LowViscosity Housing

LowViscosity Housing – Coalescer Diesel
LVH-CD-1xx-EV-BJ-FA /-C070

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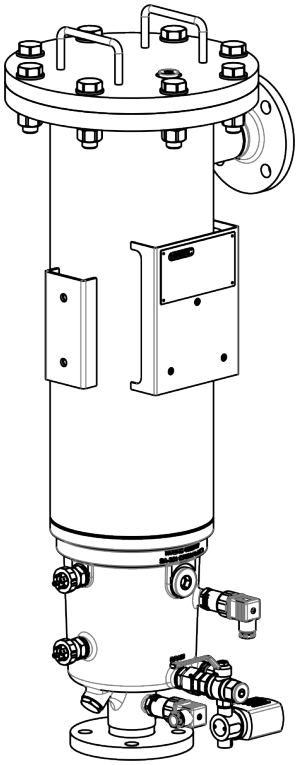

Installation instructions

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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.

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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.

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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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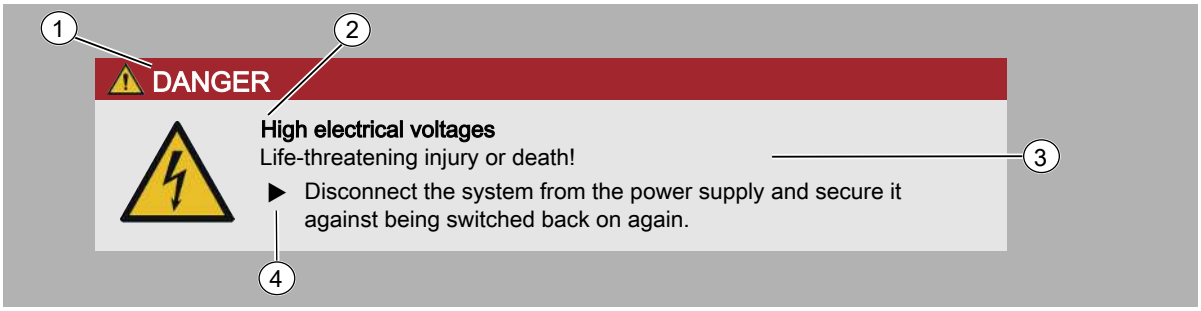
Warnings visually highlighted in boxes

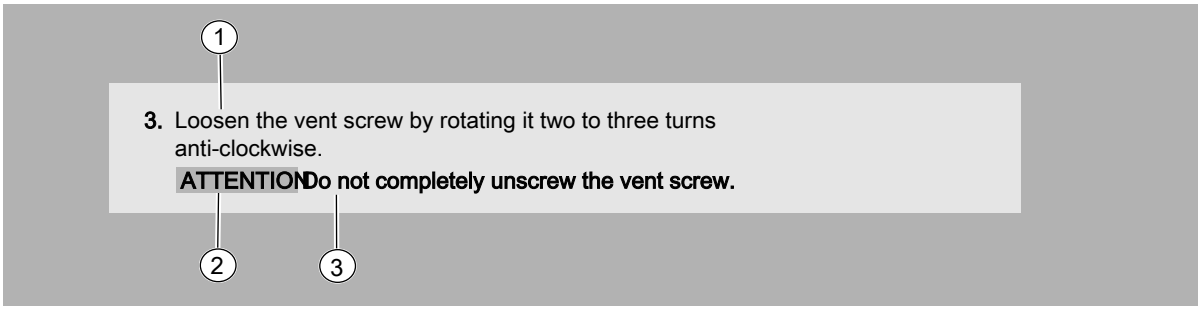
Warnings visually highlighted in boxes provide the following information in connection with a hazard:



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.

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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

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.

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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 CoalescerDiesel LVH-CD-1xx-…
1	Installation instructions (this document)
1	Filter element, 20 µm (installed in the filter housing)

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	≈ 67 kg	≈ 75 kg
Permitted operating medium	Diesel or heating oil	
Water separation efficiency	> 95%	
Permitted operating pressure	≤ 10 bar	
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 … 80 °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	DIN DN 50	
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 MP6	G1 according to ISO 228-1	

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

[2] No ice formation is allowed in the 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.

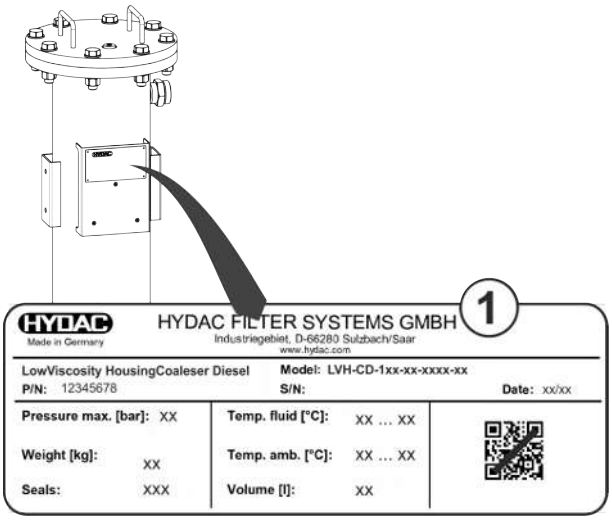

Fig. 1: Decoding the type label

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:

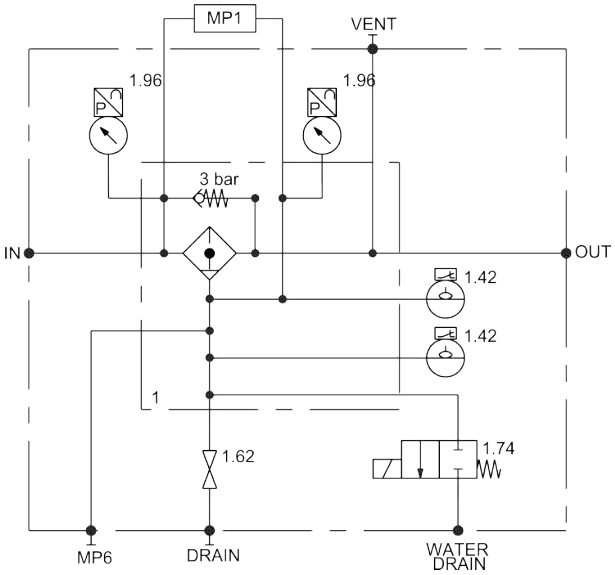

Fig. 3: Hydraulic diagram

1	Filter housing
1.42	Water sensor
1.62	Emptying / manual water drain ball valve
1.74	Drain valve / automatic water drain
1.96	Pressure sensor
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 sight glass

3.6 Connections

The filter housing has the following connections:

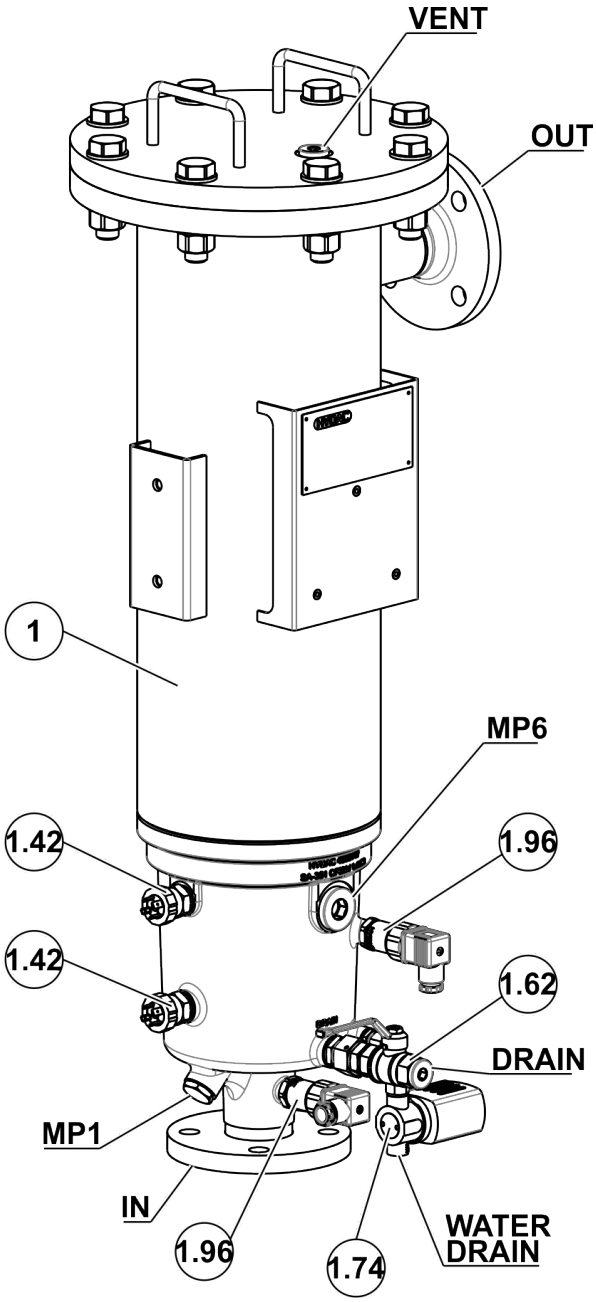

Fig. 4: Connections

1	Filter housing
1.42	Water sensor
1.62	Emptying / manual water drain ball valve
1.74	Drain valve / automatic water drain
1.96	Pressure sensor
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 sight glass

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4. Transportation / storage

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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.

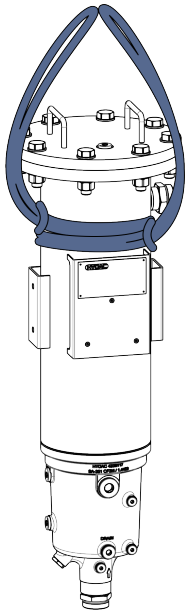

Fig. 5: Attachment points for transport

5. Assembly / installation

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

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.

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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".

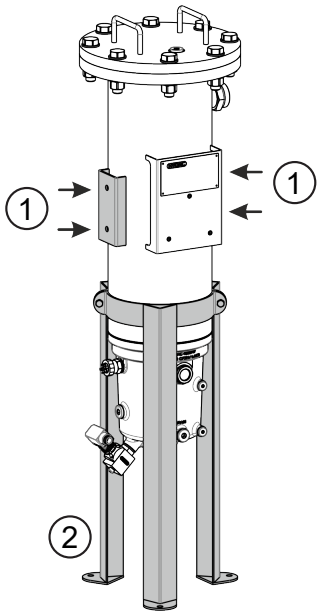

Fig. 6: Installing filter housing

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 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".

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.

The filter housing is equipped with various sensors such as water sensors, clogging indicator (differential pressure indicator), pressure sensor and solenoid valve.

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".

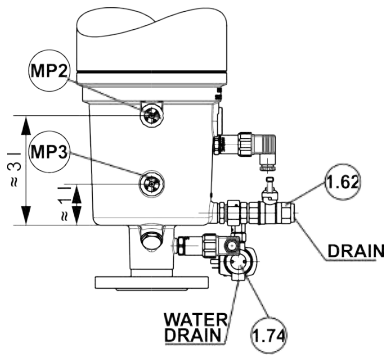

Fig. 7: Connecting a water sensor

5.2.2 Connecting a water drain valve

Connect the water drain valve / solenoid valve according to the instructions, for details, see ▸Sec. 10.4 "Instructions for components".

5.2.3 Connecting a pressure sensor

Connect the pressure sensor according to the instructions, for details, see ▸Sec. 10.4 "Instructions for components".

5.3 Startup

Proceed as follows for start-up:

1. Check or insert a filter element into the filter housing. For details, see ▸Sec. 10.2 "Finding spare parts".
2. Fill the filter housing by opening the IN connection.
3. De-aerate the filter housing, for details, see ▸Sec. 10.2 "Finding spare parts".

⚑ 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.

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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.

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.

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

8. Performing maintenance

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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"

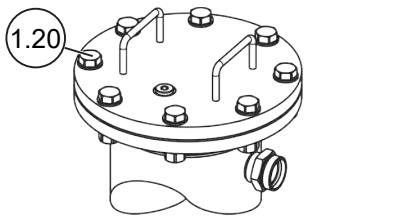
1x Allen key = 10 mm

2x spanner = 30 mm

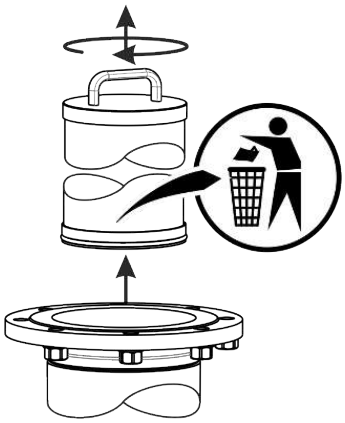
If the unit is installed below the liquid level of the tank, close the shut-off valve in the suction line before changing the element. This is in order to prevent uncontrolled leakage of operating fluid through the open filter housing.

Renew the filter element as described below:

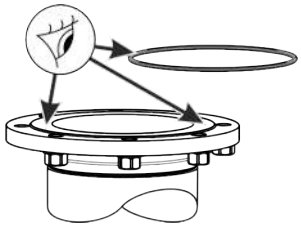
1. Close the shut-off devices at the inlet IN and outlet OUT.
2. Perform a pressure release of the filter housing. To do this, carefully open the bleed screw VENT on the filter housing cover using the Allen key ⬣ = 10 mm.
   Do not unscrew the bleed screw completely, the bleed screw has a slot.
3. Unscrew 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.



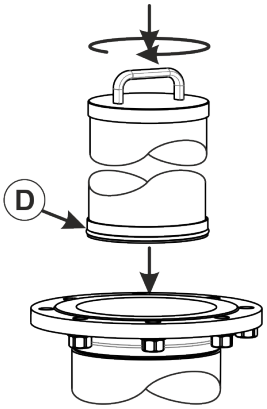
6. Remove the filter element using the handle provided.
   If the filter element is difficult to remove, move it slightly back and forth, or turn it, while pulling it out of the housing using the handle provided.
   Dispose of the used filter element in an environmentally friendly manner.
7. Clean the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



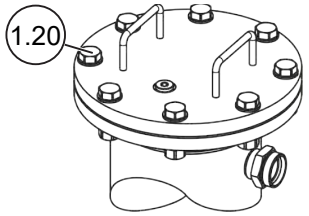
8. Check the O-ring fitted in the end cap for damage. Renew the O-ring if necessary. Clean the sealing surface between the housing and end cap. Moisten the O-ring with operating fluid before installation.



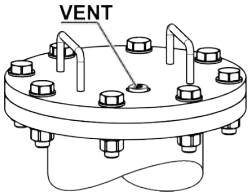
9. Lightly moisten the sealing surfaces (D) at the lower end of the filter element on the inner and outer O-ring with the operating fluid, and insert the filter element into the housing.
   If the filter element is difficult to install, move it slightly back and forth, or turn it, while sliding it into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

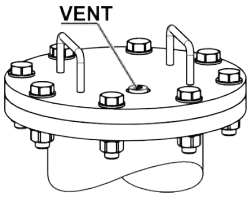
1x Allen key ⬢ = 10 mm

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.

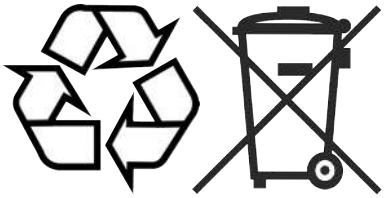
9.2 Permanent shutdown

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.

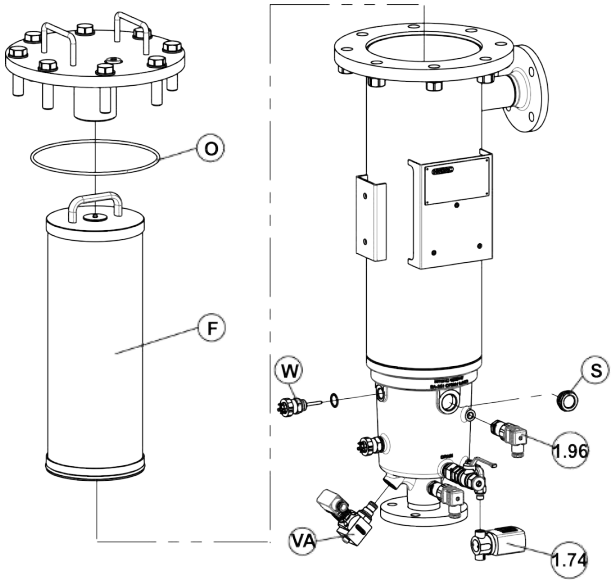

Fig. 8: Spare parts

Item	Qty.	Designation		Part no.
W	1	Water sensor set, consisting of: 1x water sensor 1x sealing ring 1x cable socket		4651720
VA	1	Clogging indicator		1335123
O	1	O-ring	For filter housing cover	637854
S	1	Sight glass	G1	6060303
1.74	1	Water drain valve		6288960
1.96	1	Pressure sensor	HDA4000	908794

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

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10.3 Finding accessories

The following accessories are available:

Base frame

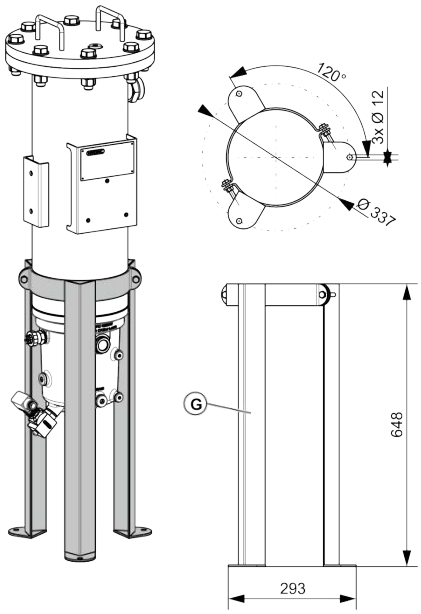

Fig. 9: Base frame accessories

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

- Datasheet water in Oil sensor - CLS-40 [▸ 33]
- Installation instructions - pressure transmitter HDA 4000 [▸ 35]
- Operating Instructions - 2/2-way solenoid valve Type 6027 [▸ 60]

10.4.1 Datasheet water in Oil sensor - CLS-40

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Technical data

Medium	water in oil
Function	maximum - quiescent current (rc)
Operating voltage	12 / 24 V (-25% / +50%) (9 - 36 VDC)
Current consumption	< 8 mA
Output	high side switch ≤ 1 A over the whole temperature range short-circuit and overload protected over the ambient temperature range. At inductive loads freewheeling diode e.g. 1N4007, has to be mounted at the load.
Mounting thread	G 1/2 A
Function control	2 seconds ±5%
Fault indication delay	10 seconds ±5%
Connection	connector according to DIN EN 175 301-803-A
Housing material	(b) X5CrNi18 10 EN 10088-3:1.4301 capacitive connected to ground
Probe coating	Tefzel® ETFE
Probe protection	IP 65 according to DIN 40050 with mounted mating connector
Weight	approx. 100 g
Marking	manufacturer; type; SN; year / week; approval
Switch point hysteresis	< 3 mm
Medium temperature	-40°C to +80°C (-40°F to +176°F) (water)/ +150°C (+302°F) (oil)
Ambient temperature	-40°C to +125°C (-40°F to +257°F)
Storage temperature	-50°C to +125°C (-58°F to +257°F)
Mounting position	optional
Reverse polarity protection	inbuilt between positive and negative terminal

Caution!!
Do not connect positive potential to signal terminal of the sensor and negative potential to positive terminal of the sensor.

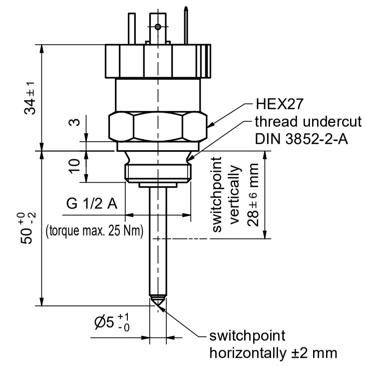
Approval	E1 10R-03 5459
Customs tariff number	90261029

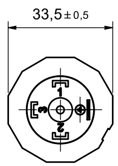
Environmental simulations

Vibration	ISO 16750-3:2007 10 Hz - 2000 Hz 20 g
Free Fall	IEC 16750
Mechanical Shock	DIN EN 60068-2-27:1995; 100 g / 11 ms
Dry Cold	DIN EN 60068-2-1:2006; -40°C / 24 h (-40°F / 24 h)
Dry Heat	DIN EN 60068-2-2:2008; +125°C / 96 h (+257°F / 96 h)
Temperature cycling	DIN EN 60068-2-14:2000
Damp Heat	DIN EN 60068-2-78:2002
Damp Heat, steady state	DIN EN 60068-2-30:2006
Salt spray	DIN EN 60068-2-52:1996
Pressure resistance	2,5 MPa (25 bar / 362,6 psi) (25°C / 77°F / 1 h)

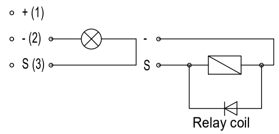
EMC

Radiated emission	2004/104/EG 30 MHz - 1 GHz; 1 m
Conducted transient emission	ISO 7637-2:2004
Immunity to RF electromagnetic fields	ISO 11452-1/-2 1000 MHz - 2000 MHz; 150 V / m (rms)
Immunity to RF electromagnetic fields in the stripline	ISO 11452-1/-5 20 MHz - 1000 MHz; 150 V / m (rms)
Transient immunity test on power lines	ISO 7637-2/2004 pulses 1, 2a, 2b, 3a, 3b, 4

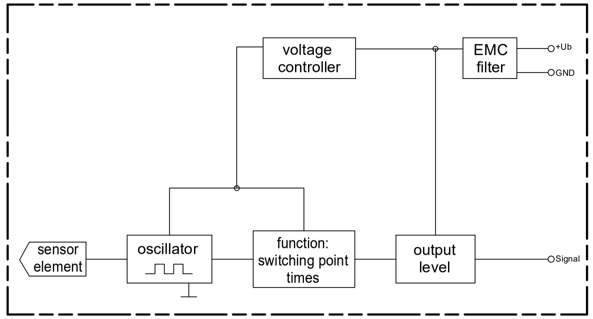




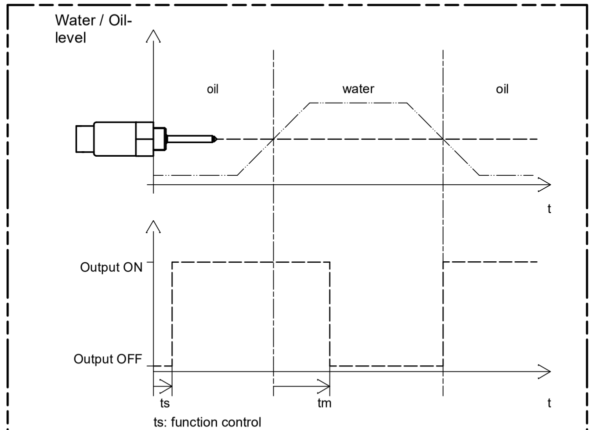
1 = positive (+)
2 = negative (-)
3 = signal (S)



Block diagram



Functional diagram for MAXIMUM Probes



ts: function control
tm: fault indication delay

Zul. Abweichung / admissible tolerance	ISO2768-mK
Maßstab / scale	1 : 1
Sprache / language	ENU
Blatt / sheet	1 /1
Erstellt / created by	22.07.2021 TriMa
Geprüft / checked by	26.07.2021 WolMa
Format / Size	A2
Benennung / description	CLS-40 water in oil sensor high side switch - quiescent current with connector according to DIN EN 175 301-803-A
Zeichnungsnummer / drawing number	351048
Zng. Art / drw. type	DRC

Zust. / rev.	Änderung/modification	Datum/date	Name/Geprüft/checked by
b	material housing	19.11.21	TriMa/SasCh
a	TA-2021-0044	14.10.21	MoeMi/KoeLa

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Altdorf bei Nürnberg

10.4.2 Installation instructions - pressure transmitter HDA 4000

EN

HYDAC ELECTRONIC

Druckmessumformer HDA 4000

Mit Schiffs-Zulassungen

Pressure transmitter HDA 4000

With Approvals for Shipping

Mat.-Nr. 669704 / Stand: 27.01.2014 D/E

D

EN

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Vorwort

Für Sie, den Benutzer unseres Produktes, haben wir in dieser Dokumentation die wichtigsten Hinweise zum Bedienen und Warten zusammengestellt.

Sie dient Ihnen dazu, das Produkt kennen zu lernen und seine bestimmungsgemäßen Einsatzmöglichkeiten optimal zu nutzen.

Diese Dokumentation muss ständig am Einsatzort verfügbar sein. Bitte beachten Sie, dass die in dieser Dokumentation gemachten Angaben der Gerätetechnik zu dem Zeitpunkt der Literaturerstellung entsprechen. Abweichungen bei technischen Angaben, Abbildungen und Maßen sind deshalb möglich.

Entdecken Sie beim Lesen dieser Dokumentation Fehler oder haben weitere Anregungen und Hinweise, so wenden Sie sich bitte an:

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Email: electronic@hydac.com

Die Redaktion freut sich über Ihre Mitarbeit.

„Aus der Praxis für die Praxis“

Mat.-Nr. 669704 / Stand: 27.01.2014 D/E

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1 Beschreibung

Speziell für den Einsatz in der Schiffsbauindustrie wurden diese Druckmessumformer auf Basis der Serie HDA 4000 entwickelt.
Zur Relativdruckmessung im Hochdruckbereich verfügt der HDA 4000 über eine Edelstahl-Messzelle mit Dünnfilm-DMS, zur Relativ- oder Absolutdruckmessung im Niederdruckbereich über eine Keramikmesszelle mit Dickschicht-DMS
Die Auswerteelektronik wandelt den gemessenen Druck in ein proportionales Analogsignal von 4 .. 20 mA um.
Die Elektronikbaugruppe ist zum Schutz gegen Feuchtigkeit, Vibrationen und Schock voll vergossen und in einem massiven Edelstahlgehäuse untergebracht.
Zur Verwendung der Druckmessumformer in der Schiffsindustrie sind diese bei den unten aufgeführten Gesellschaften zugelassen:

American Bureau of Shipping ABS

Bureau Veritas BV

Det Norske Veritas DNV

German Lloyd GL

Lloyds Register of Shipping LRS

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2 Allgemeines

Die Druckmessumformer der HDA 4000 Serien werden einzeln auf computergesteuerten Prüfplätzen abgeglichen und anschließend einem Endtest unterzogen. Sie sind wartungsfrei und arbeiten beim Einsatz innerhalb der Spezifikationen (siehe Technische Daten) einwandfrei. Falls trotzdem Fehler auftreten sollten, wenden Sie sich bitte an den HYDAC-Service. Fremdeingriffe in das Gerät führen zum Erlöschen jeglicher Gewährleistungsansprüche. Falls Sie Fragen bezüglich technischer Daten oder Eignung für Ihre Anwendungen haben, wenden Sie sich bitte an den technischen Vertrieb.

3 Montage

Die Druckmessumformer können mit ihrem mechanischen Gewinde direkt in hydraulische oder pneumatische Systeme eingebaut werden. In hydraulischen Systemen ist die empfohlene Montageposition stehend, wobei der Druckanschluss nach oben zeigen sollte. Auch in pneumatischen Systemen ist die empfohlene Montageposition stehend, wobei jedoch der Druckanschluss nach unten zeigen sollte. Bei Montage auf Navigationsbrücken ist eine Montage in direkter Nähe von magnetischen Quellen zu unterlassen (vorgeschriebener Mindestabstand zwischen Druckmessumformer und magnetischer Quelle: 1 m).
Anzugsdrehmoment zur Montage siehe Technische Daten. Der elektrische Anschluss ist von einem Fachmann nach den jeweiligen Landesvorschriften durchzuführen (in Deutschland: VDE 0100).

Alle HDA 4000 Druckmessumformer tragen das CE-Kennzeichen.
Konformitätserklärungen sind auf Anfrage erhältlich.
Es gelten die EMV-Normen: EN 61000-6-1/2/3/4. Die Forderungen der Normen werden nur bei ordnungsgemäßer und fachmännischer Erdung des Druckmessumformergehäuses erreicht. Beim Einschrauben in einen Hydraulikblock ist es ausreichend, wenn der Block über das Hydrauliksystem geerdet ist. Bei einer Schlauchmontage muss das Gehäuse separat geerdet werden.

Zusätzliche Montagehinweise, die erfahrungsgemäß den Einfluss elektromagnetischer Störungen reduzieren:

- Durchführung der elektrischen Installation von qualifiziertem Personal unter Berücksichtigung der landesüblichen Vorschriften (oder entsprechend der Bestimmungen der Zulassungsgesellschaften)
- Verbindungskabel so kurz wie möglich halten
- Verwendung von abgeschirmten Kabel
- Vermeidung der direkten Nähe zu Verbindungskabeln von Geräten oder zu elektrischen oder elektronischen Geräten, die Störungen erzeugen könnten sollte

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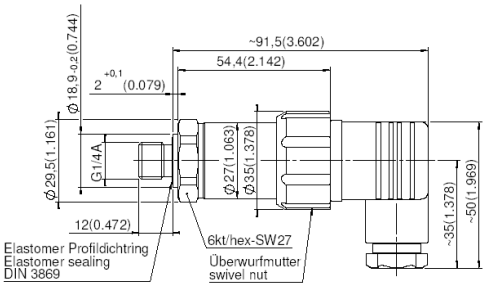
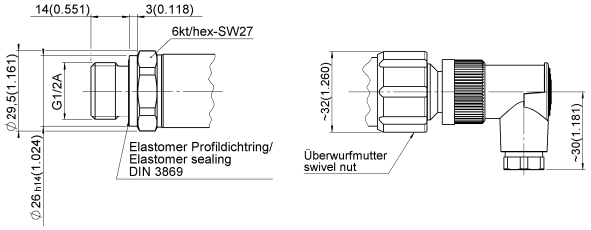
4 Abmessungen

HDA 4X4X
Einschraubzapfen/
Screwed end
DIN 3852-E-G1/4A



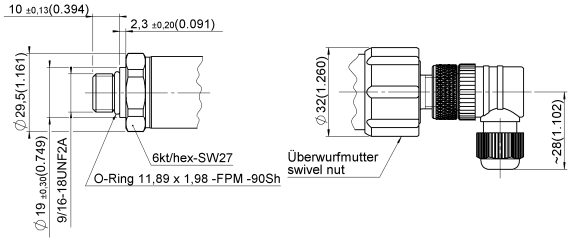
ZBE 01
DIN EN 175 301-803-A / (DIN 43650)
ISO 4400
3p + PE

HDA 4X2X
Einschraubzapfen/
Screwed end
DIN 3852-E-G1/2A



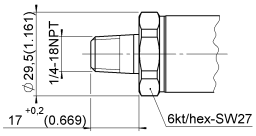
ZBE 03
Binder Serie 714 (4pol.)
M18x1

HDA 4X7X
Einschraubzapfen/
Screwed end
SAE6



ZBE 06
4p
M12x1 (4/5pol.)
IEC 60947-5-2

HDA 4X8X
Einschraubzapfen/
Screwed end
1/4-18NPT



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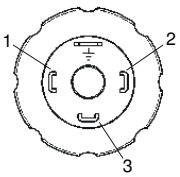
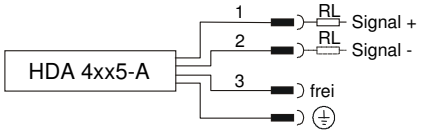
5 Anschlussbelegungen

Stecker EN 175301-803 (DIN 43650) 3pol. + PE

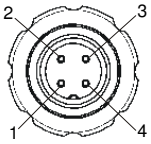


Pin 1 Signal +
Pin 2 Signal -
Pin 3 frei

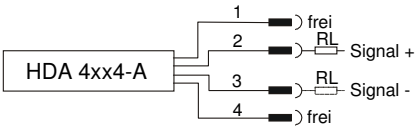


$R_{Lmax} = (U_B\text{-}10V) / 20mA\ [k\Omega]$

Stecker Binder Serie 714 M18 4pol.

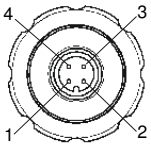


Pin 1 frei
Pin 2 Signal +
Pin 3 Signal -
Pin 4 frei

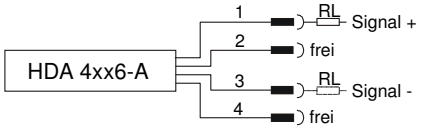


$R_{Lmax} = (U_B\text{-}10V) / 20mA\ [k\Omega]$

Stecker M12x1 4pol.



Pin 1 Signal +
Pin 2 frei
Pin 3 Signal -
Pin 4 frei



$R_{Lmax} = (U_B\text{-}10V) / 20mA\ [k\Omega]$

Bemerkung:
Der Lastwiderstand RL ergibt sich aus dem intern im Auswertegerät befindlichen Messwiderstand und dem Leitungswiderstand der Anschlussleitung.

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6 Technische Daten

6.1 Druckmessumformer mit Keramikmesszellen

Eingangskenngrößen	HDA 4100		HDA 4300							
Messbereiche [bar]	1	2,5	1	2,5	4	6	10	16	25	40
			-1..1		-1..5		-1..9			
Überlastbereiche [bar]	3	8	3	8	12	20	32	50	80	120
			8		20		32			
Berstdruck [bar]	5	12	5	12	18	30	48	75	120	180
			12		30		48			
Messbereiche [psi]	15	50	15	30	50	100	150	250	500	
Überlastbereiche [psi]	45	174	45	116	174	290	460	725	1740	
Berstdruck [psi]	70	260	70	174	260	430	690	1080	2600	
Mechanischer Anschluss (Anzugsdrehmoment)	G1/2 A DIN 3852, außen (45 Nm) G1/4 A DIN 3852, außen (20 Nm) 9/16-18 UNF 2A, SAE 6, außen (20 Nm) 1/4-18 NPT, außen (40 Nm)		G1/2 A DIN 3852, außen (45 Nm) G1/4 A DIN 3852, außen (20 Nm) 9/16-18 UNF 2A, SAE 6, außen (20 Nm) 1/4-18 NPT, außen (40 Nm)							
Medienberührende Teile	Anschlussstück: Keramik, Edelstahl Dichtungen: FPM, EPDM		Anschlussstück: Keramik, Edelstahl Dichtungen: FPM, EPDM							
Ausgangsgrößen										
Ausgangssignal, zulässige Bürde	4 ..20 mA, 2 Leiter $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$		4 ..20 mA, 2 Leiter $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$							
Genauigkeit nach DIN 16086 (Grenzpunkteinstellung)	≤ ± 1 % FS max. ≤ ± 0,5 % FS typ.		≤ ± 1 % FS max. ≤ ± 0,5 % FS typ.							
Genauigkeit bei Kleinstwert-einstellung (B.F.S.L)	≤ ± 0,5 % FS max. ≤ ± 0,25 % FS typ.		≤ ± 0,5 % FS max. ≤ ± 0,25 % FS typ.							
Temperaturkompensation Nullpunkt	≤ ± 0,03 % FS / °C max ≤ ± 0,02 % FS / °C typ.		≤ ± 0,03 % FS / °C max ≤ ± 0,02 % FS / °C typ.							
Temperaturkompensation Spanne	≤ ± 0,03 % FS / °C max ≤ ± 0,02 % FS / °C typ.		≤ ± 0,03 % FS / °C max ≤ ± 0,02 % FS / °C typ.							
Nicht-Linearität bei Grenzpunkteinstellung nach DIN 16086	≤ ± 0,5 % FS max. ≤ ± 0,25 % FS typ.		≤ ± 0,5 % FS max. ≤ ± 0,25 % FS typ.							
Hysterese	≤ ± 0,4% FS max. ≤ ± 0,2 % FS typ.		≤ ± 0,4 % FS max. ≤ ± 0,2 % FS typ.							
Wiederholbarkeit	≤ ± 0,1 % FS		≤ ± 0,1 % FS							
Anstiegszeit	≤ 1 ms		≤ 1 ms							
Langzeitdrift	≤ ± 0,3 % FS typ. / Jahr		≤ ± 0,3 % FS typ. / Jahr							
Umgebungsbedingungen										
Kompensierter Temperaturbereich	-25 .. +85 °C		-25 .. +85 °C							
Betriebstemperaturbereich[1)]	-30 .. +85 °C / -25 .. +85 °C		-30 .. +85 °C / -25 .. +85 °C							
Lagertemperaturbereich	-30 .. +100 °C		-30 .. +100 °C							
Mediumstemperaturbereich[1)]	-30 .. +85 °C / -25 .. +85 °C		-30 .. +100 °C / -25 .. +100 °C							
CE - Zeichen	EN 61000-6-1/1/2/3/4		EN 61000-6-1/1/2/3/4							
Vibrationsbeständigkeit nach DIN EN 60068-2-6 (10 .. 500 Hz)	≤ 20 g		≤ 20 g							
Schutzart nach DIN 40050	IP 67 Stecker EN 175301-803 (DIN 43650) M12x1 Stecker, bei Verwendung einer IP 67 Kupplungsdose)		IP 67 Stecker EN 175301-803 (DIN 43650) M12x1 Stecker, bei Verwendung einer IP 67 Kupplungsdose)							
Sonstige Größen										
Versorgungsspannung	10 .. 32 V		10 .. 32 V							
Restwelligkeit der Versorgungsspannung	≤ 5 %		≤ 5 %							
Lebensdauer	> 10 Millionen Lastwechsel 0 .. 100 % FS		> 10 Millionen Lastwechsel 0 .. 100 % FS							
Gewicht	ca. 150 g		ca. 150 g							

Anm.: Verpolungsschutz der Versorgungsspannung, Überspannungs-, Übersteuerungsschutz, Lastkurzschlussfestigkeit sind vorhanden.
FS (**F**ull **S**cale) = bezogen auf den vollen Messbereich
B.F.S.L. = **B**est **F**it **S**traight **L**ine

1) -25 °C mit FPM- oder EPDM-Dichtung, -30 °C auf Anfrage

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6.2 Druckmessumformer mit Edelstahlmesszellen

Eingangsgrößen	**HDA 4400**								**HDA 4700**							
Messbereich [bar]	6	16	40	60	100	250	400	600	6	16	40	60	100	250	400	600
Überlastbereiche [bar]	15	32	80	120	200	500	800	1000	15	32	80	120	200	500	800	1000
Berstdruck [bar]	100	200	200	300	500	1000	2000	2000	100	200	200	300	500	1000	2000	2000
Messbereich / [psi]	150	500	750	1000	1500				150	500	750	1000	1500			
	3000	5000	6000	9000					3000	5000	6000	9000				
Überlastbereiche [psi]	290	1160	1740	2900	2900				290	1160	1740	2900	2900			
	7250	11600	11600	14500					7250	11600	11600	14500				
Berstdruck [psi]	1450	2900	4350	7250	7250				1450	2900	4350	7250	7250			
	14500	29000	29000	29000					14500	29000	29000	29000				
Mechanischer Anschluss (Anzugsdrehmoment)	G1/2 A DIN 3852, außen (45 Nm) G1/4 A DIN 3852, außen (20 Nm) 9/16-18 UNF 2A, SAE 6, außen (20 Nm) 1/4-18 NPT, außen (40 Nm)								G1/2 A DIN 3852, außen (45 Nm) G1/4 A DIN 3852, außen (20 Nm) 9/16-18 UNF 2A, SAE 6, außen (20 Nm) 1/4-18 NPT, außen (40 Nm)							
Medienberührende Teile	Anschlussstück: Edelstahl Dichtung: FPM								Anschlussstück: Edelstahl Dichtung: FPM							
Ausgangsgrößen																
Ausgangssignal, zulässige Bürde	4 ..20 mA, 2 Leiter $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$								4 ..20 mA, 2 Leiter $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$							
Genauigkeit nach DIN 16086 (Grenzpunkteinstellung)	≤ ± 1 % FS max. ≤ ± 0,5 % FS typ.								≤ ± 0,5 % FS max. ≤ ± 0,25 % FS typ.							
Genauigkeit bei Kleinstwert-einstellung (B.F.S.L)	≤ ± 0,5 % FS max. ≤ ± 0,25 % FS typ.								≤ ± 0,25 % FS max. ≤ ± 0,15 % FS typ.							
Temperaturkompensation Nullpunkt	≤ ± 0,025 % FS / °C max ≤ ± 0,015 % FS / °C typ.								≤ ± 0,015 % FS / °C max. ≤ ± 0,008 % FS / °C typ.							
Temperaturkompensation Spanne	≤ ± 0,025 % FS / °C max ≤ ± 0,015 % FS / °C typ.								≤ ± 0,015 % FS / °C max. ≤ ± 0,008 % FS / °C typ.							
Nicht-Linearität bei Grenzpunkteinstellung nach DIN 16086	≤ ± 0,3 % FS max. ≤ ± 0,15 % FS typ.								≤ ± 0,3 % FS max. ≤ ± 0,15 % FS typ.							
Hysterese	≤ ± 0,4 % FS max. ≤ ± 0,2 % FS typ.								≤ ± 0,1 % FS max. ≤ ± 0,05 % FS typ.							
Wiederholbarkeit	≤ ± 0,1 % FS								≤ ± 0,05 % FS							
Anstiegszeit	≤ 1 ms								≤ 1 ms							
Langzeitdrift	≤ ± 0,3 % FS typ. / Jahr								≤ ± 0,1 % FS typ. / Jahr							
Umgebungsbedingungen																
Kompensierter Temperaturbereich	-25 .. +85 °C								-25 .. +85 °C							
Betriebstemperaturbereich[2)]	-40 .. +85 °C / -25 .. +85 °C								-40 .. +85 °C / -25 .. +85 °C							
Lagertemperaturbereich	-40 .. +100 °C								-40 .. +100 °C							
Mediumstemperaturbereich[2)]	-40 .. +100 °C / -25 .. +100 °C								-40 .. +100 °C / -25 .. +100 °C							
CE - Zeichen	EN 61000-6-1/1/2/3/4								EN 61000-6-1/1/2/3/4							
Vibrationsbeständigkeit nach DIN EN 60068-2-6 (10 .. 500 Hz)	≤ 20 g								≤ 20 g							
Schutzart nach DIN 40050	IP 67 Stecker EN 175301-803 (DIN 43650) M12x1 Stecker, bei Verwendung einer IP 67 Kupplungsdose)								IP 67 Stecker EN 175301-803 (DIN 43650) M12x1 Stecker, bei Verwendung einer IP 67 Kupplungsdose)							
Sonstige Größen																
Versorgungsspannung 2-Leiter	10 .. 32 V								10 .. 32 V							
Restwelligkeit der Versorgungsspannung	≤ 5 %								≤ 5 %							
Lebensdauer	10 Millionen Lastwechsel 0 .. 100 % FS								10 Millionen Lastwechsel 0 .. 100 % FS							
Gewicht	ca. 150 g								ca. 150 g							

Anm.: Verpolungsschutz der Versorgungsspannung, Überspannungs-, Übersteuerungsschutz, Lastkurzschlussfestigkeit sind vorhanden.
FS (**F**ull **S**cale) = bezogen auf den vollen Messbereich
B.F.S.L. = **B**est **F**it **S**traight **L**ine

2) -25°C mit FPM- oder EPDM-Dichtung, -40°C auf Anfrage

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7 Typenschlüssel

7.1 Druckmessumformer mit Keramikmesszellen

HDA 4 X X X - A - XXXXX - SXX - X 1

Genauigkeitsklasse
1 = 1 % FS max., absolut
3 = 1 % FS max., relativ

Anschlussart, mechanisch
2 = G1/2 A DIN 3852 (außen)
4 = G1/4 A DIN 3852 (außen)
7 = 9/16-18 UNF 2A, SAE 6 (außen)
8 = 1/4-18 NPT (außen)

Anschlussart, elektrisch
4 = Gerätestecker Binder Serie 714 M18, 4 pol.
(ohne Kupplungsdose)
5 = Gerätestecker EN 175301-803 (DIN 43650), 3 pol. + PE
(inklusive Kupplungsdose)
6 = Gerätestecker M12 x 1, 4 pol.
(ohne Kupplungsdose)

Signal
A = 4 .. 20 mA, 2-Leiter

Druckbereiche
Genauigkeitsklasse „1“
4-stellig für bar: 01,0; 02,5
5-stellig für psi: 00015; 00050

Genauigkeitsklasse „3“
4-stellig für bar: 01,0; 02,5; 04,0; 06,0; 0010; 0016; 0025; 0040
00001 (-1 .. +1); 00005 (-1 .. +5); 00009 (-1 .. +9)
5-stellig für psi: 00015; 00030; 00050; 00100; 00150; 00250; 00500

Modifikationsnummer
SXX = mit Schiffs-Zulassungen

Dichtungsmaterial (medienberührend)
F = FPM Dichtung (z.B. für Hydrauliköle)
E = EPDM Dichtung (z.B. für Kältemittel)

Anschlussmaterial (medienberührend)
1 = Edelstahl

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7.2 Druckmessumformer mit Edelstahlmesszellen

HDA 4 X X X - A - XXXXX - SXX

Genauigkeitsklasse
4 = 1 % FS max.
7 = 0,5 % FS max.

Anschlussart, mechanisch
2 = G1/2 A DIN 3852 (außen)
4 = G1/4 A DIN 3852 (außen)
7 = 9/16-18 UNF 2A, SAE 6 (außen)
8 = 1/4-18 NPT (außen)

Anschlussart, elektrisch
4 = Gerätestecker Binder Serie 714 M18, 4 pol.
(ohne Kupplungsdose)
5 = Gerätestecker EN 175301-803 (DIN 43650), 3 pol. + PE
(inklusive Kupplungsdose)
6 = Gerätestecker M12 x 1, 4 pol.
(ohne Kupplungsdose)

Signal
A = 4 .. 20 mA, 2-Leiter

Druckbereiche
4-stellig für bar: 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600
5-stellig für psi: 00150;00500; 00750; 01000; 01500; 03000; 05000; 06000; 09000

Modifikationsnummer
SXX = mit Schiffs-Zulassungen

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Fax.: +49 (0)6897 509-1933

Anmerkung

Die Angaben in dieser Bedienungsanleitung beziehen sich auf die beschriebenen Betriebsbedingungen und Einsatzfälle. Bei abweichenden Einsatzfällen und/oder Betriebsbedingungen wenden Sie sich bitte an die entsprechende Fachabteilung.

Bei technischen Fragen, Hinweisen oder Störungen nehmen Sie bitte Kontakt mit Ihrer HYDAC-Vertretung auf.

Technische Änderungen sind vorbehalten.

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HYDAC ELECTRONIC

Druckmessumformer HDA 4000

Mit Schiffs-Zulassungen

Pressure transmitter HDA 4000

With Ship-Approvals

Mat.-Nr. 669704 / Stand: 27.01.2014 D/E

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Preface

We have compiled the most important instructions for the **operation** and **maintenance** of our product for you, its user, in this documentation**.**

It will acquaint you with the product and assist you in using it as intended in an optimal manner.

Keep it in the vicinity of the product so it is always available.
Note that the information on the unit's engineering contained in the documentation was that available at the time of publication. There may be deviations in technical details, figures, and dimensions as a result.

If you discover errors while reading the documentation or have additional suggestions or notes, contact us at:

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Email: electronic@hydac.com

The editorial board would welcome your contributions.

„Putting experience into practice“

Mat.-Nr. 669704 / Stand: 27.01.2014 D/E

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1 Functional Description

Preferably for applications in marine business / ship industry these pressure transmitters were designed based on standard HDA 4000 series.
Featuring ceramic sensor cells, absolute and relative pressure in low pressure applications are measured. For measurements in high pressure applications stainless steel sensor cells are used.
The electronic circuits with HYDAC-ASIC proportionally change pressure readings into a 4..20 mA analogue signal. To protect against moisture, vibration, and shock the electronics are fully encapsulated and put in a solid stainless steel housing.
For the use in ship industry the following companies have approved the HDA 4000:

American Bureau of Shipping ABS

Bureau Veritas BV

Det Norske Veritas DNV

German Lloyd GL

Lloyds Register of Shipping LRS

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2 General Remarks

Every pressure transmitter HDA 4000 series is calibrated on computer-controlled test rigs and submitted to a final test.
The pressure transmitters do not require any maintenance and operate satisfactorily when used according to their specifications (see technical details). In the case of any unsatisfactorily operation, please contact HYDAC Service.
Interference from anyone other than HYDAC personnel will invalidate all warranty claims. If there are any queries regarding technical details or suitability of the pressure transmitter for any particular application please contact HYDAC Product Management.

3 Assembly

The pressure transmitters are ready for mounting directly to the hydraulic system by means of their thread connection. The recommended mounting position is in hydraulic applications vertical with the pressure connection pointing upwards and in pneumatic applications vertical with the pressure connection pointing downwards. For mounting on navigation bridges the place of mounting has to be outside of the vicinity of magnetic compasses (minimum distance 1 m). Mounting torque see Technical Data. The electrical connection should be carried out by a qualified electrician according to the relevant regulations of the country concerned.

All pressure transmitter HDA 4000 series carry the CE mark. A declaration of conformity is available on request.
The relevant EMC standards apply: EN 61000-6-1/2/3/4.
The requirements of the standards are fulfilled only if the pressure transmitter housings are earthed correctly by qualified personnel. When fitting the pressure transmitters into manifold blocks it is sufficient if the block itself is earthed through the hydraulic system. In the case of hose-mounting the housing must be earthed separately.

In the following please find additional assembly notes that, by experience, reduce the effect of electromagnetic interference:

- The electrical connections should be carried out by a qualified electrician according to the relevant regulations of the country concerned (resp. the requirements of individual Approval Company).
- Keep connection wiring as short as possible.
- Use screened cables.
- Avoid direct proximity to connecting lines of user units or electrical or electronic units that may cause interference.

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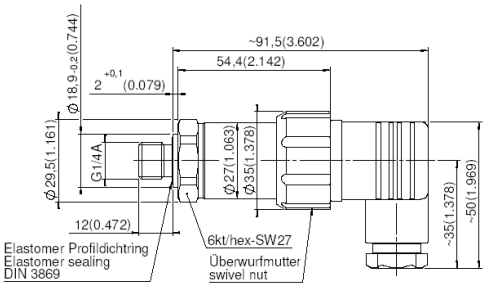
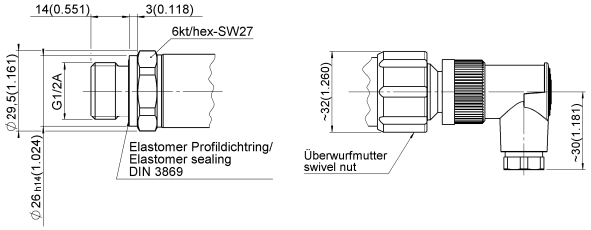
4 Dimensions

HDA 4X4X
Einschraubzapfen/
Screwed end
DIN 3852-E-G1/4A



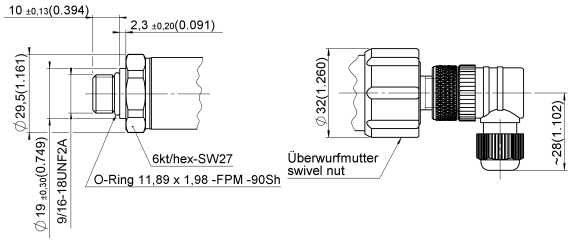
ZBE 01
DIN EN 175 301-803-A / (DIN 43650)
ISO 4400
3p + PE

HDA 4X2X
Einschraubzapfen/
Screwed end
DIN 3852-E-G1/2A



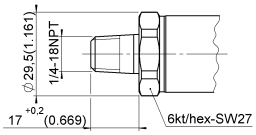
ZBE 03
Binder Serie 714 (4pol.)
M18x1

HDA 4X7X
Einschraubzapfen/
Screwed end
SAE6



ZBE 06
4p
M12x1 (4/5pol.)
IEC 60947-5-2

HDA 4X8X
Einschraubzapfen/
Screwed end
1/4-18NPT



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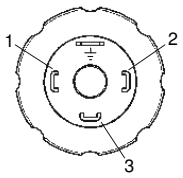
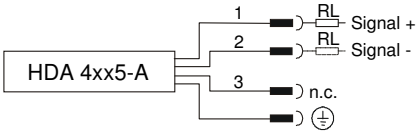
5 Pin connection

Plug EN 175301-803 (DIN 43650) 3-pole + PE

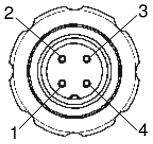


Pin 1 Signal +
Pin 2 Signal -
Pin 3 n.c.

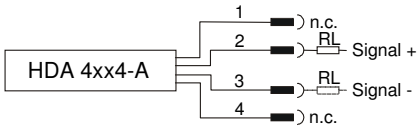


$R_{Lmax} = (U_B\text{-}10V) / 20mA\ [k\Omega]$

Plug Binder series 714 M18 4-pole

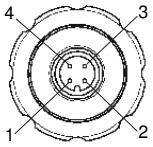


Pin 1 n.c.
Pin 2 Signal +
Pin 3 Signal -
Pin 4 n.c.

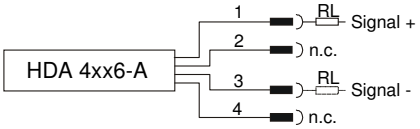


$R_{Lmax} = (U_B\text{-}10V) / 20mA\ [k\Omega]$

Plug M12x1 4-pole



Pin 1 Signal +
Pin 2 n.c.
Pin 3 Signal -
Pin 4 n.c.



$R_{Lmax} = (U_B\text{-}10V) / 20mA\ [k\Omega]$

Note:
The load resistance R_L is the sum of the measuring resistance inside the evaluation unit and the line resistance of the connection line.

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6 Technical specifications

6.1 Pressure transmitters with Ceramic cell

Input data	HDA 4100		HDA 4300
Measuring ranges [bar]	1	2,5	1 | 2,5 | 4 | 6 | 10 | 16 | 25 | 40 -1..1 | -1..5 | -1..9
Overload pressures [bar]	3	8	3 | 8 | 12 | 20 | 32 | 50 | 80 | 120 8 | 20 | 32
Burst pressures [bar]	5	12	5 | 12 | 18 | 30 | 48 | 75 | 120 | 180 12 | 30 | 48
Measuring ranges [psi]	15	50	15 | 30 | 50 | 100 | 150 | 250 | 500
Overload pressures [psi]	45	174	45 | 116 | 174 | 290 | 460 | 725 | 1740
Burst pressures [psi]	70	260	70 | 174 | 260 | 430 | 690 | 1080 | 2600
Mechanical connection (Tightening torque)	G1/2 A DIN 3852, male (45 Nm) G1/4 A DIN 3852, male (20 Nm) 9/16-18 UNF 2A, SAE 6, male (20 Nm) 1/4-18 NPT, male (40 Nm)		G1/2 A DIN 3852, male (45 Nm) G1/4 A DIN 3852, male (20 Nm) 9/16-18 UNF 2A, SAE 6, male (20 Nm) 1/4-18 NPT, male (40 Nm)
Parts in contact with medium	Mech. connect.: Ceramic, Stainless steel Seal: FPM, EPDM		Mech. connect.: Ceramic, Stainless steel Seal: FPM, EPDM
Output data			
Output signal, permitted resistance	4 ..20 mA, 2 conductor $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$		4 ..20 mA, 2 conductor $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$
Accuracy to DIN 16086 (Max. setting)	≤ ± 1 % FS max. ≤ ± 0.5 % FS typ.		≤ ± 1 % FS max. ≤ ± 0.5 % FS typ.
Accuracy at. Min. setting (B.F.S.L)	≤ ± 0.5 % FS max. ≤ ± 0.25 % FS typ.		≤ ± 0.5 % FS max. ≤ ± 0.25 % FS typ.
Temperature compensation Zero point	≤ ± 0.03 % FS / °C max ≤ ± 0.02 % FS / °C typ.		≤ ± 0.03 % FS / °C max ≤ ± 0.02 % FS / °C typ.
Temperature compensation Over range	≤ ± 0.03 % FS / °C max ≤ ± 0.02 % FS / °C typ.		≤ ± 0.03 % FS / °C max ≤ ± 0.02 % FS / °C typ.
Non-linearity at Max. setting to DIN 16086	≤ ± 0.5 % FS max. ≤ ± 0.25 % FS typ.		≤ ± 0.5 % FS max. ≤ ± 0.25 % FS typ.
Hysteresis	≤ ± 0.4 % FS max. ≤ ± 0.2 % FS typ.		≤ ± 0.4 % FS max. ≤ ± 0.2 % FS typ.
Repeatability	≤ ± 0.1 % FS		≤ ± 0.1 % FS
Rise time	≤ 1 ms		≤ 1 ms
Long-term drift	≤ ± 0.3 % FS typ. / year		≤ ± 0.3 % FS typ. / year
Ambient conditions			
Compensated temperature range	-25 .. +85 °C		-25 .. +85 °C
Operating temperature range[1)]	-30 .. +85 °C / -25 .. +85 °C		-30 .. +85 °C / -25 .. +85 °C
Storage temperature range	-30 .. +100 °C		-30 .. +100 °C
Fluid temperature range[1)]	-30 .. +85C / -25 .. +85 °C		-30 .. +100 °C / -25 .. +100 °C
CE - Zeichen	EN 61000-6-1/1/2/3/4		EN 61000-6-1/1/2/3/4
Vibration resistance to DIN EN 60068-2-6 (10 .. 500 Hz)	≤ 20 g		≤ 20 g
Protection class to DIN 40050	IP 67 Connector EN 175301-803 (DIN 43650) M12x1 when an IP 67 connector is used		IP 67 Connector to EN 175301-803 (DIN 43650) M12x1 when an IP 67 connector is used
Other data			
Supply voltage	10 .. 32 V		10 .. 32 V
Residual ripple of supply voltage	≤ 5 %		≤ 5 %
Life expectancy	> 10 million cycles 0 .. 100 % FS		> 10 million cycles 0 .. 100 % FS
Weight	approx. 150 g		approx. 150 g

Note.: Reverse polarity protection of the supply voltage, excess voltage, override, short circuit protection are provided.
FS (**F**ull **S**cale) = relative to the complete measuring range
B.F.S.L. = **B**est **F**it **S**traight **L**ine

1) -25°C with FPM or EPDM seal, -30 °C on request

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6.2 Pressure transmitters with stainless steel cell

Input data	HDA 4400								HDA 4700							
Measuring ranges [bar]	6	16	40	60	100	250	400	600	6	16	40	60	100	250	400	600
Overload pressures [bar]	15	32	80	120	200	500	800	1000	15	32	80	120	200	500	800	1000
Burst pressures [bar]	100	200	200	300	500	1000	2000	2000	100	200	200	300	500	1000	2000	2000
Measuring ranges [psi]	150	500	750	1000	1500				150	500	750	1000	1500			
	3000	5000	6000	9000					3000	5000	6000	9000				
Overload pressures [psi]	290	1160	1740	2900	2900				290	1160	1740	2900	2900			
	7250	11600	11600	14500					7250	11600	11600	14500				
Burst pressures [psi]	1450	2900	4350	7250	7250				1450	2900	4350	7250	7250			
	14500	29000	29000	29000					14500	29000	29000	29000				
Mechanical connection (Tightening torque)	G1/2 A DIN 3852, male (45 Nm) G1/4 A DIN 3852, male (20 Nm) 9/16-18 UNF 2A, SAE 6, male (20 Nm) 1/4-18 NPT, male (40 Nm)								G1/2 A DIN 3852, male (45 Nm) G1/4 A DIN 3852, male (20 Nm) 9/16-18 UNF 2A, SAE 6, male (20 Nm) 1/4-18 NPT, male (40 Nm)							
Parts in contact with medium	Mech. connect.: Stainless steel Seal: FPM								Mech. connect.: Stainless steel Seal: FPM							
Output data																
Output signal, permitted resistance	4 ..20 mA, 2 Leiter $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$								4 ..20 mA, 2 Leiter $R_{Lmax.} = (U_B - 10\ V) / 20\ mA\ [k\Omega]$							
Accuracy to DIN 16086 (Max. setting)	≤ ± 1 % FS max. ≤ ± 0.5 % FS typ.								≤ ± 0.5 % FS max. ≤ ± 0.25 % FS typ.							
Accuracy at. Min. setting (B.F.S.L)	≤ ± 0.5 % FS max. ≤ ± 0.25 % FS typ.								≤ ± 0.25 % FS max. ≤ ± 0.15 % FS typ.							
Temperature compensation Zero point	≤ ± 0.025 % FS / °C max ≤ ± 0.015 % FS / °C typ.								≤ ± 0.015 % FS / °C max. ≤ ± 0.008 % FS / °C typ.							
Temperature compensation Over range	≤ ± 0.025 % FS / °C max ≤ ± 0.015 % FS / °C typ.								≤ ± 0.015 % FS / °C max. ≤ ± 0.008 % FS / °C typ.							
Non-linearity at Max. setting to DIN 16086	≤ ± 0.3 % FS max. ≤ ± 0.15 % FS typ.								≤ ± 0.3 % FS max. ≤ ± 0.15 % FS typ.							
Hysteresis	≤ ± 0.4 % FS max. ≤ ± 0.2 % FS typ.								≤ ± 0.1 % FS max. ≤ ± 0.05 % FS typ.							
Repeatability	≤ ± 0.1 % FS								≤ ± 0.05 % FS							
Rise time	≤ 1 ms								≤ 1 ms							
Long-term drift	≤ ± 0.3 % FS typ. / year								≤ ± 0.1 % FS typ. / year							
Ambient conditions																
Compensated temperature range	-25 .. +85 °C								-25 .. +85 °C							
Operating temperature range[2)]	-40 .. +85 °C / -25 .. +85 °C								-40 .. +85 °C / -25 .. +85 °C							
Storage temperature range	-40 .. +100 °C								-40 .. +100 °C							
Fluid temperature range[2)]	-40 .. +100 °C / -25 .. +100 °C								-40 .. +100 °C / -25 .. +100 °C							
CE - Zeichen	EN 61000-6-1/1/2/3/4								EN 61000-6-1/1/2/3/4							
Vibration resistance to DIN EN 60068-2-6 (10 .. 500 Hz)	≤ 20 g								≤ 20 g							
Protection class to DIN 40050	IP 67 Connector EN 175301-803 (DIN 43650) M12x1 when an IP 67 connector is used								IP 67 Connector EN 175301-803 (DIN 43650) M12x1 when an IP 67 connector is used							
Other data																
Supply voltage	10 .. 32 V								10 .. 32 V							
Residual ripple of supply voltage	≤ 5 %								≤ 5 %							
Life expectancy	> 10 million cycles 0 .. 100 % FS								> 10 million cycles 0 .. 100 % FS							
Weight	approx. 150 g								approx. 150 g							

Note.: Reverse polarity protection of the supply voltage, excess voltage, override, short circuit protection are provided.
FS (**F**ull **S**cale) = relative to the complete measuring range
B.F.S.L. = **B**est **F**it **S**traight **L**ine

2) -25 °C with FPM or EPDM seal, -40 °C on request

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7 Model Code for Identification of Transmitter Supplied

7.1 Pressure transmitter with ceramic cell

HDA 4 X X X - A - XXXXX - SXX - X 1

Accuracy
1 = 1 % FS max., absolute
3 = 1 % FS max., relative

Mechanical connection
2 = G1/2 A DIN 3852 (male)
4 = G1/4 A DIN 3852 (male)
7 = 9/16-18 UNF 2A, SAE 6 (male)
8 = 1/4-18 NPT (male)

Electrical connection
4 = Appliance plug Binder series 714 M18, 4-pole
(connector not supplied)
5 = Appliance plug EN 175301-803 (DIN 43650),, 3-pole + PE
(connector supplied)
6 = Appliance plug M12x1, 4-pole
(connector not supplied)

Signal
A = 4 .. 20 mA, 2-conductor

Pressure ranges
Accuracy „1“
4-digits for bar: 01.0; 02.5
5-digits for psi: 00015; 00050

Accuracy „3“
4-digits for bar: 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040
0001 (-1 .. +1); 0005 (-1 .. +5); 0009 (-1 .. +9)
5-digits for psi: 00015; 00030; 00050; 00100; 00150; 00250; 00500

Modification number
SXX = with approvals for shipping

Seal material (in contact with fluid)
F = FPM seal (e.g. for hydraulic oils)
E = EPDM seal (e.g. for refrigerants)

Material of connection (in contact with fluid)
1 = Stainless steel

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7.2 Pressure transmitters with stainless steel cell

HDA 4 X X X - A - XXXXX - SXX

Accuracy
4 = 1 % FS max.
7 = 0.5 % FS max.

Mechanical connection
2 = G1/2 A DIN 3852 (male)
4 = G1/4 A DIN 3852 (male)
7 = 9/16-18 UNF 2A, SAE 6 (male)
8 = 1/4-18 NPT (male)

Electrical connection
4 = Appliance plug Binder series 714 M18, 4-pole
(connector not supplied)
5 = Appliance plug EN 175301-803 (DIN 43650), 3-pole + PE
(connector supplied)
6 = Appliance plug M12x1, 4-pole
(connector not supplied)

Signal
A = 4 .. 20 mA, 2-conductor

Pressure ranges
4-digits for bar: 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600
5-digits for psi: 00150; 00500; 00750; 01000; 01500; 03000; 05000; 06000; 09000

Modification number
SXX = with approvals for shipping

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HYDAC Service
If you have any questions concerning repair work, please do not hesitate to contact HYDAC Service:

HYDAC SERVICE GMBH
Hauptstr.27
D-66128 Saarbrücken, Germany
Germany

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Fax: +49-(0)6897-509-1933

Notice

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

If you have any questions, suggestions, or encounter any problems of a technical nature, please contact your HYDAC representative.

Subject to technical modifications.

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10.4.3 Operating Instructions - 2/2-way solenoid valve Type 6027

EN

bürkert
FLUID CONTROL SYSTEMS

Type 6027

2/2-way solenoid valve

Operating Instructions

MAN 1000095357 ML Version: GStatus: RL (released | freigegeben) printed: 11.09.2019

1 OPERATING INSTRUCTIONS

The operating instructions contain important information.

- Read the operating instructions carefully and follow the safety instructions in particular, and also observe the operating conditions.
- Operating instructions must be available to each user.
- The liability and warranty for the device are void if the operating instructions are not followed.

1.1 Symbols

- Designates an instruction to prevent risks.

→ designates a procedure which you must carry out.

Warning of injuries:

DANGER!
Imminent danger. Serious or fatal injuries.

WARNING!
Potential danger. Serious or fatal injuries.

CAUTION!
Danger. Minor or moderately severe injuries.

Warns of damage to property:
NOTE!

2 INTENDED USE

Incorrect use of the solenoid valve Type 6027 can be dangerous to people, nearby equipment and the environment.

- The device is designed to control, shut off and meter neutral media up to a viscosity of 21 mm^2/s.
- Provided the cable plug is connected and installed correctly, e.g. Bürkert Type 2518, the device satisfies protection class IP65 in accordance with DIN EN 60529 / IEC 60529.
- Use according to the permitted data, operating conditions and conditions of use specified in the contract documents and operating instructions.
- Correct transportation, correct storage and installation and careful use and maintenance are essential for reliable and problem-free operation.
- Use the device only as intended.

2.1 Definition of term

In these operating instructions, the term “device” always refers to the Type 6027.

MAN 1000095357 ML Version: GStatus: RL (released | freigegeben) printed: 11.09.2019

3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any contingencies and events which may arise during installation, operation and maintenance.

Danger – high pressure.
- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of electric shock.
- Before reaching into the system, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

Risk of burns/Risk of fire if used continuously through hot device surface.
- Keep the device away from highly flammable substances and media and do not touch with bare hands.

Risk of injury due to malfunction of valves with alternating current (AC).

Sticking core causes coil to overheat, resulting in a malfunction.
- Monitor process to ensure function is in perfect working order.

Risk of short-circuit/escape of media through leaking screw joints.
- Ensure seals are seated correctly.
- Carefully screw valve and connection lines together.

General hazardous situations.

To prevent injury, ensure that:
- Do not make any internal or external changes. Ensure that the system cannot be activated unintentionally.
- Installation and repair work may be carried out by authorized technicians only and with the appropriate tools.
- After an interruption in the power supply or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- Do not put any loads on the body.
- For models with ATEX or UL approval follow the safety instructions in the ATEX manual or on the respective supplementary sheet.
- The general rules of technology apply to application planning and operation of the device.

3.1 Warranty

The warranty is only valid if the device is used as intended in accordance with the specified application conditions.

3.2 Information on the internet

The operating instructions and data sheets for type 6027 can be found on the internet at:

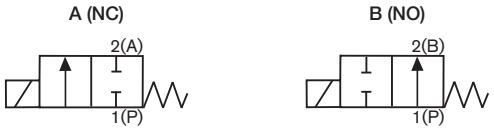
www.burkert.com → Type 6027

4 TECHNICAL DATA

4.1 Operating conditions

The following values are indicated on the type label:
- Voltage (Tolerance ± 10 %) / Current type
- Coil power consumption (active power in W - at operating temp.)
- Pressure range
- Body material: Brass (MS), Stainless steel (VA)
- Sealing material: EPDM, PTFE, FKM, PEEK, NBR
- Port connection

Circuit function 2/2-way valve:



Protection class: IP65 in accordance with DIN EN 60529 / IEC 60529 with cable plug, e.g. Bürkert Type 2518

4.2 Application conditions

Ambient temperature: max. +55 °C

Permitted medium temperature depending on coil material and sealing material:

Variant	Coil material	Seal material	Medium temperatur
Standard	Epoxid (NA38)	FKM (FF)	–10…+140 °C
		EPDM (AA)	–30…+120 °C
		NBR (BB)	–10…+80 °C
		PTFE + FKM (EP)	–10…+140 °C
		PTFE + EPDM (EA)	–30…+120 °C
		PTFE + PEEK (EP)	–40…+180 °C
Hochdruck MX31 & MX32		PEEK + FKM (TF)	–10…+80 °C
		PEEK + EPDM (TA)	–30…+80 °C
		PEEK + PEEK (TT)	–40…+80 °C
AC07		PUR + FKM (PC)	–10…+100 °C
AC10 / AC07	Polyamid	alle	–10…+100 °C

HINWEIS!
- Important note for WWB (NO) devices with alternating voltage: Maximum medium temperature +100°C.

Permitted medium temperature and ambient temperature depending on sealing material:

Temperatures for valves with UL/UR approval		
	seal material	
Ambient temperature	EPDM (AA) PTFE + EPDM (EA) PTFE + FKM (EF) PTFE + PEEK (EP) FKM (FF)	–10...+55 °C
Medium temperature	EPDM (AA)	–30...+120 °C
	PTFE + EPDM (EA)	
	PTFE + FKM (EF)	–10...+140 °C
	PTFE + PEEK (EP)	–40...+140 °C
	FKM (FF)	–10...+140 °C

Operating duration: Unless otherwise indicated on the type label, the solenoid system is suitable for continuous operation

Important information for functional reliability during continuous operation: If standstill for a long period at least 1-2 activations per day are recommended.

Medium: neutral gases and liquids which do not attack the body material, the inner parts of the valves or the sealing material. Check resistance in individual cases (www.burkert.com)

4.3 Conformity

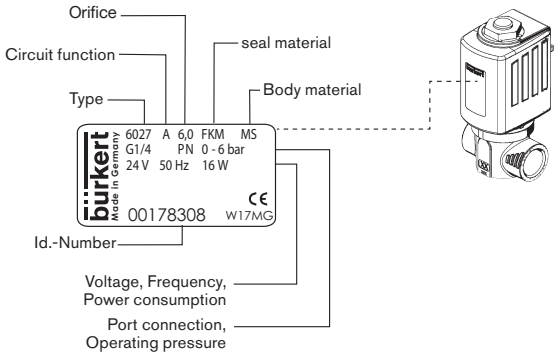
In accordance with the EC Declaration of conformity, Type 6027 is compliant with the EC Directives.

4.4 Standards

The applied standards, which verify conformity with the EC Directives, can be found on the EC-Type Examination Certificate and / or the EC Declaration of Conformity.

4.5 Type label

Example:



5 INSTALLATION

5.1 Safety instructions

DANGER!

Risk of injury from high pressure in the equipment.
- Before loosening the pipes and valves, turn off the pressure and vent the lines.

Risk of injury due to electrical shock.
- Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

WARNING!

Risk of injury from improper installation.
- Installation may be carried out by authorised technicians only and with the appropriate tools.

Risk of injury from unintentional activation of the system and an uncontrolled restart.
- Secure system from unintentional activation.
- Following assembly, ensure a controlled restart.

5.2 Before installation

Installation position: any, actuator preferably upwards.

Procedure:

→ Check pipelines for dirt and clean.

→ Install a dirt filter before the valve inlet (≤ 0.3 mm).

WARNING!

Medium leaking through damaged connections.
- Do not damage sealing surfaces of the body connections during installation.

Danger due to unsuitable screw connections.
- At high pressures and temperatures ensure that the thread length (load-bearing thread turns) is adequate for each pairing of materials.

NOTE!

Caution risk of breakage.
• Do not use the coil as a lever arm.

5.3 Installation – body variant

Procedure:

→ Hold the device with a open-end wrench on the body and screw into the pipeline.

Valve body must not be installed under tension.
Sealing material must not get into the device.

→ Observe direction of flow: from 1 → 2 (from P → A), or CF B from P → B.

5.4 Installation – flange variant

Procedure:

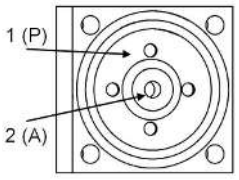
→ Loosen nut and remove coil.

→ Insert seal into body.

→ Screw body onto connection plate.

→ Install coil (see chapter „5.6“).

→ Observe direction of flow: from 1 → 2 (from P → A), or CF B from P → B.

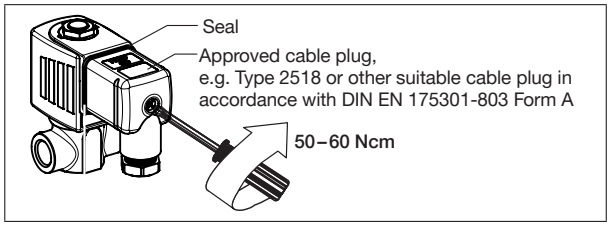


5.5 Electrical connection of the cable plug

WARNING!

Risk of injury due to electrical shock.
- Before reaching into the system, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

If the protective conductor is not connected, there is a risk of electric shock.
- Always connect protective conductor and check electrical continuity.



→ Tighten cable plug (for permitted types see data sheet), observing max. torque 50-60 Ncm.
→ Check that seal is fitted correctly.
→ Connect protective conductor and check electrical continuity.

5.6 Installation of coil

WARNING!

Risk of escape of media.
When a sticking nut is loosened, medium may escape.
▸ Do not tighten sticking nut any further.
Risk of injury due to electrical shock.
If the protective conductor contact between the coil and body is missing, there is danger of electrical shock.
▸ During installation insert the twist lock (plastic ring) into the body journal. The plastic ring must not project over the octagonal nipple.
▸ Check protective conductor contact after installing the coil.
Overheating, risk of fire.
If the coil is connected without a pre-installed valve, the coil will overheat and be destroyed.
▸ Connect the coil with a pre-installed valve only.

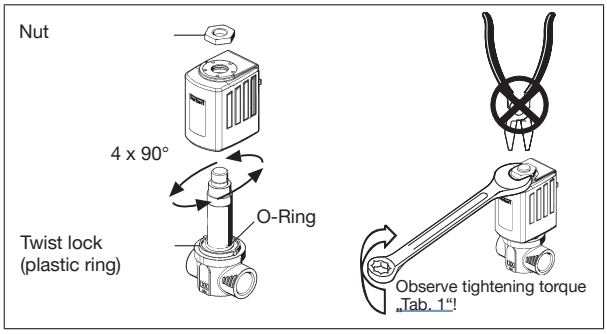


Fig. 1: Installation of coil

Solenoid type	Solenoid sizes	Tightening torque [Nm]
AC19 (Standard)	K (42mm), L (65mm)	max. 15 Nm
AC10	5 (32mm), 6 (40mm)	max. 5 Nm
AC07	2 (20mm)	max. 2.8 Nm

Tab. 1: Tightening torques, solenoid mounting, solenoid types

6 MAINTENANCE, TROUBLESHOOTING

6.1 Safety instructions

WARNING!

Risk of injury from improper maintenance.
▸ Maintenance may be carried out by authorised technicians only and with the appropriate tools.
Risk of injury from unintentional activation of the system and an uncontrolled restart.
▸ Secure system from unintentional activation.
▸ Following maintenance, ensure a controlled restart.

6.2 Malfunctions

If malfunctions occur, check whether:
• the device has been installed according to the instructions,
• the electrical and fluid connections are correct,
• the device is not damaged,
• all screws have been tightened,
• the voltage and pressure have been switched on,
• the pipelines are clean.

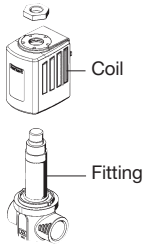
If the magnet is not attracting
Possible causes:
• Short circuit or coil interrupted,
• core or core area dirty.

7 SPARE PARTS

CAUTION!

Risk of injury and/or damage by the use of incorrect parts.
Incorrect accessories and unsuitable spare parts may cause injuries and damage the device and the surrounding area.
▸ Use only original accessories and original spare parts from Bürkert.
▸ Do not open the fluidic part of the device without the consent of the manufacturer.

7.1 Ordering spare parts



Wearing part set can be requested via the sales offices by quoting the identification number of the device.

8 TRANSPORT, STORAGE, DISPOSAL

NOTE!

Transport damages.
Inadequately protected equipment may be damaged during transport.
• During transportation protect the device against wet and dirt in shock-resistant packaging.
• Avoid exceeding or dropping below the allowable storage temperature.
Incorrect storage may damage the device.
• Store the device in a dry and dust-free location.
• Storage temperature: -40...+80 °C
Damage to the environment caused by device components contaminated with media.
• Dispose of the device and packaging in an environmentally friendly manner.
• Observe applicable regulations on disposal and the environment.

EN

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Manuel d'utilisation et fiches techniques sur Internet : www.buerkert.fr

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Glossary

HN

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

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