

Operating Instructions

Liquiline Control CDC90

Automated cleaning and calibration of Memosens sensors



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1 About this document

Structure of information	Meaning
<p>⚠ DANGER</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.</p>
<p>⚠ WARNING</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.</p>
<p>⚠ CAUTION</p> <p>Causes (/consequences) If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Corrective action 	<p>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.</p>
<p>ℹ NOTICE</p> <p>Cause/situation If necessary, Consequences of non-compliance (if applicable)</p> <ul style="list-style-type: none"> ▶ Action/note 	<p>This symbol alerts you to situations which may result in damage to property.</p>

1.1 Symbols

-  Additional information, tips
-  Permitted or recommended
-  Not permitted or not recommended
-  Reference to device documentation
-  Reference to page
-  Reference to graphic
-  Result of a step

1.1.1 Symbols on the device

-  Reference to device documentation
-  Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

1.2 Documentation

The following manuals which are available on the complement these Brief Operating Instructions Operating Instructions:

- Brief Operating Instructions for Liquiline Control CDC90
- Operating Instructions for Memosens, BA01245C
 - Software description for Memosens inputs
 - Calibration of Memosens sensors
 - Sensor-specific diagnostics and troubleshooting

2 Basic safety instructions

2.1 Requirements for the personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Faults at the measuring point may only be rectified by authorized and specially trained personnel.

 Repairs not described in the Operating Instructions provided must be carried out only directly at the manufacturer's site or by the service organization.

2.2 Intended use

Liquiline Control CDC90 is a fully automatic measuring, cleaning and calibration system for Memosens sensors. The system is fully equipped with power supply cables and a hose system.

2.2.1 Non-intended use

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Workplace safety

As the user, you are responsible for complying with the following safety conditions:

- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

Electromagnetic compatibility

- The product has been tested for electromagnetic compatibility in accordance with the applicable international standards for industrial applications.
- The electromagnetic compatibility indicated applies only to a product that has been connected in accordance with these Operating Instructions.

2.4 Operational safety

Before commissioning the entire measuring point:

1. Verify that all connections are correct.
2. Ensure that electrical cables and hose connections are undamaged.
3. Do not operate damaged products, and protect them against unintentional operation.
4. Label damaged products as defective.

During operation:

- ▶ If faults cannot be rectified:
products must be taken out of service and protected against unintentional operation.

⚠ CAUTION**Programs not switched off during maintenance activities.**

Risk of injury due to medium or cleaning agent!

- ▶ Quit any programs that are active.
- ▶ Switch to the Service Mode before you remove sensors from the assembly.
- ▶ If you need to test the cleaning function while cleaning is in progress, wear protective clothing, goggles and gloves or take other suitable measures to protect yourself.

2.5 Product safety

2.5.1 State-of-the-art technology

The product is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. The relevant regulations and international standards have been observed.

2.6 IT security

We only provide a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

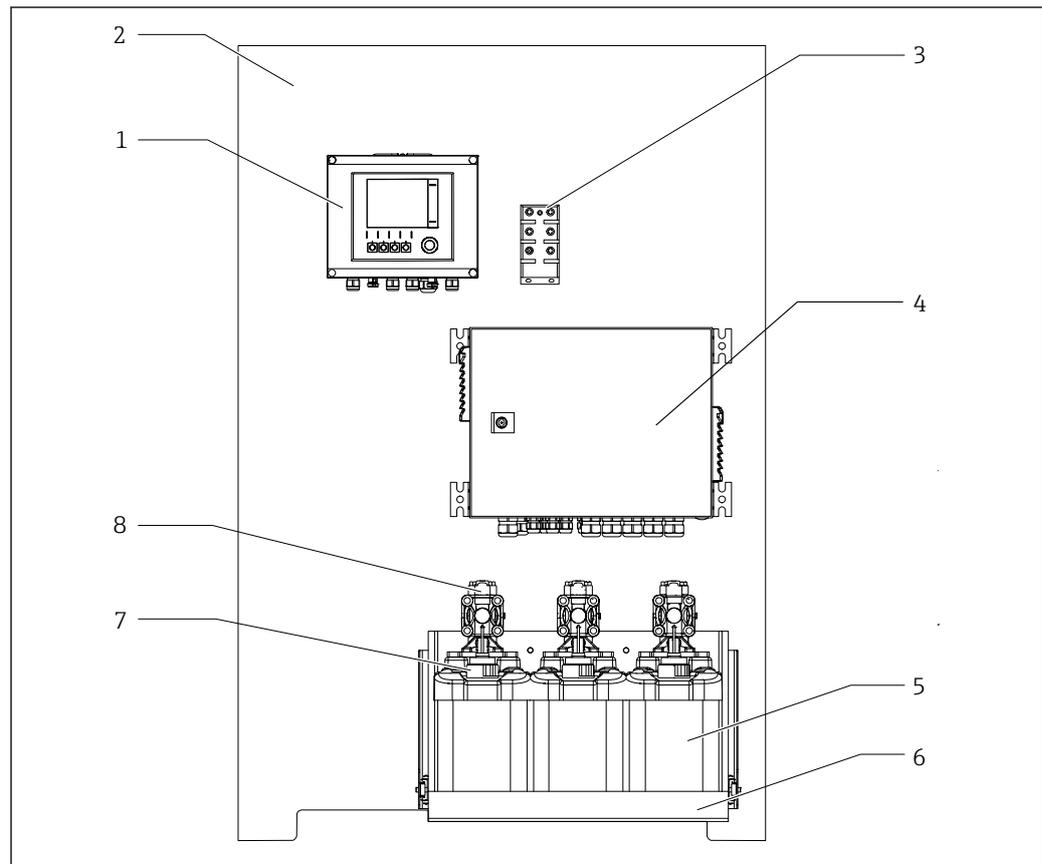
3 Product description

3.1 Product design

The complete Liquiline Control CDC90 consists of the following components:

- CDC90 control unit
- Pneumatic control unit
- Canister pump unit
- Ethernet switch

The system is available in different versions. Here is a complete overview comprising all of the system's modules.



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1 Total view of CDC90

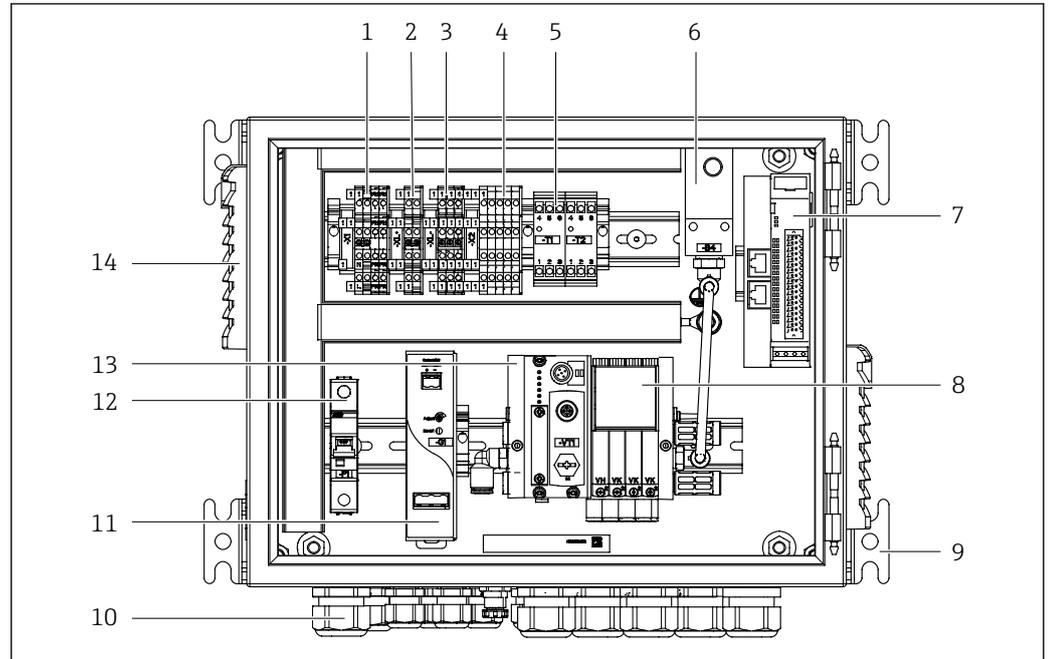
- 1 CDC90 control unit
- 2 Mounting plate
- 3 Ethernet switch
- 4 Pneumatic control unit

- 5 Canister for buffer solutions and cleaner
- 6 Canister holder
- 7 Float switch
- 8 Pumps

3.1.1 Overview of pneumatic control unit

1 measuring point

The pneumatic control unit controls air, liquids and electricity. The supply voltage is applied here, for example.

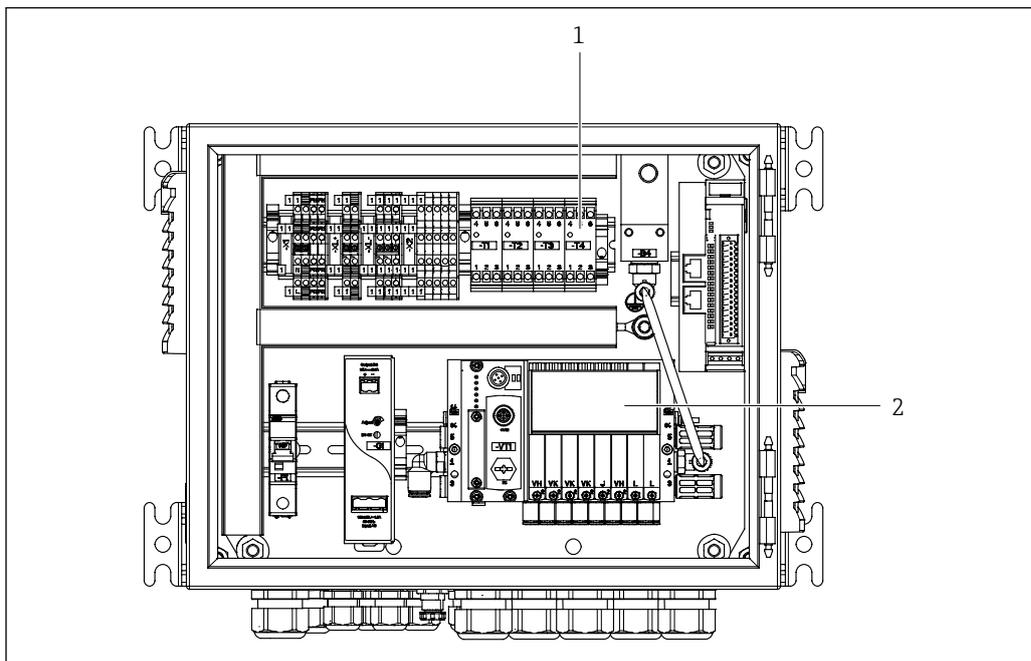


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2 Pneumatic control unit for one measuring point

- | | | | |
|---|---|----|--------------------------------|
| 1 | 100 / 230 VAC terminal | 8 | Pilot valves |
| 2 | +24 V terminal | 9 | Mounting |
| 3 | 0 V terminal | 10 | Cable gland |
| 4 | Terminals for float switches and pressure switches | 11 | 24 VDC power unit |
| 5 | Output interface terminal for assemblies, limit position switch | 12 | F1 system fuse |
| 6 | Pressure switch | 13 | Pilot valve manifold, bus node |
| 7 | External remote IO, DIO | 14 | Ventilation slot |

2 measuring points



A0044120

 3 Pneumatic control unit for a 2nd measuring point

1 Extension of the output interface terminals for a 2nd measuring point

2 Extension of the pilot valves for a 2nd measuring point

4 Incoming acceptance and product identification

4.1 Incoming acceptance

1. Verify that the packaging is undamaged.
 - ↳ Notify the supplier of any damage to the packaging.
Keep the damaged packaging until the issue has been resolved.
2. Verify that the contents are undamaged.
 - ↳ Notify the supplier of any damage to the delivery contents.
Keep the damaged goods until the issue has been resolved.
3. Check that the delivery is complete and nothing is missing.
 - ↳ Compare the shipping documents with your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
 - ↳ The original packaging offers the best protection.
Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local Sales Center.

4.2 Product identification

4.2.1 Nameplate

The nameplate provides you with the following information on your device:

- Manufacturer identification
- Order code
- Serial number
- Ambient and process conditions
- Input and output values
- Safety information and warnings

- ▶ Compare the information on the nameplate with the order.

4.2.2 Product identification

Product page

www.endress.com/cdc90

Interpreting the order code

The order code and serial number of your product can be found in the following locations:

- On the nameplate
- In the delivery papers

Obtaining information on the product

1. Go to www.endress.com.
2. Page search (magnifying glass symbol): Enter valid serial number.
3. Search (magnifying glass).
 - ↳ The product structure is displayed in a popup window.

4. Click the product overview.
 - ↳ A new window opens. Here you fill information pertaining to your device, including the product documentation.

4.3 Scope of delivery

The scope of delivery comprises:

- 1 CDC90 control unit in the version ordered
- 1 pneumatic control unit
- Up to 3 pumps for supplying cleaner and buffer with canisters
- Up to 3 float switches, complete with cable to canisters
- 1 rinsing block with bracket for mounting on the process assembly
- 2 hose packages for compressed air and liquid; 3 hose packages if there is more than one measuring point
- 1 x Brief Operating Instructions (hard copy)
- Conduit adapter G 1/4" for hose 6/8 mm (ID/OD) for the assembly rinse connections: x 2 for 1 measuring point/ x 4 for 2 measuring points
- USB stick
- In the case of 2 measuring points: 1 changeover valve to control the supply of medium to the two assemblies



The assemblies are pre-assembled on a mounting plate and pre-wired.

- ▶ If you have any queries:
Please contact your supplier or local sales center.

5 Mounting

5.1 Mounting requirements

The device is intended for wall mounting.

Wall mounting as:
Panel

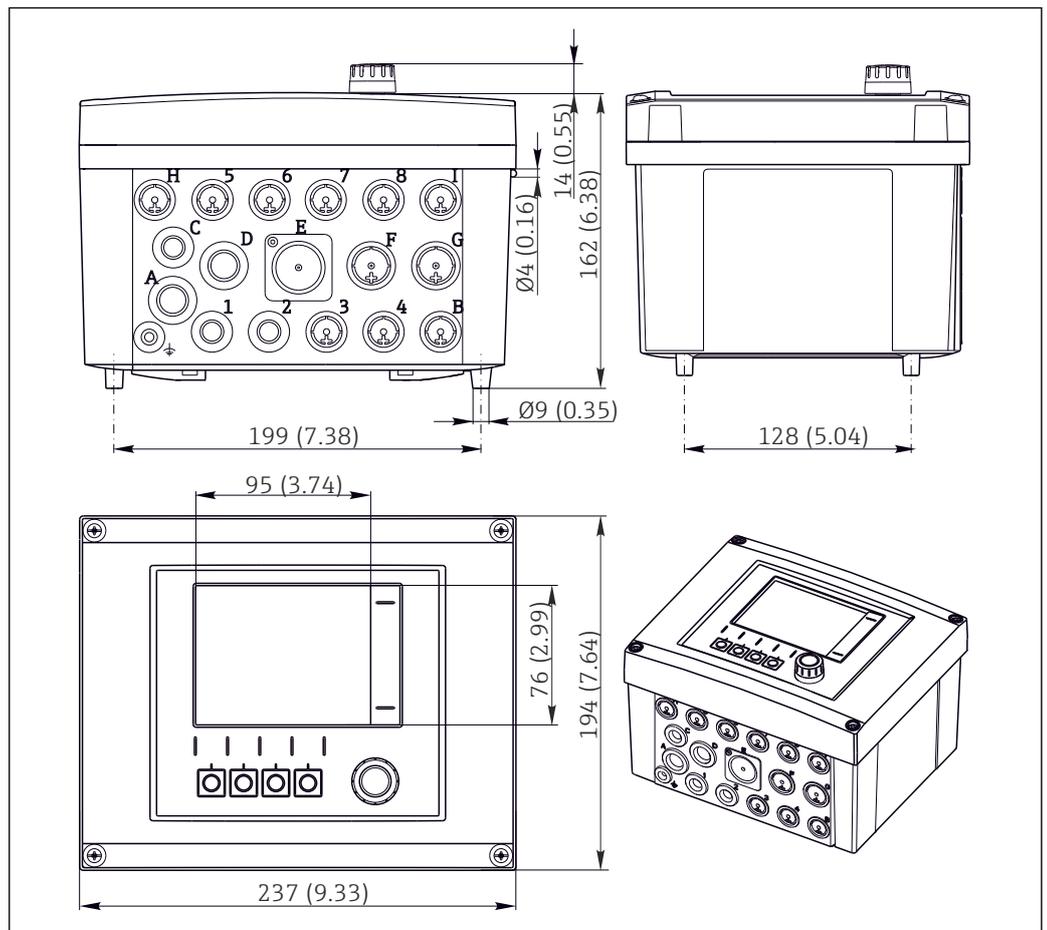
5.1.1 Installation site

Note the following when erecting the device:

1. Make sure that the wall has sufficient load-bearing capacity and is fully perpendicular.
2. Protect the device against additional heating (e.g. from heaters).
3. Protect the device against mechanical vibrations.

5.1.2 Dimensions

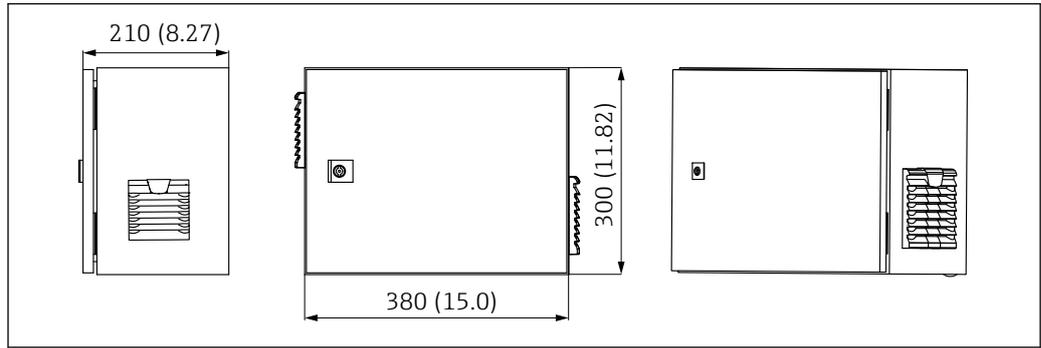
Dimensions of CDC90 control unit



4 Dimensions of field housing in mm (in)

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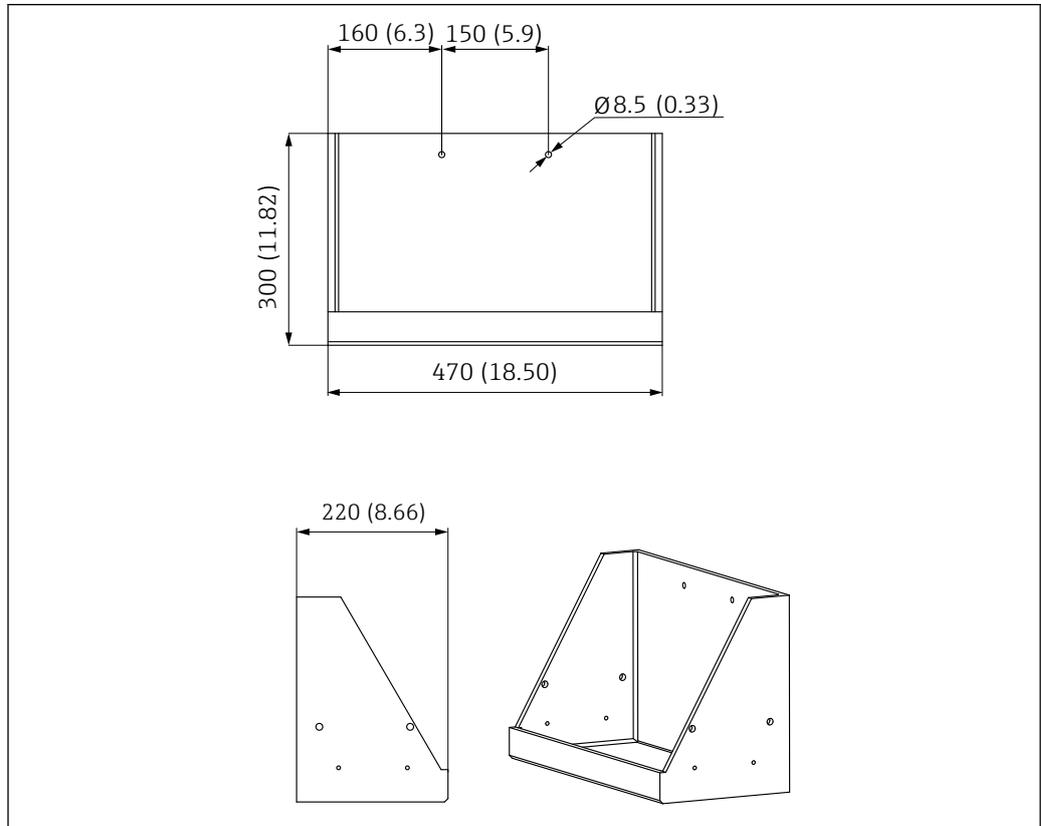
Dimensions of pneumatic control unit



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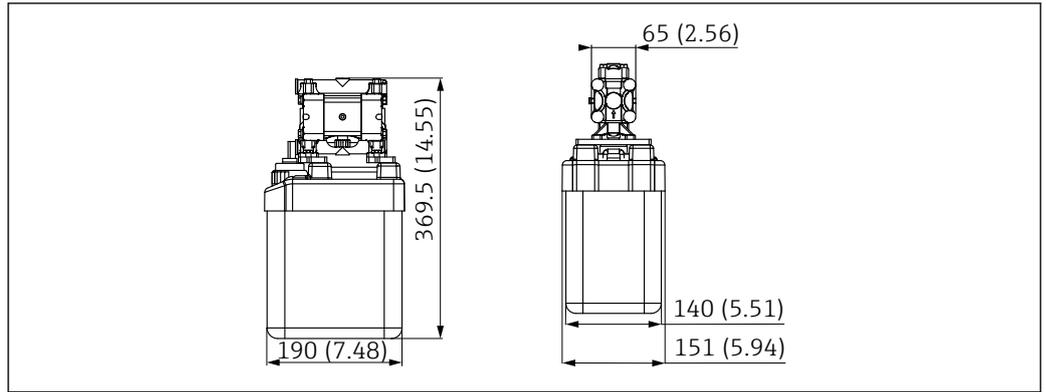
5 Dimensions of pneumatic control unit in mm (in)

Dimensions of canister holder



A0033139

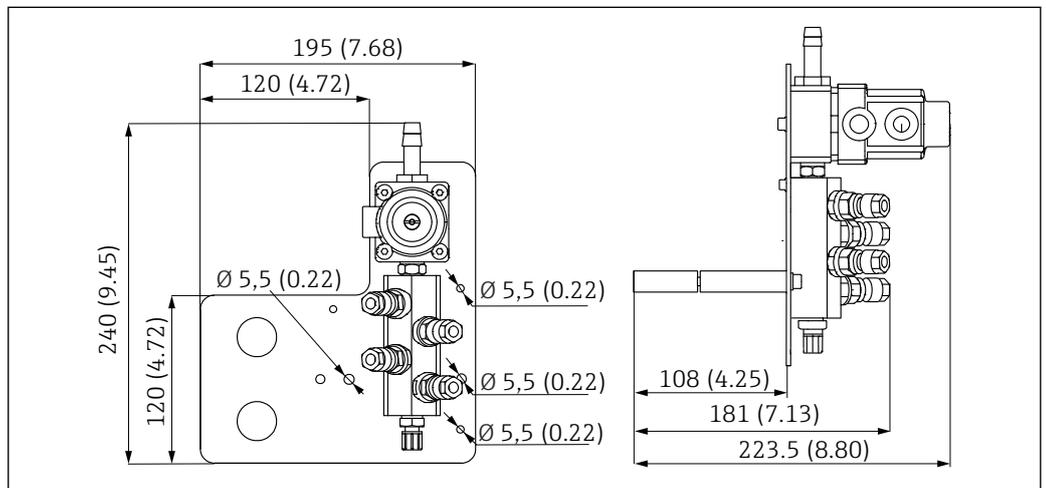
6 Dimensions of canister holder in mm (in)



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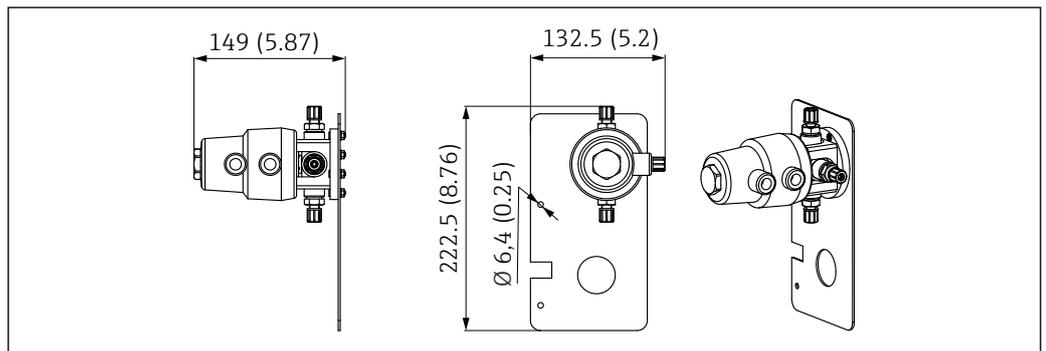
7 Dimensions of canister with pump in mm (in)

Dimensions of rinsing block and changeover valve



A0032267

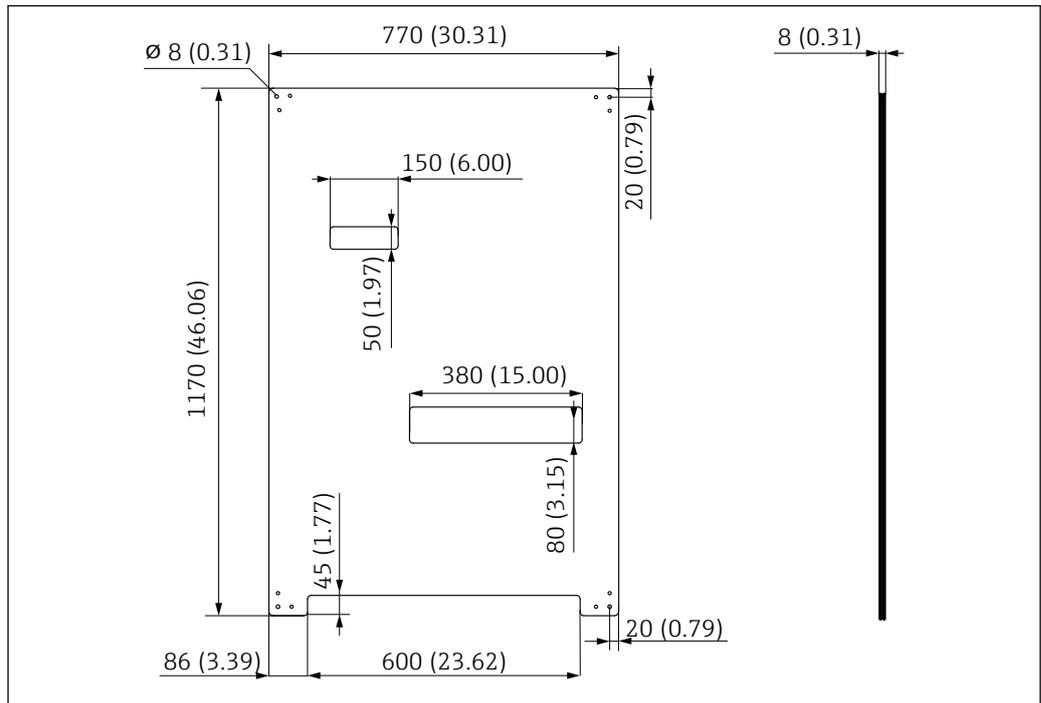
8 Dimensions of rinsing block PVDF, in mm (in)



A0033402

9 Dimensions of changeover valve, 2nd measuring point in mm (in)

Dimensions of mounting plate



10 Dimensions of mounting plate in mm (in)

5.2 Mounting the system

5.2.1 Wall mounting

CAUTION

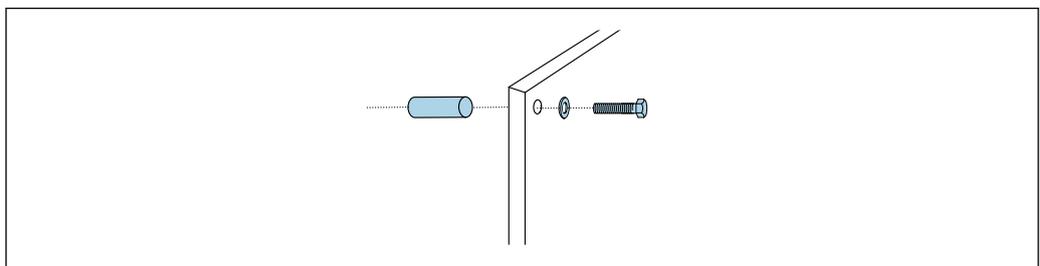
Risk of injury

The weight of the unit may result in crush injuries or other injuries.

- ▶ Mount the device in pairs.
- ▶ Use a suitable mounting tool.

i The assemblies are pre-assembled on a mounting plate and pre-wired.

Distance sleeves (30 mm (1.2 in) distance) are included in the scope of delivery to secure the mounting plate on the wall.



11 Wall mounting

The mounting plate features drill holes for the bracket on the wall. The wall plugs and screws must be provided by the customer.

- ▶ Mount the mounting plate at the securing holes provided for this purpose and using the enclosed distance sleeves.

5.2.2 Maximum hose and cable length for one measuring point

i The maximum length of the multihose is 10 m (32.8 ft) →  28.

- ▶ Shorten the hoses if necessary.

NOTICE

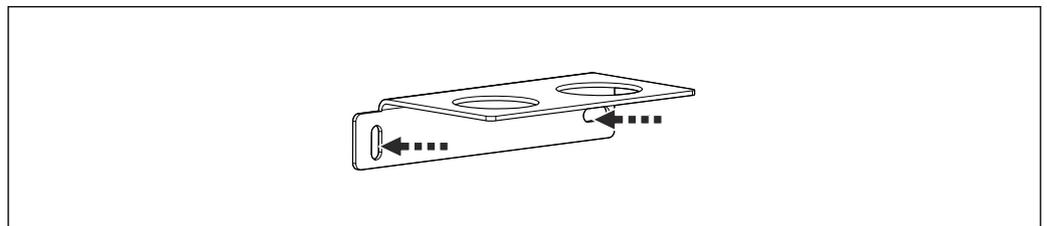
The rinsing block runs dry.

If the rinsing block is mounted below the canisters, the valves of the rinsing block open due to the pressure of the liquid and the canisters empty.

- ▶ Always mount the rinsing block and the assembly above the canisters.

5.2.3 Multihose bracket

i Brackets for the multihoses are included in the scope of delivery. The wall plugs, screws and washers must be provided by the customer.



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 12 Multihose bracket

- ▶ Screw the bracket of the multihose onto the wall with washers.

5.2.4 Securing the rinsing block on the assembly

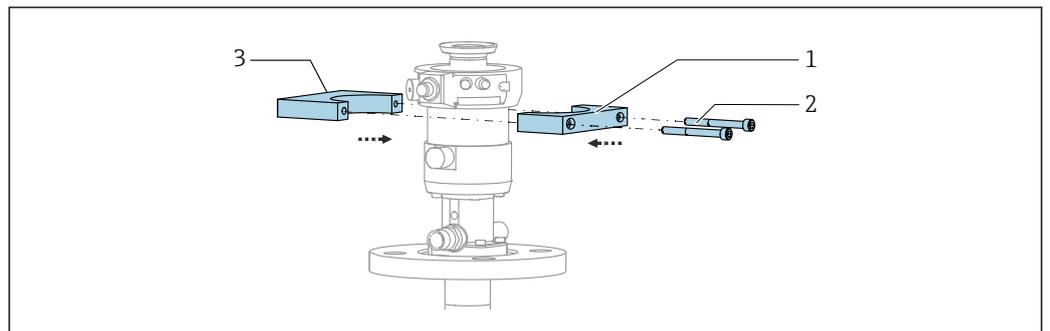
CAUTION

Risk of injury

Crush injuries or other injuries may occur.

- ▶ Use a suitable mounting tool, e.g. an Allen key.

Rinsing block bracket on assembly

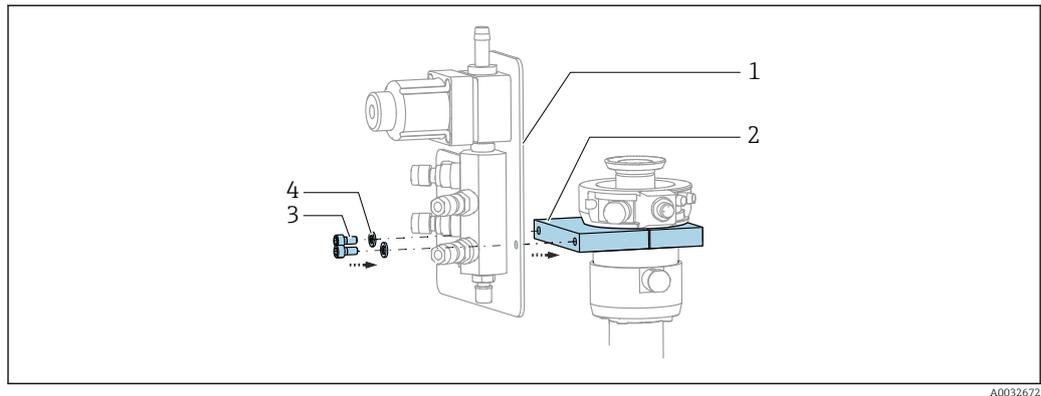


A0032669

 13 Mounting the rinsing block bracket

1. Fit one half of the rinsing block bracket (1) on the assembly cylinder.
2. Fit the counterpart (3) on the assembly cylinder from the other side.
3. Connect the rinsing block bracket using the screws (2) provided.

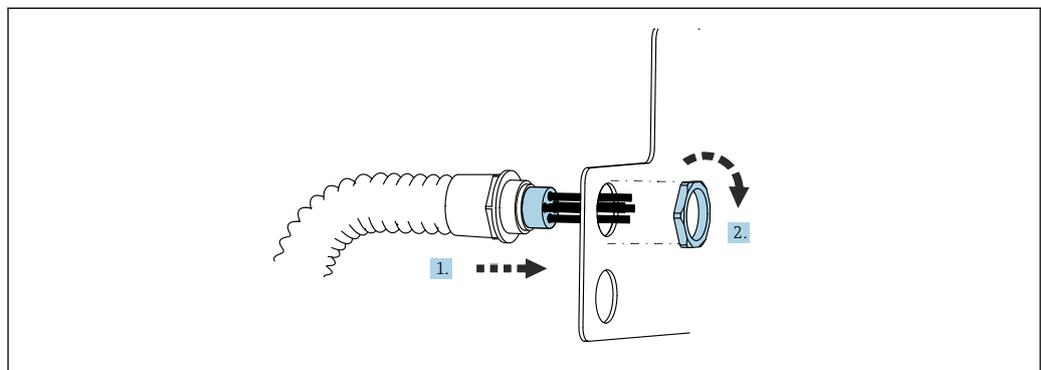
Rinsing block on rinsing block bracket



A0032672

- ▶ Secure the rinsing block panel (1) to the rinsing block bracket (2) using the screws (3) and washers (4) provided.

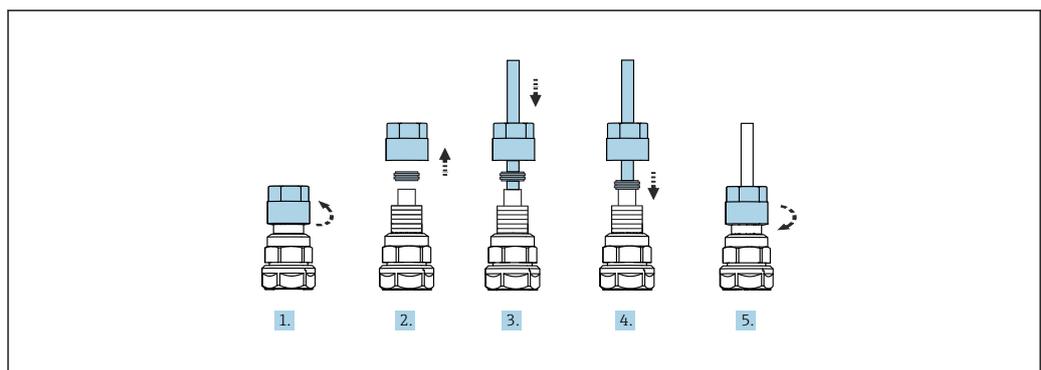
Fixing multihose on rinsing block



A0032731

1. Guide the hoses through the opening on the rinsing block plate.
2. Use the counterpart to secure the cable gland.

Connecting the individual hoses in the multihose to the rinsing block valve

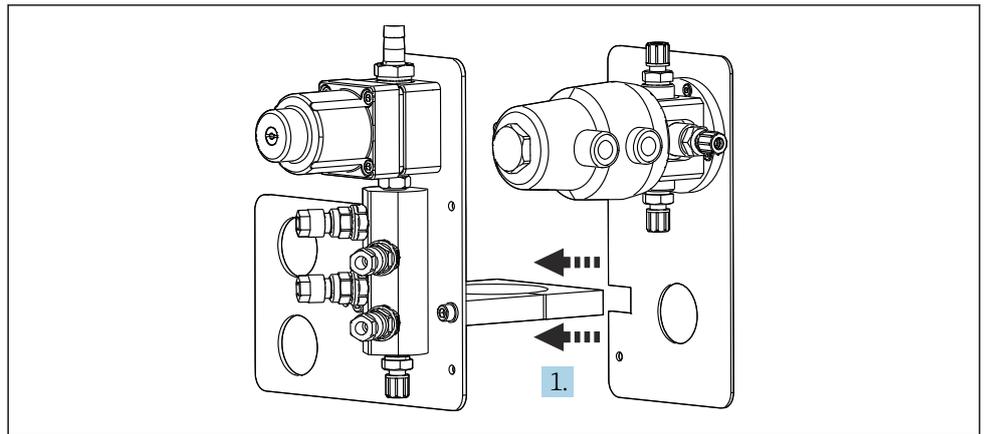


A0032739

1. Unscrew the union nut of the valve.
2. Remove the union nut and the clamping ring located underneath it.
3. Guide the hose through the union nut and the clamping ring into the valve.
4. Using the clamping ring, secure the hose to the valve by pressing lightly on it.
5. Screw the union nut back onto the valve.
 - ↳ The hose is now firmly positioned in the valve.

5.2.5 Mounting the changeover valve for the 2nd measuring point

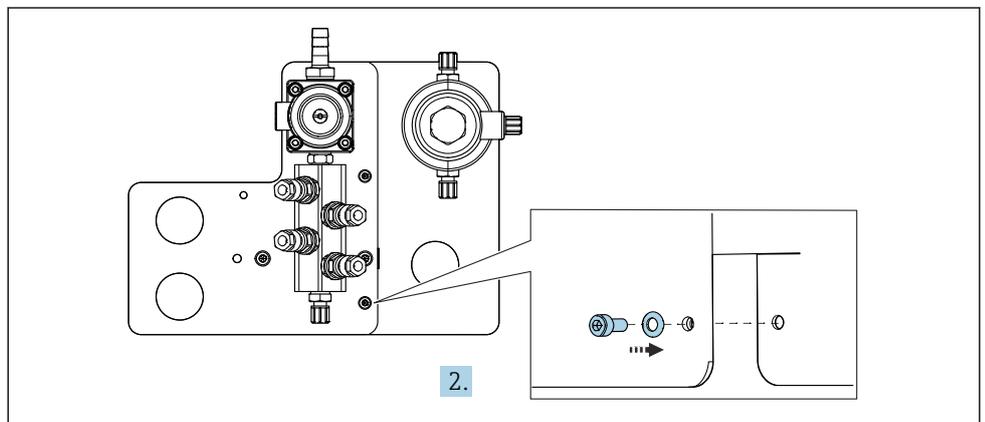
1.



A0033444

Guide the mounting plate with the changeover valve along the holder of the rinsing block.

2.



A0033445

Connect the two parts using the screws provided.

5.2.6 Mechanical connection

CAUTION

Very loud pumps

The noise from the pumps can hurt the ears.

- Wear ear protectors in the vicinity of the pumps.

Connecting the medium and compressed air

Hose connection diagram

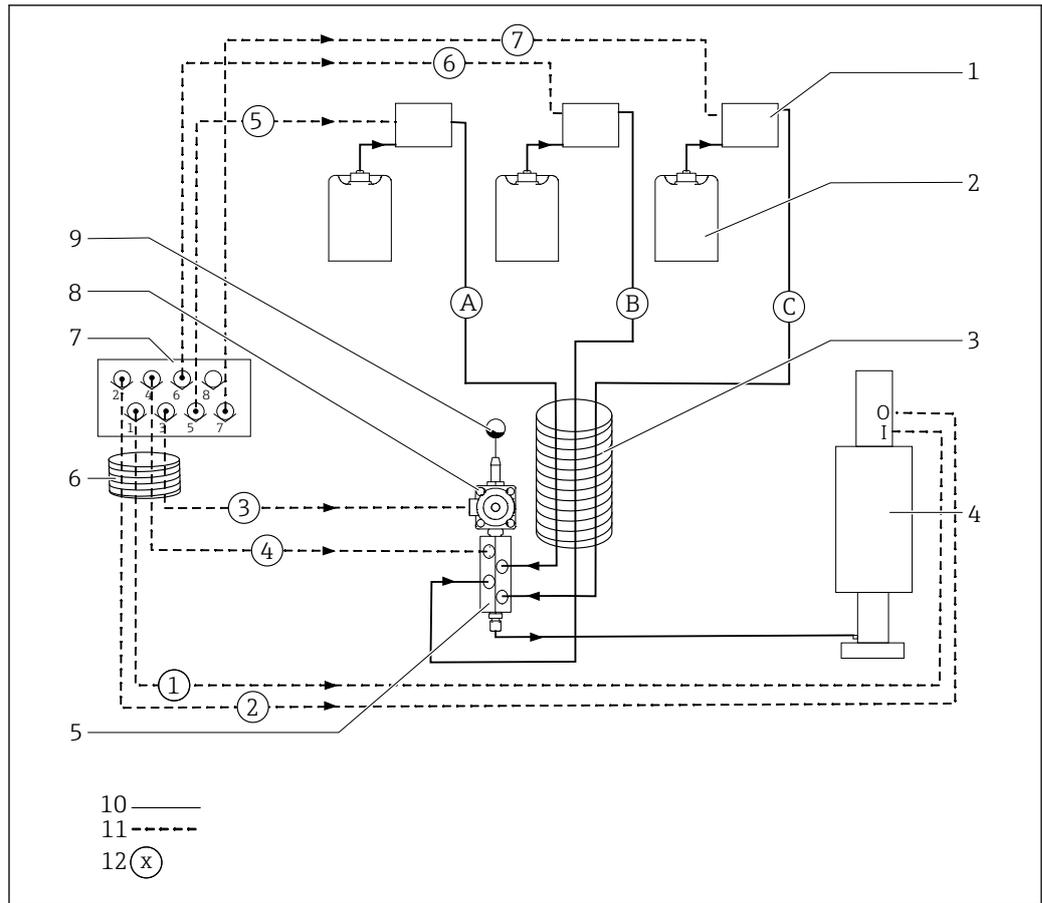
The system contains a hose package comprising:
Compressed air and rinsing hoses

CAUTION

Excessive water temperatures will damage the rinsing hoses.

Risk of injury due to water vapor discharge.

- Ensure that the water temperature does not exceed 60 °C (140 °F).



14 Hose connection diagram for medium and compressed air for one measuring point

- | | | | |
|---|---|----|--|
| 1 | Pumps 1-3 | 7 | Pilot valve manifold in pneumatic control unit (view from below) |
| 2 | Canister 1-3 | 8 | Process valve |
| 3 | Multihose M2 | 9 | Water connection |
| 4 | Assembly (connection I = measure, connection O = service) | 10 | Liquid |
| 5 | Rinsing block | 11 | Compressed air |
| 6 | Multihose M1 | 12 | Hose name |

The individual hoses are grouped together in multihoses.

Multihose	Function	Hose numbers
M1 (compressed air hose)	Compressed air control for process valve, water	3
	Compressed air control for assembly, measuring position, 1st measuring point	1
	Compressed air control for process valve, purge air	4
	Compressed air control for assembly, service position, 1st measuring point	2
M2 (liquid hose)	Pump 1 / canister 1 (left)	A
	Pump 2 / canister 2 (center)	B
	Pump 3 / canister 3 (right)	C
M3 in the case of two measuring points	Compressed air control for changeover valve, 2nd measuring point	8, 11

Multihose	Function	Hose numbers
	Compressed air control for assembly, measuring position, 2nd measuring point	9
	Compressed air control for assembly, service position, 2nd measuring point	10

Connecting compressed air supply

Compressed air supply

When connecting, pay attention to the following:

- The compressed air line is to be provided by the customer.
- The compressed air is 4 to 6 bar (58 to 87 psi).
- The optimum operating air pressure is 6 bar (87 psi)
- The air must be filtered (50 µm) and free from oil and condensate.
- The internal diameter must be at least 6 mm (0.24 in).
- The outer diameter must be at least 8 mm (0.31 in).

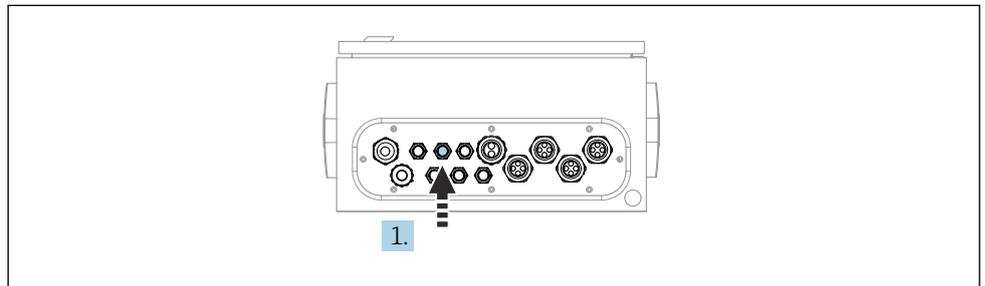
Hose specification

Hose	Size
Water connection via hose barb	For water hose with internal diameter 12 mm (0.47 in)
Compressed air	D 6/8 mm (0.24/0.31 in)

Connection in the pneumatic control unit

i The hose system for the internal compressed air supply in the pneumatic control unit is already connected at the factory.

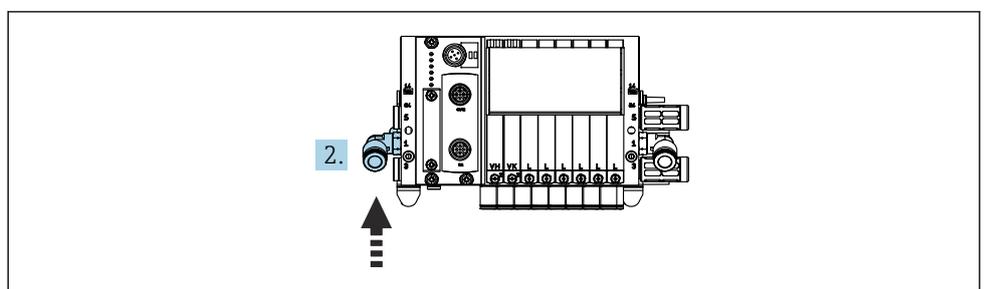
1.



A0033429

Guide the hose for the external compressed air supply into the cable gland provided on the pneumatic control unit.

2.



A0033430

Connect the hose for the compressed air supply to the supply for the pilot valve manifold.

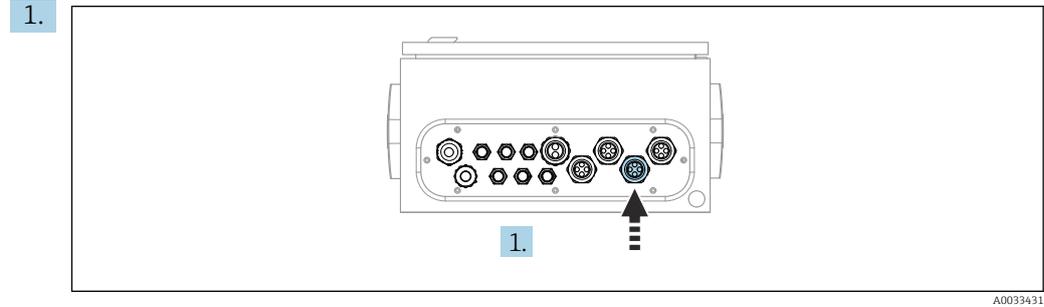
Connecting multihoses

M1- air hoses from the pneumatic control unit to the rinsing block and assembly

M1 connection in the pneumatic control unit

i The air hoses for the pilot valves in the pneumatic control unit are already connected at the factory.

The air hoses for the pilot valves are located in the hose package of the M1 multihose.

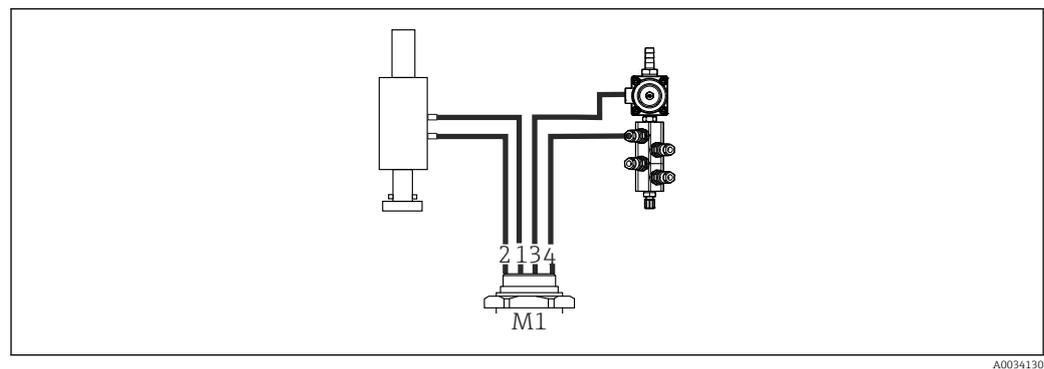


Guide hoses 1, 2, 3 and 4 of the M1 multihose into the cable gland provided on the pneumatic control unit.

2. Connect the hoses to the pilot valve manifold as follows:

Pilot valve	Function	Hose number
1	Compressed air control for assembly, measuring position	1
2	Compressed air control for assembly, service position	2
3	Compressed air control for process valve, water	3
4	Compressed air control for process valve, purge air	4

M1 connection on rinsing block and assembly



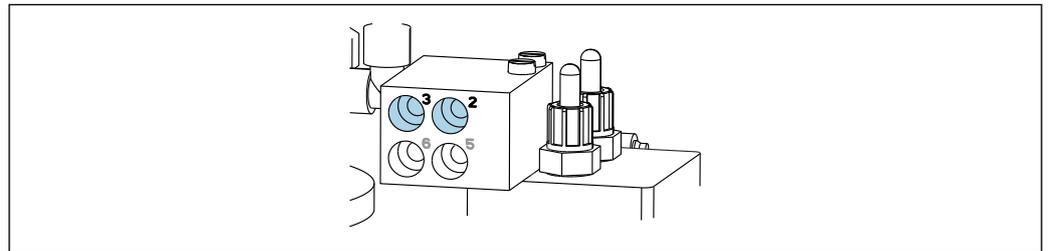
15 M1 connections on assembly and rinsing block

- 3. Connect hose 1 to the connection for moving the assembly in the measuring position.
- 4. Connect hose 2 to the connection for moving the assembly in the service position.
- 5. Connect hose 3 to the compressed air control unit for the process valve for water on the rinsing block.
- 6. Connect hose 4 (compressed air control unit for the process valve for purge air) to the valve for purge air on the rinsing block.

Connection on assemblies CPA87x and CPA471/472/472D/475

Hose number:	Connection on assembly:
CPA87x	
Hose 1	I, measure position
Hose 2	O, service position
CPA471/472/472D/475	
Hose 1	Upper connection
Hose 2	Lower connection

Connecting assembly CPA473/474



A0033220

► Connect the hoses as follows:

Hose number:	Connection on assembly:
Hose 1	2 on block, measuring
Hose 2	3 on block, service

M2 - liquid hoses from pumps to rinsing block

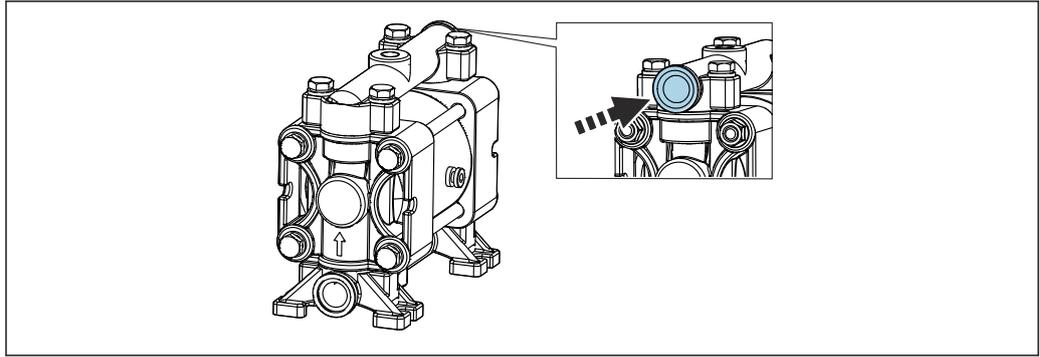
M2 connection to pumps

The hoses for supplying liquid to the rinsing block are located in the hose package of the M2 multihose.

1. Connect the hoses to the pumps from left to right as follows:

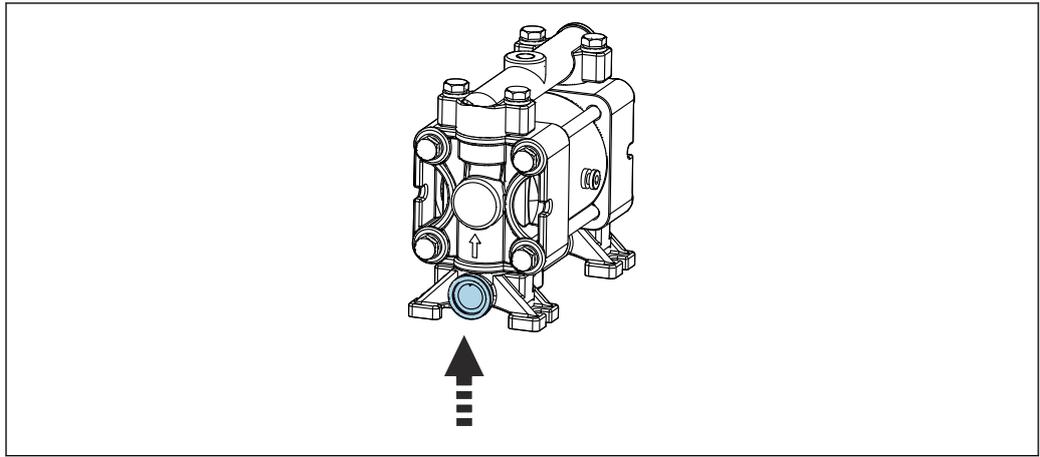
Hose number	Pump	Function
A	Pump 1 (left)	Liquid, canister 1
B	Pump 2 (center)	Liquid, canister 2
C	Pump 3 (right)	Liquid, canister 3

2. Connect the hoses as follows for the transportation of cleaner and buffer at the pump:



A0041603

16 Connection of media

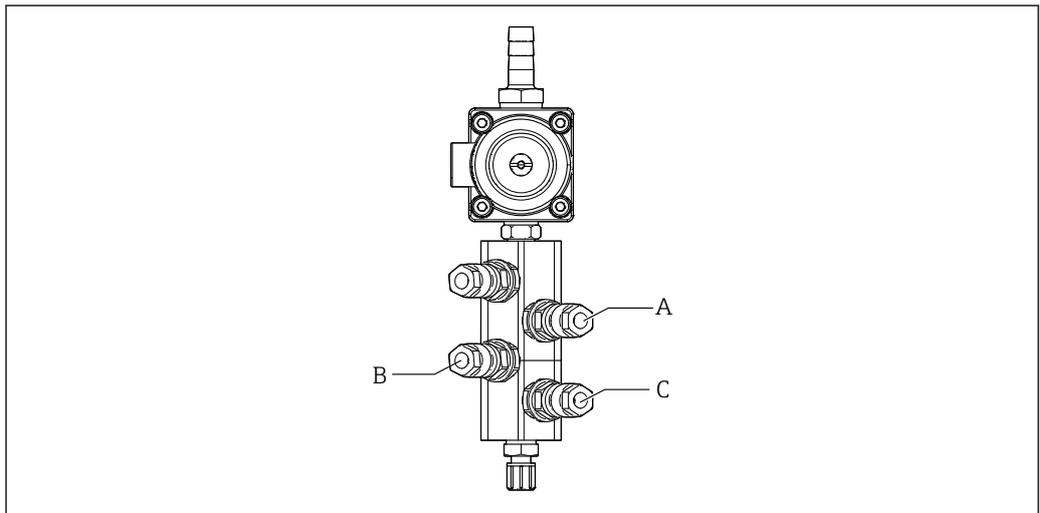


A0033922

17 Connection of float switch

M2 connection to rinsing block

► Connect the hoses from the pumps to the valves of the rinsing block as follows:



A0033436

Hose number	Function
A	Liquid, canister 1
B	Liquid, canister 2
C	Liquid, canister 3

M3 (2nd measuring point)- air hoses from the pneumatic control unit to the changeover valve and assembly of the 2nd measuring point

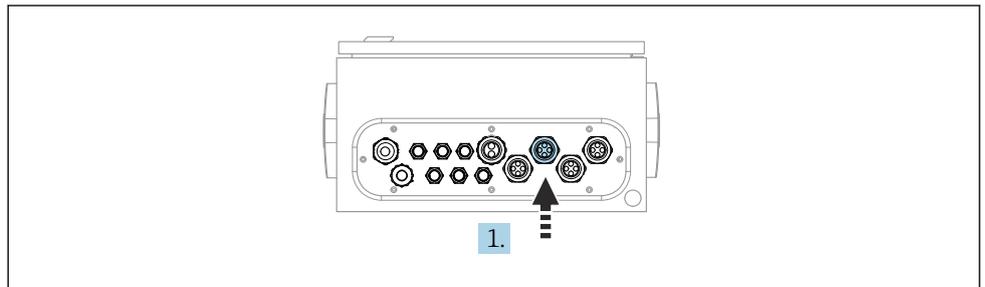
M3 connection in the pneumatic control unit

i The hoses on the pilot valves in the pneumatic control unit are already connected at the factory.

The hose package of the M3 multihose contains the following hoses:

- Changeover valve activation
- Assembly retraction

1.



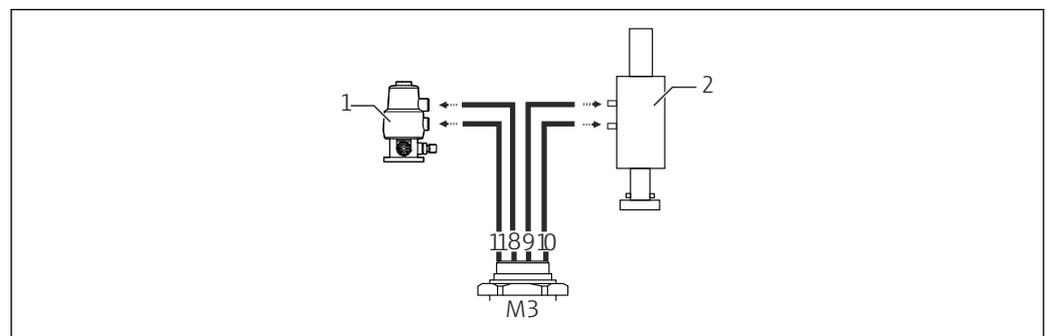
A0033441

Guide the hoses of the M3 multihose into the cable gland provided on the pneumatic control unit.

2. Connect the hoses on the pilot valves in the pneumatic control unit as follows:

Pilot valve	Function	Hose number
9, 10	Compressed air control for changeover valve, top, 1st measuring point	8
	Compressed air control for changeover valve, bottom, 2nd measuring point	11
11	Compressed air control for assembly, measuring position, 2nd measuring point	9
12	Compressed air control for assembly, service position, 2nd measuring point	10

M3 connection to changeover valve and assembly of 2nd measuring point



A0033440

i 18 M3 connections to changeover valve (1) and assembly (2)

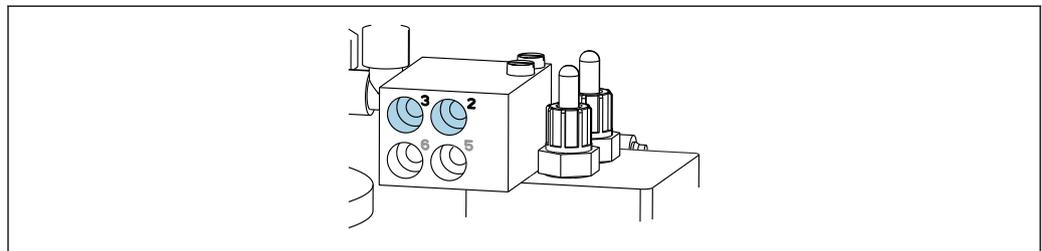
3. Connect hose 8 to the upper connection of the changeover valve (to control the supply of medium to the first measuring point).
4. Connect hose 11 to the lower connection of the changeover valve (to control the supply of medium to the second measuring point).

5. Connect hose 9 to the connection for moving the assembly to the measuring position.
6. Connect hose 10 to the connection for moving the assembly to the service position.

Connection to assemblies CPA87x and CPA47x

Hose number:	Connection on assembly:
CPA87x	
Hose 9	I, measure position
Hose 10	O, service position
CPA47x	
Hose 9	Upper connection
Hose 10	Lower connection

Connecting assembly CPA473/474

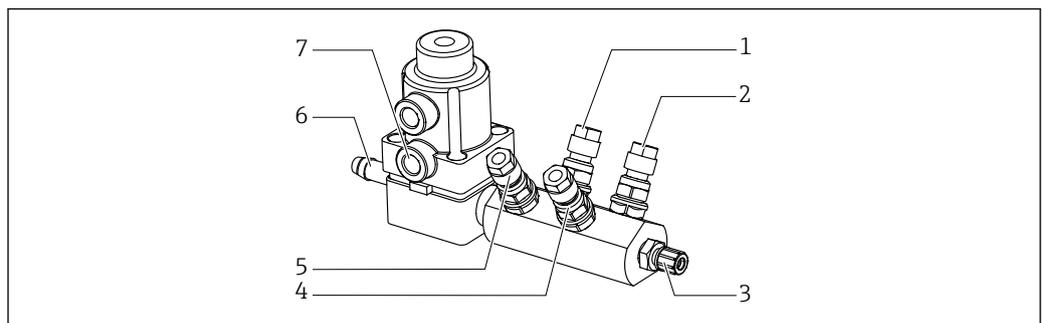


A0033220

- Connect the hoses as follows:

Hose number:	Connection on assembly:
Hose 9	2 on block, measuring
Hose 10	3 on block, service

Rinse pipe on rinsing block



A0032651

19 Rinsing block

- | | | | |
|---|-------------------------------------|---|-----------------------------------|
| 1 | Liquid, pump/ canister 1 | 5 | Air rinsing block (pilot valve 4) |
| 2 | Liquid, pump/ canister 3 | 6 | Water connection |
| 3 | Outlet rinse connection to assembly | 7 | Air process valve (pilot valve 3) |
| 4 | Liquid, pump/ canister 2 | | |

Connecting the rinse water

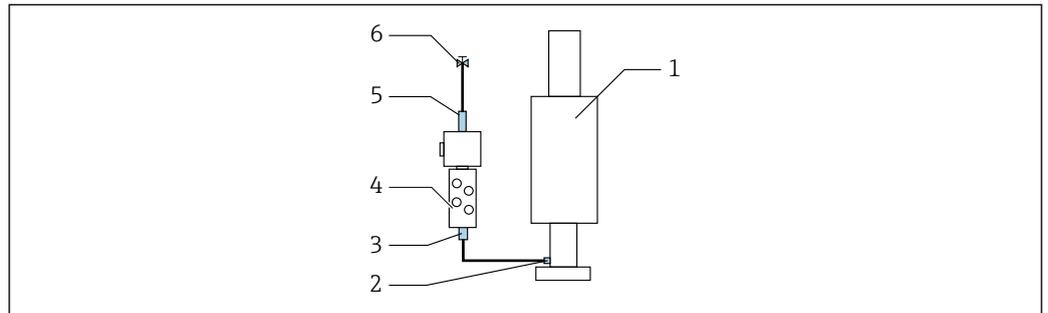
When connecting the water, pay attention to the following:

- The rinse water pipe is to be provided by the customer.
- The water pressure must be 3 to 6 bar (44 to 87 psi).

i Pay attention to the quality of the rinse water. Particles larger than 100 µm should be filtered using a water filter.

1st measuring point

Two G1/4" adapters to a 6/8 mm hose are enclosed to adapt the rinse connections of the assembly. The assembly must have G 1/4" rinse connections.



A0032653

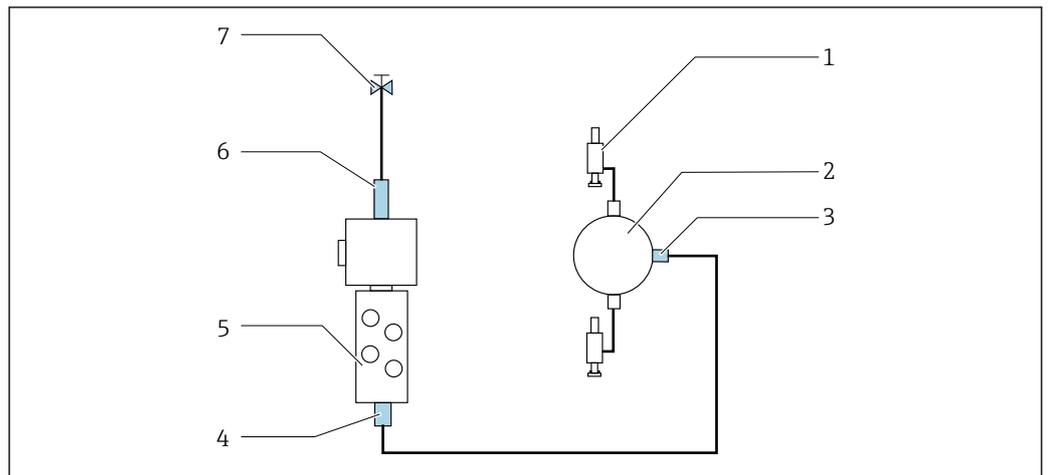
20 Rinsing block with one assembly

1. Rinse the pipe thoroughly.
2. Connect the rinse water (6) to the water connection (5) of the rinsing block (4).
3. Connect the rinse chamber connection (3) on the rinsing block to the rinse connection (2) of the assembly (1).

2nd measuring point

Four G1/4" adapters to a 6/8 mm hose are enclosed to adapt the rinse connections of the assemblies. The assemblies must have G 1/4" rinse connections.

The supply of medium for both assemblies is regulated by the changeover valve.



A0033443

21 Rinsing block with 2 assemblies (1st and 2nd measuring point)

1. Rinse the pipe thoroughly.
2. Connect the rinse water (7) to the water connection (6) of the rinsing block.
3. Connect the rinse chamber connection (4) on the rinsing block (5) to the rinse connection (3) of the changeover valve (2).

4. Connect the rinse connections of the assemblies (1) to the rinse connections of the changeover valve, 1st measuring point on right, 2nd measuring point on left.

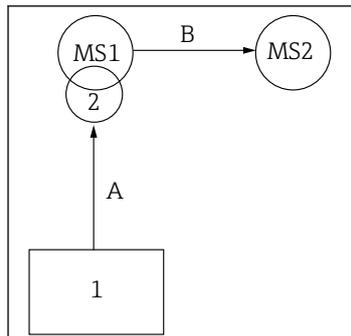
Shortening the multihoses

The hoses in the multihose must be altered depending on the distance.

1. Unscrew the M3 multihose from the rinsing block.
2. Remove the corrugated hose (outer sheathing of the multihose) from the fastener and the plug.
3. Guide the hoses and cables further inside the corrugated hose so that they can be pulled out at the other end.
4. Pull out the hoses and cables to the point where the corrugated hose should be shortened.
5. Carefully cut into the corrugated hose. Take care not to damage the inner hoses or cables.
6. Shorten the corrugated hose to the desired length.
7. Pull the hoses through the fastener and the plug.
8. Secure the corrugated hose to the bracket.

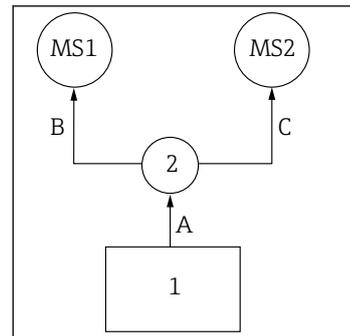
i The total length of the hoses to measuring points 1 and 2 may not exceed 10 m (32.8 ft).

Installation option 1



A+B=max 10 m

Installation option 2



A+B= max 10 m
A+C= max 10 m

- 1 = Pneumatic control unit
- 2 = Rinsing block and changeover valve
- MS1 = Measuring point 1
- MS2 = Measuring point 2

A = Length of multihose M2 for media to the rinsing block.
 = Length of multihose M1 for air to control measuring point 1 and to control the water valve and purge air.
 = Length of individual hoses 8 and 11 from multihose M3 for air to control the changeover valve.
B = Length of the connecting hose from the changeover valve to measuring point 2.
A+B = Length of individual hoses 9 and 10 from multihose M3 for air to control measuring point 2.

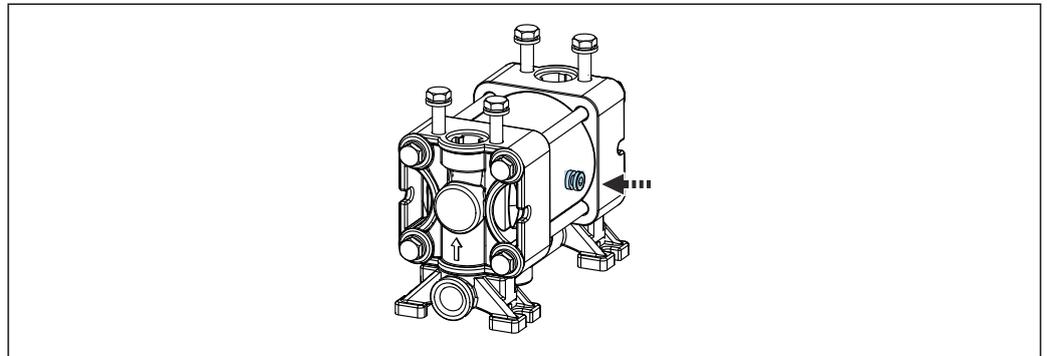
A = Length of multihose M2 for media to the rinsing block.
 = Length of individual hoses 3 and 4 from multihose M1 for air to control the water valve and purge air.
 = Length of individual hoses 8 and 11 from multihose M3 for air to control the changeover valve.
B, C = Length of the connecting hose from the changeover valve to measuring point 1 or measuring point 2.
A+B, A+C = Length of individual hoses 1 and 2 from multihose M1 for air to control measuring point 1.
 = Length of individual hoses 9 and 10 from multihose M3 for air to control measuring point 2.

Connecting the pump

Compressed air control

The compressed air control of the pumps is already connected ex works.

- For the compressed air control of the pumps, connect the 4 mm (0.16 in) tube piece provided and the 4 to 6 mm (0.16 to 0.24 in) conduit adapter as follows:



A0033921

22 Connecting the compressed air control

Pilot valve	Function	Hose number
5	Pump 1, liquid canister 1 (left)	5
6	Pump 2, liquid canister 2 (center)	6
7	Pump 3, liquid canister 3 (right)	7

5.3 Post-mounting check

1. Following the installation, check all devices for damage.
2. Verify that the specified installation clearances have been observed.
3. Ensure that the temperature limits are observed at the mounting location.
4. Verify that all hoses are securely mounted and leak-tight.
5. Verify that all multihoses are positioned in such a way that they are protected.

6 Electrical connection

6.1 Connecting requirements

NOTICE

The device does not have a power switch

- ▶ A fuse with a maximum rating of 16 A must be provided by the customer. Observe the local regulations for installation.
- ▶ The circuit breaker must be a switch or power switch, and must be labeled as the circuit breaker for the device.
- ▶ The protective ground connection must be made before all other connections. If the protective ground is disconnected, this can be a source of danger.
- ▶ The circuit breaker must be located near the device.

1. Make sure to establish a sufficient connection of at least 0.75 mm² (0.029 in²) to the housing protective ground system.
2. Ensure the mechanical loading capacity of the feed cables complies with the conditions at the place of installation.

Only the mechanical and electrical connections which are described in these instructions, and which are necessary for the required, designated use, may be established on the device delivered.

- ▶ Exercise care when carrying out the work.

Supply voltage:

100 to 230 V AC

Fluctuations in the line voltage may not exceed ± 10 %.

6.2 Connecting the CDC90 control unit

⚠ WARNING

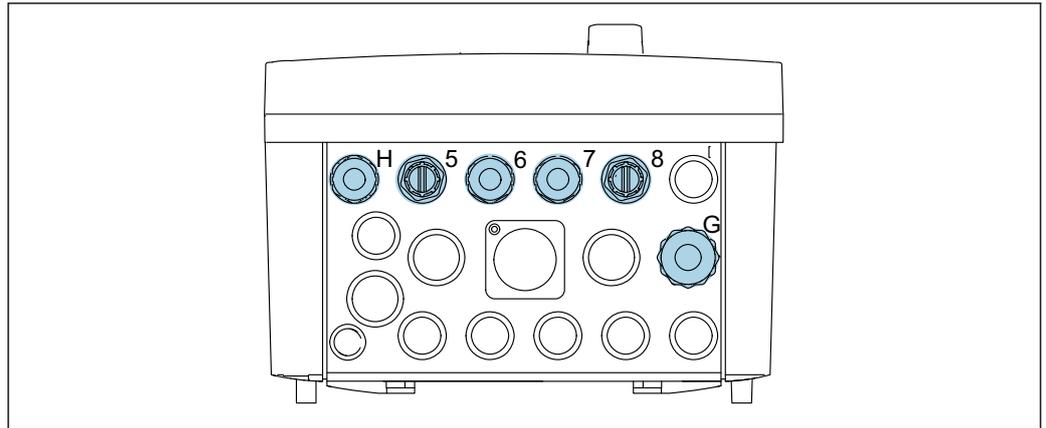
Device is live!

Incorrect connection may result in injury or death!

- ▶ The electrical connection may be performed only by an electrical technician.
- ▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions contained therein.
- ▶ **Prior** to commencing connection work, ensure that no voltage is present on any cable.

6.2.1 Cable gland assignment

 The CDC90 control unit is already wired at the factory.



A0033181

23 CDC90 control unit cable gland

Wiring	Designation	Assignment
CDC90 control unit supply voltage	W11	H
Ethernet cable from IPC to Ethernet switch	W23	5
Sensor, 1st measuring point		6
Sensor, 2nd measuring point		7
Ethernet cable from BASE2-E to Ethernet switch	W24	8
Sensor, float switch, pressure switch, IPC power supply	W8	G

6.2.2 Modules of the CDC90 control unit

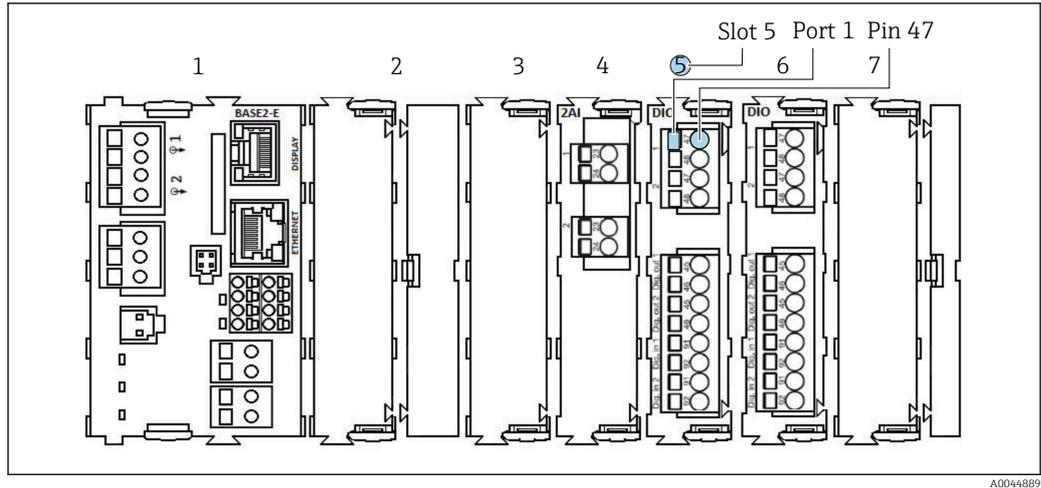
Modules:

- Slot 1: base module BASE2-E (contains 2 sensor inputs, 2 current outputs)
- Slot 2-3: empty
- Slot 4: module 2AI (2 current inputs)
- Slot 5-6: 2x module DIO
- Slot 7: retrofittable: module 4AO (4 current outputs)

i The unique terminal name is derived from:

Slot no. : Port no. : Terminal

Example of terminal name:



24 Example of port assignment

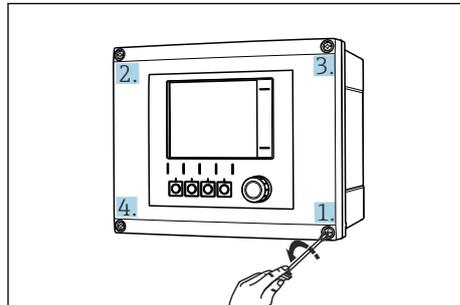
6.2.3 Opening the CDC90 control unit

NOTICE

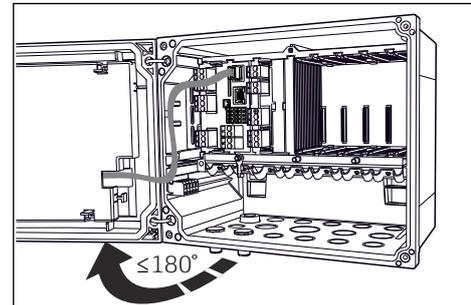
Pointed or sharp tools

The use of unsuitable tools can cause scratches on the housing or damage to the seal, and therefore negatively affect the leak-tightness of the housing!

- ▶ Do not use any sharp or pointed objects, e.g. a knife, to open the housing.
- ▶ Only use a suitable Phillips screwdriver.



25 Slacken the housing screws crosswise with a Phillips head screwdriver



26 Opening display cover, max. opening angle 180° (depends on installation position)

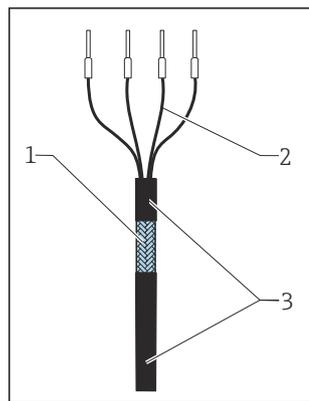
1. Slacken the housing screws crosswise.
2. To close the housing: tighten the screws in a similar step-by-step, crosswise sequence.

6.2.4 Connecting the cable shield

i Only use terminated original cables where possible. The sensor cable, fieldbus cable and Ethernet cable must be shielded cables.

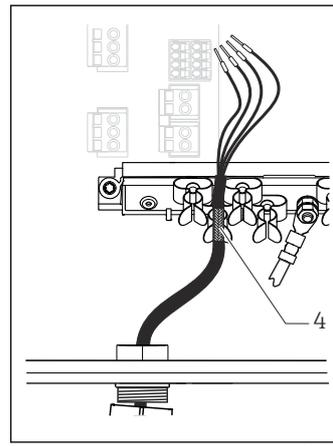
Clamping range of cable clamps: 4 to 11 mm (0.16 to 0.43 in)

Sample cable (does not necessarily correspond to the original cable supplied)



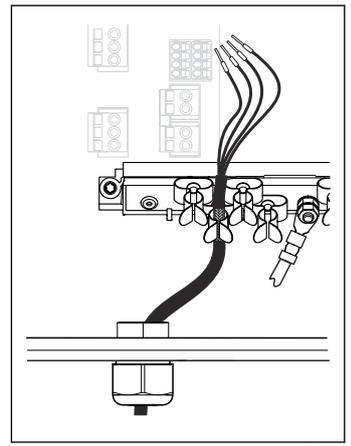
27 Terminated cable

- 1 Outer shield (exposed)
- 2 Cable cores with ferrules
- 3 Cable sheath (insulation)



28 Connect the cable to the grounding clamp

- 4 Grounding clamp



29 Press the cable into the grounding clamp

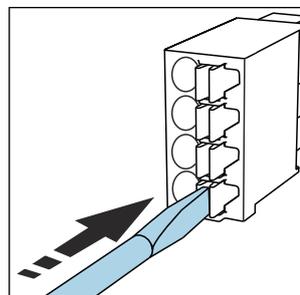
The cable shield is grounded using the grounding clamp ¹⁾

1) Please pay attention to the instructions in the "Ensuring the degree of protection" section

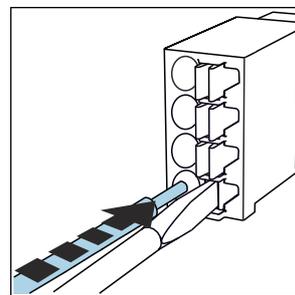
1. Loosen a suitable cable gland on the bottom of the housing.
2. Remove the dummy plug.
3. Attach the gland to the cable end, making sure the gland is facing the right direction.
4. Pull the cable through the gland and into the housing.
5. Route the cable in the housing in such a way that the **exposed** cable shield fits into one of the cable clamps and the cable cores can be easily routed as far as the connection plug on the electronics module.
6. Connect the cable to the cable clamp.
7. Clamp the cable.
8. Connect cable cores as per the wiring diagram.
9. Tighten the cable gland from outside.

6.2.5 Cable terminals

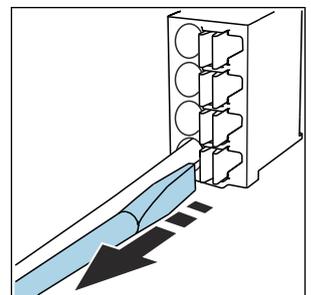
Plug-in terminals for Memosens connections



- ▶ Press the screwdriver against the clip (opens the terminal).



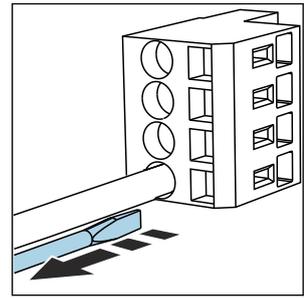
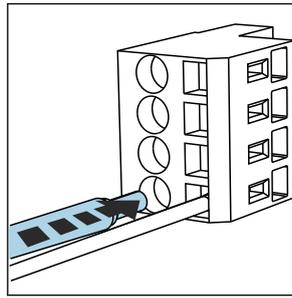
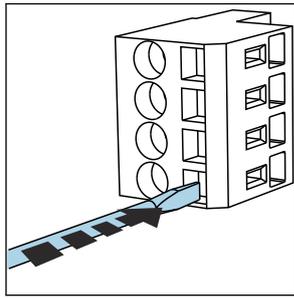
- ▶ Insert the cable until the limit stop.



- ▶ Remove the screwdriver (closes the terminal).

- ▶ After connection, make sure that every cable end is securely in place. Terminated cable ends, in particular, tend to come loose easily if they have not been correctly inserted as far as the limit stop.

All other plug-in terminals



▶ Press the screwdriver against the clip (opens the terminal).

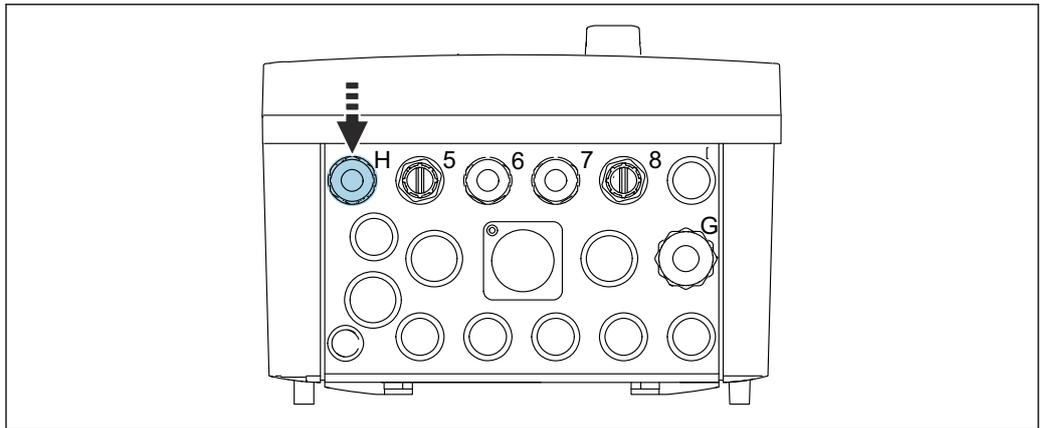
▶ Insert the cable until the limit stop.

▶ Remove the screwdriver (closes the terminal).

6.2.6 Connecting the supply voltage for the CDC90 control unit

"H" cable gland

 The supply voltage for the CDC90 control unit is already wired at the factory.



A0039453

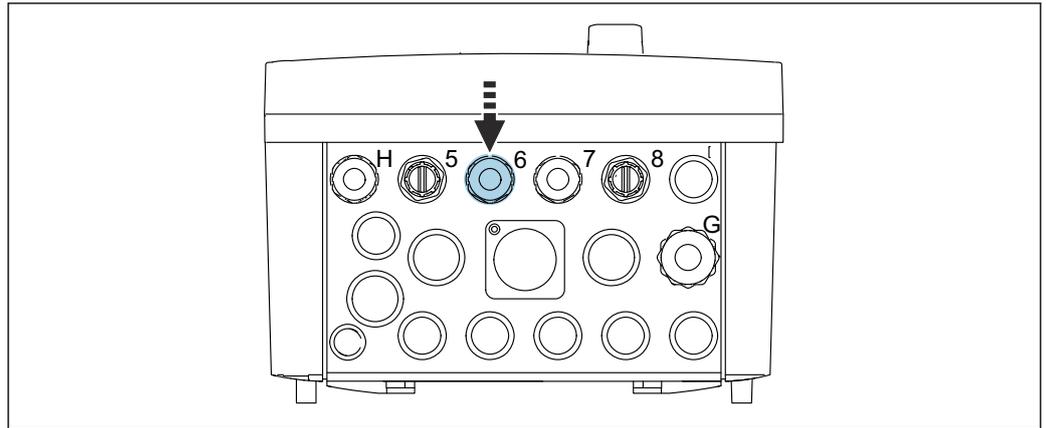
▶ Guide the cable of the supply voltage through the cable gland "H" provided.

6.3 Connecting the sensors

6.3.1 Sensor types

Sensors with Memosens protocol

Sensor types	Sensor cable	Sensors
Digital sensors without additional internal power supply	With plug-in connection and inductive signal transmission	<ul style="list-style-type: none"> ▪ pH sensors ▪ ORP sensors ▪ Combined pH/ORP sensors



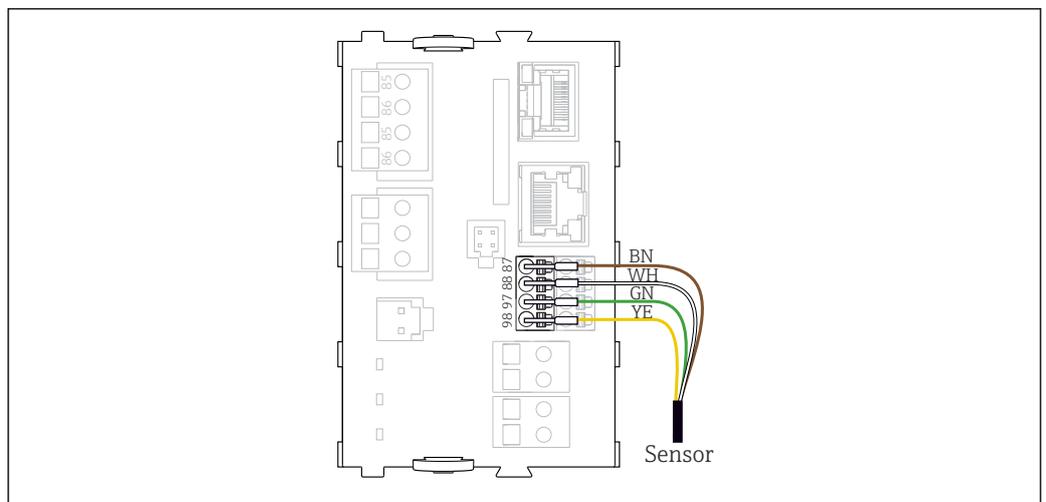
A0033455

▶ Guide the sensor cable of the 1st measuring point through cable gland "6" provided.

i Cable gland "7" is provided for the sensor of the 2nd measuring point.

Connecting the sensor cable

1. Sensor cable connected directly
Connect the sensor cable to the terminal connector of the BASE2-E module.
2. When connecting via M12 connector:
Connect the sensor connector to an M12 sensor socket which has been previously installed or is supplied on delivery.



A0039629

30 Direct connection of sensors without additional supply voltage

6.4 Connecting additional inputs and outputs

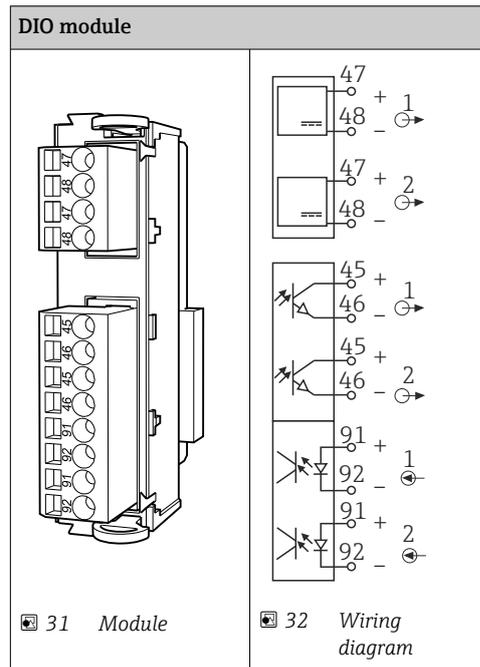
⚠ WARNING

Module not covered

No shock protection. Danger of electric shock!

- ▶ Only the 4AO module can be retrofitted at slot 7. Other hardware must not be modified.
- ▶ If additional shields are required, connect them with PE centrally in the control cabinet via terminal blocks supplied by the customer.

6.4.1 Digital inputs and outputs



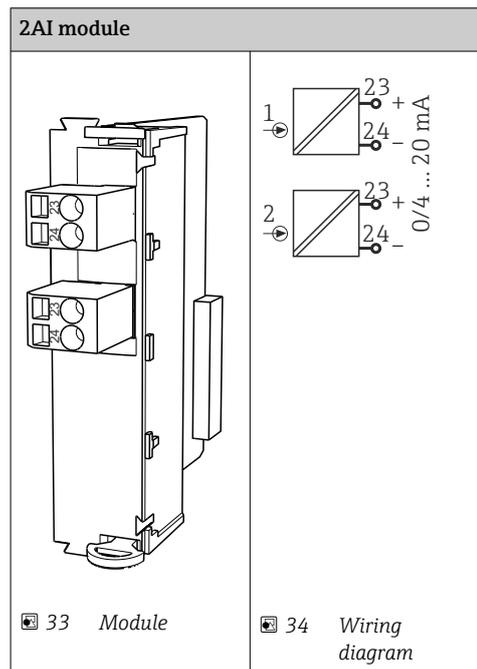
i For monitoring the compressed air and the float switches.

Connecting the DIO

Digital I/O connection to the actuator terminal in the pneumatic control unit

Cable wire	CDC control unit: DIO module	Pneumatic control unit: terminal X2, bottom	Function
W8, 5	Slot 5 (24V DC - 1) - terminal 47	1	Pressure switch BK, float switch, pump 1 BK
W8, 6	Slot 5 DI 1 terminal 91	2	Float switch, pump 1 BN
W8, 7	Slot 5 DI 2 terminal 91	3	Pressure switch BN
W8, 8	Slot 6 (24V DC - 1)	4	Float switch, pump 3 BK
W8, 9	Slot 6 DI 1 terminal 91	5	Float switch, pump 3 BN
W8, 10	Slot 6 (24V DC - 2) terminal 47	6	Float switch, pump 2 BK
W8, 11	Slot 6 DI 2 terminal 91	7	Float switch, pump 2 BN

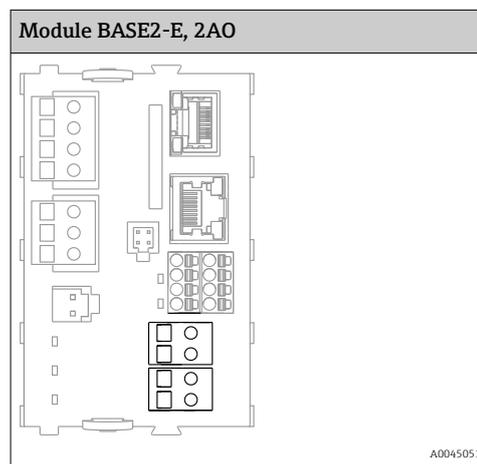
6.4.2 Current inputs



i Input for control signal from soft keys.

1. Input for control signal from soft keys.
2. Input for control signal from control station to control the implementation of the program remotely.

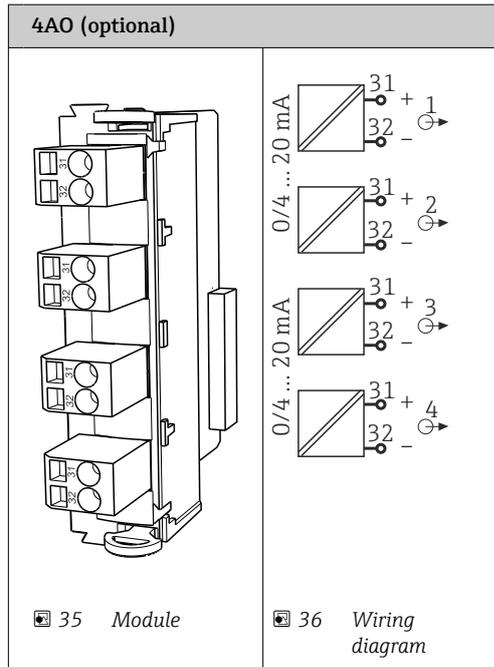
6.4.3 Current outputs



i Transmission of the status signals from the measuring point to the control system.

1. Output to control the status LED on the CDC90 control unit
2. Output to transmit the status signals from the measuring point to the control system

Optional: additional 4AO module for measured values.



i Transmission of the measured values (user-definable) from the measuring point to the control system.

6.5 Connecting digital communication

6.5.1 Connecting the Ethernet

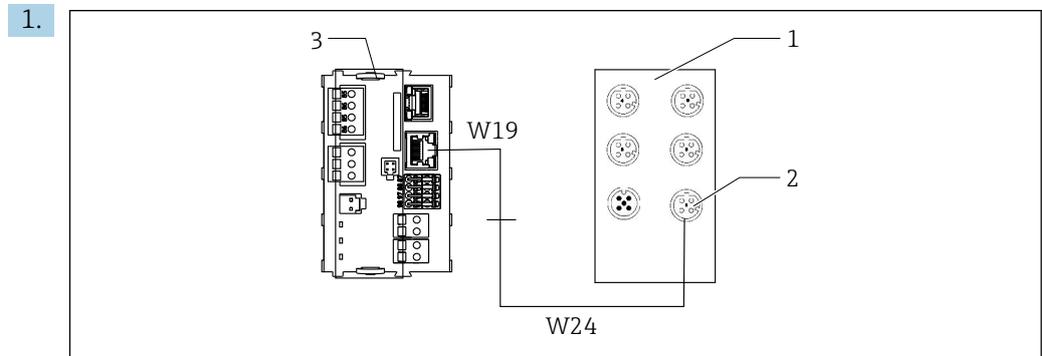
⚠ CAUTION

Electric shock!

- ▶ The connected external devices must be insulated against dangerous voltages that may occur.

Connecting the Ethernet switch communication cable to the CDC90 control unit

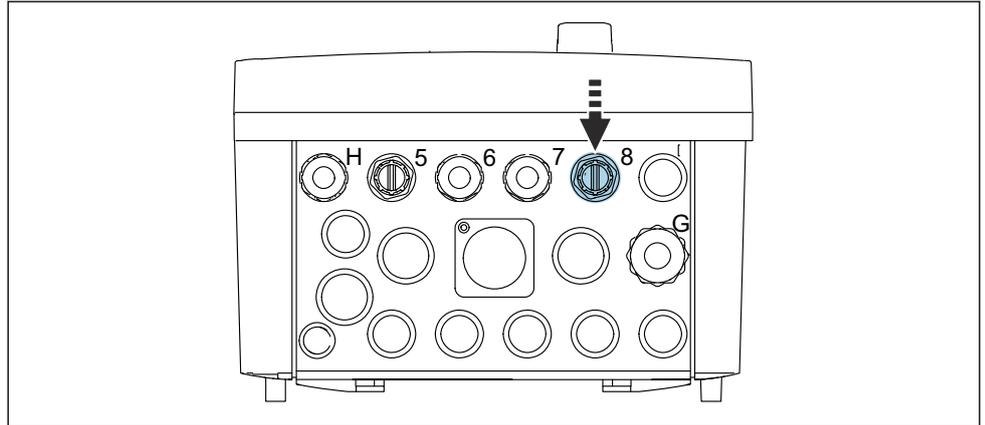
i The communication between the CDC90 control unit and the Ethernet switch is already wired at the factory.



- 1 Ethernet switch
- 2 Ethernet connection
- 3 BASE2-E module

In the CDC90 control unit, connect the Ethernet adapter cable W19 to the Ethernet connection of the BASE2-E module (3).

2.



A0033454

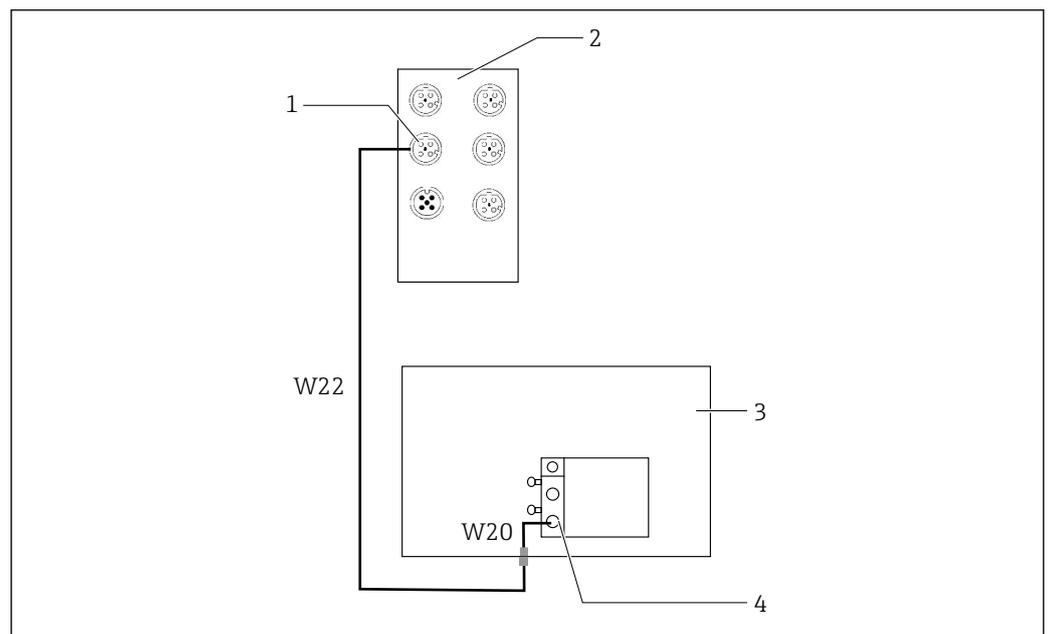
Connect the Ethernet adapter cable W24 to cable gland "8" provided.

↳ The W19 and W24 cables form a bridge.

3. Connect the EtherNet adapter cable at the EtherNet switch (1) to the connection (2) provided for this purpose.

Connecting the Ethernet switch communication cable to the pneumatic control unit

i The Ethernet cable for internal communication between the Ethernet switch and the pneumatic control unit is already wired at the factory.



A0033473

37 Wiring of the Ethernet switch at the fieldbus interface

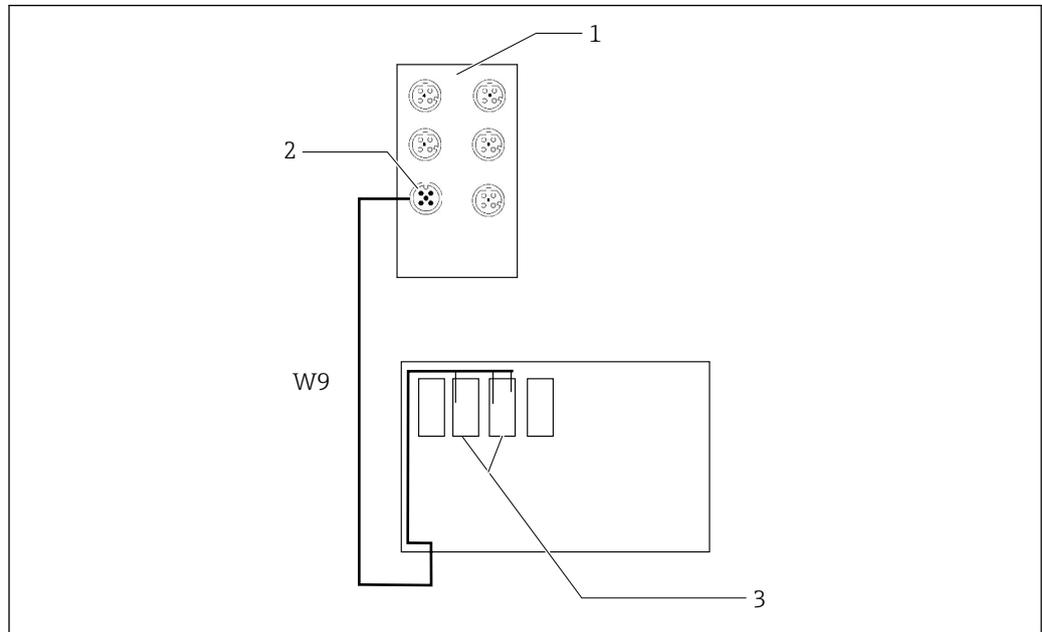
- 1 Connection on Ethernet switch
- 2 Ethernet switch
- 3 Pneumatic control unit
- 4 Fieldbus interface IN1 of the bus node

1. Connect the communication cable (W22) at the Ethernet switch (2) to the connection (1).
2. Connect the W22 cable to cable gland "4" of the pneumatic control unit (3) from below. → 41
3. Connect the W20 cable in the pneumatic control unit (3) to cable gland "4" from the inside.
 - ↳ The W22 and W20 cables form a bridge.

4. Connect the W20 cable in the pneumatic control unit (3) to the fieldbus interface IN1 of the bus node (4).

Connecting the supply voltage of the Ethernet switch

i The supply voltage of the Ethernet switch is already wired in the pneumatic control unit at the factory.



A0034129

38 *Wiring of the Ethernet switch at terminals XL*

- 1 Ethernet switch
- 2 Connection on Ethernet switch
- 3 Terminals XL in the pneumatic control unit

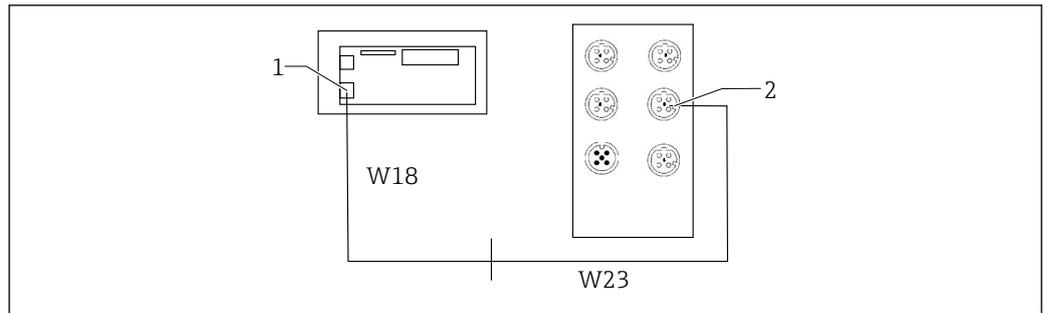
1. Connect the supply voltage (W9) at the Ethernet switch (1) to the connection (2).
2. Guide the W9 cable into the cable gland "9" of the pneumatic control unit. → **41**
3. Connect the wires as follows (3):

Terminal -XL+	Cable wire
+2	Brown

Terminal -XL-	Cable wire
-2	Blue
PE	Gray

6.5.2 Connecting the IPC

i The IPC is already connected to the Ethernet switch at the factory.



A0044184

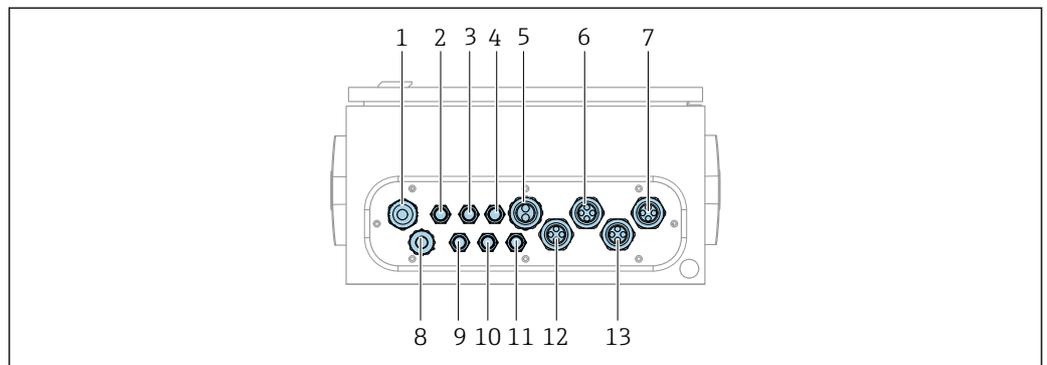
- 1 IPC
- 2 Connection on Ethernet switch

1. Open the CDC90 control unit.
2. Connect the W18 adapter cable in the CDC90 control unit to cable gland "8" from the inside.
3. In the CDC90 control unit, connect the W18 adapter cable to IPC (1).
4. Connect the W23 cable on the outside of the CDC90 control unit to cable gland "8".
 - ↳ The W18 and W23 cables form a bridge.
5. Connect cable W23 at the Ethernet switch to the connection (2) provided.

6.6 Connecting the pneumatic control unit

6.6.1 Cable gland assignment

 The hoses in the pneumatic control unit are already connected at the factory.



A0033199

 39 Cable gland of pneumatic control unit

Assignment	Wiring	Designation
1	Connecting cable to CDC90 control unit	W8
2	Power supply cable of pneumatic control unit	W11
3	Not assigned	
4	Ethernet cable of valve manifold	W20->W22
5	Hose number 8/black in valve manifold M1 1x hose 6/8 mm from M1 in valve manifold 1x hose 6/8 mm compressed air supply (at the installation location)	4
6	M3 hoses	8, 9, 10, 11

Assignment	Wiring	Designation
7	Cable of limit position switch from assembly CPA8xx	W2, W3
	Cable of limit position switch from assembly CPA4xx	W25, W26, W27, W28
8	Float switch/level switch cable	W4, W5, W6
9	PWR cable of Ethernet switch	W9
10	Not assigned	
11	Not assigned	
12	Pump hoses	5, 6, 7
13	M1 hoses	1, 2, 3

The multi-core signal cable between the CDC90 control unit and the pneumatic control unit is routed into the pneumatic control unit via the actuator terminals and is prewired. See →  46.

6.6.2 Connecting float switches and compressed air switches

1. Guide the wires of cables W4, W5 and W6 through cable gland "8" provided.
2. Connect the cable wires to the actuator terminal in the pneumatic control unit as follows:

Terminal X2, top	Cable wire	Function
1	W4, BK W5, BK	Float switch, cleaner Float switch, buffer 1
2	W4, BN	Float switch, cleaner
3	W5, BN	Float switch, buffer 1
4	W6, BK	Float switch, buffer 2
5	W6, BN	Float switch, buffer 2
6	W7, BK	Pressure switch
7	W7, BN	Pressure switch

6.6.3 Assemblies

CDC90 is designed for the following assemblies:

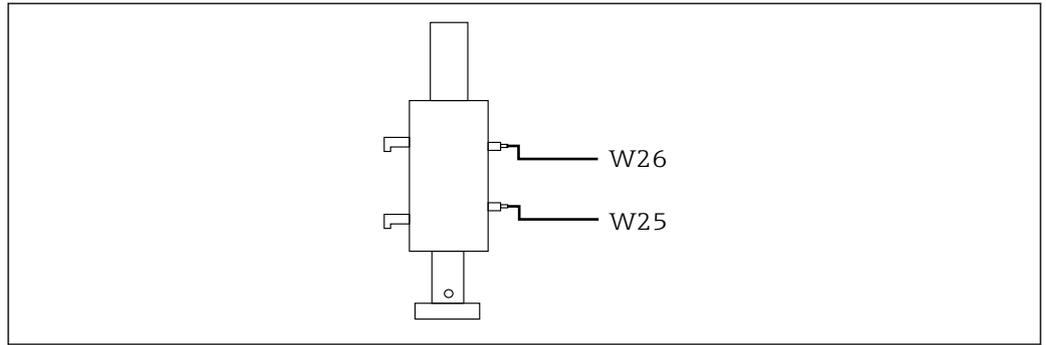
- Cleanfit CPA47x
- Cleanfit CPA871/CPA875

Limit position switches

Cleanfit CPA471/472/472D/475

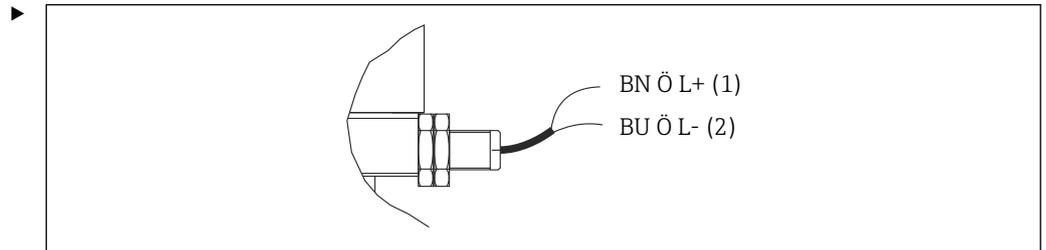
Assemblies with pneumatic limit position switches must be converted to electrical limit position switches.

Monitoring of assembly position



A0032747

40 Compressed air control CPA471/472/472D/475



A0044165

Connect the connections for the position feedback signal in the pneumatic control unit as follows:

Connection at output interface terminal in the pneumatic control unit

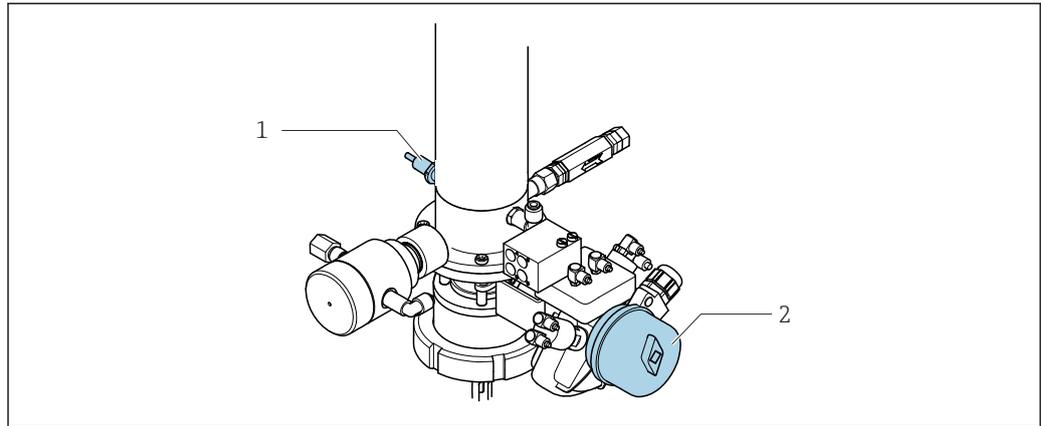
Output interface terminal T1, bottom	Cable wire	Function
Pin 1	W26, BN	Upper limit position switch
Pin 2	W26, BU	Upper limit position switch

Output interface terminal T2, bottom	Cable wire	Function
Pin 1	W25, BN	Lower limit position switch
Pin 2	W25, BU	Lower limit position switch

Cleanfit CPA473/474

Assemblies with pneumatic limit position switches must be converted to electrical limit position switches.

Monitoring of assembly position



A0033325

41 Compressed air control CPA473/474

- Connect the connections for the position feedback signal in the pneumatic control unit as follows:

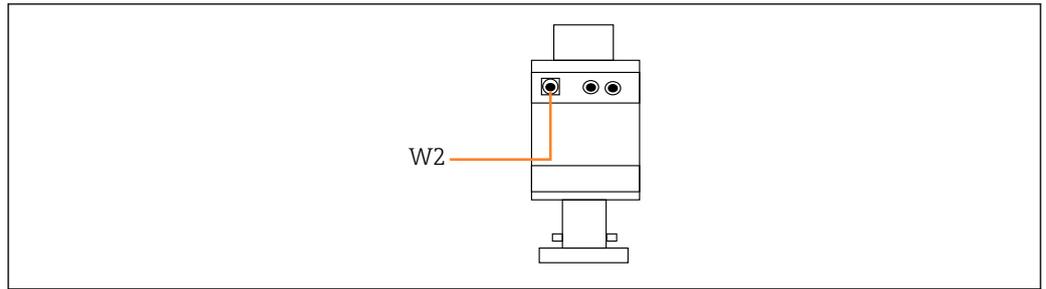
Connection at output interface terminal in the pneumatic control unit

Output interface terminal T1, bottom	Limit position switches	Function
Pin 1	Pos 2, BN limit position switch on ball valve	Limit position switch, service feedback signal
Pin 2	Pos 2, BU limit position switch on ball valve	Limit position switch, service feedback signal

Output interface terminal T2, bottom	Cable wire	Function
Pin 1	Pos 1, BN limit position switch on assembly	Limit position switch, measuring feedback signal
Pin 2	Pos 1, BU limit position switch on assembly	Limit position switch, measuring feedback signal

Cleanfit CPA8x

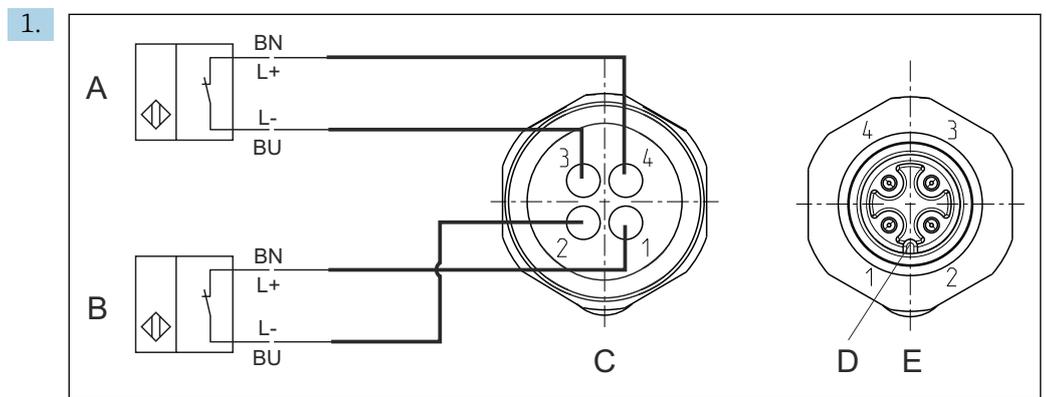
Assembly monitoring



A0032753

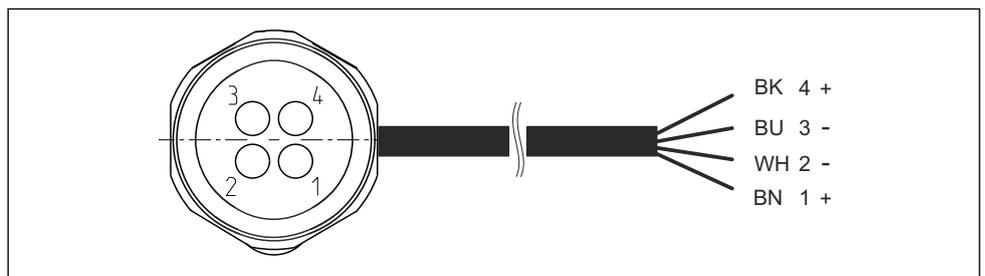
42 Position feedback signal, CPA87x

W2 Feedback cable



A0017831

- A Limit position switch, service position
- B Limit position switch, measuring position
- C Connector, M12, solder side (inside of assembly)
- D Coding
- E Connector, pin side (outside of assembly)



A0022163

43 Connecting cable for limit position switch on transmitter, switching amplifier, output interface terminal etc.

- 1 "Measuring" position
- 2 "Measuring" position
- 3 "Service" position
- 4 "Service" position

Attach the cables to the pins provided, as described in the graphic.

- 2. Connect the connections for the position feedback signal as follows:

Connection at output interface terminal in the pneumatic control unit

Output interface terminal T1, bottom	Cable wire	Function
Pin 1	W2, BK	Limit position switch, position feedback signal
Pin 2	W2, BU	Limit position switch, position feedback signal

Output interface terminal T2, bottom	Cable wire	Function
Pin 1	W2, BN	Limit position switch, position feedback signal
Pin 2	W2, WH	Limit position switch, position feedback signal

6.7 Remote IO assignment

DI	Description	Assignment
1, 2	Assembly 1	Position feedback signal, internal
3, 4	Assembly 2	Position feedback signal, internal
13-16	Soft keys	Signal to start programs that are assigned to the 4 soft keys

DO	Description	Assignment
11	Operating mode	Setting, if DO11 = 0 and DO12 = 0 Manual, if DO11 = 0 and DO12 = 1 Automatic, if DO11 = 1 and DO12 = 0 Remote access, if DO11 = 1 and DO12 = 1
12		
13	Assembly 1	Service = 0 Measure = 1
14	Assembly 2	Service = 0 Measure = 1
15	Program	No program = 0 Program running = 1
16	Error status	Alarm = 0 No alarm = 1

6.8 Connecting the main supply voltage

 The cable for the supply voltage must be provided by the customer onsite and is not included in the scope of delivery.

NOTICE

The device does not have a power switch

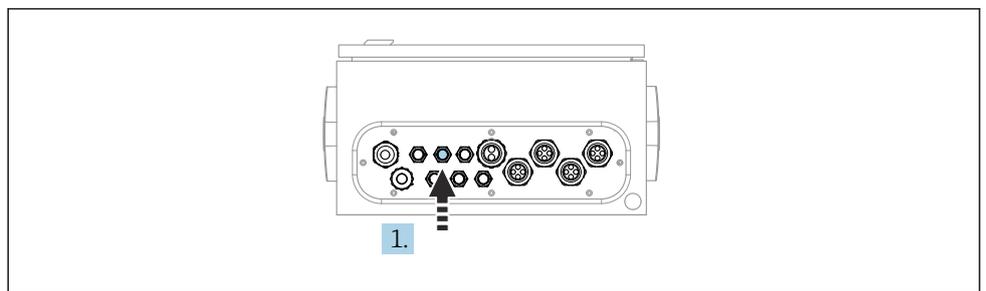
- ▶ A fuse with a maximum rating of 16 A must be provided by the customer. Observe the local regulations for installation.
- ▶ The circuit breaker must be a switch or power switch, and must be labeled as the circuit breaker for the device.
- ▶ The protective ground connection must be made before all other connections. If the protective ground is disconnected, this can be a source of danger.
- ▶ A circuit breaker must be located near the device.

Preparing the main supply voltage

1. Ensure an adequate connection to the protective grounding system of the building.
2. Use a ground cable with min. 0.75 mm² (corresponding to 18 AWG), not included in the scope of delivery.

Connecting the main supply voltage

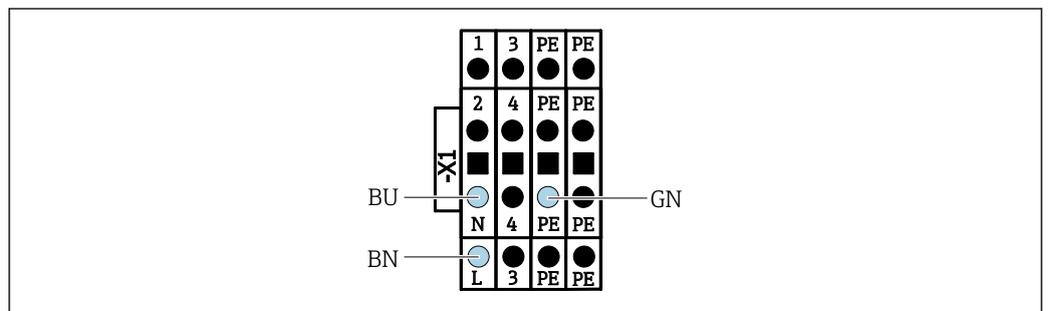
- 1.



A0033429

Guide the cable of the main supply voltage through cable gland "3" of the pneumatic control unit.

2. Connect the wires to the actuator terminal as follows:



A0035338

44 Terminal diagram of main supply voltage of actuator terminal X1 in the pneumatic control unit

Terminal X1, bottom	Cable wire
L	L1, BN
PE	PE, GN-YE
N	N, BU

6.9 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions and which are necessary for the required, designated use, may be carried out on the device delivered.

- ▶ Exercise care when carrying out the work.

Individual types of protection permitted for this product (impermeability (IP), electrical safety, EMC interference immunity, Ex protection) can no longer be guaranteed if, for example :

- Covers are left off
- Different power units to the ones supplied are used
- Cable glands are not sufficiently tightened (must be tightened with 2 Nm (1.5 lbf ft) for the permitted level of IP protection)
- Unsuitable cable diameters are used for the cable glands
- Modules are not fully secured
- The display is not fully secured (risk of moisture entering due to inadequate sealing)
- Loose or insufficiently tightened cables/cable ends
- Conductive cable strands are left in the device

6.10 Post-connection check

WARNING

Connection errors

The safety of people and of the measuring point is at risk! The manufacturer does not accept any responsibility for errors that result from failure to comply with the instructions in this manual.

- ▶ Put the device into operation only if you can answer **yes** to **all** the following questions.

Device condition and specifications

- ▶ Are the device and all the cables free from damage on the outside?

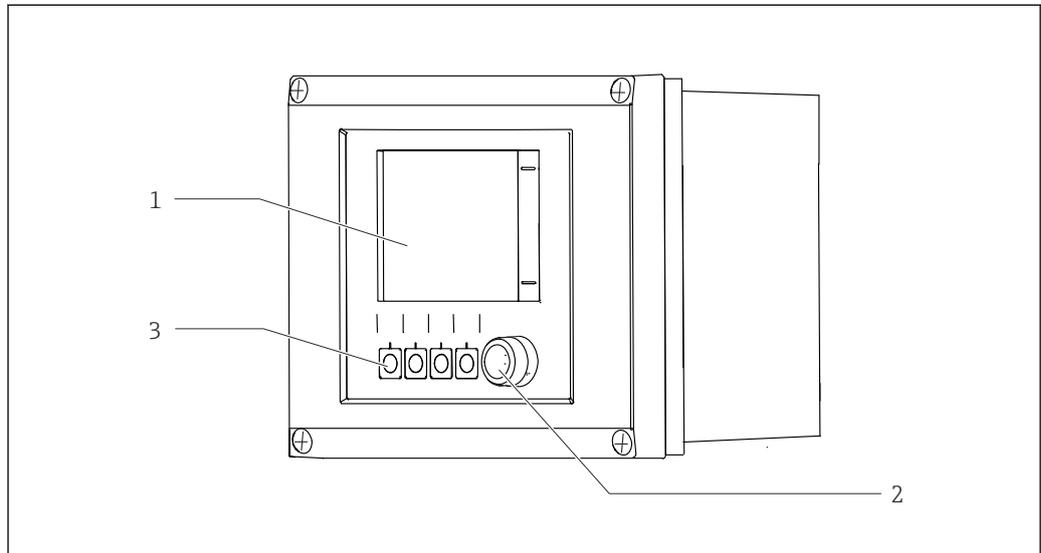
Electrical connection

- ▶ Are the mounted cables strain relieved?
- ▶ Are the cables routed without loops and cross-overs?
- ▶ Are the signal cables correctly connected as per the wiring diagram?
- ▶ Have all the other connections been established correctly?
- ▶ Are unused connection wires connected to the protective ground connection?
- ▶ Are all plug-in terminals securely engaged?
- ▶ Are all the connection wires securely positioned in the cable terminals?
- ▶ Are all cable entries mounted, tightened and leak-tight?
- ▶ Does the supply voltage match the voltage indicated on the nameplate?

7 Operation options

7.1 Overview of operation options

7.1.1 Display and operating elements



A0031833

45 Overview of operation

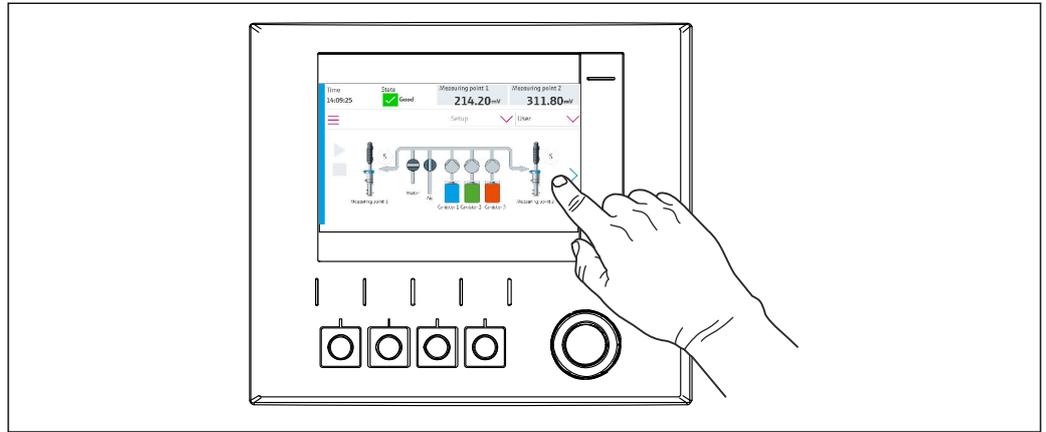
- 1 Touchscreen display
- 2 LED light
- 3 Soft keys (function selectable)

LED

Green	A program is active
Red	System error. Programs (e.g. cleaning or calibration programs) do not start.
Flashing red	The system has a Function Check (e.g. Hold), an Out of Spec or a maintenance message. The system can still be operated to a limited extent.
No light	No program is active and no errors are pending.

7.2 Access to the operating menu via the local display

7.2.1 Operating concept



A0033711

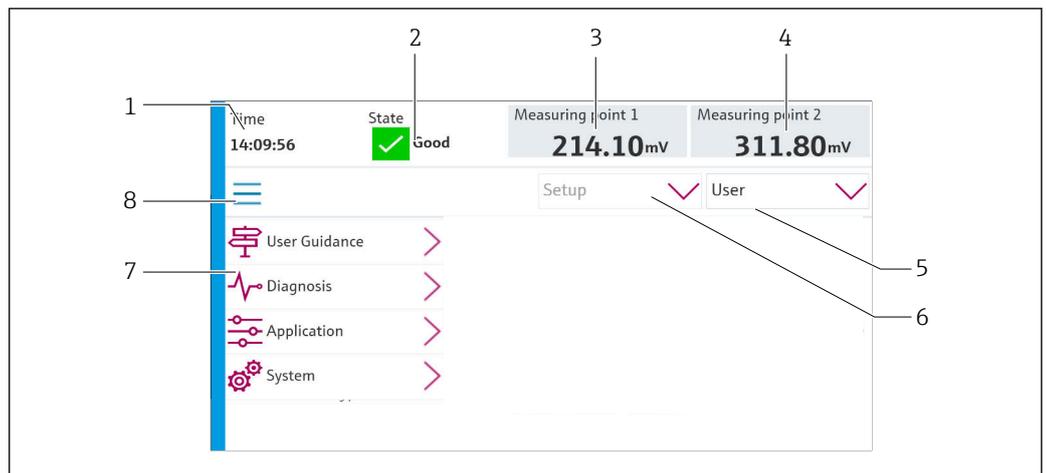
46 Touchscreen display

The CDC90 can be operated via a touchscreen display. Soft keys are also available for program operation.

7.2.2 Soft keys

You can start programs with the soft keys. The keys are preset and can be configured. Soft keys only work in the "Manual" operating mode. → 66

7.2.3 Menu overview



A0033714

Item	Function
1	Time
2	Display and fast access to the most important error message
3	Display and navigation to measuring point 1 and display of pH value or ORP value in mV
4	For one measuring point: second measured value of measuring point 1 and temperature value For two measuring points: display and navigation to measuring point 2 and display of pH value or ORP value in mV
5	User profile display and log-in

Item	Function
6	Operating mode
7	Overview of main menu
8	Navigation

Operation is via four main menus:

Menu	Function
Guidance	<ul style="list-style-type: none"> ▪ Guided operation to schedule and execute programs. ▪ Import and export files and settings.
Diagnostics	Contains information about device operation, diagnostics, troubleshooting and simulation.
Application	Device data for detailed measuring point adjustment. Setting for communication with the distributed control system.
System	These menus contain parameters for configuring and managing the overall system.

7.3 Access to the operating menu via the Web browser

The same menu options are available via the Web server as for the onsite display.

► Enter the following path: **192.168.0.1:8080/cdc90.htm**



If the IP address of the IPC has changed:

The correct IP address of the IPC followed by *:8080/cdc90.htm*

8 System integration

8.1 Integrating the measuring device in the system

8.1.1 Web server

Establishing the data connection

NOTICE

Depending on the load on the network, EtherCat can cause failures in the CDC90 IPCs if several CDC 90 devices are integrated.

- ▶ In the case of Modbus without a gateway, a physical separation must be established at the installation location with a VLAN-capable switch, e.g. Layer 2 Managed Switch (VLAN Capable).

The Ethernet settings of the **DHCP** parameter must be switched off for the device to have a valid IP address. (**Menu/Setup/General settings/Extended setup/Ethernet/Settings**)
The IP address can be assigned manually in the same menu (for point-to-point connections).

1. Start the PC.
2. First, configure a manual IP address in the network connection settings of the operating system.
3. Start the browser.
4. If you use a proxy server to connect to the Internet:
Disable the proxy (browser settings under "Connections/LAN settings").
5. Enter the IP address of the device (192.168.0.1:8080/cdc90.htm) in the address line.
 - ↳ The system takes a few moments to establish the connection and then the Web server starts.

Example: Microsoft Windows 10

6. Open Network and Sharing Center.
 - ↳ Apart from your standard network, it should also be possible to see an additional Ethernet connection (e.g. as "Unidentified network").
7. Select the link to this Ethernet connection.
8. In the pop-up window select the "Properties" button.
9. Double-click "Internet Protocol Version 4 (TCP/IPv4)".
10. Select "Use the following IP Address".
11. Enter the desired IP address. This address must be in the same subnet as the IP address of the device, e.g.:
 - ↳ IP address CDC90: 192.168.0.1
 - IP address for the PC: 192.168.0.99.
12. Start the Internet browser.
13. If you use a proxy server to connect to the Internet:
Disable the proxy (browser settings under "Connections/LAN settings").
14. Enter the IP address of your device in the address line.
 - ↳ The system takes a few moments to establish the connection and then the Web server starts.

Operation

i The menu structure of the web server corresponds to the onsite operation.

8.1.2 Fieldbus systems

NOTICE

The device uses an EtherCat connection for internal communication. Depending on the load on the network, EtherCat can cause failures in the CDC90 IPCs if several CDC90 devices are integrated in the same network.

- ▶ To reduce the network load in the event of a Modbus TCP connection, the networks must be separated. A physical separation with a VLAN-capable switch, e.g. Layer 2 Managed Switch (VLAN Capable), or a software-based separation are possible.

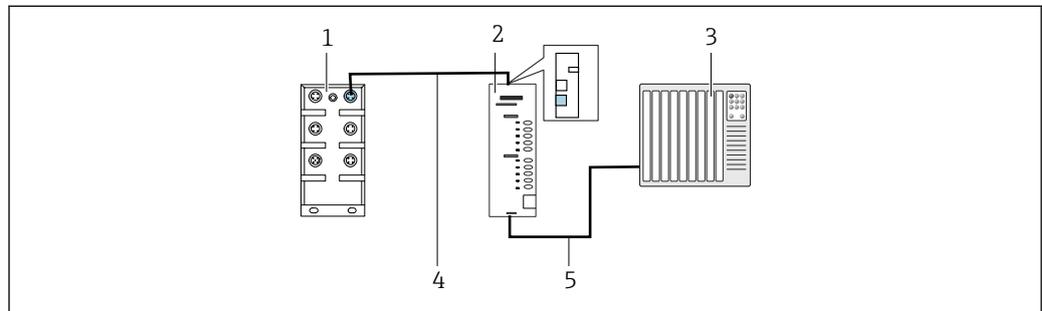
Connection

The following communication options are available in the CDC90 control unit:

- Analog current inputs and outputs
 - Activation is via the analog current input (AI).
 - Feedback is via the analog current output (AO).
 - The settings must be implemented via the Web server or the local display.
- EtherNet/IP (adapter)
- PROFIBUS DP (slave)
- Modbus TCP (server)
- PROFINET (device)

Connection of PROFINET and PROFIBUS DP via gateway

The gateway must be installed externally. A 3 m (3.28 ft) Ethernet cable is provided. The cable to the distributed control system must be provided by the customer.



A0044818

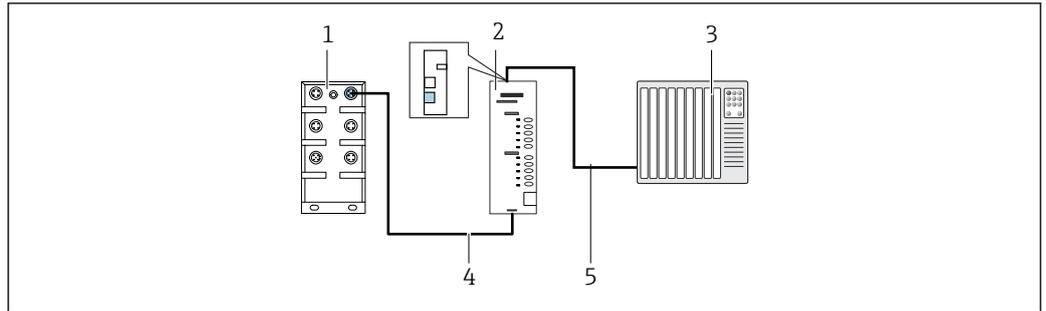
47 PROFINET and PROFIBUS DP communication connection

- 1 Ethernet switch on CDC90
- 2 Gateway
- 3 Distributed control system DCS
- 4 Ethernet cable, CDC90/gateway communication
- 5 Communication connection, gateway/distributed control system DCS

1. For connection to the CDC90, connect the Ethernet cable (4) at the top of the gateway.
2. Connect the end piece to the Ethernet switch (1).
3. For connection to the DCS, connect the cable for communication (5) at the bottom of the gateway.
4. Connect the end piece to the DCS (3).

Connection of EtherNet/IP via gateway

The gateway must be installed externally. A 3 m (3.28 ft) Ethernet cable is provided. The cable to the distributed control system must be provided by the customer.



A0044819

48 EtherNet/IP communication connection

- 1 Ethernet switch on CDC90
- 2 Gateway
- 3 Distributed control system DCS
- 4 Ethernet cable, CDC90/gateway communication
- 5 Communication connection, gateway/distributed control system DCS

1. For connection to the CDC90, connect the Ethernet cable (4) at the bottom of the gateway.
2. Connect the end piece to the Ethernet switch (1).
3. For connection to the DCS, connect the cable for communication (5) at the top of the gateway.
4. Connect the end piece to the DCS (3).

Modbus TCP connection to Ethernet switch

1. For connection to the CDC90, connect the Ethernet cable to the Ethernet switch.
2. Connect the end piece to the DCS.

Ethernet cable assignment

RJ45	Stand. cable		Ind. cable	M12
1	Amber	TxD-	Amber	3
2	Amber/White	TxD+	Yellow	1
3	Green	RxD-	Blue	4
4	Green/White	RxD+	White	2

Assignment of M12 connection

M12		M12
1	Yellow	1
2	White	2
3	Amber	3
4	Blue	4

RJ45 assignment to M12 connection

RJ45		M12
1	Yellow	1
3	White	2

2	Amber	3
6	Blue	4



More detailed information on fieldbus communication is provided on the product pages on the Internet:

- EtherNet/IP (adapter) via gateway Modbus TCP - EtherNet/IP: [BA02241C](#)
- Modbus TCP (server): [BA02238C](#)
- PROFIBUS DP (slave) via gateway Modbus TCP - PROFIBUS DP: [BA02239C](#)
- PROFINET (device) via gateway Modbus TCP - PROFINET: [BA02240C](#)

9 Commissioning

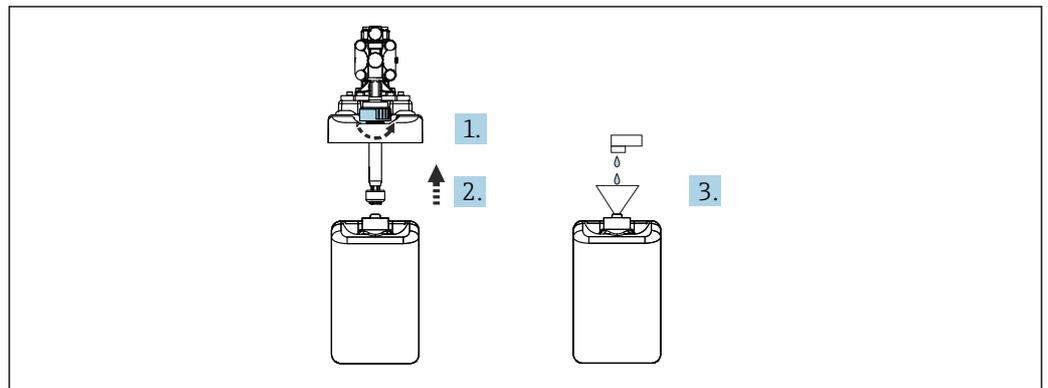
9.1 Preliminaries

9.1.1 Filling the canisters

- Fill the canisters as follows from left to right:

Canister (left to right)	Contents
1	Liquid 1 (e.g. cleaner, for version "Cleaning and calibration of pH sensors")
2	Liquid 2 (e.g. buffer 1, for version "Cleaning and calibration of pH sensors")
3	Liquid 3 (e.g. buffer 2, for version "Cleaning and calibration of pH sensors")

- i** We recommend you replace the buffers every 6 months. Pay attention to the expiry date on the canisters.



A0033912

1. Unscrew the float switch.
2. Remove the float switch with the cover and pump.
3. Fill the empty canister or replace it with a full one. Use a funnel when filling the canister.
4. Fit the cover with the pump and loose float switch onto the canister.
5. Screw the float switch into the canister.

9.2 Function check

⚠ WARNING

Incorrect connection, incorrect supply voltage

Safety risks for staff and device malfunctions!

- Check that all connections have been established correctly in accordance with the wiring diagram.
- Ensure that the supply voltage matches the voltage indicated on the nameplate.

NOTICE**Uncontrolled activation of pumps, valves or similar.**

Damage to devices.

- ▶ Perform the installation and function check.
- ▶ Ensure that all moving parts are correctly mounted.

 Operate the system only using liquids with a conductivity of > 10 nS/cm.

1. Mount the device and install it.
2. Connect the sensor with Memosens technology, which is precalibrated at the factory, to the assembly.

9.3 Switching on the measuring device

Preparation:

1. Familiarize yourself with the operation of the device before it is first switched on.
2. Pay attention to the "Basic safety instructions" section →  5.

Switching on the device

1. Energize the device. →  46
 - ↳ After power-up, the device performs a self-test and then goes to the measuring mode.
2. Watch out for possible effects on any actuators which may be connected.

During the device startup phase, the current outputs have an undefined status for a few seconds prior to initialization.

- ▶ Watch out for possible effects on any actuators which may be connected.

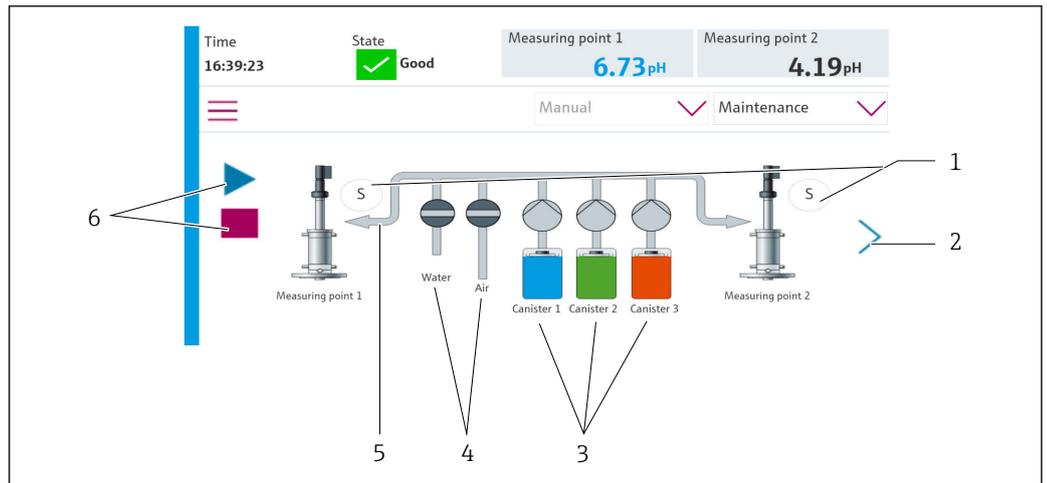
1. Fill the rinse chambers of the assembly with medium. See the documentation of the connected assembly.
 - ↳ The saved sensor-specific calibration data are automatically transmitted to the transmitter as soon as the transmitter is switched on. The measured value is displayed.
2. Check the transfer of the measured value to the distributed control system or the evaluation unit.

 Normally, you can accept this value without calibrating the sensor. Calibration is only required in the following cases:

- When very strict accuracy requirements apply.
- When the sensor has been in storage for longer than 3 months.

 Out of Specifications message active at start-up. This is because in a 1-channel system, the default programs for the second channel are also loaded. The message disappears automatically if the customized programs are imported per USB during commissioning.

9.3.1 Start screen



A0041476

Item	Function
1	Measuring or service position of assembly
2	Next page
3	Display of pumps for canisters 1-3
4	Valve (water or air) closed or open.
5	Visualization of the active medium, depending on the program.
6	Play symbol visible when program is running Stop button active and can be activated when program is running Control only possible when program is running.

To return to the start screen, go to the home icon in the menu path.

9.4 Configuring the measuring device

9.4.1 Configuring the language

The language can be configured and changed at all times on the local display, also during live operation.

- ▶ Select the desired language in the **System/Setup/Language** menu.
 - ↳ The user interface immediately appears in the selected language.

9.4.2 Setting the date and time

User role: **Maintenance**

Operating mode: **Setup**

→ 📅 65

- ▶ Change the **Date and Time** under: **System/Setup/Date and Time**

or

- ▶ Click directly on the time.
 - ↳ It can take a few seconds for the setting to be accepted.

9.4.3 Configuring system settings of the measuring points

User role: **Maintenance**

Operating mode: **Setup**

→  65

Path: System/Information/Measuring point		
Function	Options	Info
Measuring point	<ul style="list-style-type: none"> ▪ Serial number: ▪ Firmware ▪ Original extended order code ▪ Current extended order code 	<p>General information: Apart from the tag name of the order number, all the settings are preconfigured and cannot be modified.</p>
Assembly	<p>Choice of assemblies:</p> <ul style="list-style-type: none"> ▪ CPA4xx ▪ CPA8xx ▪ 	<p>Assembly: Select the assembly that is used in the measuring point. The signals of the limit position switches vary. This setting is used for the correct interpretation of the signals.</p>
Buffer value for ORP		<p>mV value of the ORP buffer used for calibration. Enter the buffer value that is indicated on the canister. If activated, every new calibration/adjustment result is compared with the previous adjustment result and an alarm is triggered if the limit values are exceeded</p>
Verification	<p>Options:</p> <ul style="list-style-type: none"> ▪ Min. offset Deviation between zero point/operating point ▪ Max. offset Deviation between zero point/operating point ▪ Min. delta slope ▪ Max. delta slope 	<p>The verification is activated by setting the limit values. After activation, calibration with adjustment is required. These determine the reference points of the verification. The verification is disabled again by setting all the limit values to 0.</p>

9.4.4 Configuring the system communication

User role: **Maintenance**

Operating mode: **Setup**

→ 65

Path: System/Connectivity		
Function	Options	Info
Modbus	Communication to DCS Byte order	Modbus information is communicated to the control station when Modbus is used as the fieldbus protocol For detailed information on "Modbus communication", see the product pages on the Internet
Ethernet	InformationEthernet <ul style="list-style-type: none"> ▪ IP address ▪ Used address area ▪ Subnetmask ▪ Gateway address 	Ethernet adapter settings The device occupies 7 consecutive IP addresses. These addresses must be free in the network. Example: configured IP address: 192.168.0.1 IP addresses 192.168.0.2 - 192.168.0.7 are also occupied.

9.4.5 Sensors

The device is preconfigured for the use of pH glass sensors.

If another sensor type is used (pH ISFET, ORP), another configuration file must be uploaded to the transmitter using an external display. This is performed by Endress+Hauser specialists during initial commissioning.

User role: **Maintenance**

Operating mode: **Setup**

→ 65

Path: System/Information/Sensor		
Function	Options	Info
Channel 1 or Channel 2	Sensor 1 or Sensor 2 <ul style="list-style-type: none"> ▪ Sensor type ▪ Serial number: ▪ Measuring point ▪ Hardwareversion ▪ Software version ▪ Date of commissioning Operating time <ul style="list-style-type: none"> ▪ Total ▪ Over max. operating temperature ▪ Below min. operating temperature Measured value: <ul style="list-style-type: none"> ▪ Number of sterilizations ▪ Number of calibrations ▪ Last calibration ▪ Last zero point calibration method Sensor specifications: Max. temperature:	List of sensor-specific information

9.4.6 Monitoring pilot valves

User role: **Maintenance**

Operating mode: **Setup**

→  65

Path: System/Operating counter/Valves		
Function	Options	Info
Valves	Display number of switching operations and warning limits of: <ul style="list-style-type: none"> ▪ Water ▪ Air ▪ Changeover valve ▪ 1 measuring point: configurable valve 8 on pilot valve manifold ▪ 2 measuring points: valves 8, 13, 14, 15, 16 on the pilot valve manifold 	Warning limit settings for the switching operations of the pilot valves.

9.4.7 Assembly

User role: **Maintenance**Operating mode: **Setup**→  65

Path: System/Operating counter/Assemblies		
Function	Options	Info
Assembly 1 or Assembly 2	Assembly 1 or Assembly 2 <ul style="list-style-type: none"> ▪ Number of strokes ▪ Warning limit 	Settings of the warning limit for the number of assembly strokes.

9.4.8 Pumps and canisters

User role: **Maintenance**Operating mode: **Setup**→  65

Path: System/Operating counter/Canister and Pump		
Function	Options	Info
Canister 1 and pump 1 or Canister 2 and pump 2 or Canister 3 and pump 3	Canister 1...3 <ul style="list-style-type: none"> ▪ Expiry date ▪ Filling level ▪ Max. filling level ▪ Warning limit Pump 1 ...3 <ul style="list-style-type: none"> ▪ Flow rate ▪ Pumped volume ▪ Warning limit ▪ Operating time ▪ Pump operating time ▪ Warning limit 	Settings for the expiry date, the maximum level, the flow and the warning limits for the canisters and pumps.  If level monitoring is used, the flow must be calculated after the installation of the system. For this, fill the canister to full capacity, start the pump by simulation and stop the time when the canister is completely empty. Flow = volume of canister/time in l/min

9.4.9 Calibration during commissioning

- Sensors with Memosens protocol are calibrated at the factory.
- Users must decide whether the process conditions present require calibration during initial commissioning.
- Additional calibration is not required in many standard applications.

- ▶ Calibrate sensors at sensible intervals depending on the process.



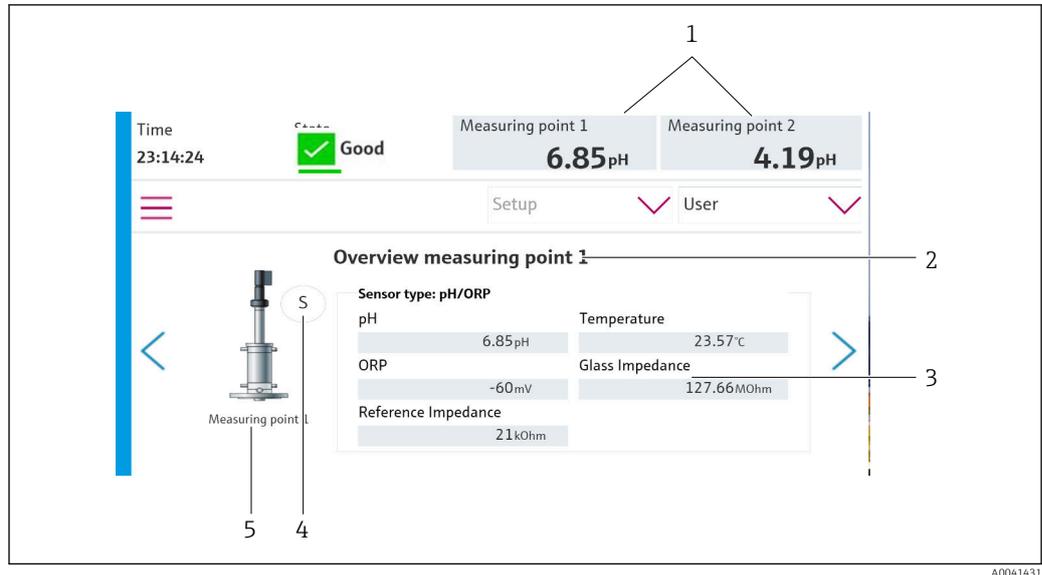
Operating Instructions "Memosens", BA01245C

9.4.10 Starting commissioning

Initial commissioning is performed by Endress+Hauser specialists.

10 Operation

10.1 Reading off measured values



49 Sample overview of a measuring point

Item	Function
1	Shortcut to measuring point overview
2	Measuring point 1 or 2
3	Main values
4	Assembly position
5	Assembly type CPA87x or CPA47x

10.2 Adapting the measuring device to the process conditions

10.2.1 User management

You can assign a password to all users in the **Admin** user role.

You can also deactivate user management.

Logged-in users can change their own password.

The user must log in as **Admin**.

1. Under **System/Setup/** go to **User Management**.
2. Under **User name:** select the user role.
3. Assign a password to the user role under **PIN:**.
4. Enter the PIN again under **Acknowledge PIN:**.
5. Select **OK** to save the changed password for the selected user.
6. If necessary, repeat the steps again and change the PIN for other users.

Default user name	Password
A (Admin)	0
M (Maintenance)	1
O (Operator)	2

User management

	Operator	Maintenance	Admin	User
Switch user management on and off			x	Read only rights to system (cannot make any settings apart from changing the language)
Change own password	x	x	x	
Change all passwords			x	
Change the operating mode	x	x		
Starting the programs	x	x		
Schedule programs		x		
Import/export data		x		
Settings in the System		x		
Settings in the Application menu		x		
Simulation of outputs	x	x		

10.2.2 Changing the operating mode

Operating modes:

- Setup
- Manual
- Automatic
- Remote

Changing the **Operation Mode**:

- ▶ Go to the **System/Setup/Operation Mode** menu.

Operation mode	Function
Setup	Used to configure the device and the application. Import/export programs, device configuration, system configuration, logbooks For example, the device addresses or the time can be changed. Changes to the scheduling of programs. No hardware is controlled in this operating mode.  This mode is used to perform maintenance activities. This mode ensures that no hardware activation can take place.
Manual	Used to manually operate the device. For example, configured programs can be started manually and outputs can be simulated. Operation of the soft keys is possible. The hardware is only controlled manually in this operating mode. No settings can be made.
Automatic	Used to control the device according to a defined schedule. Configured programs are started automatically at the scheduled time/date. The hardware is only controlled automatically in this operating mode. Soft keys cannot be activated here.
Remote	Used to control the device remotely. Configured programs can be controlled remotely via a selected protocol. The hardware is controlled exclusively by remote access in this operating mode. The soft keys cannot be activated here.

10.2.3 Managing soft keys

Programs can be assigned to the individual soft keys.

They are preassigned with the program IDs:

801: Service assembly 1

802: Measure assembly 1

803: Service assembly 2

804: Measure assembly 2

See in the "CDC90 program configuration tool" configuration tool under Programs.

If the programs for the IDs are changed, the assignment of the soft keys also changes.

If the program sequence is changed, this affects the assignment of the program to the soft key. The soft keys then need to be reassigned.

Programs can be assigned to the soft keys of the CDC90 control unit in order to quickly start the programs manually without calling up User Guidance.

Assigning programs to soft keys

Application/In-/Outputs/Softkeys:

1. Select the soft key.
2. Select the program under **Program selection**.
 - ↳ The assignment of the soft key is displayed under **Selected Program**.

Starting the program via the soft keys

Operating mode: manual

- ▶ Press the soft key for 3 seconds until the program starts.
 - ↳ The LED lights up green once the program starts.

Assign the soft keys in the local display

Required user role: maintenance

Operating mode: configuration

Path: Application/In-/Outputs/Softkeys

- ▶ Under soft key 1-4, select the desired program for **Program selection**
 - ↳ The program name appears under **Selected Program**.

Soft keys can be started remotely via DI13-16:

DI13 = Soft key 1

DI14 = Soft key 2

DI15 = Soft key 3

DI16 = Soft key 4

10.2.4 Configuring cleaning and calibration steps

The configuration is performed via an Excel-based configuration tool.

Steps

- Certain actions concerning sensor cleaning and/or calibration are divided into individual steps.
 - A step defines:
 - The state of the outputs (valves, DO).
 - The state of the inputs (DI).
- Steps 1-16 are preset, but users can define their own customized steps in steps 17-26.

Sequences

The sequences comprise the order and duration of the steps. The configuration tool contains pre-defined sequences (Seq1-8). User-defined sequences are possible from Seq9Cust1 to Seq15Cust7.

Predefined sequences can be integrated into the user-defined sequences.

Programs

A program is a sequence that has been assigned to a specific channel.

This section explains the configuration of the individual cleaning and calibration steps for sensors or calibrations. Some steps are already defined (default factory setting).

Other customized steps can be modified or added. This step configuration must be performed outside the device software using a configuration tool.

List of steps for cleaning

The device contains preconfigured steps:

ID	Name	Function
1	Service position	Sets the valves of the implicit channel to move the sensor to the service position. End condition: the step ends when it is possible to detect that the service position has been reached. A timeout should trigger an error. The timeout can be configured under Application/Operating type and units/ Measuring Point 1 or Measuring Point 2
2	Measuring position	Sets the valves of the implicit channel to move the sensor to the measure position. End condition: the step ends when it is possible to detect that the measure position has been reached. A timeout should trigger an error. The timeout can be configured under Application/Operating type and units/ Measuring Point 1 or Measuring Point 2
3	H2O + Service Pos.	Switches the water valve on and sets the valves of the implicit channel in such a way that the sensor is moved to the service position. Then switches the water valve off once the sensor has reached the service position The preconfigured step switches the outputs off again. The preconfigured step cannot be edited. A timeout should trigger an error. The timeout can be configured under Application/Operating type and units/ Measuring Point 1 or Measuring Point 2
4	H2O + Measure Position	Switches the water valve on and sets the valves of the implicit channel in such a way that the sensors are moved to the measure position ("sealing water"). Switches the water valve off once the sensor has reached the measure position. A timeout should trigger an error. The timeout can be configured under Application/Operating type and units/ Measuring Point 1 or Measuring Point 2
5	Hold On	If the HOLD function is switched on, this causes the measured values to "freeze" or a predefined measured value to be displayed. This concerns the analog and fieldbus outputs. This makes sense during a calibration. The HOLD behavior can be configured.

ID	Name	Function
6	Hold Off	"Unfreezes" the frozen measured values.
7	Abort + Service Pos.	In the event of an error, the program is aborted and the sensor goes to the service position
8	Abort + Measure Pos.	All the valves for media are closed and the sensor goes to the measuring position
9	Abort + Service Pos. + Hold On	Like Abort+Service with the Hold On function
10	Abort + Measure Pos. + Hold Off	Like Abort + Measure Pos with the Hold Off function
11	Air	Switches the air valve on for the indicated period of time and off again.
12	Water	Switches the water valve on for the indicated period of time and off again. The water valve then closes.
13	Pump 1	Pumps the medium out of canister 1 for the time indicated. Then stops afterwards
14	Pump 2	Pumps the medium out of canister 2 for the time indicated. Then stops afterwards
15	Pump 3	Pumps the medium out of canister 3 for the time indicated. Then stops afterwards
16	Wait	Delays the processing of the following step by the time indicated.
17 to 26	CustomStep1 to CustomStep10	Configurable steps

List of steps for calibration

The device contains preconfigured program steps for the calibration. The steps with the ID 5xx are used to send the command to the transmitter. These steps cannot be modified.

ID	Name	Function
500	Check Stability Criterion	The sensor is immersed in the buffer. The system can continue the calibration. Confirm in order to check the stability criteria of the sensor.
501	Start 1pt cal pH w/o adj	Starts a 1-point pH calibration without adjustment
502	Start 2pt cal pH w/o adj	Starts a 2-point pH calibration without adjustment.
503	Start 2pt cal pH + adj	Starts a 2-point pH calibration with adjustment.
504	Start cal ORP w/o adj	Starts a 1-point ORP (mV) calibration without adjustment.
505	Start cal ORP + adj	Starts a 1-point ORP (mV) calibration with adjustment.

Programming a verification

Verification for pH

1. Go to the **System/Information/Measuring Point** menu.
2. Change the limits for Delta Slope or Zero Point $\llcorner \triangleright$ 0.
3. Start a pH program with adjustment to determine the reference values for the verification.

4. Start the pH program without adjustment.
 - ↳ The differences compared to the last adjustment are calculated in the logfile and the message S1406 is displayed if the indicated values are exceeded or undershot.

Verification for ORP

1. Go to the **System/Information/Measuring Point** menu.
2. Change the buffer limits for ORP <> 0.
3. Start an ORP program with adjustment to determine the reference values for the verification.
4. Start an ORP program for adjustment.
 - ↳ The differences compared to the last adjustment are calculated in the logfile and the message S1406 is displayed if the indicated values are exceeded or undershot.

The verification is activated by setting the limit values. After activation, calibration with adjustment is required.

Assigning valves, inputs and outputs to the steps

In this section, the user specifies which preconditions must be met so that a step can be executed, and defines which outputs are set to which state as a result of the step.

It is possible to enter additional values in order to switch additional outputs, for example, or to define customized steps in the "CustomSteps" section.

Applications:

- Definitions of the outputs for assembly retraction via the valves.
- Open and close valves statically.
- Delay switching operations until a certain state is reached.

	Assembly	Output/valves	Input
ON		Is set to "ON" at the start of a step. Returns to the original state at the end of the step.	Step triggers an error if the input is not set to "ON" at the start.
OFF		Is set to "OFF" at the start of a step. Return to the original state at the end of the step.	Step triggers an error if the input is not set to "OFF" at the start.
S:ON		Is set to "ON" at the start of a step and remains "ON" after the step. Is only set to "OFF" again by S:OFF. (Static "ON")	
S:OFF		Switches off a static "S:ON".	
S	Assembly moves to the service position at the start of the step. At the end of the step, the assembly moves back to the position before the step.		
M	Assembly moves to the measure position at the start of the step. At the end of the step, the assembly moves back to the position before the step.		

additional program is planned during an active program, the program is not executed and not shifted.

Schedules for Automatic Mode							
ID	Name	Program	Days	Start	End	Periodic [min]	Comment
1	Example1	805	Mon,Tue,Wed,Thu,Fri,Sat,Sun	00:00	23:30	30	Periodically every 30 minutes
2	Example2	806	Mon,Wed,Fri	08:10			Every second day at 8:10
3							

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52 Example of detailed scheduling of sequences

Fixed date and time for program to start

1. Open the configuration tool.
2. Select the **Programs** tab.
3. Under **Schedules for Automatic Mode**, in the Program column, select the desired program from the drop-down menu.
4. Schedule the program by selecting the days and enter a time in the "Start" column.
 - ↳ The program is now assigned a day and time and is executed automatically in the automatic operating mode.
5. Save the configuration tool.
6. Export to CSV if no additional configurations are made in the tool.

Setting a periodic schedule for a program

1. Select the program.
2. Set the days.
3. In the "Start" column, specify the first starting time of the day at which the cyclic program runs for the first time on that day.
4. Enter 00:00 as the starting time for the cyclic execution of programs over the entire day.
5. In the "End" column, specify the last starting time of the day at which the cyclic program runs for the last time on that day. The end time must be a multiple of the interval and is the last time the program starts on this particular day. The end time + interval may not be after 00:00 (midnight).
6. Enter the interval in minutes in the "Periodic[min]" column. The end time must be a multiple of "Periodic"!

Example in the graphic : The program with the ID 805 starts every 30 minutes each day for the entire day: first start at 00:00, last start at 23:30.

Importing or exporting csv files from the configuration tool

User role: **Maintenance**

Operating mode: **Setup**

The following files can be imported or exported:

Programs	csv files generated with the configuration tool
System configuration	Data for system configuration, e.g. serial number. System configuration is specific for every device.
Device configuration	Settings, e.g. warning limits, for the devices
Operating data	All data that are measured and determined
Logbook	Data from the event logbook and calibration logbook

Exporting the program configuration

1. Open the configuration tool.
2. Select the **Export CSV** tab.
3. Click **Export to CSV**.
 - ↳ The configuration tool creates a cfg folder in the background. This folder contains all the CSV files for each individual tab.
4. Save the "cfg" folder on a storage medium (USB) in the following folder structure: / public

Importing the program configuration

1. Open the display cover of the control unit. →  32
2. Plug the USB stick into the port provided on the IPC.
3. In the software, navigate to **User Guidance/Service/Import / Export**.
4. Once the USB stick is recognized (this can take up to 30 seconds), follow the instructions of the **Import / Export Assistant**.
 - ↳ The **Start assistant** button appears in magenta.
5. If the USB stick is not recognized, the **Start** button is gray and the **Reboot** button is enabled. The system can then be rebooted with the USB stick and the USB stick will be recognized afterwards.
6. Select **Import** and click **Next**
7. Select the programs and click **Next**
 - ↳ The programs are imported automatically.
8. As soon as the import is finished, click **Complete** to exit User Guidance.
9. Remove the USB stick once the dialog box closes.
10. Close the display cover.
11. Repeat the steps above if reading/writing is unsuccessful.

An "Out of Spec" message is displayed if invalid steps or sequences have been imported. The invalid programs are grayed out and cannot be started.

Programs with invalid content cannot be started, e.g. calibration programs/steps in a device with cleaning only. The message disappears automatically as soon as programs are imported again and do not contain any invalid steps/sequences.

10.2.6 Running the programs

Running the program manually

User role: **Maintenance** or **Operator**

Programs can be started in the **Operation mode Manual** if no errors are pending.

1. Navigate to: **User Guidance/Configuration/Program**.
2. Start the **Program Assistant**.
3. Follow the instructions of the **Program Assistant**.
 - ↳ An overview of the programs is displayed.
4. Select the desired program and click **Next**.
5. Click the play button to start the program.
 - ↳ An overview of the steps is displayed.
6. Select **Next** and then **Finish** to quit the wizard.
 - ↳ The program is not stopped.

Explanation of buttons

Play button magenta	The program can be started
Play button blue	The program is running
Stop button magenta	The program can be stopped
Stop button gray	Cannot currently be selected

10.2.7 Configuring sequences and programs in the HMI**Programming sequences**User role: **Maintenance**Operating mode: **Setup**

1. Go to the **User Guidance/Configuration/Sequences** menu.
2. Select the sequence to be edited.
3. Click **Next**.
4. Delete the step with "-".
5. Create a new step at the same position with "+".
6. Select the desired step from the list.
7. Specify the duration of the step for the measuring points.
8. Click **Next**.
9. Click **Next**.
10. Press **Complete** to confirm.

Compiling programsUser role: **Maintenance**Operating mode: **Setup**

1. Go to the **User Guidance/Configuration/Program** menu.
2. Select the program to be edited.
3. Click **Next**.
4. Delete the program with "-".
5. Create a new program at the same position with "+".
6. Select the desired sequence from the list.
7. Select the channel on which the sequence should be executed.
8. Assign a program name.
9. Click **Next**.
10. Click **Next**.
11. Press **Complete** to confirm.

Editing the schedulingUser role: **Maintenance**Operating mode: **Setup**

1. Go to the **User Guidance/Configuration/Schedules** menu.
2. Delete the schedule with "-".
3. Create a new schedule at the same position with "+".

4. Select the program ID from the list.
5. Specify the schedule for the measuring points.
6. Specify the start time, end time and the period.
7. Click **Next**.
8. Press **Complete** to confirm.

10.2.8 Creating autostart programs

An autostart program makes it possible to create a program that is automatically executed following a failure or reboot.

User role: **Maintenance**

Operating mode: **Setup**

Programs can be started in the **Operation mode Manual** if no errors are pending.

1. Navigate to: **Application/Operating type and units/Measuring point 1 or Measuring point 2**.
2. In the **Autostart**, select the desired program.

10.2.9 Selecting communication

Selecting communication for local operation

User role: **Maintenance**

Operating mode: **Setup**

External communication is always disabled at the factory even if fieldbus communication has been ordered. This communication must be enabled if the connection to the gateway or DCS has been established. As soon as the fieldbus is enabled, the communication is checked. If the communication is not working, the message S1003 is displayed.

1. Navigate to: **Application/Communication**
 - ↳ The configured communication protocol is visible under **Selected communication**.
2. Select the desired communication protocol under **Communication selection**.
3. Click **Accept**.

Communication protocols

- Analog
- EtherNet/IP
- Modbus/TCP
- PROFIBUS DP
- PROFINET

10.2.10 Monitoring inputs and outputs

- ▶ Open the following menu to monitor or troubleshoot the inputs and outputs: **Application/In-/Outputs**.
 - ↳ The following signals and their states are displayed:

Digital inputs

- DI 1 assembly 1 end position 1
- DI 2 assembly 1 end position 2
- DI 3 assembly 2 end position 1
- DI 4 assembly 2 end position 2
- Configurable DI 5 to DI 12
- Soft key 1 to soft key 4

Digital outputs

- Status of the assemblies
- Program active
- Alarm active
- DO 1 to DO 10: user configurable DO
- DO 11 and DO 12 for operating mode
 - 0 / 0 = setting
 - 1 / 0 = manual
 - 0 / 1 = automatic
 - 1 / 1 = remote access
- DO 13: position of assembly 1 (0 = service, 1 = measure)
- DO 14: position of assembly 2 (0 = service, 1 = measure)
- DO 15: program status (0 = no program active, 1 = program active)
- DO 16: alarm status (0 = alarm, 1 = no alarm)

Analog outputs

DCS output current value

Pilot valves

- V 1: Compressed air control for assembly measuring position, 1st measuring point
- V 2: Compressed air control for assembly service position, 1st measuring point
- V 3: Compressed air control for process valve, water
- V 4: Compressed air control for process valve, air
- V 5: Pump 1 / liquid canister 1 (left)
- V 6: Pump 2 / liquid canister 2 (center)
- V 7: Pump 3 / liquid canister 3 (right)
- V 8: User-configurable valve
- V 9: Compressed air control for changeover valve, top, 1st measuring point
- V 10: Compressed air control for changeover valve, bottom, 2nd measuring point
- V 11: Compressed air control for assembly measure position, 2nd measuring point
- V 12: Compressed air control for assembly service position, 2nd measuring point
- V 13 to 16: User-configurable valves

10.2.11 Current outputs

Current outputs to transmit measured values on an additional analog card can only be configured with an external display or via the web server of an external transmitter.

Please contact your Endress+Hauser sales organization for the configuration of the current outputs.

11 Diagnostics and troubleshooting

11.1 General troubleshooting

11.1.1 Simulating the inputs and outputs

The pilot valves and outputs can be simulated for test purposes, e.g.:

- Opening or closing of the pilot valves for the assembly position or the pumps
- Program and alarm status
- Switching of the compressed air on and off

Configuring the simulation

User role: **Maintenance** or **Operator**

Operating mode: **Manual**

1. Navigate to: **Diagnosis/Simulation**.
2. Set or disable the following values:

Pilot valves

- Compressed air of assemblies
- Positions of assemblies
- Water
- Pressure
- Pump 1 to 3
- Changeover valves
- Configurable valves

Move assembly to measuring position:

1. Switch on the pilot valve **Assembly 1 measuring position (NC)**.
2. Shortly after this, switch on the pilot valve for *position assembly***Assembly 1 service position (NO)**.

Move assembly to service position:

1. First switch off the pilot valve **Assembly 1 service position (NO)**
2. Shortly after this, switch off the pilot valve **Assembly 1 measuring position (NC)**



- Pilot valves 1 and 2 for assembly 1
Pilot valves 11 and 12 for assembly 2

Digital outputs

- Status of the assemblies
- Program active
- Alarm active
- Configurable DO 1 to DO 10

11.2 Overview of diagnostic information

11.2.1 Diagnostics list

All the current diagnostic messages are listed here. A time stamp is available for each message. In addition, the configuration and the description of the message are displayed.

Path 1: **Diagnosis/Current**, most important message pending

Path 2: **Diagnosis/Diagnosis list**, list of all the messages currently pending (if several are active simultaneously)

The following values are determined:

- Description of message
- Measuring Point
- Component
- Description
- State
- Date and time of **Message appears**
- Date and time of **Message disappears**

11.2.2 Device-specific, general diagnostic messages

Namur status	Error number	Error message	Troubleshooting
F Failure	1000		Communication between the controller and pilot valve manifold is interrupted ▶ Check the connection between the devices.
F Failure	1001		Communication between the pilot valve manifold and the remote IO is interrupted. ▶ Check the connection between the devices.
F Failure	1002		Communication between the valve manifold and the remote IO is interrupted. ▶ Check the connection between the devices.
S Out of Spec	1003		The communication between the controller and the distributed control system (for Modbus TCP) or the gateway (for Profibus, Profinet, EtherNet/IP) is interrupted. ▶ Check the connection between the devices.
F Failure	1100		No float switch signal. 1. Fill the canisters. 2. Replace the float switch. 3. Check the cable connection.
M Maintenance	1101		Limit for residual volume of liquid reached ▶ Fill the canisters.
M Maintenance	1102		Canisters past expiry date. ▶ Replace the canisters.
M Maintenance	1200		Warning limit for delivery volume of pump reached ▶ Service or replace pump.
M Maintenance	1201		Operating time of pump exceeded ▶ Service or replace pump.
F Failure	1300		Compressed air below the limit value is not measured. Check if all air pipes are leak-tight. ▶ Check pressure supply unit.

Namur status	Error number	Error message	Troubleshooting
M Maintenance	1301		Number of switching operations of the purge air valve is exceeded.
M Maintenance	1302		Number of switching operations of the water valve is exceeded.
M Maintenance	1303		Number of switching operations of the changeover valve is exceeded.
M Maintenance	1304		Number of switching operations of the customer valve is exceeded.
S Out of Spec	1400		<p>Program file is incorrect. Invalid program loaded. For example, program for channel 2 even though this is a 1-channel device; calibration program in a cleaning device. In the case of 1-channel devices, this message is always active during initial commissioning as programs for the 2nd channel are also loaded at the factory. The message disappears automatically when the customer programs have been uploaded.</p> <ol style="list-style-type: none"> 1. Check the file path. 2. Check the file.
S Out of Spec	1401		<p>Invalid step in program.</p> <ul style="list-style-type: none"> ▶ Correct the program.
S Out of Spec	1402		<p>Invalid command sent. For example, if an attempt is made to start a program even though an error is currently active on this channel. The message disappears automatically when a program is started again successfully.</p> <ol style="list-style-type: none"> 1. Check the channel number. 2. Check the program ID.
F Failure	1403		<p>Error in calibration.</p> <ol style="list-style-type: none"> 1. Check the shelf life of the buffer. 2. Remove the sensor and check for dirt. 3. Check the hose connections 4. Make sure enough buffer is pumped in the assembly. 5. Calibrate again and if the error persists replace the sensor.
F Failure	1404	Step precondition breached.	<p>The preconditions requested in the program step (e.g. status of the digital inputs) have not been satisfied.</p> <ul style="list-style-type: none"> ▶ Check the inputs
S Out of Spec	1405		<p>Collision of multiple program starts</p> <ul style="list-style-type: none"> ▶ Check the scheduling
S Out of Spec	1406		<p>Limit values for verification exceeded or undershot.</p> <ol style="list-style-type: none"> 1. Check buffer 2. Start a new calibration without adjustment.

Namur status	Error number	Error message	Troubleshooting
M Maintenance	1500		Warning limit for movements exceeded. The assembly must be serviced.
F Failure	1501		Assembly position not defined. <ol style="list-style-type: none"> 1. Check the configuration of the assembly type in the system settings. 2. Check whether the assembly can insert/retract freely. 3. Check pneumatic connections. 4. Check limit position switches
C Function check	216	Hold active	Output values and status of the channel are on hold.
F Failure	374	Sensor check	No measurement signal from sensor <ol style="list-style-type: none"> 1. Check sensor connection 2. Check sensor. 3. Replace sensor if necessary.
C Function check	951	Hold active CH1	Output values and status of the channels are on hold. <ul style="list-style-type: none"> ► Wait until the hold is deactivated again
C Function check	952	Hold active CH2	
F Failure	992	pH calc. range	pH calculation outside the measuring range
F Failure	993	rH calc. range	rH calculation outside the measuring range
F Failure	002	Sensor unknown	► Replace the sensor.
F Failure	004	Sensor defective	► Replace the sensor.
F Failure	005	Sensor data invalid	<ol style="list-style-type: none"> 1. Check firmware compatibility of sensor and transmitter 2. Set the sensor to the factory settings, disconnect the sensor and reconnect it. 3. Update transmitter data. 4. Replace the sensor.
F Failure	010	Sensor scanning	► Wait for initialization to be finished.
F Failure	013	Sensor type wrong	Sensor does not suit the device configuration or device configuration must be changed to new type of sensor <ol style="list-style-type: none"> 1. Change to a sensor of the type that is configured. 2. Adapt the device configuration to the connected sensor.
F Failure	018	Sensor not ready	Sensor communication blocked <ol style="list-style-type: none"> 1. Sensor fails tag check. Replace. 2. Internal software error. Contact the Service Department.
F Failure	022	Temperature sensor	Temperature sensor defective <ul style="list-style-type: none"> ► Replace the sensor.
F Failure	061	Sensor electronic	Sensor electronics defective <ul style="list-style-type: none"> ► Replace the sensor.

Namur status	Error number	Error message	Troubleshooting
F Failure	062	Sensor connection	<ol style="list-style-type: none"> 1. Check sensor connection. 2. Contact the Service Department.
F Failure	100	Sensor communication	Sensor not communicating. <ol style="list-style-type: none"> 1. Check sensor connection. 2. Check sensor connector. 3. Contact the Service Department.
F Failure	101	Sensor incompatible	<ol style="list-style-type: none"> 1. Update sensor firmware 2. Replace the sensor. 3. Contact the Service Department.
C Function check	107	Calibration active	► Wait for calibration to be finished.
F Failure	120	Sensor reference	Reference warning, impedance of reference too low
M Maintenance	121	Sensor reference	Measuring can continue until the alarm (120) occurs. <ol style="list-style-type: none"> 1. Check reference for clogging/contamination. 2. Clean reference/junction. 3. Replace the sensor.
F Failure	122	Sensor glass	Impedance limit values exceeded/undershot
M Maintenance	123	Sensor glass	Measuring can continue until the alarm (122, 124) occurs.
F Failure	124	Sensor glass	
M Maintenance	125	Sensor glass	<ol style="list-style-type: none"> 1. Inspect sensor for hair-line cracks and breakage. 2. Check or change limit values. 3. Replace the sensor.
M Maintenance	126	Sensor check	Sensor condition check (SCC), poor sensor condition Glass membrane fouled or dry, junction blocked <ol style="list-style-type: none"> 1. Clean sensor, regenerate 2. Replace the sensor.
M Maintenance	127	Sensor check	Sensor condition check (SCC), adequate sensor condition
F Failure	128	Sensor leakage	Leak current alarm Defective due to abrasion or damage Damage to the gate (only ISFET) ► Replace the sensor.
M Maintenance	129	Sensor leakage	Leak current warning Measuring can continue until the alarm occurs
F Failure	130	Sensor supply	Poor sensor power supply <ol style="list-style-type: none"> 1. Check sensor connection. 2. Replace the sensor.
M Maintenance	179	Operating time	Operating hours > 300 mV, measurement can still take place <ol style="list-style-type: none"> 1. Replace the sensor. 2. Change monitoring limit. 3. Disable monitoring.

Namur status	Error number	Error message	Troubleshooting
M Maintenance	180	Operating time	Operating hours < -300 mV, measurement can still take place <ol style="list-style-type: none"> 1. Replace the sensor. 2. Change monitoring limit. 3. Disable monitoring.
M Maintenance	193	Operating time	Operating hours > 80 °C (176 °F), measurement can still take place <ol style="list-style-type: none"> 1. Replace the sensor. 2. Change monitoring limit. 3. Disable monitoring.
M Maintenance	194	Operating time	Operating hours > 100 °C (212°F), measurement can still take place <ol style="list-style-type: none"> 1. Replace the sensor. 2. Change monitoring limit. 3. Disable monitoring.
M Maintenance	199	Operating time	Total operating hours
M Maintenance	408	Calibration aborted	Calibration aborted
M Maintenance	500	Sensor calibration	Calibration aborted, main measured value varies Reasons: sensor too old, sensor occasionally dry, calibration value not constant <ol style="list-style-type: none"> 1. Check sensor. 2. Check calibration solution.
M Maintenance	501	Sensor calibration	Calibration aborted, temperature measured value varies Reasons: sensor too old, sensor occasionally dry, temperature of calibration solution not constant <ol style="list-style-type: none"> 1. Check sensor. 2. Regulate calibration solution temperature.
M Maintenance	505	Sensor calibration	Max. zero point warning, measurement can still take place Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated <ol style="list-style-type: none"> 1. Check or replace sensor. 2. Check or replace calibration solution. 3. Repeat calibration.
M Maintenance	507	Sensor calibration	Min. zero point warning, measurement can still take place Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated <ol style="list-style-type: none"> 1. Check or replace sensor. 2. Check or replace calibration solution. 3. Repeat calibration.

Namur status	Error number	Error message	Troubleshooting
M Maintenance	509	Sensor calibration	<p>Min. slope warning, measurement can still take place</p> <p>Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated</p> <ol style="list-style-type: none"> 1. Check or replace sensor. 2. Check or replace calibration solution. 3. Repeat calibration.
M Maintenance	511	Sensor calibration	<p>Max. slope warning, measurement can still take place</p> <p>Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated</p> <ol style="list-style-type: none"> 1. Check or replace sensor. 2. Check or replace calibration solution. 3. Repeat calibration.
M Maintenance	515	Sensor calibration	<p>Max. operating point warning, measurement can still take place</p> <p>Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated</p> <ol style="list-style-type: none"> 1. Check or replace sensor. 2. Check or replace calibration solution. 3. Repeat calibration.
M Maintenance	517	Sensor calibration	<p>Min. operating point warning, measurement can still take place</p> <p>Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated</p> <ol style="list-style-type: none"> 1. Check or replace sensor. 2. Check or replace calibration solution. 3. Repeat calibration.
M Maintenance	518	Sensor calibration	<p>Delta slope warning, measurement can still take place</p> <p>Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated</p> <ol style="list-style-type: none"> 1. Check or replace sensor. 2. Check or replace calibration solution. 3. Repeat calibration.

Namur status	Error number	Error message	Troubleshooting
M Maintenance	520	Sensor calibration	Delta zero point warning, measurement can still take place Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated <ol style="list-style-type: none">1. Check or replace sensor.2. Check or replace calibration solution.3. Repeat calibration.
M Maintenance	522	Sensor calibration	Delta operating point warning, measurement can still take place Possible reasons: sensor old or defective, reference blocked, calibration solution too old or contaminated <ol style="list-style-type: none">1. Check or replace sensor.2. Check or replace calibration solution.3. Repeat calibration.
F Failure	722		Impedance of reference membrane too low. <ol style="list-style-type: none">1. Check or replace sensor.2. Check/correct reference limit value.

11.2.3 Process errors without messages



Operating Instructions "Memosens", BA01245C

11.3 Event logbook

11.3.1 Calibration results

All the current calibration events are listed here. A time stamp is available for each event.

Logbooks as SQLite database

The logbooks can be exported as an SQLite database.

User role: **Maintenance**

Operating mode: **Setup**

► Select the **User Guidance/Import / Export/** menu.

View the calibration results

The following values are displayed:

- Measuring point
- Parameter
- Sensor serial number
- Sensor-specific calibration data
- Number of measuring points
- Results

► Select the **Diagnosis/Logbook/Calibration events** menu.

11.3.2 Diagnostic events

Lists of diagnostic events. Select a particular event to display more detailed information.

Path: **Diagnosis/Logbook/Diagnosis events**

Details of the diagnostic message:

- Message ID
- Name
- Time stamp
- Measuring point
- Status of the message

11.4 Resetting the measuring device

- ▶ Contact the Endress+Hauser Service Department to reset the device.

11.5 Firmware history

11.5.1 Update

- ▶ Contact the Endress+Hauser Service Department.

12 Maintenance

⚠ WARNING

Process pressure and temperature, contamination, electrical voltage

Risk of serious or fatal injury

- ▶ If the sensor has to be removed during maintenance work, avoid hazards posed by pressure, temperature and contamination.
- ▶ Before opening, ensure the device is de-energized.
- ▶ Power can be supplied to switching contacts from separate circuits. De-energize these circuits before work is performed on the terminals.

⚠ CAUTION

Moving assembly

Risk of injury

- ▶ Set the operating mode to configuration before commencing the maintenance work.

⚠ CAUTION

Automatic mode during calibration or maintenance work

Risk of injury from the movement of the assembly, chemicals or contaminated media

- ▶ Before hoses are removed, make sure that no operation is currently running or about to start.
- ▶ Set the device to the configuration mode.
- ▶ Wear protective clothing, goggles and gloves or take other suitable measures to protect yourself.
- ▶ In the case of remote control, set the device to the configuration mode and make sure that no other actions are running.

⚠ CAUTION

Failure to observe the maintenance intervals

Risk of personal injury and damage to property

- ▶ Comply with the recommended maintenance intervals.

NOTICE

Electrostatic discharge (ESD)

Risk of damaging the electronic components

- ▶ Take personal protective measures to avoid ESD, such as discharging beforehand at PE or permanent grounding with a wrist strap.
- ▶ For your own safety, only use genuine spare parts. With genuine parts, the function, accuracy and reliability are also ensured after maintenance work.

12.1 Cleaning

- ▶ Clean surfaces using only a damp cloth. Observe the warning notices on the devices.
- ▶ Clean the front of the housing using commercially available cleaning agents only.

The front of the housing is resistant to the following in accordance with DIN 42 115:

- Ethanol (for a short time)
- Diluted acids (max. 2% HCl)
- Diluted bases (max. 3% NaOH)
- Soap-based household cleaning agents

NOTICE

Cleaning agents not permitted

Damage to the housing surface or housing seal

- ▶ Never use concentrated mineral acids or alkaline solutions for cleaning.
- ▶ Never use organic cleaners such as acetone, benzyl alcohol, methanol, methylene chloride, xylene or concentrated glycerol cleaner.
- ▶ Never use high-pressure steam for cleaning.

12.1.1 Pneumatic control unit

Weekly	Annually
<ol style="list-style-type: none"> 1. Verify the leak-tight condition of compressed air connections on: <ul style="list-style-type: none"> ▪ Pilot valves ▪ Pumps 2. Check the level of buffer and cleaning solution, top up if necessary. 3. Verify that the multihose connections are leak-tight. 4. Check pumps for leaks. 	<ol style="list-style-type: none"> 1. Check if interior is clean, dry and free from corrosion. <ul style="list-style-type: none"> ▪ Clean and dry the interior area. ▪ Verify that seals, couplings and pumps are leak-tight and undamaged. ▪ In the event of corrosion, replace the affected parts. 2. Tighten terminals. 3. Test the level measurement for the buffer and cleaning canisters.

12.1.2 Sensors



Make sure to refer to the sensor operating instructions for information on servicing and troubleshooting the sensor.

CAUTION

Programs not switched off during maintenance activities.

Risk of injury due to medium or cleaning agent!

- ▶ Quit any programs that are active.
- ▶ Switch to the Service Mode before you remove sensors from the assembly.
- ▶ If you need to test the cleaning function while cleaning is in progress, wear protective clothing, goggles and gloves or take other suitable measures to protect yourself.

Replacing the sensor while ensuring measuring point availability

If an error occurs or the maintenance schedule stipulates that the sensor has to be replaced, use a new sensor, or a sensor that has been precalibrated in the laboratory.

- A sensor is calibrated in the laboratory under optimum external conditions, thereby ensuring better quality of measurement.
- You must perform onsite calibration if you use a sensor that is not precalibrated.

1. Remove the sensor that requires maintenance.
2. Install the new sensor.
 - ↳ The sensor data are automatically accepted by the transmitter. A release code is not required.
 - Measurement is resumed.
3. Take the used sensor back to the laboratory.
 - ↳ In the laboratory get the sensor ready for reuse while ensuring the availability of the measuring point.

Prepare the sensor for reuse

1. Clean sensor.
 - ↳ For this purpose, use the cleaning agent specified in the sensor manual.
2. Inspect the sensor for cracks or other damage.

3. If no damage is found, regenerate the sensor. Where necessary, store the sensor in a regeneration solution (→ sensor manual).
4. Recalibrate the sensor for reuse.

12.1.3 Assemblies



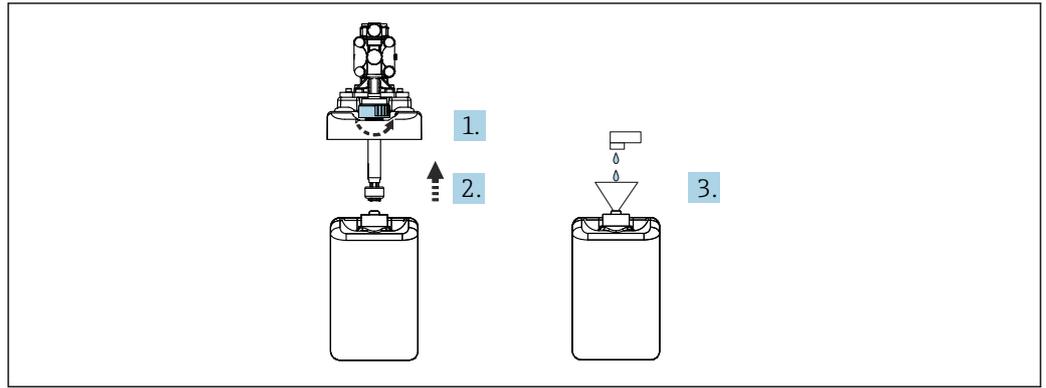
Refer to the assembly operating instructions for information on servicing and troubleshooting the assembly. The assembly operating manual describes the procedure for mounting and disassembling the assembly, replacing the sensors and seals, and contains information on the material resistance properties, as well as on spare parts and accessories.

Interval	Activities
Weekly	<ol style="list-style-type: none"> 1. Check the top section of the assembly for compressed air leaks and mechanical damage. 2. Check that the process connection is leak-tight in relation to the process and check for mechanical damage. 3. Check compressed air pipes and connections for leaks and mechanical damage.
Monthly	<ol style="list-style-type: none"> 1. Check the retraction of the assembly to the measuring and service position. 2. Clean and lubricate the retraction pipe of the assembly regularly.
Annually and as required	<ol style="list-style-type: none"> 1. Clean the assembly on the outside if necessary. To replace the seal, the assembly must be clean, dry and decontaminated. 2. In the event of an inductive feedback signal, check the switching distance and adjust if necessary. <ol style="list-style-type: none"> 1. If necessary, set the switching distance 2. Replace the seals that are not in contact with the medium (recommended: if necessary, at least 1x annually). 3. Replace the seals that are in contact with the medium (at least 1x annually, no other recommendations possible as this depends greatly on the process, material and actuation frequency of the assembly). 4. Once maintenance work has been completed, perform the following final inspection: <ul style="list-style-type: none"> ▪ Assembly moves to measure and service position? ▪ Service and measure feedback signals present? ▪ Process connection and compressed air connections leak-tight? ▪ Does measurement indicate plausible values?

The replacement of sealing elements depends on the assembly type. The replacement instructions are included in the relevant service kit. The required service kit can be found in the Operating Instructions for your assembly.

12.1.4 Pump canister unit

Proceed as follows if the canister is empty or the pump unit is to be replaced.



A003912

1. Unscrew the float switch.
2. Remove it together with the cover and the pump.
3. Fill the empty canister or replace it with a full canister. Use a funnel when filling the canister.
4. Fit the cover with the pump and loose float switch onto the canister.
5. Screw the float switch into the canister.

12.1.5 Cables, connections and power supply lines

Weekly	Monthly	Biannually
<ul style="list-style-type: none"> ▶ Check the leak-tight condition of: <ul style="list-style-type: none"> ▪ Compressed air hoses and connections, ▪ Pressurized water hoses and connections ▪ Hoses and connections of buffer and cleaner vessels ▪ Multihose connections at control unit and assembly 	<ol style="list-style-type: none"> 1. If the assembly is located in a wet environment or outdoors and you are using analog sensors, check the sensor plug-in head for leaks or moisture. 2. Check sensor cables for damage, in particular to the external insulation. Sensor cables that have become damp inside must be replaced! It is not enough to simply dry them. 3. Verify that cable connections are tight (no leaks). 	<ol style="list-style-type: none"> 1. Check if the interior and circuit boards are clean, dry and free from corrosion. If not: <ul style="list-style-type: none"> ▪ Clean and dry the interior and the circuit boards. ▪ In the event of corrosion, replace the affected circuit boards. ▪ Verify that seals and couplings are leak-tight and undamaged. 2. Tighten the terminals. 3. If the assembly is located in a dry environment and you are using analog sensors, check the sensor plug-in head for leaks or moisture.

Replacing the hoses

1. Rinse the system with water.
2. Replace the hoses with hoses of the same diameter and length.
3. Attach hose labels to the new hoses.
4. Attach hoses to the relevant pilot valves, pumps, rinsing block and assembly.

13 Repair

13.1 General information

The repair and conversion concept provides for the following:

- The product has a modular design
- Spare parts are grouped into kits which include the associated kit instructions
- Only use original spare parts from the manufacturer
- Repairs are carried out by the manufacturer's Service Department or by trained users
- Certified devices can only be converted to other certified device versions by the manufacturer's Service Department or at the factory
- Observe applicable standards, national regulations, Ex documentation (XA) and certificates

1. Carry out the repair according to the kit instructions.
2. Document the repair and conversion and enter, or have entered, in the Life Cycle Management tool (W@M).

Device spare parts that are currently available for delivery can be found on the website:

www.endress.com/device-viewer

- ▶ Quote the serial number of the device when ordering spare parts.
- ▶ Following repairs, check that the device is complete, in a safe condition and functioning correctly.

13.2 Return

The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.

To ensure the swift, safe and professional return of the device:

- ▶ Refer to the website www.endress.com/support/return-material for information on the procedure and conditions for returning devices.

13.3 Disposal

The device contains electronic components. The product must be disposed of as electronic waste.

- ▶ Observe the local regulations.



If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

Dispose of batteries correctly

- ▶ Always dispose of batteries in accordance with local regulations on battery disposal.

14 Accessories

The following are the most important accessories available at the time this documentation was issued.

- ▶ For accessories not listed here, please contact your Service or Sales Center.

14.1 Assemblies

Cleanfit CPA472D

- Robust retractable assembly for pH, ORP and other industrial sensors
- Heavy-duty version made of durable materials
- For manual or pneumatic, remote-controlled operation
- Product Configurator on the product page: www.endress.com/cpa472d

 Technical Information TI00403C

Cleanfit CPA473

- Stainless steel process retractable assembly with ball valve shutoff for particularly reliable separation of the medium from the environment
- Product Configurator on the product page: www.endress.com/cpa473

 Technical Information TI00344C

Cleanfit CPA474

- Plastic process retractable assembly with ball valve shutoff for particularly reliable separation of the medium from the environment
- Product Configurator on the product page: www.endress.com/cpa474

 Technical Information TI00345C

Cleanfit CPA871

- Flexible process retractable assembly for water, wastewater and the chemical industry
- For applications with standard sensors with 12 mm diameter
- Product Configurator on the product page: www.endress.com/cpa871

 Technical Information TI01191C

Cleanfit CPA875

- Retractable process assembly for sterile and hygienic applications
- For in-line measurement with standard sensors with 12 mm diameter, e.g. for pH, ORP, oxygen
- Product Configurator on the product page: www.endress.com/cpa875

 Technical Information TI01168C

14.2 Sensors

14.2.1 Glass electrodes

Memosens CPS11E

- pH sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps11e

 Technical Information TI01493C

Orbisint CPS11D

- pH sensor for process technology
- With dirt-repellent PTFE diaphragm
- Product Configurator on the product page: www.endress.com/cps11d



Technical Information TI00028C

Memosens CPS31E

- pH sensor for standard applications in drinking water and swimming pool water
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps31e



Technical Information TI01574C

Memosens CPS31D

- pH electrode with gel-filled reference system with ceramic diaphragm
- Product Configurator on the product page: www.endress.com/cps31d



Technical Information TI00030C

Ceraliquid CPS41D

- pH electrode with ceramic junction and KCl liquid electrolyte
- Product Configurator on the product page: www.endress.com/cps41d



Technical Information TI00079C

Memosens CPS71E

- pH sensor for chemical process applications
- With ion trap for poison-resistant reference
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps71e



Technical Information TI01496C

Ceragel CPS71D

- pH electrode with reference system including ion trap
- Product Configurator on the product page: www.endress.com/cps71d



Technical Information TI00245C

Memosens CPS171D

- pH electrode for bio-fermenters with digital Memosens technology
- Product Configurator on the product page: www.endress.com/cps171d



Technical Information TI01254C

Memosens CPS91E

- pH sensor for heavily polluted media
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps91e



Technical Information TI01497C

Orbipore CPS91D

- pH electrode with open aperture for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps91d



Technical Information TI00375C

14.2.2 ORP sensors

Memosens CPS12E

- ORP sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps12e

 Technical Information TI01494C

Memosens CPS42E

- ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps42e

 Technical Information TI01575C

Orbisint CPS12D

- ORP sensor for process technology
- Product Configurator on the product page: www.endress.com/cps12d

 Technical Information TI00367C

Ceraliquid CPS42D

- ORP electrode with ceramic junction and KCl liquid electrolyte
- Product Configurator on the product page: www.endress.com/cps42d

 Technical Information TI00373C

Memosens CPS72E

- ORP sensor for chemical process applications
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps72e

 Technical Information TI01576C

Ceragel CPS72D

- ORP electrode with reference system including ion trap
- Product Configurator on the product page: www.endress.com/cps72d

 Technical Information TI00374C

Memosens CPS92E

- ORP sensor for use in heavily polluted media
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps92e

 Technical Information TI01577C

Orbipore CPS92D

- ORP electrode with open aperture for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps92d

 Technical Information TI00435C

14.2.3 pH-ISFET sensors

Memosens CPS47D

- Sterilizable and autoclavable ISFET sensor for pH measurement
- Refillable KCl liquid electrolyte
- Product Configurator on the product page: www.endress.com/cps47d

 Technical Information TI01412C

Memosens CPS77E

- Sterilizable and autoclavable ISFET sensor for pH measurement
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps77e



Technical Information TI01396

Memosens CPS77D

- Sterilizable and autoclavable ISFET sensor for pH measurement
- Product Configurator on the product page: www.endress.com/cps77d



Technical Information TI01396

Memosens CPS97D

- ISFET sensor for pH measurement with long-term stability in media with high dirt loads
- Product Configurator on the product page: www.endress.com/cps97d



Technical Information TI01405C

Tophit CPS441D

- Sterilizable ISFET sensor for low-conductivity media
- Liquid KCl electrolyte
- Product Configurator on the product page: www.endress.com/cps441d



Technical Information TI00352C

Tophit CPS471D

- Sterilizable and autoclavable ISFET sensor for food and pharmaceuticals, process engineering
- Water treatment and biotechnology
- Product Configurator on the product page: www.endress.com/cps471d



Technical Information TI00283C

Tophit CPS491D

- ISFET sensor with open aperture for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps491d



Technical Information TI00377C

14.2.4 Combined sensors

Memosens CPS16D

- Combined pH/ORP sensor for process technology
- With dirt-repellent PTFE diaphragm
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cps16d



Technical Information TI00503C

Memosens CPS76D

- Combined pH/ORP sensor for process technology
- Hygienic and sterile applications
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cps76d



Technical Information TI00506C

Memosens CPS96D

- Combined pH/ORP sensor for chemical processes
- With poison-resistant reference with ion trap
- With Memosens technology
- Product Configurator on the product page: www.endress.com/cps96d



Technical Information TI00507C

14.3 Additional functionality

14.3.1 Hardware extension modules

Kit, extension module DIO

- 2 x digital input
- 2 x digital output
- Auxiliary voltage supply for digital output
- Order number: 71135638

Kit, extension module 4AO

- 4 x analog output 0/4 to 20 mA
- Order number: 71135633

14.4 Other accessories

14.4.1 Cable

Memosens data cable CYK10

- For digital sensors with Memosens technology
- Product Configurator on the product page: www.endress.com/cyk10



Technical Information TI00118C

14.4.2 Storage options

- Industrial Flash Drive, 1 GB
- Order number: 71110815

CDC90 USB stick kit

- 64 GB
- Order No. 71518248

14.4.3 Cable glands

Kit CM44x: gland M

- Set, 6 pieces
- Order number: 71101768

Kit CM44x: gland NPT

- Set, 6 pieces
- Order number: 71101770

Kit CM44x: gland G

- Set, 6 pieces
- Order number: 71101771

Kit CM44x: dummy plug for cable gland

- Set, 6 pieces
- Order number: 71104942

14.4.4 M12 built-in socket and cable junction with Velcro strip

CM442/CM444/CM448/CSF48 kit: M12 built-in socket for digital sensors

- Pre-terminated
- Order number: 71107456

CM442/CM444/CM448/CSF48 kit: M12 built-in socket for Ethernet

- Only for devices with BASE-E module
- D-coded, pre-terminated
- Order number: 71140893

CDC90 Ethernet cable kit, M12-RJ45 90°

For devices with BASE2-E module:

Order number: 71518244

Kit: external CDI socket, complete

- Retrofit kit for CDI interface, with terminated connecting cables
- Order number: 51517507

Cable junction with Velcro strip

- 4 pieces, for sensor cable
- Order number: 71092051

Graphic display

- For installation in the control cabinet door or panel
- Order number: 71185295

Service display

- Portable, for commissioning
- Order number: 71185296

14.4.5 Buffer solutions

High-quality buffer solutions from Endress+Hauser - CPY20

The secondary buffer solutions have been referenced to primary reference material of the PTB (German Federal Physico-technical Institute) or to standard reference material of NIST (National Institute of Standards and Technology) according to DIN 19266 by a laboratory accredited by the DAkkS (German accreditation body) according to DIN 17025. Product Configurator on the product page: www.endress.com/cpy20

ORP buffer solution CPY3

- 220 mV, pH 7
- 468 mV, pH 0.1

Product Configurator on the product page: www.endress.com/cpy3

15 Technical data

15.1 Input

Measured variables	→ Documentation of the connected sensor
Measuring ranges	→ Documentation of the connected sensor
Types of input	<ul style="list-style-type: none"> ▪ Digital sensor inputs for sensors with Memosens protocol (Base-E module in the CDC90 control unit) ▪ Digital inputs (DIO module in the CDC90 control unit) ▪ Digital inputs, Namur (pneumatic control unit) ▪ Analog inputs (AI module in the CDC90 control unit)
Input signal	Depending on version: <ul style="list-style-type: none"> ▪ Max. 2 x binary sensor signal ▪ Standard: 2 x 0/4 to 20 mA ▪ 0 to 30 V DC
Digital sensor inputs, passive in the CDC90 control unit	<p>Span</p> <p>> 0 to 20 mA</p> <p>Signal characteristic</p> <p>Linear</p> <p>Internal resistance</p> <p>Non-linear</p> <p><i>Test voltage</i></p> <p>500 V</p>
Digital inputs, passive in the CDC90 control unit	<p>Electrical specification</p> <ul style="list-style-type: none"> ▪ drawing power (passive) ▪ Galvanically isolated <p>Span</p> <ul style="list-style-type: none"> ▪ High: 11 to 30 V DC ▪ Low: 0 to 5 V DC <p>Nominal input current</p> <p>max. 8 mA</p> <p>PFM function</p> <p>Minimum pulse width: 500 μs (1 kHz)</p> <p>Test voltage</p> <p>500 V</p>

Cable specificationMax. 2.5 mm² (14 AWG)

Digital inputs, passive in
the pneumatic control unit

Span

- High: 11 to 30 V DC
- Low: 0 to 5 V DC

Nominal input current

max. 8 mA

Cable specificationMax. 2.5 mm² (14 AWG)

Analog inputs, passive in
CDC90 control unit

Span

> 0 to 20 mA

Signal characteristic

Linear

Internal resistance

Non-linear

15.2 Output

Output signal

- Analog outputs, on the Base-E module, active in the CDC90 control unit
- Digital outputs, on the External Remote IO, DIO, active in the pneumatic control unit

Analog outputs, active in CDC90 control unit

Signal on alarm

Adjustable, as per NAMUR Recommendation NE 43

- In measuring range 0 to 20 mA:
failure current from 20 to 23 mA
- In measuring range 4 to 20 mA:
failure current from 2.4 to 23 mA
- Factory setting for failure current for both measuring ranges:
22.5 mA

The failure current of 22.5 mA represents "Failure-category" alarms of the transmitter. More detailed information is available in the Operating Instructions for the transmitter.

In addition, a failure current of 10 mA represents "Failure-category" alarms of the overall system. More detailed information is available in the Special Documentation on Analog Communication. [SD02527C](#)

Load

Max. 500 Ω

Linearization/transmission behavior

Linear

Electrical specification

- Passive
- Open collector, max. 30 V, 15 mA
- Maximum voltage drop 3 V

PFM function

Minimum pulse width: 500 μ s (1 kHz)

Digital outputs, active in the pneumatic control unit

Electrical specification

- Outputs:16
- Max. current: 0.5 A per output
- Total current: max. 8A

Cable specification

Max. 2.5 mm² (14 AWG)

Protocol-specific data

IPC output signals

	Modbus TCP	EtherNet/IP (via gateway)	PROFIBUS DP (via gateway)	PROFINET (via gateway)
Signal encoding	IEEE 802.3 (Ethernet)	IEEE 802.3 (Ethernet)	PROFIBUS-DP-compliant as per IEC 61158	IEEE 802.3 (Ethernet), IEC 61131-3-Code
Data transmission rate	10 / 100 Mbit/s	10 / 100 Mbit/s	9.6 kBit/s - 12 MBit/s autodetect	10 / 100 Mbit/s
Galvanic isolation	Yes	Yes	Yes	Yes
Connection	M12	See gateway	See gateway	See gateway
IP address	192.168.0.1	192.168.0.6	192.168.0.5	192.168.0.7
Address			77	

Modbus TCP

TCP port	502	
TCP connections	3	
Log	TCP	
Function codes	03, 04, 06, 08, 16, 23	
Broadcast support for function codes	06, 16, 23	
Supported features	Address can be configured using DHCP or software	
IO data	Input (T → O)	Program control
	<ul style="list-style-type: none"> ▪ Output (O → T) ▪ System Information ▪ Measured values and status ▪ IO Feedback 	<ul style="list-style-type: none"> ▪ Program feedback ▪ Status signals ▪ Measured values ▪ Sensor calibration

Web server

The Liquiline Control's IPC features a web server that allows users to configure the device, visualize measured values and check the status of the entire system.

The web server of the CDC90 control unit enables the direct configuration of the connected sensor and peripheral modules for digital/analog inputs and outputs. The two web servers can be accessed via separate IP addresses.

Liquiline transmitter

TCP port	80
Supported features	<ul style="list-style-type: none"> ▪ Remote-controlled device configuration ▪ Save/restore device configuration (via SD card) ▪ Export as SQLite database ▪ Access to web server via Internet browser

IPC

TCP port	8080
Supported features	<ul style="list-style-type: none"> ▪ Remote-controlled device configuration ▪ Access to web server via Internet browser

15.3 Power supply

Supply voltage	100 to 230 V AC
----------------	-----------------

Frequency	50/60 Hz
-----------	----------

Power consumption	Max. 50 VA
-------------------	------------

Cable specification	Power supply cable (mains) Cable cross-section: <ul style="list-style-type: none">■ Minimum cross-section 3 x 0.75 mm² to 10 m length■ Minimum cross-section 3 x 1.5 mm² to 20 m length
---------------------	--

Overvoltage protection	Integrated overvoltage protection according to EN 61326 Protection category 1 and 3
------------------------	--

Electrical connection	Electrical safety IEC 61010-1, Class I equipment Low voltage: overvoltage category II Environment < 2000 m (< 6562 ft) above MSL
-----------------------	--

15.4 Performance characteristics

Response time	Current outputs t_{90} = max. 500 ms for an increase from 0 to 20 mA Current inputs t_{90} = max. 330 ms for an increase from 0 to 20 mA Digital inputs and outputs t_{90} = max. 330 ms for an increase from low to high
---------------	---

Reference temperature	25 °C (77 °F)
-----------------------	---------------

Measured error for sensor inputs	→ Documentation of the connected sensor
----------------------------------	---

Measured error for current inputs and outputs	Typical measured errors: < 20 µA (with current values < 4 mA) < 50 µA (with current values 4 to 20 mA) at 25 °C (77 °F) each Additional measured error depending on the temperature: < 1.5 µA/K
---	--

Frequency tolerance of digital inputs and outputs	≤ 1%
---	------

Resolution of current inputs and outputs	< 5 µA
--	--------

Repeatability	→ Documentation of the connected sensor
---------------	---

15.5 Environment

This device is for indoor use only.

Ambient temperature range	0 to 45 °C (32 to 113 °F)
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Storage temperature	-20 to 70 °C (-4 to 158 °F)
---------------------	-----------------------------

Relative humidity	10 to 90 %, non-condensating
-------------------	------------------------------

Operating height	Max. altitude above MSL < 2000 m (< 6562 ft) above MSL
------------------	--

Degree of protection	CDC90 control unit IP66/Type 4X
----------------------	---

Pneumatic control unit
IP54/Type 12

Climate class	As per IEC 60654-1: B2
Electromagnetic compatibility	Interference emission and interference immunity as per EN 61326-1:2013, Class A for Industry
Pollution degree	The product is suitable for pollution degree 2.

15.6 Mechanical construction

Dimensions See: →  13

Weight	Device	Weight
	Complete device on mounting plate	Approx. 52 kg (114.64 lbs)
CDC90 control unit	Approx. 2.1 kg (4.63 lbs) depending on the version	
Pneumatic control unit painted	7.5 kg (16.53 lbs) (empty)	
Pump canister unit	Approx. 1.5 kg (3.30 lbs)	
Mounting plate (Trespa)	Approx. 10 kg (22 lbs)	
Canister shelf	Approx. 3.2 kg (7.05 lbs)	
SD card	Max. 5 g (0.17 oz)	

Materials	Device	Material
	CDC90 control unit	
Module housing	PC (polycarbonate)	
Soft keys	TPE (thermoplastic elastomers)	
LED	POM	
Cable mounting rail	Stainless steel 1.4301 (AISI 304)	
Display glass	Plastic capacitive touchscreen	
Cable glands	PA (polyamide) V0 as per UL94	
M12 cable glands	PA (polyamide)	
Housing seals	EPDM	
Cable gland O-ring	EPDM	
Pneumatic control unit		
Housing	Stainless steel 1.4301 (AISI 304), painted steel	
Housing seals	EPDM (ethylene propylene diene rubber)	
Cable glands	PA (polyamide) V0 as per UL94	
Housing seals	EPDM	

Device	Material
Pump canister unit	
Pump	PVDF+CF/PP/NBR+PTFE/PTFE/PP
Canister	PE
Float switch	PVC/EPDM/PE
Canister fitting	ABS/PMMA
Bracket M5 L110*B40 W8	PP
O-ring	EPDM
Coupling DMG/8*6 1/4	PVDF
Canister shelf	PP
Rinsing block	
Process valve	EPDM/PP/stainless steel:1.4408/PTFE
Rinsing body	PVDF/1.4401
Rinse connection	PP
Check valves	PVDF+FKM/PVDF+FFKM/1.4571+FKM
Bracket, metal plate	1.4571
Bracket, clamp	1.4404
Hose bracket/cable gland	PA
Sealing plug	Teflon
Double nipple	PVDF
O-ring	FKM/FFKM
Hoses	
Compressed air	PUN-A
Liquid	PUN-A+/PTFE

Hose specification

Medium hoses

Max. 6 bar (87 psi)

Compressed air hoses

Pressure ratings of pilot valve manifold:

Max. 10 bar (145 psi)

Pressure switch:

Max. 12 bar (174 psi)

Pump

Vacuum pump:

Max. 8 bar (116 psi) (8 bar corresponds to 8 l/min delivery rate, depending on the control air)

Pipes:

Max. 10 bar (145 psi)

Connections

Water connection	Size
Water connection, rinsing block	Hose barb D12 PP for hoses with internal diameter 12 mm (0.47 in)
Assembly inlet and outlet	Hose coupling D6/8 mm (0.24/0.31 in) PVDF

Hose diameter	Size
Medium	ID 6 mm (0.24 in)/ OD 8 mm (0.31 in)
Compressed air	Compressed air supply, purge air: ID 6 mm (0.24 in)/ OD 8 mm (0.31 in) Compressed air of assemblies, valves, pumps: ID 4 mm (0.16 in)/ OD 6 mm (0.24 in)

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