Mat.-No. 11.63008-0027

Instructions for Use

MAN Fine Filter Module 7x4

Date of update : 11-08
Revision state : A

Intended Purpose	**:**	**Lube Oil ISO VG 100**
Drawing No.	:	DRW 11630080027
MAN PDS-Ident	:	030 020 270
Special Accessories	:	Motor protection switch automatic bleeding and venting valve pressure switch

Contents

1. Introduction

To ensure trouble-free, reliable, and - consequently - cost-effective operation, operating liquids will constantly have to be in unobjectionable condition.
Constant care of the operating liquids is, therefore, indispensable.

MAN bypass finefilter modules are high-class, compact modules for oil care, applied for cleaning operating liquids based upon mineral oil and synthetic or true operating liquids (especially hydraulic oils and lubricating oils).

While it is very cost-effective, the large MAN finefilter cartridge (depth type filter) has a very high holding capacity for sediments and water.

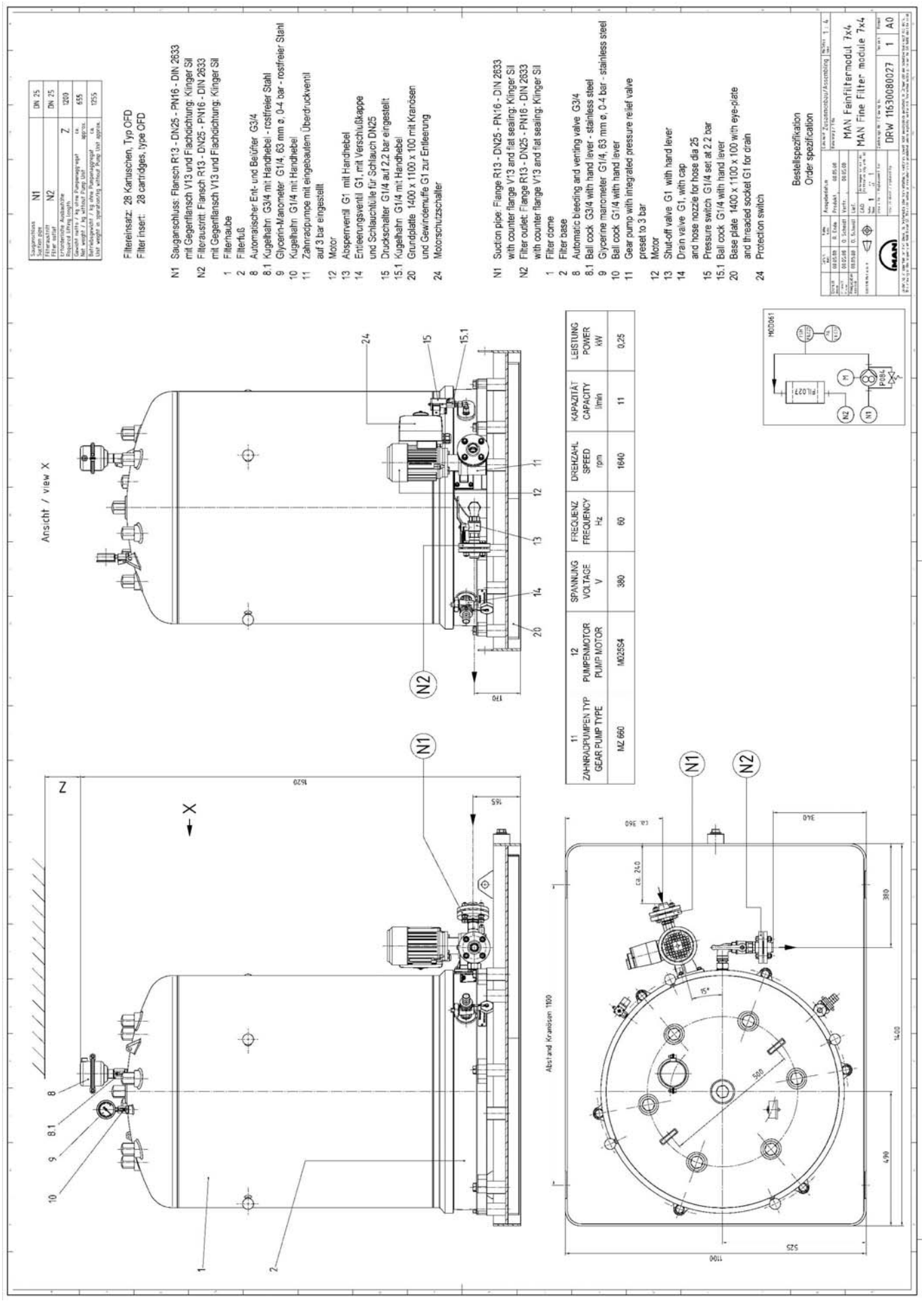
To protect your health and our environment, the latest EC directives have been strictly applied.

2. Intended Purpose

The MAN finefilter module will have to be utilised solely for the intended purpose, which has been clearly determined at the time of acknowledgement of order at the latest.
Any differing utilisation is expressly inadmissible.
With your MAN finefilter module, you may, consequently, filter only the operating liquids listed on the cover of the present Instructions for Use. Any other utilisation is inadmissible.

The MAN finefilter module has been designed for continuous operation.

3. General drawing

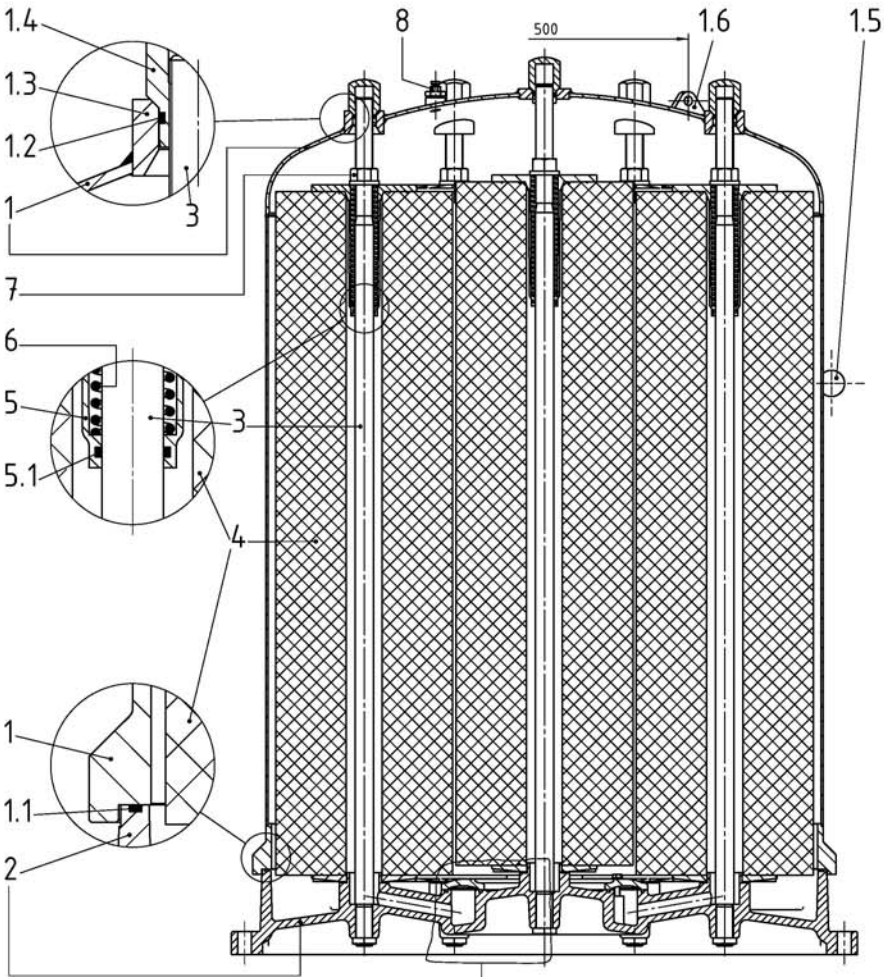


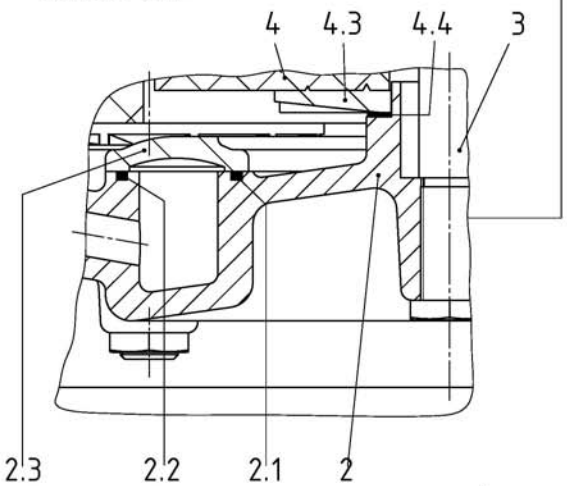
Pos. Legende

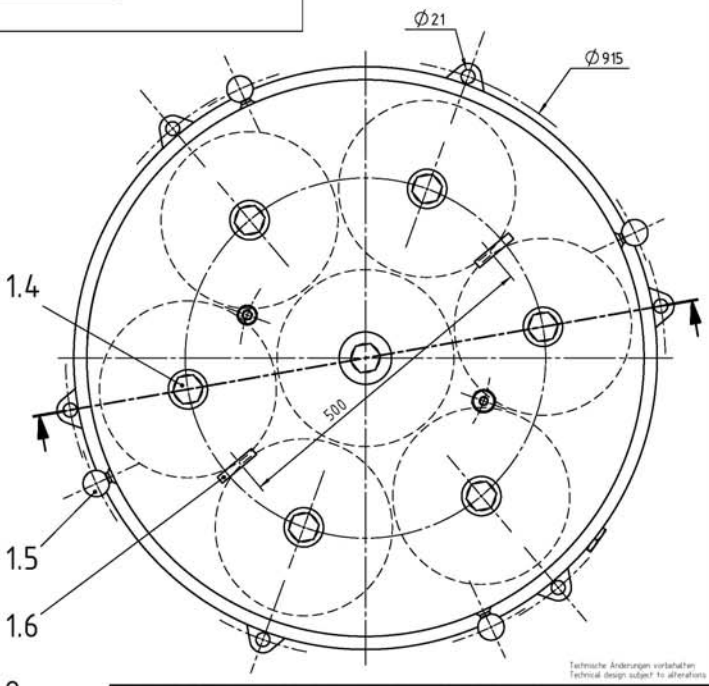
1	Filterhaube
1.1	Filterhaubendichtung: O-Ring 840 x 4
1.2	O-Ring 28,17 x 3,53
1.3	Spindelführung
1.4	Kopfmutter SW41
1.5	Kugelgriff
1.6	Kranöse
2	Filterfuß
2.1	O-Ring 185 x 5
2.2	O-Ring 295 x 5
2.3	Abdeckplatte
3	Spindel
4	MAN Feinfilterpatrone
4.3	Patronenteller
4.4	Gummipackung
5	Federhülse
5.1	O-Ring 28,17 x 3,53
6	Druckfeder
7	Spannmutter
8	Entlüftungsschraube G1/4

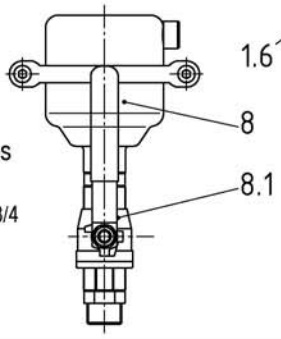
Pos. Legend

1	Filter dome
1.1	Filter dome sealing: O-ring 840 x 4
1.2	O-ring 28.17 x 3.53
1.3	Spindle guide
1.4	Top nut SW 41
1.5	Ball knob
1.6	Eye plate
2	Filter base
2.1	O-ring 185 x 5
2.2	O-ring 295 x 5
2.3	Cover plate
3	Spindle
4	MAN finefilter cartridge
4.3	Cartridge disc
4.4	Gasket
5	Spring sleeve
5.1	O-ring 28.17 x 3.53
6	Compression spring
7	Tightening nut
8	Vent screw G1/4









Als Sonderzubehör / Special Accessories

8	Automatischer Ent- und Belüfter G3/4 Automatic bleeding and venting valve G3/4
8.1	Kugelhahn G3/4 mit Handhebel Ball cock G3/4 with hand lever

Technische Änderungen vorbehalten
Technical design subject to alterations

Änderungen nur auf CAD / Modification only with CAD	Allgemeintoleranzen/General tolerances	Maßstab/Scale	1:5
Seite/Sheet 1 von/of 1	DIN ISO 2768-mK	Material	
	ISO/DIN Methode E		

	Datum/Date	Name
Bearb./Drawn	27.06.01	R. Ende
Gepr./Verified	28.06.01	D. Scheidt
Freigg./Approved	28.06.01	D. Scheidt

Benennung/Description

MAN Feinfiltermodul 7x4
MAN Fine Filter module 7x4

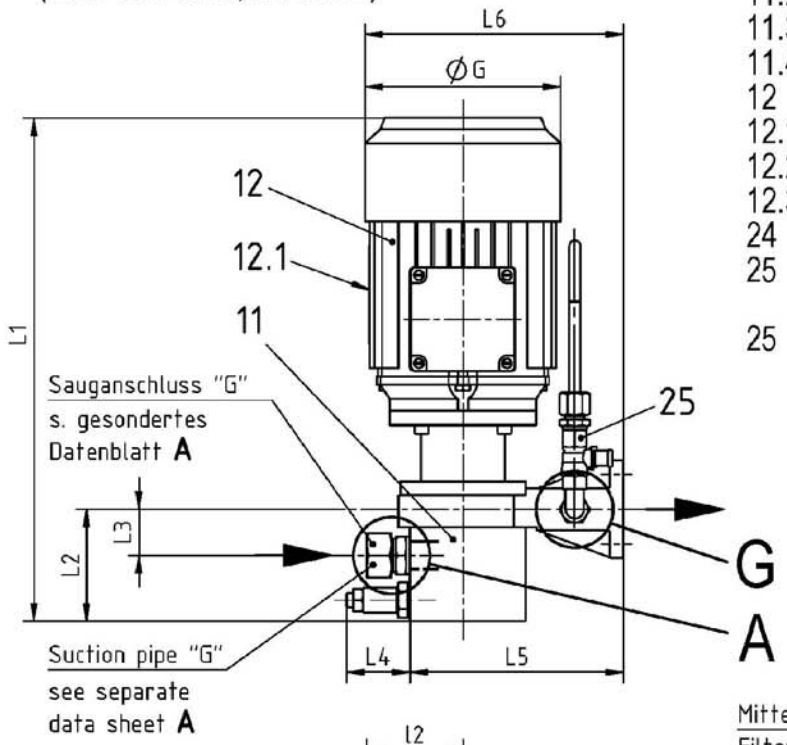
Zeichnungs-Nr. / Drawing NO. A2
Revision 0

Pos.	Änderung/Modification	Datum/Dat.	Name

Gewicht/Weight | Ersatz für/Replacement for | ersetzt durch/Replaced by

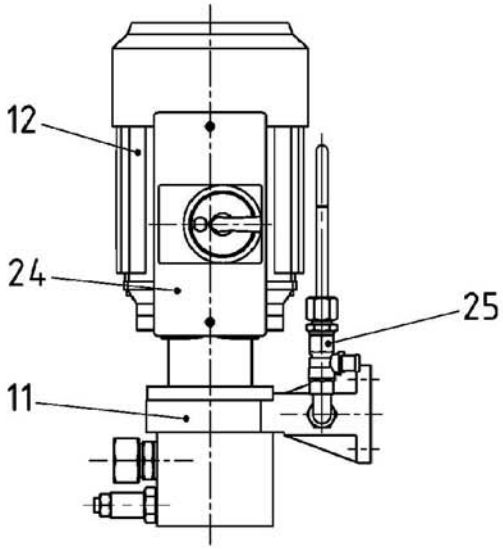
Datenblatt Pumpenaggregat / data sheet Pump Unit

1. ohne / without
Motorschutzschalter / Protection switch (24)
(230 / 400 / 440 V, 50 / 60 Hz)



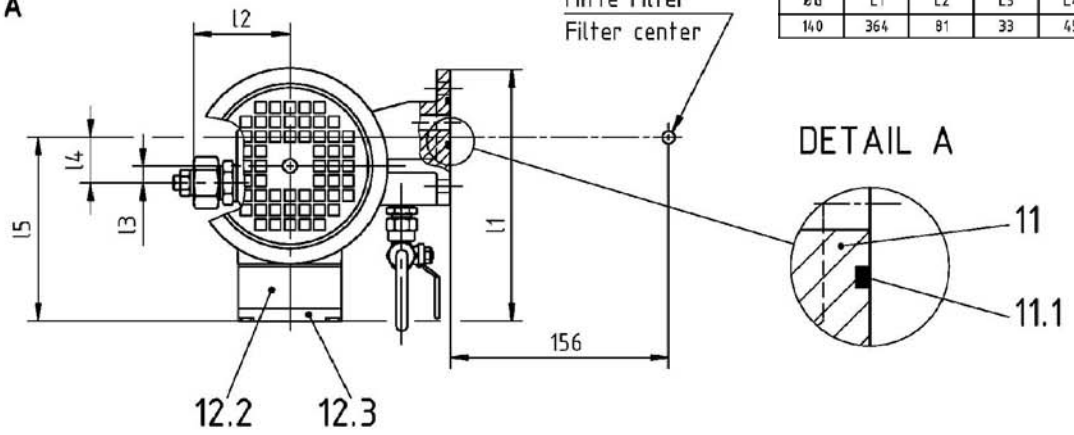
11	Pumpenaggregat / Pump Unit
11.1	O-Ring 28,17 x 3,53 / o-ring 28.17 x 3.53
11.2	Sechskantmutter M8 / hexagon nut M8
11.3	Unterlegscheibe 8,4 / washer 8.4
11.4	Stiftschraube M8 x 20 / stud bolt M8 x 20
12	Motor
12.1	Motortypenschild / type plate motor
12.2	Klemmenkasten / terminal box
12.3	Klemmenkastendeckel / terminal box cover
24	Motorschutz / protection switch
25	Probeentnahmehahn (optional) - s. gesondertes Datenblatt **G**
25	Sampling point (optional) - see separate data sheet **G**

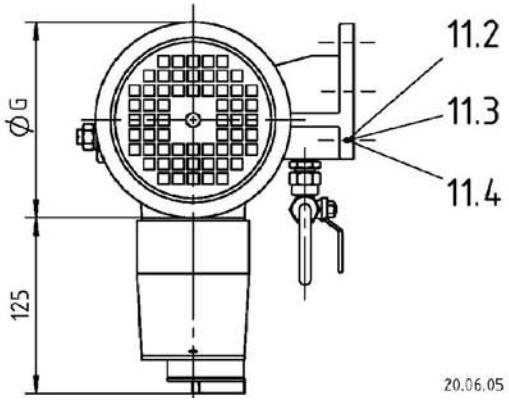
2. mit / with
Motorschutzschalter / Protection switch (24)
(nur / only 400 V, 50 Hz)



Abmessungen und Anschlüsse / Dimensions and connections

ØG	L1	L2	L3	L4	L5	L6	l1	l2	l3	l4	l5
140	364	81	33	45	153	185	180	69	12	32,5	132



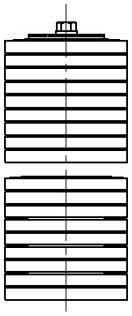


20.06.05

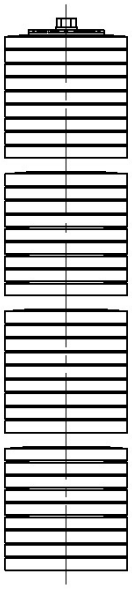
C

Patronendatenblatt für MAN Feinfilter 4x4, 7x4
Data sheet for MAN Finefilter cartridges 4x4, 7x4

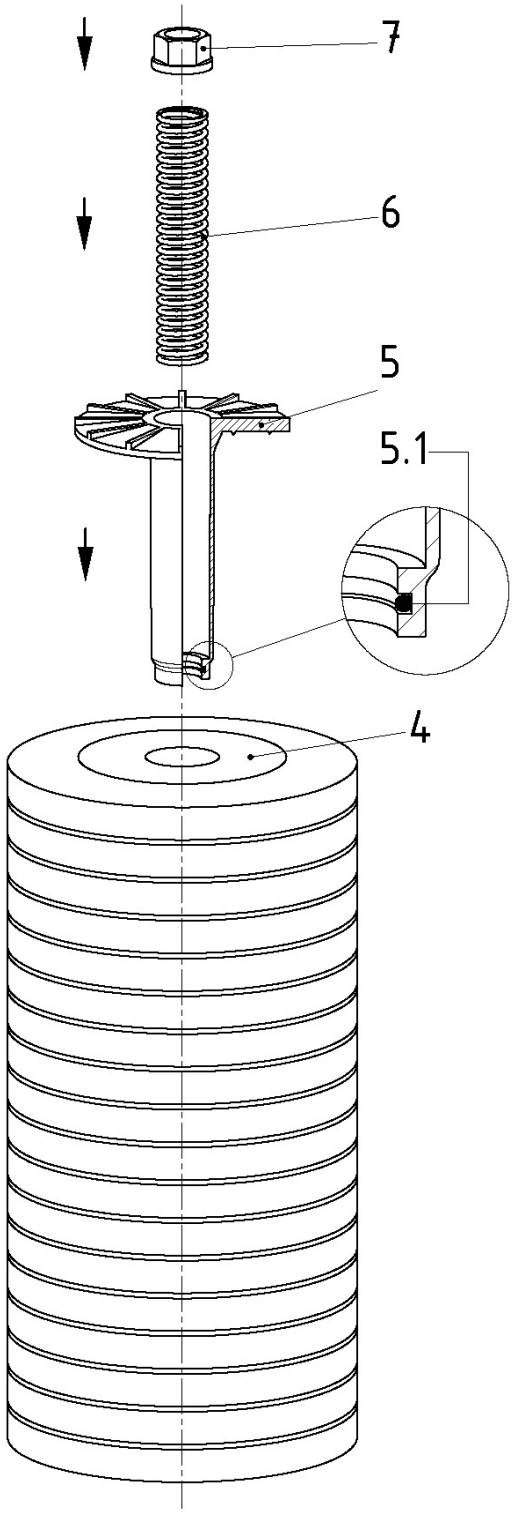
4	MANFeinfilterpatrone	4	MANfinefilter cartridge
5	Federhülse	5	Spring sleeve
5.1	O-Ring 28,17 x 3,53	5.1	O-ring 28.17 x 3.53
6	Druckfeder	6	Compression spring
7	Spannmutter	7	Tightening nut



OFD 2x



OFD 4x

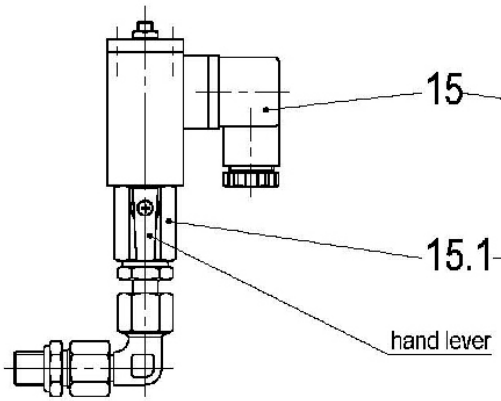


17.07.06

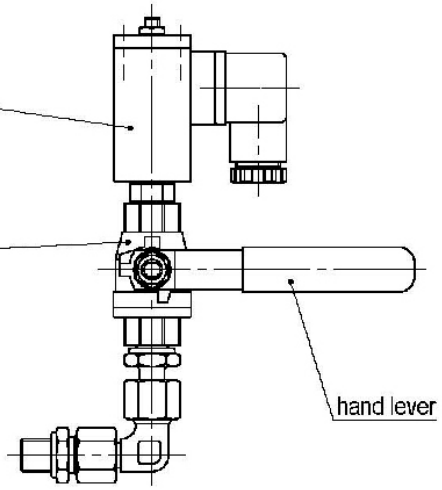
G

Special accessories for MAN Finefilter Module 2x4, 4x4, 7x4

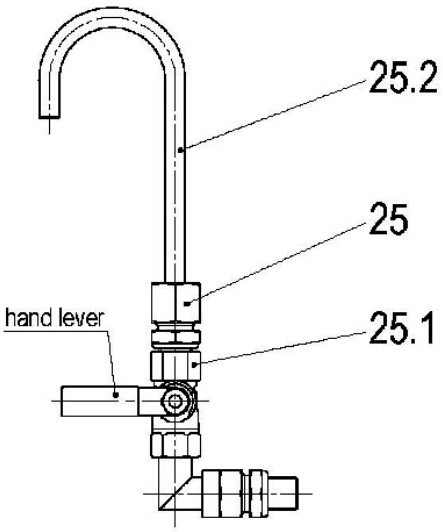
15 Pressure switch preset to 2.2 bar
15.1 Ball cock



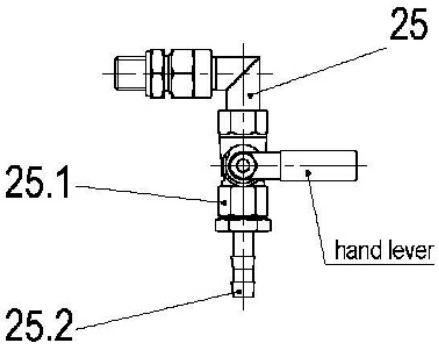
15 Pressure switch preset to 2.2 bar - stainless steel
15.1 Ball cock - stainless steel



25 Sampling point
25.1 Ball cock
25.2 Sample tube



25 Sampling point - stainless steel
25.1 Ball cock - stainless steel
25.2 Hose nozzle for hose dia 10 - stainless steel

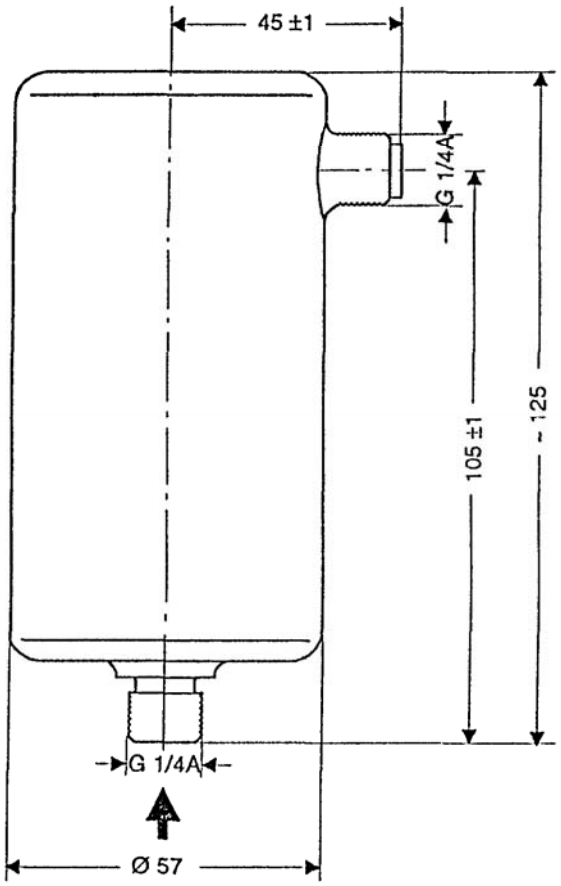


30.05.05

Data Sheet	Automatic Bleeding and Venting Valve
Document: D-D-94060-4	Page: 1 / 1
Date of Modification: January 10, 1995	State of Modification: A

Technical Data:

Nominal pressure:	PN 16
Connection:	G ¼ A
Working pressure:	0 to 6 bar
Temperature:	max. 130°C
Flow rate:	up to 9.8 m_n^3/hr
Construction:	entirely of stainless steel



Description:

The automatic bleeding and venting valve will carry off air and gases from your MANfine filter. During discharge of the MANfine filter, it will effect aeration. It is a float-controlled fitting, its valve closing with rising level (deaeration) and opening with falling level (aeration).

The automatic bleeding and venting valve is entirely made from deep-drawing stainless steel parts. Consequently, its interior and exterior surfaces are corrosion-proof and may easily be cleaned. Its soft sealing will ensure perfect tightness during operation.

Special designs with different sealing materials suitable for aggressive liquids are available. Ozone-proof designs, suitable for application for instance with aggressive liquids and at higher temperatures are available for an extra charge.

Flow rate in m_n^3/hr						
Δp bar						
0.1	0.2	0.5	1	2	4	6
1	1.4	2.2	2.8	4.2	7	9.8

EB 1.19/2.0.941.1

4. Technical Data and Wiring Diagram

4.1 Technical Data

The MAN finefilter module will be delivered in completely assembled condition and ready-for-connection, including Instructions for Use, but exclusive of operating liquid.
Your MAN finefilter module will bear the CE mark.

Pump module:	Typ MZ 11,0 – 25 BS 142,5 Pressure relief valve preset to 3.0 bar
Capacity:	Q = 11 l/min at 1640 rpm and 60 Hz (660 l/h) maximum admissible low pressure 0.3 bar maximum suction head 2 m
Noise level:	≤ 73 dB/A at a distance of 1 m
Motor type:	VEM-Ds-Motor Typ K21R 71K4 0.25 KW, 1400 min-1, 380 V Y, 60 Hz IP 55, ISO F, S 1, 40° C, Bauform B 14k the motor is maintenance-free Current connection acc. to wiring diagram in terminal cover (12.2)
Screwings:	Cutting and locking screwings acc. to DIN 2353:
Filter inlet (N1):	G 1", welded flange DN 25, PN 16, DIN 2633
Filter outlet (N2):	G 1", welded flange DN 25, PN 16, DIN 2633
Hose nozzle (14.2) of drain cock (14):	DN 25
Sealing material:	Viton
Paint coating:	RAL 6011
Net weight:	approx. 465 kg
Operating weight:	approx. 805 kg

4.2 Flow sheet

for MAN Fine Filter module 2x4, 4x4, 7x4

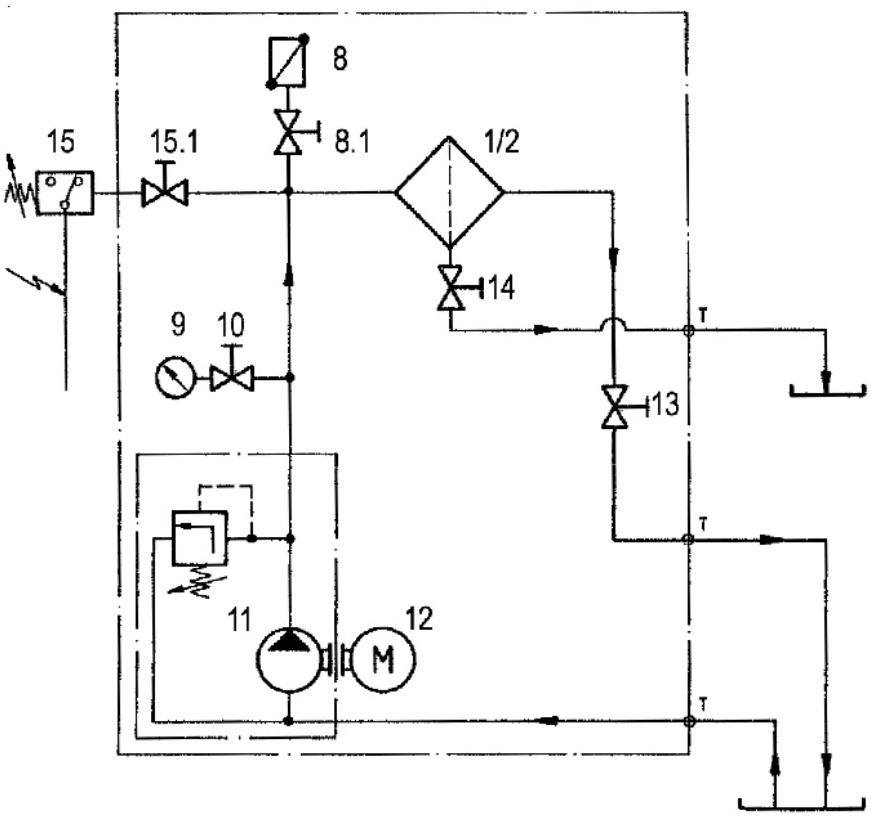
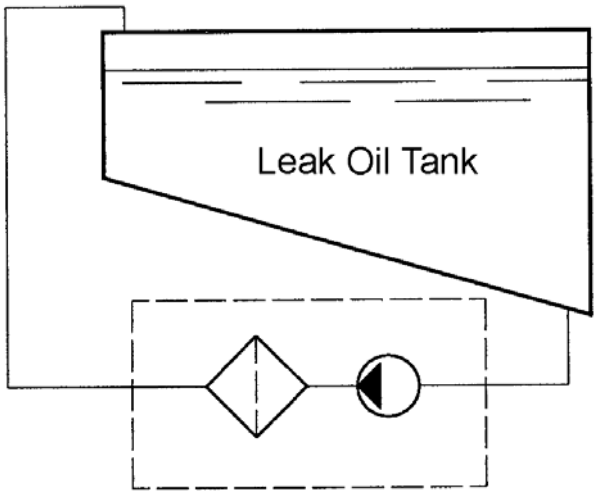
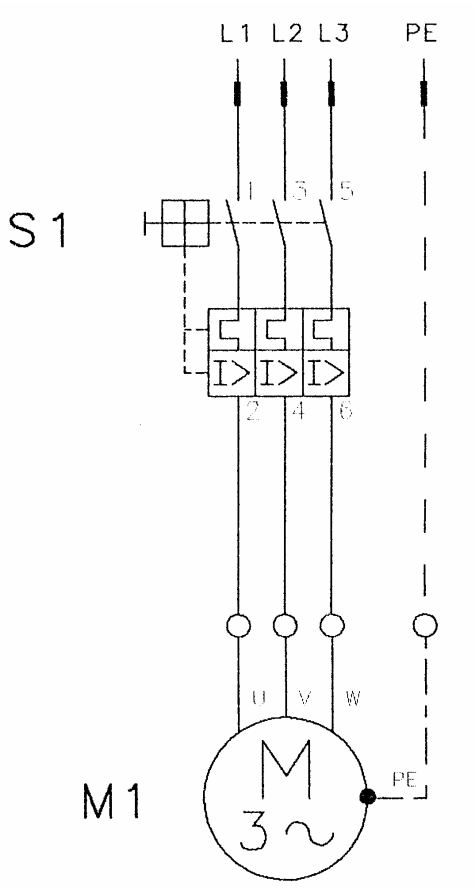


Diagram Bypass Filtration Offline

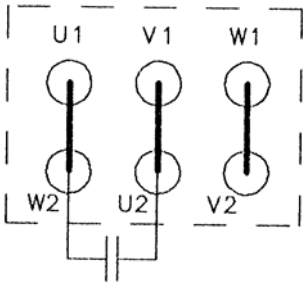


4.3 Wiring Diagram

3 x 380 V, 60 Hz:



Terminal board, motor



5. Safety Instructions for Transport, Installation and Operation

5.1 Symbols

DANGER
This symbol indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
This symbol indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
This symbol indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE
This symbol indicates a property damage message.

ATTENTION
This symbol indicates a situation which may special attention is necessar to prevent possible damage of property or health. .

Danger for the environment
This symbol indicates a situation which, if not avoided, may result in environmental damage.

Slip hazard
This symbol indicates a situation which, if not avoided, may lead to slipping**.**

Skin irritation
This symbol indicates a situation which, if not avoided, may lead to skin irritation**.**

5.2 Operating Liquids

There mustn't be any operating liquid in the MAN finefilter module during transport (delivery).

Leaking liquid will have to be immediately removed by means of absorbing material. The absorbing and cleaning materials soaked with operating liquid will have to be stored in labelled containers and disposed of in compliance with official regulations.

5.3 Health

Cleaning rags and the like, soaked with operating liquid, must not be carried along in the clothing. Clothing that has been bespattered will have to be removed. Those parts of the skin that have been in contact with operating liquid will have to be washed with water and soap. If there is danger of spattering, the eyes will have to be protected with eye preservers.
If your eyes have been in contact with the operating liquid, immediately rinse them with running water for 15 minutes, the eyelids wide open. Then see a doctor.
Protect your hands with protective gloves or with skin protection cream.
Do not eat, drink, or smoke during work with operating liquids.

As for the handling of operation liquids, we refer to the safety specifications acc. to 93/112/EG of the mineral oil industry.

5.4 Safety at Work

In case of fire, foam, powder, carbonic acid, sand or soil will be suited for extinguishing.

According to the directives of § 13 of the Ordinance on Workplaces, two hand fire extinguishers size IV, P 12, must be available in the filter room.

To ensure safe operation of the MAN FINEFILTER module, the Client will have to prepare operating instructions based on the present Instructions for Use, indicating restrictions of application and safety measures to be taken in case of malfunctions.
The operating instructions will have to be posted in a suitable place. They will have to be observed by all employees.

6. Transport and Installation

ATTENTION!

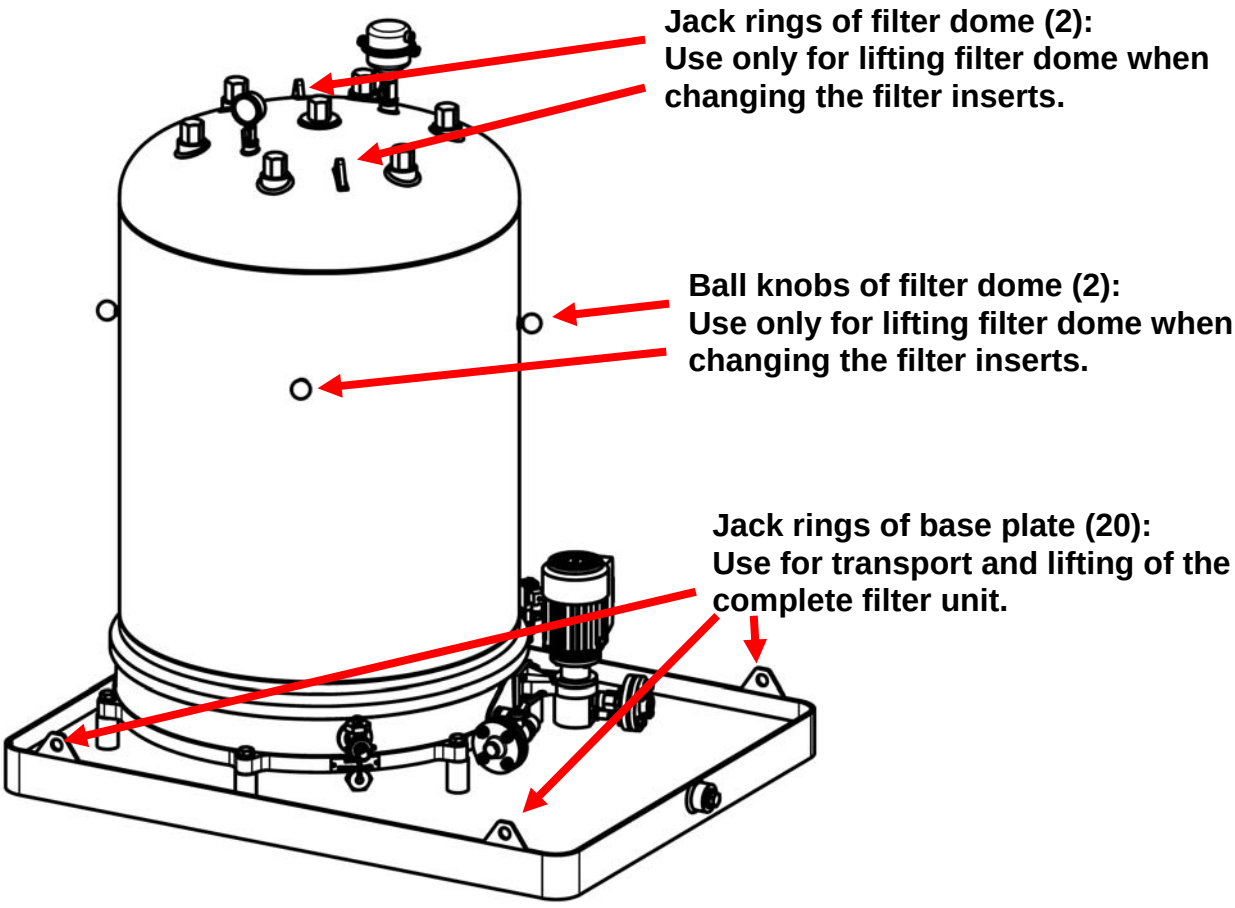
Local Requirements:
The MAN finefilter module will have to be placed upon an even surface to prevent it from tipping.

⚠ CAUTION

Please note: When lifting the whole MAN finefilter module, do not use the ring screws of the filter dome (1.5, 1.6), but only the jack rings of the base plate (20).

⚠ WARNING

If the MAN finefilter module is installed near a fire source, the fire point of the operating liquid applied will have to be taken account of (please refer to the safety specifications acc. to 93/112/EG of the mineral oil industry).



There mustn't be any operating liquid in the MAN finefilter module during transport (delivery).

Leaking liquid will have to be immediately removed by means of absorbing material. The absorbing and cleaning materials soaked with operating liquid will have to be stored in labelled containers and disposed of in compliance with official regulations.

7. Commissioning and Operation

Remove all packing material from the MAN finefilter module and dispose of it according to type.

Assembly, operation, maintenance, and disassembly of the MAN finefilter module may be carried out solely skilled staff. They will have to use suitable tools.

NOTICE

If your MAN finefilter module is part of a hydraulic or lubricating oil system, it may only be operated offline the oil circuit. For this purpose, the system tank the MAN finefilter module is connected to will have to be depressurised. The MAN finefilter has been designed for an operating pressure of 2.2 bar.

Mechanical connection:

The MAN finefilter module will have to be connected to the suction pipe (N1) of the gear pump (11) and to the filter outlet (N2) by means of an oil-resistant hydraulic hose acc. to DIN 20021 or by pipes acc. to DIN 2391. Distortions owing to improper screwing will have to be avoided. In case of pipes, those of the L series acc. to DIN 2391 will have to be utilised. Connecting dimensions may be taken from Item 4 ‘Technical Data and Wiring Diagram’. The connecting dimension of the return line (to be taken from Item 4 ‘Technical Data and Wiring Diagram’ as well) must not be reduced, as the frictional resistance caused by diminished cross section will effect inadmissible high initial filter pressure.

The suction line will have to reach down below the liquid level of the system tank, so as to avoid that air be sucked in. It should be connected as near as possible to the bottom of the tank so as to be able to catch the sump. The return line should be placed in the tank as far as possible from the suction line so as to avoid short-circuit filtration.

Electrical connection:

If your MAN finefilter module has been delivered including pump module, but excluding electrical equipment, cabling will have to be done by an authorised electrician by means of a flexible, oil-resistant line type HO 7 BQ according to the wiring diagram in the terminal cover (12.3) of the motor (12).

ATTENTION!

Correct mains voltage and sense of rotation of the motor (12) of the gear pump (11) will have to be paid attention to (i.e. looking clockwise upon the fan acc. to the arrow on the motor indicating the sense of rotation).
If the motor runs against the sense of rotation for a prolonged period, the pump will be damaged.
The rotary field of the mains supply will have to correspond with the rotary field of the motor (12) of the gear pump (11).
If the motor is not equipped with a protection switch, the motor will have to be protected corresponding to its nominal current by means of a protection switch to be provided by the Client.
Connected loads and type of electrical connection are indicated on the type plate (184) of the motor. Solely plugs with shrouded contacts acc. to CEE are to be used as mains plugs.

Providing the system tank has only a small capacity, the MAN finefilter will have to be topped up from a separate tank with an operating liquid of the same variety by means of the above suction pipe and the **self-priming** gear pump (11), so that there will remain sufficient operating liquid in the system tank. The quantity of operating liquid required for topping up is indicated on the type plate (2.1) of the MAN finefilter. For this purpose, the motor (12) of the gear pump (11) will have to be switched on by operating the protection switch ((23) if supplied). To allow filling of the filter housing (1 + 2) with operating liquid, the MAN finefilter must be deaerated.
Deaeration will be done by turning the knurled screw (10.1) at the shut-off and air-vent valve (10), or by turning the vent screw (8) counterclockwise by means of a wrench size 13.
As soon as operating liquid flows out of the shut-off and air-vent valve (10) or from the vent screw (8), the knurled screw (10.1), or the vent screw (8) has to be shut by turning it clockwise.

If the manometer (9) has to be exchanged, it can be shut-off by turning the hand wheel (10.2) at the shut-off and air-vent valve (10) clockwise. For this purpose, the MAN finefilter module will not have to be put out of operation.

Any operating liquid flown out during deaeration will have to be mopped up by means of suitable absorbing material. To prevent unintentional exit of operating liquid, the service staff will have to be present at the MAN finefilter module during the entire deaeration procedure.

Manual deaeration is not necessary, if the MAN finefilter is equipped with an automatic bleeding and venting valve (8) for non-monitoring ventilation acc. to the attached Data Sheet No. D-D-94060-4 instead of the vent screw (8).

If the automatic bleeding and venting valve (8) has to be exchanged, it may be shut-off by closing the ball cock (8.1). For this purpose, the MAN finefilter module does not have to be put out of operation.

As soon as the MAN finefilter has been filled with operating liquid, the MAN finefilter module will be put out of operation for a short time by switching off the motor (12) of the gear pump (11) at the protection switch ((23) if supplied). Then the suction line will be connected to the system tank - as described above - and the motor (12) of the gear pump (11) will be restarted.

If the operating liquid is pressed to a system tank located on a higher level after filter outlet, the initial filter pressure at the manometer (9) will be higher corresponding to the delivery head. The higher the initial filter pressure, the lower is the holding capacity for sediments of the MAN finefilter cartridge (4).

8. Putting out of Operation

The motor (12) of the gear pump (11) is switched off by operating the protection switch ((23) if supplied).

Solely an authorised electrician is permitted to disconnect the motor (12).

9. Maintenance and Supervision

9.1 Maintenance

9.1.1 Maintenance of the MAN finefilter Module

The MAN finefilter module does not require any special maintenance.
The sight glass of the manometer (9) will have to be kept clean to ensure readability.
The gear pump is self-lubricating owing to the operating liquid applied. Therefore, the MAN finefilter module is almost maintenance-free.
Manual deaeration (at 8 or 10) is not necessary, if the MAN finefilter is equipped with an automatic bleeding and venting valve.

9.1.2 Exchange of the MAN finefilter Cartridge

For exchange of the MAN finefilter cartridge (4), the motor (12) of the gear pump (11) has to be switched off by operating the protection switch ((24) if supplied). You will have to wait until the pressure in the MAN finefilter has fallen towards 0 bar.
During exchange of the MAN finefilter cartridge (4), i.e. the MAN finefilter is open, the shut-off valve (13) integrated in the filter outlet (N2) has to be closed to prevent backflow of operating liquid from the system tank.
Discharge of the filter housing (1 + 2) will be done by opening the drain cock (14). Previously, screw off the cap (14.1) and screw on the hose nozzle (14.2) hanging from the drain cock (14) , the drain cock (14) being **shut**. Stick an oil-resistant hydraulic hose acc. to DIN 20021 upon the hose nozzle (14.2). The hydraulic hose must end in a sufficiently dimensioned collecting tank for operating liquid.
The connecting dimension of the hydraulic hose with respect to the drain cock (14) may be taken from the Technical Data.
The drain cock (14) may not be used for sample taking for analysing purposes, as the operating liquid to be encountered in this zone is contaminated.

As to the handling of operating liquids we refer to Item 5.1.1 ‘Operating Liquids’.

To open the drain cock (14), please use a wrench size 12. The drain cock is opened or closed by turning the wrench that has been stuck on the square of the drain cock by a quarter turn respectively. When you look down on the square from above, you will recognise a line. When this line is in transverse position as compared with the outlet of the drain cock (14), the drain cock is closed. Simultaneously, the knurled screw (10.1) at the shut-off and air-vent valve (10), or the vent screw (8) will have to be opened with a wrench size 13 to aerate the filter casing.
Manual deaeration is not necessary, if the MAN finefilter is equipped with an automatic bleeding and venting valve (8) for non-monitoring ventilation acc. to the attached Data Sheet No. D-D-94060-4 instead of the vent screw (8).

The MAN finefilter is not empty as long as any operating liquid flows out of the open drain cock (14). We recommend to shut the drain cock (14) immediately after the discharge procedure so as not to forget it later.
Afterwards, the top nuts (10) will have to be unscrewed counterclockwise by means of a torque wrench (SW 41) and the filter dome (1) will have to be lifted off.

After removal of the tightening nuts (7) - by manually turning it counterclockwise -, of the compression springs (6), and of the spring sleeves (5), the contaminated elements of the MAN finefilter cartridge may be lifted out of the filter. Previously, please allow the MAN finefilter cartridge (4) to drain off. Owing to the integrated O-ring, (5.1), pulling-off of the spring sleeves (5) upward over the spindles is somewhat difficult. This tight seat is necessary and ensures perfect sealing by the O-rings in the MAN finefilter.

The contaminated elements of the MAN finefilter cartridge (4) may then be put into the plastic bags of the spare MAN finefilter cartridge and carried to your disposal container in the cardboard box intended for transportation.

We take this occasion to recommend a visual inspection of the base sealing (1.1) as well as of the O-rings (5.1 and 81) of the spring sleeves (5) and the spindle guides (1.2) of the filter dome (1) with respect to their being intact.

The new elements of the MAN finefilter cartridge (4) will be carefully lowered around the spindles (3). The bottom elements of the MAN finefilter cartridge should have tight contact with the sealing surface - which should have been cleaned previously - in the filter base (2).
Insert the spring sleeves (5) and the compression springs (6) and manually tighten the tightening nuts (7) clockwise up to the stop.

After placing of the filter dome (1), the top nuts (10) will have to be tightened by turning a torque wrench (SW 41) clockwise at a torque of 220 Nm.

9.1.3 Disposal of the MAN finefilter Cartridge

Used MAN finefilter cartridges have to be disposed as absorbance- and filter-material with harmful contamination (EAK-Key-no. 15 02 99 D1).

9.2 Supervision

9.2.1 Manometer

The degree of contamination of the MAN finefilter cartridge (4) may be read from the manometer (9) on the filter dome (1).
The holding capacity of the MAN finefilter cartridge (4) for sediments is exploited to full advantage as soon as the filter pressure has reached 2.2 bar, while the filter is at **working temperature.**

As soon as the filter pressure has reached 2.2 bar, the MAN finefilter cartridge (4) will have to be exchanged.

When the MAN finefilter cartridge (4) is contaminated, the pressure relief valve (opening pressure 2.2 bar) will allow the operating liquid to flow back to the pump inlet.
In this case, the operating liquid is no longer filtered and, therefore, the MAN finefilter cartridge (4) will have to be exchanged (cf. Item 9.1.2 ‘Exchange of the MAN finefilter Cartridge’).

Please note that no filtration will be effected as soon as the filter pressure has reached 2.2 bar.

In case you should notice a filter pressure exceeding 2.2 bar yet when starting-up the MAN finefilter module, switch the MAN finefilter module off and look up the possible reason under Item 11.1 in the Table ‘Trouble-Shooting’.

10. Function

The motor (12) of the gear pump (11) will be switched on by operating the protection switch ((24) if supplied). The contaminated operating liquid will be sucked from the system tank by the self-priming gear pump (11), which will slowly and regularly pump it through the MAN finefilter cartridge (4), and that radially from the outside to the inside. Through the centre of the filter base (2), the cleaned operating liquid will flow back from the filter outlet (N2) into the system tank without pressure. The shut-off valve (13) integrated in the filter outlet (N2) will prevent a backflow of operating liquid out of the system during an exchange of filter inserts.
To ensure maximum pump performance, low initial filter pressure, and optimum filtration, a warm operating medium is required, which is available in most cases owing to the operating temperatures given.
The MAN finefilter cartridge (4) may solely be utilised at temperatures that do not exceed 150°C.

11. Malfunctions, Possible Reasons, Trouble-Shooting

11.1 Table Trouble-Shooting

Trouble	Reason	Remedy
Pump motor does not run	No mains voltage	Check fuses
	Differing mains voltage	Exchange motor
	Incorrect connections	Effect correct connections acc. to type plate and wiring diagram in terminal cover
	Wrong rotary field	Reverse sense of direction by re-connecting 2 external conductors in the mains plug or in the motor
	Incorrect setting of protection switch	Re-set protection switch acc. to type plate
Pump does not take in	Leaky suction line	Check suction line for leakages, re-tighten screwings, seal thread
	Liquid level in the system tank too low	Re-fill operating liquid
	Defective shaft sealing ring	Exchange shaft sealing ring
	Wrong sense of rotation of the drive	Reverse sense of rotation
	Viscosity of the operating liquid too high	Use operating liquid with suitable viscosity
Pressure difference too high	Level of system tank too high	Install MAN Fine Filter module on level of system tank
	Cold operating liquid	Warm up operating liquid
	Diminished cross section of re-circulation line	Exchange re-circulation line for one with larger cross section
	Kinked hose	Straighten hose
	Additional shut-off valve in re-circulation line	Care for shut-off valve to be open
	Viscosity too high	Use other type of MAN Fine Filter cartridge
Delivery of the pump is interrupted despite intact drive	Pump shaft seared off	Repair by MAN Diesel
	Defective clutch	Exchange clutch
	Leaky suction line	see above
	Lack of operating liquid in the system tank	Re-fill operating liquid
Pump delivers without or with little pressure	Pipe fracture or insufficiently tightened screwings	Exchange defective pipe, re-tighten screwings
	Pressure relief valve does not close owing to contamination or defective valve spring	Clean pressure relief valve or exchange valve spring
	Considerable wear of the pump	Repair by MAN Diesel
	Suction line takes in air	see above
Pressure gauge indi-	Shut-off and air vent valve closed	Open shut-off and air vent valve

cates no pressure		
	Pressure gauge defect	Exchange pressure gauge
	MAN Fine Filter cartidge is missing	Install MAN Fine Filter cartridge
	MAN Fine Filter not filled	Fill MAN Fine Filter
	Compression spring is missing	Install compression spring
	O-ring in the spring sleeve is missing	Re-install O-ring
	compression spring in the spring sleeve too loose	Re-tighten compression spring
No automatic ventilation	Air Venting and bleeding valve is defect	Exchange air venting and bleeding valve
Leaky filter base sealing	Clamp not sufficiently tightened	Re-tighten clamp while filter is depressurized
	Defective O-ring	Exchange O-ring
Air in filter	Air in operating liquid taken in	Deaerate by means of Item 8 or 10

11.2 Exchange of the Pump Module

If the pump module (11 + 12) should have to be exchanged owing to a failure, at first the MAN finefilter has to be discharged (as fully described under ‘Exchange of the MAN finefilter Cartridge’).

Simultaneously, the motor (12) will have to be disconnected by an authorised electrician.
The MAN finefilter is not empty as long as any operating liquid flows out of the open drain cock (14). The pump module then can be dismantled.
Then, the 4 hexagon nuts M8 (11.2) acc. to DIN 555 of the 4 stud bolts M8 x 20 (11.4) acc. to DIN 938 will have to be unscrewed by means of a wrench size 13 to be turned counterclockwise.
The 4 pertaining washers (11.3) acc. to DIN 125 will have to be removed. Then the pump module (11 + 12) may be lifted forward. Preserve the nuts (11.2), the washers (11.3) and the gasket (11.1) for re-use.
Mounting of the pump module will be carried out in reverse order.
As to return to service of the MAN finefilter module, we refer to the detailed description under Item 7. ‘Commissioning and Operation’.
As far as leakages are concerned that might occur during disassembly of the pump module, please refer to Item 5.1.1 ‘Operating Liquids’.

12. Spare Parts

We shall be pleased to give you more detailed information on spare parts upon request.

13. Special Accessories

- Automatic bleeding and venting valve (8) as described before.
- Motor protection switch (24) as described above with motor circuit breaker
  When the limit of the dirt holding capacity of the MAN Fine filter cartridge (4) has been reached (2.2 bar indicated on pressure gauge (9)), the pressure switch (15) switches off the motor-pump- module of the MAN Fine Filter module via the motor circuit breaker.

- Pressure switch (15)
  When the MAN finefilter module has been operated until the holding capacity of the MAN finefilter cartridge has been exhausted and the filter pressure has reached 2.2 bar, the pressure switch according to the attached Data Sheet switches off the motor (12) of the gear pump (11) by means of a contactor to be provided by the Client.
  If the pressure switch (15) has to be exchanged, it may be shut-off by closing the ball cock (15.1) with hexagon opening. This is done by turning a 3 mm hexagon socket head wrench in the hexagon.

14. Warranty

For warranty refer to our sales terms and conditions of delivery as valid at the date of the contract.

15. Annexes

Please find on the following pages:

A. Data sheet Pressure Switch

Mechanical pressure switches block type

1 changeover contact for positive and negative gauge pressure

with rotatable case, female or flange mounted

Special features

As a result of their robust and resistant construction, block-type pressure switches guarantee a long service life, even in the case of high loads. The model featuring the rotatable pressure contact makes alignment of the pressure switches an easy task in application. The flange design can be directly screwed to the hydraulic block. At the same time, this mechanically stable connection safeguards the pressure connection, without additional pipework.

Areas of application

The switches can be used wherever high switching capacities are required under high pressure. For example, in applications involving the control and monitoring of hydraulic systems and process sequences. The measuring ranges and choice of materials from the 3165 Series make these pressure switches extremely attractive for all measurement tasks involving pneumatic systems.

Product features

The robust design of these pressure switches guarantees a long service life, even in the case of high loads and allows switching capacities of 250V and up to 5A. All switches are equipped with DIN plug connectors which make it quick and easy to install the electrical connections. An adjusting head or an adjustment screw make it easy to adjust the switching points on-site. Gold-plated contacts are also available as an option for small switching currents.

Adjustment ranges

(in bar)

adjustment range	max. working pressure	overload limit	burst pressure	model no. 3160	model no. 3161	model no. 3165	model no. 3166	model no. 3167
				changeover				
				pos gauge pressure	neg gauge pressure			
-0,8... 0,02	-0,8... 0	-0,8	2		M			
0,3... 2	0... 2	2	5	M			M	
0,3... 6	0... 6	6	10			M		
1... 10	0... 10	10	20	M			M	
1... 16	0... 16	16	25			M		
2... 40	0... 200	200	900					K
10... 70	0... 70	70	120	K			K	
5... 100	0... 300	300	900					K
20... 200	0... 400	400	900					K
50... 200	0... 200	200	300	K			K	
30... 300	0... 500	500	900					K
40... 400	0... 600	600	900					K
50... 400	0... 400	400	600					K

M diaphragm K: piston type

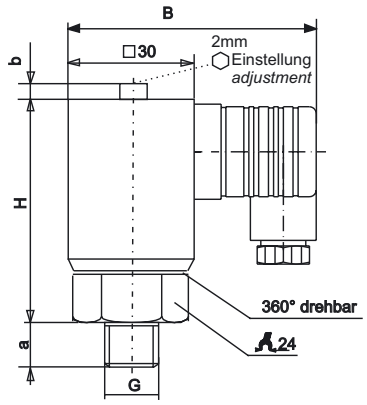
tecsis GmbH
Carl-Legien Str. 40
D-63073 Offenbach / Main
Tel.: +49(0) 69 / 5806-0
Vertrieb Inland
Fax: +49(0) 69 / 5806-170
Export Sales
Fax: +49(0) 69 / 5806-177
e-Mail: info@tecsis.de
Internet: www.tecsis.de

Technical data

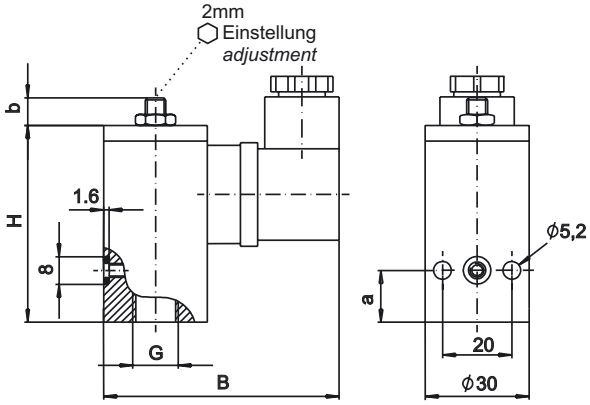
model no	3160	3161	3165	3166	3167	Options
execution	diaphragm from 10...70 bar piston	diaphragm		diaphragm from 10...70 bar piston	piston	
pressure	gauge pressure	vacuum	gauge pressure			
process conection	G 1/4 B, rotatable		G 1/4 female or flange connection			
measuring principle	spring loaded diaphragm or piston					
material						
measuring element	NBR-diaphragm brass piston with PUR-seal			NBR diaphragm steel piston with PUR seal		other materials
pressure port	zinc plated steel		aluminium anodized	zink plated steel	aluminium anodized	other materials
housing	zinc plated steel		aluminium anodized	zink plated steel	aluminium anodized	
load cycles	1 Mio.					
switch outputs						
number	1					
switch function	SPDT					
switching element	micro switch with silver plated contacts					gold plated contacts
adjustment	in site, with adjustment screw					factory setting, adjustment knob for 3167
hysteresis	10... 25% of adj. value				12% from adj. value	
power rating						
DC up to 42 V	2 A	2 A	2 A	2 A	1,5 A	
up to 110 V	0,5 A	0,5 A	0,5 A	0,5 A	0,25 A	
AC up to 42 V	5 A	5 A	5 A	5 A	5A	
up to 125 V	5 A	5 A	5 A	5 A	5A	
up to 250 V	5 A	5 A	5 A	5 A	5 A	
repeatability	5 % of adj. value				3% from adj. value	
temperature ranges						
storage	-25... +85°C				-20... +80°C	
media	-25... +85°C				-20... +80°C	
ambient	-25... +85°C				-20... +80°C	
electrical connection	connector according to DIN EN 175301-803 incl. junction box					
protection class	IP 65					
weight	approx. 0,23 kg	approx. 0,12 kg	approx. 0,18 kg	approx. 0,37 kg	approx. 0,35 kg	

Dimensions
(mm)

model no. 3160 / 3161

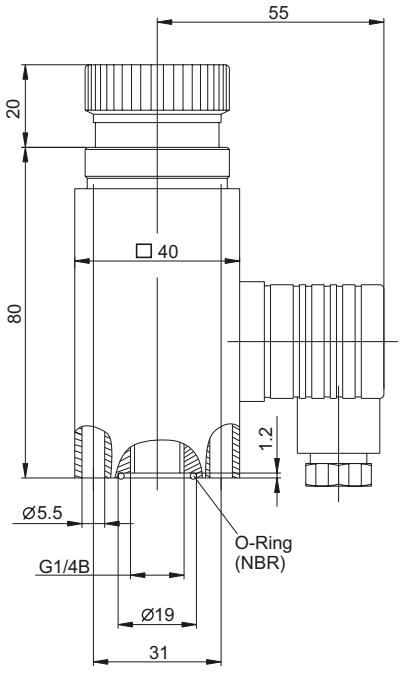


model no. 3165 / 3166

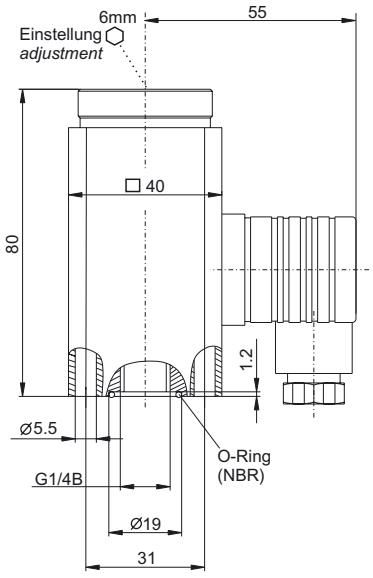


model no	B	a	b	H	G
3160	67	10	0	51	G 1/4
3161	69	9	7	58	G 1/4
3165	68	12	8	53	G 1/4
3166	68	15	8	57	G 1/4

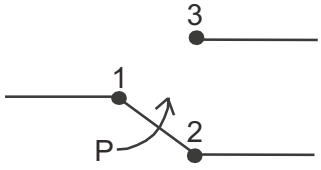
model no. 3167 with adjustment knob



model no. 3167 with adjustment screw



Electrical connection



Subject to technical alternations