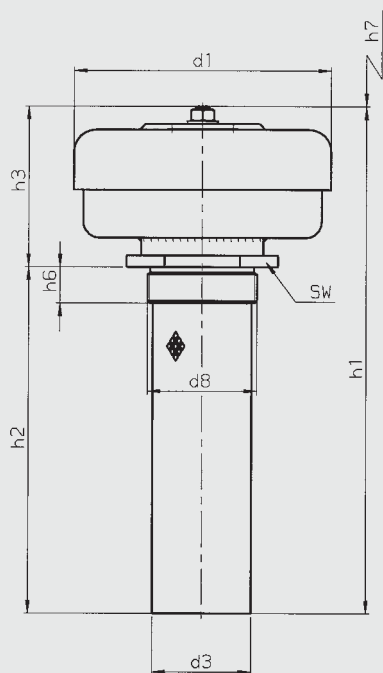
countersunk slotted screw M5x16 DIN 963



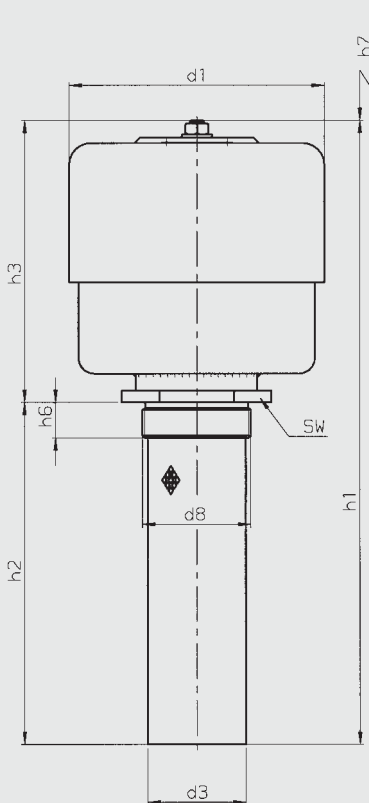
Interface to DIN 24557/Part 2

ELF 72...	
d1	116
d2	120
d3	47
d6	M5
h1	236
h2	97
h3	139
h4	60
b1	44
Weight	0.58 kg

ELF 5

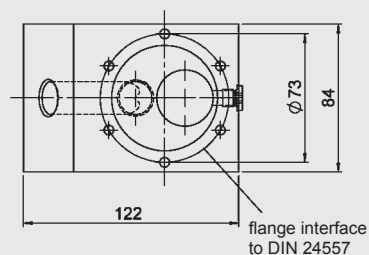
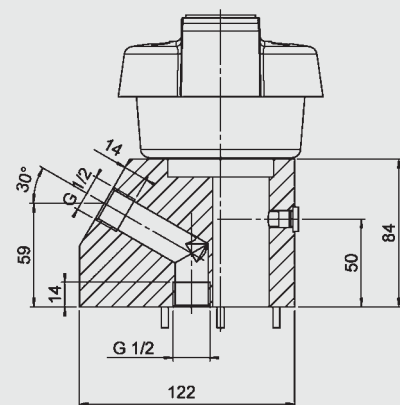


ELF 52



5. FILLER ADAPTER

This adapter can only be used on ELF 7 and ELF 72 filters!



	ELF 5...	ELF 5... /-RV
d1	177	
d8 / d3	...2.X	G 2½ / 70.5
	...3.X	G 3 / 70.5
	...4.X	G 2 / 51.5
	...5.X	G 1½ / 41.5
h1	350	360
h2	240	
h3	105	126
h6	25	
h7	90	
SW	90	
Weight	...2.X	2.70 kg
	...3.X	3.10 kg
	...4.X	2.70 kg
	...5.X	2.60 kg

	ELF 52...	ELF 52... /-RV
d1	177	
d8 / d3	...2.X	G 2½ / 70.5
	...3.X	G 3 / 70.5
	...4.X	G 2 / 51.5
	...5.X	G 1½ / 41.5
h1	416	438
h2	240	
h3	176	198
h6	25	
h7	125	112
SW	90	
Weight	...2.X	3.10 kg
	...3.X	3.50 kg
	...4.X	3.10 kg
	...5.X	3.00 kg

These filler adapters are available in the following threaded connections:

- Adapter ELF /-FA12 (G ½)
(Part No.: 00318597)
- Adapter ELF /-FA34 (G ¾)
(Part No.: 01282563)
- Adapter ELF /-FA1 (G 1)
(Part No.: 01274065)

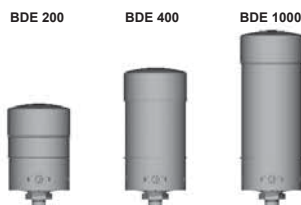
NOTE

The information in this brochure relates to the operating conditions and applications described.
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Subject to technical modifications.

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Breather Dryer BDE



1. TECHNICAL SPECIFICATIONS

1.1 DEFINITION OF THE PROBLEM

In hydraulic and lubrication systems, water ingress into the tank is a familiar problem. System operators are constantly faced with high breakdown and maintenance costs that can be traced back to water in the system. This is because water, even in its dissolved state, causes accelerated degradation of the additive components by hydrolysis. These reactions cause the oil to lose its desired characteristics and to age more rapidly. The depletion of the additives also leads to increased oxidation in the base fluid. Water also has serious and adverse effects on the operating system components, damaging them by corrosion and hydrogen embrittlement.

1.2 FILTER HOUSING

Construction

The distinctive feature of the breather dryers BDE is that it has two separate chambers which can be filled with two desiccants, which in combination increase total water retention (two-stage dewatering).

As an option, and as a special protection of the desiccant, four valves are built into the bottom of the unit so that during system downtime the desiccants will not become saturated.

A check valve is available as an option to prevent exhaust air from the tank/ transmission from flowing back through the desiccant. This means the desiccant is protected from oil mist and there is no re-drying of exiting air.

1.3 FILTER MEDIUM

The built-in pleated air filter element (absolute filtration of particles $> 2 \mu\text{m}$) provides the filter with a very high contamination retention capacity (26g). In order to ensure reliable function, the entire cartridge must be replaced. When the filter is due to be changed, the colour changes from dark red to light orange.

1.4 FILTER SPECIFICATIONS

Temperature range	-30 °C to +100 °C
Storage temperature:	-40 °C to +100 °C
Material of filter housing	Plastic (PA, PC and POM)
Material of filter cartridge unit	Combination of 2 different desiccants
Material of air filter element	phenolic resin impregnated paper

1.5 SEALS

NBR (= Perbunan)

1.6 SPECIAL MODELS AND ACCESSORIES

On request

1.7 SPARE PARTS

See Original Spare Parts List

1.8 CERTIFICATES AND APPROVALS

On request

1.9 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

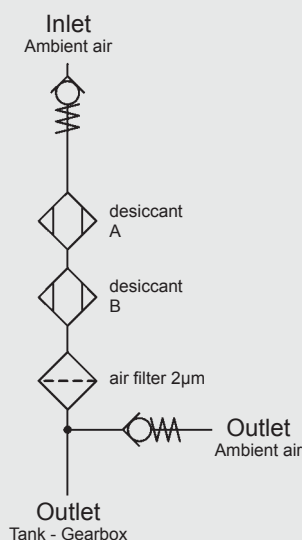
The filter cartridge actively prevents contamination particles and humidity from entering the tank. Compatible with mineral oils and bio oils.

Caution: The new BDE is not suitable as a breather for reservoirs containing highly flammable liquids (e.g. fuel, solvents, etc...)!

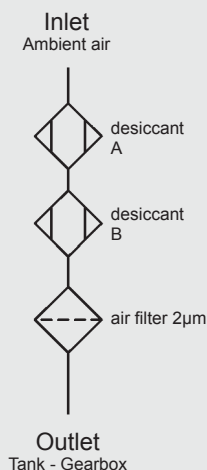
1.10 CHANGING INTERVALS

When the filter is due to be changed, the colour changes reliably from dark red to light orange.

Symbol: BDE with valves



Symbol: BDE without valves



2. MODEL CODE (also order example)

BDE 400 G 2 W 1 . X /-RV0.02

2.1 COMPLETE FILTER

Filter type

BDE

Size of filter

200, 400, 1000

Type of connection

F Flange (to DIN 24557)

G Thread

N Thread NPT

M Thread metric

S Slip fit

Filtration rating in μm

2 2 μm absolute

Type of clogging indicator

W without port, no clogging indicator

K pressure gauge

UBM vacuum indicator

Type code (TKZ)

Type code	Thread connection G	Thread connection N	Thread connection M	Slip fit connection S	Flange connection F
1	1BSP	NPT 1"	M42x2	1"	T2
2	—	NPT 2"	—	—	—

Modification number

X the latest version is always supplied

Supplementary details

ELF with filler strainer (only for connection type F = Flange)

RV0.02 check/protection valve with 0.02 bar pressure setting

RV0.003 check/protection valve with 0.003 bar pressure setting

2.2 REPLACEMENT CARTRIDGE

BDE 400 X 2 W 0 . X

Filter type

BDE

Size

200, 400, 1000

Connection type

X replacement cartridge

Filtration rating

2 2 μm absolute

Type of clogging indicator

W without port, no clogging indicator

K pressure gauge

UBM vacuum indicator

Type code

0 replacement cartridge

Modification number

X the latest version is always supplied

3. FILTER CALCULATION / SIZING

3.1 SIZING GUIDELINES

The rate at which contamination enters a hydraulic system can be considerably reduced by using efficient tank breather filtration.

CAUTION:

Incorrectly sized tank breather filters can place additional strain on the system and reduce the service life of hydraulic filter elements.

3.2 SIZING / AIR FLOW RATE

The following table indicates the size of BDE filters for gearbox lubrication in wind power plants (According to size in megawatts).

	≤ 1 MW	1-3 MW	≥ 3 MW
Standard conditions	200	400	1000
Longer service life/ service intervals	400	1000	2x1000
Very humid climate	400	1000	2x1000

Additional information on sizing criteria:

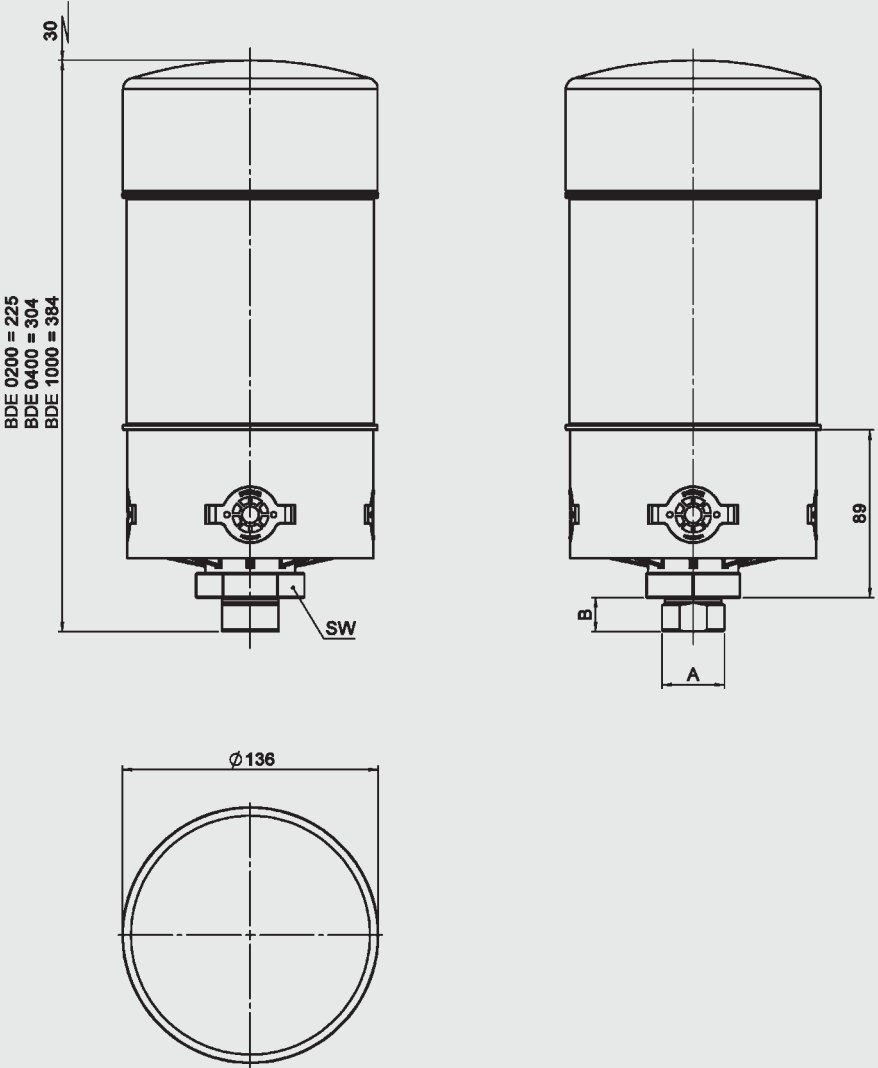
Size	Optimum air flow rate * [l air / min]	Max. drying capacity for average humidity [m³ air]	Max. drying capacity for high humidity [m³ air]
200	10	10	6
400	20	25	15
1000	35	42	25

* Air flow rate with the highest drying efficiency

3.3 WATER RETENTION CAPACITY

Size	Maximum water retention capacity
200	0.25 l
400	0.50 l
1000	0.75 l

4. DIMENSIONS



Connection	Thread length B [mm]	AF width SW [mm]
1" Slip fit connection Ø 33.4	18	50
G 1"	18	50
M42 x 2	18	50
NPT 1"	18	50
NPT 2"	24	65
Flange adapter DIN24557/Pt 2	20	50

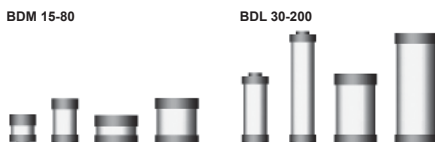
Type	Weight (kg)
BDE 200	1.7
BDE 400	2.3
BDE 1000	3.0

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Breather Dryers BDL, BDM



1. TECHNICAL SPECIFICATIONS

1.1 FILTER HOUSING Construction

The inline version BDL and the breather dryer BDM consist of a filter cartridge only, which is non-replaceable.

1.2 GENERAL

The breather dryer cartridges are filled with silica gel (orange) which, once completely saturated, cannot be regenerated.

A durable contamination filter above and below the silica gel prevents contamination from penetrating inside the cartridge (particle filtration > 2 µm nominal).

This ensures optimum humidity absorption.

To guarantee the performance of the protective filter layers, the entire cartridge must be replaced.

When the filter is due to be changed, the colour changes from orange to green.

1.3 FILTER SPECIFICATIONS

Temperature range	-32 °C to +100 °C
Material of filter cartridge	Plastic with silica gel filling (orange)

1.4 SEALS

NBR (= Perbunan)

1.5 SPECIAL MODELS AND ACCESSORIES

On request

1.6 SPARE PARTS

See Original Spare Parts List

1.7 CERTIFICATES AND APPROVALS

On request

1.8 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

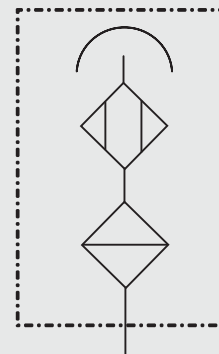
The filter cartridge actively prevents contamination particles and humidity from entering the tank. Compatible with mineral oils, bio oils and diesel fuel.

1.9 CHANGING INTERVALS

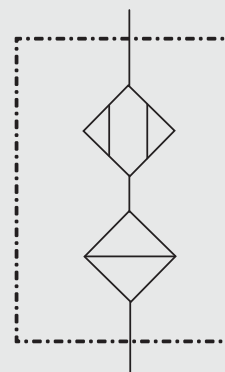
When the filter is due to be changed, the colour changes reliably from gold/orange to green.

Symbol

BDM



BDL



2. MODEL CODE (also order example)

BDL 200 N 2 W 1 . X

2.1 COMPLETE FILTER

Filter type

BDL Inline version
BDM Mini version

Size of filter

BDL: 30, 50, 60, 200
BDM: 15, 30, 50, 80

Type of connection

N NPT thread connection (½" female)

Filtration rating in µm

2 2 µm

Type of clogging indicator

W without port, no clogging indicator

Type code (TKZ)

1

Modification number

X the latest version is always supplied

3. FILTER CALCULATION / SIZING

3.1 SIZING GUIDELINES

The rate at which contamination enters a hydraulic system can be considerably reduced by using efficient tank breather filtration.

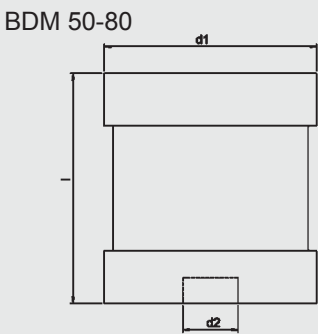
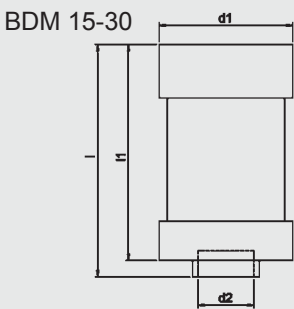
CAUTION:

Incorrectly sized tank breather filters can place additional strain on the system and reduce the service life of hydraulic filter elements.

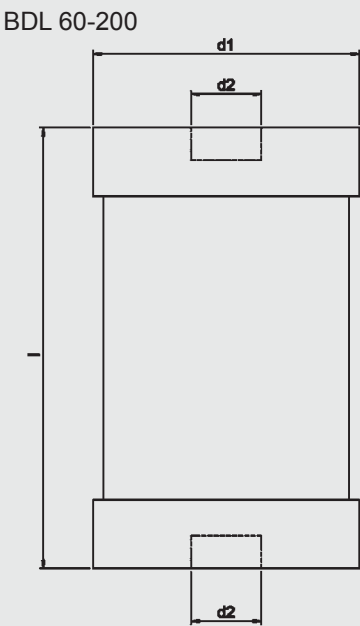
3.2 WATER RETENTION CAPACITY

Type	H ₂ O
BDL 30	0.03 l
BDL 50	0.05 l
BDL 60	0.06 l
BDL 200	0.19 l
BDM 15	0.01 l
BDM 30	0.03 l
BDM 50	0.05 l
BDM 80	0.08 l

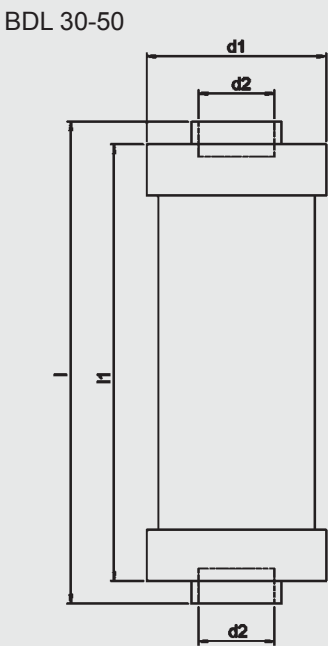
4. DIMENSIONS



Type	BDM 15	BDM 30	BDM 50	BDM 80
d1	51	51	83	83
d2	NPT 1/2"	NPT 1/2"	NPT 1/2"	NPT 1/2"
l	59	89	57	90
l1	52	82	-	-
Weight [kg]	0.09	0.14	0.28	0.40



Type	BDL 60	BDL 200
d1	82	82
d2	NPT 1/2"	NPT 1/2"
l	135	212
Weight [kg]	0.48	0.80



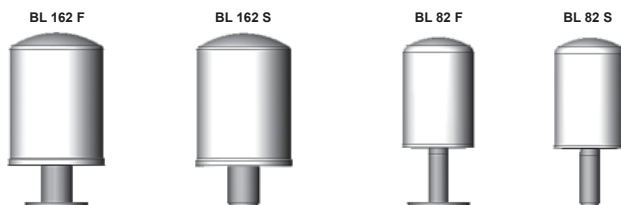
Type	BDL 30	BDL 50
d1	51	51
d2	NPT 1/2"	NPT 1/2"
l	137	216
l1	124	203
Weight [kg]	0.10	0.21

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Tank Breather Filter with Spin-On Filter Cartridge BL up to 1800 l/min



1. TECHNICAL SPECIFICATIONS

1.1 FILTER HOUSING Construction

The filters consist of a spin-on filter can which screws onto a connection tube which is fitted to the oil tank.

The connection can either be a flanged or weld version.

1.2 FILTER ELEMENTS

Contamination retention capacities in g

	10 µm	20 µm
BL		
82	67.6	99.4
162	192.0	201.3

The filter elements are made from phenolic resin impregnated paper and cannot therefore be cleaned.

1.3 FILTER SPECIFICATIONS

Temperature range	-30 °C to +100 °C
Material of connection tube	Steel
Material of spin-on can	Sheet steel
Type of clogging indicator	VMF (pressure gauge)
Type of clogging indicator	0.6 bar (K pressure gauge)

1.4 SEALS

Perbunan (= NBR)

Cardboard on the mounting flange

1.5 SPECIAL MODELS AND ACCESSORIES

- With connection for a clogging indicator
- With filler adapter

1.6 SPARE PARTS

See Original Spare Parts List

1.7 CERTIFICATES AND APPROVALS

On request

1.8 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

The standard models are suitable for use with mineral and lubrication oils. For fire-resistant and biodegradable oils, see tables:

Fire-resistant fluids

BL	HFA	HFC	HFD-R
82	●	●	—
162	●	●	—

- contact our Technical Sales Department
- not suitable

- HFA oil in water emulsion (H₂O content ≥ 80%)
- HFC water polyglycol solution (H₂O content 35-55%)
- HFD-R synthetic, water-free phosphate ester

Biodegradable fluids

BF	HTG	HE	HPG	PRG
			PAG	
82, 162	+	+	●	●

+ suitable for all

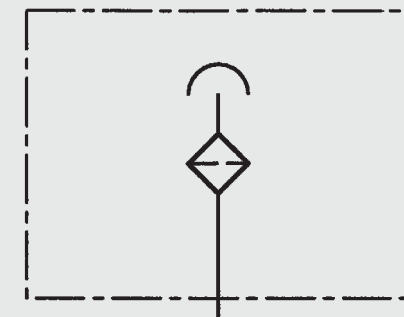
- contact our Technical Sales Department

- HTG vegetable oil based hydraulic fluids
- HE ester-based synthetic hydraulic fluids
- HPG polyglycol-based synthetic hydraulic fluids
- PAG sub-group HPG: polyalkylene glycol
- PEG sub-group HPG: polyethylene glycol

1.9 CHANGING INTERVALS

The filter elements or filters must be replaced as frequently as the fluid filters, but at least every 12 months.

Symbol



2. MODEL CODE (also order example)

BL P 162 S 10 W 1 . X /-FA12

2.1 COMPLETE FILTER

Filter type

BL

Filter material of element

P Paper

BN Betamicon® (for BL 82: only 20 µm available)

Size of filter or element

BL: 82, 162

Type and size of connection

Type	Connection	Filter size	
		82	162
F	Flange connection	●	●
S	Weld connection	●	●

Filtration rating in µm

P 10 absolute = 3µm in air

BN 10 = 1 µm absolute in air

20 = 2 µm absolute in air

Type of clogging indicator

W without port, no clogging indicator

K pressure gauge, measurement range -1 to +0.6 bar

Type code

1 for BL 82

2 for BL 162

Modification number

X the latest version is always supplied

Supplementary details

FA12 with filler adapter G ½

FA34 with filler adapter G ¾

FA1 with filler adapter G 1

only for BL 162

2.2 REPLACEMENT ELEMENT

0080 MG 010 P

Size

0080 only BL 82

0160 only BL 162

Type

MA only BL BN 162...

MU only BL P 162...

MG only BL .. 82...

Filtration rating in µm

P : 010

BN : 010, 020 (for BL 82: only 20 µm available)

Filter material

P, BN

2.3 REPLACEMENT CLOGGING INDICATOR

VMF 0.6 K . X

Type of indicator

VMF pressure gauge

Pressure setting

0.6 -1 to +0.6 bar

Type of clogging indicator

K (see Point 2.1)

Modification number

X the latest version is always supplied

3. FILTER CALCULATION / SIZING

3.1 SINGLE PASS FILTRATION PERFORMANCE DATA FOR AIR FILTER ELEMENTS

The following separation values were established under real-life simulated conditions.

This means that the selected velocity of the flow against the filter mesh-pack was 20 cm/s and the contamination added was 40 mg/m³ of ISO MTD test dust.

Filtration rating	Retention value d...	For particle size	Filter material
10 µm	d 80	0.25 µm	BN
	d 100	0.84 µm	
20 µm	d 80	0.36 µm	P
	d 100	1.21 µm	
10 µm	d 80	1.49 µm	P
	d 100	9.56 µm	

The d 80 value refers to the particle size which is filtered out at a rate of 80% during the retention test.

The particle size determined by this method is called the nominal filtration rating of the air filter. The d 100 value therefore refers to the particle size which is filtered out at a rate of 100% during the single pass test.

The particle size determined by this method is called the absolute filtration rating of the air filter.

Table of average dust concentrations in real life:

Urban regions with a low level of industry	3-7 mg/m ³ air
General mechanical engineering	9-23 mg/m ³ air
Construction industry (wheeled vehicles)	8-35 mg/m ³ air
Construction industry (tracked vehicles)	35-100 mg/m ³ air
Heavy industry	50-70 mg/m ³ air

3.2 DIFFERENTIAL PRESSURE ACROSS BREATHER FILTER

The differential pressure (with clean element) for the various filter sizes is shown in the graphs under Point 3.4.

3.3 SIZING GUIDELINES

The rate at which contamination enters a hydraulic system can be considerably reduced by using efficient tank breather filtration.

CAUTION:

Incorrectly sized tank breather filters can place additional strain on the system and reduce the service life of hydraulic filter elements.

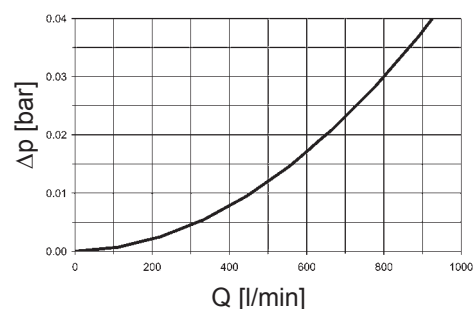
For optimum sizing the following should therefore be observed:

- Filtration rating of breather filter ≤ filtration rating of hydraulic filter
- Only use breather filters with an absolute retention rate ($d_{100} \leq x \mu\text{m}$; x = given filtration rating)
- Max. permitted initial pressure drop: 0.01 bar (with a clean filter element and at calculated air flow)
- Determining the calculated air flow:
 $Q_A = f_5 \times Q_p$
 Q_A = calculated air flow in l_N/min
 f_5 = factor for operating conditions
 Q_p = max. flow rate of the hydraulic pump in l/min

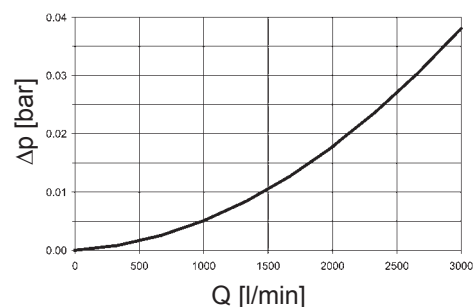
Ambient conditions	Factor f ₅
Low dust concentration; filter fitted with clogging indicator; continuous monitoring of the filter	1-2
Average dust concentration; filter without clogging indicator; intermittent monitoring of the filter	3-6
High dust concentration; filter without clogging indicator; infrequent or no monitoring of the filter	7-10

3.4 AIR FLOW RATE

BL 82

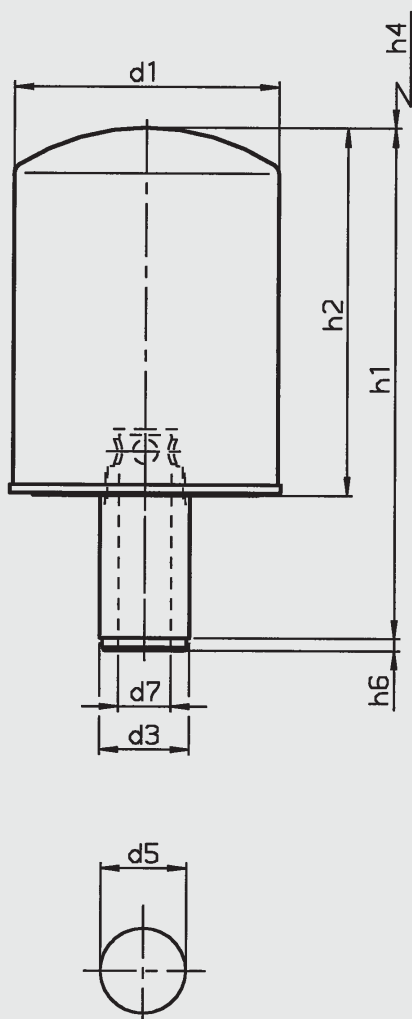


BL 162



4. DIMENSIONS

BL 82 S..., BL 162 S...

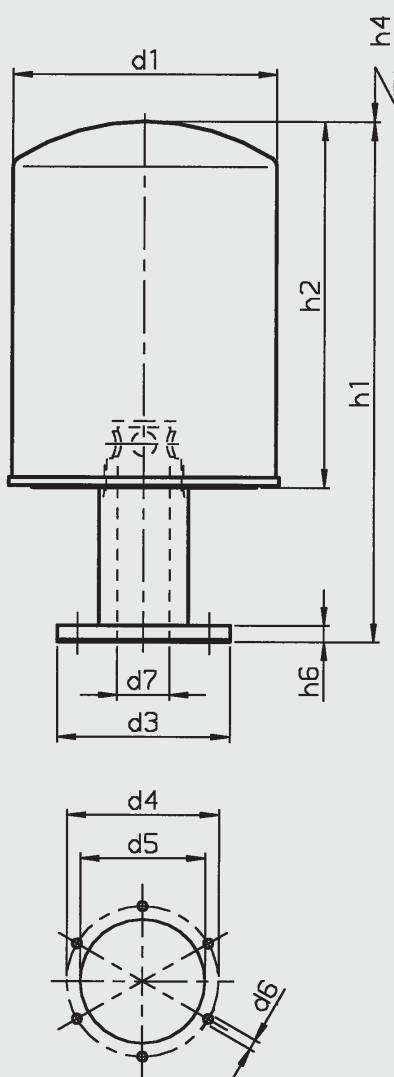


	BL 82 S...	BL 162 S...
d1	98	127
d3	27	43
d5	25	41
d7	16	25
h1	186	245
h2	142	175
h4	90	90
h6	6	6
Weight	0.95 kg	1.75 kg

NOTE

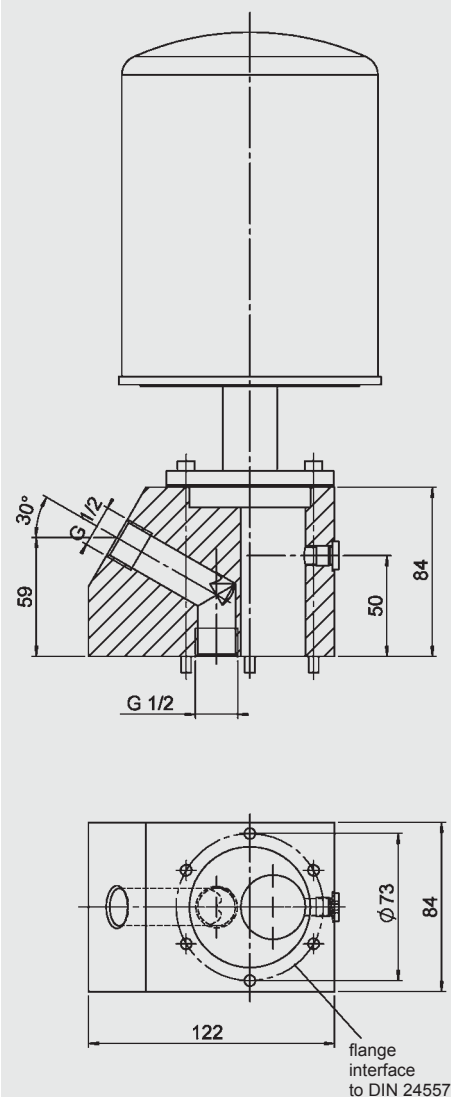
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BL 82 F..., BL 162 F...



	BL 82 F...	BL 162 F...
d1	98	127
d3	80	80
d4	73	73
d5	60	60
d6	M5	M5
d7	16	25
h1	204	260
h2	142	175
h4	90	90
h6	7	7
Weight	1.30 kg	2.10 kg

5. FILLER ADAPTER



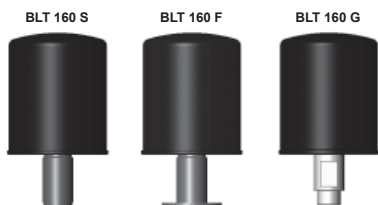
These filler adapters are available in the following threaded connections:

- Adapter FA12
Connection: G 1/2
(Part No.: 00318597)
- Adapter FA34
Connection: G 3/4
(Part No.: 01282563)
- Adapter FA1
Connection: G 1
(Part No.: 01274065)

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Tank Breather Filter and Dehumidifier BLT up to 270 l/min



1. TECHNICAL SPECIFICATIONS

1.1 FILTER HOUSING

Construction

The filters consist of a spin-on can which screws onto a connection tube which is fitted to the oil tank. The connection can either be a flange, weld or threaded version.

1.2 FILTER CARTRIDGES

The filter cartridges comply with all relevant ISO test criteria.

1.3 SEALS

Cardboard for flange model.

1.4 SPECIAL MODELS AND ACCESSORIES

On request

1.5 SPARE PARTS

See Original Spare Parts List

1.6 CERTIFICATES AND APPROVALS

On request

1.7 FILTER SPECIFICATIONS

Temperature range	-30 °C to +100 °C
Material of connection tube	Steel
Material of spin-on can	Sheet steel

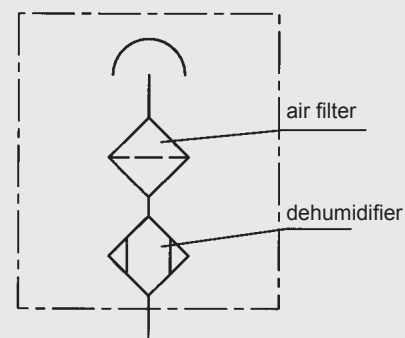
1.8 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

The tank breather filter/dehumidifier BLT is suitable for use with all standard mineral and lubrication oils.

1.9 CHANGING INTERVALS

The filter elements or filters must be replaced as frequently as the fluid filters, but at least every 6 months.

Symbol



2. MODEL CODE

2.1 COMPLETE FILTER

Filter type

BLT

Filter material

M molecular sieve

Size of filter

160

Type and size of connection

Type	Connection	Filter size
		160
F	Flange connection	●
S	Weld connection	●
G	Threaded connection	●

Filtration rating in µm

3 3 µm absolute

Type of clogging indicator

W without port, no clogging indicator

Type code

1

Modification number

X the latest version is always supplied

BLT M 160 F 3 W 1 . X

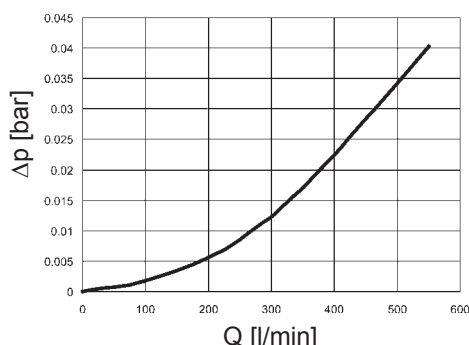
2.2 REPLACEMENT CARTRIDGE: 0160 MU 003 M

3. FILTER CALCULATION / SIZING

Differential pressure across breather filter

The differential pressure in the clean condition is shown in the graph below.

BLT 160



3.1 SIZING GUIDELINES

The rate at which contamination and humidity enters a hydraulic system can be considerably reduced by using efficient tank breather filtration.

CAUTION:

Incorrectly sized tank breather filters can place additional strain on the system and reduce the service life of hydraulic filter elements.

For optimum sizing the following should therefore be observed:

- Filtration rating of breather filter \leq filtration rating of hydraulic filter
- Only use breather filters with an absolute retention rate ($d_{100} \leq x \mu m$; x = given filtration rating)
- Max. permitted initial pressure drop: 0.01 bar (with a clean filter element and at calculated air flow)
- Determining the calculated air flow:
 $Q_A = f_5 \times Q_p$
 Q_A = calculated air flow in l/min
 f_5 = factor for operating conditions
 Q_p = max. flow rate of the hydraulic pump in l/min

Ambient conditions	Factor f5
Low dust concentration; filter fitted with clogging indicator; continuous monitoring of the filter	1-2
Average dust concentration; filter without clogging indicator; intermittent monitoring of the filter	3-6
High dust concentration; filter without clogging indicator; infrequent or no monitoring of the filter	7-10

3.2 WATER RETENTION CAPACITY

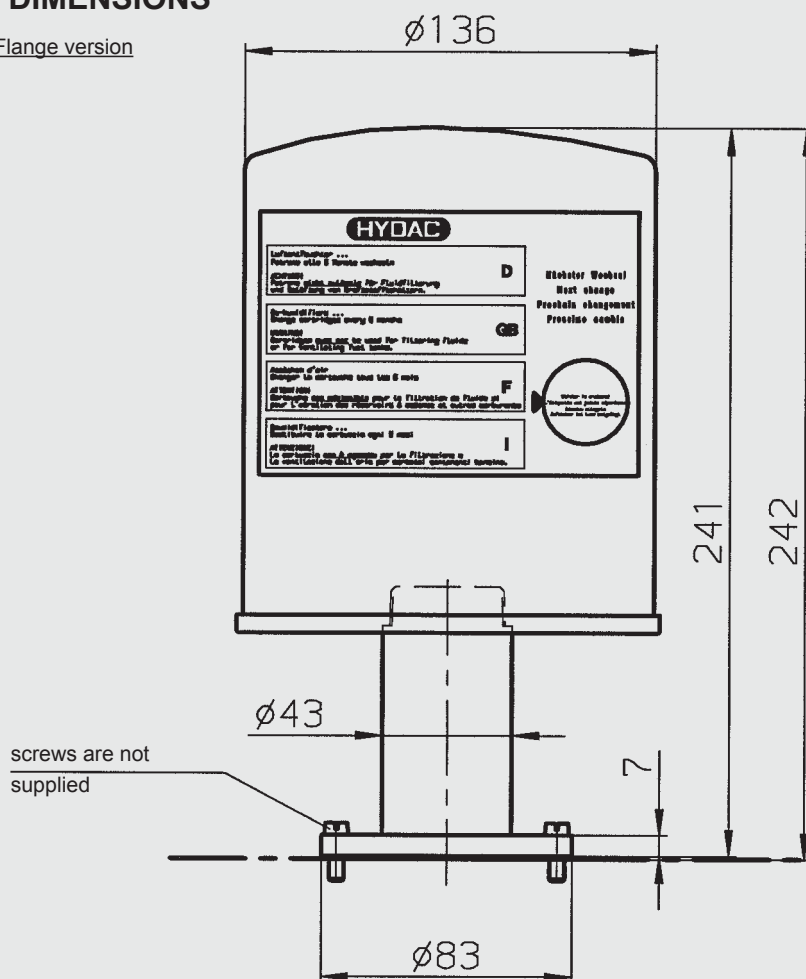
Temperature	Rel. humidity	gH ₂ O
0 °C	30%	190
15 °C	60%	210
25 °C	90%	230

NOTE

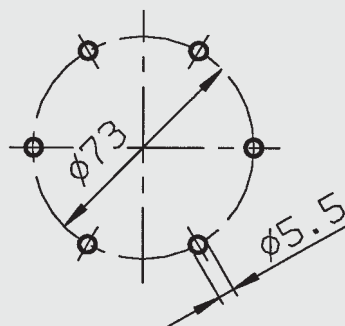
The information in this brochure relates to the operating conditions and applications described.
 For applications or operating conditions not described, please contact the relevant technical department.
 Subject to technical modifications.

4. DIMENSIONS

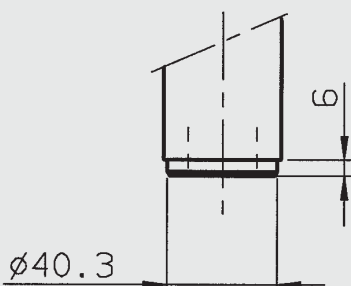
Flange version



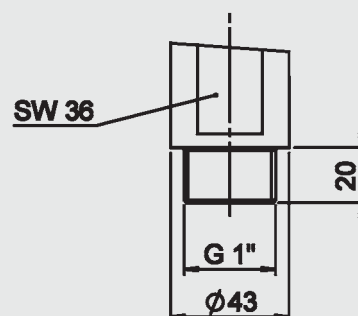
Interface to DIN 24557/Part 2



Weld version



Threaded version

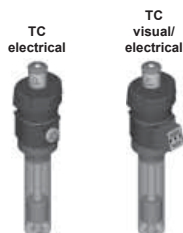


HYDAC FILTERTECHNIK GMBH
 Industriegebiet
D-66280 Sulzbach/Saar, Germany
 Tel.: 0 68 97 / 509-01
 Fax: 0 68 97 / 509-300
 Internet: www.hydac.com
 E-mail: filter@hydac.com



TankConditioner® TC

with Breather Filter, Float Switch and Temperature Monitoring System



1. TECHNICAL SPECIFICATIONS

1.1 UNIT CONSTRUCTION

The TankConditioner® TC is a multi-functional unit consisting of a fluid level and temperature monitoring system, an optional temperature display and a breather filter BF7 or BF 72.

1.2 FLUID LEVEL MONITORING

Values are measured using the float principle. For simple monitoring functions (e.g. pump protection or tank level monitoring) the fluid level monitoring device has two bistable switch contacts which can be turned through 180° for either N/O or N/C function.

A resolution of 10 mm makes it easy to set the switch points to suit the requirements of the system. The switch points can also be displayed via 3 LEDs (green, yellow, red), if specially requested by the customer.

Depending on the type of unit, the actual oil level can also be output as an analogue control signal for system control.

Oil level monitoring is maintenance-free for fluids which do not form a residue on the sensor tube during operation.

1.3 FLUID TEMPERATURE MONITORING

The thermal contact required for this is fitted to the end of the contact strip and therefore monitors the oil temperature in the lower part of the tank.

The normally closed contact responds at 70 °C and acts as an emergency cut-out.

If switching functions are to be carried out in conjunction with temperature monitoring (to control an oil cooler, for example) then, depending on the model, up to 2 PNP switch outputs can either be programmed hysteresis-free from 0-100 °C, or can be output as an analogue control signal.

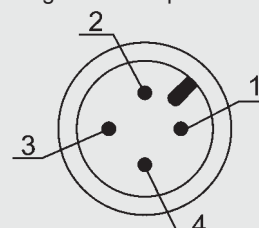
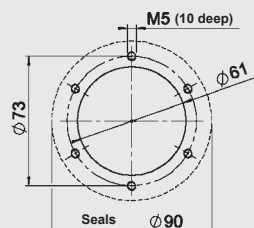
1.4 TANK BREATHER FILTER

To meet the most likely customer requirements, the TankConditioner® TC is fitted with the BF 7 or BF 72 breather filter as standard.

The breather filter is designed in such a way that it is impossible to fill or top up the tank with hydraulic fluid via the filter housing (exception: version FABF). The TankConditioner TC can be supplied without a port for a clogging indicator or with a visual-analogue clogging indicator. To make the breather filter even more maintenance-friendly, we recommend fitting a UBM type clogging indicator, which is easily visible and includes a memory function. The yellow reset button is used to reset the indicator after changing the element.

1.5 GENERAL TECHNICAL SPECIFICATIONS

Flange connection	DIN 24557/ Part 2: mounting hole Ø61
Installation position	vertical ±30°
Operating voltage	12V ... 30V DC
Electrical connection	Male: Series M12x1/ 4 pole IP67 For type S44 screened cables must be provided by the customer!
Filter element	3 µm
Air flow rate	BF 7: max. 900 l _N /min BF 72: max. 1200 l _N /min
Sensor tube / float / protective sleeve (option)	synthetic material / brass (optional stainless steel)
Nominal pressure	max. 1 bar
Temperature of fluid	max. 100 °C
Flange connection to DIN 24557 / Part 2	For pin assignment see point 3 Dimensions



For further information, please see point 3

1.6 TANK FILLING OPTION

For simple applications the tank can be filled via the breather filter (see Supplementary Details code FABF). To protect the hydraulics a filler-strainer is built into the tank flange as a coarse filter. For high performance hydraulic systems we recommend the filling connection which allows the filling of filtered oil to be monitored (Supplementary Details FA34). The required quick release coupling is not supplied.

1.7 FILTER ELEMENTS

Contamination retention capacities in g

	Paper
BF	3 µm
7	26.1
72	52.2

1.8 SEALS

NBR (= Perbunan)
NBR and cork for version FA34

1.9 WAVE MOTION PROTECTION

Wave motion on the surface of the oil can affect the float and can therefore cause measurement errors, particularly in large tanks. A protective sleeve is therefore available in brass (type code 1.x) or stainless steel (type code 2.x) as an accessory for these applications.

1.10 FLOAT

To ensure compatibility with many standard hydraulic fluids, the TankConditioner® TC sensor tube and float are made from synthetic material and brass, with stainless steel as an option.

1.11 COMPATIBILITY WITH HYDRAULIC FLUIDS ISO 2943

Brass version:

- Hydraulic oils H to HLPD DIN 51524
- Lubrication oils DIN 51517, API, ACEA, DIN 51515, ISO 6743

Stainless steel version:

- Hydraulic oils H to HLPD DIN 51524
- Lubrication oils DIN 51517, API, ACEA, DIN 51515, ISO 6743
- Biodegradable operating fluids VDMA 24568 HETG, HEES, HEPG
- Fire-resistant operating fluids HFA, HFB, HFC and HFD

2. MODEL CODE (also order example)

2.1 COMPLETE UNIT

Instrument type

TankConditioner® TC

Filter material

P Paper

Size of breather filter

7, 72

Connection

F flange (to DIN 24557 / Part 2)

Filtration rating in µm

3

Type of clogging indicator

W without port, no clogging indicator

UBM with visual vacuum indicator

Type of temperature monitoring

C electrical

D visual/electrical

Type code

1 material of float: polyurethane; material of sensor tube: brass

2 material of float and sensor tube: stainless steel

Modification number

X the latest version is always supplied

Supplementary details

Required: Switch assignment:

Switch	Fluid level	Temperature
S	1	2
S	4	4

1 = fluid level contact; normal setting: L1 = rising N/O, L2 = rising N/C

2 = N/C, 4 = measuring range 4-20mA

V250 Length of the sensor tube = 250 mm

V370 Length of the sensor tube = 370 mm

V520 Length of the sensor tube = 520 mm

Optional:

SSR wave protection sleeve

(material, brass or stainless steel, is indicated by type code 1 or 2,

i.e. 1 = brass / 2 = stainless steel)

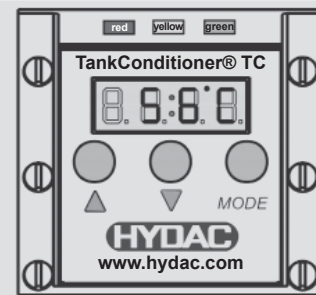
FA34 filling adapter with G 3/4 connection (including wave protection sleeve)

FABF filling via breather filter (including wave protection sleeve)

LED optional LED display for fluid level (green = operating;

yellow = warning; red = critical)

(for this option, please contact HYDAC)



2.2 REPLACEMENT FILTER ELEMENT

Size

0007, 0072

Type

L

Filtration rating in µm

003

Filter material

P Paper

2.3 PREFERRED MODELS

Out of the different models of TankConditioner® TC, with all the options available to the customer, the following are designated "preferred models":

- TC P 7 F 3 UBM+C 1.0 /-S12-Vxxx
- TC P 7 F 3 UBM+D 1.0 /-S12-Vxxx
- TC P 7 F 3 UBM+C 1.0 /-S12-Vxxx-FABF
- TC P 7 F 3 UBM+D 1.0 /-S12-Vxxx-FABF
- TC P 7 F 3 UBM+D 1.0 /-S12-Vxxx-FA34
- TC P 7 F 3 UBM+C 1.0 /-S44-Vxxx-FA34

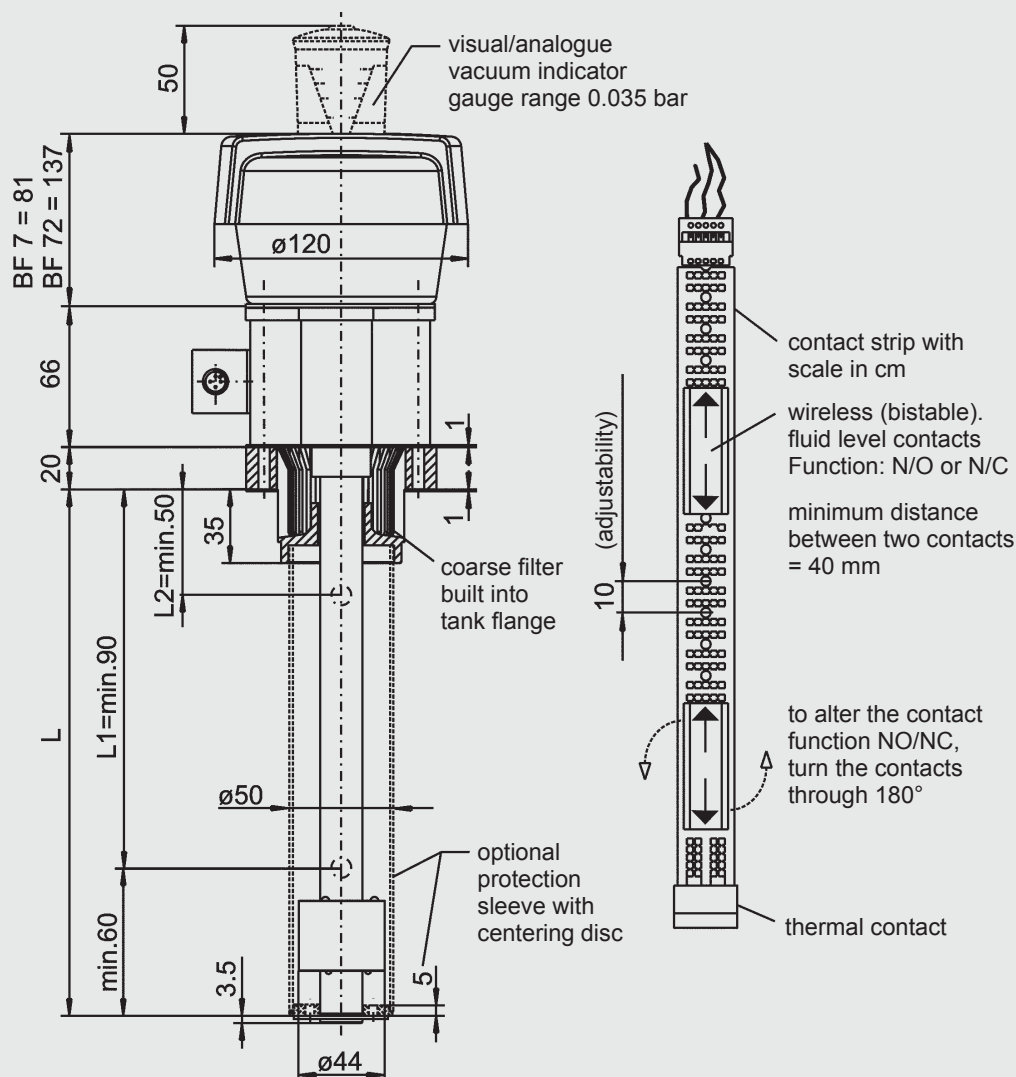
TC P 7 F 3 UBM + D 1 . X /-S12-V250 -SSR

0007 L 003 P

3. DIMENSIONS and TECHNICAL SPECIFICATIONS


3.1 TANKCONDITIONER® TC WITH SUPPLEMENTARY CODE "S12"

Version TC...C 1.x /-S12-Vxxx...(brass/synthetic material)

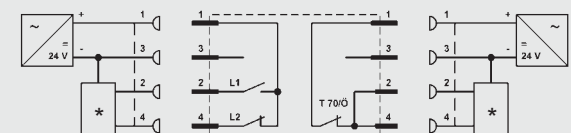


TECHNICAL SPECIFICATIONS

Level switch points	bistable N/O / N/C Max. 2 can be set
Resolution	10 mm
Hysteresis	4 mm
Thermal contact	T70 °C / N/C
Switching capacity	10W / VA max 30 V / DC max.
Switching current	1 A max.

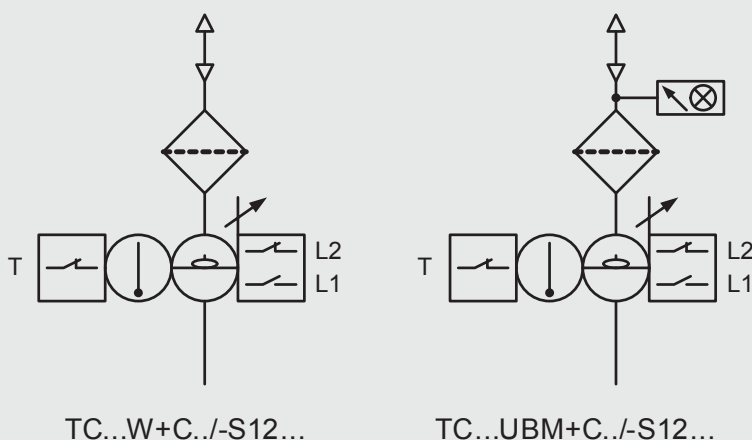
	Male connections	
	Connection A	Connection B
	Level contact(s):	Temp. contact(s):
	1 = 12V-30V DC	1 = 12V-30V DC
	2 = level L1 (+UB)	2 + 4 = T70 / N/C (+UB)
	3 = not connected	3 = not connected
	4 = level L2 (+UB)	

customer equipment	Connection A M12x1, 4-pole	Connection B M12x1, 4-pole	customer equipment
	Level	Temperature	

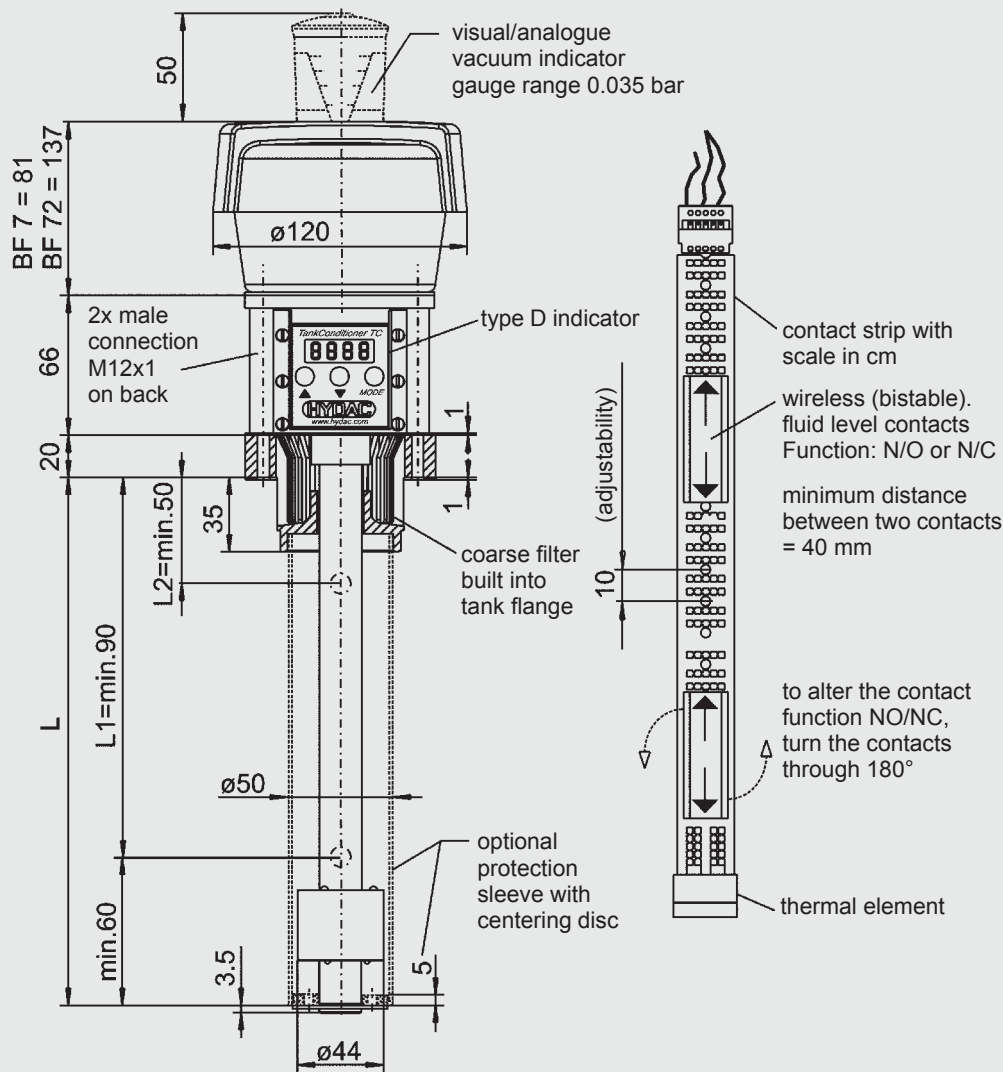


* PLC, controller, etc.

* PLC, controller, etc.



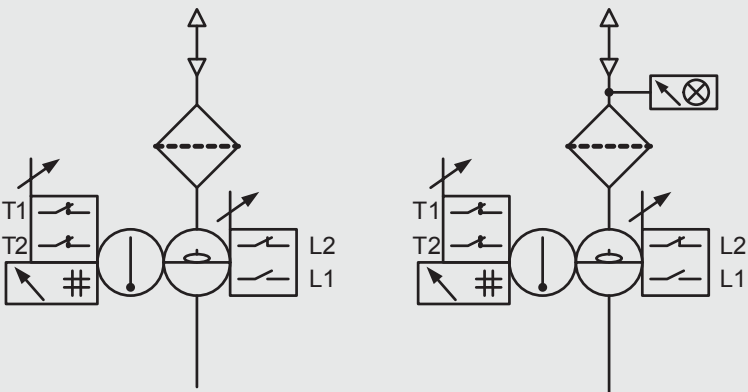
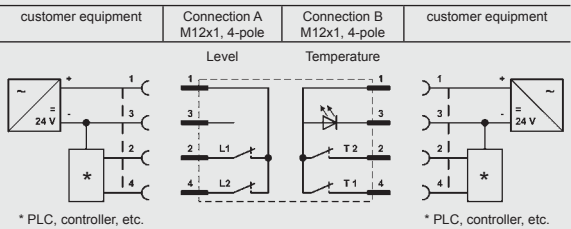
Factory normal setting for type S12: "pump protection monitoring"				
Switch points	Sensor tube length L			Possible application
L2	250	370	520	NC - rising N/C
L1	150	270	420	Warning at "min. tank level"
	190	310	460	NO - rising N/O
				Cut-out at "min. tank level"



TECHNICAL SPECIFICATIONS

Fluid level switch points	bistable N/O / N/C Max. 2 can be set
Resolution	10 mm
Hysteresis	4 mm
Thermal element	Pt100
Temp. switch points	Max. 2 can be set
Hysteresis	1 – 99 K can be set
Switching capacity	10W / VA max 30 V / DC max.
Switching current	1 A max.
Display for temperature monitoring	LED 3-digit (4-digit w/o unit of meas.)
Indication range	-20 °C to +120 °C (-4 ° to +248 °F)

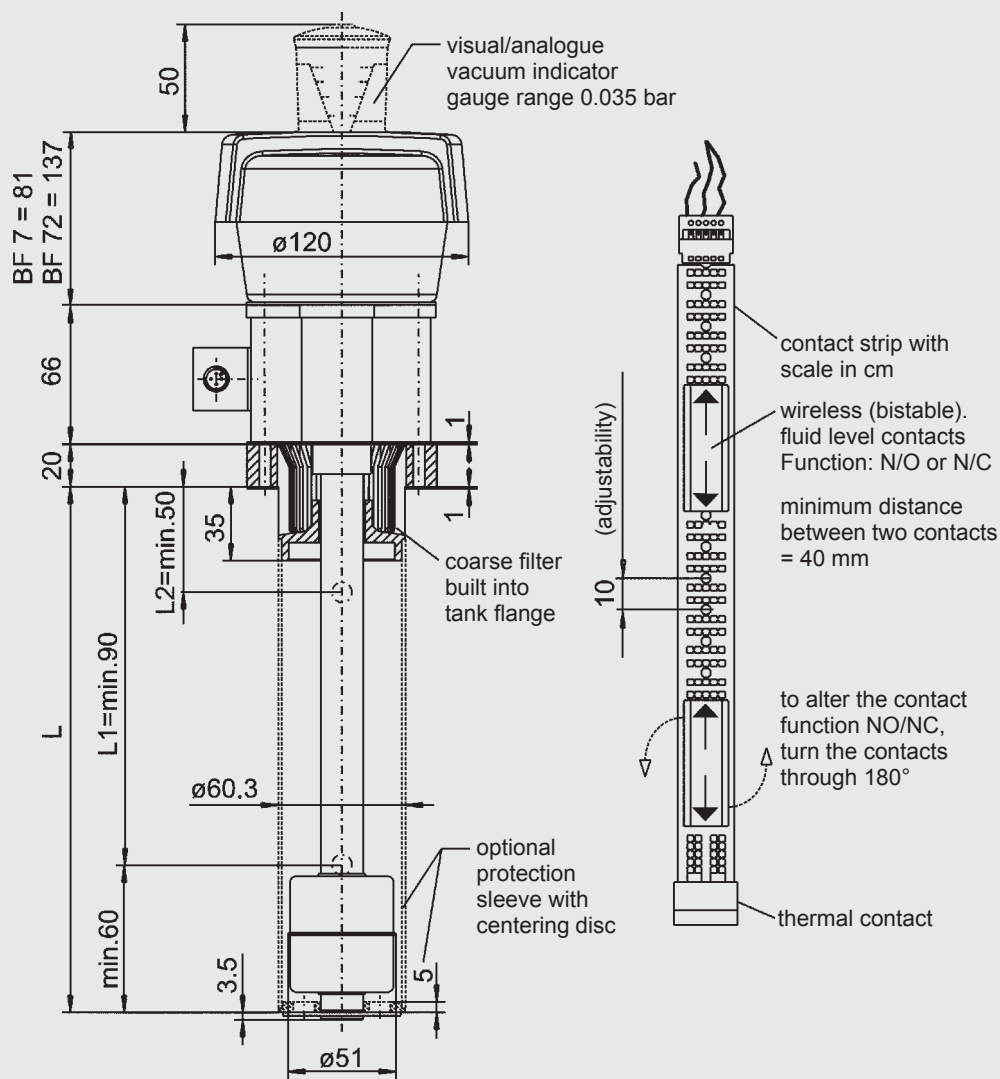
	Male connections	
	Connection A	Connection B
	Level contacts:	Temperature contacts:
	1 = 12V-30V DC	1 = 12V-30V DC
	2 = level L1 (+UB)	2 = temp. 2 (+UB)
	3 = not connected	3 = GND (0V)
	4 = level L2 (+UB)	4 = temp. 1 (+UB)



TC...W+D.../-S12...

TC...UBM+D.../-S12...

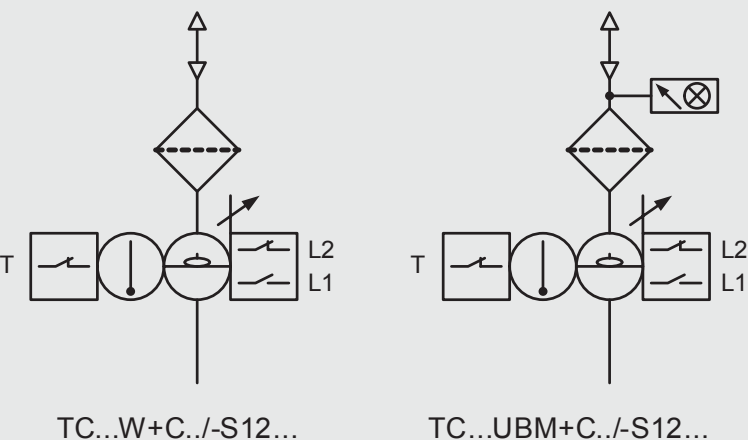
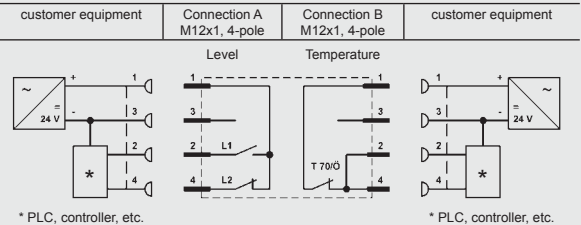
Factory normal setting for type S12: "pump protection monitoring"				
Switch points	Sensor tube length L			Possible application
	250	370	520	
L2	150	270	420	NC - rising N/C Warning at "min. tank level"
L1	190	310	460	NO - rising N/O Cut-out at "min. tank level"



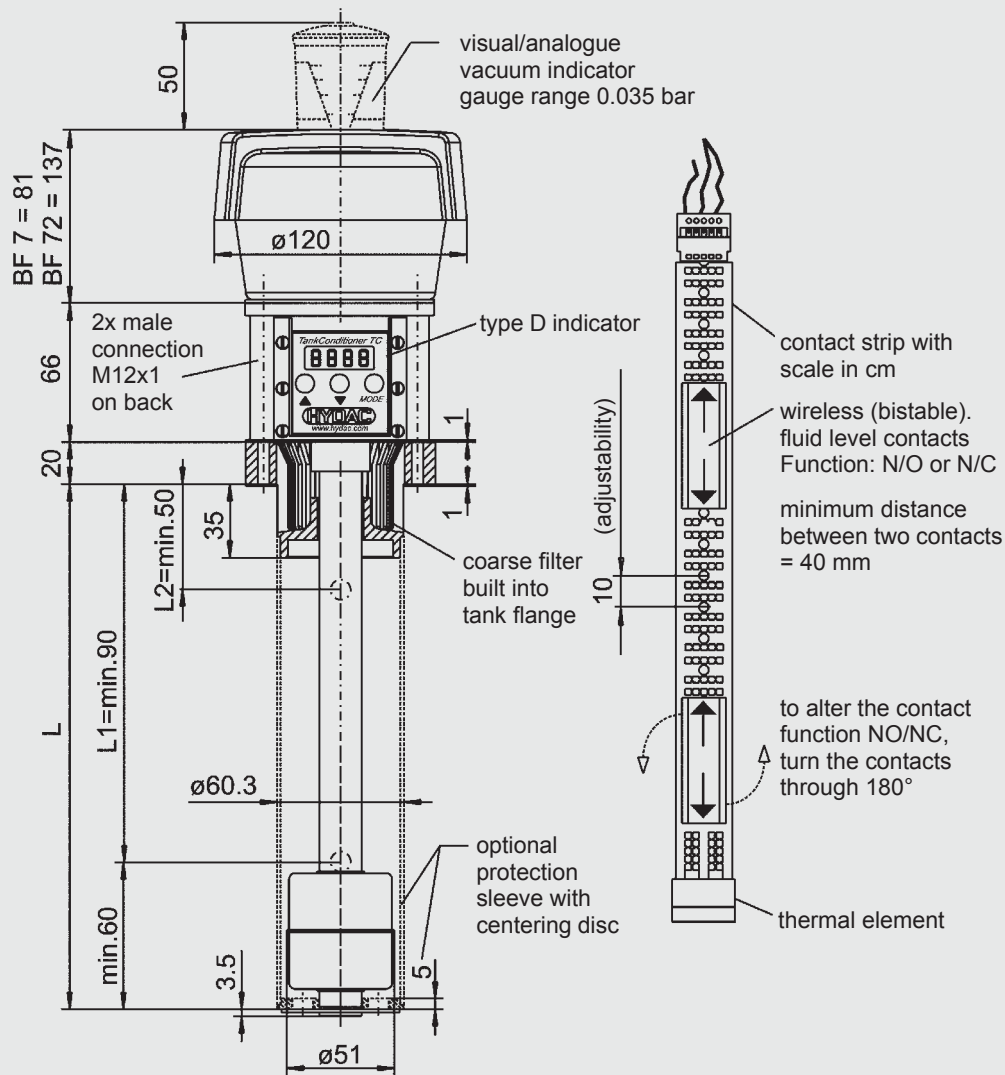
TECHNICAL SPECIFICATIONS

Level switch points	bistable N/O / N/C Max. 2 can be set
Resolution	10 mm
Hysteresis	4 mm
Thermal contact	T70 °C / N/C
Switching capacity	10W / VA max 30 V / DC max.
Switching current	1 A max.

	Male connections	
	Connection A	Connection B
	Level contact(s): 1 = 12V-30V DC 2 = level L1 (+UB) 3 = not connected 4 = level L2 (+UB)	Temp. contact(s): 1 = 12V-30V DC 2 + 4 = T70 / opens (+UB) 3 = not connected



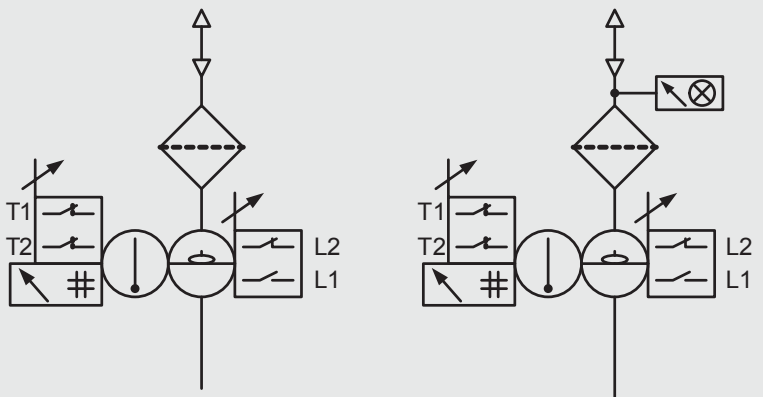
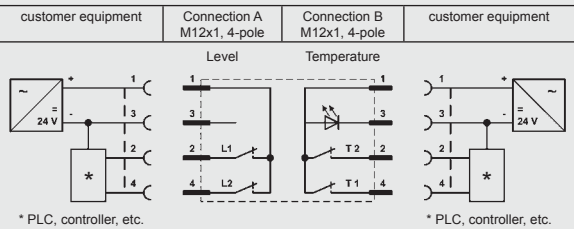
Factory normal setting for type S12: "pump protection monitoring"			
Switch points	Sensor tube length L	Contact function of fluid level contacts	Possible application
L2	250 370 520	NC - rising N/C	Warning at "min. tank level"
L1	150 270 420	NO - rising N/O	Cut-out at "min. tank level"



TECHNICAL SPECIFICATIONS

Fluid level switch points	bistable N/O / N/C Max. 2 can be set
Resolution	10 mm
Hysteresis	4 mm
Thermal element	Pt100
Temp. switch points	Max. 2 can be set
Hysteresis	1 – 99 K can be set
Switching capacity	10W / VA max 30 V / DC max.
Switching current	1 A max.
Display for temperature monitoring	LED 3-digit (4-digit w/o unit of meas.)
Indication range	-20 °C to +120 °C (-4 ° to +248 °F)

	Male connections	
	Connection A	Connection B
	Level contacts:	Temperature contacts:
	1 = 12V-30V DC	1 = 12V-30V DC
	2 = level L1 (+UB)	2 = temp. 2 (+UB)
	3 = not connected	3 = GND (0V)
	4 = level L2 (+UB)	4 = temp. 1 (+UB)



TC...W+D../-S12...

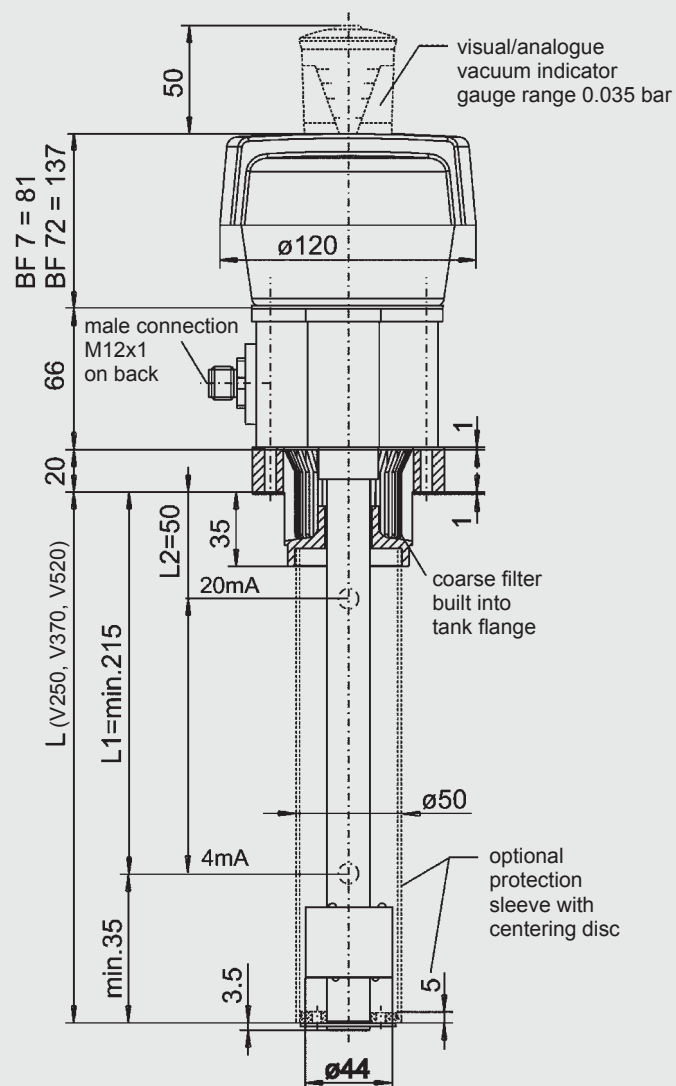
TC...UBM+D../-S12...

Factory normal setting for type S12: "pump protection monitoring"				
Switch points	Sensor tube length L			Contact function of fluid level contacts
L2	250	370	520	NC - rising N/C
L1	150	270	420	NO - rising N/O
	190	310	460	

Possible application
Warning at "min. tank level"
Cut-out at "min. tank level"

3.2 TANKCONDITIONER® TC WITH SUPPLEMENTARY CODE "S44"

Version TC...C 1.x /-S44-Vxxx... (brass/synthetic material)



TECHNICAL SPECIFICATIONS

Fluid level monitoring

Output signal 4 – 20 mA

Meas. range for V250 165 mm

Meas. range for V370 285 mm

Meas. range for V520 435 mm

Resolution 4 mm

Hysteresis 0 – 10%

Temperature monitoring

Output signal 4 – 20 mA

Measuring range 0 – 100 °C

Hysteresis 0 – 1 K

Ohmic resistance $RB = U - 8 V$
20 mA

Data transfer Screened cable must be provided!

Male connections

Connection

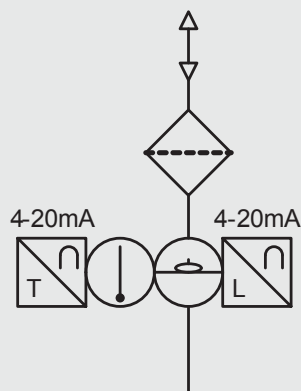
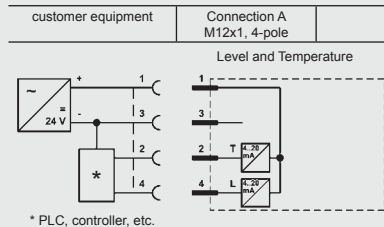
Fluid level/Temperature signals:

1 = 12V-30V DC

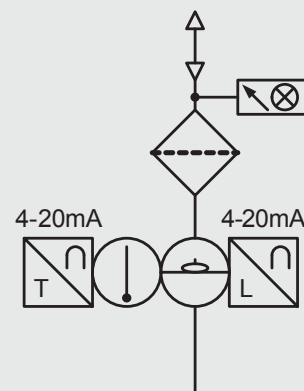
2 = temperature 4 – 20 mA

3 = not connected

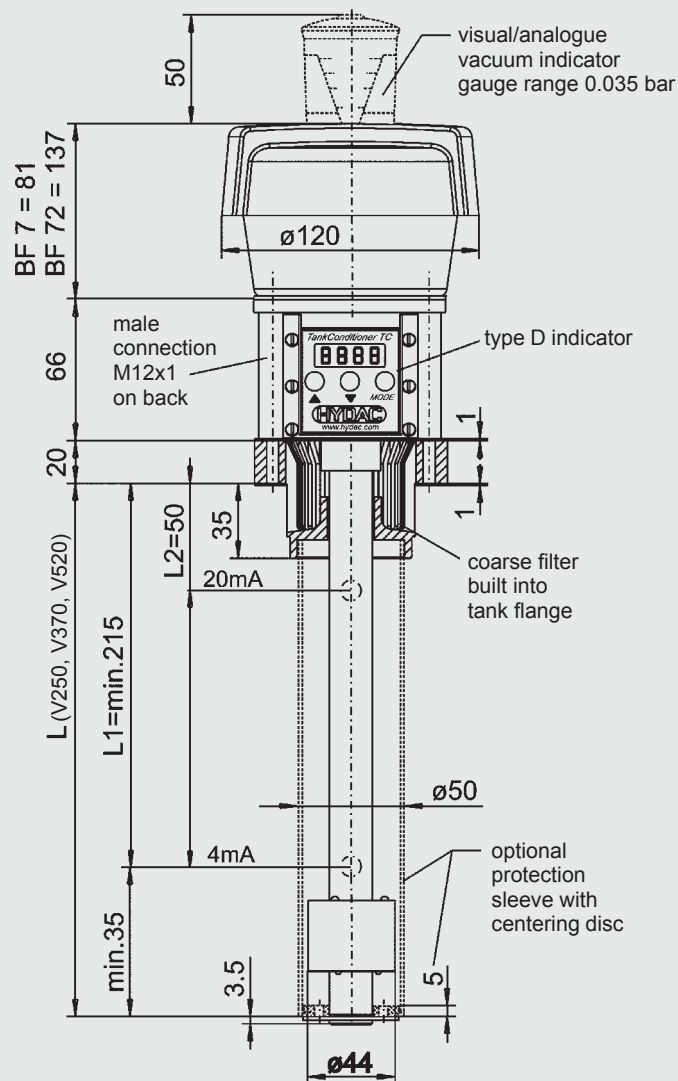
4 = level 4 – 20 mA



TC...W+C../-S44...



TC...UBM+C../-S44...

**TECHNICAL SPECIFICATIONS****Fluid level monitoring**

Output signal	4 – 20 mA
Meas. range for V250	165 mm
Meas. range for V370	285 mm
Meas. range for V520	435 mm
Resolution	4 mm
hysteresis	0 – 10%

Temperature monitoring

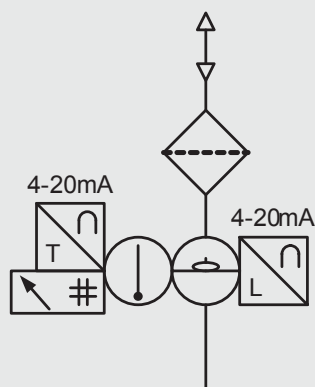
Output signal	4 – 20 mA
Measuring range	0 – 100 °C
Hysteresis	0 – 1 K

Ohmic resistance	$R_B = U - 8 V$ 20 mA
------------------	--------------------------

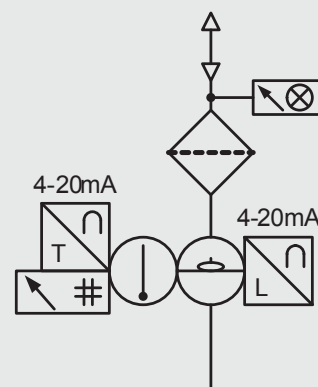
Data transfer Screened cable must be provided!

Display for LED 3-digit temperature monitoring (4-digit w/o unit of meas.)

Indication range -20 °C to +120 °C (-4 ° to +248 °F)



TC...W+D../-S44...



TC...UBM+D../-S44...

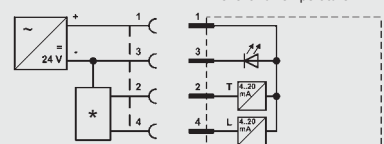
Male connections**Connection**

Fluid level/Temperature signals:

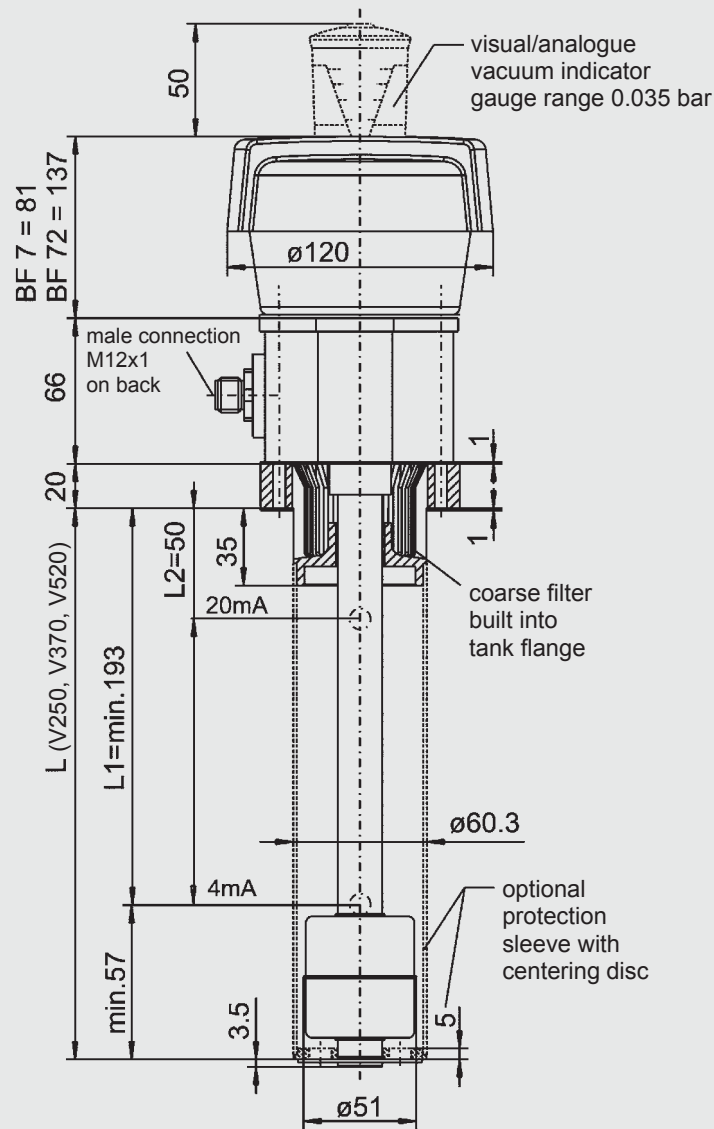
- 1 = 12V-30V DC
- 2 = temperature 4 – 20 mA
- 3 = GND (0V)
- 4 = level 4 – 20 mA

customer equipment	Connection A M12x1, 4-pole
--------------------	-------------------------------

Level and Temperature



* PLC, controller, etc.



TECHNICAL SPECIFICATIONS

Fluid level monitoring

Output signal 4 – 20 mA

Meas. range for V250 143 mm

Meas. range for V370 263 mm

Meas. range for V520 413 mm

Resolution 7.5 mm

Hysteresis 0 – 10%

Temperature monitoring

Output signal 4 – 20 mA

Measuring range 0 – 100 °C

Hysteresis 0 – 1 K

Ohmic resistance $RB = U - 8 V$
20 mA

Data transfer Screened cable must be provided!

Male connections

Connection

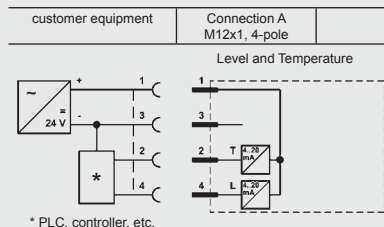
Fluid level/Temperature signals:

1 = 12V-30V DC

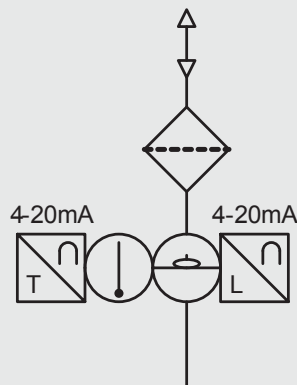
2 = temperature 4 – 20 mA

3 = not connected

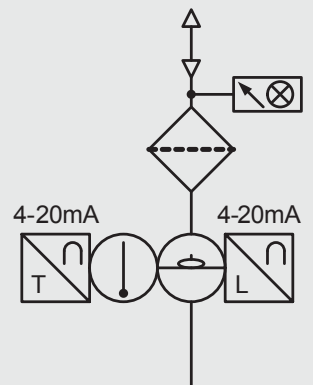
4 = level 4 – 20 mA



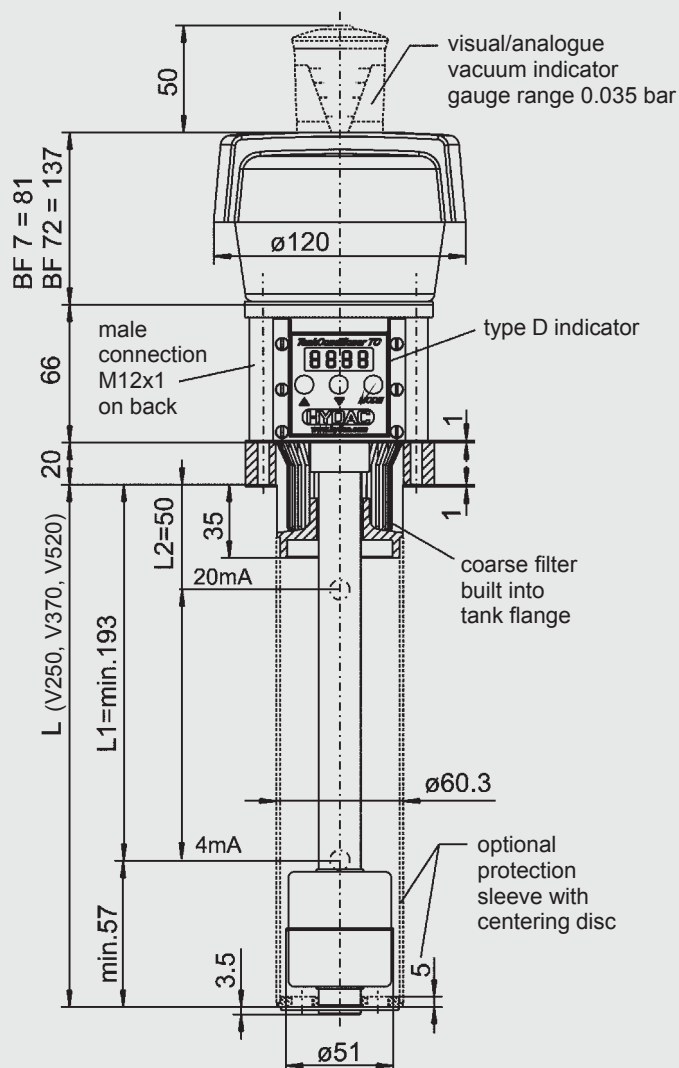
* PLC, controller, etc.



TC...W+C../-S44...



TC...UBM+C../-S44...

**TECHNICAL SPECIFICATIONS****Fluid level monitoring**

Output signal	4 – 20 mA
Meas. range for V250	143 mm
Meas. range for V370	263 mm
Meas. range for V520	413 mm
Resolution	7.5 mm
Hysteresis	0 – 10%

Temperature monitoring

Output signal	4 – 20 mA
Measuring range	0 – 100 °C
Hysteresis	0 – 1 K

Ohmic resistance $R_B = U - 8 V$
20 mA

Data transfer Screened cable must be provided!

Display for temperature monitoring LED 3-digit
(4-digit w/o unit of meas.)

Indication range -20 °C to +120 °C (-4 ° to +248 °F)

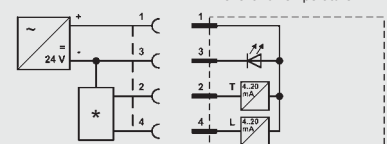
Male connections**Connection**

Fluid level/Temperature signals:

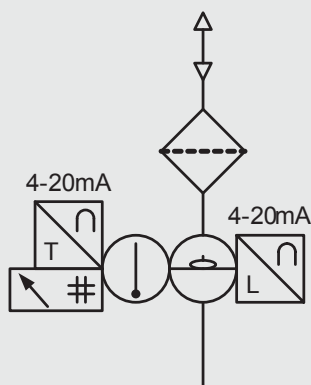
- 1 = 12V-30V DC
- 2 = temperature 4 – 20 mA
- 3 = GND (0V)
- 4 = level 4 – 20 mA

customer equipment	Connection A M12x1, 4-pole
--------------------	-------------------------------

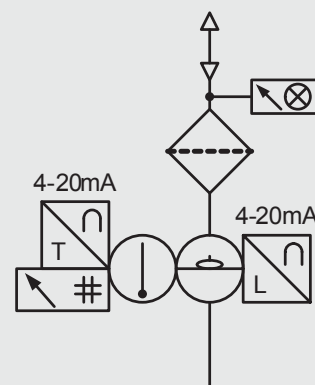
Level and Temperature



* PLC, controller, etc.



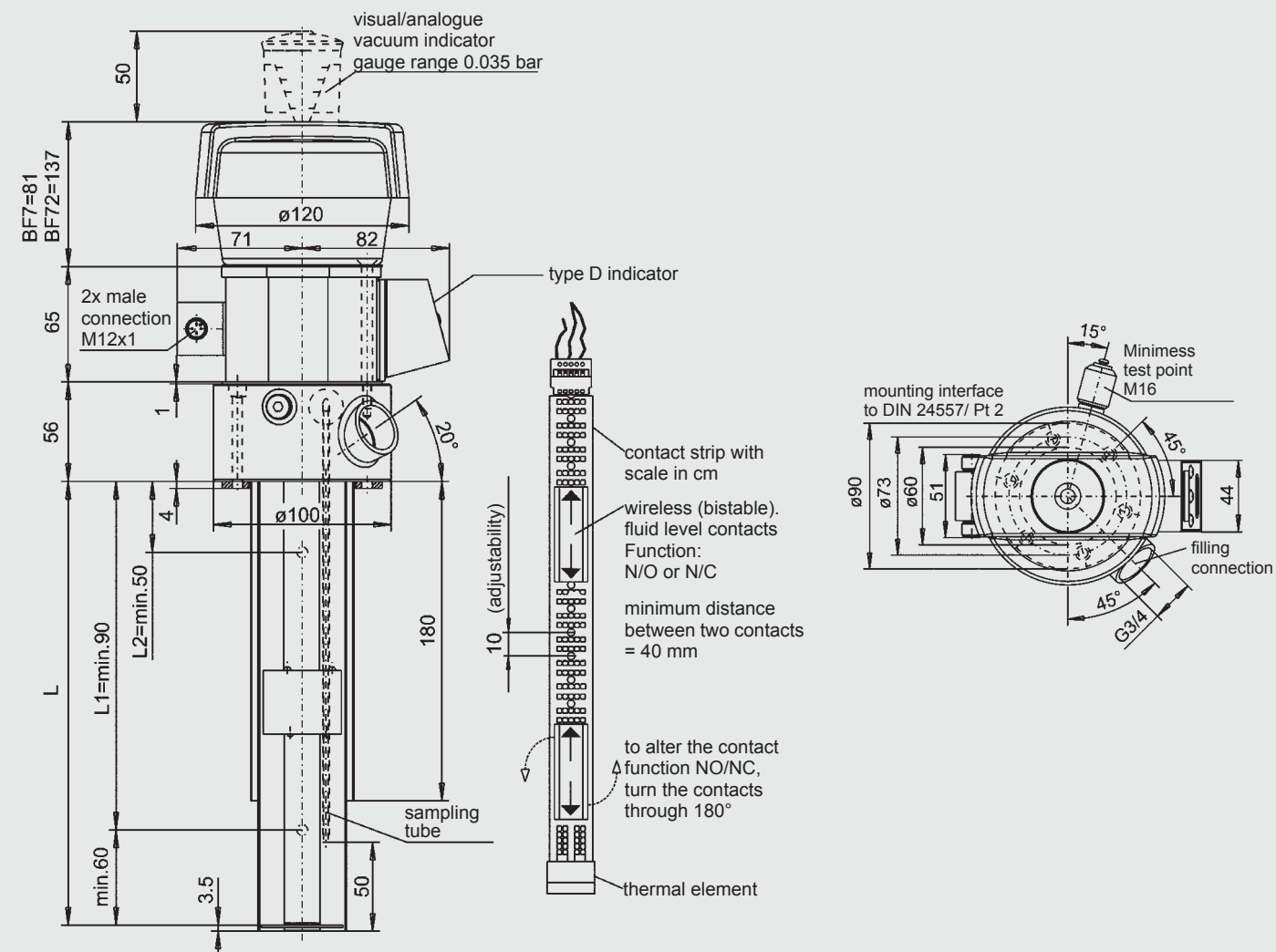
TC...W+D../-S44...



TC...UBM+D../-S44...

3.3 TANKCONDITIONER® TC WITH ADDITIONAL SUPPLEMENTARY CODE "FA34"

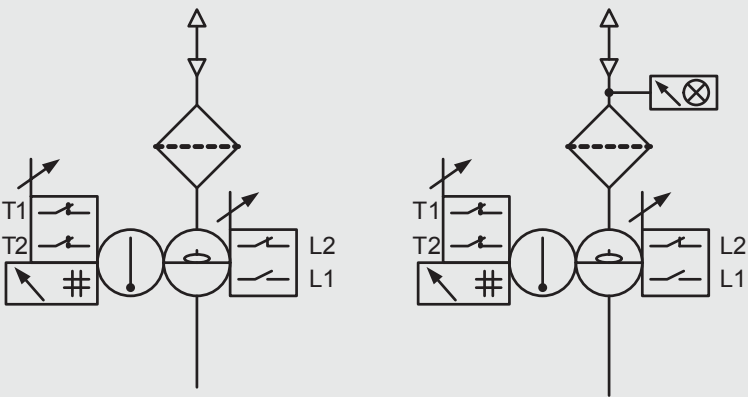
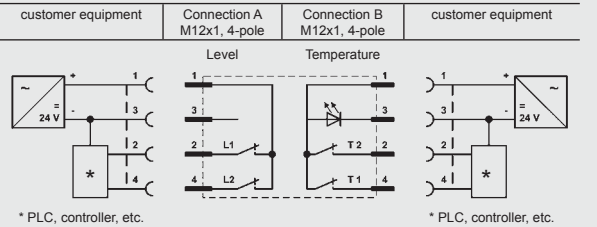
Version TC...D 1.x /-S12-Vxxx-FA34 (FA34 with filling adapter)



TECHNICAL SPECIFICATIONS

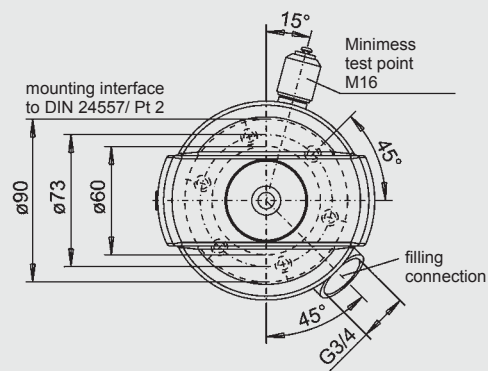
Fluid level switch points	bistable N/O / N/C Max. 2 can be set
Resolution	10 mm
Hysteresis	4 mm
Thermal element	Pt100
Temp. switch points	Max. 2 can be set
Hysteresis	1 – 99 K can be set
Switching capacity	10W / VA max 30 V / DC max.
Switching current	1 A max.
Display for temperature monitoring	LED 3-digit (4-digit w/o unit of meas.)
Indication range	-20 °C to +120 °C (-4 ° to +248 °F)

	Male connections	
	Connection A	Connection B
Level contact(s):		
1 = 12V-30V DC		
2 = level L1 (+UB)		
3 = not connected		
4 = level L2 (+UB)		
Temperature contacts:		
1 = 12V-30V DC		
2 = temperature 2 (+UB)		
3 = GND (0V)		
4 = temperature 1 (+UB)		



TC...W+D../-S12... TC...UBM+D../-S12...

Factory normal setting for type S12: "pump protection monitoring"				
Switch points	250	370	520	
Sensor tube length L	150	270	420	
Contact function of fluid level contacts	NC - rising N/C			Possible application
L2				Warning at "min. tank level"
L1				Cut-out at "min. tank level"



TC...UBM+C../-S44...

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