LowViscosity Housing

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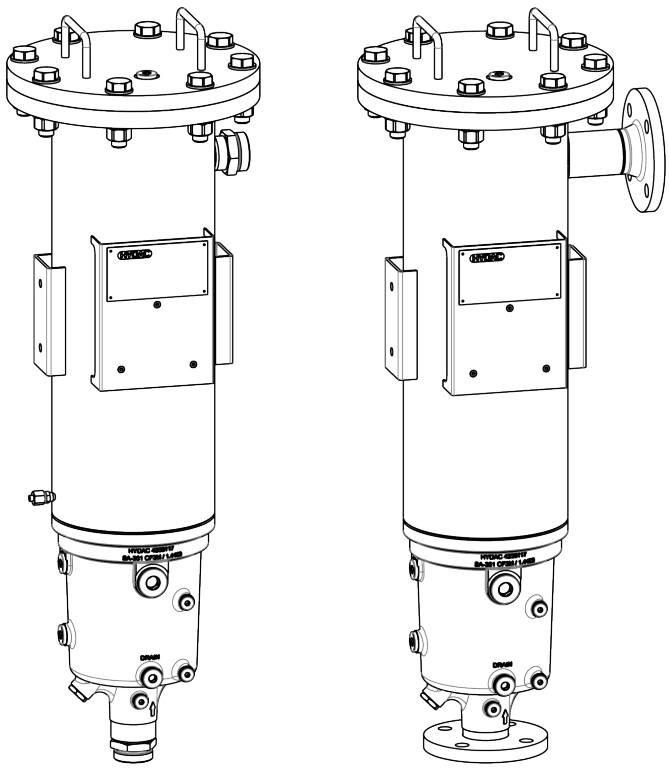
LowViscosity Housing – Coalescer Diesel
LVH-CD-1xx-EV-BM52-F…/-ZM(A)
LVH-CD-1xx-EV-BJ-F…/-ZM(A)



Installation instructions

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HYDAC INTERNATIONAL

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Translation / original language: German

This manual was prepared to the best of our knowledge. Nevertheless and despite the greatest care, it cannot be excluded that mistakes could have crept in. Please therefore understand that, unless stated otherwise below, our warranty and liability – irrespective of the legal grounds – are excluded in respect of the information in these instructions. In particular, we shall not be liable for lost profit or other financial losses.

This exclusion of liability does not apply in cases of intent or gross negligence. Moreover, it does not apply to defects that were fraudulently concealed or whose absence was guaranteed, or in cases of culpable injury to life and limb and harm to health. If we negligently breach any material contractual obligation, our liability shall be limited to the foreseeable damage. Claims arising from product liability remain unaffected.

Documentation representative:
Günter Harge, HYDAC International GmbH, Industriegebiet, D-66280 Sulzbach/Saar, guenter.harge@hydac.com

UKCA – authorised representative of the manufacturer:
HYDAC Technology Limited, De Havilland Way, Windrush Park Witney, Oxfordshire OX29 0YG, United Kingdom

Contents

EN

1. General

Before you use this product for the first time, read this manual at least up to the chapter "Operation". If you would like to carry out maintenance or troubleshooting, you can find the procedure in the respective chapters.

The use and the handling of the product as well as its use are not self-explanatory and are described in detail in this manual.

This manual will help you to use the product as intended, properly, effectively, and safely. Please refer to it every time you require specific details or actions.

EN

Validity of this manual

The diagrams and visualizations in this manual are meant for general illustration purposes. Therefore, representations and functional options can deviate from the delivered product.

We reserve the right to modifications to the contents of this manual without prior notice.

1.1 Target group of the manual

This manual was created for the following target group:

Target group	Tasks
Owner	Keep this manual and the applicable documents at the installation location of the product and also for later use. Ask the employees to read and follow the manual and the associated documents, in particular, the safety and warning instructions. Additionally, please observe the product-related instructions and requirements.
Operator, specialist personnel	Read, observe and follow this manual and the associated documents, in particular, the safety and warning instructions.

Tab. 1: Target groups

1.2 Illustrations in the manual

You will find illustrations in this manual. You can find details regarding these in the following chapters.

1.2.1 Depiction of warning signs

Information that draws your attention to specific or potential hazards is presented as warnings in these instructions.

Function of warnings

Warnings serve to protect you from accidents and injuries when handling the product and to prevent material and environmental damage.

Read and observe the warnings carefully and follow the specified steps precisely.

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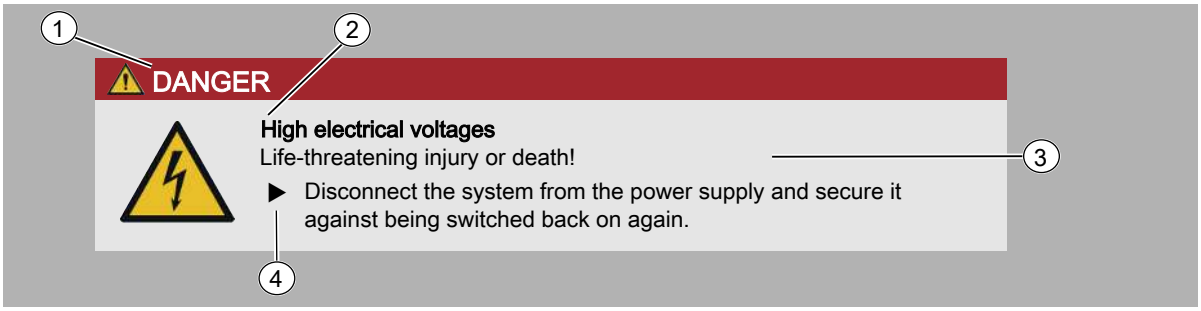
Warnings visually highlighted in boxes

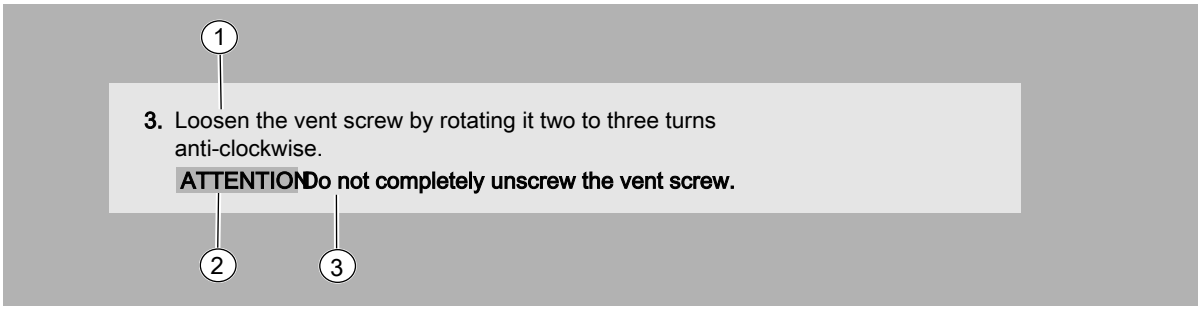
Warnings visually highlighted in boxes provide the following information in connection with a hazard:



1	**Warning level** How high is the risk potential? (▸Tab. 2, p. 7)	2	**Type and source of the hazard** What is the specific danger? What is the source of the danger?
3	**Consequences if not observed** What are the consequences if you fail to observe the instructions given in the warning (**4**)?	4	**Actions to be taken** What do you have to do specifically to safely eliminate the hazard?

Warnings integrated into the text

Warnings are sometimes integrated into the body of the text to keep the content easy to read. Example:



1	**Context** An action step in this example	2	**Warning level** How high is the risk potential? (▸Tab. 2, p. 7)
3	**Safety information** What do you have to do specifically to safely eliminate the hazard?		

Warning levels

The warning level in a warning gives you information on the risk potential associated with a hazard and failure to observe the appropriate warning.

Warning level	What this means for you
⚠ DANGER	Warns of dangers for **people** with a **high risk potential**. Failure to observe this warning is highly likely to result in serious injury or even death.
⚠ WARNING	Warns of dangers for **people** with a **medium risk potential**. Failure to observe this warning may result in serious injury or even death.
⚠ CAUTION	Warns of dangers for **people** with a **low risk potential**. Failure to observe this warning may result in minor to moderate injury.
ATTENTION	Warns of **property damage** with a **high risk potential**. Failure to observe this warning may result in serious property and environmental damage.

Tab. 2: Depiction of the warning levels

1.2.2 Representation of requirements

These are absolutely required for carrying out a work activity on the product and are marked with a check mark and are in bold in the text.

An example for the representation of requirements:

✓ The product is assembled and connected.

✓ The product is switched off.

1. Switch the product on.
2. Select an operating mode.
3. Switch the product off.

1.2.3 Representation of procedural instructions

In the case of procedural instructions, there are the two following representations:

Procedural instructions with a fixed sequence

Procedural instructions, the order of which must be strictly adhered to, are listed with sequential numbering (1., 2., 3., etc.).

An example for procedural instructions with a fixed sequence:

1. Remove the transport securing device.
2. First fill the product.
3. Switch the product on.

Procedural instructions with a random sequence

Procedural instructions with a random sequence are listed as bullet points.

An example of a procedural instruction with a random sequence:

- Clean the display.
- Rinse the product.

1.2.4 Representation of intermediate results/results

In the case of some activities, it is necessary to carry out work steps with intermediate results and end results.

Intermediate results are the consequence of activities; they are marked with an indented arrow.

End results represent the end of an activity and are represented with a flag.

An example for a procedural instruction with intermediate result and final result:

1. Switch the product on.
   ⇨ The display lights up.
2. Press the button.

⚐ The product is ready for use.

EN

1.2.5 Supplementary symbols

You will find the following symbols in the manual as additional details:

[▶##] Cross reference to a page/a chapter/a section or another document.

Glossary Terms in grey are explained in detail in the glossary, a chapter at the end of the manual.


Required tool.

Information for handling the product.

1.3 Warranty

For the warranty provided by us, please refer to our terms of delivery. They are made available to you at the conclusion of the contract at the latest. They can also be found at www.hydac.com -> General Terms and Conditions.

1.4 Notes on copyright

2. Safety information

This section gives you important information on the safe handling and use of your product.

2.1 Intended use

The LowViscosity Housing – Coalescer Diesel LVH-CD is a stationary dewatering unit for dewatering diesel or heating oil.

Permitted areas of application

The unit is designed only for stationary use.

Furthermore, intended use includes:

- Follow all the instructions in the instruction manual
- Performing requisite inspection and maintenance work.

Improper use / foreseeable misuse

Any other use, or use that goes beyond that indicated, is not permitted and is therefore considered improper use.

Improper use or use deviating from intended use includes in particular:

- Operation with a non-permitted operating medium.
- Operation under non-approved operational conditions.
- Product modifications without authorisation.
- Inadequate monitoring of parts that are subject to wear and tear.
- Improperly performed repair work.

Claims for defects or liability

Claims for defects or liability – on whatever legal grounds – do not exist, particularly in the event of incorrect or improper installation, commissioning, use, handling, storage, maintenance, repair, use of unsuitable operating material or other circumstances that the manufacturer is not responsible for.

The manufacturer assumes no responsibility for determining the interfaces for installation in a system or the installation, use or functionality of the product in this system.

2.2 Obligations of the owner

As the owner, you have the following obligations in relation to the use of our product:

Instruction and training

- Provision of these instructions
  The owner must ensure that all employees who are assigned work on the product have read and understood these instructions.
- Readability of the warning signs on the product
  Warning signs that have become illegible must be replaced by the owner.

Occupational health and safety

- Creation of own risk assessment and implementation of required measures
  The owner must determine in their own risk assessment the sources of danger arising from the product being used in their machine or system. On this basis, the owner must independently define appropriate measures for safety of the machine or system and must put together the documentation of their product accordingly.
- Application of the occupational health and safety and accident prevention regulations applicable in the country of use
- Clear regulation of which people are responsible for the various types of activities (e.g. assembly, operation, troubleshooting, maintenance) and what qualifications they need to have
- Provision of personal protective equipment (▸Sec. 2.5 "Personal protective equipment")

Compliance with standards and regulations

- Observance of the statutory inspection intervals for the system
  The owner must document the results of inspection in an inspection certificate and retain this certificate until the next inspection.
- Compliance with the environmental protection regulations applicable in the country of use

EN

2.3 Personnel qualifications

The activities described in these instructions may only be carried out by individuals with specific specialist knowledge in the areas listed below:

Activity	Qualification
Transport / storage	• Specialist personnel for transportation and storage
Assembly	• Specialist personnel for electric and mechanical systems
Initial commissioning	
Maintenance	• Specialist personnel for hydraulics and mechanical systems
Troubleshooting	
Repair	
Shutdown	
Disassembly	
Disposal	
Handling, operation, operation monitoring	• Operating personnel

Requirements for specialist personnel:

- Specialist training, knowledge and experience in the mentioned area
- Knowledge of the relevant provisions.
- Knowledge about how to handle operating media.
- These individuals can assess work assigned to them, identify possible hazards and take suitable safety measures independently.
- For transport and storage: Safe handling / operation of lifting equipment and accessories.

Requirements for operating personnel:

- These individuals have received product-related instruction from the owner and have been informed of potential hazards arising from improper conduct.
- Knowledge about how to handle operating media.

2.4 General safety instructions

We develop our products in accordance with the latest technological developments. Nevertheless, it is impossible to design products in a way that eliminates all residual risks. An overview of the potential sources of danger is provided below.

2.4.1 Hazard symbols/pictograms

The following safety signs / pictograms can be found in this manual. They indicate specific dangers to persons, property or to the surroundings. Observe these safety signs / pictograms and act with particular caution in such cases. Always keep all safety signs / pictograms complete and legible.

Warning signs used

These marks can be found for all safety and warning instructions in this manual which indicate particular dangers to persons, property or the environment.

Danger point warning

Signs used for giving orders

These symbols can be found for all safety and warning instructions in this manual which indicate particular dangers to persons, property or the environment.

Follow the direction.

Follow the instructions.

Wear eye protection.

Use protective gloves.

Used GHS symbols

These symbols can be found for all safety and warning instructions in this manual which indicate particular dangers to persons, property or the environment.

Hazardous to the environment

Others symbols used

These marks can be found for all safety and warning instructions in this manual which indicate a particular danger to persons, property or the environment.

Danger due to operating pressure

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Signs used for the required specialist personnel

These symbols show the required training/knowledge for installation work and/or maintenance work.

Specialist personnel – General/Operating personnel

These persons have a specialist training and several years of work experience. They are able to assess and perform the work assigned to them and to recognise potential hazards.

Specialist personnel – Electrical

These persons have specific specialist training and several years of work experience. They are able to assess and perform the work assigned to them and to recognise potential hazards.

Specialist personnel – Mechanical

These persons have specific specialist training and several years of work experience. They are able to assess and perform the work assigned to them and to recognise potential hazards.

Specialist personnel – Service/Administrator

These persons have been trained by the manufacturer and are authorised to perform service.

2.4.2 Danger notifications

The following dangers can occur in the various life cycles of the product:

Life cycle – installation/assembly/maintenance and troubleshooting

The following dangers can arise in the installation/assembly and troubleshooting life cycles:

⚠ WARNING

Hydraulic system is under pressure

Danger of bodily injury

▶ The hydraulic system must be depressurised before performing any work on it.

⚠ CAUTION

Operating medium

Health hazard

▶ Wear personal protective equipment, for details, see the safety data sheet for the operating medium.

2.5 Personal protective equipment

Personnel are required to wear protective equipment for certain activities.

The specific protective equipment required in each case is identified in the corresponding sections.

Required protective equipment – an overview

	Protective gloves

Additional protective measures

- Observe the additional notices regarding personal protective equipment in the safety data sheets of the operating medium.

2.6 Observing environmental precautions

Take all measures to protect the environment. Ensure that no operating medium is released into the environment (soil or water).

Environmental tip

Operating fluid/operating medium is released into the soil or water.

Environmental hazard

- ▶ Remove any escaped operating fluid/operating medium immediately and dispose of it in an environmentally sound manner.

Environmental tip

Discharged water can contain some operating medium.

Environmental hazard

- ▶ Dispose of the mixture in an environmentally friendly manner.

EN

3. Product and technical specifications

The LowViscosity Housing Coalescer Diesel LVH-CD is primarily used for dewatering diesel. It is mainly used where large quantities of water occur that need to be removed in a single pass.

The Optimicron® filter elements used ensure that large quantities of water are separated in a single pass.

Optimum integration of the housings in new system planning or in existing systems is achieved thanks to the different sizes.

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3.1 Checking the scope of supply

Here you will find the scope of supply for the product.

- Check the packaging and the product for damage.
  Report any damage in transit to the forwarding agent or the HYDAC department in charge.
- Check the scope of supply for completeness.

The scope of supply includes:

Qty.	Designation
1	LowViscosity Housing Coalescer Diesel LVH-CD-…
1	Installation instructions (this document)

Tab. 3: Checking the scope of supply

3.2 Technical data

If you are aware of the technical data of the product, you will be able to use it optimally. This chapter provides the technical data of the product:

Technical data	LVH-CD-120- …	LVH-CD-140- …
Flow rate	≤ 135 l/min	≤ 270 l/min
Filling volume of filter housing	≈ 26 litres	≈ 44 litres
Empty weight	≈ 56 kg	≈ 66 kg
Permitted operating medium	Diesel or heating oil	
Water separation efficiency	> 95%	
Permitted operating pressure	≤ 7 bar, pressure vessel class III	
Permitted pressure at the water drain WATER DRAIN	0 bar	
Permitted differential pressure across the filter element	≤ 2 bar	
Filter housing material	Stainless steel	
Sealing material	FKM (FPM, Viton®)	
Permitted fluid temperature range	0 … 60 °C [1)]	
Permitted ambient temperature range	0 … 50°C [2)]	
Permitted storage temperature range	-10 … 40°C	

Technical data	LVH-CD-120- …	LVH-CD-140- …
Storage environment	Clean, salt-free air, not near oxidising substances (rust film).	
Storage duration	Unlimited. Before the unit is started up again after a storage period of greater than two years, all seals must be replaced.	
Permitted ambient air humidity	≤ 80% relative humidity, non-condensing	
Connection IN / OUT	M52 or DIN DN 50, see model code	
Connection DRAIN	G½ according to ISO 228-1	
Connection WATER DRAIN	G¼ according to ISO 228-1	
Connection VENT	G½ according to ISO 228-1	
Connection MP1	HN 28-22 installation space for HYDAC clogging indicators.	
Connection MP2	G½ according to ISO 228-1	
Connection MP3	G½ according to ISO 228-1	
Connection MP4	G¼ according to ISO 228-1	
Connection MP5	G¼ according to ISO 228-1	
Connection MP6	G1 according to ISO 228-1	
Connection MP7	M14x1,5 8L according to ISO 8434-1	

[1)] but ≥ 10 °C below the flash point of the operating fluid.

[2)] No ice formation permitted in coalescer housing and accessories

Tab. 4: Technical data

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3.3 Decoding the type label

Details for identifying the product are found on the name plates on the product as well as their components. Always mention the part number and the serial number when contacting HYDAC.

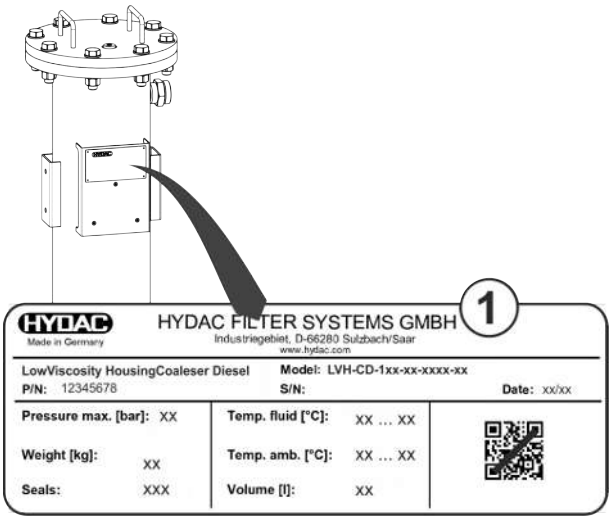

Fig. 1: Decoding the type label

Item	Description
(1)	The name plate for the filter housing
Model	Model code, for details, see ▸Sec. 3.3.1 "Model code"
Part No.	Part number
S/N	Serial number
Date	Year / week of manufacture
Pressure max. [bar]	Operating pressure, maximum
Weight [kg]	Empty weight
Seals	Sealing material
Temp. fluid. [°C]	Permitted fluid temperature range
Temp. amb. [°C]	Permitted ambient temperature range
Volume [l]	Filter housing volume

3.3.1 Model code

The filter housing is defined by the following model code:

LVH - C D 4 40 - E H - B V - F A /-ZA

Filter type

LVH = LowViscosity Housing

Function

C = Coalescer

Operating fluid

D = Diesel

Size

1 = Combination element filtration/ coalescing and separation element
2 = 2 coalescing elements + 1 separation element
4 = 4 coalescing elements + 3 separation elements
6 = 6 coalescing elements + 4 separation elements
9 = 9 coalescing elements + 6 separation elements
12 = 12 coalescing elements + 9 separation elements
19 = 19 coalescing elements + 15 separation elements

Filter element length

18 = 18" (only for size 1)
20 = 20" (only for size 1)
40 = 40"

Housing material

A = Aluminium (only size 118)
C = Carbon steel* (only size 120...1940, not for ZM(A))
E = Stainless steel (not for size 118)

Version

V = Vertical (not for size 1240...1940)
H = Horizontal (only size 240...1940)

Pressure range

B = 10 bar
(marine equipment: Pressure vessel class III ≤ 7 bar

Hydraulic connection

	118	120	140	240	440	640	940	1240	1940
F = F	x								
M52 = M52		x	x						
J = DIN DN 50		x	x	x	x	x	x		
R = DIN DN 100				x	x	x	x	x	
V = DIN DN 150					x	x	x	x	x
W = DIN DN 200						x	x	x	x
Y = DIN DN 300									x
4" = 3"				x	x	x	x	x	
5" = 4"				x	x	x	x	x	x
7" = 6"					x	x	x	x	x
8" = 8"						x	x	x	x
9" = 10"									x

Sealing material

F = FKM (FPM, Viton®)

Clogging indicator

for housing material A

A = Without display with G1/2" holder for differential pressure indicator 2 bar
D48 = Differential pressure gauge, visual

for housing material C and E

A = Without display with G ½" holder for differential pressure indicator
- 0.8 bar for size 240 ... 1940;
- 2 bar for size 120 and 140)

D43 = Differential pressure gauge, optical (not for ZM(A))
D44 = Differential pressure gauge, visual / electrical
Z = Without holder for clogging indicator

Supplementary details

Z = Acceptance test certificate 3.1 according to EN 10204 (material certificate)
CD = Acceptance test certificate 3.1 according to EN 10204 (material certificate) + ASME calculation
ZM = Marine equipment with approval (only for sizes 120 and 140; Short specification of the classification society required
ZMA = Marine equipment with approval (only for sizes 120 and 140; Short specification of the classification society required
150 = 150 lbs (flange pressure rating; for ASME housing design)

Classification society:
LR = Lloyds Register
BV = Bureau Veritas
DNV = Det Norske Veritas

*) Painting of the housing in carbon steel to ISO 12944 class C3 RAL 7021

Fig. 2: Model code

3.4 Unit dimensions

3.5 Hydraulic diagram

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The filter housing has the following hydraulic diagram:

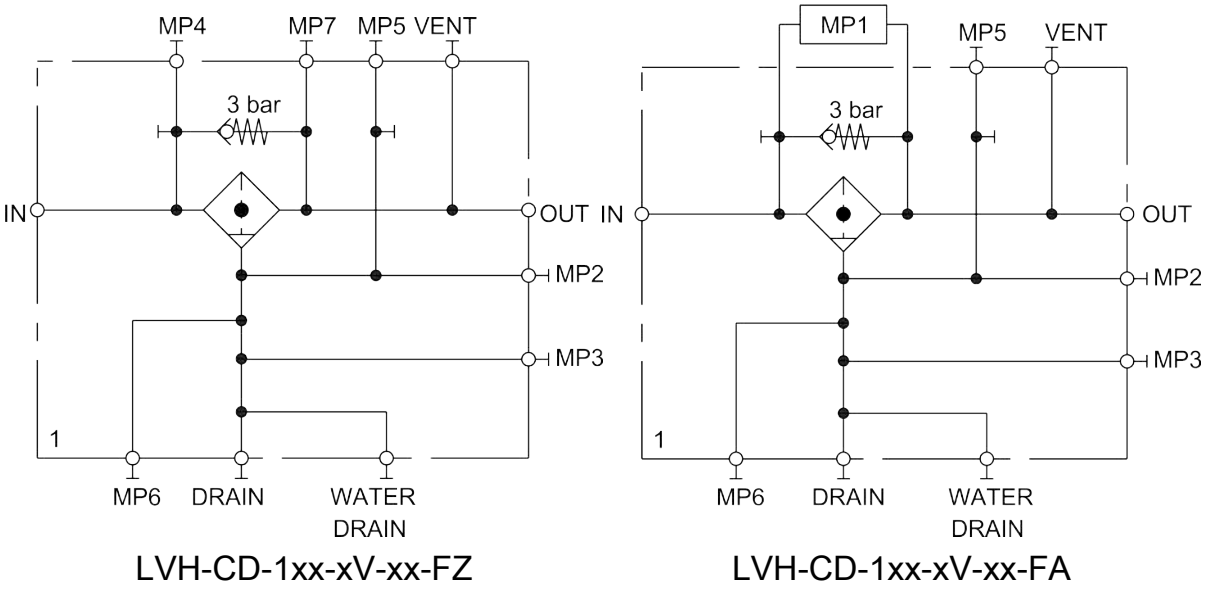

Fig. 3: Hydraulic diagram

1	Filter housing
IN	Inlet
OUT	Outlet
VENT	Air vent
DRAIN	Emptying / manual water drain
WATER DRAIN	Automatic water drain
MP1	Connection for clogging indicator
MP2	Connection for water sensor, top
MP3	Connection for water sensor, bottom
MP4	Measuring point inlet
MP5	Measuring point water collecting chamber
MP6	Connection for sight glass
MP7	Measuring point clean side

3.6 Connections

The filter housing has the following connections:

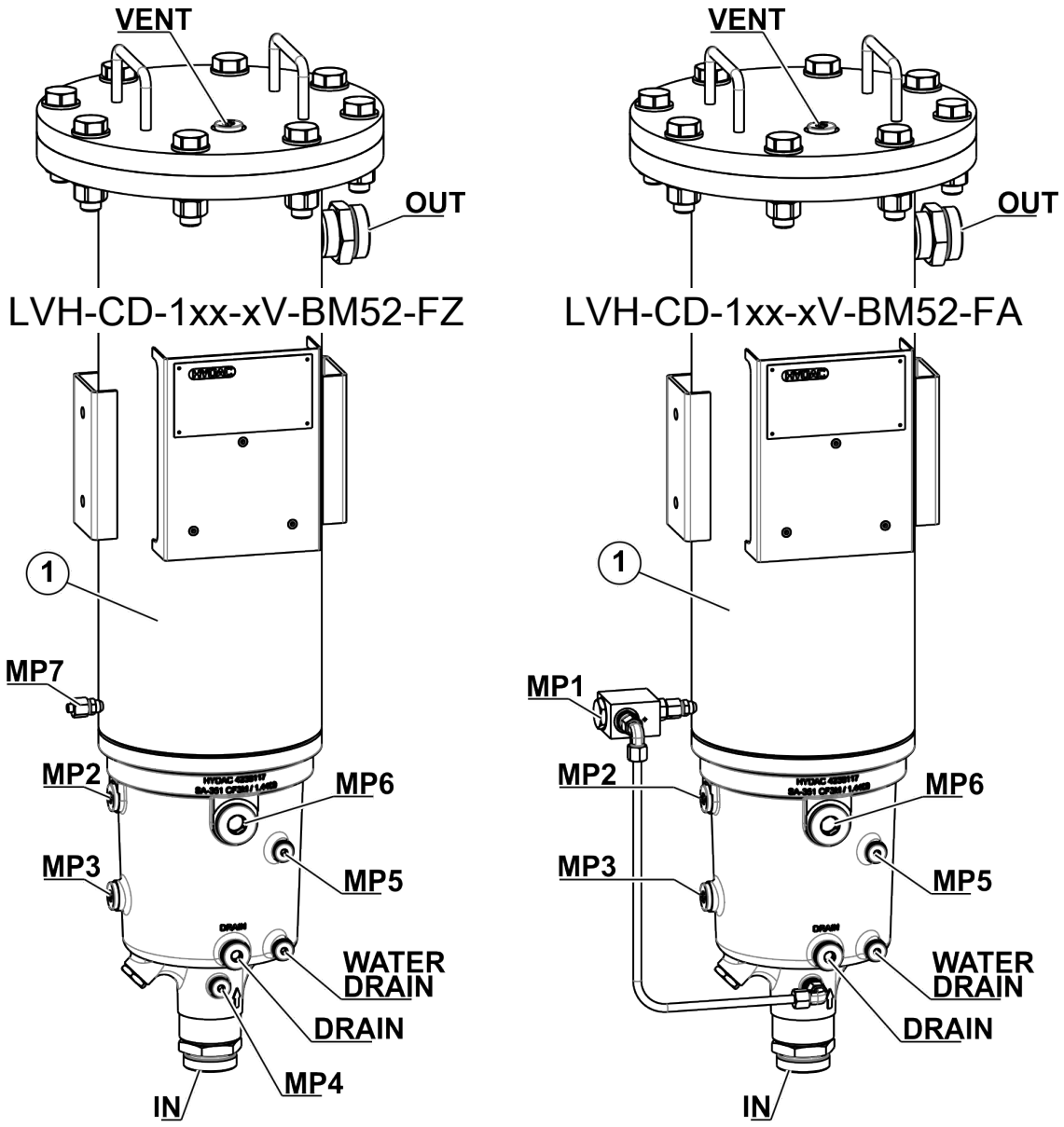

Fig. 4: Connections

1	Filter housing
IN	Inlet
OUT	Outlet
VENT	Air vent
DRAIN	Emptying / manual water drain
WATER DRAIN	Automatic water drain
MP1	Connection for clogging indicator
MP2	Connection for water sensor, top
MP3	Connection for water sensor, bottom
MP4	Measuring point inlet
MP5	Measuring point water collecting chamber
MP6	Connection for sight glass
MP7	Measuring point clean side

4. Transportation / storage

You will find the respective notice on the prevention of damage to the product during transport or storage in this chapter.

Always transport or store the filter housing horizontally.

Empty the filter housing fully before transporting it or putting it into storage. Remove the used filter element and clean the inside of the filter housing.

Use suitable hoisting equipment to attach to the filter housing. Ensure that attachments are not damaged during transport and storage.

For transport with a crane or forklift, attach two slings to the jacket pipe under the cover flange using an anchor knot in each case.

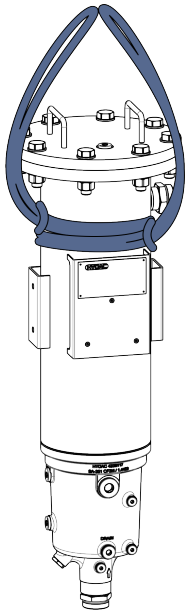

Fig. 5: Attachment points for transport

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5. Assembly / installation

An optimally assembled and installed product ensures a safe and continuous operation.

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If the coalescing housing/filter housing is to be used in a potentially explosive atmosphere, carry out an assessment of the entire system with regard to ignition sources before commissioning. The standard DIN EN 13463-1 can be used for this purpose. Electrostatic charging of the non-conductive filter elements during element replacement must also be taken into account.

Fasten the filter housing over:

- the fixing plate (1), for details, see ▸Sec. 3.4 "Unit dimensions" or
- with a mounting foot (2), for details, see ▸Sec. 10.3 "Finding accessories"

Observe the required working area around the filter housing for maintenance work, for details, see ▸Sec. 3.4 "Unit dimensions".

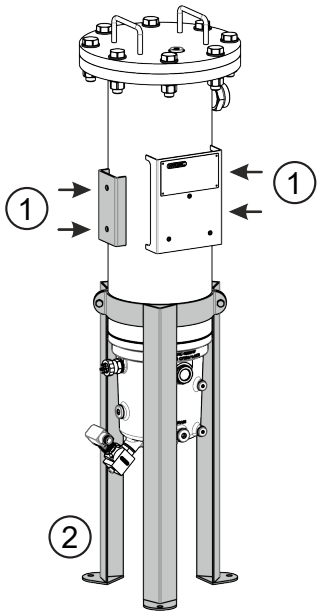


Fig. 6: Installing filter housing

5.1 Hydraulic installation

Connect the housing hydraulically via a flexible hose connection or pipe lines.

Care must be taken to ensure that no stresses and/or vibrations are transferred to the coalescing housing / filter housing through the attachment of the pipe lines. Use compensators if necessary.

To make it easy to change the filter element, install suitable shut-off devices on the IN / OUT connections.

Install suitable shut-off devices in the drip legs at the connections for housing dewatering. Make sure that the lines end in a tank without pressure.

The coalescing housing / filter housing can contain residual amounts of test fluid. Rinse or clean the coalescing housing / filter housing before initial commissioning.

5.1.1 Calculating the drop off load

Install the coalescing housing / filter housing securely in a hydraulic system, taking into account the pressure loss in the pipe system when connecting via pipes or hoses. You will find the respective formula to calculate the pressure loss.

The pressure drop in a hydraulic line depends on:

- Flow rate
- Kinematic viscosity
- Pipe dimensions
- Density of the operating fluid

Calculate the pressure drop approximately as follows:

$$\Delta p \approx 6{,}8 \times \frac{L}{d^4} \times Q \times v \times D$$

Δp	Pressure difference	[bar]
L	Line length	[m]
d	Internal pipe diameter	[mm]
Q	Flow rate	[l/min]
v	Kinematic viscosity	[mm²/s]
D	Density	[kg/dm³]

This formula applies to straight pipe runs. Particularly with regard to the suction side connection, note that additional connectors and pipe bends increase the pressure difference.

Example: The density of:

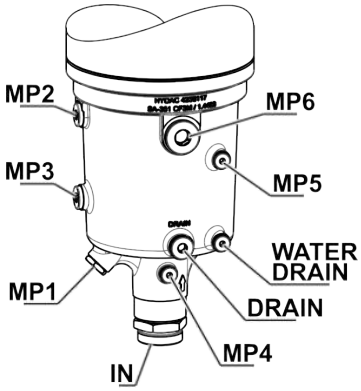
- Diesel ≈ 0.82 ... 0.84 kg/dm³
- Marine fuel ≈ 0.86 ... 0.9 kg/dm³
- Mineral oil-based hydraulic oil ≈ 0.9 kg/dm³

For the hydraulic connection, note the following points:

- Keep the height difference of the product to the Fluid level in the reservoir as small as possible.
- Use a vacuum-resistant suction hose suitable for a pressure of ≤ -0.5 bar.
- The nominal size of the connection line corresponds to the cross section of the screw-in thread.
- Avoid constrictions in the connected hoses. This reduces the pressure drop and increases the risk of cavitation.
- No tension and vibrations are transmitted to the product through, e.g. pipe lines. If needed, install the hoses or compensators.

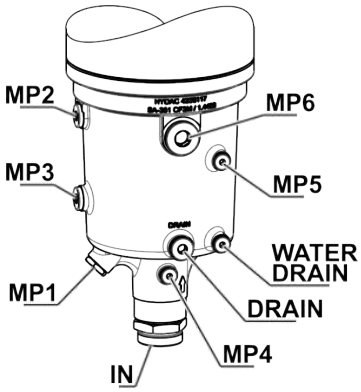
5.1.2 Installing drainage – DRAIN

To be able to drain the filter housing quickly for maintenance purposes, install a shut-off valve on the DRAIN connection and secure it against unintentional opening.



5.1.3 Installing the water drain manually – WATER DRAIN

To drain the separated water, install a shut-off valve on the WATER DRAIN connection and secure it against unintentional opening.



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5.1.4 Installing the clogging indicator

The clogging indicator outputs the differential pressure visually and/or electrically as a signal. This visual/ electrical signal is an indicator of the condition of the filter elements. The permitted differential pressure across the filter elements can be found in chapter ▸Sec. 3.2 "Technical data".

If the filter housing was ordered without a clogging indicator, install a clogging indicator between the pressure measuring points MP4 upstream of the filter element (dirty side) and the connection MP7 downstream of the filter element (clean side).

If the filter housing was ordered with a holder for a clogging indicator, install a clogging indicator in MP1 in the connection block 1.26.

Unscrew the locking screw with a spanner ⬡ = 27 mm and screw in the clogging indicator.

> HYDAC recommends operating the filter housing with a clogging indicator. See ▸Sec. 10.3 "Finding accessories".

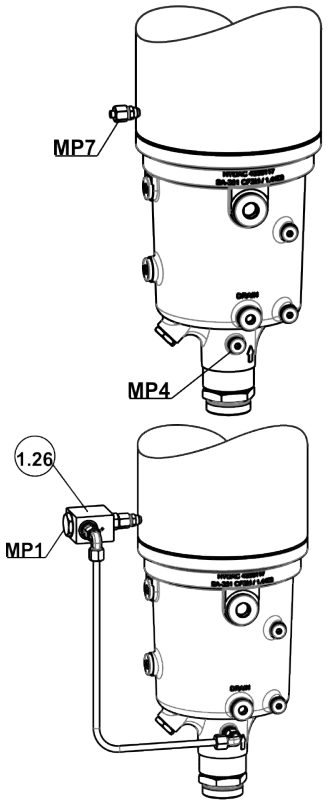


Fig. 7: Installing the clogging indicator

See also

Installing the clogging indicator [24]

5.2 Electrical installation

Specialist personnel – Electrical

These persons have specific specialist training and several years of work experience. They are able to assess and perform the work assigned to them and to recognise potential hazards.

5.2.1 Connecting a water sensor

There are two connections for water sensors MP2 and MP3in the water collecting chamber. The two positions indicate certain water levels, for details, see figure.

Details on connecting the water sensors can be found in the instructions for the water sensor, see ▸Sec. 10.4 "Instructions for components".

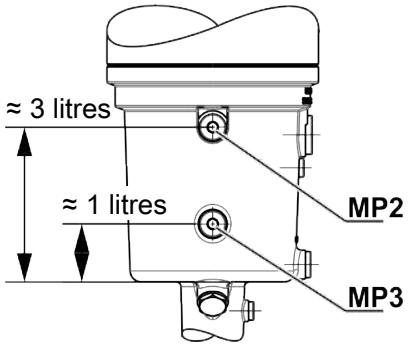


Fig. 8: Connecting a water sensor

5.2.2 Connecting a contamination sensor

If the filter housing is equipped with an electrical or visual/electrical clogging indicator or with a visual/electrical differential pressure gauge (D44), connect these according to the instructions, for details, see --- FEHLENDER LINK ---.

The permitted differential pressure across the filter elements can be found in chapter ▸Sec. 3.2 "Technical data".

EN

5.3 Startup

Proceed as follows for start-up:

✓ The filter housing is installed as described, for details, see ▸Sec. 5.1 "Hydraulic installation".

✓ All electrical components have been connected and checked for function, for details, see ▸Sec. 5.2 "Electrical installation".

1. Insert the filter element into the filter housing, for details, see ▸Sec. 8.2 "Changing the filter element".
2. Fill the filter housing by opening the IN connection and vent the filter housing, for details, see ▸Sec. 8.3 "De-aerating the filter housing".

The start-up is complete.

6. Operation

Procedures, notes and tips for optimum, fault-free operation can be found in this chapter.

Monitor the clogging indicator and change the filter elements if this is signalled.

Carry out a daily visual inspection of the coalescing housing / filter housing. Repair leakages immediately.

EN

NOTICE

Frost and ice formation in the filter housing

The filter housing will be damaged.

▶ Pay attention to the environmental temperatures during inspections or downtimes.

6.1 Draining separated water

Water discharged from the operating medium collects at the bottom of the filter housing. When the water reaches the connection MP2, drain the separated water from the filter housing.

Water discharged from the operating medium collects at the bottom of the filter housing. When the water reaches the connection MP3, drain the separated water from the filter housing.

Environmental tip

Discharged water can contain some operating medium.

Environmental hazard

▶ Dispose of the mixture in an environmentally friendly manner.

Environmental tip

Operating fluid/operating medium is released into the soil or water.

Environmental hazard

▶ Remove any escaped operating fluid/operating medium immediately and dispose of it in an environmentally sound manner.

To drain the separated water, open the shut-off valve on the WATER DRAIN. Drain the water into a suitable container. Close the shut-off valve as soon as diesel emerges, if not before.

The expected water discharge volumes are shown in the adjacent figure.

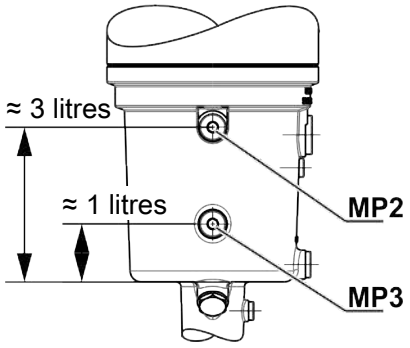


Fig. 9: Water collecting chamber

7. Rectifying a malfunction

In order to get quick and immediate assistance in the case of errors, you will find the most common faults with their causes, to be rectified by qualified personnel.

Error	Cause(s)	Remedy	
The clogging indicator responds.	The capacity of the filter element is exhausted.	Change the filter element, for details, see ▸Sec. 8.2 "Changing the filter element".	
Leakage at the cover or housing.	The screwed fittings on the housing or the cover are loose.	Tighten the screwed fittings to the specified torque, for details, see ▸Sec. 8.2 "Changing the filter element".	

Tab. 5: Rectifying a malfunction

EN

8. Performing maintenance

EN

For a long, trouble-free service life of the product, regular maintenance activities are required.

⚠ WARNING

Hydraulic system is under pressure

Danger of bodily injury

▶ The hydraulic system must be depressurised before performing any work on it.

⚠ CAUTION

Operating medium

Health hazard

▶ Wear personal protective equipment, for details, see the safety data sheet for the operating medium.

Environmental tip

Operating fluid/operating medium is released into the soil or water.

Environmental hazard

▶ Remove any escaped operating fluid/operating medium immediately and dispose of it in an environmentally sound manner.

Can a potentially explosive atmosphere be caused by changing the coalescing element / filter element:

- If the operating medium, for example diesel fuel, is at a temperature higher than the flash point, allow the operating medium to cool below the flash point before the filter element is changed.
- If there are external sources, for example petrol vapours or potentially explosive gases in the environment, they must not be present when the filter element is changed.

8.1 Maintenance table

		Annually	As required
8.2	Changing the filter element	1	
8.3	De-aerating the filter housing	1	
8.2	Changing the filter element		1
8.3	De-aerating the filter housing		1

1 Specialist personnel – Mechanical

8.2 Changing the filter element

The filter elements are subject to wear, e.g. due to solids from the operating fluid. This wear is shown by the increase in differential pressure across the filter elements, i.e. the Δp across filter elements.

The permitted differential pressure, see ▸Sec. 3.2 "Technical data"

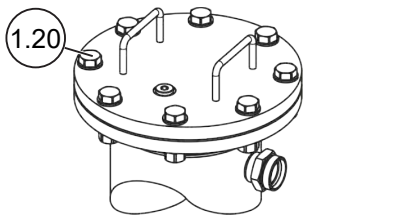
1x Allen key = 10 mm

2x spanner = 30 mm

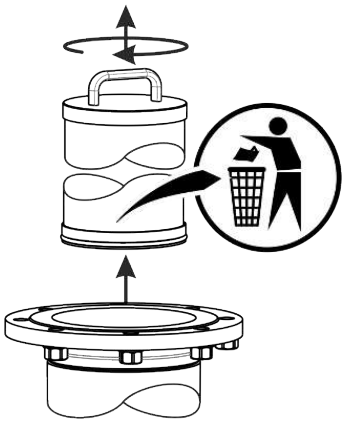
If the unit is installed below the liquid level of the tank, close the shut-off valve in the suction line before changing the element. This is in order to prevent uncontrolled leakage of operating fluid through the open filter housing.

Renew the filter element as described below:

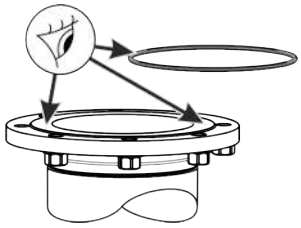
1. Close the shut-off devices at the inlet IN and outlet OUT.
2. Perform a pressure release of the filter housing. To do this, carefully open the bleed screw VENT on the filter housing cover using the Allen key ⬣ = 10 mm.
   Do not unscrew the bleed screw completely, the bleed screw has a slot.
3. Unscrew the locking screw from the ball valve at connection DRAIN using an Allen key ⬡ = 10 mm.
4. Empty the filter housing completely via the connection DRAIN.
   Collect the operating fluid in a suitable container.
5. Loosen the eight screws (1.20) on the end cap using a spanner ⬡ = 30 mm and unscrew them.
   Remove the end cap from the filter housing and place it on a clean surface.



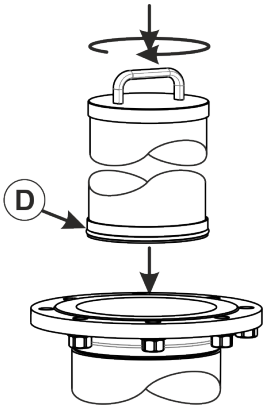
6. Remove the filter element using the handle provided.
   If the filter element is difficult to remove, move it slightly back and forth, or turn it, while pulling it out of the housing using the handle provided.
   Dispose of the used filter element in an environmentally friendly manner.
7. Clean the inside of the filter housing.



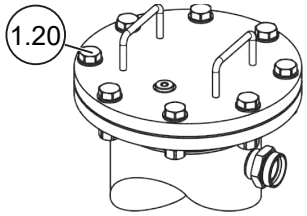
8. Check the O-ring fitted in the end cap for damage. Renew the O-ring if necessary. Clean the sealing surface between the housing and end cap. Moisten the O-ring with operating fluid before installation.



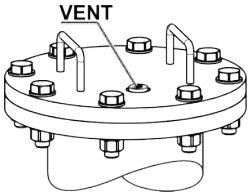
9. Lightly moisten the sealing surfaces (D) at the lower end of the filter element on the inner and outer O-ring with the operating fluid, and insert the filter element into the housing.
   If the filter element is difficult to install, move it slightly back and forth, or turn it, while sliding it into the housing using the handle provided.



10. Place the cover on the housing and screw in the eight screws by hand.
    Tighten the eight screws with a tightening torque of 150 Nm, working diagonally across.
11. Screw in the locking screw on the DRAIN connection.



12. Fill the filter housing slowly by opening the shut-off device at the inlet IN.
13. De-aerate the filter housing.
    To do this, carefully open the bleed screw VENT on the filter housing cover using the Allen key ⬣ = 10 mm.
    Do not unscrew the bleed screw completely, the bleed screw has a slot.



14. As soon as fluid escapes at the bleed screw VENT, close the shut-off device at the inlet IN. Close the bleed screw VENT and tighten it with a tightening torque of 40 Nm.
15. Check the filter housing for any leaks and rectify them immediately.

⚐ The replacement of the filter element is complete.

8.3 De-aerating the filter housing

After the filter element has been changed, and during operation, an air cushion forms under the housing cover, which means that the filter element is not fully utilised.
De-aerate the filter housing regularly.

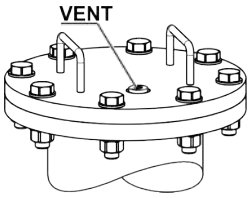
1x Allen key ⬣ = 10 mm

Proceed as follows to de-aerate the filter housing:

✓ All shut-off devices at inlet IN / outlet OUT are open.

✓ The filter housing is in operation.

1. To do this, carefully open the bleed screw VENT on the filter housing cover using the Allen key ⬣ = 10 mm.
   Do not unscrew the bleed screw completely, the bleed screw has a slot.



2. As soon as fluid emerges at the bleed screw VENT, close the bleed screw VENT and tighten it with a torque of 40 Nm.
3. Check the filter housing for any leakages and rectify them immediately.

⚐ De-aeration of the filter housing is complete.

9. Decommissioning/Disposal

In the following chapters, you will be provided with information regarding temporary shutdown/final decommissioning and disposal of the product.

9.1 Temporary shutdown

If the product is being temporarily shut down, the following measures are adequate:

1. Switch the product off and disconnect it from all sources of energy.
2. Follow all the notices in the *Transport/storage* chapter.

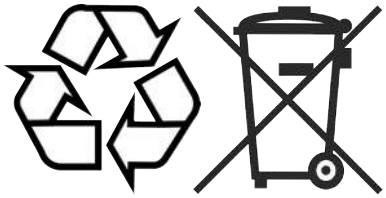
9.2 Permanent shutdown

If the product is being shut down permanently, proceed as follows:

- Empty the product fully, including all the components, before the shutdown.
- Fully disconnect the product from the surrounding units.
- Slacken or remove the electric, pneumatic or hydraulic connections insofar as they are present.

9.3 Disposal/Recycling

Dismount and recycle the product that cannot be used any more, not as a whole unit, but in individual parts and according to the kind of the materials. After dismantling the product and separating its various materials into categories, dispose of all parts in an environmentally friendly manner according to the local specifications.



Dispose of the drained operating fluids and operating materials according to the local specifications in an environmentally friendly manner.

10. Annex

This Annex contains additional information on the product.

10.1 Contacting Customer Service

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Contact details such as the telephone numbers, e-mail and mailing addresses for the Hotline, product support, Customer Service, branch offices, service partners for maintenance, repair and spare parts can be found on our homepage www.hydac.com.

HYDAC SYSTEMS & SERVICES GMBH
Friedrichsthaler Str. 15, Werk 13
66450 Neunkirchen - Heinitz
Germany

Phone:	+49 6897 509 01
Fax:	+49 6897 509 324
E-mail:	service@hydac.com
Homepage:	www.hydac.com

10.2 Finding spare parts

Use only original spare parts for a long and defect-free life cycle of the product. When ordering spare parts and accessories make sure to always indicate the exact model code and the serial number.

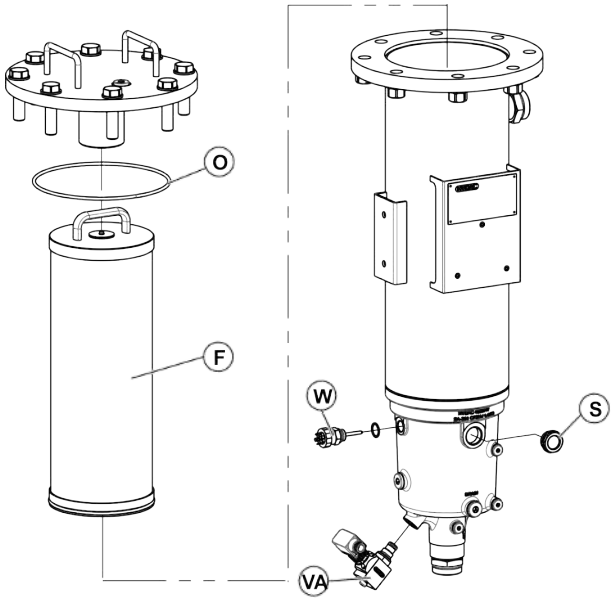

Fig. 10: Spare parts

Item	Qty.	Designation		Part no.
W	1	Water sensor set, consisting of: 1x water sensor 1x sealing ring 1x cable socket		4651719
VA	1	Clogging indicator		1300564
O	1	O-ring	For filter housing cover	637854

Filter element 20" for filtration and dewatering

Item	Qty.	Designation		Material	Part no.
F	1	Filter element 20", 3 µm	N20ON-DC003-CD65F	FKM	4379416
F	1	Filter element 20", 10 µm	N20ON-DC010-CD65F	FKM	4379417
F	1	Filter element 20", 20 µm	N20ON-DC020-CD65F	FKM	4379418

Tab. 6: Filter element N20ONxxx for filtration and dewatering

Filter element 20" for dewatering

Item	Qty.	Designation		Material	Part no.
F	1	Filter element 20"	N20ON-DCZ-CD65F	FKM	4295019

Tab. 7: Filter elements N20ONxxx for dewatering

Filter element 40“ for filtration and dewatering

Item	Qty.	Designation		Material	Part no.
F	1	Filter element 40", 3 µm	N40ON-DC003-CD65F	FKM	4379223
F	1	Filter element 40", 10 µm	N40ON-DC010-CD65F	FKM	4379224
F	1	Filter element 40", 20 µm	N40ON-DC020-CD65F	FKM	4379415

Tab. 8: Filter element N40ONxxx for filtration and dewatering

Filter element 40“ for dewatering

Item	Qty.	Designation		Material	Part no.
F	1	Filter element 40"	N40ON-DCZ-CD65F	FKM	4294900

Tab. 9: Filter element N40ONxxx for dewatering

10.3 Finding accessories

The following accessories are available:

Base frame

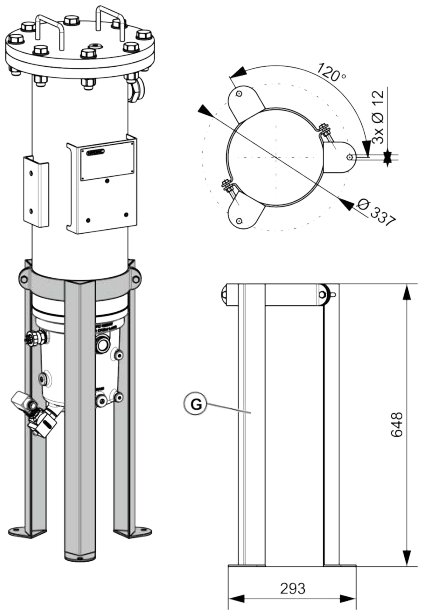

Fig. 11: Base frame accessories

Item	Qty.	Designation		Part no.
G	1	Base frame		4770046

10.4 Instructions for components

In this chapter, you will find additional information on installed components

See also

- D44 - Differential pressure measuring and switching devicel DS11 [▶ 36]
- Datasheet water in Oil sensor - CLS-50 [▶ 73]

10.4.1 Differential pressure indicator, visual / electrical – VD x LZ.1 /-DB

The visual / electrical differential pressure indicator reacts to the increasing pressure difference as the contamination level of the filter element increases.

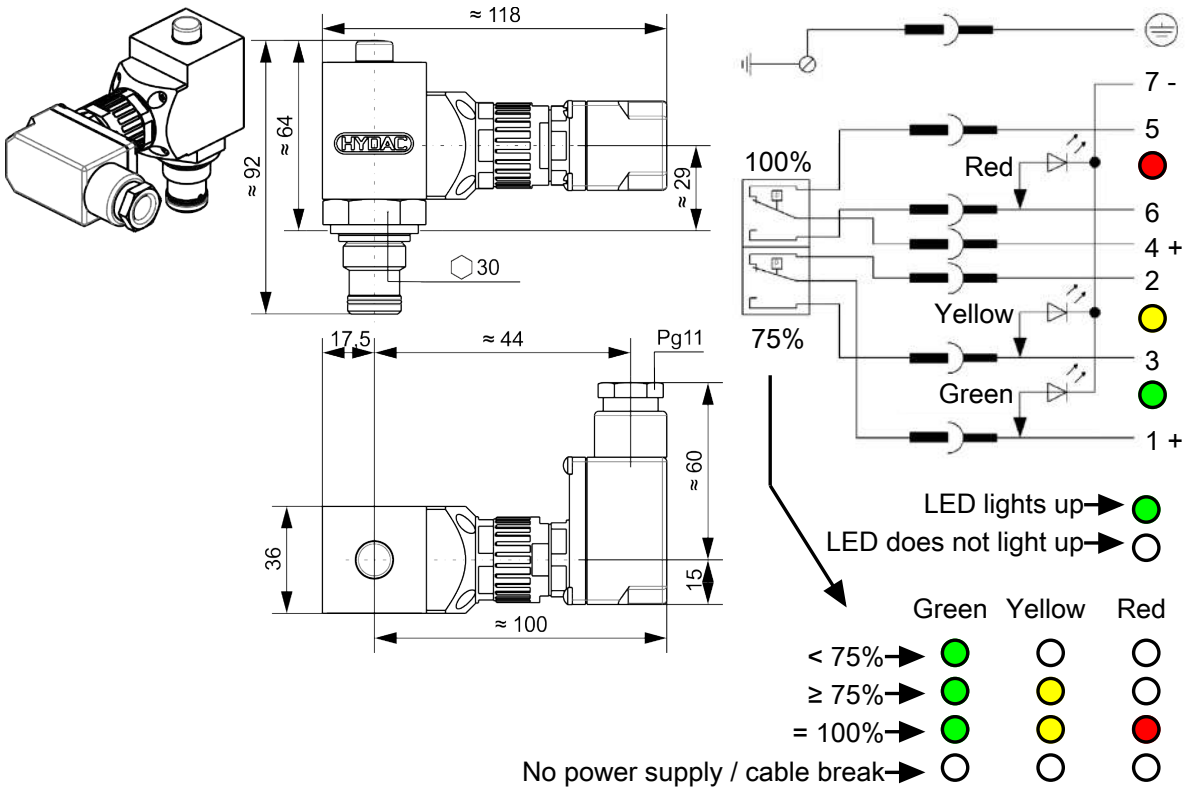

Fig. 12: Differential pressure indicator, visual/electrical VD x LZ.x /-DB

Display type	Visual indicator and one electrical switch each at 75% and 100% of the response pressure
Weight	245 g
Response pressure or indication range	VD 2 LZ.x = 2 bar -10% VD 5 LZ.x = 5 bar -10% VD 8 LZ.x = 8 bar ±10%
Permitted operating pressure	≤ 420 bar
Permitted temperature range	-10 … +100 °C
Thread	G ½
Required installation space	According to HN 28-22
Maximum tightening torque	30 Nm
Switching type	NC or NO contact, switching contacts (changeover contact)
Maximum switching voltage	24 V DC
Maximum switching power with resistive load	15 W 15 VA AC
Switching capacity	ohmic 1 A @ 15 V DC ohmic 1 A @ 15 V AC
Electrical connection	Plug connection DIN 4365
Protection type acc. to IEC 60529	IP 65 (only with plugged-in and correctly wired cable socket)

Tab. 10: Differential pressure indicator, visual/electrical VD…LZ.1 / -DB

10.4.2 D44 - Differential pressure measuring and switching devicel DS11

developing solutions

FISCHER MESS- UND REGELTECHNIK

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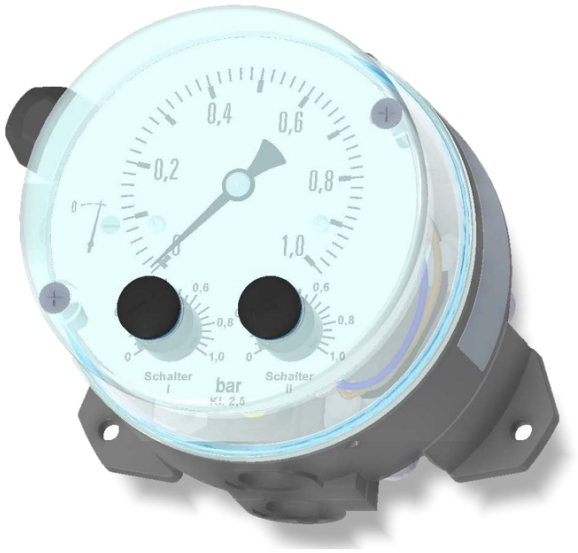
IEC 61508
SIL



Operating manual

DS11

Differential pressure measuring and switching device

09005104 • BA_EN_DS11 • Rev. ST4-C • 03/23

EN

Masthead

Manufacturer: **FISCHER Mess- und Regeltechnik GmbH**

Bielefelderstr. 37a
D-32107 Bad Salzuflen

Telephone: +49 5222 974 0
Telefax: +49 5222 7170

eMail: info@fischermesstechnik.de
web: www.fischermesstechnik.de

Technical editorial team: Documentation representative: T. Malischewski
Technical editor: R. Kleemann

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Rev. ST4-B 11/21	Version 2 (Correction perm. stat. operating pressure; UKCA)
Rev. ST4-C 03/23	Version 3 (Correction switching hysteresis)

EN

Table of contents

EN

1 Safety instructions

1.1 General

This operating manual contains basic instructions for the installation, operation and maintenance of the device that must be followed without fail. It must be read by the installer, the operator and the responsible specialist personnel before installing and commissioning the device.

This operating manual is an integral part of the product and therefore needs to be kept close to the instrument in a place that is accessible at all times to the responsible personnel.

The following sections, in particular instructions about the assembly, commissioning and maintenance, contain important information, non-observance of which could pose a threat to humans, animals, the environment and property.

The instrument described in these operating instructions is designed and manufactured in line with the state of the art and good engineering practice.

1.2 Personnel Qualification

The instrument may only be installed and commissioned by specialized personnel familiar with the installation, commissioning and operation of this product.

Specialized personnel are persons who can assess the work they have been assigned and recognize potential dangers by virtue of their specialized training, their skills and experience and their knowledge of the pertinent standards.

1.3 Risks due to Non-Observance of Safety Instructions

Non-observance of these safety instructions, the intended use of the device or the limit values given in the technical specifications can be hazardous or cause harm to persons, the environment or the plant itself.

The supplier of the equipment will not be liable for damage claims if this should happen.

1.4 Safety Instructions for the Operating Company and the Operator

The safety instructions governing correct operation of the instrument must be observed. The operating company must make them available to the installation, maintenance, inspection and operating personnel.

Dangers arising from electrical components, energy discharged by the medium, escaping medium and incorrect installation of the device must be eliminated. See the information in the applicable national and international regulations.

Please observe the information about certification and approvals in the Technical Data section.

1.5 Unauthorised Modification

Modifications of or other technical alterations to the instrument by the customer are not permitted. This also applies to replacement parts. Only the manufacturer is authorised to make any modifications or changes.

1.6 Inadmissible Modes of Operation

The operational safety of this instrument can only be guaranteed if it is used as intended. The instrument model must be suitable for the medium used in the system. The limit values given in the technical data may not be exceeded.

The manufacturer is not liable for damage resulting from improper or incorrect use.

1.7 Safe working practices for maintenance and installation work

The safety instructions given in this operating manual, any nationally applicable regulations on accident prevention and any of the operating company's internal work, operating and safety guidelines must be observed.

The operating company is responsible for ensuring that all required maintenance, inspection and installation work is carried out by qualified specialized personnel.

1.8 Pictogram explanation

⚠ DANGER

Type and source of danger

This indicates a **direct** dangerous situation that could lead to death or **serious injury** (highest danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ WARNING

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to death or **serious injury** (medium danger level).

1. Avoid danger by observing the valid safety regulations.

⚠ CAUTION

Type and source of danger

This indicates a **potentially** dangerous situation that could lead to slight or serious injury, damage or **environmental pollution** (low danger level).

1. Avoid danger by observing the valid safety regulations.

NOTICE

Note / advice

This indicates useful information of advice for efficient and smooth operation.

EN

2 Product and functional description

2.1 Delivery scope

- Differential pressure measuring and switching device DS11
- Operating Manual

2.2 Equipment versions

2.2.1 Pressure chamber

Aluminium

Stainless steel

Fig. 1: Material options for the pressure chamber

2.2.2 Assembly

Wall structure

Switch panel installation

Fig. 2: Options for installation

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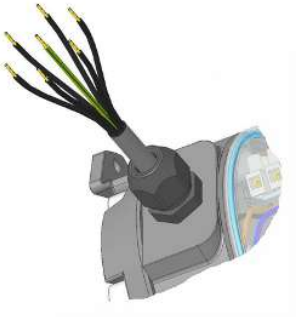
2.2.3 Protection class

Pressure chamber in aluminium

Pressure chamber in stainless steel

Fig. 3: Protection class IP65

2.2.4 Electrical connection



Number cable

Cable socket/plug connection

Fig. 4: Options for the electrical connection

2.2.5 Type plate

This type plate serves as an example of the information that is stated. For more information, please see the order code at the end of these instructions.

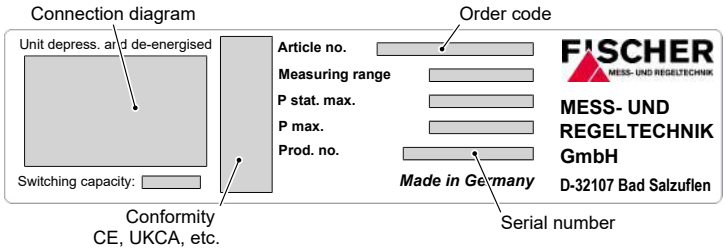


Fig. 5: Type plate

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2.3 Intended use

The DS11 is a combined display and switching device for differential pressure, over and under-pressure for gaseous and fluid media. This series is ideally suited for various measuring tasks in rough environments.

Typical applications are measuring differential pressure between the supply and return in heating systems and monitoring filters and pumps.

Please contact the manufacturer before using this unit with dirty or aggressive media because the unit needs to be adapted in terms of the parts that come into contact with the media.

The device can be used as a functional safety components (SIL) as agreed with the manufacturer (see order code).

The device is to be exclusively used for the applications agreed between the manufacturer and the user.

2.4 Function diagram

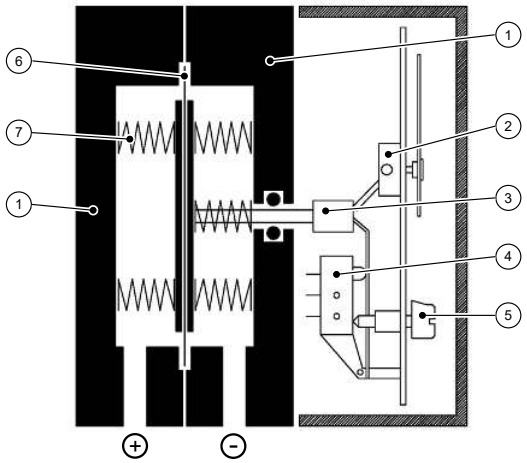


Fig. 6: Function diagram

1	Pressure chamber	**2**	Motion train
3	Tappet	**4**	Micro-switch
5	Switch point setting	**6**	Measuring diaphragm
7	Measuring springs		

2.5 Design and mode of operation

A sturdy non-sensitive diaphragm measuring unit that is suitable for measuring differential pressure, and over and under-pressure is used as a measuring system. The unit uses the same measuring principle for all three measuring applications.

In the rest position, the spring forces on both sides of the membrane are balanced out. Due to the pressure or under-pressure to be measured, a single-sided force is created on the membrane which shifts the membrane system against the measurement range springs up to compensation of the spring forces. In case of overload, the membrane supports against the metallic support surfaces.

A centrally positioned tappet transfers the movement of the membrane system on the motion train and operating elements of the micro-switches.

EN

3 Assembly

3.1 General

The device is designed for wall mounting. Optionally, the device can also be supplied with an installed switch panel set.

NOTICE! At the factory, the device is calibrated for vertical installation and only this installation position is allowed.

To ensure safety during installation and maintenance, we recommend installing a suitable shut-off valve on the system (see accessories). A shut-off valve offers the following advantages:

- The device can be depressurized or decommissioned.
- The device can be disconnected from the power supply within the applicable system for repairs or inspections.
- A function test of the device can be performed on-site.

3.2 Process connection

- By authorized and qualified specialized personnel only.
- The pipes need to be depressurized when the instrument is being connected.
- Appropriate steps must be taken to protect the device from pressure surges.
- Check that the device is suitable for the medium being measured.
- Maximum pressures must be observed (cf. Tech. data)

The pressure connections are marked with (+) and (-) symbols on the device. When the differential pressure is measured, the higher pressure is connected to the (+) side and the lower pressure to the (-) side.

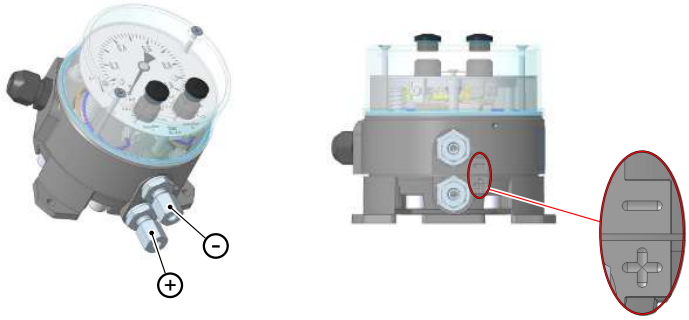


Fig. 7: Process connection

The pressure lines must be kept as short as possible and installed without any tight bends to avoid delays.

The pressure lines must be installed at an inclination so that when fluids are measured no air pockets are created or when measuring gases, no water pockets are created. If the required inclination is not reached, water or air filters must be installed at suitable places.

In the case of fluid measuring media, the pressure lines must be vented because different fluid columns in the lines will distort the measurements.

If water is used as a measuring medium, the unit must be protected against frost.

Pulsating pressure on the system side can lead to wear and functional problems. To safeguard this, we recommend installing absorption elements in the pressure line.

EN

Fluid media

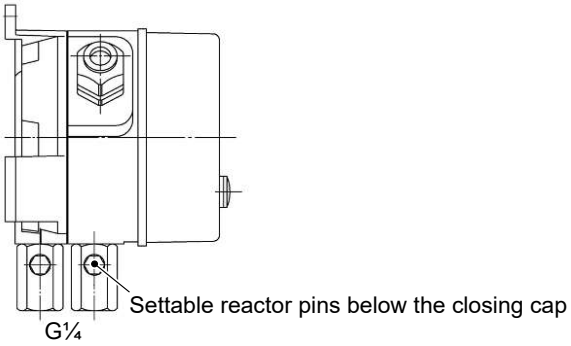


Fig. 8: Controllable damping reactor MZ40

In the operational status, the reactor pins need to be set so that the measurement display follows the pressure changes with a delay.

Gaseous media

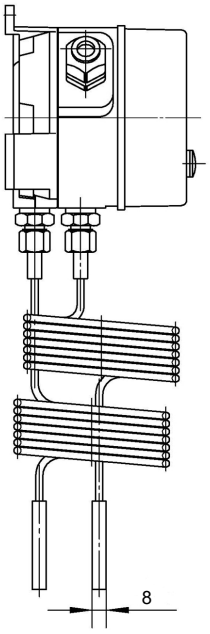


Fig. 9: Capillary throttle coils MZ401

EN

3.3 Electrical connections

- By authorized and qualified specialized personnel only.
- When connecting the unit, the national and international electro-technical regulations must be observed.
- Disconnect the system from the mains, before electrically connecting the device.
- Install the consumer-adapted fuses.
- Do not connect the connector if strained.

The DS11 can be equipped with one or two micro-switches. Each micro-switch has a changeover contact that is wired as follows.

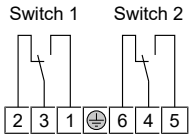


Fig. 10: Electrical connection

3.3.1 Cable socket

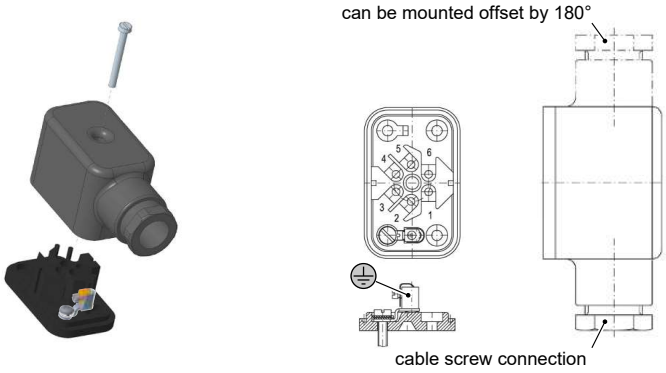


Fig. 11: Cable socket

Terminals 1 to 6	Brass	Screw terminal up to 1.5 mm²
Ground terminal	Nickel-plated brass	Screw terminal up to 2.5 mm²

Cable screw connection	Polyamide 6	M20x1.5
Sealant	EPDM	
Terminal range		7 to 13 mm

EN

3.3.2 Plug connection

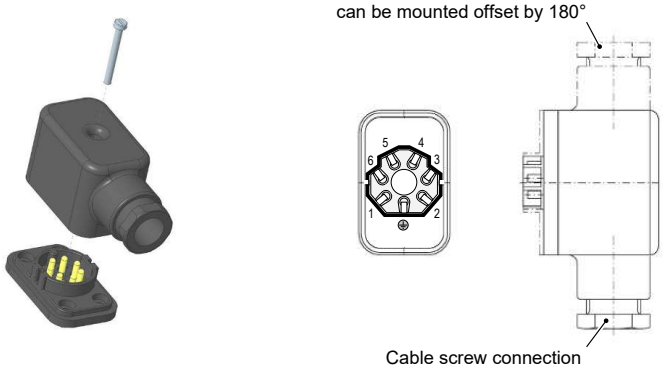


Fig. 12: Cable plug

Terminals 1 to 6	Brass	Screw terminal up to 1.5 mm²
Ground terminal		

Cable screw connection	Polyamide 6	M20x1.5
Sealant	EPDM	
Terminal range		7 to 13 mm

3.3.3 Numbered cables

For models with numbered cables, the cable numbers correspond with the presented terminal numbers.

EN

4 Start-up

4.1 General

All electrical supply, operating and measuring lines, and the pressure connections must have been correctly installed before commissioning. All supply lines are arranged so that there are no mechanical forces acting on the device.

Check that the pressure connections do not leak before commissioning.

4.2 Control elements

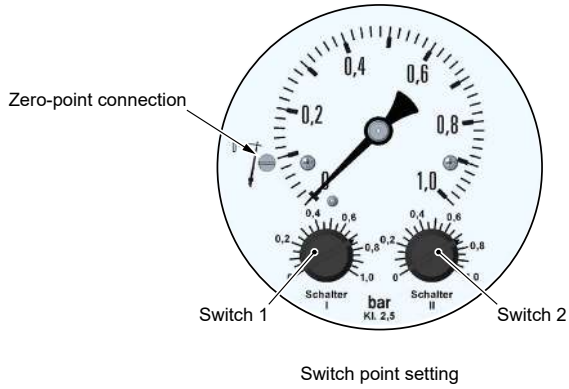
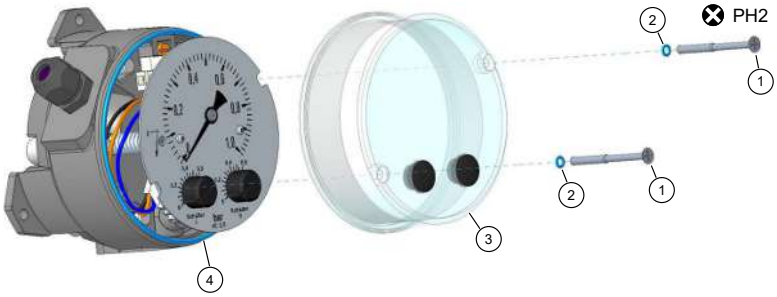


Fig. 13: Control elements

- Depending on the enclosure model, the switch point setting is accessible in different ways.
- The enclosure must be opened to set the zero-point.

4.3 Opening the enclosure

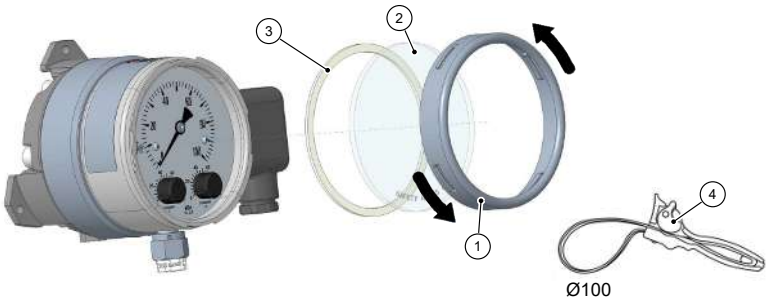
4.3.1 Enclosure with protection class IP55



1. Remove the attachment screws (1) with a screwdriver. Ensure that the sealing rings (2) do not get lost. The protection class is no longer guaranteed without these sealing rings.
2. Remove the Makrolon in the hood (3) and the seal (4).
3. It is assembled in reverse order. The seal (4) must lie precisely in the groove of the hood before the hood is screwed on.

EN

4.3.2 Enclosure with protection class IP65



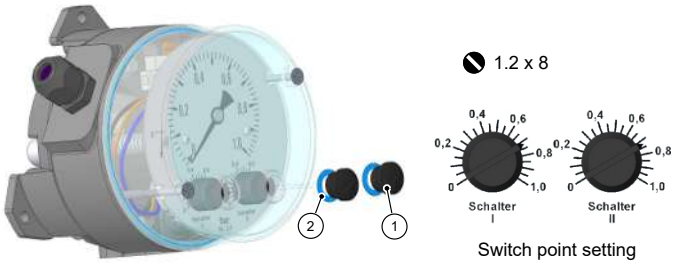
1. Release the bayonet ring (1) by turning to the left. if the bayonet ring cannot be opened by hand, use a pipe wrench (4).
2. Remove the glass pane (2) and the seal (3).
3. It is assembled in reverse order.

The bayonet ring in switch panel installation devices cannot be removed if installed. In this case, the device first needs to be removed before the enclosure can be opened.

4.4 Zero point correction

1. Depressurise the measuring chamber.
2. Open the enclosure
3. Set the measurement value pointer to the zero-point scale (see fig. above [▶ 13]) using the zero point correction screw.
4. Close the casing.

4.5 Switch point setting



Switch point setting

1. Remove the plugs (1) and the seals (2) in the hood and/or open the bayonet ring enclosure.
2. The required switch points can be set on the reference scale guide with a screwdriver. The achievable accuracy is 5 %.
3. Replace the plug and/or the bayonet ring after completing the settings.

4.6 Function test

Remove both plugs in the hood for testing or open the bayonet ring enclosure. If the unit has two micro-switches, the stated test steps must be carried out for both switches. After the test, the switch points need to be reset (see above).

Check when the system is depressurized.

- No measurement is shown and the measurement display point to zero.
- Turn the switch point setting button toward the zero-point until the micro-switch is activated.

Test when the system is operational

- A measurement is shown.
- Turn the switch point setting button toward the measurement until the micro-switch is activated.

EN

5 Servicing

5.1 Maintenance

The instrument is maintenance-free. We recommend the following regular inspection to guarantee reliable operation and a long service life:

- Check the function in combination with downstream components.
- Check the leak-tightness of the pressure connection lines.
- Check the electrical connections.

The exact test cycles need to be adapted to the operating and environmental conditions. In combination with other devices, the operating instructions for the other devices also need to be observed.

5.2 Transport

The measuring device must be protected against impacts. It should be transported in the original packaging or a suitable transport container.

5.3 Service

All defective or faulty devices should be sent directly to our repair department. Please coordinate all shipments with our sales department.

⚠ WARNING

Process media residues

Process media residues in and on dismantled devices can be a hazard to people, animals and the environment. Take adequate preventive measures. If required, the devices must be cleaned thoroughly.

Return the device in the original packaging or a suitable transport container.

5.4 Disposal

Please help to protect the environment by always disposing of the work pieces and packaging materials in compliance with the valid national waste and recycling guidelines or reuse them.

EN

6 Technical data

6.1 General Information

Reference conditions (acc. to IEC 61298-1)		
Temperature	+15 … +25 °C	
Relative humidity	45 … 75 %	
Air pressure	86 … 106 kPa	860 … 1060 mbar
Installation position	vertical	

6.2 Input variables

Measuring ranges	Measuring accuracy	Allowed static operating pressure	Overpressure	Underpressure
0 … 250 mbar	± 6.25 mbar	16 bar	25 bar	- 1 bar
0 … 400 mbar	± 10 mbar	16 bar		
0 … 0.6 bar	± 0.015 bar	16 bar		
0 … 1 bar	± 0.025 bar	16 bar		
0 … 1.6 bar	± 0.04 bar	25 bar		
0 … 2.5 bar	± 0.0625 bar	25 bar		
0 … 4 bar	± 0.1 bar	25 bar		
0 … 6 bar	± 0.15 bar	25 bar		
0 … 10 bar	± 0.25 bar	25 bar		
0 … 16 bar	± 0.4 bar	25 bar		
0 … 25 bar	± 0.625 bar	25 bar		
-0.6 … 0 bar	± 0.015 bar	16 bar		
-1 … 0 bar	± 0.025 bar	16 bar		
-1 … +0.6 bar	± 0.04 bar	25 bar		
-1 … +1.5 bar	± 0.0625 bar	25 bar		
-1 … +3 bar	± 0.1 bar	25 bar		
-1 … +5 bar	± 0.15 bar	25 bar		
0 … 30 psi	± 0.75 psi	25 bar		

Rated pressure of the measuring system	25 bar
Test pressure	1.5 times the rated pressure
Zero-point setting	Arranged in the front panel of the scale
Measuring accuracy	± 2.5% of the measuring span

EN

6.3 Output parameters

Switch contacts	1 to 2 micro-switches
Switching function (per contact)	Changeover contact
Switch point setting	Can be set to reference scales from outside
Smallest settable value	5% of the measuring span
Switch hysteresis	approx. 2.5% of the measuring span

Per contact	**AC**	**DC**
Switching voltage	250 V	30 V
Switching current	5 A	0.4 A
Switching output	250 VA	10 W

6.4 Operating conditions

Increase ambient temperature	-10 … +70 °C
Media temperature	-10 … +70 °C
Storage temperature	-15 … +75 °C
Enclosure protection class	IP55 or IP65 acc. to EN 60529 depending on model
NSR	EN 61010-1:2010
RoHS	EN 50581:2012
SIL2	EN 61508:2010 Parts 1-7
DNV-GL	Type testing according to the regulations of the DNV GL Class Guideline CG0339, November 2016

6.5 Construction design

Process connection	Inner thread G¼
	Inner thread ¼-18 NPT
Brass, CrNi steel	Connection shank G½ B DIN EN 837
	Connection shank G¼ B DIN EN 837
	Connecting shanks ¼-18 NPT
Brass, CrNi steel, galvanised steel	Cutting ring connection in brass for 6 mm pipe
	Cutting ring connection in brass for 8 mm pipe
	Cutting ring connection in brass for 10 mm pipe
Electrical connection	Permanently wired numbered cables
	7-pin plug connection
	Cable socket
Installation position	vertical
Dimensions	See dimensional drawings
Weight	Pressure chamber in aluminium 1.2 kg
	Pressure chamber in stainless steel 3.5 kg

EN

6.5.1 Materials

Parts in contact with the medium	
Pressure chamber	Aluminium GkAlSi10(mg); painted black
	Aluminium GkALSi10(mg); HART-COAT© surface protection
	Chromium nickel steel 1.4305
Measuring diaphragm	NBR
	VITON®
	Inconel 718
Seals	NBR
	VITON®
Other inner parts	Rustproof steel 1.4310, 1.4305
Process connection Connection shanks	Brass
	Chromium nickel steel
Process connection Cutting ring screw connection	Brass
	Galvanised steel
	Chromium nickel steel

Parts with no contact with the medium		
Cover hood	IP55	Makrolon
Bayonet ring housing	IP65	Stainless steel 1.4301
Dial face and needle		Aluminium
Setting buttons		AlCuMgPb 3.1645

EN

6.5.2 Dimensional drawings

All dimensions in mm unless otherwise stated

The following are the dimensional diagrams for the different models of the pressure chambers in aluminium. The dimensional diagrams for the pressure chambers in stainless steel are similar. For this reason, there is no illustration.

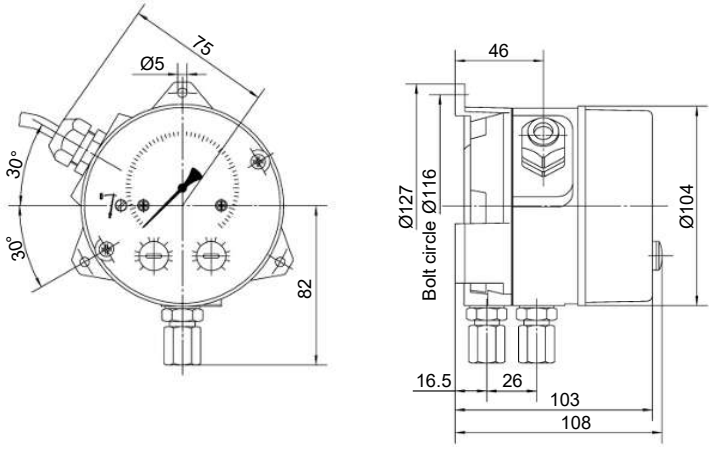


Fig. 14: Standard model (Wall mounting)

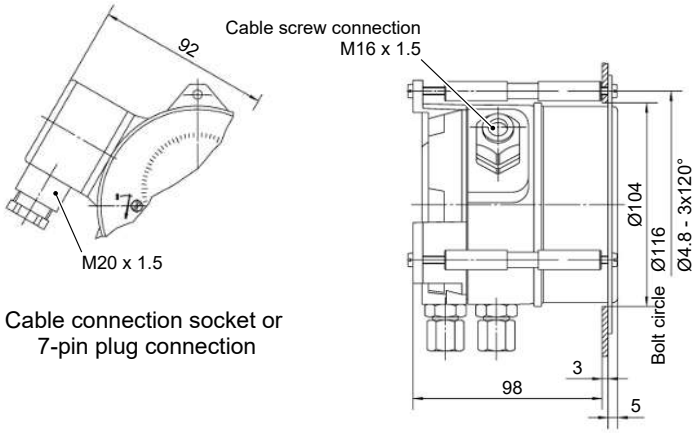


Fig. 15: Electrical connection and switch panel installation

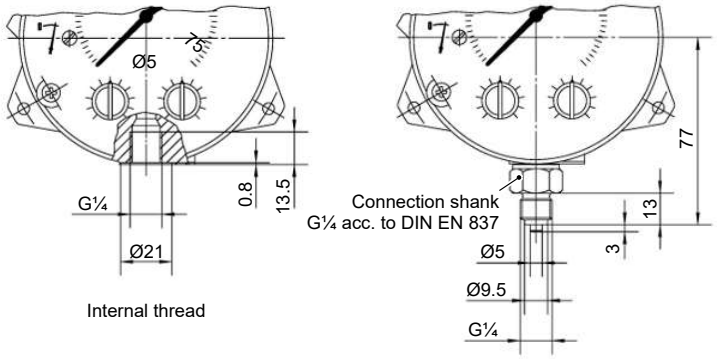


Fig. 16: Process connection

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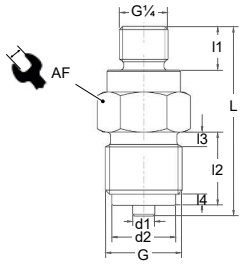
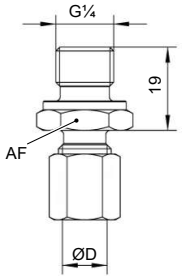
Process connection variants

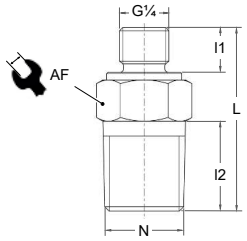


DIN EN 837



Cutting ring

Connecting shanks	d1	d2	l1	l2	l3	l4	A/F
G¼B	5	9.5	13	13	3,3	2	19
G½B	6	17.5	20	12,5	4,5	3	22
Cutting ring screw connection				ØD			A/F
Pipe diameter				6, 8, 10			19

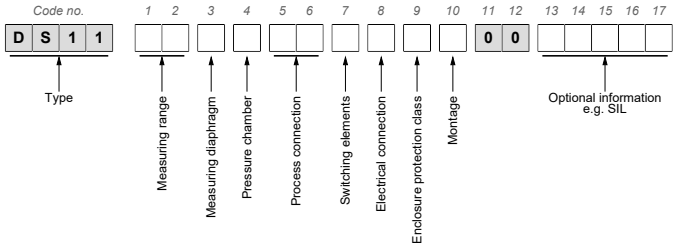


NPT outside

Connecting shanks	N	L	l1	l2	A/F
NPT outside	¼-18 NPT	42	12	18	19

EN

7 Order Codes



		Measuring diaphragm	
[1.2]	**Measuring range**	**NBR / VITON**	**Inconel 718**
82	0 … 250 mbar	x	
83	0 … 400 mbar	x	
01	0 … 0.6 bar	x	
02	0 … 1 bar	x	
03	0 … 1.6 bar	x	
04	0 … 2.5 bar	x	
05	0 … 4 bar	x	
06	0 … 6 bar	x	
07	0 … 10 bar	x	
08	0 … 16 bar	x	
09	0 … 25 bar		x
30	-0.6 … 0 bar	x	
31	-1 … 0 bar	x	
32	-1 … +0.6 bar	x	
33	-1 … +1.5 bar	x	
34	-1 … +3 bar	x	
35	-1 … +5 bar	x	
H5	0 … 30 psi	x	

[3]	**Measuring dia-phragm**	**Sealant**	**Comment**
N	NBR	NBR	
V	VITON®	VITON®	
E	Inconel 718	NBR	Only measuring ranges 0 … 25 bar
E	Inconel 718	VITON®	Only measuring ranges 0 … 25 bar

[4]	**Pressure chamber**	**Comment**
A	Aluminium	Only measuring range ≤ 0 ... 16 bar
E	Aluminium HART COAT®	
W	Stainless steel 1.4305	

[5.6]	Process connection	Material
01	Inner thread G¼	
04	Inner thread ¼-18 NPT	
06	Connection shanks with external thread G¼ B	Brass
11	Connection shanks with external thread G¼ B	CrNi steel
14	Connecting port G½ with outer thread ¼-18 NPT	CrNi steel
20	Cutting ring connection in brass for 6 mm pipe	Galvanised steel
21	Cutting ring connection in brass for 8 mm pipe	Galvanised steel
22	Cutting ring connection in brass for 10 mm pipe	Galvanised steel
24	Cutting ring connection in brass for 6 mm pipe	CrNi steel 1.4571
25	Cutting ring connection in brass for 8 mm pipe	CrNi steel 1.4571
26	Cutting ring connection in brass for 10 mm pipe	CrNi steel 1.4571
28	Cutting ring connection in brass for 6 mm pipe	Brass
29	Cutting ring connection in brass for 8 mm pipe	Brass
30	Cutting ring connection in brass for 10 mm pipe	Brass

[7]	Switching Elements
A	1 adjustable micro-switch
B	2 adjustable microswitches

[8]	Electrical connection
1	1 metre numbered cable; permanently wired
2	2.5 metre numbered cable; permanently wired
5	5 metre numbered cable; permanently wired
K	Cable connection socket
W	7-pin plug connection
S	DNV-GL approved version with 3 m connection cable

[9]	Casing protection class	Comment
0	IP55 as per DIN EN 60529	
P	IP65 as per DIN EN 60529	Only with electrical connection K, W, Z

[10]	Assembly
D	Switch panel installation set
W	Wall mounting

[13-17]	Optional information
#####	Code for special models e.g. SIL The code is generated as agreed with our sales team.

EN

Accessories

Please go to our website fischermesstechnik.de for data sheets for the measuring device accessories.

DZ11	Installation set for retrofitting from wall mounting to switch panel installation. Please state the precise device type of the DS11 because there are different switch panel installation sets depending on the model.
DZ23/24	The shut-off valve DZ23 in a three spindle model and DZ24 in a four spindle model can be particularly beneficial when mounting the differential pressure measuring and switch device DS11. The following can be used for example: • is a system is to be depressurized or taken out of operation • for repairs or tests to disconnect differential pressure devices within the affected systems from the mains supply The shutoff devices can therefore also be used for function tests on site. In contrast to DZ23, the DZ24 also has a venting valve to vent the connected pipe system. The shut-off and venting valves are designed for the rated pressure level PN40. The housing can be selected in aluminium, brass or chrome-nickel-steel 1.4301. There are various pressure connections available for process-side screw connections or connection threads.
MZ	Measuring device accessory (throttles, siphons, etc.)

8 Attachments

8.1 SIL Certificate

EN

TÜV NORD

ZERTIFIKAT
CERTIFICATE

Hiermit wird bescheinigt, dass das unten beschriebene Produkt der Firma
This certifies that the product mentioned below from company

Fischer Mess- und Regeltechnik
Bielefelder Straße 37a
32107 Bad Salzuflen
Deutschland

die Anforderungen der folgenden Prüfunterlage(n) erfüllt.
fulfills the requirements of the following test regulations.

Geprüft nach: *Tested in accordance with:*	**EN 61508:2010 Teile/Parts 1-7**
Beschreibung des Produktes: (Details s. Anlage 1) *Description of product:* *(Details see Annex 1)*	**Differenzdruck Mess- und Schaltgerät** / *Differental Presure Switch* **Kontaktmanometer** / *Contact Pressure Gauge*
Typenbezeichnung: *Type Designation:*	**DS11, DS13 und DS21** **MS11**

Dieses Zertifikat bescheinigt das Ergebnis der Prüfung an dem vorgestellten Prüfgegenstand. Eine allgemein gültige Aussage über die Qualität der Produkte aus der laufenden Fertigung kann hieraus nicht abgeleitet werden.
This certifies the result of the examination of the product sample submitted by the manufacturer. A general statement concerning the quality of the products from the series manufacture cannot be derived there from.

Registrier-Nr. / *Registered No.* 44 799 13759902
Prüfbericht Nr. / *Test Report No.* 3526 2583
Aktenzeichen / *File reference* 8003015248

Gültigkeit / Validity
von / *from* 2020-03-18
bis / *until* 2025-03-17

Zertifizierungsstelle der
TÜV NORD CERT GmbH

Essen, 2020-03-18

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de technology@tuev-nord.de

Bitte beachten Sie auch die umseitigen Hinweise
Please also pay attention to the information stated overleaf

Fig. 17: SIL_4479913759902

EN

TÜV NORD

ANLAGE
ANNEX

Anlage 1, Seite 1 von 1
Annex 1, page 1 of 1

zum Zertifikat Registrier-Nr. / *to Certificate Registration No.* 44 799 13759902

Allgemeine Angaben *General Information*	**Siehe auch Seite 1 des Zertifikats** *See also page 1 of the certificate*
Produktbeschreibung: *Product description:*	**Differenzdruck Mess- und Schaltgerät** / *Differental Presure Switch* **DS11, DS13, DS21** **Kontaktmanometer** / Contact Pressure Gauge MS11
Technische Daten: *Technical data:*	**Sicherheitsparameter** / *Safety Parameter* SFF = 70 % PFH = 3,3 10^{-11} 1/h HFT = 0 Typ-A-Teilkomponente / *Type*
	Die Geräte können mit einer geeigneten Testung in SIL2 Anwendungen eingesetzt werden. *The components can be used with an appropriate testing in SIL2 applications.*

Zertifizierungsstelle der
TÜV NORD CERT GmbH

Essen, 2020-03-18

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.de technology@tuev-nord.de

Fig. 18: SIL_4479913759902

8.2 DNV-GL Certificate

DNV·GL

Certificate No:
TAA00002BW

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pressure Indicator

with type designation(s)
DS11, DS21

Issued to
FISCHER Mess- und Regeltechnik GmbH
Bad Salzuflen, Nordrhein-Westfalen, Germany

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Location classes:

Temperature	**B**
Humidity	**B**
Vibration	**A***
EMC	**N/A**
Enclosure	**B (IP54)**

Issued at **Hamburg** on **2019-06-03**

This Certificate is valid until **2024-06-02**.
DNV GL local station: **Magdeburg**

Approval Engineer: **Holger Jansen**

Digitally Signed By: Rinkel, Marco
for **DNV GL**
Location: Hamburg, on behalf of

Joannis Papanuskas
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Form code: TA 251 Revision: 2016-12 www.dnvgl.com Page 1 of 3

Fig. 19: DNV-GL_TAA00002BW_(1)

EN

Job Id: **262.1-030917-1**
Certificate No: **TAA00002BW**

Product description

Pressure Indicator and Switching Device

Type: DS11, DS21
Pressure indicator: 270° scale, Indicator class: 2.5

Ranges	Max. Static Pressure DS11 [DS21]
0 - 400 mbar	6 [6] bar
0 - 0.6 bar	10 [10] bar
0 - 1 bar	16 [16] bar
0 - 1.6bar; 0 - 2.5bar; 0 – 4bar; 0 – 6bar	25 [16] bar
0 - 10 bar [only DS11]	25 bar

Max. medium temperature:	70° C
Gasket and membrane:	NBR or Viton
Wetted parts:	1.4310, 1.4305
Pressure gauge:	GKAlSi 10(MgCu), with hart coat or 1.4305
Output:	2 c/o - contacts separate adjustable
Rating:	3A, 250 V AC, 250 VA
Electrical connection:	fixed cable, length 3m, type MPRX 0,6/1 (Nexans) or equivalent

Type DS21: identical technical data, gaskets and membrane = viton

Application/Limitation

The Type Approval covers hardware listed under Product description. When the hardware is used in applications to be classed by DNV GL, documentation for the actual application is to be submitted for approval by the manufacturer of the application system in each case. Reference is made to DNV GL Rules for Ships Pt.4 Ch.9 Control and Monitoring Systems.

A* Vibration test: 2 to 17 Hz amplitude = 1.6 mm,
17 to 100 Hz acceleration = 2g

Type Approval documentation

Data sheets: DS11, Rev.B 2014-08
DS21, Rev.B 2014-08
Drawings: DS11 Dwg.-no. 24855, Rev.d; 2019-02-13
DS11 Dwg.-no. 02.011.00.24857.3, Rev.e; 2018-02-06
DS21 Dwg.-no. 26023, Rev.g; 2019-02-15
DS21 Dwg.-no. 02.021.00.26067.3, Rev.h; 2018-02-12
DS11-DS21 Dwg.-no. 02.021.01.34017.3, Rev.a; 2011-02-08
Test reports: TüV 57 011 7, 1982-06-04
Type Approval Assessment Report 2019-05-21

Tests carried out

Applicable tests according to DNV GL Class Guideline CG0339, November 2016.

Marking of product

The products to be marked with:
- Model name
- Manufacturer name
- Serial number

Fig. 20: DNV-GL_TAA00002BW_(2)

Job Id: **262.1-030917-1**
Certificate No: **TAA00002BW**

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the type are complied with, and that no alterations are made to the product design or choice of systems, software versions, components and/or materials.

The main elements of the assessment are:

- Ensure that type approved documentation is available
- Inspection of factory samples, selected at random from the production line (where practicable)
- Review of production and inspection routines, including test records from product sample tests and control routines
- Ensuring that systems, software versions, components and/or materials used comply with type approved documents and/or referenced system, software, component and material specifications
- Review of possible changes in design of systems, software versions, components, materials and/or performance, and make sure that such changes do not affect the type approval given
- Ensuring traceability between manufacturer's product type marking and the type approval certificate

Periodical assessment is to be performed after 2 years and after 3.5 years. A renewal assessment will be performed at renewal of the certificate.

END OF CERTIFICATE

Fig. 21: DNV-GL_TAA00002BW_(3)

EN

8.3 EU Declaration of Conformity

FISCHER MESS- UND REGELTECHNIK

(Translation) CE

EU Declaration of Conformity

For the product described as follows

Product designation **Pressure Switch**

Type designation **DS11**

it is hereby declared that it corresponds with the basic requirements specified in the following designated directives:

2014/35/EU	*Low Voltage Directive*
2011/65/EU	*RoHS Directive*

The products were tested in compliance with the following standards.

Low Voltage Directive (LVD)

DIN EN 61010-1:2011-07 *EN 61010-1:2010*	*Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements*

RoHS Directive (RoHS 2)

DIN EN 50581:2013-02 *EN 50581:2012*	*Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*

Also they were subjected to the conformity assessment procedure „**Internal production control**".

Sole responsibility for the issue of this declaration of conformity in relation to fulfilment of the fundamental requirements and the production of the technical documents is with the manufacturer.

Manufacturer
FISCHER Mess- und Regeltechnik GmbH
Bielefelder Str. 37a
32107 Bad Salzuflen, Germany
Tel. +49 (0)5222 974 0

Documentation representative
Mr. Torsten Malischewski
B.Sc.
Development department

The devices bear the following marking: CE

Bad Salzuflen
29 Januar 2019

G. Gödde
Managing director

09010360 • CE_EN_DS11 • Rev. ST4-A • 01/19 1 / 1

Fig. 22: CE_DE_DS11

8.4 UKCA Declaration of Conformity

FISCHER MESS- UND REGELTECHNIK

(Translation) UK CA

UKCA Declaration of Conformity

For the product described as follows

Product designation **Differenzdruck Mess- und Schaltgerät**

Type designation **DS11 ## # # ## # # # # 00 #####**

is hereby declared to comply with the essential requirements, specified in the following UK regulations:

Statutory regulation No.	***Description***
2016 No. 1101	*The Electrical Equipment (Safety) Regulations 2016*
2021 No. 422	*The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (Amendment) Regulations 2021*

The products have been tested according to the following standards.

Low Voltage Directive (LVD):

BS EN 61010-1+A1:2017-03-31	*Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements*

Restriction of Hazardous Substances (RoHS):

BS EN IEC 63000:2018-12-10	*Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances*

The sole responsibility for drawing up this declaration of conformity in relation to the fulfilment of the essential requirements and the preparation of the technical documentation lies with the manufacturer.

Manufacturer

FISCHER Mess- und Regeltechnik GmbH
Bielefelder Str. 37a
32107 Bad Salzuflen, Germany
Tel. +49 (0)5222 974 0

The devices bear the following marking: UK CA

Bad Salzuflen
24 Nov 2021

G. Gödde
Managing director

09010622 • UKCA_EN_DS11 • Rev. ST4-A • 11/21 1 / 1

Fig. 23: UKCA_EN_DS11

8.5 EAC Declaration

EN

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ
ДЕКЛАРАЦИЯ О СООТВЕТСТВИИ

Заявитель Общество с ограниченной ответственностью «МАТИС-М». Место нахождения: 117261, город Москва, улица Вавилова, дом 70, корпус 3, комната правления, Российская Федерация. Адрес места осуществления деятельности: 109029, город Москва, город, Сибирский проезд, дом 2, корпус 12, Российская Федерация, Основной государственный регистрационный номер: 1037739575125, телефон: +7 495 725-23-09, адрес электронной почты: info@matis-m.ru

в лице Генерального директора Шарова Александра Анатольевича

заявляет, что Дифференциальный манометр с переключателем, тип DS21, DS11
Продукция изготовлена в соответствии с Директивой 2014/30/EU

Изготовитель "FISCHER Mess- und Regeltechnik GmbH"
Место нахождения: Bielefelder StraBe 37a, D-32107 Bad Salzuflen, Германия. Филиал завода-изготовителя: "FISCHER Mess- und Regeltechnik GmbH", Bielefelder StraBe 37a, D-32107 Bad Salzuflen, Германия.
Код ТН ВЭД ЕАЭС 9026 20 400 0, серийный выпуск

Соответствует требованиям Технического регламента таможенного союза ТР ТС 020/2011 "Электромагнитная совместимость технических средств"

Декларация о соответствии приията иа осиоваиии протокола № 01724-219-1-17/БМ от 31.01.2017 года. Испытательной лаборатории Общества с ограниченной ответственностью «БизнесМаркет», аттестат аккредитации регистрационный № РОСС RU.0001.21АВ90 Схема декларирования: 3д

Дополнительная информация ГОСТ 30804.3.2-2013, ГОСТ 30804.3.3-2013. Условия хранения продукции в соответствии с ГОСТ 15150-69. Срок хранения (службы, годности) указан в прилагаемой к продукции товаросопроводительной и/или эксплуатационной документации.

Декларация о соответствии действительна с даты регистрации по 31.01.2022 включительно

М.П. Шаров Александр Анатольевич
(подпись) (Ф. И. О. заявителя)

Регистрационный номер декларации о соответствии: ЕАЭС № RU Д-DE.АЛ16.В.65130

Дата регистрации декларации о соответствии: 01.02.2017

Fig. 24: EAC_RU_D-DE-AB71-B-0956

Notes

Notes

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FISCHER MESS- UND REGELTECHNIK developing solutions

EN

FISCHER Mess- und Regeltechnik GmbH
Bielefelder Str. 37a
D-32107 Bad Salzuflen

Tel. +49 5222 974-0
Fax +49 5222 7170
www.fischermesstechnik.de
info@fischermesstechnik.de

10.4.3 Datasheet water in Oil sensor - CLS-50

EN

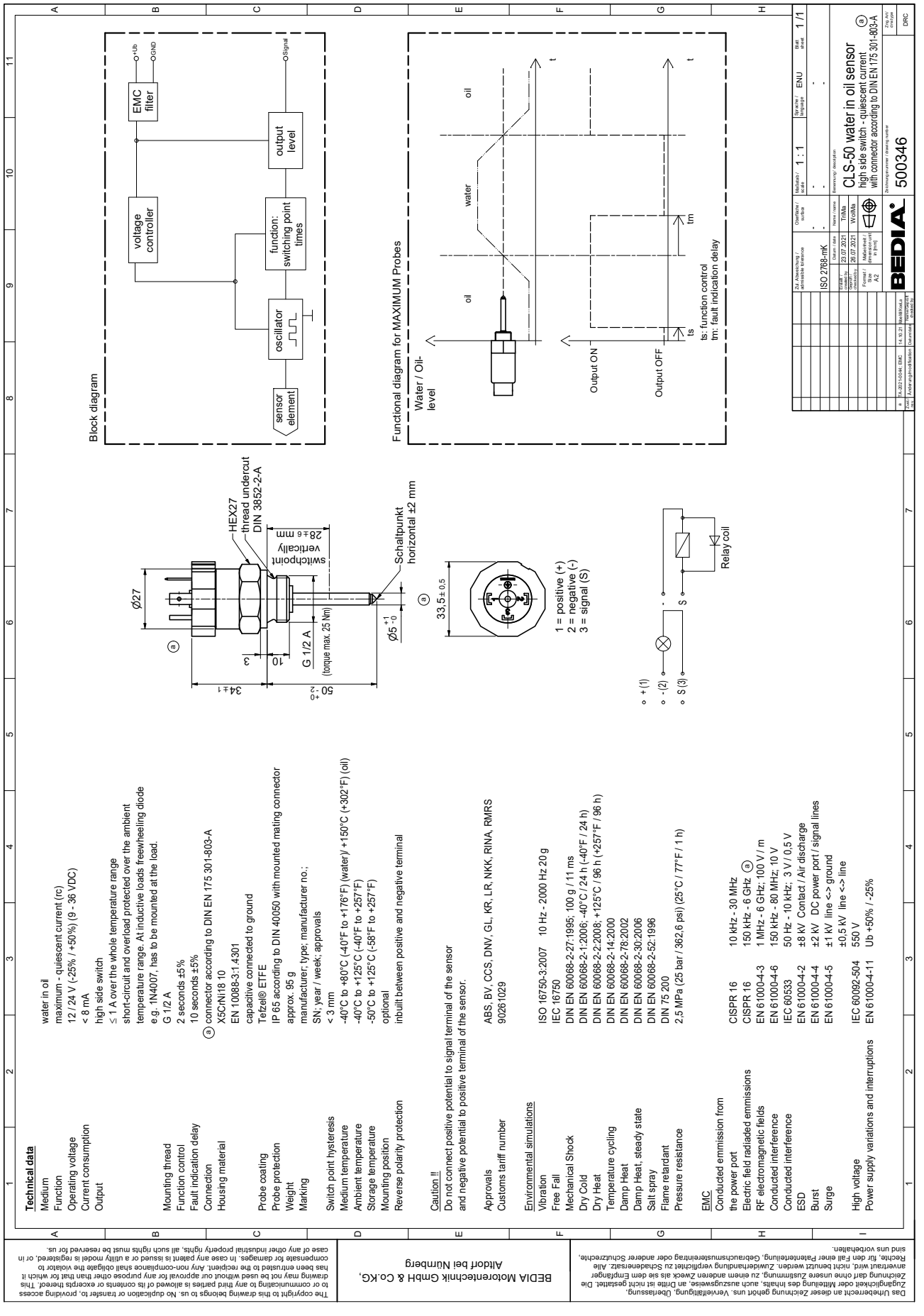

Table of illustrations

Index of tables

Glossary

HN

HYDAC standard with dimensions for the installation space for HYDAC clogging indicators.

Index

EN

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HYDAC INTERNATIONAL

HYDAC Filter Systems GmbH
Industriegebiet
66280 Sulzbach/Saar
Germany
Tel. +49 6897 509-01
filtersystems@hydac.com
www.hydac.com

Further addresses:
www.hydac.com/en/contacts