Operating Instructions
Proline Promass A 500

Coriolis flowmeter
PROFINET with Ethernet-APL
- Make sure the document is stored in a safe place such that it is always available when working on or with the device.
- To avoid danger to individuals or the facility, read the “Basic safety instructions” section carefully, as well as all other safety instructions in the document that are specific to working procedures.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser Sales Center will supply you with current information and updates to these instructions.
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1 About this document

1.1 Document function
These Operating Instructions contain all the information required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to installation, connection, operation and commissioning, through to troubleshooting, maintenance and disposal.

1.2 Symbols

1.2.1 Safety symbols

⚠️ DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠️ WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠️ CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol contains information on procedures and other facts which do not result in personal injury.

1.2.2 Electrical symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚡️</td>
<td>Direct current</td>
</tr>
<tr>
<td>casually</td>
<td>Alternating current</td>
</tr>
<tr>
<td>⚡️</td>
<td>Direct current and alternating current</td>
</tr>
<tr>
<td>⚡️</td>
<td>Ground connection</td>
</tr>
<tr>
<td>⚡️</td>
<td>A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.</td>
</tr>
<tr>
<td>⚡️</td>
<td>Potential equalization connection (PE: protective earth)</td>
</tr>
<tr>
<td>⚡️</td>
<td>Ground terminals that must be connected to ground prior to establishing any other connections.</td>
</tr>
<tr>
<td>⚡️</td>
<td>The ground terminals are located on the interior and exterior of the device:</td>
</tr>
<tr>
<td>⚡️</td>
<td>• Interior ground terminal: potential equalization is connected to the supply network.</td>
</tr>
<tr>
<td>⚡️</td>
<td>• Exterior ground terminal: device is connected to the plant grounding system.</td>
</tr>
</tbody>
</table>

1.2.3 Communication-specific symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>⚡️</td>
<td>Wireless Local Area Network (WLAN)</td>
</tr>
<tr>
<td>⚡️</td>
<td>Communication via a wireless, local network.</td>
</tr>
<tr>
<td>⚡️</td>
<td>LED</td>
</tr>
<tr>
<td>⚡️</td>
<td>Light emitting diode is off.</td>
</tr>
</tbody>
</table>
### 1.2.4 Tool symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Torx screwdriver" /></td>
<td>Torx screwdriver</td>
</tr>
<tr>
<td><img src="image" alt="Phillips head screwdriver" /></td>
<td>Phillips head screwdriver</td>
</tr>
<tr>
<td><img src="image" alt="Open-ended wrench" /></td>
<td>Open-ended wrench</td>
</tr>
</tbody>
</table>

### 1.2.5 Symbols for certain types of information

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ✔ ✔ ✔ | Permitted
Procedures, processes or actions that are permitted. |
| ✔ ✔ | Preferred
Procedures, processes or actions that are preferred. |
| ✗ | Forbidden
Procedures, processes or actions that are forbidden. |
| 💡 | Tip
Indicates additional information. |
| 📖 | Reference to documentation |
| 📖 | Reference to page |
| 📖 | Reference to graphic |
| 🔴 | Notice or individual step to be observed |
| 1, 2, 3, ... | Series of steps |
| 🔸 | Result of a step |
| 🚹 | Help in the event of a problem |
| 🕵️‍♂️ | Visual inspection |

### 1.2.6 Symbols in graphics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, ...</td>
<td>Item numbers</td>
</tr>
<tr>
<td>1, 2, 3, ...</td>
<td>Series of steps</td>
</tr>
<tr>
<td>A, B, C, ...</td>
<td>Views</td>
</tr>
<tr>
<td>A-A, B-B, C-C, ...</td>
<td>Sections</td>
</tr>
<tr>
<td>🚨</td>
<td>Hazardous area</td>
</tr>
</tbody>
</table>
1.3  Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:

- **Device Viewer** ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): Enter the serial number from the nameplate
- **Endress+Hauser Operations app**: Enter serial number from nameplate or scan matrix code on nameplate.

### 1.3.1  Document function

The following documentation may be available depending on the version ordered:

<table>
<thead>
<tr>
<th>Document type</th>
<th>Purpose and content of the document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Information (TI)</td>
<td>Planning aid for your device</td>
</tr>
<tr>
<td></td>
<td>The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.</td>
</tr>
<tr>
<td>Brief Operating Instructions (KA)</td>
<td>Guide that takes you quickly to the 1st measured value</td>
</tr>
<tr>
<td></td>
<td>The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.</td>
</tr>
<tr>
<td>Operating Instructions (BA)</td>
<td>Your reference document</td>
</tr>
<tr>
<td></td>
<td>The Operating Instructions contain all the information that is required in the various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.</td>
</tr>
<tr>
<td>Description of Device Parameters (GP)</td>
<td>Reference for your parameters</td>
</tr>
<tr>
<td></td>
<td>The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.</td>
</tr>
<tr>
<td>Safety Instructions (XA)</td>
<td>Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. The Safety Instructions are an integral part of the Operating Instructions.</td>
</tr>
<tr>
<td></td>
<td>Information on the Safety Instructions (XA) relevant to the device is provided on the nameplate.</td>
</tr>
<tr>
<td>Supplementary device-dependent documentation (SD/FY)</td>
<td>Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the device documentation.</td>
</tr>
</tbody>
</table>

1.4  Registered trademarks

**Ethernet-APL™**

Registered trademark of the PROFIBUS Nutzerorganisation e.V. (PROFIBUS User Organization), Karlsruhe, Germany

**TRI-CLAMP®**

Registered trademark of Ladish & Co., Inc., Kenosha, USA
2 Safety instructions

2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
▶ Are authorized by the plant owner/operator.
▶ Are familiar with federal/national regulations.
▶ Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
▶ Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:

▶ Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
▶ Follow the instructions in this manual.

2.2 Intended use

Application and media

The measuring device described in this manual is intended only for the flow measurement of liquids and gases.

Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing media.

Measuring devices for use in hazardous areas, in hygienic applications or where there is an increased risk due to process pressure, are labeled accordingly on the nameplate.

To ensure that the measuring device remains in proper condition for the operation time:

▶ Keep within the specified pressure and temperature range.
▶ Only use the measuring device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
▶ Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area (e.g. explosion protection, pressure vessel safety).
▶ Use the measuring device only for media to which the process-wetted materials are sufficiently resistant.
▶ If the ambient temperature of the measuring device is outside the atmospheric temperature, it is absolutely essential to comply with the relevant basic conditions as specified in the device documentation → 8.
▶ Protect the measuring device permanently against corrosion from environmental influences.

Incorrect use

Non-designated use can compromise safety. The manufacturer is not liable for damage caused by improper or non-intended use.

⚠️ WARNING

Danger of breakage due to corrosive or abrasive fluids and ambient conditions!

▶ Verify the compatibility of the process fluid with the sensor material.
▶ Ensure the resistance of all fluid-wetted materials in the process.
▶ Keep within the specified pressure and temperature range.
NOTICE
Verification for borderline cases:
- For special fluids and fluids for cleaning, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of fluid-wetted materials, but does not accept any warranty or liability as minute changes in the temperature, concentration or level of contamination in the process can alter the corrosion resistance properties.

Residual risks

⚠️ CAUTION
The electronics and the medium may cause the surfaces to heat up or freeze. Risk of burns or frostbite!
- Mount suitable touch protection.

⚠️ WARNING
Danger of housing breaking due to measuring tube breakage!
If a measuring tube ruptures, the pressure inside the sensor housing will rise according to the operating process pressure.
- Use a rupture disk.

⚠️ WARNING
Danger from medium escaping!
For device versions with a rupture disk: medium escaping under pressure can cause injury or material damage.
- Take precautions to prevent injury and material damage if the rupture disk is actuated.

2.3 Workplace safety

When working on and with the device:
- Wear the required personal protective equipment as per national regulations.

2.4 Operational safety

Damage to the device!
- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for the interference-free operation of the device.

Modifications to the device
Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers!
- If modifications are nevertheless required, consult with the manufacturer.

Repair
To ensure continued operational safety and reliability:
- Carry out repairs on the device only if they are expressly permitted.
- Observe federal/national regulations pertaining to the repair of an electrical device.
- Use only original spare parts and accessories.

2.5 Product safety

This measuring device is designed in accordance with good engineering practice 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.
It meets general safety standards and legal requirements. It also complies with the EU directives listed in the device-specific EU Declaration of Conformity. The manufacturer confirms this by affixing the CE mark to the device.
2.6  IT security

Our warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

2.7  Device-specific IT security

The device offers a range of specific functions to support protective measures on the operator's side. These functions can be configured by the user and guarantee greater in-operation safety if used correctly. The following list provides an overview of the most important functions:

<table>
<thead>
<tr>
<th>Function/interface</th>
<th>Factory setting</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write protection via hardware write protection switch</td>
<td>Not enabled</td>
<td>On an individual basis following risk assessment</td>
</tr>
<tr>
<td>Access code (also applies for Web server login or FieldCare connection)</td>
<td>Not enabled</td>
<td>Assign a customized access code during commissioning</td>
</tr>
<tr>
<td>WLAN (order option in display module)</td>
<td>Enabled</td>
<td>On an individual basis following risk assessment</td>
</tr>
<tr>
<td>WLAN security mode</td>
<td>Enabled (WPA2-PSK)</td>
<td>Do not change</td>
</tr>
<tr>
<td>WLAN passphrase (password)</td>
<td>Serial number</td>
<td>Assign a customized WLAN passphrase during commissioning</td>
</tr>
<tr>
<td>WLAN mode</td>
<td>Access point</td>
<td>On an individual basis following risk assessment</td>
</tr>
<tr>
<td>Web server</td>
<td>Enabled</td>
<td>On an individual basis following risk assessment</td>
</tr>
<tr>
<td>CDI-RJ45 service interface</td>
<td></td>
<td>On an individual basis following risk assessment</td>
</tr>
</tbody>
</table>

2.7.1  Protecting access via hardware write protection

Write access to the parameters of the device via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare) can be disabled via a write protection switch (DIP switch on the main electronics module). When hardware write protection is enabled, only read access to the parameters is possible.

Hardware write protection is disabled when the device is delivered.

2.7.2  Protecting access via a password

Different passwords are available to protect write access to the device parameters or access to the device via the WLAN interface.

- User-specific access code
  
  Protect write access to the device parameters via the local display, Web browser or operating tool (e.g. FieldCare, DeviceCare). Access authorization is clearly regulated through the use of a user-specific access code.

- WLAN passphrase
  
  The network key protects a connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface which can be ordered as an option.

- Infrastructure mode
  
  When the device is operated in infrastructure mode, the WLAN passphrase corresponds to the WLAN passphrase configured on the operator side.
User-specific access code

Write access to the device parameters via the local display, web browser or operating tool (e.g. FieldCare, DeviceCare) can be protected by the modifiable, user-specific access code (→ 172).

When the device is delivered, the device does not have an access code and is equivalent to 0000 (open).

WLAN passphrase: Operation as WLAN access point

A connection between an operating unit (e.g. notebook or tablet) and the device via the WLAN interface (→ 91), which can be ordered as an optional extra, is protected by the network key. The WLAN authentication of the network key complies with the IEEE 802.11 standard.

When the device is delivered, the network key is pre-defined depending on the device. It can be changed via the WLAN settings submenu in the WLAN passphrase parameter (→ 166).

Infrastructure mode

A connection between the device and WLAN access point is protected by means of an SSID and passphrase on the system side. Please contact the relevant system administrator for access.

General notes on the use of passwords

- The access code and network key supplied with the device should be changed during commissioning.
- Follow the general rules for generating a secure password when defining and managing the access code or network key.
- The user is responsible for the management and careful handling of the access code and network key.
- For information on configuring the access code or on what to do if you lose the password, for example, see the 'Write protection via access code' section → 172.

2.7.3 Access via Web server

The device can be operated and configured via a Web browser with the integrated Web server. The connection is via the service interface (CDI-RJ45). signal transmission connection for PROFINET with Ethernet-APL (IO1) or the WLAN interface.

The Web server is enabled when the device is delivered. The Web server can be disabled if necessary (e.g. after commissioning) via the Web server functionality parameter.

The device and status information can be hidden on the login page. This prevents unauthorized access to the information.

For detailed information on device parameters, see: "Description of Device Parameters" document → 314.

2.7.4 Access via service interface (CDI-RJ45)

The device can be connected to a network via the service interface (CDI-RJ45). Device-specific functions guarantee the secure operation of the device in a network.

The use of relevant industrial standards and guidelines that have been defined by national and international safety committees, such as IEC/ISA62443 or the IEEE, is recommended.
This includes organizational security measures such as the assignment of access authorization as well as technical measures such as network segmentation.

Transmitters with an Ex de approval may not be connected via the service interface (CDI-RJ45)!

Order code for "Approval transmitter + sensor", options (Ex de): BA, BB, C1, C2, GA, GB, MA, MB, NA, NB
3  Product description
The measuring system consists of a transmitter and a sensor. The transmitter and sensor are mounted in physically separate locations. They are interconnected by connecting cables.

3.1  Product design
Two versions of the transmitter are available.

3.1.1  Proline 500 – digital
Signal transmission: digital
Order code for "Integrated ISEM electronics", option A 'Sensor'
For use in applications not required to meet special requirements due to ambient or operating conditions.
As the electronics are located in the sensor, the device is ideal:
For simple transmitter replacement.
- A standard cable can be used as the connecting cable.
- Not sensitive to external EMC interference.

1 Important components of a measuring device
1  Electronics compartment cover
2  Display module
3  Transmitter housing
4  Sensor connection housing with integrated ISEM electronics: connecting cable connection
5  Sensor
3.1.2 Proline 500

Signal transmission: analog
Order code for "Integrated ISEM electronics", option B "Transmitter"

For use in applications required to meet special requirements due to ambient or operating conditions.

As the electronics are located in the transmitter, the device is ideal in the event of:
- Strong vibrations at the sensor.
- Sensor operation in underground installations.
- Permanent sensor immersion in water.

![Diagram of Proline 500 components]

2 Important components of a measuring device
1 Connection compartment cover
2 Display module
3 Transmitter housing with integrated ISEM electronics
4 Electronics compartment cover
5 Sensor
6 Sensor connection housing: connecting cable connection
7 Connection compartment cover: connecting cable connection
4  Incoming acceptance and product identification

4.1  Incoming acceptance

Are the order codes on the delivery note (1) and the product sticker (2) identical?

Are the goods undamaged?

Do the data on the nameplate match the ordering information on the delivery note?

Is the envelope present with accompanying documents?

- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- The Technical Documentation is available via the Internet or via the Endress+Hauser Operations App, see the ‘Product identification’ section → 17.

4.2  Product identification

The following options are available for identification of the device:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter the serial numbers from the nameplates in the Device Viewer (www.endress.com/deviceviewer): all the information about the device is displayed.
- Enter the serial numbers from the nameplates into the Endress+Hauser Operations App or scan the DataMatrix code on the nameplate with the Endress+Hauser Operations App: all the information about the device is displayed.
For an overview of the scope of the associated Technical Documentation, refer to the following:
- The chapters "Additional standard documentation on the device" and "Supplementary device-dependent documentation"
- The Device Viewer: Enter the serial number from the nameplate (www.endress.com/deviceviewer)
- The Endress+Hauser Operations App: Enter the serial number from the nameplate or scan the DataMatrix code on the nameplate.

### 4.2.1 Transmitter nameplate

Proline 500 – digital

![Example of a transmitter nameplate](image)

1. Name of the transmitter
2. Place of manufacture
3. Space for approvals: use in hazardous areas
4. Degree of protection
5. Electrical connection data: available inputs and outputs
6. Permitted ambient temperature ($T_a$)
7. 2-D matrix code
8. Space for approvals and certificates: e.g. CE mark, RCM tick
9. Permitted temperature range for cable
10. Date of manufacture: year-month
11. Firmware version (FW) and device revision (Dev.Rev.) from the factory
12. Document number of safety-related supplementary documentation
13. Space for additional information in the case of special products
14. Available inputs and outputs, supply voltage
15. Electrical connection data: supply voltage
16. Extended order code (Ext. ord. cd.)
17. Serial number (Ser. no.)
18. Order code
Proline 500

Example of a transmitter nameplate

1. Place of manufacture
2. Name of the transmitter
3. Order code
4. Serial number (Ser. no.)
5. Extended order code (Ext. ord. cd.)
6. Degree of protection
7. Space for approvals: use in hazardous areas
8. Electrical connection data: available inputs and outputs
9. 2-D matrix code
10. Date of manufacture: year-month
11. Document number of safety-related supplementary documentation
12. Space for approvals and certificates: e.g. CE mark, RCM tick
13. Space for degree of protection of connection and electronics compartment when used in hazardous areas
14. Firmware version (FW) and device revision (Dev.Rev.) from the factory
15. Space for additional information in the case of special products
16. Permitted temperature range for cable
17. Permitted ambient temperature \( T_a \)
18. Information on cable gland
19. Available inputs and outputs, supply voltage
20. Electrical connection data: supply voltage
4.2.2 Sensor nameplate

A0029199

5 Example of a sensor nameplate

1 Name of the sensor
2 Place of manufacture
3 Order code
4 Serial number (Ser. no.)
5 Extended order code (Ext. ord. cd.)
6 Nominal diameter of the sensor; flange nominal diameter/nominal pressure; sensor test pressure; medium temperature range; material of measuring tube and manifold; sensor-specific information: e.g. pressure range of sensor housing, wide-range density specification (special density calibration)
7 Approval information for explosion protection, Pressure Equipment Directive and degree of protection
8 Flow direction
9 Manufacturing date: year-month
10 2-D matrix code
11 Document number of safety-related supplementary documentation
12 CE mark, RCM-Tick mark
13 Surface roughness
14 Permitted ambient temperature \( T_a \)

Order code

The measuring device is reordered using the order code.

Extended order code

- The device type (product root) and basic specifications (mandatory features) are always listed.
- Of the optional specifications (optional features), only the safety and approval-related specifications are listed (e.g. LA). If other optional specifications are also ordered, these are indicated collectively using the \# placeholder symbol (e.g. \#LA\#).
- If the ordered optional specifications do not include any safety and approval-related specifications, they are indicated by the + placeholder symbol (e.g. XXXXXX-ABCDE +).
### 4.2.3 Symbols on measuring device

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ![WARNING!](image) | **WARNING!**  
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. To determine the nature of the potential hazard and the measures required to avoid it, consult the documentation accompanying the measuring device. |
| ![Reference to documentation](image) | **Reference to documentation**  
Refers to the corresponding device documentation. |
| ![Protective ground connection](image) | **Protective ground connection**  
A terminal which must be connected to ground prior to establishing any other connections. |
5 Storage and transport

5.1 Storage conditions
Observe the following notes for storage:
- Store in the original packaging to ensure protection from shock.
- Do not remove protective covers or protective caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring pipe.
- Protect from direct sunlight to avoid unacceptably high surface temperatures.
- Store in a dry and dust-free place.
- Do not store outdoors.

Storage temperature → 298

5.2 Transporting the product
Transport the measuring device to the measuring point in the original packaging.

Do not remove protective covers or caps installed on process connections. They prevent mechanical damage to the sealing surfaces and contamination in the measuring tube.

5.2.1 Measuring devices without lifting lugs

Center of gravity of the measuring device is higher than the suspension points of the webbing slings.
Risk of injury if the measuring device slips.
- Secure the measuring device against slipping or turning.
- Observe the weight specified on the packaging (stick-on label).
5.2.2  Measuring devices with lifting lugs

⚠️ CAUTION

Special transportation instructions for devices with lifting lugs

- Only use the lifting lugs fitted on the device or flanges to transport the device.
- The device must always be secured at two lifting lugs at least.

5.2.3  Transporting with a fork lift

If transporting in wood crates, the floor structure enables the crates to be lifted lengthwise or at both sides using a forklift.

5.3  Packaging disposal

All packaging materials are environmentally friendly and 100 % recyclable:

- Outer packaging of device
  Polymer stretch wrap, complying with EU Directive 2002/95/EC (RoHS)
- Packaging
  - Wooden crate treated in accordance with ISPM 15 standard, confirmed by IPPC logo
  - Cardboard box in accordance with European packaging guideline 94/62EC, recyclability confirmed by Resy symbol
- Carrying and securing materials
  - Disposable plastic pallet
  - Plastic straps
  - Plastic adhesive strips
- Filler material
  - Paper pads

6  Mounting

6.1  Mounting requirements

6.1.1  Mounting position

Mounting location

To prevent measuring errors arising from accumulation of gas bubbles in the measuring pipe, avoid the following mounting locations in the piping:

- Highest point of a pipeline.
- Directly upstream of a free pipe outlet in a down pipe.
Installation in down pipes

However, the following installation suggestion allows for installation in an open vertical pipeline. Pipe restrictions or the use of an orifice with a smaller cross-section than the nominal diameter prevent the sensor running empty while measurement is in progress.

![Diagram of installation in a down pipe](image)

### 6 Installation in a down pipe (e.g. for batching applications)

1. Supply tank
2. Sensor
3. Orifice plate, pipe restriction
4. Valve
5. Batching tank

<table>
<thead>
<tr>
<th>DN</th>
<th>[mm]</th>
<th>[in]</th>
<th>Ø orifice plate, pipe restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/4</td>
<td>0.8</td>
<td>0.03</td>
</tr>
<tr>
<td>2</td>
<td>1/12</td>
<td>1.5</td>
<td>0.06</td>
</tr>
<tr>
<td>4</td>
<td>1/8</td>
<td>3.0</td>
<td>0.12</td>
</tr>
</tbody>
</table>

**Orientation**

The direction of the arrow on the sensor nameplate helps you to install the sensor according to the flow direction (direction of medium flow through the piping).

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Vertical orientation</td>
</tr>
<tr>
<td>B</td>
<td>Horizontal orientation, transmitter at top</td>
</tr>
</tbody>
</table>
Mounting

Proline Promass A 500 PROFINET with Ethernet-APL

Orientation Recommendation

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Horizontal orientation, transmitter at bottom</td>
</tr>
<tr>
<td>D</td>
<td>Horizontal orientation, transmitter at side</td>
</tr>
</tbody>
</table>

1) This orientation is recommended to ensure self-draining.
2) Applications with low process temperatures may reduce the ambient temperature. To maintain the minimum ambient temperature for the transmitter, this orientation is recommended.
3) Applications with high process temperatures may increase the ambient temperature. To maintain the maximum ambient temperature for the transmitter, this orientation is recommended.

If a sensor is installed horizontally with a curved measuring tube, match the position of the sensor to the fluid properties.

Inlet and outlet runs

No special precautions need to be taken for fittings that create turbulence, such as valves, elbows or T-pieces, as long as no cavitation occurs → 24.

Dimensions

For the dimensions and installation lengths of the device, see the Technical Information document, "Mechanical construction" section.

6.1.2 Environment and process requirements

Ambient temperature range

<table>
<thead>
<tr>
<th>Measuring device</th>
<th>-40 to +60 °C (-40 to +140 °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readability of the local display</td>
<td>-20 to +60 °C (-4 to +140 °F)</td>
</tr>
</tbody>
</table>

The readability of the display may be impaired at temperatures outside the temperature range.

Dependency of ambient temperature on medium temperature → 300

If operating outdoors:
Avoid direct sunlight, particularly in warm climatic regions.

You can order a weather protection cover from Endress+Hauser. → 279.

System pressure

It is important that cavitation does not occur, or that gases entrained in the liquids do not outgas.
Cavitation is caused if the pressure drops below the vapor pressure:
- In liquids that have a low boiling point (e.g. hydrocarbons, solvents, liquefied gases)
- In suction lines
  - Ensure the system pressure is sufficiently high to prevent cavitation and outgassing.

For this reason, the following mounting locations are recommended:
- At the lowest point in a vertical pipe
- Downstream from pumps (no danger of vacuum)

**Thermal insulation**

In the case of some fluids, it is important to keep the heat radiated from the sensor to the transmitter to a low level. A wide range of materials can be used for the required insulation.

**NOTICE**

**Electronics overheating on account of thermal insulation!**
- Recommended orientation: horizontal orientation, sensor connection housing pointing downwards.
- Do not insulate the sensor connection housing.
- Maximum permissible temperature at the lower end of the sensor connection housing: 80 °C (176 °F)
- Thermal insulation with not isolated extended neck: We recommend that you do not insulate the extended neck in order to ensure optimum dissipation of heat.

**Heating**

**NOTICE**

**Electronics can overheat due to elevated ambient temperature!**
- Observe maximum permitted ambient temperature for the transmitter.
- Depending on the medium temperature, take the device orientation requirements into account.
NOTICE

Danger of overheating when heating

- Ensure that the temperature at the lower end of the transmitter housing does not exceed 80 °C (176 °F).
- Ensure that sufficient convection takes place at the transmitter neck.
- Ensure that a sufficiently large area of the transmitter neck remains exposed. The uncovered part serves as a radiator and protects the electronics from overheating and excessive cooling.
- When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation. For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.
- Take account of the behavior of process diagnostic "830 Ambient temperature too high" and "832 Electronics temperature too high" if it is not possible to avoid overheating with a suitable system layout.

Heating options

If a fluid requires that no heat loss should occur at the sensor, users can avail of the following heating options:
- Electrical heating, e.g. with electric band heaters 1)
- Via pipes carrying hot water or steam
- Via heating jackets

Vibrations

The high oscillation frequency of the measuring tubes ensures that the correct operation of the measuring system is not influenced by plant vibrations.

6.1.3 Special mounting instructions

Drainability

When the device is installed in a vertical position, the measuring tube can be drained completely and protected against deposit buildup if the properties of the measured liquid allow this. Furthermore, as only one measuring tube is used the flow is not impeded and the risk of product being retained in the measuring device is reduced to a minimum. The larger internal diameter of the measuring tube 2) also reduces the risk of particles getting trapped in the measuring system. Due to the larger cross-section of the individual measuring tube, the tube is also generally less susceptible to clogging.

Hygienic compatibility

When installing in hygienic applications, please refer to the information in the "Certificates and approvals/hygienic compatibility" section → 310

Rupture disk

Process-related information: → 301.

---

1) The use of parallel electric band heaters is generally recommended (bidirectional electricity flow). Particular considerations must be made if a single-wire heating cable is to be used. Additional information is provided in the document EA01339D "Installation instructions for electrical trace heating systems".

2) Compared with the double-tube design with a similar flow capacity and measuring tubes with a smaller internal diameter.
**WARNING**

**Danger from medium escaping!**

Medium escaping under pressure can cause injury or material damage.

- Take precautions to prevent danger to persons and damage if the rupture disk is actuated.
- Observe the information on the rupture disk sticker.
- Make sure that the function and operation of the rupture disk is not impeded through the installation of the device.
- Do not remove or damage the rupture disk, drain connection and warning signs.

The position of the rupture disk is indicated by an affixed sticker. In versions without a drain connection (order option CU), the sticker is destroyed if the rupture disk is triggered. The disk can therefore be visually monitored.

To allow any escaping medium to drain in a controlled manner, a drain connection is available for the rupture disk integrated in the sensor: order code for "Sensor option", option CU "Drain connection for rupture disk". This connection is intended for a pipe connection with a ¹⁄₄" NPT thread and sealed with a grip plug for protection. To guarantee the function of the rupture disk with a drain connection, the drain connection must be connected to the drain system in a hermetically tight manner.

The drain connection is firmly mounted in place by the manufacturer and may not be removed.

It is not possible to use the holder with a measuring device with a drain connection for a rupture disk: order code for "Sensor option", option CU "Drain connection for rupture disk"

It is not possible to use a heating jacket if the drain connection is used: order code for "Sensor option", option CU "Drain connection for rupture disk"

For information on the dimensions, see the "Technical Information" document, "Mechanical construction" section (accessories).

**Sensor holder**

The sensor holder is used to secure the device to a wall, tabletop or pipe (order code for "Accessory enclosed", option PR).
If the holder is used with a measuring device fitted with a rupture disk, it is important to ensure that the rupture disk in the neck is not covered over and that the cover of the rupture disk is not damaged.

Lubricate all threaded joints prior to mounting. The screws for wall, tabletop or pipe mounting are not supplied with the device and must be chosen to suit the individual installation position.

⚠️ **WARNING**

Strain on pipes!

Excessive strain on an unsupported pipe can cause the pipe to break.

- Install the sensor in a sufficiently supported pipe. In addition to the use of the sensor holder, for maximum mechanical stability the sensor can also be supported on the inlet and outlet sides onsite at the installation location with the use of pipe clamps, for example.

The following mounting versions are recommended for the installation:

Use of the sensor holder.

1. Sensor holder (order code for "Accessory enclosed", option PR)
**Mounting**

*Wall mounting*
Screw the sensor holder to the wall with four screws. Two of the four holes to secure the holder are designed to hook into the screws.

*Mounting on a table*
Screw the sensor holder onto the tabletop with four screws.

*Pipe mounting*
Secure the sensor holder to the pipe with two clamps.

---

**WARNING**
Failure to comply with the specifications for vibration and shock resistance can damage the measuring device!
- During operation, transportation and storage, ensure compliance with the specifications for maximum vibration and shock resistance → 299.

**Weather protection cover**

![Diagram of weather protection cover](image)

8 Weather protection cover for Proline 500 — digital; engineering unit mm (in)

![Diagram of weather protection cover](image)

9 Weather protection cover for Proline 500; engineering unit mm (in)
6.2 Mounting the measuring device

6.2.1 Required tools

For transmitter
For mounting on a post:
- Proline 500 – digital transmitter
- Open-ended wrench AF 10
- Torx screwdriver TX 25
- Proline 500 transmitter
  Open-ended wrench AF 13

For wall mounting:
Drill with drill bit Ø 6.0 mm

For sensor
For flanges and other process connections: use a suitable mounting tool

6.2.2 Preparing the measuring device

1. Remove all remaining transport packaging.
2. Remove any protective covers or protective caps present from the sensor.
3. Remove stick-on label on the electronics compartment cover.

6.2.3 Mounting the measuring device

⚠️ WARNING
Danger due to improper process sealing!
- Ensure that the inside diameters of the gaskets are greater than or equal to that of the process connections and piping.
- Ensure that the seals are clean and undamaged.
- Secure the seals correctly.

1. Ensure that the direction of the arrow on the nameplate of the sensor matches the flow direction of the medium.
2. Install the measuring device or turn the transmitter housing so that the cable entries do not point upwards.

![Diagram showing correct and incorrect cable entry directions]

6.2.4 Mounting the transmitter housing: Proline 500 – digital

⚠️ CAUTION
Ambient temperature too high!
Danger of electronics overheating and housing deformation.
- Do not exceed the permitted maximum ambient temperature.
- If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.
**CAUTION**
Excessive force can damage the housing!
- Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:
- Post mounting
- Wall mounting

**Pipe mounting**

**WARNING**
Excessive tightening torque applied to the fixing screws!
Risk of damaging the plastic transmitter.
- Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)
Wall mounting

Order code for "Transmitter housing"
- Option A, aluminum, coated: \( L = 14 \text{ mm} \) (0.55 in)
- Option D, polycarbonate: \( L = 13 \text{ mm} \) (0.51 in)

1. Drill the holes.
2. Insert wall plugs into the drilled holes.
3. Screw in the securing screws slightly.
4. Fit the transmitter housing over the securing screws and hook into place.
5. Tighten the securing screws.

6.2.5 Mounting the transmitter housing: Proline 500

**CAUTION**
Ambient temperature too high!
Danger of electronics overheating and housing deformation.
- Do not exceed the permitted maximum ambient temperature.
- If operating outdoors: Avoid direct sunlight and exposure to weathering, particularly in warm climatic regions.

**CAUTION**
Excessive force can damage the housing!
- Avoid excessive mechanical stress.

The transmitter can be mounted in the following ways:
- Post mounting
- Wall mounting
Wall mounting

1. Drill the holes.
2. Insert wall plugs into the drilled holes.
3. Screw in the securing screws slightly.
4. Fit the transmitter housing over the securing screws and hook into place.
5. Tighten the securing screws.

Post mounting

6.2.6 Turning the transmitter housing: Proline 500

To provide easier access to the connection compartment or display module, the transmitter housing can be turned.
1. Loosen the fixing screws.
2. Turn the housing to the desired position.
3. Tighten the securing screws.

### 6.2.7 Turning the display module: Proline 500

The display module can be turned to optimize display readability and operability.

1. Depending on the device version: Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Turn the display module to the desired position: max. 8 × 45° in each direction.
4. Screw on the connection compartment cover.
5. Depending on the device version: Attach the securing clamp of the connection compartment cover.
6.3  Post-installation check

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the device undamaged (visual inspection)?</td>
<td></td>
</tr>
<tr>
<td>Does the measuring device conform to the measuring point specifications?</td>
<td></td>
</tr>
<tr>
<td>For example:</td>
<td></td>
</tr>
<tr>
<td>* Process temperature → 300</td>
<td></td>
</tr>
<tr>
<td>* Process pressure (refer to the section on 'Pressure-temperature ratings' in the 'Technical Information' document)</td>
<td></td>
</tr>
<tr>
<td>* Ambient temperature</td>
<td></td>
</tr>
<tr>
<td>* Measuring range</td>
<td></td>
</tr>
<tr>
<td>Has the correct orientation for the sensor been selected?</td>
<td></td>
</tr>
<tr>
<td>* According to sensor type</td>
<td></td>
</tr>
<tr>
<td>* According to medium temperature</td>
<td></td>
</tr>
<tr>
<td>* According to medium properties (outgassing, with entrained solids)</td>
<td></td>
</tr>
<tr>
<td>Does the arrow on the sensor nameplate match the direction of flow of the fluid through the piping → 23?</td>
<td></td>
</tr>
<tr>
<td>Are the measuring point identification and labeling correct (visual inspection)?</td>
<td></td>
</tr>
<tr>
<td>Is the device adequately protected from precipitation and direct sunlight?</td>
<td></td>
</tr>
<tr>
<td>Are the securing screw and securing clamp tightened securely?</td>
<td></td>
</tr>
</tbody>
</table>
7  Electrical connection

**WARNING**

Live parts! Incorrect work performed on the electrical connections can result in an electric shock.

- Set up a disconnecting device (switch or power-circuit breaker) to easily disconnect the device from the supply voltage.
- In addition to the device fuse, include an overcurrent protection unit with max. 10 A in the plant installation.

7.1  Electrical safety

In accordance with applicable national regulations.

7.2  Connecting requirements

7.2.1  Required tools

- For cable entries: Use corresponding tools
- For securing clamp: Allen key 3 mm
- Wire stripper
- When using stranded cables: crimper for wire end ferrule
- For removing cables from terminal: Flat blade screwdriver ≤ 3 mm (0.12 in)

7.2.2  Requirements for connecting cable

The connecting cables provided by the customer must fulfill the following requirements.

**Protective grounding cable for the outer ground terminal**

Conductor cross-section < 2.1 mm² (14 AWG)

The use of a cable lug enables the connection of larger cross-sections.

The grounding impedance must be less than 2 Ω.

**Permitted temperature range**

- The installation guidelines that apply in the country of installation must be observed.
- The cables must be suitable for the minimum and maximum temperatures to be expected.

**Power supply cable (incl. conductor for the inner ground terminal)**

Standard installation cable is sufficient.

**Signal cable**

*PROFINET with Ethernet-APL*

The reference cable type for APL segments is fieldbus cable type A, MAU type 1 and 3 (specified in IEC 61158-2). This cable meets the requirements for intrinsically safe applications according to IEC TS 60079-47 and can also be used in non-intrinsically safe applications.

<table>
<thead>
<tr>
<th>Cable type</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable capacitance</td>
<td>45 to 200 nF/km</td>
</tr>
</tbody>
</table>
Loop resistance | 15 to 150 Ω/km
---|---
Cable inductance | 0.4 to 1 mH/km

Further details are provided in the Ethernet-APL Engineering Guideline ([https://www.ethernet-apl.org](https://www.ethernet-apl.org)).

**Current output 0/4 to 20 mA**
Standard installation cable is sufficient

**Pulse /frequency /switch output**
Standard installation cable is sufficient

**Relay output**
Standard installation cable is sufficient.

**Current input 0/4 to 20 mA**
Standard installation cable is sufficient

**Status input**
Standard installation cable is sufficient

**Cable diameter**
- Cable glands supplied:
  - M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Spring-loaded terminals: Suitable for strands and strands with ferrules. Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).

**Choice of connecting cable between the transmitter and sensor**
Depends on the type of transmitter and the installation zones
Electrical connection

Proline Promass A 500 PROFINET with Ethernet-APL

1 Proline 500 digital transmitter
2 Proline 500 transmitter
3 Sensor Promass
4 Non-hazardous area
5 Hazardous area: Zone 2; Class I, Division 2
6 Hazardous area: Zone 1; Class I, Division 1
A Standard cable to 500 digital transmitter → 38
   Transmitter installed in the non-hazardous area or hazardous area: Zone 2; Class I, Division 2 / sensor
   installed in the hazardous area: Zone 2; Class I, Division 2
B Standard cable to 500 digital transmitter → 39
   Transmitter installed in the hazardous area: Zone 2; Class I, Division 2 / sensor installed in the hazardous
   area: Zone 1; Class I, Division 1
C Signal cable to 500 transmitter → 41
   Transmitter and sensor installed in the hazardous area: Zone 2; Class I, Division 2 or Zone 1;
   Class I, Division 1

A: Connecting cable between sensor and transmitter: Proline 500 – digital

Standard cable

A standard cable with the following specifications can be used as the connecting cable.

<table>
<thead>
<tr>
<th>Design</th>
<th>4 cores (2 pairs); uninsulated stranded CU wires; pair-stranded with common shield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shielding</td>
<td>Tin-plated copper braid, optical cover ≥ 85 %</td>
</tr>
<tr>
<td>Loop resistance</td>
<td>Power supply line (+, –): maximum 10 Ω</td>
</tr>
<tr>
<td>Cable length</td>
<td>Maximum 300 m (900 ft), see the following table.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cross-section</th>
<th>Cable length [max.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.34 mm² (AWG 22)</td>
<td>80 m (240 ft)</td>
</tr>
<tr>
<td>0.50 mm² (AWG 20)</td>
<td>120 m (360 ft)</td>
</tr>
<tr>
<td>0.75 mm² (AWG 18)</td>
<td>180 m (540 ft)</td>
</tr>
<tr>
<td>1.00 mm² (AWG 17)</td>
<td>240 m (720 ft)</td>
</tr>
<tr>
<td>1.50 mm² (AWG 15)</td>
<td>300 m (900 ft)</td>
</tr>
</tbody>
</table>
**Optionally available connecting cable**

| Design | 2 × 2 × 0.34 mm² (AWG 22) PVC cable ¹ with common shield (2 pairs, uninsulated stranded CU wires; pair-stranded) |
| Flame resistance | According to DIN EN 60332-1-2 |
| Oil-resistance | According to DIN EN 60811-2-1 |
| Shielding | Tin-plated copper braid, optical cover ≥ 85 % |
| Operating temperature | When mounted in a fixed position: −50 to +105 °C (−58 to +221 °F); when cable can move freely: −25 to +105 °C (−13 to +221 °F) |
| Available cable length | Fixed: 20 m (60 ft); variable: up to maximum 50 m (150 ft) |

¹) UV radiation can impair the cable outer sheath. Protect the cable from direct sunshine where possible.

**B: Connecting cable between sensor and transmitter: Proline 500 - digital**

**Standard cable**

A standard cable with the following specifications can be used as the connecting cable.

| Design | 4, 6, 8 cores (2, 3, 4 pairs); uninsulated stranded CU wires; pair-stranded with common shield |
| Shielding | Tin-plated copper braid, optical cover ≥ 85 % |
| Capacitance C | Maximum 760 nF IIC, maximum 4.2 µF IIB |
| Inductance L | Maximum 26 µH IIC, maximum 104 µH IIB |
| Inductance/resistance ratio (L/R) | Maximum 8.9 µH/Ω IIC, maximum 35.6 µH/Ω IIB (e.g. according to IEC 60079-25) |
| Loop resistance | Power supply line (+, −): maximum 5 Ω |
| Cable length | Maximum 150 m (450 ft), see the following table. |
### Electrical connection

#### Proline Promass A 500 PROFINET with Ethernet-APL

<table>
<thead>
<tr>
<th>Cross-section</th>
<th>Cable length [max.]</th>
<th>Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 2 x 0.50 mm² (AWG 20)</td>
<td>50 m (150 ft)</td>
<td>2 x 2 x 0.50 mm² (AWG 20)</td>
</tr>
<tr>
<td>3 x 2 x 0.50 mm² (AWG 20)</td>
<td>100 m (300 ft)</td>
<td>3 x 2 x 0.50 mm² (AWG 20)</td>
</tr>
<tr>
<td>4 x 2 x 0.50 mm² (AWG 20)</td>
<td>150 m (450 ft)</td>
<td>4 x 2 x 0.50 mm² (AWG 20)</td>
</tr>
</tbody>
</table>

- +, − = 0.5 mm²
- A, B = 0.5 mm²

#### Optionally available connecting cable

<table>
<thead>
<tr>
<th>Connecting cable for</th>
<th>Zone 1; Class I, Division 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard cable</strong></td>
<td>2 x 2 x 0.50 mm² (AWG 20) PVC cable ¹ with common shield (2 pairs, pair-stranded)</td>
</tr>
<tr>
<td><strong>Flame resistance</strong></td>
<td>According to DIN EN 60332-1-2</td>
</tr>
<tr>
<td><strong>Oil-resistance</strong></td>
<td>According to DIN EN 60811-2-1</td>
</tr>
<tr>
<td><strong>Shielding</strong></td>
<td>Tin-plated copper braid, optical cover ≥ 85 %</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>When mounted in a fixed position: −50 to +105 °C (−58 to +221 °F); when cable can move freely: −25 to +105 °C (−13 to +221 °F)</td>
</tr>
<tr>
<td><strong>Available cable length</strong></td>
<td>Fixed: 20 m (60 ft); variable: up to maximum 50 m (150 ft)</td>
</tr>
</tbody>
</table>

¹ UV radiation can impair the cable outer sheath. Protect the cable from direct sunshine where possible.
C: Connecting cable between sensor and transmitter: Proline 500

<table>
<thead>
<tr>
<th>Design</th>
<th>6 × 0.38 mm² PVC cable with individual shielded cores and common copper shield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor resistance</td>
<td>≤ 50 Ω/km (0.015 Ω/ft)</td>
</tr>
<tr>
<td>Capacitance: core/shield</td>
<td>≤ 420 pF/m (128 pF/ft)</td>
</tr>
<tr>
<td>Cable length (max.)</td>
<td>20 m (60 ft)</td>
</tr>
<tr>
<td>Cable lengths (available for order)</td>
<td>5 m (15 ft), 10 m (30 ft), 20 m (60 ft)</td>
</tr>
<tr>
<td>Cable diameter</td>
<td>11 mm (0.43 in) ± 0.5 mm (0.02 in)</td>
</tr>
<tr>
<td>Continuous operating temperature</td>
<td>Max. 105 °C (221 °F)</td>
</tr>
</tbody>
</table>

1) UV radiation can impair the cable outer sheath. Protect the cable from direct sunshine where possible.

7.2.3 Terminal assignment

Transmitter: supply voltage, input/outputs

The terminal assignment of the inputs and outputs depends on the individual order version of the device. The device-specific terminal assignment is documented on an adhesive label in the terminal cover.

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Input/output 1</th>
<th>Input/output 2</th>
<th>Input/output 3</th>
<th>Input/output 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (+)</td>
<td>26 (+)</td>
<td>27 (+)</td>
<td>24 (+)</td>
<td>22 (+)</td>
</tr>
<tr>
<td>2 (–)</td>
<td>27 (–)</td>
<td>25 (–)</td>
<td>23 (–)</td>
<td>21 (–)</td>
</tr>
</tbody>
</table>

Device-specific terminal assignment: adhesive label in terminal cover.

Transmitter and sensor connection housing: connecting cable

The sensor and transmitter, which are mounted in separate locations, are interconnected by a connecting cable. The cable is connected via the sensor connection housing and the transmitter housing.

Terminal assignment and connection of the connecting cable:
- Proline 500 – digital → 44
- Proline 500 → 53

7.2.4 Available device plugs

Device plugs may not be used in hazardous areas!

Order code for "Input; output 1", option RB "PROFINET with Ethernet-APL"

<table>
<thead>
<tr>
<th>Order code &quot;Electrical connection&quot;</th>
<th>Cable entry/connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>L, N, P, U</td>
<td>M12 plug × 1</td>
</tr>
</tbody>
</table>

Endress+Hauser
### 7.2.5 Device plug pin assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
<th>Coding</th>
<th>Plug/socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>APL signal -</td>
<td>A</td>
<td>Socket</td>
</tr>
<tr>
<td>2</td>
<td>APL signal +</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Cable shield¹</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Not assigned</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metal plug housing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹If a cable shield is used

### 7.2.6 Shielding and grounding

Optimal electromagnetic compatibility (EMC) of the fieldbus system can be guaranteed only if the system components and, in particular, the lines are shielded and the shield forms as complete a cover as possible.

1. To ensure optimal EMC protection, connect the shield to the reference ground as often as possible.

2. For reasons concerning explosion protection, it is recommended that grounding be dispensed with.

To comply with both requirements, there are basically three different types of shielding in the fieldbus system:

- Shielding at both ends
- Shielding at one end on the feed side with capacitance termination at the field device
- Shielding at one end on the feed side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with one-sided shielding on the feed side (without capacitance termination at the field device). Appropriate measures with regard to input wiring must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

1. Observe national installation requirements and guidelines during installation.

2. Where there are large differences in potential between the individual grounding points, connect only one point of the shielding directly to the reference ground.

3. In systems without potential equalization, the cable shielding of fieldbus systems should be grounded on one side only, for example at the fieldbus supply unit or at safety barriers.

**NOTICE**

In systems without potential matching, the multiple grounding of the cable shield causes mains frequency equalizing currents!

Damage to the bus cable shield.

- Only ground the bus cable shield to either the local ground or the protective ground at one end.
- Insulate the shield that is not connected.
7.2.7 Preparing the measuring device

Carry out the steps in the following order:

1. Mount the sensor and transmitter.
2. Sensor connection housing: Connect connecting cable.
3. Transmitter: Connect connecting cable.
4. Transmitter: Connect signal cable and cable for supply voltage.

**NOTICE**

Insufficient sealing of the housing!
Operational reliability of the measuring device could be compromised.

- Use suitable cable glands corresponding to the degree of protection.

1. Remove dummy plug if present.
2. If the measuring device is supplied without cable glands:
   Provide suitable cable gland for corresponding connecting cable.
3. If the measuring device is supplied with cable glands:
   Observe requirements for connecting cables → A0047536.
7.3 Connecting the measuring device: Proline 500 – digital

**NOTICE**

An incorrect connection compromises electrical safety!

- Have electrical connection work carried out by appropriately trained specialists only.
- Observe applicable federal/national installation codes and regulations.
- Comply with local workplace safety regulations.
- Always connect the protective ground cable  before connecting additional cables.
- When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

7.3.1 Connecting the connecting cable

**WARNING**

Risk of damaging electronic components!

- Connect the sensor and transmitter to the same potential equalization.
- Only connect the sensor to a transmitter with the same serial number.

Connecting cable terminal assignment

1. Cable entry for cable on transmitter housing
2. Protective earth (PE)
3. Connecting cable ISEM communication
4. Grounding via ground connection; on device plug versions grounding is through the plug itself
5. Cable entry for cable or connection of device plug on sensor connection housing
6. Protective earth (PE)

Connecting the connecting cable to the sensor connection housing

- Connection via terminals with order code for “Sensor connection housing”:
  - Option A "Aluminum, coated" → 45
  - Option B "Stainless" → 46
  - Option L "Cast, stainless" → 45
- Connection via connectors with order code for "Sensor connection housing":
  Option C "Ultra-compact hygienic, stainless" → 47

Connecting the connecting cable to the transmitter

The cable is connected to the transmitter via terminals → 48.
Connecting the sensor connection housing via terminals

For the device version with the order code for 'Sensor connection housing':
- Option A 'Aluminum coated'
- Option L 'Cast, stainless'

1. Loosen the securing clamp of the housing cover.
2. Unscrew the housing cover.
3. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the connecting cable terminal assignment.
7. Firmly tighten the cable glands.
   - This concludes the process for connecting the connecting cable.

**WARNING**

Housing degree of protection voided due to insufficient sealing of the housing.
- Screw in the thread on the cover without using any lubricant. The thread on the cover is coated with a dry lubricant.

8. Screw on the housing cover.
9. Tighten the securing clamp of the housing cover.
Connecting the sensor connection housing via terminals
For the device version with the order code for "Sensor connection housing": Option B "Stainless"

1. Release the securing screw of the housing cover.
2. Open the housing cover.
3. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the connecting cable terminal assignment.
7. Firmly tighten the cable glands.
   ← This concludes the process for connecting the connecting cable.
8. Close the housing cover.
9. Tighten the securing screw of the housing cover.
Connecting the sensor connection housing via the connector

For the device version with the order code for 'Sensor connection housing': Option C "Ultra-compact hygienic, stainless"

1. Connect the protective ground.
2. Connect the connector.
Connecting the connecting cable to the transmitter

1. Loosen the 4 fixing screws on the housing cover.
2. Open the housing cover.
3. Fold open the terminal cover.
4. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
5. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
6. Connect the protective ground.
7. Connect the cable according to the terminal assignment for the connecting cable → 44.
8. Firmly tighten the cable glands.
   ◮ This concludes the process for connecting the connecting cable.
9. Close the housing cover.
10. Tighten the securing screw of the housing cover.
11. After connecting the connecting cable:
    Connect the signal cable and the supply voltage cable.
7.3.2  Connecting the transmitter

1. Terminal connection for supply voltage
2. Terminal connection for signal transmission, input/output
3. Terminal connection for signal transmission, input/output
4. Terminal connection for connecting cable between sensor and transmitter
5. Terminal connection for signal transmission, input/output; optional: connection for external WLAN antenna
6. Protective earth (PE)

In addition to connecting the device via and the available input/outputs, additional connection options are also available:
Integrate into a network via the service interface (CDI-RJ45) → 52.

Connecting the plug

1. Loosen the 4 fixing screws on the housing cover.
2. Open the housing cover.
3. Fold open the terminal cover.
4. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
5. Strip the cable and cable ends and connect to the RJ45 connector.
6. Connect the protective ground.
7. Plug in the RJ45 connector.
8. Firmly tighten the cable glands.
   ➤ This concludes the connection process.

Connecting the supply voltage and additional inputs/outputs

1. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
2. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
3. Connect the protective ground.
4. Connect the cable according to the terminal assignment.
   ➤ **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.
   **Supply voltage terminal assignment:** Adhesive label in the terminal cover or ➔ 41.
5. Firmly tighten the cable glands.
   ➤ This concludes the cable connection process.
6. Close the terminal cover.
7. Close the housing cover.

**WARNING**
Housing degree of protection may be voided due to insufficient sealing of the housing.
▷ Screw in the screw without using any lubricant.

**WARNING**
Excessive tightening torque applied to the fixing screws!
Risk of damaging the plastic transmitter.
▷ Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)
8. Tighten the 4 fixing screws on the housing cover.
Removing a cable

1. To remove a cable from the terminal, use a flat-blade screwdriver to push the slot between the two terminal holes
2. while simultaneously pulling the cable end out of the terminal.
7.3.3 Integrating the transmitter into a network

This section only presents the basic options for integrating the device into a network.
For information on the procedure to follow to connect the transmitter correctly → 44.

Integrating via the service interface

The device is integrated via the connection to the service interface (CDI-RJ45).

Note the following when connecting:
- Recommended cable: CAT5e, CAT6 or CAT7, with shielded connector (e.g. brand: YAMAICHI; Part No Y-ConProfixPlug63 / Prod. ID: 82-006660)
- Maximum cable thickness: 6 mm
- Length of plug including anti-bend protection: 42 mm
- Bending radius: 5 x cable thickness

An adapter for the RJ45 to the M12 plug is optionally available for the non-hazardous area:
Order code for 'Accessories', option NB: "Adapter RJ45 M12 (service interface)"

The adapter connects the service interface (CDI-RJ45) to an M12 plug mounted in the cable entry. The connection to the service interface can therefore be established via an M12 plug without opening the device.
7.4 Connecting the measuring device: Proline 500

**NOTICE**

An incorrect connection compromises electrical safety!

- Have electrical connection work carried out by appropriately trained specialists only.
- Observe applicable federal/national installation codes and regulations.
- Comply with local workplace safety regulations.
- Always connect the protective ground cable before connecting additional cables.
- When using in potentially explosive atmospheres, observe the information in the device-specific Ex documentation.

7.4.1 Connecting the connecting cable

**WARNING**

Risk of damaging electronic components!

- Connect the sensor and transmitter to the same potential equalization.
- Only connect the sensor to a transmitter with the same serial number.

Connecting cable terminal assignment

| 1 | Protective earth (PE) |
| 2 | Cable entry for connecting cable on transmitter connection housing |
| 3 | Connecting cable |
| 4 | Cable entry for connecting cable on sensor connection housing |
| 5 | Protective earth (PE) |

Connecting the connecting cable to the sensor connection housing

Connection via terminals with order code for "Housing":

Option B "Stainless" → 54
Connecting the sensor connection housing via terminals

For the device version with the order code for “Housing”:
Option B “Stainless”

1. Release the securing screw of the housing cover.
2. Open the housing cover.
3. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the connecting cable terminal assignment.
7. Firmly tighten the cable glands.
   
   This concludes the process for connecting the connecting cable.
8. Close the housing cover.
9. Tighten the securing screw of the housing cover.
Attaching the connecting cable to the transmitter

1. Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.
5. Connect the protective ground.
6. Connect the cable in accordance with the connecting cable terminal assignment →  53.
7. Firmly tighten the cable glands.
   ➤ This concludes the process for attaching the connecting cable.
8. Screw on the connection compartment cover.
9. Tighten the securing clamp of the connection compartment cover.
10. After connecting the connecting cable:
    Connect the signal cable and the supply voltage cable.
7.4.2 Connecting the transmitter

1. Terminal connection for supply voltage
2. Terminal connection for signal transmission, input/output
3. Terminal connection for signal transmission, input/output or terminal connection for network connection via service interface (CDI-RJ45)
4. Protective earth (PE)

In addition to connecting the device via PROFINET with Ethernet-APL and the available inputs/outputs, an additional connection option is also available: Integrate into a network via the service interface (CDI-RJ45) → 59.

Connecting the plug

1. Loosen the securing clamp of the connection compartment cover.
2. Unscrew the connection compartment cover.
3. Squeeze the tabs of the display module holder together.
4. Remove the display module holder.
5. Attach the holder to the edge of the electronics compartment.
6. Open the terminal cover.
7. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.

8. Strip the cable and cable ends and connect to terminals 26-27. In the case of stranded cables, also fit ferrules.


10. Firmly tighten the cable glands.

   This concludes the connection via the APL port.

Connecting the supply voltage and additional inputs/outputs

1. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.

2. Strip the cable and cable ends. In the case of stranded cables, also fit ferrules.

3. Connect the protective ground.

4. Connect the cable according to the terminal assignment.

   **Signal cable terminal assignment:** The device-specific terminal assignment is documented on an adhesive label in the terminal cover.

   **Supply voltage terminal assignment:** Adhesive label in the terminal cover or →  41.
5. Firmly tighten the cable glands. 
   This concludes the cable connection process.
6. Close the terminal cover.
7. Fit the display module holder in the electronics compartment.
8. Screw on the connection compartment cover.
9. Secure the securing clamp of the connection compartment cover.

Removing a cable

1. To remove a cable from the terminal, use a flat-blade screwdriver to push the slot between the two terminal holes
2. while simultaneously pulling the cable end out of the terminal.
7.4.3 Integrating the transmitter into a network

This section only presents the basic options for integrating the device into a network. For information on the procedure to follow to connect the transmitter correctly → 53.

Integrating via the service interface

The device is integrated via the connection to the service interface (CDI-RJ45).

Note the following when connecting:
- Recommended cable: CAT 5e, CAT 6 or CAT 7, with shielded connector (e.g. brand: YAMAICHI; Part No Y-ConProfexPlug63 / Prod. ID: 82-006660)
- Maximum cable thickness: 6 mm
- Length of plug including anti-bend protection: 42 mm
- Bending radius: 5 x cable thickness

An adapter for the RJ45 to the M12 plug is optionally available:
Order code for "Accessories", option NB: "Adapter RJ45 M12 (service interface)"

The adapter connects the service interface (CDI-RJ45) to an M12 plug mounted in the cable entry. The connection to the service interface can therefore be established via an M12 plug without opening the device.
7.5 Potential equalization

7.5.1 Requirements

For potential equalization:
- Pay attention to in-house grounding concepts
- Take account of operating conditions like the pipe material and grounding
- Connect the medium, sensor and transmitter to the same electrical potential
- Use a ground cable with a minimum cross-section of 6 mm² (0.0093 in²) and a cable lug for potential equalization connections

For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).

7.6 Special connection instructions

7.6.1 Connection examples

PROFINET with Ethernet-APL

![Connection example for PROFINET with Ethernet-APL](image)

1 Cable shield
2 Measuring device
3 Local grounding
4 Potential equalization
5 Trunk or TCP
6 Field switch
Current output 4-20 mA

1. Automation system with current input (e.g. PLC)
2. Analog display unit: observe maximum load
3. Transmitter

Pulse/frequency output

1. Automation system with pulse/frequency input (e.g. PLC with 10 kΩ pull-up or pull-down resistor)
2. Power supply
3. Transmitter: observe input values → 288
Switch output

1. Automation system with switch input (e.g. PLC with a 10 kΩ pull-up or pull-down resistor)
2. Power supply
3. Transmitter: observe input values → 288

Relay output

1. Automation system with relay input (e.g. PLC)
2. Power supply
3. Transmitter: observe input values → 289

Current input

1. Power supply
2. Terminal box
3. External measuring device (to read in pressure or temperature, for instance)
4. Transmitter

Connection example for switch output (passive)

Connection example for relay output (passive)

Connection example for 4 to 20 mA current input
Status input

![Connection example for status input](image)

- **1**: Automation system with status output (e.g. PLC)
- **2**: Power supply
- **3**: Transmitter

### 7.7 Hardware settings

#### 7.7.1 Setting the device name

A measuring point can be quickly identified within a plant on the basis of the tag name. The factory-assigned device name can be changed using the DIP switches or the automation system.

Example: EH-Promass500-XXXX

<table>
<thead>
<tr>
<th>EH</th>
<th>Endress+Hauser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promass</td>
<td>Instrument family</td>
</tr>
<tr>
<td>500</td>
<td>Transmitter</td>
</tr>
<tr>
<td>XXXX</td>
<td>Serial number of the device</td>
</tr>
</tbody>
</table>

The device name currently used is displayed in Setup → Name of station.

**Setting the device name using the DIP switches**

The last part of the device name can be set using DIP switches 1-8. The address range is between 1 and 254 (factory setting: serial number of the device)

**Overview of the DIP switches**

<table>
<thead>
<tr>
<th>DIP switch</th>
<th>Bit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>Configurable part of the device name</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Example: setting the device name EH-PROMASS500-065
### Setting the device name: Proline 500 - digital

Risk of electric shock when opening the transmitter housing.

- Before opening the transmitter housing:
- Disconnect the device from the power supply.

ℹ️ The default IP address may **not** be activated → ️ 65.

1. Loosen the 4 securing screws on the housing cover.
2. Open the housing cover.
3. Fold open the terminal cover.
4. Set the desired device name using the corresponding DIP switches on the I/O electronics module.
5. Reassemble the transmitter in the reverse order.
6. Reconnect the device to the power supply.

⚠️ The configured device address is used once the device is restarted.

### Setting the device name: Proline 500

Risk of electric shock when opening the transmitter housing.

- Before opening the transmitter housing:
- Disconnect the device from the power supply.

ℹ️ The default IP address may **not** be activated → ️ 66.
1. Depending on the housing version, loosen the securing clamp or securing screw of the housing cover.

2. Depending on the housing version, unscrew or open the housing cover and disconnect the local display from the main electronics module where necessary.

3. Set the desired device name using the corresponding DIP switches on the I/O electronics module.

4. Reassemble the transmitter in the reverse order.

5. Reconnect the device to the power supply.
   - The configured device address is used once the device is restarted.

Setting the device name via the automation system

DIP switches 1-8 must all be set to OFF (factory setting) or all be set to ON to be able to set the device name via the automation system.

The complete device name (name of station) can be changed individually via the automation system.

- The serial number used as part of the device name in the factory setting is not saved. It is not possible to reset the device name to the factory setting with the serial number. The device name is empty following the reset.
- When assigning the device name via the automation system:
  assign the device name in lower case letters.

7.7.2 Activating the default IP address

Activating the default IP address by DIP switch: Proline 500 - digital

Risk of electric shock when opening the transmitter housing.

- Before opening the transmitter housing:
- Disconnect the device from the power supply.
1. Loosen the 4 fixing screws on the housing cover.
2. Open the housing cover.
3. Fold open the terminal cover.
4. Set DIP switch no. 2 on the I/O electronics module from OFF → ON.
5. Reassemble the transmitter in the reverse order.
6. Reconnect the device to the power supply.
   ‣ The default IP address is used once the device is restarted.

Activating the default IP address by DIP switch: Proline 500

Risk of electric shock when opening the transmitter housing.
▸ Before opening the transmitter housing:
▸ Disconnect the device from the power supply.

1. Depending on the housing version, loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version, unscrew or open the housing cover and disconnect the local display from the main electronics module where necessary.
3. Set DIP switch no. 2 on the I/O electronics module from OFF → ON.
4. Reassemble the transmitter in the reverse order.
5. Reconnect the device to the power supply.
   ‣ The default IP address is used once the device is restarted.
7.8 Ensuring the degree of protection

The measuring device fulfills all the requirements for the degree of protection IP66/67, Type 4X enclosure.

To guarantee the degree of protection IP66/67, Type 4X enclosure, carry out the following steps after the electrical connection:

1. Check that the housing seals are clean and fitted correctly.
2. Dry, clean or replace the seals if necessary.
3. Tighten all housing screws and screw covers.
4. Firmly tighten the cable glands.
5. To ensure that moisture does not enter the cable entry:
   Route the cable so that it loops down before the cable entry (‘water trap’).

6. The cable glands supplied do not provide any housing protection if they are not used. Therefore, they must be replaced by dummy plugs that match the housing protection.

7.9 Post-connection check

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are cables or the device undamaged (visual inspection)?</td>
<td>☐</td>
</tr>
<tr>
<td>Is the protective earthing established correctly?</td>
<td>☐</td>
</tr>
<tr>
<td>Do the cables used comply with the requirements?</td>
<td>☐</td>
</tr>
<tr>
<td>Do the mounted cables have adequate strain relief?</td>
<td>☐</td>
</tr>
<tr>
<td>Are all cable glands installed, securely tightened and leak-tight? Cable run with ‘water trap’ + ☐ 67?</td>
<td>☐</td>
</tr>
<tr>
<td>Is the terminal assignment correct?</td>
<td>☐</td>
</tr>
<tr>
<td>Are dummy plugs inserted in unused cable entries and have transportation plugs been replaced with dummy plugs?</td>
<td>☐</td>
</tr>
</tbody>
</table>
8 Operation options

8.1 Overview of operation options

1 Local operation via display module
2 Computer with web browser (e.g. Internet Explorer) or with operating tool (e.g. FieldCare, SIMATIC PDM)
3 Field Xpert SMT70
4 Mobile handheld terminal
5 Control system (e.g. PLC)
8.2 Structure and function of the operating menu

8.2.1 Structure of the operating menu

For an overview of the operating menu for experts: see the "Description of Device Parameters' document supplied with the device → 314

![Schematic structure of the operating menu](image)
### 8.2.2 Operating philosophy

The individual parts of the operating menu are assigned to certain user roles (operator, maintenance etc.). Each user role contains typical tasks within the device lifecycle.

<table>
<thead>
<tr>
<th>Menu/parameter</th>
<th>User role and tasks</th>
<th>Content/meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Language</strong></td>
<td><strong>Task-oriented</strong></td>
<td></td>
</tr>
<tr>
<td>Role &quot;Operator&quot;, &quot;Maintenance&quot;</td>
<td>Tasks during operation:</td>
<td>Defining the operating language</td>
</tr>
<tr>
<td></td>
<td>• Configuration of the operational display</td>
<td>Defining the Web server operating language</td>
</tr>
<tr>
<td></td>
<td>• Reading measured values</td>
<td>Resetting and controlling totalizers</td>
</tr>
<tr>
<td><strong>Operation</strong></td>
<td></td>
<td>Configuring the operational display (e.g. display format, display contrast)</td>
</tr>
<tr>
<td><strong>Setup</strong></td>
<td></td>
<td>Resetting and controlling totalizers</td>
</tr>
<tr>
<td><em>&quot;Maintenance&quot; role</em></td>
<td>Commissioning:</td>
<td>Wizards for quick commissioning:</td>
</tr>
<tr>
<td></td>
<td>• Configuration of the measurement</td>
<td>• Configuration of the system units</td>
</tr>
<tr>
<td></td>
<td>• Configuration of the inputs and outputs</td>
<td>• Configuration of the communication interface</td>
</tr>
<tr>
<td></td>
<td>• Configuration of the communication interface</td>
<td>• Definition of the medium</td>
</tr>
<tr>
<td><strong>Diagnostics</strong></td>
<td></td>
<td>Display the I/O configuration</td>
</tr>
<tr>
<td><em>&quot;Maintenance&quot; role</em></td>
<td>Troubleshooting:</td>
<td>Configuration of the inputs</td>
</tr>
<tr>
<td></td>
<td>• Diagnostics and elimination of process and device errors</td>
<td>Configuration of the outputs</td>
</tr>
<tr>
<td></td>
<td>• Measured value simulation</td>
<td>Configuration of the operational display</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Configuration of the low flow cut off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Configuration of the detection of partially filled and empty pipes</td>
</tr>
<tr>
<td><strong>Expert</strong></td>
<td><strong>Function-oriented</strong></td>
<td>Advanced setup</td>
</tr>
<tr>
<td></td>
<td>Tasks that require detailed knowledge of the function of the device:</td>
<td>For more customized configuration of the measurement (adaptation to special measuring conditions)</td>
</tr>
<tr>
<td></td>
<td>• Commissioning measurements under difficult conditions</td>
<td>Configuration of totalizers</td>
</tr>
<tr>
<td></td>
<td>• Optimal adaptation of the measurement to difficult conditions</td>
<td>Configuration of WLAN settings</td>
</tr>
<tr>
<td></td>
<td>• Detailed configuration of the communication interface</td>
<td>Administration (define access code, reset measuring device)</td>
</tr>
<tr>
<td></td>
<td>• Error diagnostics in difficult cases</td>
<td><strong>Data logging</strong> submenu with the &quot;Extended HistoROM&quot; order option</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Storage and visualization of measured values</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Heartbeat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The functionality of the device is checked on demand and the verification results are documented.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Simulation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Is used to simulate measured values or output values.</td>
</tr>
</tbody>
</table>

Contains all parameters for error detection and analyzing process and device errors:

- **Diagnostic list**
  Contains up to 5 currently pending diagnostic messages.
- **Event logbook**
  Contains event messages that have occurred.
- **Device information**
  Contains information for identifying the device.
- **Measured values**
  Contains all current measured values.
- **Data logging**
  Storage and visualization of measured values
- **Heartbeat**
  The functionality of the device is checked on demand and the verification results are documented.
- **Simulation**
  Is used to simulate measured values or output values.
8.3 Access to the operating menu via the local display

8.3.1 Operational display

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \hat{m} )</td>
<td>Mass flow</td>
</tr>
<tr>
<td>( \hat{V} )</td>
<td>Volume flow</td>
</tr>
<tr>
<td></td>
<td>Corrected volume flow</td>
</tr>
<tr>
<td>( \hat{\rho} )</td>
<td>Density</td>
</tr>
<tr>
<td></td>
<td>Reference density</td>
</tr>
<tr>
<td>( \hat{T} )</td>
<td>Temperature</td>
</tr>
<tr>
<td>( \sum )</td>
<td>Totalizer</td>
</tr>
<tr>
<td></td>
<td>The measurement channel number indicates which of the three totalizers is displayed.</td>
</tr>
<tr>
<td>( \sigma )</td>
<td>Status input</td>
</tr>
</tbody>
</table>

**Status area**

The following symbols appear in the status area of the operational display at the top right:
- Status signals→ 197
  - F: Failure
  - C: Function check
  - S: Out of specification
  - M: Maintenance required
- Diagnostic behavior→ 198
  - \( \sigma \): Alarm
  - \( \Delta \): Warning
  - \( \Theta \): Locking (the device is locked via the hardware )
  - \( \rightarrow \): Communication (communication via remote operation is active)

**Display area**

In the display area, each measured value is prefaced by certain symbol types for further description:

*Measured variables*
**Measurement channel numbers**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ... 4</td>
<td>Measurement channel 1 to 4</td>
</tr>
</tbody>
</table>

The measurement channel number is displayed only if more than one channel is present for the same measured variable type (e.g. totalizer 1 to 3).

**Diagnostic behavior**

The diagnostic behavior pertains to a diagnostic event that is relevant to the displayed measured variable. For information on the symbols → 198

ℹ️ The number and display format of the measured values can be configured via the **Format display** parameter (→ 142).
8.3.2 Navigation view

<table>
<thead>
<tr>
<th>In the submenu</th>
<th>In the wizard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>/../Operation</td>
<td>/../Select medium</td>
</tr>
<tr>
<td>0091-1</td>
<td>0095-1</td>
</tr>
<tr>
<td>Access stat.disp</td>
<td>Select medium</td>
</tr>
<tr>
<td>Operator</td>
<td>Liquid</td>
</tr>
<tr>
<td>Display</td>
<td>Display</td>
</tr>
<tr>
<td>Locking status</td>
<td>Display</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>/../Operation</td>
<td>/../Select medium</td>
</tr>
<tr>
<td>0091-1</td>
<td>0095-1</td>
</tr>
<tr>
<td>Access stat.disp</td>
<td>Select medium</td>
</tr>
<tr>
<td>Operator</td>
<td>Liquid</td>
</tr>
<tr>
<td>Display</td>
<td>Display</td>
</tr>
<tr>
<td>Locking status</td>
<td>Display</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>/../</td>
<td>/../</td>
</tr>
<tr>
<td>/../Operation</td>
<td>/../Select medium</td>
</tr>
<tr>
<td>0091-1</td>
<td>0095-1</td>
</tr>
<tr>
<td>Access stat.disp</td>
<td>Select medium</td>
</tr>
<tr>
<td>Operator</td>
<td>Liquid</td>
</tr>
<tr>
<td>Display</td>
<td>Display</td>
</tr>
<tr>
<td>Locking status</td>
<td>Display</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>/../</td>
<td>/../</td>
</tr>
<tr>
<td>/../Operation</td>
<td>/../Select medium</td>
</tr>
<tr>
<td>0091-1</td>
<td>0095-1</td>
</tr>
<tr>
<td>Access stat.disp</td>
<td>Select medium</td>
</tr>
<tr>
<td>Operator</td>
<td>Liquid</td>
</tr>
<tr>
<td>Display</td>
<td>Display</td>
</tr>
<tr>
<td>Locking status</td>
<td>Display</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>/../</td>
<td>/../</td>
</tr>
<tr>
<td>/../Operation</td>
<td>/../Select medium</td>
</tr>
<tr>
<td>0091-1</td>
<td>0095-1</td>
</tr>
<tr>
<td>Access stat.disp</td>
<td>Select medium</td>
</tr>
<tr>
<td>Operator</td>
<td>Liquid</td>
</tr>
<tr>
<td>Display</td>
<td>Display</td>
</tr>
<tr>
<td>Locking status</td>
<td>Display</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Navigation view
2 Navigation path to current position
3 Status area
4 Display area for navigation
5 Operating elements → 77

Navigation path
The navigation path - displayed at the top left in the navigation view - consists of the following elements:

- In the submenu:
  - Display symbol for menu
  - In the wizard:
    - Display symbol for wizard

Examples

Status area
The following appears in the status area of the navigation view in the top right corner:

- In the submenu
  - The direct access code for the parameter you are navigating to (e.g. 0022-1)
  - If a diagnostic event is present, the diagnostic behavior and status signal

- In the wizard
  - If a diagnostic event is present, the diagnostic behavior and status signal

For more information on the diagnostic behavior and status signal → 197
For information on the function and entry of the direct access code → 79
Display area

**Menus**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="arrow-left" alt="Operation" /></td>
<td>Operation&lt;br&gt;Appears:&lt;br&gt;• In the menu next to the 'Operation' selection&lt;br&gt;• At the left in the navigation path in the Operation menu</td>
</tr>
<tr>
<td><img src="wrench" alt="Setup" /></td>
<td>Setup&lt;br&gt;Appears:&lt;br&gt;• In the menu next to the 'Setup' selection&lt;br&gt;• At the left in the navigation path in the Setup menu</td>
</tr>
<tr>
<td><img src="globe" alt="Diagnostics" /></td>
<td>Diagnostics&lt;br&gt;Appears:&lt;br&gt;• In the menu next to the 'Diagnostics' selection&lt;br&gt;• At the left in the navigation path in the Diagnostics menu</td>
</tr>
<tr>
<td><img src="gear" alt="Expert" /></td>
<td>Expert&lt;br&gt;Appears:&lt;br&gt;• In the menu next to the 'Expert' selection&lt;br&gt;• At the left in the navigation path in the Expert menu</td>
</tr>
</tbody>
</table>

**Submenus, wizards, parameters**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="medium" alt="Submenu" /></td>
<td>Submenu</td>
</tr>
<tr>
<td><img src="wrench" alt="Wizard" /></td>
<td>Wizard</td>
</tr>
<tr>
<td><img src="medium" alt="Parameters within a wizard" /></td>
<td>Parameters within a wizard&lt;br&gt;ℹ️ No display symbol exists for parameters in submenus.</td>
</tr>
</tbody>
</table>

**Locking**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="lock" alt="Parameter locked" /></td>
<td>Parameter locked&lt;br&gt;When displayed in front of a parameter name, indicates that the parameter is locked.&lt;br&gt;• By a user-specific access code&lt;br&gt;• By the hardware write protection switch</td>
</tr>
</tbody>
</table>

**Wizard operation**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="arrow-left" alt="Switches to the previous parameter" /></td>
<td>Switches to the previous parameter.</td>
</tr>
<tr>
<td><img src="checkmark" alt="Confirms the parameter value and switches to the next parameter" /></td>
<td>Confirms the parameter value and switches to the next parameter.</td>
</tr>
<tr>
<td><img src="edit" alt="Opens the editing view of the parameter" /></td>
<td>Opens the editing view of the parameter.</td>
</tr>
</tbody>
</table>
8.3.3 Editing view

Numeric editor

Text editor

Using the operating elements in the editing view

<table>
<thead>
<tr>
<th>Key</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minus key</td>
<td>Move the entry position to the left.</td>
</tr>
<tr>
<td>Plus key</td>
<td>Move the entry position to the right.</td>
</tr>
</tbody>
</table>
### Key Meaning

<table>
<thead>
<tr>
<th>Key</th>
<th>Enter key</th>
</tr>
</thead>
</table>
| ![Enter key](image) | • Pressing the key briefly confirms the selection.  
• Pressing the key for 2 s confirms your entry. |

<table>
<thead>
<tr>
<th>Key</th>
<th>Escape key combination (press keys simultaneously)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Escape key combination" /></td>
<td>Close the editing view without accepting a change.</td>
</tr>
</tbody>
</table>

### Input screens

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Upper case" /></td>
<td>Upper case</td>
</tr>
<tr>
<td><img src="image" alt="Lower case" /></td>
<td>Lower case</td>
</tr>
<tr>
<td><img src="image" alt="Numbers" /></td>
<td>Numbers</td>
</tr>
<tr>
<td><img src="image" alt="Punctuation marks and special characters" /></td>
<td>Punctuation marks and special characters: = + – * / ² ³ ¼ ½ ¾ ( ) [ ] &lt; &gt; { }</td>
</tr>
<tr>
<td><img src="image" alt="Punctuation marks and special characters" /></td>
<td>Punctuation marks and special characters: ‘ “ ` ^ . , ; : ? ! % µ ° € $ £ ¥ § @ # / \ I ~ &amp; _</td>
</tr>
<tr>
<td><img src="image" alt="Umlauts and accents" /></td>
<td>Umlauts and accents</td>
</tr>
</tbody>
</table>

### Controlling data entries

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Move entry position" /></td>
<td>Move entry position</td>
</tr>
<tr>
<td><img src="image" alt="Reject entry" /></td>
<td>Reject entry</td>
</tr>
<tr>
<td><img src="image" alt="Confirm entry" /></td>
<td>Confirm entry</td>
</tr>
<tr>
<td><img src="image" alt="Delete character immediately to the left of the entry position" /></td>
<td>Delete character immediately to the left of the entry position</td>
</tr>
<tr>
<td><img src="image" alt="Delete character immediately to the right of the entry position" /></td>
<td>Delete character immediately to the right of the entry position</td>
</tr>
<tr>
<td><img src="image" alt="Clear all the characters entered" /></td>
<td>Clear all the characters entered</td>
</tr>
</tbody>
</table>
8.3.4 Operating elements

<table>
<thead>
<tr>
<th>Key</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minus key</td>
<td></td>
</tr>
<tr>
<td>In menu, submenu</td>
<td>Moves the selection bar upwards in a picklist.</td>
</tr>
<tr>
<td>With a wizard</td>
<td>Confirms the parameter value and goes to the previous parameter.</td>
</tr>
<tr>
<td>For text and numeric editor</td>
<td>Move the entry position to the left.</td>
</tr>
</tbody>
</table>

| Plus key |
| In menu, submenu | Moves the selection bar downwards in a picklist. |
| With a wizard | Confirms the parameter value and goes to the next parameter. |
| For text and numeric editor | Move the entry position to the right. |

| Enter key |
| For operational display | Pressing the key briefly opens the operating menu. |
| In menu, submenu | Pressing the key briefly: |
| | • Opens the selected menu, submenu or parameter. |
| | • Starts the wizard. |
| | • If help text is open, closes the help text of the parameter. |
| | • Pressing the key for 2 s in a parameter: |
| | • If present, opens the help text for the function of the parameter. |
| With a wizard | Opens the editing view of the parameter. |
| For text and numeric editor | Pressing the key briefly confirms the selection. |
| | Pressing the key for 2 s confirms your entry. |

| Escape key combination (press keys simultaneously) |
| In menu, submenu | Pressing the key briefly: |
| | • Exits the current menu level and takes you to the next level up. |
| | • If help text is open, closes the help text of the parameter. |
| | • Pressing the key for 2 s returns you to the operational display ("home position"). |
| With a wizard | Exits the wizard and takes you to the next level up. |
| For text and numeric editor | Closes the editing view without applying changes. |

| Minus/Enter key combination (press and hold down the keys simultaneously) |
| If the keypad lock is enabled: |
| Pressing the key for 3 s disables the keypad lock. |
| If the keypad lock is not enabled: |
| Pressing the key for 3 s opens the context menu including the selection for activating the keypad lock. |

8.3.5 Opening the context menu

Using the context menu, the user can call up the following menus quickly and directly from the operational display:

- Setup
- Data backup
- Simulation
Calling up and closing the context menu

The user is in the operational display.

1. Press the ▼ and ▲ keys for longer than 3 seconds.
   ↘ The context menu opens.

2. Press ▼ + ▲ simultaneously.
   ↘ The context menu is closed and the operational display appears.

Calling up the menu via the context menu

1. Open the context menu.
2. Press ▼ to navigate to the desired menu.
3. Press ▲ to confirm the selection.
   ↘ The selected menu opens.
8.3.6 Navigating and selecting from list

Different operating elements are used to navigate through the operating menu. The navigation path is displayed on the left in the header. Icons are displayed in front of the individual menus. These icons are also shown in the header during navigation.

For an explanation of the navigation view with symbols and operating elements → 73

Example: Setting the number of displayed measured values to "2 values"

8.3.7 Calling the parameter directly

A parameter number is assigned to every parameter to be able to access a parameter directly via the onsite display. Entering this access code in the Direct access parameter calls up the desired parameter directly.

Navigation path
Expert → Direct access
The direct access code consists of a 5-digit number (at maximum) and the channel number, which identifies the channel of a process variable: e.g. 00914-2. In the navigation view, this appears on the right-hand side in the header of the selected parameter.

Note the following when entering the direct access code:
- The leading zeros in the direct access code do not have to be entered.
  Example: Enter "914" instead of "00914"
- If no channel number is entered, channel 1 is opened automatically.
  Example: Enter 00914 \rightarrow Assign process variable parameter
- If a different channel is opened: Enter the direct access code with the corresponding channel number.
  Example: Enter 00914-2 \rightarrow Assign process variable parameter

For the direct access codes of the individual parameters, see the 'Description of Device Parameters' document for the device

8.3.8 Calling up help text
Help text is available for some parameters and can be called up from the navigation view. The help text provides a brief explanation of the parameter function and thereby supports swift and safe commissioning.

Calling up and closing the help text
The user is in the navigation view and the selection bar is on a parameter.

1. Press \( \text{\texttt{5}} \) for 2 s.
   \( \uparrow \) The help text for the selected parameter opens.

2. Press \( \text{\texttt{6}} + \text{\texttt{7}} \) simultaneously.
   \( \downarrow \) The help text is closed.

8.3.9 Changing the parameters
Parameters can be changed via the numeric editor or text editor.
- Numeric editor: Change values in a parameter, e.g. specifications for limit values.
- Text editor: Enter text in a parameter, e.g. tag name.

A message is displayed if the value entered is outside the permitted value range.
For a description of the editing view - consisting of the text editor and numeric editor - with symbols →  75, for a description of the operating elements →  77

8.3.10  User roles and related access authorization

The two user roles 'Operator' and 'Maintenance' have different write access to the parameters if the customer defines a user-specific access code. This protects the device configuration via the local display from unauthorized access →  172.

Defining access authorization for user roles

An access code is not yet defined when the device is delivered from the factory. Access authorization (read and write access) to the device is not restricted and corresponds to the 'Maintenance' user role.

Define the access code.

- The 'Operator' user role is redefined in addition to the 'Maintenance' user role. Access authorization differs for the two user roles.

Access authorization to parameters: 'Maintenance' user role

<table>
<thead>
<tr>
<th>Access code status</th>
<th>Read access</th>
<th>Write access</th>
</tr>
</thead>
<tbody>
<tr>
<td>An access code has not yet been defined</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>(factory setting)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After an access code has been defined.</td>
<td>✔</td>
<td>✔ ³)</td>
</tr>
</tbody>
</table>

1) The user only has write access after entering the access code.

Access authorization to parameters: 'Operator' user role

<table>
<thead>
<tr>
<th>Access code status</th>
<th>Read access</th>
<th>Write access</th>
</tr>
</thead>
<tbody>
<tr>
<td>After an access code has been defined.</td>
<td>✔</td>
<td>– ¹)</td>
</tr>
</tbody>
</table>

1) Despite the defined access code, certain parameters can always be modified and thus are excluded from the write protection, as they do not affect the measurement. Refer to the 'Write protection via access code' section

The user role with which the user is currently logged on is indicated by the Access status parameter. Navigation path: Operation → Access status

8.3.11  Disabling write protection via access code

If the ☐-symbol appears on the local display in front of a parameter, the parameter is write-protected by a user-specific access code and its value cannot be changed at the moment using local operation →  172.

Parameter write protection via local operation can be disabled by entering the user-specific access code in the Enter access code parameter (→  148) via the respective access option.

1. After you press ☐, the input prompt for the access code appears.
2. Enter the access code.  
   ➔ The -symbol in front of the parameters disappears; all previously write-protected parameters are now re-enabled.

8.3.12 Enabling and disabling the keypad lock

The keypad lock makes it possible to block access to the entire operating menu via local operation. As a result, it is no longer possible to navigate through the operating menu or change the values of individual parameters. Users can only read the measured values on the operational display.

The keypad lock is switched on and off via the context menu.

Switching on the keypad lock

The keypad lock is switched on automatically:
- If the device has not been operated via the display for > 1 minute.
- Each time the device is restarted.

To activate the keylock manually:

1. The device is in the measured value display.  
   Press the ☐ and ☐ keys for 3 seconds.  
   ➔ A context menu appears.

2. In the context menu select the Keylock on option.  
   ➔ The keypad lock is switched on.

If the user attempts to access the operating menu while the keypad lock is active, the Keylock on message appears.

Switching off the keypad lock

- The keypad lock is switched on.  
  Press the ☐ and ☐ keys for 3 seconds.  
  ➔ The keypad lock is switched off.
8.4 Access to operating menu via Web browser

8.4.1 PROFINET with Ethernet-APL

<table>
<thead>
<tr>
<th>Device use</th>
<th>Device connection to an APL field switch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The device may only be operated according to the following APL port classifications:</td>
</tr>
<tr>
<td></td>
<td>• If used in hazardous areas: SLAA or SLAC (1)\</td>
</tr>
<tr>
<td></td>
<td>• If used in non-hazardous areas: SLAX</td>
</tr>
<tr>
<td></td>
<td>• Connection values of APL field switch (for example corresponds to APL port classification SPCC or SPAA):</td>
</tr>
<tr>
<td></td>
<td>• Maximum input voltage: (15 , V_{DC})</td>
</tr>
<tr>
<td></td>
<td>• Minimum output values: (0.54 , W)</td>
</tr>
</tbody>
</table>

**Device connection to an SPE switch**

If used in non-hazardous areas: suitable SPE switch

**SPE switch prerequisite:**

• Support of 10BASE-T1L standard
• Support of PoDL power class 10, 11 or 12
• Detection of SPE field devices without integrated PoDL module

**Connection values of SPE switch:**

• Maximum input voltage: \(30 \, V_{DC}\)
• Minimum output values: \(1.85 \, W\)

PROFINET

According to IEC 61158 and IEC 61784

Ethernet-APL

According to IEEE 802.3cg, APL profile specification v1.0, galvanically isolated

**Data transfer**

10 Mbit/s

**Current consumption**

Transmitter

Max. 55.56 mA

**Permitted supply voltage**

• Ex: 9 to 15 V
• Non-Ex: 9 to 32 V

**Network connection**

With integrated reverse polarity protection

---

1) For more information on using the device in the hazardous area, see the Ex-specific Safety Instructions

8.4.2 Prerequisites

**Computer hardware**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Interface</th>
<th>CDI-RJ45</th>
<th>WLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The computer must have an RJ45 interface. (1)\</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The operating unit must have a WLAN interface.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>Standard Ethernet cable</td>
<td></td>
<td>Connection via Wireless LAN.</td>
</tr>
<tr>
<td>Screen</td>
<td>Recommended size: (\geq 12'') (depends on the screen resolution)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Recommended cable: CAT5e, CAT6 or CAT7, with shielded connector (e.g. brand YAMAICHI ; Part No Y-ConProfixPlug63 / Prod. ID: 82-006660)
Operation options

Proline Promass A 500 PROFINET with Ethernet-APL

---

**Computer software**

<table>
<thead>
<tr>
<th>Software</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended operating systems</td>
<td>CDI-RJ45</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Windows 8 or higher.</td>
</tr>
<tr>
<td></td>
<td>• Mobile operating systems:</td>
</tr>
<tr>
<td></td>
<td>• iOS</td>
</tr>
<tr>
<td></td>
<td>• Android</td>
</tr>
<tr>
<td></td>
<td>Microsoft Windows XP and Windows 7 is supported.</td>
</tr>
<tr>
<td>Web browsers supported</td>
<td>CDI-RJ45</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Internet Explorer 8 or higher</td>
</tr>
<tr>
<td></td>
<td>• Microsoft Edge</td>
</tr>
<tr>
<td></td>
<td>• Mozilla Firefox</td>
</tr>
<tr>
<td></td>
<td>• Google Chrome</td>
</tr>
<tr>
<td></td>
<td>• Safari</td>
</tr>
</tbody>
</table>

**Computer settings**

<table>
<thead>
<tr>
<th>Settings</th>
<th>Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>User rights</td>
<td>CDI-RJ45</td>
</tr>
<tr>
<td></td>
<td>Appropriate user rights (e.g. administrator rights) for TCP/IP and proxy server settings are necessary (for adjusting the IP address, subnet mask etc.).</td>
</tr>
<tr>
<td>Proxy server settings of the web browser</td>
<td>CDI-RJ45</td>
</tr>
<tr>
<td></td>
<td>The web browser setting <em>Use proxy server for LAN</em> must be <strong>disabled</strong>.</td>
</tr>
<tr>
<td>JavaScript</td>
<td>CDI-RJ45</td>
</tr>
<tr>
<td></td>
<td>JavaScript must be enabled.</td>
</tr>
<tr>
<td></td>
<td>[2] When installing a new firmware version: To enable correct data display, clear the temporary memory (cache) under <strong>Internet options</strong> in the web browser.</td>
</tr>
<tr>
<td>Network connections</td>
<td>CDI-RJ45</td>
</tr>
<tr>
<td></td>
<td>Only the active network connections to the measuring device should be used.</td>
</tr>
<tr>
<td></td>
<td>[3] Switch off all other network connections such as WLAN.</td>
</tr>
</tbody>
</table>

![Diagram](image-url)

---

**Measuring device: Via CDI-RJ45 service interface**

<table>
<thead>
<tr>
<th>Device</th>
<th>CDI-RJ45 service interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring device</td>
<td>The measuring device has an RJ45 interface.</td>
</tr>
<tr>
<td>Web server</td>
<td>Web server must be enabled; factory setting: ON</td>
</tr>
<tr>
<td></td>
<td>[1] For information on enabling the Web server → 89</td>
</tr>
</tbody>
</table>

**Measuring device: via WLAN interface**

<table>
<thead>
<tr>
<th>Device</th>
<th>WLAN interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring device</td>
<td>The measuring device has a WLAN antenna:</td>
</tr>
<tr>
<td></td>
<td>• Transmitter with integrated WLAN antenna</td>
</tr>
<tr>
<td></td>
<td>• Transmitter with external WLAN antenna</td>
</tr>
<tr>
<td>Web server</td>
<td>Web server and WLAN must be enabled; factory setting: ON</td>
</tr>
<tr>
<td></td>
<td>[1] For information on enabling the Web server → 89</td>
</tr>
</tbody>
</table>

---

In the event of connection problems: → 192

---

84

Endress+Hauser
8.4.3 Establishing a connection

Via service interface (CDI-RJ45)

Preparing the measuring device

Proline 500 – digital

1. Loosen the 4 fixing screws on the housing cover.
2. Open the housing cover.
3. The location of the connection socket depends on the measuring device and the communication protocol.
   Connect the computer to the RJ45 plug via the standard Ethernet cable.

Proline 500

1. Depending on the housing version:
   Loosen the securing clamp or fixing screw of the housing cover.
2. Depending on the housing version:
   Unscrew or open the housing cover.
3. Connect the computer to the RJ45 plug via the standard Ethernet cable.

Configuring the Internet protocol of the computer

The following information refers to the default Ethernet settings of the device.

IP address of the device: 192.168.1.212 (factory setting)

The IP address can be assigned to the measuring device in a variety of ways:
- Software addressing:
  The IP address is entered via the IP address parameter (→ 115).
- DIP switch for "Default IP address":
  To establish the network connection via the service interface (CDI-RJ45): the fixed IP address 192.168.1.212 is used.

To establish a network connection via the service interface (CDI-RJ45): set the "Default IP address" DIP switch to ON. The measuring device then has the fixed IP address: 192.168.1.212. The fixed IP address 192.168.1.212 can now be used to establish the connection to the network.

1. Via DIP switch 2, activate the default IP address 192.168.1.212:
2. Switch on the measuring device.
3. Connect the computer to the RJ45 plug via the standard Ethernet cable → 91.
4. If a 2nd network card is not used, close all the applications on the notebook.
   Applications requiring Internet or a network, such as e-mail, SAP applications, Internet or Windows Explorer.
5. Close any open Internet browsers.
6. Configure the properties of the Internet protocol (TCP/IP) as defined in the table:

<table>
<thead>
<tr>
<th>IP address</th>
<th>192.168.1.XXX; for XXX all numerical sequences except: 0, 212 and 255 → e.g. 192.168.1.213</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subnet mask</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Default gateway</td>
<td>192.168.1.212 or leave cells empty</td>
</tr>
</tbody>
</table>
Via WLAN interface

Configuring the Internet protocol of the mobile terminal

**NOTICE**

*If the WLAN connection is lost during the configuration, settings made may be lost.*

- Make sure that the WLAN connection is not disconnected while configuring the device.

**NOTICE**

*Note the following to avoid a network conflict:*

- Avoid accessing the measuring device simultaneously from the same mobile terminal via the service interface (CDI-RJ45) and the WLAN interface.
- Only activate one service interface (CDI-RJ45 or WLAN interface).
- If simultaneous communication is necessary: configure different IP address ranges, e.g. 192.168.0.1 (WLAN interface) and 192.168.1.212 (CDI-RJ45 service interface).

Preparing the mobile terminal

- Enable WLAN on the mobile terminal.

Establishing a WLAN connection from the mobile terminal to the measuring device

1. In the WLAN settings of the mobile terminal: Select the measuring device using the SSID (e.g. EH_Promass_500_A802000).
2. If necessary, select the WPA2 encryption method.
3. Enter the password:
   - Serial number of the measuring device ex-works (e.g. L100A802000).
   - The LED on the display module flashes. It is now possible to operate the measuring device with the web browser, FieldCare or DeviceCare.

The serial number can be found on the nameplate.

To ensure the safe and swift assignment of the WLAN network to the measuring point, it is advisable to change the SSID name. It should be possible to clearly assign the new SSID name to the measuring point (e.g. tag name) because it is displayed as the WLAN network.

Terminating the WLAN connection

- After configuring the device:
  - Terminate the WLAN connection between the mobile terminal and measuring device.

Starting the Web browser

1. Start the Web browser on the computer.
2. Enter the IP address of the web server in the address line of the web browser:
192.168.1.212

The login page appears.

If a login page does not appear, or if the page is incomplete → 192

8.4.4 Logging on

1. Select the preferred operating language for the Web browser.
2. Enter the user-specific access code.
3. Press OK to confirm your entry.

Access code

0000 (factory setting); can be changed by customer

If no action is performed for 10 minutes, the Web browser automatically returns to the login page.
8.4.5 User interface

**Function row**

<table>
<thead>
<tr>
<th>Functions</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured values</td>
<td>Displays the measured values of the device</td>
</tr>
</tbody>
</table>
| Menu | Access to the operating menu from the measuring device  
The structure of the operating menu is the same as for the local display  
[Detailed information on the structure of the operating menu: see the Description of Device Parameters](#) |
| Device status | Displays the diagnostic messages currently pending, listed in order of priority |
| Data management | Data exchange between computer and measuring device:  
Device configuration:  
- Load settings from the device  
  (XML format, save configuration)  
- Save settings to the device  
  (XML format, restore configuration)  
- Logbook - Export Event logbook (.csv file)  
- Documents - Export documents:  
  - Export backup data record  
    (.csv file, create documentation of the measuring point configuration)  
  - Verification report  
    (PDF file, only available with the 'Heartbeat Verification' application package)  
  - Firmware update - Flashing a firmware version |
| Network | Configuration and checking of all the parameters required for establishing the connection to the measuring device:  
Network settings (e.g. IP address, MAC address)  
Device information (e.g. serial number, firmware version) |
| Logout | End the operation and call up the login page |

**Navigation area**

The menus, the associated submenus and parameters can be selected in the navigation area.
Working area

Depending on the selected function and the related submenus, various actions can be performed in this area:

- Configuring parameters
- Reading measured values
- Calling up help text
- Starting an upload/download

8.4.6 Disabling the Web server

The Web server of the measuring device can be switched on and off as required using the Web server functionality parameter.

Navigation

'Expert' menu → Communication → Web server

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web server functionality</td>
<td>Switch the Web server on and off.</td>
<td>• Off&lt;br&gt;• HTML Off&lt;br&gt;• On</td>
<td>On</td>
</tr>
</tbody>
</table>

Function scope of the "Web server functionality" parameter

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
</table>
| Off        | • The Web server is completely disabled.  
             • Port 80 is locked.                                                      |
| HTML Off   | The HTML version of the Web server is not available.                         |
| On         | • The complete Web server functionality is available. 
             • JavaScript is used. 
             • The password is transferred in an encrypted state. 
             • Any change to the password is also transferred in an encrypted state. |

Enabling the Web server

If the Web server is disabled it can only be re-enabled with the Web server functionality parameter via the following operating options:

- Via local display
- Via Bedientool 'FieldCare'
- Via 'DeviceCare' operating tool

8.4.7 Logging out

Before logging out, perform a data backup via the Data management function (upload configuration from device) if necessary.

1. Select the Logout entry in the function row. 
   ➔ The home page with the Login box appears.

2. Close the Web browser.
3. If no longer needed:
   Reset the modified properties of the Internet protocol (TCP/IP) → 85.

If communication with the web server was established via the default IP address 192.168.1.212, DIP switch no. 10 must be reset (from \textbf{ON} \rightarrow \textbf{OFF}). Afterwards, the IP address of the device is active again for network communication.

### 8.5 Access to the operating menu via the operating tool
The structure of the operating menu in the operating tools is the same as for operation via the local display.

### 8.5.1 Connecting the operating tool

**Via APL network**

![Diagram of APL network connection](image.png)

#### Options for remote operation via APL network

1. Automation system, e.g. Simatic S7 (Siemens)
2. Ethernet switch, e.g. Scalance X204 (Siemens)
3. Computer with Web browser (e.g. Internet Explorer) for access to integrated Web server or computer with operating tool (e.g. FieldCare, DeviceCare with PROFINET COM DTM or SIMATIC PDM with FDI-Package)
4. APL power switch (optional)
5. APL field switch
6. Measuring device
Service interface

Via service interface (CDI-RJ45)

A point-to-point connection can be established via onsite device configuration. With the housing open, the connection is established directly via the service interface (CDI-RJ45) of the device.

An adapter for the RJ45 to the M12 plug is optionally available for the non-hazardous area:

Order code for "Accessories", option NB: "Adapter RJ45 M12 (service interface)"

The adapter connects the service interface (CDI-RJ45) to an M12 plug mounted in the cable entry. The connection to the service interface can be established via an M12 plug without opening the device.

Proline 500 – digital transmitter

![Connection via service interface (CDI-RJ45)](image)

1 Computer with Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated Web server or with "FieldCare", "DeviceCare" operating tool with COM DTM "CDI Communication TCP/IP"
2 Standard Ethernet connecting cable with RJ45 plug
3 Service interface (CDI-RJ45) of the measuring device with access to the integrated Web server

Proline 500 transmitter

![Connection via service interface (CDI-RJ45)](image)

1 Computer with Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated Web server or with "FieldCare", "DeviceCare" operating tool with COM DTM "CDI Communication TCP/IP"
2 Standard Ethernet connecting cable with RJ45 plug
3 Service interface (CDI-RJ45) of the measuring device with access to the integrated Web server

Via WLAN interface

The optional WLAN interface is available on the following device version:

Order code for "Display; operation", option G:4-line, illuminated; touch control + WLAN"
Operation options

Proline Promass A 500 PROFINET with Ethernet-APL

1. Transmitter with integrated WLAN antenna
2. Transmitter with external WLAN antenna
3. LED lit constantly: WLAN reception is enabled on measuring device
4. LED flashing: WLAN connection established between operating unit and measuring device
5. Computer with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or with operating tool (e.g. FieldCare, DeviceCare)
6. Mobile handheld terminal with WLAN interface and Web browser (e.g. Microsoft Internet Explorer, Microsoft Edge) for accessing the integrated device Web server or operating tool (e.g. FieldCare, DeviceCare)
7. Smart phone or tablet (e.g. Field Xpert SMT70)

Function
- WLAN: IEEE 802.11 b/g (2.4 GHz)

Encryption
- WPA2-PSK AES-128 (in accordance with IEEE 802.11i)

Configurable WLAN channels
- 1 to 11

Degree of protection
- IP67

Available antennas
- Internal antenna
- External antenna (optional)

In the event of poor transmission/reception conditions at the place of installation.

Only 1 antenna is active at any one time!

Range
- Internal antenna: typically 10 m (32 ft)
- External antenna: typically 50 m (164 ft)

Materials (external antenna)
- Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass
- Adapter: Stainless steel and nickel-plated brass
- Cable: Polyethylene
- Plug: Nickel-plated brass
- Angle bracket: Stainless steel

Configuring the Internet protocol of the mobile terminal

**NOTICE**

If the WLAN connection is lost during the configuration, settings made may be lost.
- Make sure that the WLAN connection is not disconnected while configuring the device.
NOTICE

Note the following to avoid a network conflict:

- Avoid accessing the measuring device simultaneously from the same mobile terminal via the service interface (CDI-RJ45) and the WLAN interface.
- Only activate one service interface (CDI-RJ45 or WLAN interface).
- If simultaneous communication is necessary: configure different IP address ranges, e.g. 192.168.0.1 (WLAN interface) and 192.168.1.212 (CDI-RJ45 service interface).

Preparing the mobile terminal

- Enable WLAN on the mobile terminal.

Establishing a WLAN connection from the mobile terminal to the measuring device

1. In the WLAN settings of the mobile terminal:
   Select the measuring device using the SSID (e.g. EH_Promass_500_A802000).
2. If necessary, select the WPA2 encryption method.
3. Enter the password:
   Serial number of the measuring device ex-works (e.g. L100A802000).
   The LED on the display module flashes. It is now possible to operate the measuring device with the web browser, FieldCare or DeviceCare.

   The serial number can be found on the nameplate.

   To ensure the safe and swift assignment of the WLAN network to the measuring point, it is advisable to change the SSID name. It should be possible to clearly assign the new SSID name to the measuring point (e.g. tag name) because it is displayed as the WLAN network.

Terminating the WLAN connection

- After configuring the device:
  Terminate the WLAN connection between the mobile terminal and measuring device.

8.5.2 FieldCare

Function scope

FDT (Field Device Technology)-based plant asset management tool from Endress+Hauser. It can configure all smart field units in a system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.

Access is via:
- CDI-RJ45 service interface → 91
- WLAN interface → 91

Typical functions:
- Configuring parameters of transmitters
- Loading and saving device data (upload/download)
- Documentation of the measuring point
- Visualization of the measured value memory (line recorder) and event logbook

For additional information about FieldCare, see Operating Instructions BA00027S and BA00059S

Source for device description files

See information → 96
Establishing a connection

1. Start FieldCare and launch the project.
2. In the network: Add a device.
   - The Add device window opens.
3. Select the CDI Communication TCP/IP option from the list and press OK to confirm.
4. Right-click CDI Communication TCP/IP and select the Add device option in the context menu that opens.
5. Select the desired device from the list and press OK to confirm.
   - The CDI Communication TCP/IP (Configuration) window opens.
6. Enter the device address in the IP address field: 192.168.1.212 and press Enter to confirm.
7. Establish the online connection to the device.

For additional information, see Operating Instructions BA00027S and BA00059S

User interface

1. Header
2. Picture of device
3. Device name
4. Tag name
5. Status area with status signal → 200
6. Display area for current measured values
7. Edit toolbar with additional functions such as save/load, event list and create documentation
8. Navigation area with operating menu structure
9. Working area
10. Range of action
11. Status area
8.5.3 DeviceCare

Function scope
Tool to connect and configure Endress+Hauser field devices.
The fastest way to configure Endress+Hauser field devices is with the dedicated "DeviceCare" tool. Together with the device type managers (DTMs) it presents a convenient, comprehensive solution.

For details, see Innovation Brochure IN01047S

Source for device description files
See information →  96

8.5.4 SIMATIC PDM

Function scope
SIMATIC PDM is a standardized, vendor-independent program from Siemens for the operation, configuration, maintenance and diagnosis of intelligent field devices via PROFINET protocol.

Source for device description files
See information →  96
9 System integration

9.1 Overview of device description files

9.1.1 Current version data for the device

| Firmware version | 01.00.zz | • On the title page of the Operating Instructions
|                 |         | • On the transmitter nameplate
|                 |         | • Firmware version
| Manufacturer     | 17      | • Diagnostics → Device information → Firmware version
| Device ID        | 0xA43B  | Manufacturer
| Device type ID   | Promass 500 | Expert → Communication → Physical block → Manufacturer
| Device revision  | 1       | Device type
| PROFINET with Ethernet-APL version | 2.43 | Version of the PROFINET specification

For an overview of the various firmware versions for the device → 275

9.1.2 Operating tools

The suitable device description file for the individual operating tools is listed in the table below, along with information on where the file can be acquired.

| FieldCare | • www.endress.com → Download Area
|           | • USB stick (contact Endress+Hauser)
|           | • DVD (contact Endress+Hauser)
| DeviceCare | • www.endress.com → Download Area
|           | • CD–ROM (contact Endress+Hauser)
|           | • DVD (contact Endress+Hauser)
| SIMATIC PDM (Siemens) | www.endress.com → Download Area

9.2 Device master file (GSD)

In order to integrate field devices into a bus system, PROFINET needs a description of the device parameters, such as output data, input data, data format and data volume. These data are available in the device master file (GSD) which is provided to the automation system when the communication system is commissioned. In addition device bit maps, which appear as icons in the network structure, can also be integrated.

The device master file (GSD) is in XML format, and the file is created in the GSDML description markup language.

With the PA Profile 4.02 device master file (GSD) it is possible to exchange field devices made by different manufacturers without having to reconfigure.

The use of two different device master files (GSDs) is possible: the manufacturer-specific GSD and the PA-Profile GSD.
9.2.1 File name of the manufacturer-specific device master file (GSD)

Example of the name of a device master file:
GSDML-V2.43-EH-PROMASS_300_500_APL_yyyymmdd.xml

<table>
<thead>
<tr>
<th>GSDML</th>
<th>Description language</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2.43</td>
<td>Version of the PROFINET specification</td>
</tr>
<tr>
<td>EH</td>
<td>Endress+Hauser</td>
</tr>
<tr>
<td>PROMASS</td>
<td>Instrument family</td>
</tr>
<tr>
<td>300_500_APL</td>
<td>Transmitter</td>
</tr>
<tr>
<td>yyyymmdd</td>
<td>Date of issue (yyyy: year, mm: month, dd: day)</td>
</tr>
<tr>
<td>.xml</td>
<td>File name extension (XML file)</td>
</tr>
</tbody>
</table>

9.2.2 File name of the PA Profile device master file (GSD)

Example of the name of a PA Profile device master file:
GSDML-V2.43-PA_Profile_V4.02-B333-FLOW_CORIOLIS-yyyymmdd.xml

<table>
<thead>
<tr>
<th>GSDML</th>
<th>Description language</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2.43</td>
<td>Version of the PROFINET specification</td>
</tr>
<tr>
<td>PA_Profile_V4.02</td>
<td>Version of the PA Profile specification</td>
</tr>
<tr>
<td>B333</td>
<td>PA Profile device identification</td>
</tr>
<tr>
<td>FLOW</td>
<td>Product family</td>
</tr>
<tr>
<td>CORIOLIS</td>
<td>Flow measuring principle</td>
</tr>
<tr>
<td>yyyymmdd</td>
<td>Date of issue (yyyy: year, mm: month, dd: day)</td>
</tr>
<tr>
<td>.xml</td>
<td>File name extension (XML file)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>API</th>
<th>Supported modules</th>
<th>Input and output variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x9700</td>
<td>Analog input</td>
<td>Mass flow</td>
</tr>
<tr>
<td></td>
<td>Analog input</td>
<td>Density</td>
</tr>
<tr>
<td></td>
<td>Analog input</td>
<td>Temperature</td>
</tr>
<tr>
<td></td>
<td>Totalizer</td>
<td>Totalizer value: mass/mass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Totalizer control</td>
</tr>
</tbody>
</table>

Source for device master files (GSD):

- Manufacturer-specific GSD: [www.endress.com → Download Area](http://www.endress.com)
## 9.3 Cyclic data transmission

### 9.3.1 Overview of the modules

The following graphic shows which modules are available to the device for cyclic data transfer. Cyclic data transfer is performed with an automation system.

<table>
<thead>
<tr>
<th>API</th>
<th>Measuring device Modules</th>
<th>Slot</th>
<th>Sub-slot</th>
<th>Direction Data flow</th>
<th>Control system</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x9700</td>
<td>Analog Input 1 (Mass flow)</td>
<td>1</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 2 (Density)</td>
<td>2</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 3 (Temperature)</td>
<td>3</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 4</td>
<td>20</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 5</td>
<td>21</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 6</td>
<td>22</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 7</td>
<td>23</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 8</td>
<td>24</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 9</td>
<td>25</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 10</td>
<td>26</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 11</td>
<td>27</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 12</td>
<td>28</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 13</td>
<td>29</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 14</td>
<td>30</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 15</td>
<td>31</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Input 16</td>
<td>32</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Totalizer 1 (Mass)</td>
<td>4</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Totalizer 2</td>
<td>70</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Totalizer 3</td>
<td>71</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Binary Input 1 (Heartbeat)</td>
<td>80</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Binary Input 2</td>
<td>81</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Output 1 (Pressure)</td>
<td>160</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Output 2 (Temperature)</td>
<td>161</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Output 3 (Ref. density)</td>
<td>162</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Output 4 (% Sediment and water)</td>
<td>163</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Output 5 (Water cut percentage)</td>
<td>164</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Output 6 (Appl. Spec. out 0)</td>
<td>165</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analog Output 7 (Appl. Spec. out 1)</td>
<td>166</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Binary Output 1 (Heartbeat)</td>
<td>210</td>
<td>1</td>
<td>→</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Binary Output 2</td>
<td>211</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enumerated Output</td>
<td>240</td>
<td>1</td>
<td>←</td>
<td></td>
</tr>
</tbody>
</table>
9.3.2 Description of the modules

The data structure is described from the perspective of the automation system:
- Input data: Are sent from the measuring device to the automation system.
- Output data: Are sent from the automation system to the measuring device.

Analog Input module

Transmit input variables from the measuring device to the automation system.

Analog Input modules cyclically transmit the selected input variables, including the status, from the measuring device to the automation system. The input variable is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the input variable.

Selection: input variable

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Input variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Mass flow</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Density</td>
</tr>
</tbody>
</table>
## System integration

### Proline Promass A 500 PROFINET with Ethernet-APL

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Input variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Corrected volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Density</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reference density</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Electronics temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Oscillation frequency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Frequency fluctuation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Oscillation damping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Tube damping fluctuation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Signal asymmetry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Exciter current</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Application-specific output 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Application-specific output 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Index inhomogeneous medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Index suspended bubbles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Index sensor asymmetry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Current output 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Current output 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Current output 3</td>
</tr>
</tbody>
</table>

### Additional input variables with the Heartbeat Verification application package
- Carrier pipe temperature
- Oscillation damping 1
- Oscillation frequency 1
- Oscillation amplitude 0
- Oscillation amplitude 1
- Frequency fluctuation 1
- Tube damping fluctuation 1
- Exciter current 1
- HBSI

### Additional input variables with the Concentration Measurement application package
- Concentration
- Target mass flow
- Carrier mass flow
- Target volume flow
- Carrier volume flow
- Target corrected volume flow
- Carrier corrected volume flow

### Additional input variables with the Petroleum application package
- Alternative reference density
- GSV flow
- Alternative GSV flow
- NSV flow
- Alternative NSV flow
- S&W volume flow
- Water cut %
- Oil density
- Water density
- Oil mass flow
- Water mass flow
- Oil volume flow
- Water volume flow
- Oil corrected volume flow
- Water corrected volume flow
Data structure

Output data of Analog Output

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
<th>Byte 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Measured value: floating point number (IEEE 754)  Status 1)

1) Status coding → 108

Application-specific Input module

Transmit compensation values from the measuring device to the automation system.

The Application-specific Input module cyclically transmits compensation values, including the status, from the measuring device to the automation system. The compensation value is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the compensation value.

Assigned compensation values

The configuration is performed via: Expert → Application → Application specific calculations → Process variables

<table>
<thead>
<tr>
<th>Slot</th>
<th>Compensation value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20...32</td>
<td>Application-specific Input module 0</td>
</tr>
<tr>
<td>20...32</td>
<td>Application-specific Input module 1</td>
</tr>
</tbody>
</table>

Data structure

Input data of Application-specific Input module

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
<th>Byte 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Measured value: floating point number (IEEE 754)  Status 1)

1) Status coding → 108

Binary Input module

Transmit binary input variables from the measuring device to the automation system.

Binary input variables are used by the measuring device to transmit the state of device functions to the automation system.

Binary Input modules cyclically transmit discrete input variables, including the status, from the measuring device to the automation system. The discrete input variable is depicted in the first byte. The second byte contains standardized status information pertaining to the input variable.

Selection: Device function Binary Input Slot 80

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Bit</th>
<th>Device function</th>
<th>Status (meaning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>1</td>
<td>0</td>
<td>Verification has not been performed.</td>
<td>= 0 (device function not active)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Verification has failed.</td>
<td>= 1 (device function active)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Currently performing verification.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Verification completed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Verification has failed.</td>
<td></td>
</tr>
</tbody>
</table>
Selection: Device function Binary Input Slot 81

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Bit</th>
<th>Device function</th>
<th>Status (meaning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td></td>
<td>0</td>
<td>Partially empty pipe detection</td>
<td>• 0 (device function not active)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Low flow cut off</td>
<td>• 1 (device function active)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>Reserved</td>
<td></td>
</tr>
</tbody>
</table>

Data structure

Input data of Binary Input

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary Input</td>
<td>Status 1)</td>
</tr>
</tbody>
</table>

1) Status coding $\Rightarrow$ 108

Mass module

Transmit mass counter value from the measuring device to the automation system. The Mass module cyclically transmits the mass, including the status, from the measuring device to the automation system. The totalizer value is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the input variable.

Selection: input variable

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Input variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>Mass</td>
</tr>
</tbody>
</table>

Data structure

Volume input data

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
<th>Byte 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Measured value: floating point number (IEEE 754)</td>
</tr>
</tbody>
</table>

1) Status coding $\Rightarrow$ 108

Mass Totalizer Control module

Transmit totalizer value from the measuring device to the automation system.
The Mass Totalizer Control module cyclically transmits a selected totalizer value, including the status, from the measuring device to the automation system. The totalizer value is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the input variable.

**Selection: input variable**

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Input variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>Mass</td>
</tr>
</tbody>
</table>

**Data structure**

*Mass Totalizer Control input data*

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
<th>Byte 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured value: floating point number (IEEE 754)</td>
<td></td>
<td></td>
<td>Status 1)</td>
<td></td>
</tr>
</tbody>
</table>

1) Status coding → 108

**Selection: output variable**

Transmit the control value from the automation system to the measuring device.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Value</th>
<th>Input variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>70...71</td>
<td>1</td>
<td>1</td>
<td>Reset to '0'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Preset value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Stop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Totalize</td>
</tr>
</tbody>
</table>

**Data structure**

*Mass Totalizer Control output data*

<table>
<thead>
<tr>
<th>Byte 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control variable</td>
</tr>
</tbody>
</table>

**Totalizer module**

Transmit totalizer value from the measuring device to the automation system.

The Totalizer module cyclically transmits a selected totalizer value, including the status, from the measuring device to the automation system. The totalizer value is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the input variable.
**Selection: input variable**

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Input variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 to 71</td>
<td>1</td>
<td>• Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Corrected volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target mass flow 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target corrected volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier corrected volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GSV flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Alternative GSV flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• NSV flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Alternative NSV flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• S&amp;W volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil mass flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water mass flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil corrected volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Raw value mass flow 2)</td>
</tr>
</tbody>
</table>

1) Only available with the Concentration application package
2) Only available with the Petroleum application package

**Data structure**

**Totalizer input data**

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
<th>Byte 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured value: floating point number (IEEE 754)</td>
<td>Status 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Status coding → 108

**Totalizer Control module**

Transmit totalizer value from the measuring device to the automation system.

The Totalizer Control module cyclically transmits a selected totalizer value, including the status, from the measuring device to the automation system. The totalizer value is depicted in the first four bytes in the form of a floating point number as per the IEEE 754 standard. The fifth byte contains standardized status information pertaining to the input variable.
Selection: input variable

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Input variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 to 71</td>
<td>1</td>
<td>• Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Corrected volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target mass flow 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target corrected volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier corrected volume flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GSV flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Alternative GSD flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• NSV flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Alternative NSV flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• S&amp;W volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil mass flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water mass flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil corrected volume flow 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Raw value mass flow 2)</td>
</tr>
</tbody>
</table>

1) Only available with the Concentration application package
2) Only available with the Petroleum application package

Data structure

Totalizer Control input data

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
<th>Byte 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Measured value: floating point number (IEEE 754) Status 1)

1) Status coding → 108

Selection: output variable

Transmit the control value from the automation system to the measuring device.

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Value</th>
<th>Input variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 to 71</td>
<td>1</td>
<td>1</td>
<td>Reset to '0'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Preset value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Stop</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Totalize</td>
</tr>
</tbody>
</table>

Data structure

Totalizer Control output data

<table>
<thead>
<tr>
<th>Byte 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

Control variable

Analog Output module

Transmit a compensation value from the automation system to the measuring device.

Analog Output modules cyclically transmit compensation values, including the status and associated unit, from the automation system to the measuring device. The compensation value is depicted in the first four bytes in the form of a floating point number as per the
IEEE 754 standard. The fifth byte contains standardized status information pertaining to the compensation value.

**Assigned compensation values**

The selection is made via: Expert → Sensor → External compensation

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Compensation value</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td></td>
<td>Pressure</td>
</tr>
<tr>
<td>161</td>
<td></td>
<td>Temperature</td>
</tr>
<tr>
<td>162</td>
<td></td>
<td>Reference density</td>
</tr>
<tr>
<td>163</td>
<td>1</td>
<td>External value for % S&amp;W (sediment and water) (^1)</td>
</tr>
<tr>
<td>164</td>
<td></td>
<td>External value for % Water cut (^1)</td>
</tr>
<tr>
<td>165</td>
<td></td>
<td>Appl. Spec. Outp. 0</td>
</tr>
<tr>
<td>166</td>
<td></td>
<td>Appl. Spec. Outp. 1</td>
</tr>
</tbody>
</table>

\(^1\) Only available with the Petroleum application package.

**Data structure**

**Output data of Analog Output**

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
<th>Byte 3</th>
<th>Byte 4</th>
<th>Byte 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured value: floating point number (IEEE 754)</td>
<td>Status (^1)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Status coding → 108

**Failsafe mode**

A failsafe mode can be defined for using the compensation values.

If the status is GOOD or UNCERTAIN, the compensation values transmitted by the automation system are used. If the status is BAD, the failsafe mode is activated for the use of the compensation values.

Parameters are available per compensation value to define the failsafe mode: Expert → Sensor → External compensation

**Fail safe type parameter**

- Fail safe value option: The value defined in the Fail safe value parameter is used.
- Fallback value option: The last valid value is used.
- Off option: The failsafe mode is disabled.

**Fail safe value parameter**

Use this parameter to enter the compensation value which is used if the Fail safe value option is selected in the Fail safe type parameter.

**Binary Output module**

Transmit binary output values from the automation system to the measuring device.

Binary output values are used by the automation system to enable and disable device functions.

Binary output values cyclically transmit discrete output values, including the status, from the automation system to the measuring device. The discrete output values are transmitted in the first byte. The second byte contains standardized status information pertaining to the output value.
Selection: Device function Binary Output Slot 210

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Bit</th>
<th>Device function</th>
<th>Status (meaning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>1</td>
<td>0</td>
<td>Start verification.</td>
<td>A change of status from 0 to 1 starts Heartbeat Verification 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>Reserved</td>
<td></td>
</tr>
</tbody>
</table>

1) Only available with the Heartbeat application package

Selection: Device function Binary Output Slot 211

<table>
<thead>
<tr>
<th>Slot</th>
<th>Sub-slot</th>
<th>Bit</th>
<th>Device function</th>
<th>Status (meaning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>211</td>
<td>1</td>
<td>0</td>
<td>Flow override</td>
<td>• 0 (disable device function) • 1 (enable device function)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Zero adjust</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Relay output</td>
<td>Relay output value: • 0 • 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Relay output</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Relay output</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>Reserved</td>
<td></td>
</tr>
</tbody>
</table>

Data structure

Binary Output input data

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>Byte 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binary Output</td>
<td>Status 1) 2)</td>
</tr>
</tbody>
</table>

1) Status coding → 108
2) If the status is BAD, the control variable is not adopted.

Concentration module

Only available with the Concentration Measurement application package.

Assigned device functions

<table>
<thead>
<tr>
<th>Slot</th>
<th>Input variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>240</td>
<td>Selection of the liquid type</td>
</tr>
</tbody>
</table>
Data structure

Concentration output data

<table>
<thead>
<tr>
<th>Liquid type</th>
<th>Enum code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off</td>
<td>0</td>
</tr>
<tr>
<td>Sucrose in water</td>
<td>5</td>
</tr>
<tr>
<td>Glucose in water</td>
<td>2</td>
</tr>
<tr>
<td>Fructose in water</td>
<td>1</td>
</tr>
<tr>
<td>Invert sugar in water</td>
<td>6</td>
</tr>
<tr>
<td>Corn syrup HFC542</td>
<td>15</td>
</tr>
<tr>
<td>Corn syrup HFC555</td>
<td>16</td>
</tr>
<tr>
<td>Corn syrup HFC90</td>
<td>17</td>
</tr>
<tr>
<td>Original wort</td>
<td>18</td>
</tr>
<tr>
<td>Ethanol in water</td>
<td>11</td>
</tr>
<tr>
<td>Methanol in water</td>
<td>12</td>
</tr>
<tr>
<td>Hydrogen peroxide in water</td>
<td>4</td>
</tr>
<tr>
<td>Hydrochloric acid</td>
<td>24</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>25</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>7</td>
</tr>
<tr>
<td>Phosphoric acid</td>
<td>8</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>10</td>
</tr>
<tr>
<td>Potassium hydroxide</td>
<td>9</td>
</tr>
<tr>
<td>Ammonium nitrate in water</td>
<td>13</td>
</tr>
<tr>
<td>Iron(III) chloride in water</td>
<td>14</td>
</tr>
<tr>
<td>% mass / % volume</td>
<td>19</td>
</tr>
<tr>
<td>User Profile Coef Set No. 1</td>
<td>21</td>
</tr>
<tr>
<td>User Profile Coef Set No. 2</td>
<td>22</td>
</tr>
<tr>
<td>User Profile Coef Set No. 3</td>
<td>23</td>
</tr>
</tbody>
</table>

9.3.3 Status coding

<table>
<thead>
<tr>
<th>Status</th>
<th>Coding (hex)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAD - Maintenance alarm</td>
<td>0x24 to 0x27</td>
<td>A measured value is not available because a device error has occurred.</td>
</tr>
<tr>
<td>BAD - Process related</td>
<td>0x28 to 0x2B</td>
<td>A measured value is not available because the process conditions are not within the device's technical specification limits.</td>
</tr>
<tr>
<td>BAD - Function check</td>
<td>0x3C to 0x3F</td>
<td>A function check is active (e.g. cleaning or calibration)</td>
</tr>
<tr>
<td>UNCERTAIN - Initial value</td>
<td>0x4F to 0x4F</td>
<td>A predefined value is output until a correct measured value is available again or corrective measures have been performed that change this status.</td>
</tr>
</tbody>
</table>
### Status and Meaning

<table>
<thead>
<tr>
<th>Status</th>
<th>Coding (hex)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNCERTAIN - Maintenance demanded</td>
<td>0x68 to 0x6B</td>
<td>Signs of wear and tear have been detected on the measuring device. Short-term maintenance is needed to ensure that the measuring device remains operational. The measured value might be invalid. The use of the measured value depends on the application.</td>
</tr>
<tr>
<td>UNCERTAIN - Process related</td>
<td>0x78 to 0x7B</td>
<td>The process conditions are not within the device’s technical specification limits. This could have a negative impact on the quality and accuracy of the measured value. The use of the measured value depends on the application.</td>
</tr>
<tr>
<td>GOOD - OK</td>
<td>0x80 to 0x83</td>
<td>No error has been diagnosed.</td>
</tr>
<tr>
<td>GOOD - Maintenance required</td>
<td>0xA4 to 0xA7</td>
<td>The measured value is valid. The device will require servicing in the near future.</td>
</tr>
<tr>
<td>GOOD - Maintenance demanded</td>
<td>0xA8 to 0xAB</td>
<td>The measured value is valid. It is highly advisable to service the device in the near future.</td>
</tr>
<tr>
<td>GOOD - Function check</td>
<td>0xBC to 0XBF</td>
<td>The measured value is valid. The measuring device is performing an internal function check. The function check does not have any noticeable effect on the process.</td>
</tr>
</tbody>
</table>

### Factory setting

The slots are already assigned in the automation system for initial commissioning.

#### Assigned slots

<table>
<thead>
<tr>
<th>Slot</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mass flow</td>
</tr>
<tr>
<td>2</td>
<td>Density</td>
</tr>
<tr>
<td>3</td>
<td>Temperature</td>
</tr>
<tr>
<td>4</td>
<td>Mass</td>
</tr>
<tr>
<td>20 to 32</td>
<td>–</td>
</tr>
<tr>
<td>70 to 71</td>
<td>–</td>
</tr>
<tr>
<td>80 to 81</td>
<td>–</td>
</tr>
<tr>
<td>160 to 166</td>
<td>–</td>
</tr>
<tr>
<td>210 to 211</td>
<td>–</td>
</tr>
<tr>
<td>240</td>
<td>–</td>
</tr>
</tbody>
</table>
9.4 System redundancy S2

A redundant layout with two automation systems is necessary for processes that are in continuous operation. If one system fails the second system guarantees continued, uninterrupted operation. The measuring device supports S2 system redundancy and can communicate with both automation systems simultaneously.

![Diagram of a redundant system (S2): star topology]

- 1 Automation system 1
- 2 Synchronization of automation systems
- 3 Automation system 2
- 4 Industrial Ethernet Managed Switch
- 5 APL field switch
- 6 Measuring device

All the devices in the network must support S2 system redundancy.
10 Commissioning

10.1 Post-installation and post-connection check

Before commissioning the device:

- Make sure that the post-installation and post-connection checks have been performed successfully.
  - "Post-installation check" checklist → 35
  - "Post-connection check" checklist → 67

10.2 Switching on the measuring device

- After a successful post-installation and post-connection check, switch on the device.
  - After a successful startup, the local display switches automatically from the startup display to the operational display.

If the local display is blank or if a diagnostic message is displayed, refer to the section on "Diagnostics and troubleshooting" → 191.

10.3 Connecting via FieldCare

- For FieldCare → 91 connection
- For connecting via FieldCare → 94
- For the FieldCare → 94 user interface

10.4 Setting the operating language

Factory setting: English or ordered local language

Taking the example of the local display
10.5 Configuring the measuring device

- The Setup menu with its guided wizards contains all the parameters needed for standard operation.
- Navigation to the Setup menu

![Diagram of the Setup menu]

35 Taking the example of the local display

The number of submenus and parameters can vary depending on the device version. Certain submenus and parameters in these submenus are not described in the Operation Instructions. Instead, a description is provided in the Special Documentation for the device (→ "Supplementary documentation" section).

```
Setup

PROFINET device name
→ 113

Communication
→ 113

System units
→ 115

Medium selection
→ 118

Analog inputs
→ 121

I/O configuration
→ 124

Current input 1 to n
→ 125

Status input 1 to n
→ 126

Current output 1 to n
→ 127
```
10.5.1 Defining the tag name

A measuring point can be quickly identified within a plant on the basis of the tag name. The tag name is equivalent to the device name (name of station) of the PROFINET specification (data length: 255 bytes). The device name can be changed via DIP switches or the automation system. The device name currently used is displayed in the Name of station parameter.

Navigation
'Setup' menu → PROFINET device name

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROFINET device name</td>
<td>Name of the measuring point.</td>
<td>Max. 32 characters such as letters and numbers.</td>
<td>EH-PROMASS500 serial number of the device</td>
</tr>
</tbody>
</table>

10.5.2 Displaying the communication interface

The Communication submenu shows all the current parameter settings for selecting and configuring the communication interface.

Navigation
'Setup' menu → Communication
"APL port" submenu

Navigation
"Setup" menu → Communication → APL port

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User entry / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td>Enter the IP address of the measuring device.</td>
<td>Character string comprising numbers, letters and special characters (15)</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Default gateway</td>
<td>Enter IP address for the default gateway of the measuring device.</td>
<td>Character string comprising numbers, letters and special characters (15)</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>Enter subnet mask of the measuring device.</td>
<td>Character string comprising numbers, letters and special characters (15)</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>MAC address</td>
<td>Shows the MAC address of the measuring device.</td>
<td>Character string comprising numbers, letters and special characters</td>
<td></td>
</tr>
</tbody>
</table>

"Service interface" submenu

Navigation
"Setup" menu → Communication → Service interface

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User entry / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subnet mask</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default gateway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAC address</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User entry / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP address</td>
<td>Enter the IP address of the measuring device.</td>
<td>4 octet: 0 to 255 (in the particular octet)</td>
<td>192.168.1.212</td>
</tr>
<tr>
<td>Subnet mask</td>
<td>Displays the subnet mask.</td>
<td>4 octet: 0 to 255 (in the particular octet)</td>
<td>255.255.255.0</td>
</tr>
<tr>
<td>Default gateway</td>
<td>Displays the default gateway.</td>
<td>4 octet: 0 to 255 (in the particular octet)</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>MAC address</td>
<td>Displays the MAC address of the measuring device.</td>
<td>Unique 12-digit character string comprising letters and numbers, e.g.: 00:07:05:10:01:5F</td>
<td>Each measuring device is given an individual address.</td>
</tr>
</tbody>
</table>

"Network diagnostics" submenu

Navigation
'Setup' menu → Communication → Network diagnostics

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean squared error</td>
<td>Provides an indication of the link signal quality.</td>
<td>Signed floating-point number</td>
<td>0 dB</td>
</tr>
<tr>
<td>Number of failed received packets</td>
<td>Shows the number of failed received packets.</td>
<td>0 to 65535</td>
<td>0</td>
</tr>
</tbody>
</table>

10.5.3 Setting the system units
In the System units submenu the units of all the measured values can be set.

The number of submenus and parameters can vary depending on the device version. Certain submenus and parameters in these submenus are not described in the Operation Instructions. Instead a description is provided in the Special Documentation for the device (→ "Supplementary documentation" section).

Navigation
'Setup' menu → System units
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass flow unit</td>
<td>Select mass flow unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td><em>Effect</em></td>
<td></td>
<td>• kg/h</td>
</tr>
<tr>
<td></td>
<td>• Output</td>
<td></td>
<td>• lb/min</td>
</tr>
<tr>
<td></td>
<td>• Low flow cut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Simulation process variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass unit</td>
<td>Select mass unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• kg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• lb</td>
</tr>
<tr>
<td>Volume flow unit</td>
<td>Select volume flow unit.</td>
<td>Unit choose list</td>
<td>Depends on country:</td>
</tr>
<tr>
<td></td>
<td><em>Effect</em></td>
<td></td>
<td>• l/h</td>
</tr>
<tr>
<td></td>
<td>• Output</td>
<td></td>
<td>• gal/min (us)</td>
</tr>
<tr>
<td></td>
<td>• Low flow cut off</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Simulation process variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume unit</td>
<td>Select volume unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• l</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• gal (us)</td>
</tr>
<tr>
<td>Corrected volume flow unit</td>
<td>Select corrected volume flow unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td><em>Result</em></td>
<td></td>
<td>• Nl/h</td>
</tr>
<tr>
<td></td>
<td>The selected unit applies for:</td>
<td></td>
<td>• Sft³/min</td>
</tr>
<tr>
<td></td>
<td>*Corrected volume flow parameter (→ 178)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected volume unit</td>
<td>Select corrected volume unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Nl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sft³</td>
</tr>
<tr>
<td>Density unit</td>
<td>Select density unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td><em>Effect</em></td>
<td></td>
<td>• kg/l</td>
</tr>
<tr>
<td></td>
<td>The selected unit applies for:</td>
<td></td>
<td>• lb/ft³</td>
</tr>
<tr>
<td></td>
<td>• Output</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Simulation process variable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Density adjustment <em>(Expert menu)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Selection</td>
<td>Factory setting</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------------------</td>
<td>-------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Reference density unit</td>
<td>Select reference density unit.</td>
<td>Unit choose list</td>
<td>Country-dependent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• kg/Nl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• lb/ft³</td>
</tr>
<tr>
<td>Density 2 unit</td>
<td>Select second density unit.</td>
<td>Unit choose list</td>
<td>Depends on country:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• kg/l</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• lb/ft³</td>
</tr>
<tr>
<td>Temperature unit</td>
<td>Select temperature unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td>Effect</td>
<td></td>
<td>• °C</td>
</tr>
<tr>
<td></td>
<td>The selected unit applies for:</td>
<td></td>
<td>• °F</td>
</tr>
<tr>
<td></td>
<td>• Electronic temperature parameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(6053)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maximum value parameter (6051)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Minimum value parameter (6052)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maximum value parameter (6108)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Minimum value parameter (6109)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maximum value parameter (6029)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Minimum value parameter (6030)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Reference temperature parameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1816)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Temperature parameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure unit</td>
<td>Select process pressure unit.</td>
<td>Unit choose list</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td>Result</td>
<td></td>
<td>• bar a</td>
</tr>
<tr>
<td></td>
<td>The unit is taken from:</td>
<td></td>
<td>• psi a</td>
</tr>
<tr>
<td></td>
<td>• Pressure value parameter (+ 120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• External pressure parameter (+ 120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pressure value</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10.5.4 Selecting and setting the medium

The Select medium wizard submenu contains parameters that must be configured in order to select and set the medium.

Navigation
“Setup” menu → Medium selection

<table>
<thead>
<tr>
<th>▶ Medium selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select medium type</td>
</tr>
<tr>
<td>Select gas type</td>
</tr>
<tr>
<td>Reference sound velocity</td>
</tr>
<tr>
<td>Reference sound velocity</td>
</tr>
<tr>
<td>Temperature coefficient sound velocity</td>
</tr>
<tr>
<td>Temperature coefficient sound velocity</td>
</tr>
<tr>
<td>Pressure compensation</td>
</tr>
<tr>
<td>Pressure value</td>
</tr>
<tr>
<td>External pressure</td>
</tr>
</tbody>
</table>
## Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select medium type</td>
<td>–</td>
<td>Use this function to select the type of medium: 'Gas' or 'Liquid'. Select the 'Other' option in exceptional cases in order to enter the properties of the medium manually (e.g. for highly compressive liquids such as sulfuric acid).</td>
<td>Liquid  •  Gas  •  Other</td>
<td>Liquid</td>
</tr>
<tr>
<td>Select gas type</td>
<td>In the Medium selection submenu, the Gas option is selected.</td>
<td>Select measured gas type.  •  Air  •  Ammonia NH3  •  Argon Ar  •  Sulfur hexafluoride SF6  •  Oxygen O2  •  Ozone O3  •  Nitrogen oxide NOx  •  Nitrogen N2  •  Nitrous oxide N2O  •  Methane CH4  •  Methane CH4 + 10% Hydrogen H2  •  Methane CH4 + 20% Hydrogen H2  •  Methane CH4 + 30% Hydrogen H2  •  Hydrogen H2  •  Helium He  •  Hydrogen chloride HCl  •  Hydrogen sulfide H2S  •  Ethylene C2H4  •  Carbon dioxide CO2  •  Carbon monoxide CO  •  Chlorine Cl2  •  Butane C4H10  •  Propane C3H8  •  Propylene C3H6  •  Ethane C2H6  •  Other</td>
<td>Methane CH4</td>
<td></td>
</tr>
<tr>
<td>Reference sound velocity</td>
<td>In the Select gas type parameter, the Other option is selected.</td>
<td>Enter sound velocity of the gas at 0 °C (32 °F). 1 to 99999.9999 m/s  •  415.0 m/s</td>
<td>Signed floating-point number</td>
<td>1456 m/s</td>
</tr>
<tr>
<td>Reference sound velocity</td>
<td>In the Select medium type parameter, the Other option is selected.</td>
<td>Enter sound velocity of the medium at 0 °C (32 °F).</td>
<td>Signed floating-point number</td>
<td>1456 m/s</td>
</tr>
<tr>
<td>Temperature coefficient sound velocity</td>
<td>In the Select gas type parameter, the Other option is selected.</td>
<td>Enter the temperature coefficient for the gas sound velocity.</td>
<td>Positive floating point number</td>
<td>0.87 (m/s)/K</td>
</tr>
<tr>
<td>Temperature coefficient sound velocity</td>
<td>In the Select medium type parameter, the Other option is selected.</td>
<td>Enter temperature coefficient for the medium sound velocity.</td>
<td>Signed floating-point number</td>
<td>1.3 (m/s)/K</td>
</tr>
<tr>
<td>Pressure compensation</td>
<td>–</td>
<td>Select pressure compensation type.  •  Off  •  Fixed value  •  External value  •  Current input 1 *  •  Current input 2 *  •  Current input 3 *</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User entry / User interface</td>
<td>Factory setting</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Pressure value</td>
<td>In the Pressure compensation parameter, the <strong>Fixed value</strong> option is selected.</td>
<td>Enter process pressure to be used for pressure correction.</td>
<td>Positive floating-point number</td>
<td>1.01325 bar</td>
</tr>
<tr>
<td>External pressure</td>
<td>In the Pressure compensation parameter, the <strong>External value</strong> option or the <strong>Current input 1...n</strong> option is selected.</td>
<td>Shows the external process pressure value.</td>
<td></td>
<td>~</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
10.5.5 Configuration of the Analog Inputs

The Analog inputs submenu guides the user systematically to the individual Analog input 1 to n submenu. From here you get to the parameters of the individual analog input.

Navigation
“Setup” menu → Analog inputs

"Analog inputs" submenu

Navigation
“Setup” menu → Analog inputs → Mass flow

- Assign process variable (11074) → 123
- Damping (11073) → 124
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent class</td>
<td></td>
<td>0 to 255</td>
<td>70</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>User interface / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Assign process variable</td>
<td>Select a process variable.</td>
<td></td>
<td>Mass flow</td>
</tr>
</tbody>
</table>

- Mass flow
- Volume flow
- Density
- Temperature
- Carrier pipe temperature
- Electronics temperature
- Oscillation frequency 0
- Oscillation frequency 1
- Oscillation amplitude 0
- Oscillation amplitude 1
- Frequency fluctuation 0
- Frequency fluctuation 1
- Oscillation damping 0
- Oscillation damping 1
- Oscillation damping fluctuation 0
- Oscillation damping fluctuation 1
- Signal asymmetry
- Torsion signal asymmetry *
- Exciter current 0
- Exciter current 1
- HBSI
- Current input 1
- Current input 2
- Current input 3
- Application specific output 0
- Application specific output 1
- Inhomogeneous medium index
- Suspended bubbles index
- Test point 0
- Test point 1
- Sensor index coil asymmetry
- Raw value mass flow
- Corrected volume flow
- Target mass flow
- Carrier mass flow
- Target volume flow
- Carrier volume flow
- Target corrected volume flow
- Carrier corrected volume flow
- Reference density
- Reference density alternative
- GSV flow
- GSV flow alternative
- NSV flow
- NSV flow alternative *
- S&W volume flow
- Water cut *
- Oil density
- Water density
- Oil mass flow
- Water mass flow
- Oil volume flow
- Water volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Concentration
- Dynamic viscosity
- Kinematic viscosity
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
### Damping

Enter time constant for input damping (PT1 element). Damping reduces the effect of fluctuations in the measured value on the output signal.

**Parameter table**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damping</td>
<td></td>
<td>Positive floating-point number</td>
<td>1.0 s</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

### Displaying the I/O configuration

The I/O configuration submenu guides the user systematically through all the parameters in which the configuration of the I/O modules is displayed.

**Navigation**

"Setup" menu → I/O configuration

#### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface / Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O module 1 to n terminal numbers</td>
<td>Shows the terminal numbers used by the I/O module.</td>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>26-27 (I/O 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24-25 (I/O 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>22-23 (I/O 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>20-21 (I/O 4)</td>
<td></td>
</tr>
<tr>
<td>I/O module 1 to n information</td>
<td>Shows information of the plugged I/O module.</td>
<td>Not plugged</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invalid</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not configurable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Configurable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PROFINET</td>
<td></td>
</tr>
<tr>
<td>I/O module 1 to n type</td>
<td>Shows the I/O module type.</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Current output</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Current input</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Status input</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pulse/frequency/switch output</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Double pulse output</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relay output</td>
<td></td>
</tr>
<tr>
<td>Apply I/O configuration</td>
<td>Apply parameterization of the freely configurable I/O module.</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>I/O alteration code</td>
<td>Enter the code in order to change the I/O configuration.</td>
<td>Positive integer</td>
<td>0</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
10.5.7 Configuring the current input

The "Current input" wizard guides the user systematically through all the parameters that have to be set for configuring the current input.

Navigation
"Setup" menu → Current input

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface / Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
</table>
| Terminal number      |              | Shows the terminal numbers used by the current input module. | • Not used
                                                                       • 24-25 (I/O 2)
                                                                       • 22-23 (I/O 3)
                                                                       • 20-21 (I/O 4)  | –               |
| Signal mode          | The measuring device is not approved for use in the hazardous area with type of protection Ex-i. | Select the signal mode for the current input. | • Passive
                                                                       • Active  | Active          |
| 0/4 mA value         |              | Enter 4 mA value. | Signed floating-point number            | 0               |
| 20 mA value          |              | Enter 20 mA value. | Signed floating-point number | Depends on country and nominal diameter |
| Current span         |              | Select current range for process value output and upper/lower level for alarm signal. | • 4...20 mA (4...
                                                                       20.5 mA)  | Country-specific:
                                                                       • 4...20 mA NE
                                                                       (3.8...20.5 mA)  |
### 10.5.8 Configuring the status input

The **Status input** submenu guides the user systematically through all the parameters that have to be set for configuring the status input.

#### Navigation

*Setup* menu → Status input 1 to n

#### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection / User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign status input</td>
<td>Select function for the status input.</td>
<td>• Off</td>
<td>Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reset totalizer 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reset totalizer 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reset totalizer 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reset all totalizers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flow override</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Zero adjustment</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reset weighted averages *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reset weighted averages + totalizer 3</td>
<td></td>
</tr>
<tr>
<td>Terminal number</td>
<td>Shows the terminal numbers used by the status input module.</td>
<td>• Not used</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 24-25 (I/O 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 22-23 (I/O 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 20-21 (I/O 4)</td>
<td></td>
</tr>
</tbody>
</table>

*Visibility depends on order options or device settings*
## 10.5.9 Configuring the current output

The **Current output** wizard guides you systematically through all the parameters that have to be set for configuring the current output.

**Navigation**

'Setup' menu → Current output

---

### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface / Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal number</td>
<td>-</td>
<td>Shows the terminal numbers used by the current output module.</td>
<td><a href="#">127</a></td>
<td>-</td>
</tr>
<tr>
<td>Signal mode</td>
<td>-</td>
<td>Select the signal mode for the current output.</td>
<td><a href="#">127</a></td>
<td>-</td>
</tr>
<tr>
<td>Process variable current output</td>
<td>-</td>
<td></td>
<td><a href="#">128</a></td>
<td>-</td>
</tr>
<tr>
<td>Current range output</td>
<td>-</td>
<td></td>
<td><a href="#">129</a></td>
<td>-</td>
</tr>
<tr>
<td>Lower range value output</td>
<td>-</td>
<td></td>
<td><a href="#">129</a></td>
<td>-</td>
</tr>
<tr>
<td>Upper range value output</td>
<td>-</td>
<td></td>
<td><a href="#">129</a></td>
<td>-</td>
</tr>
<tr>
<td>Fixed current</td>
<td>-</td>
<td></td>
<td><a href="#">129</a></td>
<td>-</td>
</tr>
<tr>
<td>Damping current output</td>
<td>-</td>
<td></td>
<td><a href="#">129</a></td>
<td>-</td>
</tr>
<tr>
<td>Failure behavior current output</td>
<td>-</td>
<td></td>
<td><a href="#">129</a></td>
<td>-</td>
</tr>
<tr>
<td>Failure current</td>
<td>-</td>
<td></td>
<td><a href="#">129</a></td>
<td>-</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface / Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process variable current output</td>
<td></td>
<td>Select the process variable for the current output.</td>
<td>Off , Mass flow , Volume flow , Corrected volume flow , Density , Reference density , Temperature , Target mass flow , Carrier mass flow , Target volume flow , Carrier volume flow , Target corrected volume flow , Carrier corrected volume flow , Concentration , Application specific output 0 , Application specific output 1 , Inhomogeneous medium index , Suspended bubbles index , Raw value mass flow , Exciter current 0 , Oscillation damping 0 , Oscillation damping fluctuation 0 , Oscillation frequency 0 , Frequency fluctuation 0 , Signal asymmetry , Torsion signal asymmetry , Carrier pipe temperature , Frequency fluctuation 0 , Oscillation amplitude 0 , Oscillation damping fluctuation 0 , HBSI , Pressure , Electronics temperature , Sensor index coil asymmetry , Test point 0 , Test point 1</td>
<td>Mass flow</td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>User interface / Selection / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Current range output</td>
<td>–</td>
<td>Select current range for process value output and upper/lower level for alarm signal.</td>
<td>4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA) 4...20 mA (4...20.5 mA) 0...20 mA (0...20.5 mA) Fixed value</td>
<td>Depends on country: 4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA)</td>
</tr>
<tr>
<td>Lower range value output</td>
<td>One of the following options is selected in the Current span parameter (→ 129): 4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA) 4...20 mA (4...20.5 mA) 0...20 mA (0...20.5 mA)</td>
<td>Enter lower range value for the measured value range. Signed floating-point number</td>
<td>Depends on country: 0 kg/h 0 lb/min</td>
<td></td>
</tr>
<tr>
<td>Upper range value output</td>
<td>One of the following options is selected in the Current span parameter (→ 129): 4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA) 4...20 mA (4...20.5 mA) 0...20 mA (0...20.5 mA)</td>
<td>Enter upper range value for the measured value range. Signed floating-point number</td>
<td>Depends on country and nominal diameter</td>
<td></td>
</tr>
<tr>
<td>Fixed current</td>
<td>The Fixed current option is selected in the Current span parameter (→ 129).</td>
<td>Defines the fixed output current. 0 to 22.5 mA 22.5 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damping current output</td>
<td>A process variable is selected in the Assign current output parameter (→ 128) and one of the following options is selected in the Current span parameter (→ 129): 4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA) 4...20 mA (4...20.5 mA) 0...20 mA (0...20.5 mA)</td>
<td>Set reaction time for output signal to fluctuations in the measured value. 0.0 to 999.9 s 1.0 s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure behavior current output</td>
<td>A process variable is selected in the Assign current output parameter (→ 128) and one of the following options is selected in the Current span parameter (→ 129): 4...20 mA NE (3.8...20.5 mA) 4...20 mA US (3.9...20.8 mA) 4...20 mA (4...20.5 mA) 0...20 mA (0...20.5 mA)</td>
<td>Define output behavior in alarm condition. Min. Max. Last valid value Actual value Fixed value</td>
<td>Max.</td>
<td></td>
</tr>
<tr>
<td>Failure current</td>
<td>The Defined value option is selected in the Failure mode parameter.</td>
<td>Enter current output value in alarm condition. 0 to 22.5 mA 22.5 mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
10.5.10 Configuring the pulse/frequency/switch output

The Pulse/frequency/switch output wizard guides you systematically through all the parameters that can be set for configuring the selected output type.

Navigation
"Setup" menu → Advanced setup → Pulse/frequency/switch output

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating mode</td>
<td>Define the output as a pulse, frequency or switch output.</td>
<td>• Pulse</td>
<td>Pulse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Switch</td>
<td></td>
</tr>
</tbody>
</table>

Configuring the pulse output

Navigation
"Setup" menu → Pulse/frequency/switch output
## Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating mode</td>
<td>–</td>
<td>Define the output as a pulse, frequency or switch output.</td>
<td>Pulse, Frequency, Switch</td>
<td>Pulse</td>
</tr>
<tr>
<td>Terminal number</td>
<td>–</td>
<td>Shows the terminal numbers used by the PFS output module.</td>
<td>Not used, 24-25 (I/O 2), 22-23 (I/O 3), 20-21 (I/O 4)</td>
<td>–</td>
</tr>
<tr>
<td>Signal mode</td>
<td>–</td>
<td>Select the signal mode for the PFS output.</td>
<td>Passive, Active, Passive NE</td>
<td>Passive</td>
</tr>
<tr>
<td>Pulse scaling</td>
<td>The Pulse option is selected in the Operating mode parameter (→ 130) and a process variable is selected in the Assign pulse output parameter (→ 131).</td>
<td>Enter quantity for measured value at which a pulse is output.</td>
<td>Positive floating point number</td>
<td>Depends on country and nominal diameter</td>
</tr>
<tr>
<td>Pulse width</td>
<td>The Pulse option is selected in the Operating mode parameter (→ 130) and a process variable is selected in the Assign pulse output parameter (→ 131).</td>
<td>Define time width of the output pulse.</td>
<td>0.05 to 2000 ms</td>
<td>100 ms</td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User interface / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Failure mode</td>
<td>The Pulse option is selected in the Operating mode parameter (→ 130) and a process variable is selected in the Assign pulse output parameter (→ 131).</td>
<td>Define output behavior in alarm condition.</td>
<td>• Actual value  • No pulses</td>
<td>No pulses</td>
</tr>
<tr>
<td>Invert output signal</td>
<td>~</td>
<td>Invert the output signal.</td>
<td>• No                                         • Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

**Configuring the frequency output**

**Navigation**

"Setup" menu → Pulse/frequency/switch output

```
< Pulse/frequency/switch output
1 to n

Operating mode → 133
Terminal number → 133
Signal mode → 133
Assign frequency output → 134
Minimum frequency value → 134
Maximum frequency value → 135
Measuring value at minimum frequency → 135
Measuring value at maximum frequency → 135
Failure mode → 135
Failure frequency → 135
Invert output signal → 135
```
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating mode</td>
<td>–</td>
<td>Define the output as a pulse, frequency or switch output.</td>
<td>• Pulse</td>
<td>Pulse</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Switch</td>
<td></td>
</tr>
<tr>
<td>Terminal number</td>
<td>–</td>
<td>Shows the terminal numbers used by the PFS output module.</td>
<td>• Not used</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 24-25 (I/O 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 22-23 (I/O 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 20-21 (I/O 4) *</td>
<td></td>
</tr>
<tr>
<td>Signal mode</td>
<td>–</td>
<td>Select the signal mode for the PFS output.</td>
<td>• Passive</td>
<td>Passive</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Active</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Passive NE</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User interface / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
</tbody>
</table>
| Assign frequency output    | In the **Operating mode** parameter (→ 130), the **Frequency** option is selected. | Select process variable for frequency output.                                | ● Off  
● Mass flow  
● Volume flow  
● Corrected volume flow*  
● Density  
● Reference density*  
● Time period signal frequency (TPS)*  
● Temperature  
● Pressure  
● Concentration*  
● Target mass flow*  
● Carrier mass flow*  
● Target volume flow*  
● Carrier volume flow*  
● Target corrected volume flow*  
● Carrier corrected volume flow*  
● Application specific output 0*  
● Application specific output 1*  
● Inhomogeneous medium index  
● Suspended bubbles index*  
● HBSI*  
● Raw value mass flow  
● Exciter current 0  
● Oscillation damping 0  
● Oscillation damping fluctuation 0*  
● Oscillation frequency 0  
● Frequency fluctuation 0*  
● Oscillation amplitude 0*  
● Signal asymmetry  
● Torsion signal asymmetry*  
● Carrier pipe temperature  
● Electronics temperature  
● Sensor index coil asymmetry  
● Test point 0  
● Test point 1                                                                 | Off                                          |
<p>| Minimum frequency value    | The <strong>Frequency</strong> option is selected in the <strong>Operating mode</strong> parameter (→ 130) and a process variable is selected in the <strong>Assign frequency output</strong> parameter (→ 134). | Enter minimum frequency.                                                    | 0.0 to 10 000.0 Hz                                                                                         | 0.0 Hz          |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum frequency value</td>
<td>The Frequency option is selected in the Operating mode parameter (→ 130) and a process variable is selected in the Assign frequency output parameter (→ 134).</td>
<td>Enter maximum frequency.</td>
<td>0.0 to 10000.0 Hz</td>
<td>10000.0 Hz</td>
</tr>
<tr>
<td>Measuring value at minimum frequency</td>
<td>The Frequency option is selected in the Operating mode parameter (→ 130) and a process variable is selected in the Assign frequency output parameter (→ 134).</td>
<td>Enter measured value for minimum frequency.</td>
<td>Signed floating-point number</td>
<td>Depends on country and nominal diameter</td>
</tr>
<tr>
<td>Measuring value at maximum frequency</td>
<td>The Frequency option is selected in the Operating mode parameter (→ 130) and a process variable is selected in the Assign frequency output parameter (→ 134).</td>
<td>Enter measured value for maximum frequency.</td>
<td>Signed floating-point number</td>
<td>Depends on country and nominal diameter</td>
</tr>
<tr>
<td>Failure mode</td>
<td>The Frequency option is selected in the Operating mode parameter (→ 130) and a process variable is selected in the Assign frequency output parameter (→ 134).</td>
<td>Define output behavior in alarm condition.</td>
<td>• Actual value • Defined value • 0 Hz</td>
<td>0 Hz</td>
</tr>
<tr>
<td>Failure frequency</td>
<td>In the Operating mode parameter (→ 130), the Frequency option is selected, in the Assign frequency output parameter (→ 134) a process variable is selected, and in the Failure mode parameter, the Defined value option is selected.</td>
<td>Enter frequency output value in alarm condition.</td>
<td>0.0 to 12500.0 Hz</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td>Invert output signal</td>
<td>-</td>
<td>Invert the output signal.</td>
<td>• No • Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
Configuring the switch output

Navigation

'Setup' menu → Pulse/frequency/switch output

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating mode</td>
<td>–</td>
<td>Define the output as a pulse, frequency or switch output.</td>
<td>● Pulse ● Frequency ● Switch</td>
<td>Pulse</td>
</tr>
<tr>
<td>Terminal number</td>
<td>–</td>
<td>Shows the terminal numbers used by the PFS output module.</td>
<td>● Not used ● 24-25 (I/O 2) ● 22-23 (I/O 3) ● 20-21 (I/O 4)</td>
<td>–</td>
</tr>
<tr>
<td>Signal mode</td>
<td>–</td>
<td>Select the signal mode for the PFS output.</td>
<td>● Passive ● Active ● Passive NE</td>
<td>Passive</td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User interface / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Switch output function</td>
<td>The <strong>Switch</strong> option is selected in the <strong>Operating mode</strong> parameter.</td>
<td>Select function for switch output.</td>
<td>• Off • On • Diagnostic behavior • Limit • Flow direction check • Status</td>
<td>Off</td>
</tr>
<tr>
<td>Assign diagnostic behavior</td>
<td>• In the <strong>Operating mode</strong> parameter, the <strong>Switch</strong> option is selected.</td>
<td>Select diagnostic behavior for switch output.</td>
<td>• Alarm • Alarm or warning • Warning</td>
<td>Alarm</td>
</tr>
<tr>
<td>Assign limit</td>
<td>• In the <strong>Operating mode</strong> parameter, the <strong>Switch</strong> option is selected.</td>
<td>Select process variable for limit function.</td>
<td>• Mass flow • Volume flow • Corrected volume flow • Target mass flow • Carrier mass flow • Target volume flow • Carrier volume flow • Target corrected volume flow • Carrier corrected volume flow • Density • Reference density • Concentration • Temperature • Totalizer 1 • Totalizer 2 • Totalizer 3 • Oscillation damping • Pressure • Application specific output 0 • Application specific output 1 • Inhomogeneous medium index • Suspended bubbles index</td>
<td>Volume flow</td>
</tr>
<tr>
<td>Assign flow direction check</td>
<td>• The <strong>Switch</strong> option is selected in the <strong>Operating mode</strong> parameter.</td>
<td>Select process variable for flow direction monitoring.</td>
<td>• Off • Volume flow • Mass flow • Corrected volume flow</td>
<td>Mass flow</td>
</tr>
<tr>
<td>Assign status</td>
<td>• The <strong>Switch</strong> option is selected in the <strong>Operating mode</strong> parameter.</td>
<td>Select device status for switch output.</td>
<td>• Partially filled pipe detection • Low flow cut off • Binary output • Binary output</td>
<td>Partially filled pipe detection</td>
</tr>
</tbody>
</table>
### 10.5.11 Configuring the relay output

The Relay output wizard guides the user systematically through all the parameters that have to be set for configuring the relay output.

**Navigation**

“Setup” menu → Relay output 1 to n

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch-on value</td>
<td>• The Switch option is selected in the Operating mode parameter.</td>
<td>Enter measured value for the switch-on point.</td>
<td>Signed floating-point number</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td>• The Limit option is selected in the Switch output function parameter.</td>
<td></td>
<td></td>
<td>• 0 kg/h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0 lb/min</td>
</tr>
<tr>
<td>Switch-off value</td>
<td>• The Switch option is selected in the Operating mode parameter.</td>
<td>Enter measured value for the switch-off point.</td>
<td>Signed floating-point number</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td>• The Limit option is selected in the Switch output function parameter.</td>
<td></td>
<td></td>
<td>• 0 kg/h</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0 lb/min</td>
</tr>
<tr>
<td>Switch-on delay</td>
<td>• The Switch option is selected in the Operating mode parameter.</td>
<td>Define delay for the switch-on of status output.</td>
<td>0.0 to 100.0 s</td>
<td>0.0 s</td>
</tr>
<tr>
<td></td>
<td>• The Limit option is selected in the Switch output function parameter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch-off delay</td>
<td>• The Switch option is selected in the Operating mode parameter.</td>
<td>Define delay for the switch-off of status output.</td>
<td>0.0 to 100.0 s</td>
<td>0.0 s</td>
</tr>
<tr>
<td></td>
<td>• The Limit option is selected in the Switch output function parameter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure mode</td>
<td>–</td>
<td>Define output behavior in alarm condition.</td>
<td>• Actual status</td>
<td>Open</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Open</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Closed</td>
<td></td>
</tr>
<tr>
<td>Invert output signal</td>
<td>–</td>
<td>Invert the output signal.</td>
<td>• No</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Yes</td>
<td></td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

Terminal number

Relay output function

Assign flow direction check

Assign limit

Assign diagnostic behavior

Assign status
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface / Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal number</td>
<td>–</td>
<td>Shows the terminal numbers used by the relay output module.</td>
<td>• Not used</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 24-25 (I/O 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 22-23 (I/O 3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 20-21 (I/O 4)</td>
<td></td>
</tr>
<tr>
<td>Relay output function</td>
<td>–</td>
<td>Select the function for the relay output.</td>
<td>• Closed</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Open</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Diagnostic behavior</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Limit</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Flow direction check</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Status</td>
<td></td>
</tr>
<tr>
<td>Assign flow direction check</td>
<td>The Flow direction check option is selected in the Relay output function parameter.</td>
<td>Select process variable for flow direction monitoring.</td>
<td>• Off</td>
<td>Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Mass flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Corrected volume flow*</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>User interface / Selection / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Assign limit</td>
<td>The <strong>Limit</strong> option is selected in the <strong>Relay output function</strong> parameter.</td>
<td>Select process variable for limit function.</td>
<td>Mass flow, Volume flow, Corrected volume flow, Target mass flow, Carrier mass flow, Target volume flow, Carrier volume flow, Target corrected volume flow, Carrier corrected volume flow, Mass flow</td>
<td>Mass flow</td>
</tr>
<tr>
<td>Assign diagnostic behavior</td>
<td>In the <strong>Relay output function</strong> parameter, the <strong>Diagnostic behavior</strong> option is selected.</td>
<td>Select diagnostic behavior for switch output.</td>
<td>Alarm, Alarm or warning, Warning</td>
<td>Alarm</td>
</tr>
<tr>
<td>Assign status</td>
<td>In the <strong>Relay output function</strong> parameter, the <strong>Digital Output option</strong> is selected.</td>
<td>Select device status for switch output.</td>
<td>Partially filled pipe detection, Low flow cut off, Binary output, Binary output, Binary output</td>
<td>Partially filled pipe detection</td>
</tr>
<tr>
<td>Switch-off value</td>
<td>In the <strong>Relay output function</strong> parameter, the <strong>Limit</strong> option is selected.</td>
<td>Enter measured value for the switch-off point.</td>
<td>Signed floating-point number</td>
<td>Country-specific: 0 kg/h, 0 lb/min</td>
</tr>
<tr>
<td>Switch-off delay</td>
<td>In the <strong>Relay output function</strong> parameter, the <strong>Limit</strong> option is selected.</td>
<td>Define delay for the switch-off of status output.</td>
<td>0.0 to 100.0 s</td>
<td>0.0 s</td>
</tr>
<tr>
<td>Switch-on value</td>
<td>The <strong>Limit</strong> option is selected in the <strong>Relay output function</strong> parameter.</td>
<td>Enter measured value for the switch-on point.</td>
<td>Signed floating-point number</td>
<td>Country-specific: 0 kg/h, 0 lb/min</td>
</tr>
<tr>
<td>Switch-on delay</td>
<td>In the <strong>Relay output function</strong> parameter, the <strong>Limit</strong> option is selected.</td>
<td>Define delay for the switch-on of status output.</td>
<td>0.0 to 100.0 s</td>
<td>0.0 s</td>
</tr>
<tr>
<td>Failure mode</td>
<td>–</td>
<td>Define output behavior in alarm condition.</td>
<td>Actual status, Open, Closed</td>
<td>Open</td>
</tr>
</tbody>
</table>

*Visibility depends on order options or device settings*
10.5.12 Configuring the local display

The **Display** wizard guides you systematically through all the parameters that can configured for configuring the local display.

**Navigation**

"Setup" menu → Display

---

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<thead>
<tr>
<th>Display</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Format display</td>
<td>→ 142</td>
</tr>
<tr>
<td>Value 1 display</td>
<td>→ 143</td>
</tr>
<tr>
<td>0% bargraph value 1</td>
<td>→ 143</td>
</tr>
<tr>
<td>100% bargraph value 1</td>
<td>→ 143</td>
</tr>
<tr>
<td>Value 2 display</td>
<td>→ 144</td>
</tr>
<tr>
<td>Value 3 display</td>
<td>→ 144</td>
</tr>
<tr>
<td>0% bargraph value 3</td>
<td>→ 144</td>
</tr>
<tr>
<td>100% bargraph value 3</td>
<td>→ 144</td>
</tr>
<tr>
<td>Value 4 display</td>
<td>→ 144</td>
</tr>
<tr>
<td>Value 5 display</td>
<td>→ 144</td>
</tr>
<tr>
<td>Value 6 display</td>
<td>→ 144</td>
</tr>
<tr>
<td>Value 7 display</td>
<td>→ 144</td>
</tr>
<tr>
<td>Value 8 display</td>
<td>→ 144</td>
</tr>
</tbody>
</table>
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format display</td>
<td>A local display is provided.</td>
<td>Select how measured values are shown on the display.</td>
<td>• 1 value, max. size&lt;br&gt;• 1 bargraph + 1 value&lt;br&gt;• 2 values&lt;br&gt;• 1 value large + 2 values&lt;br&gt;• 4 values</td>
<td>1 value, max. size</td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Value 1 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>• Mass flow</td>
<td>Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Volume flow</td>
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<tr>
<td></td>
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<td>• Corrected volume flow</td>
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<td>• Density</td>
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<td>• Reference density *</td>
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<td>• Temperature</td>
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<td>• Pressure</td>
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<td>• Totalizer 1</td>
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<td>• Totalizer 2</td>
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<td>• Totalizer 3</td>
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<td>• Concentration *</td>
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<td></td>
<td></td>
<td></td>
<td>• Target mass flow *</td>
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<td></td>
<td></td>
<td></td>
<td>• Carrier mass flow *</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• Target volume flow</td>
<td></td>
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<td></td>
<td>• Carrier volume flow</td>
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<td></td>
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<td></td>
<td>• Target corrected volume flow</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Carrier corrected volume flow</td>
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<td>• Application specific output 0 *</td>
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<td></td>
<td></td>
<td>• Application specific output 1 *</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Inhomogeneous medium index</td>
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<td></td>
<td>• Suspended bubbles index</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• HBSI *</td>
<td></td>
</tr>
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<td></td>
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<td></td>
<td>• Raw value mass flow</td>
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<td>• Exciter current 0</td>
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<td>• Oscillation damping 0</td>
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<td></td>
<td>• Oscillation damping fluctuation 0 *</td>
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<td></td>
<td>• Oscillation frequency 0</td>
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<td></td>
<td>• Frequency fluctuation 0 *</td>
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</tr>
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<td></td>
<td></td>
<td>• Oscillation amplitude 0 *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Signal asymmetry</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Torsion signal asymmetry *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Carrier pipe temperature *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Electronics temperature</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sensor index coil asymmetry</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>• Test point 0</td>
<td></td>
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<td>• Test point 1</td>
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<td>• Current output 1</td>
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<td></td>
<td></td>
<td>• Current output 2 *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Current output 3 *</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Current output 4 *</td>
<td></td>
</tr>
</tbody>
</table>

0% bargraph value 1  
A local display is provided.  
Enter 0% value for bar graph display.  
Signed floating-point number  
Country-specific:  
• 0 kg/h  
• 0 lb/min

100% bargraph value 1  
A local display is provided.  
Enter 100% value for bar graph display.  
Signed floating-point number  
Depends on country and nominal diameter
## Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value 2 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Value 3 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>0% bargraph value 3</td>
<td>A selection was made in the Value 3 display parameter.</td>
<td>Enter 0% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>Country-specific:</td>
</tr>
<tr>
<td>100% bargraph value 3</td>
<td>A selection was made in the Value 3 display parameter.</td>
<td>Enter 100% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>0</td>
</tr>
<tr>
<td>Value 4 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Value 5 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Value 6 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Value 7 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Value 8 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
10.5.13 Configuring the low flow cut off

The **Low flow cut off** wizard systematically guides the user through all the parameters that must be set to configure low flow cut off.

**Navigation**

"Setup" menu → Low flow cut off

---

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign process variable</td>
<td>-</td>
<td>Select process variable for low flow cut off.</td>
<td>• Off</td>
<td>Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Mass flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Corrected volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On value low flow cutoff</td>
<td>A process variable is selected in the Assign process variable parameter (→ 145).</td>
<td>Enter on value for low flow cut off.</td>
<td>Positive floating-point number</td>
<td>Depends on country and nominal diameter</td>
</tr>
<tr>
<td>Off value low flow cutoff</td>
<td>A process variable is selected in the Assign process variable parameter (→ 145).</td>
<td>Enter off value for low flow cut off.</td>
<td>0 to 100.0 %</td>
<td>50 %</td>
</tr>
<tr>
<td>Pressure shock suppression</td>
<td>A process variable is selected in the Assign process variable parameter (→ 145).</td>
<td>Enter time frame for signal suppression (= active pressure shock suppression).</td>
<td>0 to 100 s</td>
<td>0 s</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
10.5.14 Configuring partially filled pipe detection

The Partial filled pipe detection wizard guides you systematically through all parameters that have to be set for configuring the monitoring of the pipe filling.

Navigation
"Setup" menu → Partially filled pipe detection

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign process variable</td>
<td>-</td>
<td>Select process variable for partially filled pipe detection.</td>
<td>• Off</td>
<td>Off</td>
</tr>
</tbody>
</table>
| Low value partial filled pipe detection| A process variable is selected in the Assign process variable parameter (→ 146). | Enter lower limit value for deactivating partially filled pipe detection.   | Signed floating-point number | Depends on country:  
  • 200 kg/m³  
  • 12.5 lb/ft³ |
| High value partial filled pipe detection| A process variable is selected in the Assign process variable parameter (→ 146). | Enter upper limit value for deactivating partially filled pipe detection.  | Signed floating-point number | Depends on country:  
  • 6000 kg/m³  
  • 374.6 lb/ft³ |
| Response time part. filled pipe detect.| A process variable is selected in the Assign process variable parameter (→ 146). | Use this function to enter the minimum time (hold time) the signal must be present before diagnostic message S962 "Pipe only partly filled" is triggered in the event of a partially filled or empty measuring pipe. | 0 to 100 s              | 1 s                   |
10.6  Advanced settings

The Advanced setup submenu with its submenus contains parameters for specific settings.

Navigation to the 'Advanced setup' submenu

The number of submenus can vary depending on the device version. Some submenus are not dealt with in the Operating Instructions. These submenus and the parameters they contain are explained in the Special Documentation for the device.

Navigation
'Setup' menu → Advanced setup
10.6.1 Using the parameter to enter the access code

**Navigation**

"Setup" menu → Advanced setup

**Parameter overview with brief description**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter access code</td>
<td>Enter access code to disable write protection of parameters.</td>
<td>Max. 16-digit character string comprising numbers, letters and special characters</td>
</tr>
</tbody>
</table>

10.6.2 Calculated process variables

The **Calculated values** submenu contains parameters for calculating the corrected volume flow.

**Navigation**

"Setup" menu → Advanced setup → Calculated values

**"Corrected volume flow calculation" submenu**

**Navigation**

"Setup" menu → Advanced setup → Calculated values → Corrected volume flow calculation

- Select reference density (1812) 
- External reference density (6198)
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>External reference density</td>
<td>–</td>
<td>Shows external reference density.</td>
<td>Floating point number with sign</td>
<td>–</td>
</tr>
<tr>
<td>Fixed reference density</td>
<td>The Fixed reference density option is selected in the Corrected volume flow calculation parameter parameter.</td>
<td>Enter fixed value for reference density.</td>
<td>Positive floating-point number</td>
<td>1 kg/Nl</td>
</tr>
<tr>
<td>Reference temperature</td>
<td>The Calculated reference density option is selected in the Corrected volume flow calculation parameter parameter.</td>
<td>Enter reference temperature for calculating the reference density.</td>
<td>–273.15 to 99999 °C</td>
<td>Country-specific: +20 °C, +68 °F</td>
</tr>
<tr>
<td>Linear expansion coefficient</td>
<td>The Calculated reference density option is selected in the Corrected volume flow calculation parameter parameter.</td>
<td>Enter linear, medium-specific expansion coefficient for calculating the reference density.</td>
<td>Signed floating-point number</td>
<td>0.0 1/K</td>
</tr>
<tr>
<td>Square expansion coefficient</td>
<td>The Calculated reference density option is selected in the Corrected volume flow calculation parameter parameter.</td>
<td>For media with a non-linear expansion pattern: enter the quadratic, medium-specific expansion coefficient for calculating the reference density.</td>
<td>Signed floating-point number</td>
<td>0.0 1/K²</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

### 10.6.3 Carrying out a sensor adjustment

The **Sensor adjustment** submenu contains parameters that pertain to the functionality of the sensor.
Navigation
"Setup" menu → Advanced setup → Sensor adjustment

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation direction</td>
<td>Select sign of flow direction.</td>
<td>• Forward flow • Reverse flow</td>
<td>Forward flow</td>
</tr>
</tbody>
</table>

Density adjustment

With density adjustment, a high level of accuracy is achieved only at the point of adjustment and at the relevant density and temperature. However, the accuracy of a density adjustment is only ever as good as the quality of the reference measuring data provided. Therefore it is not a substitute for special density calibration.

Performing density adjustment

Note the following before performing the adjustment:
- A density adjustment only makes sense if there is little variation in the operating conditions and the density adjustment is performed under the operating conditions.
- The density adjustment scales the internally computed density value with a user-specific slope and offset.
- A 1-point or 2-point density adjustment can be performed.
- For a 2-point density adjustment, there must be a difference of at least 0.2 kg/l between the two target density values.
- The reference media must be gas-free or pressurized so that any gas they contain is compressed.
- The reference density measurements must be performed at the same medium temperature that prevails in the process, as otherwise the density adjustment will not be accurate.
- The correction resulting from the density adjustment can be deleted with the Restore original option.

"1 point adjustment" option

1. In the Density adjustment mode parameter, select the 1 point adjustment option and confirm.
2. In the Density setpoint 1 parameter, enter the density value and confirm.
   - In the Execute density adjustment parameter the following options are now available:
     - Ok
     - Measure density 1 option
     - Restore original
3. Select the Measure density 1 option and confirm.
4. If 100% was reached in the Progress parameter on the display and the Ok option is displayed in the Execute density adjustment parameter, then confirm.
   ⬤ In the Execute density adjustment parameter the following options are now available:
   Ok
   Calculate
   Cancel

5. Select the Calculate option and confirm.
If the adjustment was completed successfully, the Density adjustment factor parameter and the Density adjustment offset parameter and the values calculated for them are shown on the display.

"2 point adjustment" option
1. In the Density adjustment mode parameter, select the 2 point adjustment option and confirm.
2. In the Density setpoint 1 parameter, enter the density value and confirm.
3. In the Density setpoint 2 parameter, enter the density value and confirm.
   ⬤ In the Execute density adjustment parameter the following options are now available:
   Ok
   Measure density 1
   Restore original

4. Select the Measure density 1 option and confirm.
   ⬤ In the Execute density adjustment parameter the following options are now available:
   Ok
   Measure density 2
   Restore original

5. Select the Measure density 2 option and confirm.
   ⬤ In the Execute density adjustment parameter the following options are now available:
   Ok
   Calculate
   Cancel

6. Select the Calculate option and confirm.
If the Density adjust failure option is displayed in the Execute density adjustment parameter, call up the options and select the Cancel option. The density adjustment is canceled and can be repeated.
If the adjustment was completed successfully, the Density adjustment factor parameter and the Density adjustment offset parameter and the values calculated for them are shown on the display.

Navigation
"Expert" menu → Sensor → Sensor adjustment → Density adjustment

<table>
<thead>
<tr>
<th>Density adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density adjustment mode</td>
</tr>
<tr>
<td>Density setpoint 1</td>
</tr>
</tbody>
</table>
Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density adjustment mode</td>
<td>–</td>
<td>Select the method for field density adjustment to correct the factory setting.</td>
<td>1 point adjustment, 2 point adjustment</td>
<td>1 point adjustment</td>
</tr>
<tr>
<td>Density setpoint 1</td>
<td>–</td>
<td>Enter density for the first reference media.</td>
<td>The entry depends on the unit selected in the Density unit parameter (0555).</td>
<td>1 kg/l</td>
</tr>
<tr>
<td>Density setpoint 2</td>
<td>In the Density adjustment mode parameter, the 2 point adjustment option is selected.</td>
<td>Enter density for the second reference media.</td>
<td>The entry depends on the unit selected in the Density unit parameter (0555).</td>
<td>1 kg/l</td>
</tr>
<tr>
<td>Execute density adjustment</td>
<td>–</td>
<td>Select the next step to be performed for the density adjustment.</td>
<td>Cancel, Busy, Ok, Density adjust failure, Measure density 1, Measure density 2, Calculate, Restore original</td>
<td>Ok</td>
</tr>
<tr>
<td>Progress</td>
<td>–</td>
<td>Shows the progress of the process.</td>
<td>0 to 100 %</td>
<td>–</td>
</tr>
<tr>
<td>Density adjustment factor</td>
<td>–</td>
<td>Shows the calculated correction factor for the density.</td>
<td>Signed floating-point number</td>
<td>1</td>
</tr>
<tr>
<td>Density adjustment offset</td>
<td>–</td>
<td>Shows the calculated correction offset for the density.</td>
<td>Signed floating-point number</td>
<td>0</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

Zero point verification and zero adjustment

All measuring devices are calibrated in accordance with state-of-the-art technology. Calibration takes place under reference conditions → 294. Therefore, a zero adjustment in the field is generally not required.

Experience shows that zero adjustment is advisable only in special cases:
- To achieve maximum measuring accuracy even with low flow rates.
- Under extreme process or operating conditions (e.g. very high process temperatures or very high-viscosity fluids).
To get a representative zero point, ensure that:
- any flow in the device is prevented during the adjustment
- the process conditions (e.g. pressure, temperature) are stable and representative

Zero point verification and zero adjustment cannot be performed if the following process conditions are present:
- Gas pockets
  Ensure that the system has been sufficiently flushed with the medium. Repeat flushing can help to eliminate gas pockets
- Thermal circulation
  In the event of temperature differences (e.g. between the measuring tube inlet and outlet section), induced flow can occur even if the valves are closed due to thermal circulation in the device
- Leaks at the valves
  If the valves are not leak-tight, flow is not sufficiently prevented when determining the zero point

If these conditions cannot be avoided, it is advisable to keep the factory setting for the zero point.

**Zero point verification**
The zero point can be verified with the **Zero verification** wizard.

**Navigation**
'Setup' menu → Advanced setup → Sensor adjustment → Zero verification

```
Zero verification

- Process conditions
- Progress
- Status
- Additional information
- Recommendation:
- Root cause
- Abort cause
- Zero point measured
- Zero point standard deviation
```

> [154]
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
</table>
| Process conditions         | Ensure process conditions as follows.                                        | • Tubes are completely filled  
                             |                                                                             | • Process operational pressure applied  
                             |                                                                             | • No-flow conditions (closed valves)  
                             |                                                                             | • Process and ambient temperatures stable  |                           |
| Progress                   | Shows the progress of the process.                                           | 0 to 100 %                                                                                  | –               |
| Status                     | Shows the status of the process.                                            | • Busy  
                             |                                                                             | • Failed  
                             |                                                                             | • Done  |                           |
| Additional information     | Indicate whether to display additional information.                         | • Hide  
                             |                                                                             | • Show  |                           |
| Recommendation:           | Indicates whether an adjustment is recommended. Only recommended if the measured zero point deviates significantly from the current zero point. | • Do not adjust zero point  
                             |                                                                             | • Adjust zero point  |                           |
| Abort cause                | Indicates why the wizard was aborted.                                       | • Check process conditions!  
                             |                                                                             | • A technical issue has occurred  |                           |
| Root cause                 | Shows the diagnostic and remedy.                                           | • Zero point too high. Ensure no-flow.  
                             |                                                                             | • Zero point is unstable. Ensure no-flow.  
                             |                                                                             | • Fluctuation high. Avoid 2-phase medium.  |                           |
| Zero point measured        | Shows the zero point measured for the adjustment.                           | Signed floating-point number                                                                | –               |
| Zero point standard deviation | Shows the standard deviation of the zero point measured.                 | Positive floating-point number                                                              | –               |

**Zero adjust**

The zero point can be adjusted with the **Zero adjustment** wizard.

- A zero point verification should be performed before a zero adjustment.
- The zero point can also be adjusted manually: Expert → Sensor → Calibration

**Navigation**

*Setup* menu → Advanced setup → Sensor adjustment → Zero adjustment

[Zero adjustment]
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process conditions</td>
<td>Ensure process conditions as follows.</td>
<td>• Tubes are completely filled&lt;br&gt;• Process operational pressure applied&lt;br&gt;• No-flow conditions (closed valves)&lt;br&gt;• Process and ambient temperatures stable</td>
<td>–</td>
</tr>
<tr>
<td>Progress</td>
<td>Shows the progress of the process.</td>
<td>0 to 100 %</td>
<td>–</td>
</tr>
<tr>
<td>Status</td>
<td>Shows the status of the process.</td>
<td>• Busy&lt;br&gt;• Failed&lt;br&gt;• Done</td>
<td>–</td>
</tr>
<tr>
<td>Abort cause</td>
<td>Indicates why the wizard was aborted.</td>
<td>• Check process conditions!&lt;br&gt;• A technical issue has occurred</td>
<td>–</td>
</tr>
<tr>
<td>Root cause</td>
<td>Shows the diagnostic and remedy.</td>
<td>• Zero point too high. Ensure no-flow.&lt;br&gt;• Zero point is unstable. Ensure no-flow.&lt;br&gt;• Fluctuation high. Avoid 2-phase medium.</td>
<td>–</td>
</tr>
<tr>
<td>Reliability of measured zero point</td>
<td>Indicates the reliability of the zero point measured.</td>
<td>• Not done&lt;br&gt;• Good&lt;br&gt;• Uncertain</td>
<td>–</td>
</tr>
<tr>
<td>Additional information</td>
<td>Indicate whether to display additional information.</td>
<td>• Hide&lt;br&gt;• Show</td>
<td>Hide</td>
</tr>
<tr>
<td>Zero point measured</td>
<td>Shows the zero point measured for the adjustment.</td>
<td>Signed floating-point number</td>
<td>–</td>
</tr>
<tr>
<td>Zero point standard deviation</td>
<td>Shows the standard deviation of the zero point measured.</td>
<td>Positive floating-point number</td>
<td>–</td>
</tr>
<tr>
<td>Select action</td>
<td>Select the zero point value to apply.</td>
<td>• Restore&lt;br&gt;• Keep current zero point&lt;br&gt;• Apply zero point measured&lt;br&gt;• Apply factory zero point</td>
<td>Keep current zero point</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
10.6.4 Configuring the totalizer

In the "Totalizer 1 to n" submenu the individual totalizer can be configured.

Navigation

"Setup" menu → Advanced setup → Totalizer 1 to n

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign process variable 1 to n</td>
<td>Select process variable for totalizer.</td>
<td>• Mass flow</td>
<td>Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Corrected volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target mass flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier mass flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Target corrected volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Carrier corrected volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GSV flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• GSV flow alternative</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• NSV flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• NSV flow alternative</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• S&amp;W volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil mass flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water mass flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Oil corrected volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Water corrected volume flow</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Raw value mass flow</td>
<td></td>
</tr>
<tr>
<td>Process variable unit 1 to n</td>
<td>Select the unit for the process variable of the</td>
<td>Unit choose list</td>
<td>kg</td>
</tr>
<tr>
<td></td>
<td>totalizer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totalizer 1 to n operation mode</td>
<td>Select totalizer operation mode, e.g. only</td>
<td>• Net</td>
<td>Forward</td>
</tr>
<tr>
<td></td>
<td>totalize forward flow or only totalize reverse</td>
<td>• Forward</td>
<td></td>
</tr>
<tr>
<td></td>
<td>flow.</td>
<td>• Reverse</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td>Selection</td>
<td>Factory setting</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------------</td>
<td>--------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Totalizer 1 to n control</td>
<td>Operate the totalizer.</td>
<td>• Reset + hold&lt;br&gt;• Preset + hold&lt;br&gt;• Hold&lt;br&gt;• Totalize</td>
<td>Totalize</td>
</tr>
<tr>
<td>Totalizer 1 to n failure behavior</td>
<td>Select totalizer behavior in the event of a device alarm.</td>
<td>• Hold&lt;br&gt;• Continue&lt;br&gt;• Last valid value + continue</td>
<td>Continue</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings
10.6.5 Carrying out additional display configurations

In the Display submenu you can set all the parameters associated with the configuration of the local display.

Navigation
"Setup" menu → Advanced setup → Display

<table>
<thead>
<tr>
<th>▶ Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format display</td>
</tr>
<tr>
<td>Value 1 display</td>
</tr>
<tr>
<td>0% bargraph value 1</td>
</tr>
<tr>
<td>100% bargraph value 1</td>
</tr>
<tr>
<td>Decimal places 1</td>
</tr>
<tr>
<td>Value 2 display</td>
</tr>
<tr>
<td>Decimal places 2</td>
</tr>
<tr>
<td>Value 3 display</td>
</tr>
<tr>
<td>0% bargraph value 3</td>
</tr>
<tr>
<td>100% bargraph value 3</td>
</tr>
<tr>
<td>Decimal places 3</td>
</tr>
<tr>
<td>Value 4 display</td>
</tr>
<tr>
<td>Decimal places 4</td>
</tr>
<tr>
<td>Value 5 display</td>
</tr>
<tr>
<td>0% bargraph value 5</td>
</tr>
<tr>
<td>100% bargraph value 5</td>
</tr>
<tr>
<td>Decimal places 5</td>
</tr>
<tr>
<td>Value 6 display</td>
</tr>
<tr>
<td>Decimal places 6</td>
</tr>
<tr>
<td>Value 7 display</td>
</tr>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>0% bargraph value 7</td>
</tr>
<tr>
<td>100% bargraph value 7</td>
</tr>
<tr>
<td>Decimal places 7</td>
</tr>
<tr>
<td>Value 8 display</td>
</tr>
<tr>
<td>Decimal places 8</td>
</tr>
<tr>
<td>Display language</td>
</tr>
<tr>
<td>Display interval</td>
</tr>
<tr>
<td>Display damping</td>
</tr>
<tr>
<td>Header</td>
</tr>
<tr>
<td>Header text</td>
</tr>
<tr>
<td>Separator</td>
</tr>
<tr>
<td>Backlight</td>
</tr>
</tbody>
</table>
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format display</td>
<td>A local display is provided.</td>
<td>Select how measured values are shown on the display.</td>
<td>■ 1 value, max. size</td>
<td>1 value, max. size</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>■ 1 bargraph + 1 value</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>■ 2 values</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>■ 1 value large + 2 values</td>
<td></td>
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<td></td>
<td></td>
<td>■ 4 values</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User entry</td>
<td>Factory setting</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Value 1 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>- Mass flow</td>
<td>Mass flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Volume flow</td>
<td></td>
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<td></td>
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<td></td>
<td>- Corrected volume flow*</td>
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<td></td>
<td></td>
<td>- Density</td>
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<td>- Reference density*</td>
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<td>- Temperature</td>
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<td>- Pressure</td>
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<td>- Totalizer 1</td>
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<td>- Totalizer 2</td>
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<td>- Totalizer 3</td>
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<td>- Concentration*</td>
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<td>- Target mass flow*</td>
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<td></td>
<td>- Carrier mass flow*</td>
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<td>- Target volume flow*</td>
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<td>- Carrier volume flow*</td>
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<td></td>
<td>- Target corrected volume flow*</td>
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<td></td>
<td>- Carrier corrected volume flow*</td>
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<td></td>
<td></td>
<td></td>
<td>- Application specific output 0*</td>
<td></td>
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<td></td>
<td>- Application specific output 1*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Inhomogeneous medium index</td>
<td></td>
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<tr>
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<td></td>
<td></td>
<td>- Suspended bubbles index</td>
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<td></td>
<td>- HBSI*</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>- Raw value mass flow</td>
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<td>- Exciter current 0</td>
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<td>- Oscillation damping 0</td>
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<td>- Oscillation damping fluctuation 0*</td>
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<td>- Oscillation frequency 0</td>
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<td>- Frequency fluctuation 0*</td>
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<td>- Oscillation amplitude 0*</td>
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<td>- Torsion signal asymmetry</td>
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<td>- Carrier pipe temperature</td>
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<td>- Electronics temperature</td>
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<td>- Sensor index coil asymmetry</td>
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<td>- Test point 0</td>
<td>Country-specific:</td>
</tr>
<tr>
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<td></td>
<td>- Test point 1</td>
<td>- 0 kg/h</td>
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<td></td>
<td></td>
<td></td>
<td>- Current output 1</td>
<td>- 0 lb/min</td>
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<td></td>
<td>- Current output 2*</td>
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<td></td>
<td>- Current output 3*</td>
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<td></td>
<td>- Current output 4</td>
<td></td>
</tr>
<tr>
<td>0% bargraph value 1</td>
<td>A local display is provided.</td>
<td>Enter 0% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td></td>
</tr>
<tr>
<td>100% bargraph value 1</td>
<td>A local display is provided.</td>
<td>Enter 100% value for bar graph display.</td>
<td>Signed floating-point number</td>
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<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User entry</td>
<td>Factory setting</td>
</tr>
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<td>-------------------------</td>
<td>---------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Decimal places 1</td>
<td>A measured value is specified in the Value 1 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td></td>
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<td></td>
<td>• x.x</td>
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<td>• x.xxx</td>
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<td></td>
<td>• x.xxxxx</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>• x.xxxxxx</td>
<td></td>
</tr>
<tr>
<td>Value 2 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (+ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Decimal places 2</td>
<td>A measured value is specified in the Value 2 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td>• x.x</td>
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<td>• x.xxxxx</td>
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<td>• x.xxxxxx</td>
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</tr>
<tr>
<td>Value 3 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (+ 143)</td>
<td>None</td>
</tr>
<tr>
<td>0% bargraph value 3</td>
<td>A selection was made in the Value 3 display parameter.</td>
<td>Enter 0% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>Country-specific:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0 kg/h</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• 0 lb/min</td>
</tr>
<tr>
<td>100% bargraph value 3</td>
<td>A selection was made in the Value 3 display parameter.</td>
<td>Enter 100% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>0</td>
</tr>
<tr>
<td>Decimal places 3</td>
<td>A measured value is specified in the Value 3 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td>• x.x</td>
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<td>• x.xxxxx</td>
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<td>• x.xxxxxx</td>
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</tr>
<tr>
<td>Value 4 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (+ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Decimal places 4</td>
<td>A measured value is specified in the Value 4 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td>• x.x</td>
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<td>• x.xxxxxx</td>
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<tr>
<td>Value 5 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (+ 143)</td>
<td>None</td>
</tr>
<tr>
<td>0% bargraph value 5</td>
<td>An option was selected in the Value 5 display parameter.</td>
<td>Enter 0% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>Depends on country:</td>
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<td></td>
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<td></td>
<td></td>
<td>• 0 kg/h</td>
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<td></td>
<td></td>
<td>• 0 lb/min</td>
</tr>
<tr>
<td>100% bargraph value 5</td>
<td>An option was selected in the Value 5 display parameter.</td>
<td>Enter 100% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>0</td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User entry</td>
<td>Factory setting</td>
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<td>---------------------------</td>
<td>---------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Decimal places 5</td>
<td>A measured value is specified in the Value 5 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td>• x.xxxxxx</td>
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<tr>
<td>Value 6 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Decimal places 6</td>
<td>A measured value is specified in the Value 6 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td>• x.xxxxxx</td>
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<tr>
<td>Value 7 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>0% bargraph value 7</td>
<td>An option was selected in the Value 7 display parameter.</td>
<td>Enter 0% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>Depends on country:</td>
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<td></td>
<td>• 0 kg/h</td>
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<td></td>
<td>• 0 lb/min</td>
</tr>
<tr>
<td>100% bargraph value 7</td>
<td>An option was selected in the Value 7 display parameter.</td>
<td>Enter 100% value for bar graph display.</td>
<td>Signed floating-point number</td>
<td>0</td>
</tr>
<tr>
<td>Decimal places 7</td>
<td>A measured value is specified in the Value 7 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td>• x.xxxxxx</td>
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<tr>
<td>Value 8 display</td>
<td>A local display is provided.</td>
<td>Select the measured value that is shown on the local display.</td>
<td>For the picklist, see the Value 1 display parameter (→ 143)</td>
<td>None</td>
</tr>
<tr>
<td>Decimal places 8</td>
<td>A measured value is specified in the Value 8 display parameter.</td>
<td>Select the number of decimal places for the display value.</td>
<td>• x</td>
<td>x.xx</td>
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<td>• x.x</td>
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<td>• x.xxxxxx</td>
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</tr>
</tbody>
</table>
### Parameter Settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display language</td>
<td>A local display is provided.</td>
<td>Set display language.</td>
<td>• English</td>
<td>English (alternatively, the ordered language is preset in the device)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Deutsch</td>
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<td></td>
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<td></td>
<td>• Français</td>
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<td>• Español</td>
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<td>• Italiano</td>
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<td>• Nederlands</td>
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<td>• Portuguesa</td>
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<td>• Polski</td>
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<td></td>
<td></td>
<td></td>
<td>• русский язык (Russian)</td>
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<td>• Svenska</td>
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<td>• Türkçe</td>
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<td></td>
<td>• 中文 (Chinese)</td>
<td></td>
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<td></td>
<td>• 日本語 (Japanese)</td>
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<td></td>
<td>• 한국어 (Korean)</td>
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<td></td>
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<td></td>
<td>• tiếng Việt (Vietnamese)</td>
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<td></td>
<td></td>
<td></td>
<td>• čeština (Czech)</td>
<td></td>
</tr>
<tr>
<td>Display interval</td>
<td>A local display is provided.</td>
<td>Set time measured values are shown on display if display alternates between values.</td>
<td>1 to 10 s</td>
<td>5 s</td>
</tr>
<tr>
<td>Display damping</td>
<td>A local display is provided.</td>
<td>Set display reaction time to fluctuations in the measured value.</td>
<td>0.0 to 999.9 s</td>
<td>0.0 s</td>
</tr>
<tr>
<td>Header</td>
<td>A local display is provided.</td>
<td>Select header contents on local display.</td>
<td>• Device tag</td>
<td>Device tag</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Free text</td>
<td></td>
</tr>
<tr>
<td>Header text</td>
<td>The Free text option is selected in the Header parameter.</td>
<td>Enter display header text.</td>
<td>Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)</td>
<td>---------------</td>
</tr>
<tr>
<td>Separator</td>
<td>A local display is provided.</td>
<td>Select decimal separator for displaying numerical values.</td>
<td>• . (point)</td>
<td>. (point)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• , (comma)</td>
<td></td>
</tr>
<tr>
<td>Backlight</td>
<td>One of the following conditions is met:</td>
<td>Switch the local display backlight on and off.</td>
<td>• Disable</td>
<td>Enable</td>
</tr>
<tr>
<td></td>
<td>• Order code for 'Display; operation', option F 4-line, illum.; touch control&quot;</td>
<td></td>
<td>• Enable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Order code for 'Display; operation', option G 4-line, illum.; touch control +WLAN&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

### 10.6.6 WLAN configuration
The **WLAN Settings** submenu guides the user systematically through all the parameters that have to be set for the WLAN configuration.

**Navigation**
"Setup" menu → Advanced setup → WLAN settings

![WLAN settings](image)
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLAN</td>
<td></td>
<td>Switch WLAN on and off.</td>
<td>• Disable</td>
<td>Enable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Enable</td>
<td></td>
</tr>
<tr>
<td>WLAN mode</td>
<td></td>
<td>Select WLAN mode.</td>
<td>• WLAN access point</td>
<td>WLAN access point</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• WLAN Client</td>
<td></td>
</tr>
<tr>
<td>SSID name</td>
<td>The client is activated.</td>
<td>Enter the user-defined SSID name (max. 32 characters).</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Network security</td>
<td></td>
<td>Select the security type of the WLAN network.</td>
<td>• Unsecured</td>
<td>WPA2-PSK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• WPA-PSK</td>
<td></td>
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<td></td>
<td>• EAP-PEAP with MSCHAPv2</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• EAP-PEAP MSCHAPv2 no server authentic.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• EAP-TLS</td>
<td></td>
</tr>
<tr>
<td>Security identification</td>
<td></td>
<td>Select security settings and download these settings via menu Data management &gt; Security &gt; WLAN.</td>
<td>• Trusted issuer certificate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Device certificate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Device private key</td>
<td></td>
</tr>
<tr>
<td>User name</td>
<td></td>
<td>Enter user name.</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>WLAN password</td>
<td></td>
<td>Enter WLAN password.</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>Selection / User entry / User interface</td>
<td>Factory setting</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>WLAN IP address</td>
<td>–</td>
<td>Enter IP address of the WLAN interface of the device.</td>
<td>4 octet: 0 to 255 (in the particular octet)</td>
<td>192.168.1.212</td>
</tr>
<tr>
<td>WLAN MAC address</td>
<td>–</td>
<td>Enter MAC address of the WLAN interface of the device.</td>
<td>Unique 12-digit character string</td>
<td>Each measuring device is given an individual address.</td>
</tr>
<tr>
<td>WLAN passphrase</td>
<td>The WPA2-PSK option is selected in the Security type parameter.</td>
<td>Enter the network key (8 to 32 characters).</td>
<td>8 to 32-digit character string comprising numbers, letters and special characters</td>
<td>Serial number of the measuring device (e.g. L100A802000)</td>
</tr>
<tr>
<td>Assign SSID name</td>
<td>–</td>
<td>Select which name will be used for SSID: device tag or user-defined name.</td>
<td>• Device tag</td>
<td>User-defined</td>
</tr>
<tr>
<td>SSID name</td>
<td>• The User-defined option is selected in the Assign SSID name parameter.</td>
<td>Enter the user-defined SSID name (max. 32 characters).</td>
<td>Max. 32-digit character string comprising numbers, letters and special characters</td>
<td>EH_device designation_last 7 digits of the serial number (e.g. EH_Promass_500_A802000)</td>
</tr>
<tr>
<td>Connection state</td>
<td>–</td>
<td>Displays the connection status.</td>
<td>• Connected</td>
<td>Not connected</td>
</tr>
<tr>
<td>Received signal strength</td>
<td>–</td>
<td>Shows the received signal strength.</td>
<td>• Low</td>
<td>High</td>
</tr>
</tbody>
</table>

* Visibility depends on order options or device settings

### 10.6.7 Viscosity application package

For detailed information on the parameter descriptions for the Viscosity application package, see the Special Documentation for the device → 314

**Navigation**

*Setup* menu → Advanced setup → Viscosity

### 10.6.8 Concentration Measurement application package

For detailed information on the parameter descriptions for the Concentration application package, see the Special Documentation for the device → 314

**Navigation**

*Setup* menu → Advanced setup → Concentration

### 10.6.9 Petroleum application package

For detailed information on the parameter descriptions for the Petroleum application package, see the Special Documentation for the device → 314

**Navigation**

*Setup* menu → Advanced setup → Petroleum
### 10.6.10 Heartbeat Technology application package

For detailed information on the parameter descriptions for the Heartbeat setup application package, see the Special Documentation for the device → 314

**Navigation**

"Setup" menu → Advanced setup → Heartbeat setup

### 10.6.11 Configuration management

After commissioning, you can save the current device configuration or restore the previous device configuration. The device configuration is managed via the **Configuration management** parameter.

**Navigation**

"Setup" menu → Advanced setup → Configuration backup

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface / Selection</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating time</td>
<td>Indicates how long the device has been in operation.</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
<td>-</td>
</tr>
<tr>
<td>Last backup</td>
<td>Shows when the last data backup was saved to HistoROM backup.</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
<td>-</td>
</tr>
<tr>
<td>Configuration management</td>
<td>Select action for managing the device data in the HistoROM backup.</td>
<td>Cancel</td>
<td>-</td>
</tr>
<tr>
<td>Backup state</td>
<td>Shows the current status of data saving or restoring.</td>
<td>None</td>
<td>-</td>
</tr>
<tr>
<td>Comparison result</td>
<td>Comparison of current device data with HistoROM backup.</td>
<td>Settings identical, Settings not identical, No backup available, Backup settings corrupt, Check not done, Dataset incompatible</td>
<td>Check not done</td>
</tr>
</tbody>
</table>
Function scope of the "Configuration management" parameter

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td>No action is executed and the user exits the parameter.</td>
</tr>
<tr>
<td>Execute backup</td>
<td>A backup copy of the current device configuration is saved from the HistoROM backup to the memory of the device. The backup copy includes the transmitter data of the device.</td>
</tr>
<tr>
<td>Restore</td>
<td>The last backup copy of the device configuration is restored from the device memory to the device's HistoROM backup. The backup copy includes the transmitter data of the device.</td>
</tr>
<tr>
<td>Compare</td>
<td>The device configuration saved in the device memory is compared with the current device configuration of the HistoROM backup.</td>
</tr>
<tr>
<td>Clear backup data</td>
<td>The backup copy of the device configuration is deleted from the memory of the device.</td>
</tr>
</tbody>
</table>

**HistoROM backup**
A HistoROM is a 'non-volatile' device memory in the form of an EEPROM.

While this action is in progress, the configuration cannot be edited via the local display and a message on the processing status appears on the display.

10.6.12 Using parameters for device administration

The **Administration** submenu systematically guides the user through all the parameters that can be used for device administration purposes.

**Navigation**
"Setup" menu → Advanced setup → Administration

Using the parameter to define the access code

Complete this wizard to specify an access code for the Maintenance role.

**Navigation**
"Setup" menu → Advanced setup → Administration → Define access code
Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define access code</td>
<td>Restrict write-access to parameters to protect the configuration of the device against unintentional changes.</td>
<td>Max. 16-digit character string comprising numbers, letters and special characters</td>
</tr>
<tr>
<td>Confirm access code</td>
<td>Confirm the entered access code.</td>
<td>Max. 16-digit character string comprising numbers, letters and special characters</td>
</tr>
</tbody>
</table>

Using the parameter to reset the access code

**Navigation**

*Setup* menu → Advanced setup → Administration → Reset access code

Using the parameter to reset the device

**Navigation**

*Setup* menu → Advanced setup → Administration

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating time</td>
<td>Indicates how long the device has been in operation.</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
<td>~</td>
</tr>
<tr>
<td>Reset access code</td>
<td>Reset access code to factory settings.</td>
<td>Character string comprising numbers, letters and special characters</td>
<td>0x00</td>
</tr>
</tbody>
</table>

Using the parameter to reset the device

**Navigation**

*Setup* menu → Advanced setup → Administration

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection</th>
<th>Factory setting</th>
</tr>
</thead>
</table>
| Device reset| Reset the device configuration - either entirely or in part - to a defined state. | ● Cancel  
● To delivery settings  
● Restart device  
● Restore S-DAT backup * | Cancel |

* Visibility depends on order options or device settings

**10.7 Simulation**

Via the Simulation submenu, it is possible to simulate various process variables in the process and the device alarm mode and verify downstream signal chains (switching valves
or closed-control loops). The simulation can be performed without a real measurement (no flow of medium through the device).

**Navigation**
'Diagnostics' menu → Simulation

<table>
<thead>
<tr>
<th>Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assign simulation process variable</td>
</tr>
<tr>
<td>Process variable value</td>
</tr>
<tr>
<td>Current input 1 to n simulation</td>
</tr>
<tr>
<td>Value current input 1 to n</td>
</tr>
<tr>
<td>Status input 1 to n simulation</td>
</tr>
<tr>
<td>Input signal level 1 to n</td>
</tr>
<tr>
<td>Current output 1 to n simulation</td>
</tr>
<tr>
<td>Current output value</td>
</tr>
<tr>
<td>Frequency output 1 to n simulation</td>
</tr>
<tr>
<td>Frequency output 1 to n value</td>
</tr>
<tr>
<td>Pulse output simulation 1 to n</td>
</tr>
<tr>
<td>Pulse value 1 to n</td>
</tr>
<tr>
<td>Switch output simulation 1 to n</td>
</tr>
<tr>
<td>Switch state 1 to n</td>
</tr>
<tr>
<td>Relay output 1 to n simulation</td>
</tr>
<tr>
<td>Switch state 1 to n</td>
</tr>
<tr>
<td>Device alarm simulation</td>
</tr>
<tr>
<td>Diagnostic event category</td>
</tr>
<tr>
<td>Diagnostic event simulation</td>
</tr>
</tbody>
</table>
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assign simulation process variable</strong></td>
<td>-</td>
<td>Select a process variable for the simulation process that is activated.</td>
<td>• Off • Mass flow • Volume flow • Corrected volume flow • Target mass flow • Carrier mass flow • Target volume flow • Carrier volume flow • Target corrected volume flow • Carrier corrected volume flow • Density • Reference density • Temperature • Concentration • Time period signal frequency (TPS)</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Process variable value</strong></td>
<td>A process variable is selected in the Assign simulation process variable parameter (➔ 171).</td>
<td>Enter the simulation value for the selected process variable. Depends on the process variable selected</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td><strong>Current output 1 to n simulation</strong></td>
<td>-</td>
<td>Switch the simulation of the current output on and off.</td>
<td>• Off • On</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Current output value</strong></td>
<td>In the Current output 1 to n simulation parameter, the On option is selected.</td>
<td>Enter the current value for simulation.</td>
<td>3.59 to 22.5 mA</td>
<td>3.59 mA</td>
</tr>
<tr>
<td><strong>Frequency output 1 to n simulation</strong></td>
<td>In the Operating mode parameter, the Frequency option is selected.</td>
<td>Switch the simulation of the frequency output on and off.</td>
<td>• Off • On</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Frequency output 1 to n value</strong></td>
<td>In the Frequency simulation 1 to n parameter, the On option is selected.</td>
<td>Enter the frequency value for the simulation.</td>
<td>0.0 to 12 500.0 Hz</td>
<td>0.0 Hz</td>
</tr>
<tr>
<td><strong>Pulse output simulation 1 to n</strong></td>
<td>In the Operating mode parameter, the Pulse option is selected.</td>
<td>Set and switch off the pulse output simulation. For Fixed value option: Pulse width parameter (➔ 131) defines the pulse width of the pulses output.</td>
<td>• Off • Fixed value • Down-counting value</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Pulse value 1 to n</strong></td>
<td>In the Pulse output simulation 1 to n parameter, the Down-counting value option is selected.</td>
<td>Enter the number of pulses for simulation.</td>
<td>0 to 65 535</td>
<td>0</td>
</tr>
<tr>
<td><strong>Switch output simulation 1 to n</strong></td>
<td>In the Operating mode parameter, the Switch option is selected.</td>
<td>Switch the simulation of the switch output on and off.</td>
<td>• Off • On</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Switch state 1 to n</strong></td>
<td>-</td>
<td>Select the status of the status output for the simulation.</td>
<td>• Open • Closed</td>
<td>Open</td>
</tr>
<tr>
<td><strong>Relay output 1 to n simulation</strong></td>
<td>-</td>
<td>Switch simulation of the relay output on and off.</td>
<td>• Off • On</td>
<td>Off</td>
</tr>
<tr>
<td><strong>Switch state 1 to n</strong></td>
<td>The On option is selected in the Switch output simulation 1 to n parameter parameter.</td>
<td>Select status of the relay output for the simulation.</td>
<td>• Open • Closed</td>
<td>Open</td>
</tr>
</tbody>
</table>
### 10.8 Protecting settings from unauthorized access

The following write protection options exist in order to protect the configuration of the measuring device from unintentional modification:

- Protect access to parameters via access code → 172
- Protect access to local operation via key locking → 82
- Protect access to measuring device via write protection switch → 174

#### 10.8.1 Write protection via access code

The effects of the user-specific access code are as follows:

- Via local operation, the parameters for the measuring device configuration are write-protected and their values can no longer be changed.
- Device access is protected via the Web browser, as are the parameters for the measuring device configuration.
- Device access is protected via FieldCare or DeviceCare (via CDI-RJ45 service interface), as are the parameters for the measuring device configuration.

**Defining the access code via local display**

1. Navigate to the **Define access code** parameter (→ 169).
2. Define a max. 16-digit character string comprising numbers, letters and special characters as the access code.
3. Enter the access code again in the **Confirm access code** parameter (→ 169) to confirm the code.
   - The ☑-symbol appears in front of all write-protected parameters.

The device automatically locks the write-protected parameters again if a key is not pressed for 10 minutes in the navigation and editing view. The device locks the write-protected...
parameters automatically after 60 s if the user skips back to the operational display mode from the navigation and editing view.

- If parameter write protection is activated via an access code, it can also only be deactivated via this access code → 81.
- The user role with which the user is currently logged on via the local display → 81 is indicated by the Access status parameter. Navigation path: Operation → Access status

**Parameters which can always be modified via the local display**

Certain parameters that do not affect the measurement are excepted from parameter write protection via the local display. Despite the user-specific access code, they can always be modified, even if the other parameters are locked.

<table>
<thead>
<tr>
<th>Parameters for configuring the local display</th>
<th>Parameters for configuring the totalizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Control Totalizer</td>
</tr>
<tr>
<td>Format display</td>
<td>Preset value</td>
</tr>
<tr>
<td>Contrast display</td>
<td>Reset all totalizers</td>
</tr>
<tr>
<td>Display interval</td>
<td></td>
</tr>
</tbody>
</table>

**Defining the access code via the Web browser**

1. Navigate to the Define access code parameter (→ 169).
2. Define a max. 16-digit numeric code as an access code.
3. Enter the access code again in the Confirm access code parameter (→ 169) to confirm the code.
   - The Web browser switches to the login page.

**Resetting the access code**

If you misplace the user-specific access code, it is possible to reset the code to the factory setting. A reset code must be entered for this purpose. The user-specific access code can then be defined again afterwards.

**Via Web browser, FieldCare, DeviceCare (via CDI-RJ45 service interface), fieldbus**

You can only obtain a reset code from your local Endress+Hauser service organization. The code must be calculated explicitly for every device.

1. Note down the serial number of the device.
2. Read off the Operating time parameter.
3. Contact the local Endress+Hauser service organization and tell them the serial number and the operating time.
   - Get the calculated reset code.
4. Enter the reset code in the **Reset access code** parameter (→ 169).
   The access code has been reset to the factory setting **0000**. It can be redefined → 172.

For IT security reasons, the calculated reset code is only valid for 96 hours from the specified operating time and for the specific serial number. If you cannot return to the device within 96 hours, you should either increase the operating time you read out by a few days or switch off the device.

10.8.2 **Write protection via write protection switch**

Unlike parameter write protection via a user-specific access code, this allows the user to lock write access to the entire operating menu - apart from the "**Contrast display**" parameter.

The parameter values are now read only and cannot be edited any more (exception "**Contrast display**" parameter):
- Via local display
- Via PROFINET protocol

**Proline 500 – digital**

**Enabling/disabling write protection**

1. Open the housing cover.
2. Remove the display module.
3. Fold open the terminal cover.
4. **Enable or disable write protection:**
   Setting the write protection (WP) switch on the main electronics module to the **ON** position enables hardware write protection/to the **OFF** position (factory setting) disables hardware write protection.
   
   ¬ In the **Locking status** parameter, the **Hardware locked** option is displayed → 176. When hardware write protection is active, the symbol appears in the header of the measured value display and in the navigation view in front of the parameters.

5. Insert the display module.

6. Close the housing cover.

7. **WARNING**
   **Excessive tightening torque applied to the fixing screws!**
   Risk of damaging the plastic transmitter.
   ▶ Tighten the fixing screws as per the tightening torque: 2 Nm (1.5 lbf ft)
   
   Tighten the securing screws.

---

### Proline 500

1. Setting the write protection (WP) switch on the main electronics module to the **ON** position enables hardware write protection.

   ¬ In the **Locking status** parameter, the **Hardware locked** option is displayed → 176. In addition, on the local display the symbol appears in front of the parameters in the header of the operational display and in the navigation view.

2. Setting the write protection (WP) switch on the main electronics module to the **OFF** position (factory setting) disables hardware write protection.

   ¬ No option is displayed in the **Locking status** parameter → 176. On the local display, the symbol disappears from in front of the parameters in the header of the operational display and in the navigation view.
11 Operation

11.1 Reading off the device locking status
Device active write protection: Locking status parameter
Operation → Locking status

**Function scope of the 'Locking status' parameter**

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>The access authorization displayed in the Access status parameter applies → 📝 81. Only appears on local display.</td>
</tr>
<tr>
<td>Hardware locked</td>
<td>The DIP switch for hardware locking is activated on the PCB board. This locks write access to the parameters (e.g. via local display or operating tool) → 📝 174.</td>
</tr>
<tr>
<td>Temporarily locked</td>
<td>Write access to the parameters is temporarily locked on account of internal processes running in the device (e.g. data upload/download, reset, etc.). Once the internal processing has been completed, the parameters can be changed once again.</td>
</tr>
</tbody>
</table>

11.2 Adjusting the operating language
Detailed information:
- To configure the operating language → 📝 111
- For information on the operating languages supported by the measuring device → 📝 306

11.3 Configuring the display
Detailed information:
- On the basic settings for the local display → 📝 141
- On the advanced settings for the local display → 📝 158

11.4 Reading measured values
With the Measured values submenu, it is possible to read all the measured values.

**Navigation**
*Diagnostics* menu → Measured values

<table>
<thead>
<tr>
<th>► Measured values</th>
</tr>
</thead>
<tbody>
<tr>
<td>► Measured variables → 📝 177</td>
</tr>
<tr>
<td>► Totalizer → 📝 179</td>
</tr>
<tr>
<td>► Input values → 📝 180</td>
</tr>
<tr>
<td>► Output values → 📝 181</td>
</tr>
</tbody>
</table>
11.4.1 "Measured variables" submenu

The Measured variables submenu contains all the parameters needed to display the current measured values for each process variable.

Navigation
"Diagnostics" menu → Measured values → Measured variables

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass flow</td>
<td>-</td>
<td>Displays the mass flow that is currently measured.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dependency: The unit is taken from: Mass flow unit parameter (→ 116)</td>
<td></td>
</tr>
<tr>
<td>Volume flow</td>
<td>-</td>
<td>Displays the volume flow that is currently calculated.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dependency: The unit is taken from the Volume flow unit parameter (→ 116).</td>
<td></td>
</tr>
<tr>
<td>Parameter</td>
<td>Prerequisite</td>
<td>Description</td>
<td>User interface</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Corrected volume flow</td>
<td></td>
<td>Displays the corrected volume flow that is currently calculated.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from: <strong>Corrected volume flow unit</strong> parameter (→ 116)</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td></td>
<td>Shows the density currently measured.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from the <strong>Density unit</strong> parameter (→ 116).</td>
<td></td>
</tr>
<tr>
<td>Reference density</td>
<td></td>
<td>Displays the reference density that is currently calculated.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from: <strong>Reference density unit</strong> parameter (→ 116)</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td>Shows the medium temperature currently measured.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from: <strong>Temperature unit</strong> parameter (→ 117)</td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td></td>
<td>Displays either a fixed or external pressure value.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from the <strong>Pressure unit</strong> parameter (→ 117)</td>
<td></td>
</tr>
<tr>
<td>Concentration</td>
<td>For the following order code: Order code for &quot;Application package&quot;, option ED ‘Concentration’</td>
<td>Displays the concentration that is currently calculated.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td><img src="https://www.example.com" alt="Software option overview" /></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The software options currently enabled are displayed in the <strong>Software option overview</strong> parameter.</td>
<td></td>
</tr>
<tr>
<td>Target mass flow</td>
<td>With the following conditions: Order code for &quot;Application package&quot;, option ED ‘Concentration’</td>
<td>Displays the mass flow that is currently measured for the target medium.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td><img src="https://www.example.com" alt="Software option overview" /></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The software options currently enabled are displayed in the <strong>Software option overview</strong> parameter.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from the <strong>Mass flow unit</strong> parameter (→ 116).</td>
<td></td>
</tr>
<tr>
<td>Carrier mass flow</td>
<td>With the following conditions: Order code for &quot;Application package&quot;, option ED ‘Concentration’</td>
<td>Displays the mass flow of the carrier medium that is currently measured.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td><img src="https://www.example.com" alt="Software option overview" /></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The software options currently enabled are displayed in the <strong>Software option overview</strong> parameter.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from: <strong>Mass flow unit</strong> parameter (→ 116)</td>
<td></td>
</tr>
<tr>
<td>Target corrected volume flow</td>
<td>With the following conditions: Order code for &quot;Application package&quot;, option ED ‘Concentration’</td>
<td>Displays the corrected volume flow that is currently measured for the target fluid.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td></td>
<td><img src="https://www.example.com" alt="Software option overview" /></td>
<td><strong>Dependency</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The software options currently enabled are displayed in the <strong>Software option overview</strong> parameter.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The unit is taken from the <strong>Volume flow unit</strong> parameter (→ 116).</td>
<td></td>
</tr>
</tbody>
</table>
### Parameter | Prerequisite | Description | User interface
--- | --- | --- | ---
Carrier corrected volume flow | With the following conditions:  
- Order code for 'Application package', option ED 'Concentration'  
- In the Liquid type parameter, the Ethanol in water option or %mass / %volume option is selected.  
- The software options currently enabled are displayed in the Software option overview parameter. | Displays the corrected volume flow currently measured for the carrier fluid.  
**Dependency**  
The unit is taken from the Volume flow unit parameter (→ @ 116). | Signed floating-point number
Target volume flow | With the following conditions:  
- Order code for 'Application package', option ED 'Concentration'  
- The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter.  
- The %vol option is selected in the Concentration unit parameter.  
- The software options currently enabled are displayed in the Software option overview parameter. | Displays the volume flow currently measured for the target medium.  
**Dependency**  
The unit is taken from the Volume flow unit parameter (→ @ 116). | Signed floating-point number
Carrier volume flow | With the following conditions:  
- Order code for 'Application package', option ED 'Concentration'  
- The Ethanol in water option or %mass / %volume option is selected in the Liquid type parameter.  
- The %vol option is selected in the Concentration unit parameter.  
- The software options currently enabled are displayed in the Software option overview parameter. | Displays the volume flow currently measured for the carrier medium.  
**Dependency**  
The unit is taken from the Volume flow unit parameter (→ @ 116). | Signed floating-point number

### 11.4.2 Totalizer

The **Totalizer** submenu contains all the parameters needed to display the current measured values for every totalizer.

**Navigation**  
'Diagnostics' menu → Measured values → Totalizer

---

**Totalizer**

Assign process variable 1 to n → @ 180

Totalizer 1 to n value → @ 180

Totalizer 1 to n status → @ 180

Totalizer 1 to n status (Hex) → @ 180
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
</table>
| Assign process variable 1 to n | Select process variable for totalizer. | • Mass flow  
• Volume flow  
• Corrected volume flow  
• Target mass flow  
• Carrier mass flow  
• Target volume flow  
• Carrier volume flow  
• Target corrected volume flow  
• Carrier corrected volume flow  
• GSV flow  
• GSV flow alternative  
• NSV flow  
• NSV flow alternative  
• S&W volume flow  
• Oil mass flow  
• Water mass flow  
• Oil volume flow  
• Water volume flow  
• Oil corrected volume flow  
• Water corrected volume flow  
• Raw value mass flow | Mass flow |

| Totalizer 1 to n value | Shows the totalizer value reported to the controller for further processing. | Signed floating-point number | 0 kg |
| Totalizer 1 to n status | Shows the status of the totalizer value reported to the controller for further processing ('Good', 'Uncertain', 'Bad'). | • Good  
• Uncertain  
• Bad | Good |
| Totalizer 1 to n status (Hex) | Shows the status of the totalizer value reported to the controller for further processing (Hex). | 0 to 255 | 128 |

* Visibility depends on order options or device settings

### 11.4.3 "Input values" submenu

The **Input values** submenu guides you systematically to the individual input values.

**Navigation**

'Diagnostics' menu → Measured values → Input values

![Input values](Image)

**Input values of current input**

The **Current input 1 to n** submenu contains all the parameters needed to display the current measured values for every current input.
Navigation
"Diagnostics" menu → Measured values → Input values → Current input 1 to n

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured values 1 to n</td>
<td>Displays the current input value.</td>
<td>Signed floating-point number</td>
</tr>
<tr>
<td>Measured current 1 to n</td>
<td>Displays the current value of the current input.</td>
<td>0 to 22.5 mA</td>
</tr>
</tbody>
</table>

Input values of status input
The Status input 1 to n submenu contains all the parameters needed to display the current measured values for every status input.

Navigation
"Diagnostics" menu → Measured values → Input values → Status input 1 to n

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value status input</td>
<td>Shows the current input signal level.</td>
<td>High, Low</td>
</tr>
</tbody>
</table>

11.4.4 Output values
The Output values submenu contains all the parameters needed to display the current measured values for every output.

Navigation
"Diagnostics" menu → Measured values → Output values
Output values of current output

The **Value current output** submenu contains all the parameters needed to display the current measured values for every current output.

**Navigation**

'Diagnostics' menu → Measured values → Output values → Value current output 1 to n

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output current</td>
<td>Displays the current value currently calculated for the current output.</td>
<td>3.59 to 22.5 mA</td>
</tr>
<tr>
<td>Measured current</td>
<td>Displays the current value currently measured for the current output.</td>
<td>0 to 30 mA</td>
</tr>
</tbody>
</table>

Output values for pulse/frequency/switch output

The **Pulse/frequency/switch output 1 to n** submenu contains all the parameters needed to display the current measured values for every pulse/frequency/switch output.

**Navigation**

'Diagnostics' menu → Measured values → Output values → Pulse/frequency/switch output 1 to n

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse output 1 to n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch state</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output frequency</td>
<td>In the Operating mode parameter, the Frequency option is selected.</td>
<td>Displays the value currently measured for the frequency output.</td>
<td>0.0 to 12 500.0 Hz</td>
</tr>
<tr>
<td>Pulse output 1 to n</td>
<td>The Pulse option is selected in the Operating mode parameter parameter.</td>
<td>Displays the pulse frequency currently output.</td>
<td>Positive floating-point number</td>
</tr>
<tr>
<td>Switch state</td>
<td>The Switch option is selected in the Operating mode parameter.</td>
<td>Displays the current switch output status.</td>
<td>• Open • Closed</td>
</tr>
</tbody>
</table>

Output values for relay output

The Relay output 1 to n submenu contains all the parameters needed to display the current measured values for every relay output.

Navigation

"Diagnostics" menu → Measured values → Output values → Relay output 1 to n

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch state</td>
<td>Shows the current relay switch status.</td>
<td>• Open • Closed</td>
</tr>
<tr>
<td>Switch cycles</td>
<td>Shows number of all performed switch cycles.</td>
<td>Positive integer</td>
</tr>
<tr>
<td>Max. switch cycles number</td>
<td>Shows the maximal number of guaranteed switch cycles.</td>
<td>Positive integer</td>
</tr>
</tbody>
</table>

11.5  Adapting the measuring device to the process conditions

The following are available for this purpose:
- Basic settings using the Setup menu (→ 112)
- Advanced settings using the Advanced setup submenu (→ 147)

11.6  Performing a totalizer reset

The totalizers are reset in the Operation submenu:
- Control Totalizer
- Reset all totalizers
### Navigation

‘Operation’ menu → Totalizer handling

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totalizer 1 to n control</td>
<td>Operate the totalizer.</td>
<td>• Reset + hold</td>
<td>Totalize</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Preset + hold</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hold</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Totalize</td>
<td></td>
</tr>
<tr>
<td>Preset value 1 to n</td>
<td>Specify start value for totalizer.</td>
<td>Signed floating-point number</td>
<td>0 kg</td>
</tr>
<tr>
<td>Reset all totalizers</td>
<td>Reset all totalizers to 0 and start.</td>
<td>• Cancel</td>
<td>Cancel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reset + totalize</td>
<td></td>
</tr>
</tbody>
</table>

#### 11.6.1  Function scope of "Control Totalizer" parameter

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totalize</td>
<td>The totalizer is started or continues running.</td>
</tr>
<tr>
<td>Reset + hold</td>
<td>The totaling process is stopped and the totalizer is reset to 0.</td>
</tr>
<tr>
<td>Preset + hold &lt;sup&gt;1&lt;/sup&gt;</td>
<td>The totaling process is stopped and the totalizer is set to its defined start value from the Preset value parameter.</td>
</tr>
<tr>
<td>Reset + totalize</td>
<td>The totalizer is reset to 0 and the totaling process is restarted.</td>
</tr>
<tr>
<td>Preset + totalize &lt;sup&gt;1&lt;/sup&gt;</td>
<td>The totalizer is set to the defined start value in the Preset value parameter and the totaling process is restarted.</td>
</tr>
<tr>
<td>Hold</td>
<td>Totalizing is stopped.</td>
</tr>
</tbody>
</table>

<sup>1</sup> Visible depending on the order options or device settings

#### 11.6.2  Function scope of the "Reset all totalizers" parameter

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td>No action is executed and the user exits the parameter.</td>
</tr>
<tr>
<td>Reset + totalize</td>
<td>Resets all totalizers to 0 and restarts the totaling process. This deletes all the flow values previously totalized.</td>
</tr>
</tbody>
</table>
11.7  Show data logging

The **Extended HistoROM** application package must be enabled in the device (order option) for the **Data logging** submenu to appear. This contains all the parameters for the measured value history.

Data logging is also available via:
- Plant Asset Management Tool FieldCare → 93.
- Web browser

**Function scope**
- A total of 1000 measured values can be stored
- 4 logging channels
- Adjustable logging interval for data logging
- Measured value trend for each logging channel displayed in the form of a chart

![Chart of a measured value trend](image)

**x-axis**: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.

**y-axis**: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

If the length of the logging interval or the assignment of the process variables to the channels is changed, the content of the data logging is deleted.

**Navigation**

'Diagnostics' menu → Data logging
Data logging status → 188

Entire logging duration → 188
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>Selection / User entry / User interface</th>
<th>Factory setting</th>
</tr>
</thead>
</table>
| Assign channel 1   | The **Extended HistoROM** application package is available.                  | Assign process variable to logging channel.                                 | • Off  
• Mass flow  
• Volume flow  
• Corrected volume flow  
• Density  
• Reference density  
• Temperature  
• Pressure  
• Concentration  
• Target mass flow  
• Carrier mass flow  
• Target volume flow  
• Carrier volume flow  
• Target corrected volume flow  
• Carrier corrected volume flow  
• Application specific output 0  
• Application specific output 1  
• Inhomogeneous medium index  
• Suspended bubbles index  
• HBSI  
• Raw value mass flow  
• Exciter current 0  
• Oscillation damping 0  
• Oscillation damping fluctuation 0  
• Oscillation frequency 0  
• Frequency fluctuation 0  
• Oscillation amplitude  
• Oscillation amplitude 1  
• Signal asymmetry  
• Torsion signal asymmetry  
• Carrier pipe temperature  
• Electronics temperature  
• Sensor index coil asymmetry  
• Test point 0  
• Test point 1  
• Current output 1  
• Current output 2  
• Current output 3  
• Current output 4 | Off                           |
### 11.8 Gas Fraction Handler

The Gas Fraction Handler improves measurement stability and repeatability in the event of two-phase media and provides valuable diagnostic information for the process.

The function continuously checks for the presence of gas bubbles in liquids or droplets in gases, as this second phase influences the output values for flow and density.
In the case of two-phase media, the Gas Fraction Handler stabilizes the output values and enables better readability for operators and easier interpretation by the distributed control system. The level of smoothing is adjusted according to the severity of the disturbances introduced by the second phase. In the case of single-phase media, the Gas Fraction Handler does not have any influence on the output values.

Possible options in the Gas Fraction Handler parameter:
- Off: Disables the Gas Fraction Handler. When a second phase is present, large fluctuations in the values output for flow and density will occur.
- Moderate: Use for applications with low levels or intermittent levels of second phase.
- Powerful: Use for applications with very significant levels of second phase.

The Gas Fraction Handler is cumulative to any fixed damping constants applied to flow and density that are set elsewhere in the instrument parameterization.

For detailed information on the parameter descriptions of the Gas Fraction Handler, see the Special Documentation for the device → 314

11.8.1  "Measurement mode" submenu

Navigation
'Expert' menu → Sensor → Measurement mode

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Selection</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas Fraction Handler</td>
<td>Activates the Gas Fraction Handler function for two phase media.</td>
<td>Off, Moderate, Powerful</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

11.8.2  "Medium index" submenu

Navigation
'Expert' menu → Application → Medium index

Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhomogeneous medium index (6368)</td>
<td>→ 190</td>
<td></td>
</tr>
<tr>
<td>Cut off inhomogeneous wet gas (6375)</td>
<td>→ 190</td>
<td></td>
</tr>
<tr>
<td>Cut off inhomogeneous liquid (6374)</td>
<td>→ 190</td>
<td></td>
</tr>
<tr>
<td>Suspended bubbles index (6376)</td>
<td>→ 190</td>
<td></td>
</tr>
<tr>
<td>Cut off suspended bubbles (6370)</td>
<td>→ 190</td>
<td></td>
</tr>
</tbody>
</table>
### Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface / User entry</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhomogeneous medium index</td>
<td>–</td>
<td>Shows the degree of inhomogeneity of the medium.</td>
<td>Signed floating-point number</td>
<td>–</td>
</tr>
<tr>
<td>Cut off inhomogeneous wet gas</td>
<td>–</td>
<td>Enter cut off value for wet gas applications. Below this value the Inhomogeneous medium index is set to 0.</td>
<td>Positive floating-point number</td>
<td>0.25</td>
</tr>
<tr>
<td>Cut off inhomogeneous liquid</td>
<td>–</td>
<td>Enter cut off value for liquid applications. Below this value the Inhomogeneous medium index is set to 0.</td>
<td>Positive floating-point number</td>
<td>0.05</td>
</tr>
<tr>
<td>Suspended bubbles index</td>
<td>The diagnostic index is only available for Promass Q.</td>
<td>Shows the relative amount of suspended bubbles in the medium.</td>
<td>Signed floating-point number</td>
<td>–</td>
</tr>
<tr>
<td>Cut off suspended bubbles</td>
<td>The parameter is only available for Promass Q.</td>
<td>Enter the cut off value for suspended bubbles. Below this value the Index for suspended bubbles is set to 0.</td>
<td>Positive floating-point number</td>
<td>0.05</td>
</tr>
</tbody>
</table>
12 Diagnostics and troubleshooting

12.1 General troubleshooting

For local display

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local display dark and no output signals</td>
<td>Supply voltage does not match that specified on the nameplate.</td>
<td>Apply the correct supply voltage.</td>
</tr>
<tr>
<td>Local display dark and no output signals</td>
<td>The polarity of the supply voltage is wrong.</td>
<td>Correct the polarity.</td>
</tr>
<tr>
<td>Local display dark and no output signals</td>
<td>No contact between connecting cables and terminals.</td>
<td>Check the connection of the cables and correct if necessary.</td>
</tr>
<tr>
<td>Local display dark and no output signals</td>
<td>Terminals are not plugged into the I/O electronics module correctly. Terminals are not plugged into the main electronics module correctly.</td>
<td>Check terminals.</td>
</tr>
<tr>
<td>Local display dark and no output signals</td>
<td>I/O electronics module is defective. Main electronics module is defective.</td>
<td>Order spare part →   277.</td>
</tr>
<tr>
<td>Local display dark and no output signals</td>
<td>The connector between the main electronics module and display module is not plugged in correctly.</td>
<td>Check the connection and correct if necessary.</td>
</tr>
<tr>
<td>Local display dark and no output signals</td>
<td>The connecting cable is not plugged in correctly.</td>
<td>1. Check the connection of the electrode cable and correct if necessary. 2. Check the connection of the coil current cable and correct if necessary.</td>
</tr>
<tr>
<td>Local display is dark, but signal output is within the valid range</td>
<td>Display is set too bright or too dark.</td>
<td>• Set the display brighter by simultaneously pressing  + .   • Set the display darker by simultaneously pressing  + .</td>
</tr>
<tr>
<td>Local display is dark, but signal output is within the valid range</td>
<td>The cable of the display module is not plugged in correctly.</td>
<td>Insert the plug correctly into the main electronics module and display module.</td>
</tr>
<tr>
<td>Local display is dark, but signal output is within the valid range</td>
<td>Display module is defective.</td>
<td>Order spare part →   277.</td>
</tr>
<tr>
<td>Backlighting of local display is red</td>
<td>Diagnostic event with 'Alarm' diagnostic behavior has occurred.</td>
<td>Take remedial measures →   203.</td>
</tr>
<tr>
<td>Text on local display appears in a foreign language and cannot be understood.</td>
<td>Incorrect operating language is configured.</td>
<td>1. Press 2 s  +  (&quot;home position&quot;). 2. Press . 3. Set the desired language in the Display language parameter (→   164).</td>
</tr>
<tr>
<td>Message on local display: &quot;Communication Error&quot; 'Check Electronics'</td>
<td>Communication between the display module and the electronics is interrupted.</td>
<td>• Check the cable and the connector between the main electronics module and display module. • Order spare part →   277.</td>
</tr>
</tbody>
</table>
### For output signals

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes</th>
<th>Remedial action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal output outside the valid range</td>
<td>Main electronics module is defective.</td>
<td>Order spare part → 277.</td>
</tr>
<tr>
<td>Device shows correct value on local display, but signal output is incorrect, though in the valid range.</td>
<td>Parametrization errors</td>
<td>Check parameterization and correct it.</td>
</tr>
<tr>
<td>Device measures incorrectly.</td>
<td>Configuration error or device is operated outside the application.</td>
<td>1. Check and correct parameter configuration. 2. Observe limit values specified in the 'Technical Data'.</td>
</tr>
</tbody>
</table>

### For access

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No write access to parameters.</td>
<td>Hardware write protection is enabled.</td>
<td>Set the write protection switch on the main electronics module to the <strong>OFF</strong> position → 174.</td>
</tr>
<tr>
<td>No write access to parameters.</td>
<td>Current user role has limited access authorization.</td>
<td>1. Check user role → 81. 2. Enter correct customer-specific access code → 81.</td>
</tr>
<tr>
<td>No connection to web server.</td>
<td>Web server is disabled.</td>
<td>Using the &quot;FieldCare&quot; or &quot;DeviceCare&quot; operating tool, check whether the Web server of the measuring device is enabled, and enable it if necessary→ 89.</td>
</tr>
<tr>
<td>No connection to web server.</td>
<td>Incorrect settings for the Ethernet interface of the computer.</td>
<td>1. Check the properties of the Internet protocol (TCP/IP) → 85→ 85. 2. Check the network settings with the IT manager.</td>
</tr>
<tr>
<td>Incorrect WLAN access data.</td>
<td></td>
<td>• Check WLAN network status. • Log on to the device again using WLAN access data. • Check that WLAN is enabled on the measuring device and operating device → 85.</td>
</tr>
<tr>
<td>WLAN communication is disabled.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not connecting to web server, FieldCare or DeviceCare.</td>
<td>No WLAN network available.</td>
<td>• Check if WLAN reception is present: LED on display module is lit blue • Check if WLAN connection is enabled: LED on display module flashes blue • Switch on instrument function.</td>
</tr>
<tr>
<td>Network connection not present or unstable.</td>
<td>WLAN network is weak.</td>
<td>• Operating device is outside of reception range: Check network status on operating device. • To improve network performance, use an external WLAN antenna.</td>
</tr>
<tr>
<td>Parallel WLAN and Ethernet communication.</td>
<td></td>
<td>• Check network settings. • Temporarily enable only the WLAN as an interface.</td>
</tr>
<tr>
<td>Web browser is frozen and operation no longer possible.</td>
<td>Data transfer is active.</td>
<td>Wait until data transfer or current action is finished.</td>
</tr>
<tr>
<td>Connection lost</td>
<td></td>
<td>1. Check cable connection and power supply. 2. Refresh the Web browser and restart if necessary.</td>
</tr>
<tr>
<td>Content of web browser is incomplete or difficult to read.</td>
<td>Not using optimum version of Web server.</td>
<td>1. Use the correct Web browser version → 83. 2. Clear the Web browser cache and restart the Web browser.</td>
</tr>
<tr>
<td>Problem</td>
<td>Possible causes</td>
<td>Remedy</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Unsuitable view settings.</td>
<td></td>
<td>Change the font size/display ratio of the Web browser.</td>
</tr>
<tr>
<td>No or incomplete display of contents in the web browser.</td>
<td>JavaScript is not enabled</td>
<td>1. Enable JavaScript.</td>
</tr>
<tr>
<td></td>
<td>JavaScript cannot be enabled</td>
<td>2. Enter <a href="http://XXX.XXX.X.X.XX/servlet/basic.html">http://XXX.XXX.X.X.XX/servlet/basic.html</a> as the IP address.</td>
</tr>
<tr>
<td>Operation with FieldCare or DeviceCare is not possible via CDI-RJ45 service interface (port 8000).</td>
<td>Firewall of computer or network is preventing communication.</td>
<td>Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/ DeviceCare access.</td>
</tr>
<tr>
<td>Flashing of firmware with FieldCare or DeviceCare via CDI-RJ45 service interface (via port 8000 or TFTP ports) is not possible.</td>
<td>Firewall of computer or network is preventing communication.</td>
<td>Depending on the settings of the firewall used on the computer or in the network, the firewall must be adapted or disabled to allow FieldCare/ DeviceCare access.</td>
</tr>
</tbody>
</table>

**For system integration**

<table>
<thead>
<tr>
<th>Error</th>
<th>Possible causes</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The PROFINET device name is not displayed correctly and contains coding.</td>
<td>A device name containing one or more underscores has been specified via the automation system.</td>
<td>Specify a correct device name (without underscores) via the automation system.</td>
</tr>
</tbody>
</table>

**12.2 Diagnostic information via light emitting diodes**

**12.2.1 Transmitter**

Proline 500 – digital

Different LEDs in the transmitter provide information on the device status.
1. Open the housing cover.
2. Remove the display module.
3. Fold open the terminal cover.

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply voltage</td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>Supply voltage is off or too low.</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Supply voltage is ok.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Device status/module status (normal operation)</td>
<td></td>
</tr>
<tr>
<td>Off</td>
<td>Firmware error</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Device status is ok.</td>
<td></td>
</tr>
<tr>
<td>Flashing green</td>
<td>Device is not configured.</td>
<td></td>
</tr>
<tr>
<td>Flashing red</td>
<td>A diagnostic event with 'Warning' diagnostic behavior has occurred.</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>A diagnostic event with 'Alarm' diagnostic behavior has occurred.</td>
<td></td>
</tr>
<tr>
<td>Flashing red/green</td>
<td>The device restarts/self-test.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Flashing/network status</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Cyclic data exchange is active.</td>
<td></td>
</tr>
<tr>
<td>Flashing green</td>
<td>Following request from automation system:</td>
<td></td>
</tr>
<tr>
<td>Flash frequency: 1 Hz (flash functionality: 500 ms on, 500 ms off)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyclic data exchange is not active, no IP address is available:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash frequency: 4 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>IP address is available but there is no connection to the automation system</td>
<td></td>
</tr>
<tr>
<td>Flashing red</td>
<td>Cyclic data exchange was active but the connection was disconnected:</td>
<td></td>
</tr>
<tr>
<td>Flash frequency: 3 Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Diagnostics and troubleshooting

#### Proline Promass A 500 PROFINET with Ethernet-APL

Different LEDs in the transmitter provide information on the device status.

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Port 1 active: PROFINET with Ethernet-APL</td>
<td><strong>Off</strong> Not connected or no connection established.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Green</strong> Connection available, no active communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Flashing green</strong> Connection with active communication</td>
</tr>
<tr>
<td>5</td>
<td>Port 2 active: Service interface (CDI)</td>
<td><strong>Off</strong> Not connected or no connection established.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Amber</strong> Connection available but no activity.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Flashing amber</strong> Activity present.</td>
</tr>
</tbody>
</table>

#### Proline 500

Different LEDs in the transmitter provide information on the device status.

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply voltage</td>
<td><strong>Off</strong> Supply voltage is off or too low.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Green</strong> Supply voltage is ok.</td>
</tr>
<tr>
<td>2</td>
<td>Device status/module status (normal operation)</td>
<td><strong>Off</strong> Firmware error</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Green</strong> Device status is ok.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Flashing green</strong> Device is not configured.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Flashing red</strong> A diagnostic event with &quot;Warning&quot; diagnostic behavior has occurred.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Red</strong> A diagnostic event with &quot;Alarm&quot; diagnostic behavior has occurred.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Flashing red/green</strong> The device restarts/self-test.</td>
</tr>
<tr>
<td>3</td>
<td>Flashing/network status</td>
<td><strong>Green</strong> Cyclic data exchange is active.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Flashing green</strong> Following request from automation system:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flash frequency: 1 Hz (flash functionality: 500 ms on, 500 ms off)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If no 'Name of Station' is defined:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Flash frequency: 4 Hz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>● Display: no 'Name of Station' available.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Red</strong> IP address is available but there is no connection to the automation system</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Flashing red</strong> Cyclic data exchange was active but the connection was disconnected:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flash frequency: 3 Hz</td>
</tr>
</tbody>
</table>
### 12.2.2 Sensor connection housing

**Proline 500 – digital**

Various light emitting diodes (LED) on the ISEM electronics unit (intelligent sensor electronics module) in the sensor connection housing provide information about the device status.

#### LED

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Off</td>
<td>Not connected or no connection established.</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>Connection available, no active communication</td>
</tr>
<tr>
<td></td>
<td>Flashing white</td>
<td>Connection with active communication</td>
</tr>
<tr>
<td>5</td>
<td>Off</td>
<td>Not connected or no connection established.</td>
</tr>
<tr>
<td></td>
<td>Amber</td>
<td>Connection available but no activity.</td>
</tr>
<tr>
<td></td>
<td>Flashing amber</td>
<td>Activity present.</td>
</tr>
</tbody>
</table>

1. **Communication**
2. **Device status**
3. **Supply voltage**

![Sensor connection housing diagram](image-url)
12.3 Diagnostic information on local display

12.3.1 Diagnostic message

Faults detected by the self-monitoring system of the measuring device are displayed as a diagnostic message in alternation with the operational display.

<table>
<thead>
<tr>
<th>Operational display in alarm condition</th>
<th>Diagnostic message</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Diagram showing operational display]</td>
<td>[Diagram showing diagnostic message]</td>
</tr>
</tbody>
</table>

If two or more diagnostic events are pending simultaneously, only the message of the diagnostic event with the highest priority is shown.

Other diagnostic events that have occurred can be displayed in the Diagnostics menu:
- Via parameter → 269
- Via submenus → 270

Status signals

The status signals provide information on the state and reliability of the device by categorizing the cause of the diagnostic information (diagnostic event).

The status signals are categorized according to VDI/VDE 2650 and NAMUR Recommendation NE 107: F = Failure, C = Function Check, S = Out of Specification, M = Maintenance Required

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Failure</td>
</tr>
<tr>
<td>C</td>
<td>Function check</td>
</tr>
<tr>
<td>S</td>
<td>Out of specification</td>
</tr>
<tr>
<td>M</td>
<td>Maintenance required</td>
</tr>
</tbody>
</table>

- Failure: A device error has occurred. The measured value is no longer valid.
- Function check: The device is in service mode (e.g. during a simulation).
- Out of specification: The device is operated: Outside its technical specification limits (e.g. outside the process temperature range).
- Maintenance required: Maintenance is required. The measured value remains valid.
Diagnostics and troubleshooting

Proline Promass A 500 PROFINET with Ethernet-APL

Diagnostic behavior

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ![Alarm Symbol] | **Alarm**
- Measurement is interrupted.
- Signal outputs and totalizers assume the defined alarm condition.
- A diagnostic message is generated. |
| ![Warning Symbol] | **Warning**
Measurement is resumed. The signal outputs and totalizers are not affected. A diagnostic message is generated. |

Diagnostic information

The fault can be identified using the diagnostic information. The short text helps you by providing information about the fault. In addition, the corresponding symbol for the diagnostic behavior is displayed in front of the diagnostic information on the local display.

Operating elements

<table>
<thead>
<tr>
<th>Key</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ![Plus Key] | **Plus key**
*In a menu, submenu*
Opens the message about remedy information. |
| ![Enter Key] | **Enter key**
*In a menu, submenu*
Opens the operating menu. |
### 12.3.2 Calling up remedial measures

1. The user is in the diagnostic message.
   - Press \( \bigoplus \) (\( \bigcirc \) symbol).
     - The Diagnostic list submenu opens.
2. Select the desired diagnostic event with \( \bigoplus \) or \( \bigotimes \) and press \( \Downarrow \) .
   - The message about the remedial measures opens.
3. Press \( \bigoplus \) + \( \bigotimes \) simultaneously.
   - The message about the remedial measures closes.

The user is in the Diagnostics menu at an entry for a diagnostics event, e.g. in the Diagnostic list submenu or Previous diagnostics parameter.

1. Press \( \Downarrow \).
   - The message for the remedial measures for the selected diagnostic event opens.
2. Press \( \bigoplus \) + \( \bigotimes \) simultaneously.
   - The message for the remedial measures closes.

### 12.4 Diagnostic information in the Web browser

#### 12.4.1 Diagnostic options

Any faults detected by the measuring device are displayed in the Web browser on the home page once the user has logged on.
In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
- Via parameter → 269
- Via submenu → 270

### Status signals

The status signals provide information on the state and reliability of the device by categorizing the cause of the diagnostic information (diagnostic event).

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td>Failure</td>
</tr>
<tr>
<td></td>
<td>A device error has occurred. The measured value is no longer valid.</td>
</tr>
<tr>
<td>⚠️</td>
<td>Function check</td>
</tr>
<tr>
<td></td>
<td>The device is in the service mode (during a simulation, for example).</td>
</tr>
<tr>
<td>🚫</td>
<td>Out of specification</td>
</tr>
<tr>
<td></td>
<td>The device is being operated: Outside its technical specification limits (e.g. outside the process temperature range)</td>
</tr>
<tr>
<td>🟢</td>
<td>Maintenance required</td>
</tr>
<tr>
<td></td>
<td>Maintenance is required. The measured value is still valid.</td>
</tr>
</tbody>
</table>

The status signals are categorized in accordance with VDI/VDE 2650 and NAMUR Recommendation NE 107.

### 12.4.2 Calling up remedy information

Remedy information is provided for every diagnostic event to ensure that problems can be rectified quickly. These measures are displayed in red along with the diagnostic event and the related diagnostic information.

### 12.5 Diagnostic information in FieldCare or DeviceCare

#### 12.5.1 Diagnostic options

Any faults detected by the measuring device are displayed on the home page of the operating tool once the connection has been established.
In addition, diagnostic events which have occurred can be shown in the **Diagnostics** menu:
- Via parameter → \( \rightarrow \) 269
- Via submenu → \( \rightarrow \) 270

**Diagnostic information**

The fault can be identified using the diagnostic information. The short text helps you by providing information about the fault. In addition, the corresponding symbol for the diagnostic behavior is displayed in front of the diagnostic information on the local display.

### 12.5.2 Calling up remedy information

Remedy information is provided for every diagnostic event to ensure that problems can be rectified quickly:
- On the home page
  - Remedy information is displayed in a separate field below the diagnostics information.
- In the **Diagnostics** menu
  - Remedy information can be called up in the working area of the user interface.

The user is in the **Diagnostics** menu.

1. Call up the desired parameter.
2. On the right in the working area, mouse over the parameter.
   - A tool tip with remedy information for the diagnostic event appears.
12.6 Adapting the diagnostic information

12.6.1 Adapting the diagnostic behavior

Each item of diagnostic information is assigned a specific diagnostic behavior at the factory. The user can change this assignment for specific diagnostic information in the Diagnostic behavior submenu.

Expert → System → Diagnostic handling → Diagnostic behavior

Available diagnostic behaviors

The following diagnostic behaviors can be assigned:

<table>
<thead>
<tr>
<th>Diagnostic behavior</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm</td>
<td>The device stops measurement. The totalizers assume the defined alarm condition. A diagnostic message is generated.</td>
</tr>
<tr>
<td>Warning</td>
<td>The device continues to measure. Measured value output via PROFINET and totalizers are not affected. A diagnostic message is generated.</td>
</tr>
<tr>
<td>Logbook entry only</td>
<td>The device continues to measure. The diagnostic message is only displayed in the Event logbook submenu (Event list submenu) and is not displayed in alternating sequence with the operational display.</td>
</tr>
<tr>
<td>Off</td>
<td>The diagnostic event is ignored, and no diagnostic message is generated or entered.</td>
</tr>
</tbody>
</table>

Displaying the measured value status

If modules with input data (e.g. Analog Input module, Discrete Input module, Totalizer module, Heartbeat module) are configured for cyclic data transmission, the measured value status is coded as per PROFINET PA Profile 4 Specification and transmitted along with the measured value to the PROFINET Controller via the status byte. The status byte is split into three segments: Quality, Quality Substatus and Limits.

![Structure of the status byte](image)

The content of the status byte depends on the configured failure mode in the individual function block. Depending on which failure mode has been configured, status information in accordance with PROFINET PA Profile Specification 4 is transmitted to the the PROFINET with Ethernet-APL controller via the status byte status information. The two bits for the limits always have the value 0.
### Supported status information

<table>
<thead>
<tr>
<th>Status</th>
<th>Coding (hex)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAD - Maintenance alarm</td>
<td>0x24 to 0x27</td>
</tr>
<tr>
<td>BAD - Process related</td>
<td>0x28 to 0x2B</td>
</tr>
<tr>
<td>BAD - Function check</td>
<td>0x3C to 0x3F</td>
</tr>
<tr>
<td>UNCERTAIN - Initial value</td>
<td>0x4C to 0x4F</td>
</tr>
<tr>
<td>UNCERTAIN - Maintenance demanded</td>
<td>0x68 to 0x6B</td>
</tr>
<tr>
<td>UNCERTAIN - Process related</td>
<td>0x78 to 0x7B</td>
</tr>
<tr>
<td>GOOD - OK</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>GOOD - Maintenance required</td>
<td>0xA4 to 0xA7</td>
</tr>
<tr>
<td>GOOD - Maintenance demanded</td>
<td>0xA8 to 0xAB</td>
</tr>
<tr>
<td>GOOD - Function check</td>
<td>0xBC to 0xBF</td>
</tr>
</tbody>
</table>

### 12.7 Overview of diagnostic information

- The amount of diagnostic information and the number of measured variables affected increase if the measuring device has one or more application packages.
- All of the measured variables affected in the entire Promass instrument family are always listed under 'Measured variables affected'. The measured variables available for the device in question depend on the device version. When assigning the measured variables to the device functions, for example to the individual outputs, all of the measured variables available for the device version in question are available for selection.

In the case of some items of diagnostic information, the diagnostic behavior can be changed. Adapting the diagnostic information → 202
## 12.7.1 Diagnostic of sensor

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>002</td>
<td>Sensor unknown</td>
<td>1. Check if the correct sensor is mounted</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Check if the 2-D matrix code on the sensor is undamaged</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity

- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
### Diagnostic Information

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic Information</th>
<th>Short Text</th>
<th>Remedy Instructions</th>
</tr>
</thead>
</table>
| 022  | Temperature sensor defective |            | 1. If available: Check connection cable between sensor and transmitter  
|      |                         |            | 2. Check or replace sensor electronic module (ISEM)  
|      |                         |            | 3. Replace sensor   |

#### Measured Variable Status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

#### Influenced Measured Variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)

<table>
<thead>
<tr>
<th>swung</th>
<th>GSV flow</th>
<th>GSV flow alternative</th>
<th>Kinematic viscosity</th>
</tr>
</thead>
<tbody>
<tr>
<td>swung</td>
<td>Mass flow</td>
<td>Oil mass flow</td>
<td>Water mass flow</td>
</tr>
<tr>
<td>swung</td>
<td>Inhomogeneous medium index</td>
<td>Suspended bubbles index</td>
<td>HBSI</td>
</tr>
<tr>
<td>swung</td>
<td>NSV flow</td>
<td>NSV flow alternative</td>
<td></td>
</tr>
<tr>
<td>swung</td>
<td>External pressure</td>
<td>Exciter current 1</td>
<td>Exciter current 2</td>
</tr>
<tr>
<td>swung</td>
<td>Oscillation frequency 1</td>
<td>Oscillation frequency 2</td>
<td></td>
</tr>
<tr>
<td>swung</td>
<td>Raw value mass flow</td>
<td>S&amp;W volume flow</td>
<td></td>
</tr>
<tr>
<td>swung</td>
<td>Torsion signal asymmetry</td>
<td>Reference density</td>
<td></td>
</tr>
</tbody>
</table>

- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

#### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>046</td>
<td>Sensor limit exceeded</td>
<td>1. Check process conditions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Check sensor</td>
</tr>
</tbody>
</table>

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## Proline Promass A 500 PROFINET with Ethernet-APL

### Diagnostics and troubleshooting

#### No. 062

**Sensor connection faulty**

<table>
<thead>
<tr>
<th>Measured variable status</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quality</strong></td>
<td>Good</td>
</tr>
<tr>
<td><strong>Quality substatus</strong></td>
<td>Ok</td>
</tr>
<tr>
<td><strong>Coding (hex)</strong></td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td><strong>Status signal</strong></td>
<td>F</td>
</tr>
<tr>
<td><strong>Diagnostic behavior</strong></td>
<td>Alarm</td>
</tr>
</tbody>
</table>

#### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Short text</th>
</tr>
</thead>
<tbody>
<tr>
<td>062</td>
<td>Sensor connection faulty</td>
<td></td>
</tr>
</tbody>
</table>

#### Remedy instructions

1. If available: Check connection cable between sensor and transmitter
2. Check or replace sensor electronic module (ISEM)
3. Replace sensor

#### Measured variable status

- **Quality**: Good
- **Quality substatus**: Ok
- **Coding (hex)**: 0x80 to 0x83
- **Status signal**: F
- **Diagnostic behavior**: Alarm

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
### Measured variable status

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 063 | Exciter current faulty  | 1. If available: Check connection cable between sensor and transmitter  
2. Check or replace sensor electronic module (ISEM)  
3. Replace sensor |

#### Quality
Good

#### Quality substatus
Ok

#### Coding (hex)
0x80 to 0x83

#### Status signal
F

#### Diagnostic behavior
Alarm

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)

- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
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- Reference density
- Reference density alternative
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- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
## Proline Promass A 500 PROFINET with Ethernet-APL

### Diagnostics and troubleshooting

#### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>082</td>
<td>Data storage inconsistent</td>
<td></td>
<td>Check module connections</td>
</tr>
</tbody>
</table>

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

#### Infl uenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity

- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
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- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 083 | Memory content inconsistent | 1. Restart device  
2. Restore S-DAT data  
3. Replace S-DAT |

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality status</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
## Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>119</td>
<td>Sensor initialization active</td>
<td>Sensor initialization in progress, please wait</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>C</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
### Diagnostics and troubleshooting

#### Proline Promass A 500 PROFINET with Ethernet-APL

## Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 140 | Sensor signal asymmetrical          | 1. If available: Check connection cable between sensor and transmitter  
|     |                                     | 2. Check or replace sensor electronic module (ISEM)       
|     |                                     | 3. Replace sensor                                         |

### Measured variable status [from the factory] ¹)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

## Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
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- Carrier mass flow
- Carrier pipe temperature
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- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

¹) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short text</td>
<td></td>
</tr>
</tbody>
</table>
| 141 | Zero adjustment failed | 1. Check process conditions  
|     |                        | 2. Repeat commissioning procedure  
|     |                        | 3. Check sensor |

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
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- NSV flow
- NSV flow alternative
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- Exciter current 1
- Exciter current 2
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- Oscillation frequency 2
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- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

#### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>Sensor index coil asymmetry too high</td>
<td>Check sensor</td>
</tr>
</tbody>
</table>

#### Quality

- Good

#### Quality substatus

- Ok

#### Coding (hex)

- 0x80 to 0x83

#### Status signal

- S

#### Diagnostic behavior

- Warning

### Measured variable status [from the factory] ¹)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity

- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

¹) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Measured variable status [from the factory]</th>
<th>1)</th>
<th>Diagnostic behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>144</td>
<td>Measurement error too high</td>
<td></td>
<td>Alarm</td>
</tr>
</tbody>
</table>

| Quality       | Good                         |    |
| Quality substatus | Ok                       |    |
| Coding (hex)  | 0x80 to 0x83                |    |
| Status signal | F                           |    |

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
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- Mass flow
- Oil mass flow
- Water mass flow
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- NSV flow alternative
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- Oil corrected volume flow
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- Target volume flow
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- Temp. compensated kinematic viscosity
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- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
# 12.7.2 Diagnostic of electronic

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Electronics faulty</td>
<td>1. Restart device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Replace electronics</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
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- Water density
- Test point
- Test point
- Dynamic viscosity

- Sensor electronics temperature (ISEM)
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- Water volume flow
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## Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>242</td>
<td>Firmware incompatible</td>
<td>1. Check firmware version</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Flash or replace electronic module</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>0k</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

#### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>252</td>
<td>Module incompatible</td>
<td>1. Check electronic modules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Check if correct modules are available (e.g. NEx, Ex)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Replace electronic modules</td>
</tr>
</tbody>
</table>

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality status</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
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</tbody>
</table>

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- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
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- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 262 | Module connection interrupted | 1. Check or replace connection cable between sensor electronic module (ISEM) and main electronics  
2. Check or replace ISEM or main electronics |

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

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- Application specific output
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- Water mass flow
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- NSV flow
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- Exciter current 1
- Exciter current 2
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- Oscillation frequency 2
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- Torsion signal asymmetry
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- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>270 Main electronics defective</td>
<td>1. Restart device 2. Replace main electronic module</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Measured variable status**
- Quality: Good
- Quality substatus: Ok
- Coding (hex): 0x80 to 0x83
- Status signal: F
- Diagnostic behavior: Alarm

**Influenced measured variables**
- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
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- NSV flow alternative
- External pressure
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- Exciter current 2
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- Reference density alternative
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- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 271 | Main electronics faulty | 1. Restart device  
2. Replace main electronic module |

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
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- Carrier corrected volume flow
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- Oscillation damping 2
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- Water density
- Test point
- Test point
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<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>272</td>
<td>Main electronics faulty</td>
<td>Restart device</td>
</tr>
</tbody>
</table>

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
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</table>

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- Oscillation amplitude 1
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<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 273 | Main electronics defective | 1. Pay attention to display emergency operation  
2. Replace main electronics |

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

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## Proline Promass A 500 PROFINET with Ethernet-APL

### Diagnostics and troubleshooting

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>275</td>
<td>I/O module defective</td>
<td>Change I/O module</td>
</tr>
</tbody>
</table>

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

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- Oscillation amplitude 1
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<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>276</td>
<td>I/O module faulty</td>
<td>1. Restart device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Change I/O module</td>
</tr>
</tbody>
</table>

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
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<tr>
<td>Coding (hex)</td>
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## Diagnostics and troubleshooting

**Proline Promass A 500 PROFINET with Ethernet-APL**

### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>283</td>
<td>Memory content inconsistent</td>
<td>Restart device</td>
</tr>
</tbody>
</table>

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

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- Test point
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- Target volume flow
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- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Device verification active</th>
<th>Device verification active, please wait.</th>
</tr>
</thead>
</table>

#### Measured variable status [from the factory] ¹)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Function check</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0xBC to 0xBF</td>
</tr>
<tr>
<td>Status signal</td>
<td>C</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
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- Oscillation damping 2
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- Test point
- Test point
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- GSV flow alternative
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- Reference density alternative
- Oil mass flow
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- Water mass flow
- Carrier corrected volume flow
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- Frequency fluctuation 1
- Sensor index coil asymmetry
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- Frequency fluctuation 2
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- Frequency fluctuation 2
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- Oscillation damping fluctuation 2
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- Water volume flow
- Test point
- Exciter current 1
- Temp. compensated dynamic viscosity
- Test point
- Exciter current 2
- Temperature
- Dynamic viscosity
- Oscillation frequency 1
- Water cut
- Raw value mass flow
- Volume flow
- Oscillation frequency 2
- S&W volume flow
- Target mass flow
- Torsion signal asymmetry

¹) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

### Remedy instructions

| 302 | 1. Apply I/O module configuration (parameter 'Apply I/O configuration') 2. Afterwards reload device description and check wiring |

<table>
<thead>
<tr>
<th>No.</th>
<th>I/O 1 to n configuration changed</th>
<th>1. Apply I/O module configuration (parameter 'Apply I/O configuration') 2. Afterwards reload device description and check wiring</th>
</tr>
</thead>
</table>

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>M</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

-
### No. 304

**Device verification failed**

<table>
<thead>
<tr>
<th>Measured variable status [from the factory]</th>
<th>1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Good</td>
</tr>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
311  Sensor electronics (ISEM) faulty

<table>
<thead>
<tr>
<th>Measured variable status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
</tr>
<tr>
<td>Quality substatus</td>
</tr>
<tr>
<td>Coding (hex)</td>
</tr>
<tr>
<td>Status signal</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance required!</td>
</tr>
<tr>
<td>Do not reset device</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Influenced measured variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillation amplitude 1</td>
</tr>
<tr>
<td>Oscillation amplitude 2</td>
</tr>
<tr>
<td>Application specific output</td>
</tr>
<tr>
<td>Application specific output</td>
</tr>
<tr>
<td>Signal asymmetry</td>
</tr>
<tr>
<td>Carrier mass flow</td>
</tr>
<tr>
<td>Carrier pipe temperature</td>
</tr>
<tr>
<td>Target corrected volume flow</td>
</tr>
<tr>
<td>Carrier corrected volume flow</td>
</tr>
<tr>
<td>Sensor index coil asymmetry</td>
</tr>
<tr>
<td>Concentration</td>
</tr>
<tr>
<td>Measured values</td>
</tr>
<tr>
<td>Oscillation damping 1</td>
</tr>
<tr>
<td>Oscillation damping 2</td>
</tr>
<tr>
<td>Density</td>
</tr>
<tr>
<td>Oil density</td>
</tr>
<tr>
<td>Water density</td>
</tr>
<tr>
<td>Test point</td>
</tr>
<tr>
<td>Test point</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
</tr>
<tr>
<td>Reference density</td>
</tr>
<tr>
<td>Corrected volume flow</td>
</tr>
<tr>
<td>Water corrected volume flow</td>
</tr>
<tr>
<td>Oscillation damping fluctuation 1</td>
</tr>
<tr>
<td>Frequency fluctuation 1</td>
</tr>
<tr>
<td>Target mass flow</td>
</tr>
<tr>
<td>Carrier volume flow</td>
</tr>
<tr>
<td>Test point</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
</tr>
<tr>
<td>Oil volume flow</td>
</tr>
<tr>
<td>Water volume flow</td>
</tr>
<tr>
<td>Water cut</td>
</tr>
</tbody>
</table>

Proline Promass A 500 PROFINET with Ethernet-APL

Diagnostics and troubleshooting

Endress+Hauser
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 330  | Flash file invalid     | 1. Update firmware of device  
|      |                        | 2. Restart device       |

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>M</td>
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<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
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- Application specific output
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- Oscillation damping 2
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- Water density
- Test point
- Test point
- Dynamic viscosity

- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
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- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
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- Oscillation frequency 2
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- Oscillation damping fluctuation 2
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- Frequency fluctuation 2
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- Target volume flow
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- Temp. compensated kinematic viscosity
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- Volume flow
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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 331 | Firmware update failed | 1. Update firmware of device  
|     |                        | 2. Restart device    |

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

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- Temp. compensated kinematic viscosity
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- Water volume flow
- Water cut
## Diagnostics and troubleshooting

**Proline Promass A 500 PROFINET with Ethernet-APL**

### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>332</td>
<td>Writing in HistoROM backup failed</td>
<td>1. Replace user interface board</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Ex d/XP: replace transmitter</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

### Influenced measured variables

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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short text</td>
<td></td>
</tr>
</tbody>
</table>
| 361 | I/O module 1 to n faulty | 1. Restart device  
|     |                        | 2. Check electronic modules  
|     |                        | 3. Change I/O module or main electronics |

**Measurable variable status**

- Quality: Good
- Quality substatus: Ok
- Coding (hex): 0x80 to 0x83
- Status signal: F
- Diagnostic behavior: Alarm

**Influenced measured variables**

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
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- Carrier mass flow
- Carrier pipe temperature
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- Water density
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- Frequency fluctuation 2
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- Target pressure
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
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- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>369</td>
<td>Matrix code scanner defective</td>
<td>Replace matrix code scanner</td>
</tr>
</tbody>
</table>

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
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</tr>
<tr>
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</tr>
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<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
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</table>

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- Oscillation amplitude 2
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- Frequency fluctuation 2
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- Target volume flow
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- Temp. compensated kinematic viscosity
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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>371</td>
<td>Temperature sensor defective</td>
<td>Contact service</td>
</tr>
</tbody>
</table>

### Measured variable status

- **Quality**: Good
- **Quality substatus**: Ok
- **Coding (hex)**: 0x80 to 0x83
- **Status signal**: M
- **Diagnostic behavior**: Warning

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
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- Temperature
- Volume flow
- Oil volume flow
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- Water cut
# Diagnostics and troubleshooting

## Proline Promass A 500 PROFINET with Ethernet-APL

### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>372</td>
<td>Sensor electronics (ISEM) faulty</td>
<td>1. Restart device&lt;br&gt;2. Check if failure recurs&lt;br&gt;3. Replace sensor electronic module (ISEM)</td>
</tr>
</tbody>
</table>

### Measured variable status

- **Quality**: Good
- **Quality substatus**: Ok
- **Coding (hex)**: 0x80 to 0x83
- **Status signal**: F
- **Diagnostic behavior**: Alarm

### Influenced measured variables

- Oscillation amplitude 1
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- Application specific output
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- Water density
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- Test point
- Dynamic viscosity
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>373</td>
<td>Sensor electronics (ISEM) faulty</td>
<td>Transfer data or reset device</td>
</tr>
</tbody>
</table>

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
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</tr>
<tr>
<td>Status signal</td>
<td>F</td>
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<tr>
<td>Diagnostic behavior</td>
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- Water corrected volume flow
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- Target mass flow
- Carrier volume flow
- Target volume flow
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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 374 | Sensor electronics (ISEM) faulty | 1. Restart device  
2. Check if failure recurs  
3. Replace sensor electronic module (ISEM) |

**Measured variable status [from the factory] 1)**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>Status signal</td>
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<tr>
<td>Diagnostic behavior</td>
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- Oscillation amplitude 1
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1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
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<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>375</td>
<td>I/O-1 to n communication failed</td>
<td>1. Restart device</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Check if failure recurs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Replace module rack inclusive electronic modules</td>
</tr>
</tbody>
</table>

#### Measured variable status

<table>
<thead>
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</thead>
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- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
### Diagnostics and troubleshooting

#### Proline Promass A 500 PROFINET with Ethernet-APL

**Diagnostic information**

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 378 | Supply voltage ISEM faulty | 1. If available: Check connection cable between sensor and transmitter  
2. Replace main electronic module  
3. Replace sensor electronic module (ISEM) |

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
</tbody>
</table>

| Diagnostic behavior | Alarm |

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
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- Oscillation frequency 2
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- Reference density alternative
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- Water corrected volume flow
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- Temp. compensated kinematic viscosity
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- Water volume flow
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<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>382</td>
<td>Data storage</td>
<td>1. Insert T-DAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Replace T-DAT</td>
</tr>
</tbody>
</table>

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
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</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Oscillation amplitude 1
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<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>383</td>
<td>Memory content</td>
<td>Reset device</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>Diagnostic behavior</td>
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</tr>
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<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>387</td>
<td>HistoROM data faulty</td>
<td>Contact service organization</td>
</tr>
</tbody>
</table>

**Measured variable status**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
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<tr>
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- Water volume flow
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## 12.7.3 Diagnostic of configuration

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 410 | Data transfer failed   | 1. Retry data transfer  
|     |                        | 2. Check connection  |

### Measured variable status

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Good</td>
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<tr>
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<td>Ok</td>
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<tr>
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</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

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## Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>412</td>
<td>Processing download</td>
<td>Download active, please wait</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality status</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>C</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

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- Water cut

## Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>431</td>
<td>Trim 1 to n required</td>
<td>Carry out trim</td>
</tr>
</tbody>
</table>

### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality status</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>C</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

-
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short text</td>
<td>1. Update firmware</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Execute factory reset</td>
</tr>
</tbody>
</table>

### Measured variable status
- **Quality**: Good
- **Quality substatus**: Ok
- **Coding (hex)**: 0x80 to 0x83
- **Status signal**: F
- **Diagnostic behavior**: Alarm

### Influenced measured variables
- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
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- Target volume flow
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- Temp. compensated kinematic viscosity
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- Water volume flow
- Water cut
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 438 | Dataset different       | 1. Check dataset file  
|     |                        | 2. Check device parameterization  
|     |                        | 3. Download new device parameterization  |

**Measured variable status**

<table>
<thead>
<tr>
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</thead>
<tbody>
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</tr>
<tr>
<td>Status signal</td>
<td>M</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

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- Frequency fluctuation 2
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---

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 441 | Current output 1 to n saturated | 1. Check current output settings  
|     |                        | 2. Check process        |

**Measured variable status**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
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<tr>
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</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

-
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 442 | Frequency output 1 saturated | 1. Check frequency output settings  
2. Check process |

**Measured variable status**

- Quality: Good
- Quality substatus: Ok
- Coding (hex): 0x80 to 0x83
- Status signal: S
- Diagnostic behavior: Warning

**Influenced measured variables**

<table>
<thead>
<tr>
<th>Measured variable status</th>
<th>Quality</th>
<th>Quality substatus</th>
<th>Coding (hex)</th>
<th>Status signal</th>
<th>Diagnostic behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 443 | Pulse output 1 saturated | 1. Check pulse output settings  
2. Check process |

**Measured variable status [from the factory]**

- Quality: Good
- Quality substatus: Ok
- Coding (hex): 0x80 to 0x83
- Status signal: S
- Diagnostic behavior: Warning

**Influenced measured variables**

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<thead>
<tr>
<th>Measured variable status</th>
<th>Quality</th>
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<td></td>
<td></td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 444 | Current input 1 to n saturated | 1. Check current input settings  
2. Check connected device  
3. Check process |

**Measured variable status [from the factory]**

- Quality: Good
- Quality substatus: Ok
- Coding (hex): 0x80 to 0x83
- Status signal: S
- Diagnostic behavior: Warning

**Influenced measured variables**

<table>
<thead>
<tr>
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<td></td>
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</table>

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<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>453</td>
<td>Flow override active</td>
<td>Deactivate flow override</td>
</tr>
</tbody>
</table>

**Measured variable status**

<table>
<thead>
<tr>
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## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

#### Diagnostic information

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<thead>
<tr>
<th>No.</th>
<th>Short text</th>
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</tr>
</thead>
<tbody>
<tr>
<td>484</td>
<td>Failure mode simulation active</td>
<td>Deactivate simulation</td>
</tr>
</tbody>
</table>

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
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<tbody>
<tr>
<td>Quality substatus</td>
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</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>C</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)

- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut
### No. 485
**Diagnostic information**
- **Short text**: Process variable simulation active

**Measured variable status**
- **Quality**: Good
- **Quality substatus**: Ok
- **Coding (hex)**: 0x80 to 0x83
- **Status signal**: C
- **Diagnostic behavior**: Warning

**Influenced measured variables**
- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
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- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
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- Oil mass flow
- Water mass flow
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- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

### No. 486
**Diagnostic information**
- **Short text**: Current input 1 to n simulation active

**Measured variable status**
- **Quality**: Good
- **Quality substatus**: Ok
- **Coding (hex)**: 0x80 to 0x83
- **Status signal**: C
- **Diagnostic behavior**: Warning

**Influenced measured variables**
- Measured values
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short text</td>
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<tr>
<td>491</td>
<td>Current output 1 to n simulation active</td>
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<td></td>
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<tr>
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<td>Quality substatus: Ok</td>
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<tr>
<td></td>
<td>Coding (hex): 0x80 to 0x83</td>
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<tr>
<td></td>
<td>Status signal: C</td>
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<td></td>
<td>Diagnostic behavior: Warning</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Influenced measured variables</strong></td>
<td>-</td>
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<tr>
<td>492</td>
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<td>Status signal: C</td>
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<td>493</td>
<td>Pulse output simulation active</td>
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<td>Diagnostic behavior: Warning</td>
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<td><strong>Influenced measured variables</strong></td>
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<tr>
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<td>Switch output 1 to n simulation active</td>
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<table>
<thead>
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<th>No.</th>
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<table>
<thead>
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<th>No.</th>
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<tr>
<td></td>
<td><strong>Influenced measured variables</strong></td>
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</table>
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

#### No. 520

**I/O 1 to n hardware configuration invalid**

<table>
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<tr>
<th>Measured variable status</th>
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<tbody>
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<tr>
<td>Diagnostic behavior</td>
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**Influenced measured variables**

- 

---

#### No. 528

**Concentration calculation not possible**

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<td></td>
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<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
<td></td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Carrier mass flow
- Target corrected volume flow
- Carrier corrected volume flow
- Concentration
- Density
- Mass flow
- Target mass flow
- Carrier volume flow
- Target volume flow
- Volume flow

---

#### No. 529

**Concentration calculation not accurate**

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<td></td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
<td></td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Carrier mass flow
- Target corrected volume flow
- Carrier corrected volume flow
- Concentration
- Density
- Mass flow
- Target mass flow
- Carrier volume flow
- Target volume flow
- Volume flow

---

1. Check I/O hardware configuration
2. Replace wrong I/O module
3. Plug the module of double pulse output on correct slot

Out of valid range of the selected calculation algorithm
1. Check concentration settings
2. Check measured values, e.g. density or temperature

Out of valid range of the selected calculation algorithm
1. Check concentration settings
2. Check measured values, e.g. density or temperature
### Proline Promass A 500 PROFINET with Ethernet-APL

#### Diagnostics and troubleshooting

<table>
<thead>
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<th>Remedy instructions</th>
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<td>Coding (hex)</td>
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</tr>
<tr>
<td></td>
<td><strong>Influenced measured variables</strong></td>
<td>-</td>
</tr>
</tbody>
</table>

1. Check IP addresses in network
2. Change IP address

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>594</td>
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<td>Coding (hex)</td>
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<td>Status signal</td>
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<td></td>
<td>Diagnostic behavior</td>
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</tr>
<tr>
<td></td>
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#### 12.7.4 Diagnostic of process

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<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
<tr>
<td></td>
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<td>-</td>
</tr>
</tbody>
</table>

1. Check wiring
2. Change I/O module
## Diagnostics and troubleshooting

**Proline Promass A 500 PROFINET with Ethernet-APL**

### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>830</td>
<td>Ambient temperature too high</td>
<td>Reduce ambient temp. around the sensor housing</td>
</tr>
</tbody>
</table>

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
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<tr>
<td>Coding (hex)</td>
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</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
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- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## Diagnostic information

<table>
<thead>
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<th>No.</th>
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</thead>
<tbody>
<tr>
<td>831</td>
<td>Ambient temperature too low</td>
<td>Increase ambient temp. around the sensor housing</td>
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### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
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</thead>
<tbody>
<tr>
<td>Quality substatus</td>
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- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
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<tbody>
<tr>
<td>832</td>
<td>Electronics temperature too high</td>
<td>Reduce ambient temperature</td>
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</table>

#### Measured variable status [from the factory] 1)  

<table>
<thead>
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<th>Quality</th>
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- Carrier corrected volume flow
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- Water cut

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<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
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<tr>
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### Measured variable status [from the factory] ¹)

<table>
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<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity

### Remedy instructions

- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

¹) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## Proline Promass A 500 PROFINET with Ethernet-APL

### Diagnostics and troubleshooting

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>834</td>
<td>Process temperature too high</td>
<td>Reduce process temperature</td>
<td></td>
</tr>
</tbody>
</table>

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Status signal</td>
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<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
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- Oscillation amplitude 2
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- Application specific output
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- Carrier pipe temperature
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- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## No. 835: Process temperature too low

<table>
<thead>
<tr>
<th>Measured variable status [from the factory]</th>
<th>Increase process temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Good</td>
</tr>
<tr>
<td>Quality substatus</td>
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</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)

- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic Information</th>
<th>Short Text</th>
<th>Remedy Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>842</td>
<td>Process value below limit</td>
<td>1. Decrease process value 2. Check application 3. Check sensor</td>
<td></td>
</tr>
</tbody>
</table>

### Measured variable status [from the factory] ¹)

<table>
<thead>
<tr>
<th>Short Text</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Good</td>
</tr>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)

<table>
<thead>
<tr>
<th>Short Text</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSV flow</td>
<td></td>
</tr>
<tr>
<td>GSV flow alternative</td>
<td></td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td></td>
</tr>
<tr>
<td>Mass flow</td>
<td></td>
</tr>
<tr>
<td>Oil mass flow</td>
<td></td>
</tr>
<tr>
<td>Water mass flow</td>
<td></td>
</tr>
<tr>
<td>Inhomogeneous medium index</td>
<td></td>
</tr>
<tr>
<td>Suspended bubbles index</td>
<td></td>
</tr>
<tr>
<td>HBSI</td>
<td></td>
</tr>
<tr>
<td>NSV flow</td>
<td></td>
</tr>
<tr>
<td>NSV flow alternative</td>
<td></td>
</tr>
<tr>
<td>External pressure</td>
<td></td>
</tr>
<tr>
<td>Exciter current 1</td>
<td></td>
</tr>
<tr>
<td>Exciter current 2</td>
<td></td>
</tr>
<tr>
<td>Oscillation frequency 1</td>
<td></td>
</tr>
<tr>
<td>Oscillation frequency 2</td>
<td></td>
</tr>
<tr>
<td>Raw value mass flow</td>
<td></td>
</tr>
<tr>
<td>S&amp;W volume flow</td>
<td></td>
</tr>
<tr>
<td>Torsion signal asymmetry</td>
<td></td>
</tr>
<tr>
<td>Reference density</td>
<td></td>
</tr>
<tr>
<td>Reference density alternative</td>
<td></td>
</tr>
<tr>
<td>Corrected volume flow</td>
<td></td>
</tr>
<tr>
<td>Oil corrected volume flow</td>
<td></td>
</tr>
<tr>
<td>Water corrected volume flow</td>
<td></td>
</tr>
<tr>
<td>Oscillation damping fluctuation 1</td>
<td></td>
</tr>
<tr>
<td>Oscillation damping fluctuation 2</td>
<td></td>
</tr>
<tr>
<td>Frequency fluctuation 1</td>
<td></td>
</tr>
<tr>
<td>Frequency fluctuation 2</td>
<td></td>
</tr>
<tr>
<td>Target mass flow</td>
<td></td>
</tr>
<tr>
<td>Carrier volume flow</td>
<td></td>
</tr>
<tr>
<td>Temp. compensated dynamic viscosity</td>
<td></td>
</tr>
<tr>
<td>Temp. compensated kinematic viscosity</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
</tr>
<tr>
<td>Volume flow</td>
<td></td>
</tr>
<tr>
<td>Oil volume flow</td>
<td></td>
</tr>
<tr>
<td>Water volume flow</td>
<td></td>
</tr>
<tr>
<td>Water cut</td>
<td></td>
</tr>
</tbody>
</table>

¹) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
### Diagnostic information

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
<th>Coding (hex)</th>
<th>0x80 to 0x83</th>
<th>Status signal</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Application specific output
- Carrier mass flow
- Target corrected volume flow
- Carrier corrected volume flow
- Concentration
- Density
- Oil density
- Water density
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- S&W volume flow
- Reference density
- Reference density alternative

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

---

### Diagnostic information

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Bad</th>
<th>Coding (hex)</th>
<th>0x24 to 0x27</th>
<th>Status signal</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- S&W volume flow
- Reference density
- Reference density alternative

1. Check for gas in process
2. Adjust detection limits
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

### No. 910: Tubes not oscillating

#### Measured variable status

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>F</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- 

**Remedy instructions**

1. If available: Check connection cable between sensor and transmitter
2. Check or replace sensor electronic module (ISEM)
3. Check sensor

### No. 912: Medium inhomogeneous

#### Measured variable status [from the factory]¹)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
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</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 913 | Medium unsuitable      | 1. Check process conditions  
                  |                      | 2. Check electronic modules or sensor |

**Measured variable status [from the factory]**

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
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</tr>
<tr>
<td>Coding (hex)</td>
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</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
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- GSV flow alternative
- Kinematic viscosity
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- Water mass flow
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- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
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- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- S&W volume flow
- Torsion signal asymmetry
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
## Diagnostics and troubleshooting

### Proline Promass A 500 PROFINET with Ethernet-APL

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>915</td>
<td>Viscosity out of specification</td>
<td>1. Avoid 2-phase flow  &lt;br&gt; 2. Increase system pressure  &lt;br&gt; 3. Verify viscosity and density are within range  &lt;br&gt; 4. Check process conditions</td>
</tr>
</tbody>
</table>

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Status signal</td>
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<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
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#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
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- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
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- Oil density
- Water density
- Test point
- Test point
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- Sensor electronics temperature (ISEM)
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- GSV flow alternative
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- Mass flow
- Oil mass flow
- Water mass flow
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- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
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- Oscillation frequency 2
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- Frequency fluctuation 2
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- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Remedy instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>941</td>
<td>API/ASTM temperature out of specification</td>
<td>1. Check process temperature with selected API/ASTM commodity group  &lt;br&gt; 2. Check API/ASTM-related parameters</td>
</tr>
</tbody>
</table>

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
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<tr>
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</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oil density
- Water density
- GSV flow
- GSV flow alternative
- Mass flow
- Oil mass flow
- Water mass flow
- S&W volume flow
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 942 | API/ASTM density out of specification | 1. Check process density with selected API/ASTM commodity group  
2. Check API/ASTM-related parameters |

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Quality substatus</th>
<th>Coding (hex)</th>
<th>Status signal</th>
<th>Diagnostic behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Ok</td>
<td>0x80 to 0x83</td>
<td>S</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oil density
- Water density
- GSV flow
- GSV flow alternative
- Mass flow
- Oil mass flow
- Water mass flow
- NSV flow
- NSV flow alternative
- S&W volume flow
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oil volume flow
- Water volume flow
- Oil cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

---

### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 943 | API pressure out of specification | 1. Check process pressure with selected API commodity group  
2. Check API-related parameters |

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Quality substatus</th>
<th>Coding (hex)</th>
<th>Status signal</th>
<th>Diagnostic behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Ok</td>
<td>0x80 to 0x83</td>
<td>S</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oil density
- Water density
- GSV flow
- GSV flow alternative
- Mass flow
- Oil mass flow
- Water mass flow
- NSV flow
- NSV flow alternative
- S&W volume flow
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oil volume flow
- Water volume flow
- Water cut

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
### No. 944

**Diagnostic information**

<table>
<thead>
<tr>
<th>Short text</th>
<th>Measured variable status [from the factory] 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring failed</td>
<td>Check process conditions for Heartbeat Monitoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Oscillation amplitude 1
- Oscillation amplitude 2
- Signal asymmetry
- Carrier pipe temperature
- Sensor index coil asymmetry
- Oscillation damping 1
- Oscillation damping 2
- Test point
- Test point

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

### No. 948

**Diagnostic information**

<table>
<thead>
<tr>
<th>Short text</th>
<th>Measured variable status [from the factory] 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillation damping too high</td>
<td>Check process conditions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

**Influenced measured variables**

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.
### Diagnostic information

<table>
<thead>
<tr>
<th>No.</th>
<th>Diagnostic information</th>
<th>Short text</th>
<th>Remedy instructions</th>
</tr>
</thead>
</table>
| 984  | Condensation risk      |            | 1. Decrease ambient temperature  
2. Increase medium temperature |

#### Measured variable status [from the factory] 1)

<table>
<thead>
<tr>
<th>Quality</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality substatus</td>
<td>Ok</td>
</tr>
<tr>
<td>Coding (hex)</td>
<td>0x80 to 0x83</td>
</tr>
<tr>
<td>Status signal</td>
<td>S</td>
</tr>
<tr>
<td>Diagnostic behavior</td>
<td>Warning</td>
</tr>
</tbody>
</table>

#### Influenced measured variables

- Oscillation amplitude 1
- Oscillation amplitude 2
- Application specific output
- Application specific output
- Signal asymmetry
- Carrier mass flow
- Carrier pipe temperature
- Target corrected volume flow
- Carrier corrected volume flow
- Sensor index coil asymmetry
- Concentration
- Measured values
- Oscillation damping 1
- Oscillation damping 2
- Density
- Oil density
- Water density
- Test point
- Test point
- Dynamic viscosity
- Sensor electronics temperature (ISEM)
- GSV flow
- GSV flow alternative
- Kinematic viscosity
- Mass flow
- Oil mass flow
- Water mass flow
- Inhomogeneous medium index
- Suspended bubbles index
- HBSI
- NSV flow
- NSV flow alternative
- External pressure
- Exciter current 1
- Exciter current 2
- Oscillation frequency 1
- Oscillation frequency 2
- Raw value mass flow
- Carrier mass flow
- NSV flow alternative
- S&W volume flow
- Reference density
- Reference density alternative
- Corrected volume flow
- Oil corrected volume flow
- Water corrected volume flow
- Oscillation damping fluctuation 1
- Oscillation damping fluctuation 2
- Frequency fluctuation 1
- Frequency fluctuation 2
- Target mass flow
- Carrier volume flow
- Target volume flow
- Temp. compensated dynamic viscosity
- Temp. compensated kinematic viscosity
- Temperature
- Volume flow
- Oil volume flow
- Water volume flow
- Water cut

---

1) Diagnostic behavior can be changed. This causes the overall status of the measured variable to change.

### 12.8 Pending diagnostic events

The **Diagnostics** menu allows the user to view the current diagnostic event and the previous diagnostic event separately.

To call up the measures to rectify a diagnostic event:

- Via local display → 199
- Via web browser → 200
- Via "FieldCare" operating tool → 201
- Via "DeviceCare" operating tool → 201

Other pending diagnostic events can be displayed in the **Diagnostic list** submenu → 270

#### Navigation

"Diagnostics" menu

![Diagnostics menu](image)
Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Prerequisite</th>
<th>Description</th>
<th>User interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual diagnostics</td>
<td>A diagnostic event has occurred.</td>
<td>Shows the current occurred diagnostic event along with its diagnostic information.</td>
<td>Symbol for diagnostic behavior, diagnostic code and short message.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous diagnostics</td>
<td>Two diagnostic events have already occurred.</td>
<td>Shows the diagnostic event that occurred prior to the current diagnostic event along with its diagnostic information.</td>
<td>Symbol for diagnostic behavior, diagnostic code and short message.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating time from restart</td>
<td>-</td>
<td>Shows the time the device has been in operation since the last device restart.</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
</tr>
<tr>
<td>Operating time</td>
<td>-</td>
<td>Indicates how long the device has been in operation.</td>
<td>Days (d), hours (h), minutes (m) and seconds (s)</td>
</tr>
</tbody>
</table>

12.9 Diagnostic list

Up to 5 currently pending diagnostic events can be displayed in the Diagnostic list submenu along with the associated diagnostic information. If more than 5 diagnostic events are pending, the events with the highest priority are shown on the display.

Navigation path
Diagnostics → Diagnostic list

12.10 Event logbook

12.10.1 Reading out the event logbook

A chronological overview of the event messages that have occurred is provided in the Events list submenu.
Navigation path
Diagnostics menu → Event logbook submenu → Event list

Taking the example of the local display

- A maximum of 20 event messages can be displayed in chronological order.
- If the Extended HistoROM application package (order option) is enabled in the device, the event list can contain up to 100 entries.

The event history includes entries for:
- Diagnostic events → 203
- Information events → 271

In addition to the operation time of its occurrence, each event is also assigned a symbol that indicates whether the event has occurred or is ended:
- Diagnostic event
  - Occurred: Occurrence of the event
  - Ended: End of the event
- Information event
  - Occurrence of the event

To call up the measures to rectify a diagnostic event:
- Via local display → 199
- Via web browser → 200
- Via 'FieldCare' operating tool → 201
- Via 'DeviceCare' operating tool → 201

For filtering the displayed event messages → 271

12.10.2 Filtering the event logbook

Using the Filter options parameter you can define which category of event message is displayed in the Events list submenu.

Navigation path
Diagnostics → Event logbook → Filter options

Filter categories
- All
- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)
- Information (I)

12.10.3 Overview of information events

Unlike a diagnostic event, an information event is displayed in the event logbook only and not in the diagnostic list.

<table>
<thead>
<tr>
<th>Info number</th>
<th>Info name</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1000</td>
<td>--------(Device ok)</td>
</tr>
<tr>
<td>I1079</td>
<td>Sensor changed</td>
</tr>
</tbody>
</table>
## Diagnostics and troubleshooting

<table>
<thead>
<tr>
<th>Info number</th>
<th>Info name</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1089</td>
<td>Power on</td>
</tr>
<tr>
<td>I1090</td>
<td>Configuration reset</td>
</tr>
<tr>
<td>I1091</td>
<td>Configuration changed</td>
</tr>
<tr>
<td>I1092</td>
<td>HistoROM backup deleted</td>
</tr>
<tr>
<td>I1111</td>
<td>Density adjust failure</td>
</tr>
<tr>
<td>I11280</td>
<td>ZeroPT verified and adjustm. recommended</td>
</tr>
<tr>
<td>I11281</td>
<td>ZeroPT verif. and adjust. not recommend.</td>
</tr>
<tr>
<td>I1137</td>
<td>Electronics changed</td>
</tr>
<tr>
<td>I1151</td>
<td>History reset</td>
</tr>
<tr>
<td>I1155</td>
<td>Reset electronics temperature</td>
</tr>
<tr>
<td>I1156</td>
<td>Memory error trend</td>
</tr>
<tr>
<td>I1157</td>
<td>Memory error event list</td>
</tr>
<tr>
<td>I1209</td>
<td>Density adjustment ok</td>
</tr>
<tr>
<td>I1221</td>
<td>Zero point adjust ok</td>
</tr>
<tr>
<td>I1222</td>
<td>Zero point adjustment ok</td>
</tr>
<tr>
<td>I1256</td>
<td>Display: access status changed</td>
</tr>
<tr>
<td>I1278</td>
<td>I/O module restarted</td>
</tr>
<tr>
<td>I1335</td>
<td>Firmware changed</td>
</tr>
<tr>
<td>I1361</td>
<td>Web server: login failed</td>
</tr>
<tr>
<td>I1397</td>
<td>Fieldbus: access status changed</td>
</tr>
<tr>
<td>I1398</td>
<td>CDE: access status changed</td>
</tr>
<tr>
<td>I1444</td>
<td>Device verification passed</td>
</tr>
<tr>
<td>I1445</td>
<td>Device verification failed</td>
</tr>
<tr>
<td>I1447</td>
<td>Record application reference data</td>
</tr>
<tr>
<td>I1448</td>
<td>Application reference data recorded</td>
</tr>
<tr>
<td>I1449</td>
<td>Recording application ref. data failed</td>
</tr>
<tr>
<td>I1450</td>
<td>Monitoring off</td>
</tr>
<tr>
<td>I1451</td>
<td>Monitoring on</td>
</tr>
<tr>
<td>I1457</td>
<td>Measurement error verification failed</td>
</tr>
<tr>
<td>I1459</td>
<td>I/O module verification failed</td>
</tr>
<tr>
<td>I1460</td>
<td>HBSI verification failed</td>
</tr>
<tr>
<td>I1461</td>
<td>Sensor verification failed</td>
</tr>
<tr>
<td>I1462</td>
<td>Sensor electronic module verific. failed</td>
</tr>
<tr>
<td>I1512</td>
<td>Download started</td>
</tr>
<tr>
<td>I1513</td>
<td>Download finished</td>
</tr>
<tr>
<td>I1514</td>
<td>Upload started</td>
</tr>
<tr>
<td>I1515</td>
<td>Upload finished</td>
</tr>
<tr>
<td>I1618</td>
<td>I/O module 2 replaced</td>
</tr>
<tr>
<td>I1619</td>
<td>I/O module 3 replaced</td>
</tr>
<tr>
<td>I1621</td>
<td>I/O module 4 replaced</td>
</tr>
<tr>
<td>I1622</td>
<td>Calibration changed</td>
</tr>
<tr>
<td>I1624</td>
<td>All totalizers reset</td>
</tr>
<tr>
<td>I1625</td>
<td>Write protection activated</td>
</tr>
</tbody>
</table>
### 12.11 Resetting the measuring device

The entire device configuration or some of the configuration can be reset to a defined state with the **Device reset** parameter (→ 169).

#### 12.11.1 Function scope of "Device reset" parameter

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancel</td>
<td>No action is executed and the user exits the parameter.</td>
</tr>
<tr>
<td>To delivery settings</td>
<td>Every parameter for which a customer-specific default setting was ordered is reset to the customer-specific value. All other parameters are reset to the factory setting.</td>
</tr>
<tr>
<td>Restart device</td>
<td>The restart resets every parameter with data stored in volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration remains unchanged.</td>
</tr>
</tbody>
</table>

#### 12.12 Device information

The **Device information** submenu contains all parameters that display different information for device identification.

**Navigation**

"Diagnostics" menu → Device information
## Parameter overview with brief description

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>User interface</th>
<th>Factory setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device tag</td>
<td>Shows name of measuring point.</td>
<td>Character string comprising numbers, letters and special characters</td>
<td>Promass</td>
</tr>
<tr>
<td>Serial number</td>
<td>Shows the serial number of the measuring device.</td>
<td>Max. 11-digit character string comprising letters and numbers.</td>
<td>-</td>
</tr>
<tr>
<td>Firmware version</td>
<td>Shows the device firmware version installed.</td>
<td>Character string in the format xx.yy.zz</td>
<td>-</td>
</tr>
<tr>
<td>Device name</td>
<td>Shows the name of the transmitter.</td>
<td>Promass 300/500</td>
<td>-</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Displays the manufacturer.</td>
<td>Character string comprising numbers, letters and special characters</td>
<td>Endress+Hauser</td>
</tr>
<tr>
<td>Order code</td>
<td>Shows the device order code.</td>
<td>Character string composed of letters, numbers and certain punctuation marks (e.g. /).</td>
<td>-</td>
</tr>
<tr>
<td>Extended order code 1</td>
<td>Shows the 1st part of the extended order code.</td>
<td>Character string</td>
<td>-</td>
</tr>
<tr>
<td>Extended order code 2</td>
<td>Shows the 2nd part of the extended order code.</td>
<td>Character string</td>
<td>-</td>
</tr>
</tbody>
</table>
### 12.13 Firmware history

<table>
<thead>
<tr>
<th>Release date</th>
<th>Firmware version</th>
<th>Order code for &quot;Firmware version&quot;</th>
<th>Firmware changes</th>
<th>Documentation type</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2023</td>
<td>01.00.zz</td>
<td>Option 61</td>
<td>Original firmware</td>
<td>Operating Instructions</td>
<td>BA02121D/06/EN/01.21</td>
</tr>
</tbody>
</table>

- It is possible to flash the firmware to the current version using the service interface.

- For the compatibility of the firmware version with the installed device description files and operating tools, observe the information about the device in the "Manufacturer's information" document.

- The manufacturer's information is available:
  - In the Download Area of the Endress+Hauser web site: www.endress.com → Downloads
  - Specify the following details:
    - Product root: e.g. 8A5B
      - The product root is the first part of the order code: see the nameplate on the device.
    - Text search: Manufacturer's information
    - Media type: Documentation – Technical Documentation
13 Maintenance

13.1 Maintenance tasks
No special maintenance work is required.

13.1.1 Exterior cleaning
When cleaning the exterior of measuring devices, always use cleaning agents that do not attack the surface of the housing or the seals.

13.1.2 Interior cleaning
Observe the following points for CIP and SIP cleaning:
- Use only cleaning agents to which the process-wetted materials are adequately resistant.
- Observe the maximum permitted medium temperature for the measuring device →  300.

13.2 Measuring and test equipment
Endress+Hauser offers a wide variety of measuring and test equipment, such as W@M or device tests.

Your Endress+Hauser Sales Center can provide detailed information on the services.

List of some of the measuring and testing equipment: →  279→  281

13.3 Endress+Hauser services
Endress+Hauser offers a wide variety of services for maintenance such as recalibration, maintenance service or device tests.

Your Endress+Hauser Sales Center can provide detailed information on the services.
14 Repair

14.1 General information

14.1.1 Repair and conversion concept
The Endress+Hauser repair and conversion concept provides for the following:
- The measuring devices have a modular design.
- Spare parts are grouped into logical kits with the associated Installation Instructions.
- Repairs are carried out by Endress+Hauser Service or by appropriately trained customers.
- Certified devices can only be converted to other certified devices by Endress+Hauser Service or at the factory.

14.1.2 Notes for repair and conversion
For repair and modification of a measuring device, observe the following notes:
- Use only original Endress+Hauser spare parts.
- Carry out the repair according to the Installation Instructions.
- Observe the applicable standards, federal/national regulations, Ex documentation (XA) and certificates.
- Document every repair and each conversion and enter them into the W@M life cycle management database and Netilion Analytics.

14.2 Spare parts
Device Viewer (www.endress.com/deviceviewer): All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

- Measuring device serial number:
  - Is located on the nameplate of the device.
  - Can be read out via the Serial number parameter (→ 274) in the Device information submenu.

14.3 Endress+Hauser services
Endress+Hauser offers a wide range of services.

- Your Endress+Hauser Sales Center can provide detailed information on the services.

14.4 Return
The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the web page for information:
   http://www.endress.com/support/return-material
   - Select the region.

2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.
14.5 Disposal

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.

14.5.1 Removing the measuring device

1. Switch off the device.

**WARNING**

Danger to persons from process conditions!

- Beware of hazardous process conditions such as pressure in the measuring device, high temperatures or aggressive media.

2. Carry out the mounting and connection steps from the 'Mounting the measuring device' and 'Connecting the measuring device' sections in reverse order. Observe the safety instructions.

14.5.2 Disposing of the measuring device

**WARNING**

Danger to personnel and environment from fluids that are hazardous to health.

- Ensure that the measuring device and all cavities are free of fluid residues that are hazardous to health or the environment, e.g. substances that have permeated into crevices or diffused through plastic.

Observe the following notes during disposal:

- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.
15 Accessories

Various accessories, which can be ordered with the device or subsequently from Endress + Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress + Hauser sales center or on the product page of the Endress + Hauser website: [www.endress.com](http://www.endress.com).

15.1 Device-specific accessories

15.1.1 For the transmitter

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Description</th>
</tr>
</thead>
</table>
| Transmitter                  | Transmitter for replacement or storage. Use the order code to define the following specifications:  
  - Approvals  
  - Output  
  - Input  
  - Display/operation  
  - Housing  
  - Software  
  - Proline 500 – digital transmitter: Order number: 8X5BXX-*********A  
  - Proline 500 transmitter: Order number: 8X5BXX-*********B  
  Proline 500 transmitter for replacement:  
  It is essential to specify the serial number of the current transmitter when ordering. On the basis of the serial number, the device-specific data (e.g. calibration factors) of the replaced device can be used for the new transmitter.  
  - Proline 500 – digital transmitter: Installation Instructions EA01151D  
  - Proline 500 transmitter: Installation Instructions EA01152D  
| External WLAN antenna        | External WLAN antenna with 1.5 m (59.1 in) connecting cable and two angle brackets. Order code for "Accessory enclosed", option P8 "Wireless antenna wide area".  
  - The external WLAN antenna is not suitable for use in hygienic applications.  
  Additional information regarding the WLAN interface → 91.  
  Order number: 71351317  
  Installation Instructions EA01238D  
| Pipe mounting set            | Pipe mounting set for transmitter.  
  - Proline 500 – digital transmitter  
  Order number: 71346427  
  Installation Instructions EA01195D  
  - Proline 500 transmitter  
  Order number: 71346428  
| Weather protection cover     | Is used to protect the measuring device from the effects of the weather: e.g. rainwater, excess heating from direct sunlight.  
  - Proline 500 – digital transmitter  
  Order number: 71343504  
  - Proline 500 transmitter  
  Order number: 71343505  
  Installation Instructions EA01191D |
Display guard Proline 500 – digital

Is used to protect the display against impact or scoring, for example from sand in desert areas.

- Order number: 71228792
- Installation Instructions EA01093D

Connecting cable Proline 500 – digital Sensor – Transmitter

The connecting cable can be ordered directly with the measuring device (order code for “Cable, sensor connection”) or as an accessory (order number DK8012). The following cable lengths are available: order code for “Cable, sensor connection”

- Option B: 20 m (65 ft)
- Option E: User-configurable up to max. 50 m
- Option F: User-configurable up to max. 165 ft

- Maximum possible cable length for a Proline 500 – digital connecting cable: 300 m (1,000 ft)

Connecting cable Proline 500 Sensor – Transmitter

The connecting cable can be ordered directly with the measuring device (order code for “Cable, sensor connection”) or as an accessory (order number DK8012). The following cable lengths are available: order code for “Cable, sensor connection”

- Option 1: 5 m (16 ft)
- Option 2: 10 m (32 ft)
- Option 3: 20 m (65 ft)

- Possible cable length for a Proline 500 connecting cable: max. 20 m (65 ft)

15.1.2 For the sensor

Accessories Description

Heating jacket

Is used to stabilize the temperature of the fluids in the sensor. Water, water vapor and other non-corrosive liquids are permitted for use as fluids.

- If using oil as a heating medium, please consult with Endress+Hauser.
- If ordered together with the measuring device:
  - Order code for “Accessory enclosed”
  - Option RB “Heating jacket, G 1/2” female thread”
  - Option RD “Heating jacket, NPT 1/2” female thread”
- If ordered subsequently:
  - Use the order code with the product root DK8003.

Sensor holder

For wall, tabletop and pipe mounting.

- Order number: 71392563

15.2 Communication-specific accessories

Accessories Description

Fieldgate FXA42

Is used to transmit the measured values of connected 4 to 20 mA analog measuring devices, as well as digital measuring devices

- Technical Information TI01297S
- Operating Instructions BA01778S
- Product page: www.endress.com/fxa42
### Field Xpert SMT50
The Field Xpert SMT50 tablet PC for device configuration enables mobile plant asset management in non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress. This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.

- Technical Information TI01342S
- Operating Instructions BA01709S
- Product page: [www.endress.com/smt50](http://www.endress.com/smt50)

### Field Xpert SMT70
The Field Xpert SMT70 tablet PC for device configuration enables mobile plant asset management in hazardous and non-hazardous areas. It is suitable for commissioning and maintenance staff to manage field instruments with a digital communication interface and to record progress. This tablet PC is designed as an all-in-one solution with a preinstalled driver library and is an easy-to-use, touch-sensitive tool which can be used to manage field instruments throughout their entire life cycle.

- Technical Information TI01342S
- Operating Instructions BA01709S
- Product page: [www.endress.com/smt70](http://www.endress.com/smt70)

### Field Xpert SMT77
The Field Xpert SMT77 tablet PC for device configuration enables mobile plant asset management in areas categorized as Ex Zone 1.

- Technical Information TI01418S
- Operating Instructions BA01923S
- Product page: [www.endress.com/smt77](http://www.endress.com/smt77)

### Service-specific accessories

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
</tr>
</thead>
</table>
| Applicator      | Software for selecting and sizing Endress+Hauser measuring devices:  
|                 | - Choice of measuring devices with industrial requirements  
|                 | - Calculation of all the necessary data for identifying the optimum flowmeter:  
|                 |    e.g. nominal diameter, pressure loss, flow velocity and accuracy.  
|                 | - Graphic illustration of the calculation results  
|                 | - Determination of the partial order code, administration, documentation and access to all project-related data and parameters over the entire life cycle of a project.  
|                 | Applicator is available:  
|                 | - Via the Internet: [https://portal.endress.com/webapp/applicator](https://portal.endress.com/webapp/applicator)  
|                 | - As a downloadable DVD for local PC installation.                                                                                         |
| W@M             | W@M Life Cycle Management  
|                 | Improved productivity with information at your fingertips. Data relevant to a plant and its components is generated from the first stages of planning and  
|                 | during the asset’s complete life cycle.  
|                 | W@M Life Cycle Management is an open and flexible information platform with online and on-site tools. Instant access for your staff to current, in-depth  
|                 | data shortens your plant’s engineering time, speeds up procurement processes and increases plant uptime.  
|                 | Combined with the right services, W@M Life Cycle Management boosts productivity in every phase. For more information, see: [www.endress.com/lifecyclemanagement](http://www.endress.com/lifecyclemanagement) |
| FieldCare       | FDT-based plant asset management tool from Endress+Hauser. It can configure all smart field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.  
|                 | Operating Instructions BA00027S and BA00059S                                                                                                   |
| DeviceCare      | Tool for connecting and configuring Endress+Hauser field devices.  
|                 | Innovation brochure IN01047S                                                                                                                 |
## 15.4 System components

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Description</th>
<th>Information</th>
</tr>
</thead>
</table>
| **Memograph M graphic data manager** | The Memograph M graphic data manager provides information on all the relevant measured variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a SD card or USB stick. | • Technical Information TI00133R  
• Operating Instructions BA00247R |
| **Cerabar M**                   | The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value. | • Technical Information TI00426P and TI00436P  
• Operating Instructions BA00200P and BA00382P |
| **Cerabar S**                   | The pressure transmitter for measuring the absolute and gauge pressure of gases, steam and liquids. It can be used to read in the operating pressure value. | • Technical Information TI00383P  
• Operating Instructions BA00271P |
| **iTEMP**                       | The temperature transmitters can be used in all applications and are suitable for the measurement of gases, steam and liquids. They can be used to read in the medium temperature. | 'Fields of Activity' document FA00006T |
16  Technical data

16.1  Application
The measuring device is intended only for the flow measurement of liquids and gases. Depending on the version ordered, the measuring device can also measure potentially explosive, flammable, poisonous and oxidizing media.

To ensure that the device remains in proper operating condition for its service life, use the measuring device only for media against which the process-wetted materials are sufficiently resistant.

16.2  Function and system design

<table>
<thead>
<tr>
<th>Measuring principle</th>
<th>Mass flow measurement based on the Coriolis measuring principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring system</td>
<td>The measuring system consists of a transmitter and a sensor. The transmitter and sensor are mounted in physically separate locations. They are interconnected by connecting cables. Information on the structure of the device →  14</td>
</tr>
</tbody>
</table>
16.3 Input

Measured variable

<table>
<thead>
<tr>
<th>Direct measured variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Mass flow</td>
</tr>
<tr>
<td>■ Density</td>
</tr>
<tr>
<td>■ Temperature</td>
</tr>
</tbody>
</table>

Calculated measured variables

| ■ Volume flow             |
| ■ Corrected volume flow   |
| ■ Reference density       |

Measuring range

<table>
<thead>
<tr>
<th>Measuring range for liquids</th>
<th>( \frac{DN}{[mm]} )</th>
<th>( \frac{DN}{[in]} )</th>
<th>Measuring range full scale values ( \dot{m}<em>{min(F)} ) to ( \dot{m}</em>{max(F)} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>( \frac{1}{24} )</td>
<td>0 to 20</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>( \frac{1}{12} )</td>
<td>0 to 100</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>( \frac{1}{8} )</td>
<td>0 to 450</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range for gases</th>
<th>( \dot{m}_{max(G)} ) Maximum full scale value for gas [kg/h]</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \dot{m}<em>{max(G)} &lt; \dot{m}</em>{max(F)} )</td>
<td>( \dot{m}<em>{max(G)} ) can never be greater than ( \dot{m}</em>{max(F)} )</td>
</tr>
<tr>
<td>( \rho_G )</td>
<td>Gas density in [kg/m³] at operating conditions</td>
</tr>
<tr>
<td>( x )</td>
<td>Limitation constant for max. gas flow [kg/m³]</td>
</tr>
<tr>
<td>( c_G )</td>
<td>Sound velocity (gas) [m/s]</td>
</tr>
<tr>
<td>( d_i )</td>
<td>Measuring tube internal diameter [m]</td>
</tr>
<tr>
<td>( n )</td>
<td>( \pi )</td>
</tr>
<tr>
<td>( n = 1 )</td>
<td>Number of measuring tubes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>( \frac{DN}{[mm]} )</th>
<th>( \frac{DN}{[in]} )</th>
<th>( x ) [kg/m³]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>( \frac{1}{24} )</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>( \frac{1}{12} )</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>( \frac{1}{8} )</td>
<td>32</td>
</tr>
</tbody>
</table>

If calculating the full scale value using the two formulas:

1. Calculate the full scale value with both formulas.
2. The smaller value is the value that must be used.

**Recommended measuring range**

Flow limit ➔ 301

<table>
<thead>
<tr>
<th>Operable flow range</th>
<th>Over 1000 : 1.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flow rates above the preset full scale value do not override the electronics unit, with the result that the totalizer values are registered correctly.</td>
</tr>
</tbody>
</table>

**Input signal**

**External measured values**

To increase the accuracy of certain measured variables or to calculate the corrected volume flow for gases, the automation system can continuously write different measured values to the measuring device:

- Operating pressure to increase accuracy (Endress+Hauser recommends the use of a pressure measuring device for absolute pressure, e.g. Cerabar M or Cerabar S)
- Medium temperature to increase accuracy (e.g. iTEMP)
- Reference density for calculating the corrected volume flow for gases

Various pressure and temperature measuring devices can be ordered from Endress + Hauser: see "Accessories" section ➔ 282

It is recommended to read in external measured values to calculate the corrected volume flow.

**Current input**

The measured values are written from the automation system to the measuring device via the current input ➔ 285.

**Digital communication**

The measured values are written by the automation system via PROFINET with Ethernet-APL.

**Current input 0/4 to 20 mA**

<table>
<thead>
<tr>
<th>Current input</th>
<th>0/4 to 20 mA (active/passive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current span</td>
<td>4 to 20 mA (active)</td>
</tr>
<tr>
<td></td>
<td>0/4 to 20 mA (passive)</td>
</tr>
<tr>
<td>Resolution</td>
<td>1 µA</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>Typically: 0.6 to 2 V for 3.6 to 22 mA (passive)</td>
</tr>
<tr>
<td>Maximum input voltage</td>
<td>≤ 30 V (passive)</td>
</tr>
<tr>
<td>Open-circuit voltage</td>
<td>≤ 28.8 V (active)</td>
</tr>
<tr>
<td>Possible input variables</td>
<td>Pressure</td>
</tr>
<tr>
<td></td>
<td>Temperature</td>
</tr>
<tr>
<td></td>
<td>Density</td>
</tr>
</tbody>
</table>

**Status input**

<table>
<thead>
<tr>
<th>Maximum input values</th>
<th>DC –3 to 30 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If status input is active (ON): R &gt; 3 kΩ</td>
</tr>
<tr>
<td>Response time</td>
<td>Configurable: 5 to 200 ms</td>
</tr>
</tbody>
</table>
### Input signal level
- Low signal: DC –3 to +5 V
- High signal: DC 12 to 30 V

### Assignable functions
- Off
- Reset the individual totalizers separately
- Reset all totalizers
- Flow override
## 16.4 Output

### Output signal

<table>
<thead>
<tr>
<th>PROFINET with Ethernet-APL</th>
</tr>
</thead>
</table>
| **Device use** | Device connection to an APL field switch  
The device may only be operated according to the following APL port classifications:  
- If used in hazardous areas: SLAA or SLAC \(^1\)  
- If used in non-hazardous areas: SLAX  
Connection values of APL field switch (for example corresponds to APL port classification SPCC or SPAA, for instance):  
- Maximum input voltage: 15 V\(_{\text{DC}}\)  
- Minimum output values: 0.54 W |
| **Device connection to an SPE switch** | In non-hazardous areas, the device can be used with a suitable SPE switch: The device can be connected to an SPE switch with a maximum voltage of 30 V\(_{\text{DC}}\) and a minimum output power of 1.85 W.  
- The SPE switch must support the 10BASE-T1L standard and the PoDL power classes 10, 11 or 12 and have a function to disable power class recognition. |
| **PROFINET** | According to IEC 61158 and IEC 61784 |
| **Ethernet-APL** | According to IEEE 802.3cg, APL port profile specification v1.0, galvanically isolated |
| **Data transfer** | 10 Mbit/s |
| **Current consumption** | **Transmitter**  
- Max. 400 mA (24 V)  
- Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz) |
| **Permitted supply voltage** | 9 to 30 V |
| **Network connection** | With integrated reverse polarity protection |

\(^1\) For more information on using the device in the hazardous area, see the Ex-specific Safety Instructions

### Current output 4 to 20 mA

| **Signal mode** | Can be set to:  
- Active  
- Passive |
| **Current span** | Can be set to:  
- 4 to 20 mA NAMUR  
- 4 to 20 mA US  
- 4 to 20 mA  
- 0 to 20 mA (only if the signal mode is active)  
- Fixed current |
| **Maximum output values** | 22.5 mA |
| **Open-circuit voltage** | DC 28.8 V (active) |
| **Maximum input voltage** | DC 30 V (passive) |
| **Load** | 0 to 700 Ω |
| **Resolution** | 0.38 μA |
### Technical data

**Damping**

| Configurable: 0 to 999.9 s |

**Assignable measured variables**

- Mass flow
- Volume flow
- Corrected volume flow
- Density
- Reference density
- Temperature
- Electronics temperature
- Oscillation frequency 0
- Oscillation damping 0
- Signal asymmetry
- Exciter current 0

The range of options increases if the measuring device has one or more application packages.

---

**Pulse/frequency/switch output**

**Function**

Can be configured as pulse, frequency or switch output

**Version**

- Open collector
- Can be set to:
  - Active
  - Passive
  - Passive NAMUR
  - Ex-i, passive

**Maximum input values**

- DC 30 V, 250 mA (passive)

**Open-circuit voltage**

- DC 28.8 V (active)

**Voltage drop**

- For 22.5 mA: ≤ DC 2 V

**Pulse output**

- **Maximum input values**: DC 30 V, 250 mA (passive)
- **Maximum output current**: 22.5 mA (active)
- **Open-circuit voltage**: DC 28.8 V (active)
- **Pulse width**: Configurable: 0.05 to 2000 ms
- **Maximum pulse rate**: 10000 Impulse/s
- **Pulse value**: Configurable
- **Assignable measured variables**
  - Mass flow
  - Volume flow
  - Corrected volume flow

**Frequency output**

- **Maximum input values**: DC 30 V, 250 mA (passive)
- **Maximum output current**: 22.5 mA (active)
- **Open-circuit voltage**: DC 28.8 V (active)
- **Output frequency**: Configurable: end value frequency 2 to 10000 Hz ($f_{\text{max}} = 12500$ Hz)
- **Damping**: Configurable: 0 to 999.9 s
- **Pulse/pause ratio**: 1:1
Assignable measured variables

- Mass flow
- Volume flow
- Corrected volume flow
- Density
- Reference density
- Temperature
- Electronics temperature
- Oscillation frequency 0
- Oscillation damping 0
- Signal asymmetry
- Exciter current 0

The range of options increases if the measuring device has one or more application packages.

Switch output

<table>
<thead>
<tr>
<th>Maximum input values</th>
<th>DC 30 V, 250 mA (passive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open-circuit voltage</td>
<td>DC 28.8 V (active)</td>
</tr>
<tr>
<td>Switching behavior</td>
<td>Binary, conductive or non-conductive</td>
</tr>
<tr>
<td>Switching delay</td>
<td>Configurable: 0 to 100 s</td>
</tr>
<tr>
<td>Number of switching cycles</td>
<td>Unlimited</td>
</tr>
</tbody>
</table>

Assignable functions

- Off
- On
- Diagnostic behavior
- Limit value
  - Mass flow
  - Volume flow
  - Corrected volume flow
  - Density
  - Reference density
  - Temperature
  - Totalizer 1-3
  - Flow direction monitoring
  - Status
  - Partially filled pipe detection
  - Low flow cut off

The range of options increases if the measuring device has one or more application packages.

Relay output

<table>
<thead>
<tr>
<th>Function</th>
<th>Switch output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>Relay output, galvanically isolated</td>
</tr>
<tr>
<td>Switching behavior</td>
<td>Can be set to:</td>
</tr>
<tr>
<td></td>
<td>• NO (normally open), factory setting</td>
</tr>
<tr>
<td></td>
<td>• NC (normally closed)</td>
</tr>
</tbody>
</table>
Maximum switching capacity (passive)

- DC 30 V, 0.1 A
- AC 30 V, 0.5 A

Assignable functions

- Off
- On
- Diagnostic behavior
- Limit value
- Mass flow
- Volume flow
- Corrected volume flow
- Density
- Reference density
- Temperature
- Totalizer 1-3
- Flow direction monitoring
- Status
- Partially filled pipe detection
- Low flow cut off

The range of options increases if the measuring device has one or more application packages.

User-configurable input/output

One specific input or output is assigned to a user-configurable input/output (configurable I/O) during device commissioning.

The following inputs and outputs are available for assignment:
- Choice of current output: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Pulse/frequency/switch output
- Choice of current input: 4 to 20 mA (active), 0/4 to 20 mA (passive)
- Status input

Signal on alarm

Depending on the interface, failure information is displayed as follows:

**PROFINET with Ethernet-APL**

<table>
<thead>
<tr>
<th>Device diagnostics</th>
<th>Diagnostics according to PROFINET PA Profile 4</th>
</tr>
</thead>
</table>

Current output 0/4 to 20 mA

4 to 20 mA

<table>
<thead>
<tr>
<th>Failure mode</th>
<th>Choose from:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 to 20 mA in accordance with NAMUR recommendation NE 43</td>
</tr>
<tr>
<td></td>
<td>4 to 20 mA in accordance with US</td>
</tr>
<tr>
<td></td>
<td>Min. value: 3.59 mA</td>
</tr>
<tr>
<td></td>
<td>Max. value: 22.5 mA</td>
</tr>
<tr>
<td></td>
<td>Definable value between: 3.59 to 22.5 mA</td>
</tr>
<tr>
<td></td>
<td>Actual value</td>
</tr>
<tr>
<td></td>
<td>Last valid value</td>
</tr>
</tbody>
</table>

0 to 20 mA

<table>
<thead>
<tr>
<th>Failure mode</th>
<th>Choose from:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum alarm: 22 mA</td>
</tr>
<tr>
<td></td>
<td>Definable value between: 0 to 20.5 mA</td>
</tr>
</tbody>
</table>
### Pulse/frequency/switch output

#### Pulse output

<table>
<thead>
<tr>
<th>Failure mode</th>
<th>Choose from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual value</td>
<td></td>
</tr>
<tr>
<td>No pulses</td>
<td></td>
</tr>
</tbody>
</table>

#### Frequency output

<table>
<thead>
<tr>
<th>Failure mode</th>
<th>Choose from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual value</td>
<td></td>
</tr>
<tr>
<td>0 Hz</td>
<td></td>
</tr>
<tr>
<td>Definable value between: 2 to 12 500 Hz</td>
<td></td>
</tr>
</tbody>
</table>

#### Switch output

<table>
<thead>
<tr>
<th>Failure mode</th>
<th>Choose from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current status</td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>Closed</td>
<td></td>
</tr>
</tbody>
</table>

#### Relay output

<table>
<thead>
<tr>
<th>Failure mode</th>
<th>Choose from:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current status</td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td></td>
</tr>
<tr>
<td>Closed</td>
<td></td>
</tr>
</tbody>
</table>

#### Local display

<table>
<thead>
<tr>
<th>Plain text display</th>
<th>With information on cause and remedial measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backlight</td>
<td>Red lighting indicates a device error.</td>
</tr>
</tbody>
</table>

**Status signal as per NAMUR recommendation NE 107**

#### Interface/protocol

- Via digital communication:
  - PROFINET with Ethernet-APL
- Via service interface
  - CDI-RJ45 service interface
  - WLAN interface

<table>
<thead>
<tr>
<th>Plain text display</th>
<th>With information on cause and remedial measures</th>
</tr>
</thead>
</table>

#### Web browser

<table>
<thead>
<tr>
<th>Plain text display</th>
<th>With information on cause and remedial measures</th>
</tr>
</thead>
</table>
Light emitting diodes (LED)

| Status information | Status indicated by various light emitting diodes
|                   | The following information is displayed depending on the device version:
|                   | • Supply voltage active
|                   | • Data transmission active
|                   | • Device alarm/error has occurred
|                   | • PROFINET network available
|                   | • PROFINET connection established
|                   | • PROFINET blinking feature

Diagnostic information via light emitting diodes → 193

Low flow cut off

The switch points for low flow cut off are user-selectable.

Galvanic isolation

The outputs are galvanically isolated:
• from the power supply
• from one another
• from the potential equalization (PE) terminal

<table>
<thead>
<tr>
<th>Protocol-specific data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
</tr>
<tr>
<td>Communication type</td>
</tr>
<tr>
<td>Conformance Class</td>
</tr>
<tr>
<td>Netload Class</td>
</tr>
<tr>
<td>Baud rates</td>
</tr>
<tr>
<td>Cycle times</td>
</tr>
<tr>
<td>Polarity</td>
</tr>
<tr>
<td>Media Redundancy Protocol (MRP)</td>
</tr>
<tr>
<td>System redundancy support</td>
</tr>
<tr>
<td>Device profile</td>
</tr>
<tr>
<td>Manufacturer ID</td>
</tr>
<tr>
<td>Device type ID</td>
</tr>
</tbody>
</table>
| Device description files (GSD, DTM, FDI) | Information and files at:
• www.endress.com → Download Area
• www.profibus.com |
| Supported connections  | • 2x AR (IO Controller AR)
• 2x AR (IO Supervisor Device AR connection allowed) |
| Configuration options for measuring device | • DIP switches on the electronics module, for device name assignment (last part)
• Asset management software (FieldCare, DeviceCare, Field Xpert)
• Integrated Web server via Web browser and IP address
• Device master file (GSD), can be read out via the integrated Web server of the measuring device.
• Onsite operation |
| Configuration of the device name | • DIP switches on the electronics module, for device name assignment (last part)
• DCP protocol
• Asset management software (FieldCare, DeviceCare, Field Xpert)
• Integrated Web server |
### 16.5 Power supply

**Terminal assignment** →  41

**Available device plugs** →  41

**Pin assignment, device plug** →  42

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Order code for &quot;Power supply&quot;</th>
<th>Terminal voltage</th>
<th>Frequency range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option D</td>
<td>DC 24 V ±20%</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Option E</td>
<td>AC 100 to 240 V –15 to +10%</td>
<td>50/60 Hz</td>
<td></td>
</tr>
<tr>
<td>Option I</td>
<td>DC 24 V ±20%</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AC 100 to 240 V –15 to +10%</td>
<td>50/60 Hz</td>
<td></td>
</tr>
</tbody>
</table>

**Power consumption** **Transmitter**

Max. 10 W (active power)

| switch-on current | Max. 36 A (<5 ms) as per NAMUR Recommendation NE 21 |

**Current consumption** **Transmitter**

- Max. 400 mA (24 V)
- Max. 200 mA (110 V, 50/60 Hz; 230 V, 50/60 Hz)

**Power supply failure**

- Totalizers stop at the last value measured.
- Depending on the device version, the configuration is retained in the device memory or in the plug-in memory (HistoROM DAT).
- Error messages (incl. total operated hours) are stored.

**Overcurrent protection element**

The device must be operated with a dedicated circuit breaker, as it does not have an ON/OFF switch of its own.
- The circuit breaker must be easy to reach and labeled accordingly.
- Permitted nominal current of the circuit breaker: 2 A up to maximum 10 A.
Technical data

Proline Promass A 500 PROFINET with Ethernet-APL

Electrical connection
- 44
- 53

Potential equalization
- 60

Terminals
Spring-loaded terminals: Suitable for strands and strands with ferrules. Conductor cross-section 0.2 to 2.5 mm² (24 to 12 AWG).

Cable entries
- Cable gland: M20 × 1.5 with cable Ø 6 to 12 mm (0.24 to 0.47 in)
- Thread for cable entry:
  - NPT ½"
  - G ¼"
  - M20

Cable specification
- 36

Overvoltage protection

<table>
<thead>
<tr>
<th>Overvoltage category</th>
<th>Mains voltage fluctuations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overvoltage category II</td>
<td>293</td>
</tr>
<tr>
<td>Short-term, temporary overvoltage</td>
<td>Up to 1200 V between cable and ground, for max. 5 s</td>
</tr>
<tr>
<td>Long-term, temporary overvoltage</td>
<td>Up to 500 V between cable and ground</td>
</tr>
</tbody>
</table>

16.6 Performance characteristics

Reference operating conditions
- Error limits based on ISO 11631
- Water with +15 to +45 °C (+59 to +113 °F) at 2 to 6 bar (29 to 87 psi)
- Specifications as per calibration protocol
- Accuracy based on accredited calibration rigs that are traced to ISO 17025.

To obtain measured errors, use the Applicator sizing tool → 281

Maximum measured error
- o.r. = of reading; 1 g/cm³ = 1 kg/l; T = medium temperature

Base accuracy
- 297

Design fundamentals

Mass flow and volume flow (liquids)
±0.10 % o.r.

Mass flow (gases)
±0.35 % o.r.
Density (liquids)

<table>
<thead>
<tr>
<th>Under reference conditions</th>
<th>Standard density calibration 1)</th>
<th>Wide-range Density specification 2) 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>[g/cm³]</td>
<td>[g/cm³]</td>
<td>[g/cm³]</td>
</tr>
<tr>
<td>±0.0005</td>
<td>±0.02</td>
<td>±0.002</td>
</tr>
</tbody>
</table>

1) Valid over the entire temperature and density range
2) Valid range for special density calibration: 0 to 2 g/cm³, +5 to +80 °C (+41 to +176 °F)
3) order code for 'Application package', option EE 'Special density'

Temperature

±0.5 °C ± 0.005 · T °C (±0.9 °F ± 0.009 · (T – 32) °F)

Zero point stability

Standard version: order code for 'Measuring tube mat., wetted surface', option BB, BF, HA, SA

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>DN [in]</th>
<th>Zero point stability [kg/h]</th>
<th>Zero point stability [lb/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/24</td>
<td>0.0005</td>
<td>0.000018</td>
</tr>
<tr>
<td>2</td>
<td>1/12</td>
<td>0.0025</td>
<td>0.00009</td>
</tr>
<tr>
<td>4</td>
<td>1/8</td>
<td>0.0100</td>
<td>0.00036</td>
</tr>
</tbody>
</table>

High-pressure version: order code for 'Measuring tube mat., wetted surface', option HB

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>DN [in]</th>
<th>Zero point stability [kg/h]</th>
<th>Zero point stability [lb/min]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/24</td>
<td>0.0008</td>
<td>0.0000288</td>
</tr>
<tr>
<td>2</td>
<td>1/12</td>
<td>0.0040</td>
<td>0.000144</td>
</tr>
<tr>
<td>4</td>
<td>1/8</td>
<td>0.0160</td>
<td>0.000576</td>
</tr>
</tbody>
</table>

Flow values

Flow values as turndown parameters depending on the nominal diameter.

SI units

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>2</td>
<td>1</td>
<td>0.4</td>
<td>0.2</td>
<td>0.04</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>4</td>
<td>450</td>
<td>45</td>
<td>22.5</td>
<td>9</td>
<td>4.5</td>
<td>0.9</td>
</tr>
</tbody>
</table>
US units

<table>
<thead>
<tr>
<th>DN</th>
<th>1:1</th>
<th>1:10</th>
<th>1:20</th>
<th>1:50</th>
<th>1:100</th>
<th>1:500</th>
</tr>
</thead>
<tbody>
<tr>
<td>[inch]</td>
<td>[lb/min]</td>
<td>[lb/min]</td>
<td>[lb/min]</td>
<td>[lb/min]</td>
<td>[lb/min]</td>
<td>[lb/min]</td>
</tr>
<tr>
<td>¹⁄₂₄</td>
<td>0.735</td>
<td>0.074</td>
<td>0.037</td>
<td>0.015</td>
<td>0.007</td>
<td>0.001</td>
</tr>
<tr>
<td>¹⁄₁₂</td>
<td>3.675</td>
<td>0.368</td>
<td>0.184</td>
<td>0.074</td>
<td>0.037</td>
<td>0.007</td>
</tr>
<tr>
<td>¹⁄₈</td>
<td>16.54</td>
<td>1.654</td>
<td>0.827</td>
<td>0.331</td>
<td>0.165</td>
<td>0.033</td>
</tr>
</tbody>
</table>

Accuracy of outputs

The outputs have the following base accuracy specifications.

Current output

| Accuracy | ±5 µA |

Pulse/frequency output

o.r. = of reading

| Accuracy | Max. ±50 ppm o.r. (over the entire ambient temperature range) |

Repeatability

o.r. = of reading; 1 g/cm³ = 1 kg/l; T = medium temperature

Base repeatability

Design fundamentals → 297

Mass flow and volume flow (liquids)

±0.05 % o.r.

Mass flow (gases)

±0.15 % o.r.

Density (liquids)

±0.00025 g/cm³

Temperature

±0.25 °C ± 0.0025 · T °C (±0.45 °F ± 0.0015 · (T–32) °F)

Response time

The response time depends on the configuration (damping).

Influence of ambient temperature

Current output

| Temperature coefficient | Max. 1 µA/°C |

Pulse/frequency output

| Temperature coefficient | No additional effect. Included in accuracy. |
Influence of medium temperature

**Mass flow and volume flow**

o.f.s. = of full scale value

If there is a difference between the temperature during zero adjustment and the process temperature, the additional measured error of the sensors is typically ±0.0002 %o.f.s./°C (±0.0001 % o.f.s./°F).

The influence is reduced when the zero adjustment is performed at process temperature.

**Density**

If there is a difference between the density calibration temperature and the process temperature, the measured error of the sensors is typically ±0.00005 g/cm³/°C (±0.000025 g/cm³/°F). Field density adjustment is possible.

**Wide-range density specification (special density calibration)**

If the process temperature is outside the valid range (→ 294) the measured error is ±0.00005 g/cm³/°C (±0.000025 g/cm³/°F)

A0016616

1 Field density adjustment, for example at +20 °C (+68 °F)
2 Special density calibration

Influence of medium pressure

A difference between the calibration pressure and process pressure does not affect accuracy.

Design fundamentals

o.r. = of reading, o.f.s. = of full scale value

BaseAccu = base accuracy in % o.r., BaseRepeat = base repeatability in % o.r.

MeasValue = measured value; ZeroPoint = zero point stability

**Calculation of the maximum measured error as a function of the flow rate**

<table>
<thead>
<tr>
<th>Flow rate</th>
<th>Maximum measured error in % o.r.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZeroPoint ≥ ZeroPoint</td>
<td>± BaseAccu</td>
</tr>
<tr>
<td>BaseAccu · 100</td>
<td></td>
</tr>
<tr>
<td>ZeroPoint &lt; ZeroPoint</td>
<td>± (ZeroPoint · MeasValue · 100)</td>
</tr>
<tr>
<td>BaseAccu · 100</td>
<td></td>
</tr>
</tbody>
</table>

A0021332
A0021333
A0021334
A0021335
A0021339
Calculation of the maximum repeatability as a function of the flow rate

<table>
<thead>
<tr>
<th>Flow rate</th>
<th>Maximum repeatability in % o.r.</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ ½ \cdot \text{ZeroPoint} \cdot \text{BaseRepeat} \cdot 100</td>
<td>± BaseRepeat</td>
</tr>
<tr>
<td>≤ ½ \cdot \text{ZeroPoint} \cdot \text{BaseRepeat} \cdot 100</td>
<td>± \frac{½ \cdot \text{ZeroPoint}}{\text{MeasValue}} \cdot 100</td>
</tr>
</tbody>
</table>

Example of maximum measured error

![Graph showing maximum measured error E vs flow rate Q.](image)

- $E$: Maximum measured error in % o.r. (example)
- $Q$: Flow rate in % of maximum full scale value

16.7 Mounting

Mounting requirements → 22

16.8 Environment

Ambient temperature range

- Omit

Temperature tables

- Observe the interdependencies between the permitted ambient and fluid temperatures when operating the device in hazardous areas.
- For detailed information on the temperature tables, see the separate document entitled "Safety Instructions" (XA) for the device.

Storage temperature

- \(-50 \text{ to } +80 \degree \text{C} (-58 \text{ to } +176 \degree \text{F})\)

Climate class

- DIN EN 60068-2-38 (test Z/AD)

Relative humidity

- The device is suitable for use in outdoor and indoor areas with a relative humidity of 4 to 95%.
Operating height

According to EN 61010-1

- ≤ 2,000 m (6,562 ft)
- > 2,000 m (6,562 ft) with additional overvoltage protection (e.g. Endress+Hauser HAW Series)

Degree of protection

**Transmitter**

- IP66/67, Type 4X enclosure, suitable for pollution degree 4
- When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2
- Display module: IP20, Type 1 enclosure, suitable for pollution degree 2

**Sensor**

- IP66/67, Type 4X enclosure, suitable for pollution degree 4
- When the housing is open: IP20, Type 1 enclosure, suitable for pollution degree 2

*Optional*

Order code for "Sensor options", option CM "IP69"

**External WLAN antenna**

IP67

Vibration- and shock-resistance

**Vibration sinusoidal, in accordance with IEC 60068-2-6**

**Sensor**

- 2 to 8.4 Hz, 3.5 mm peak
- 8.4 to 2,000 Hz, 1 g peak

**Transmitter**

- 2 to 8.4 Hz, 7.5 mm peak
- 8.4 to 2,000 Hz, 2 g peak

**Vibration broad-band random, according to IEC 60068-2-64**

**Sensor**

- 10 to 200 Hz, 0.003 g²/Hz
- 200 to 2,000 Hz, 0.001 g²/Hz
- Total: 1.54 g rms

**Transmitter**

- 10 to 200 Hz, 0.01 g²/Hz
- 200 to 2,000 Hz, 0.003 g²/Hz
- Total: 2.70 g rms

**Shock half-sine, according to IEC 60068-2-27**

- **Sensor**
  - 6 ms 30 g
- **Transmitter**
  - 6 ms 50 g

**Rough handling shocks, according to IEC 60068-2-31**

Interior cleaning

- Cleaning in place (CIP)
- Sterilization in place (SIP)

**Options**

Oil- and grease-free version for wetted parts, without declaration

Order code for "Service", option HA
Technical data

Mechanical load

Transmitter housing and sensor connection housing:
- Protect against mechanical effects, such as shock or impact
- Do not use as a ladder or climbing aid

Electromagnetic compatibility (EMC)

Details are provided in the Declaration of Conformity.

This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

16.9 Process

Medium temperature range

-50 to +205 °C (−58 to +401 °F)

Dependency of ambient temperature on medium temperature

<table>
<thead>
<tr>
<th>Version</th>
<th>Not insulated A</th>
<th>Insulated A</th>
<th>Insulated B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$T_a$</td>
<td>$T_m$</td>
<td>$T_a$</td>
</tr>
<tr>
<td>Promass A 500 – digital</td>
<td>60 °C (140 °F)</td>
<td>205 °C (401 °F)</td>
<td>-</td>
</tr>
<tr>
<td>Promass A 500</td>
<td>60 °C (140 °F)</td>
<td>205 °C (401 °F)</td>
<td>-</td>
</tr>
</tbody>
</table>

Density

0 to 5 000 kg/m$^3$ (0 to 312 lb/cf)

Pressure-temperature ratings

For an overview of the pressure-temperature ratings for the process connections, see the Technical Information.
Sensor housing

The sensor housing is filled with dry nitrogen gas and protects the electronics and mechanics inside.

If a measuring tube fails (e.g. due to process characteristics like corrosive or abrasive fluids), the fluid will initially be contained by the sensor housing.

In the event of a tube failure, the pressure level inside the sensor housing will rise according to the operating process pressure. If the user judges that the sensor housing burst pressure does not provide an adequate safety margin, the device can be fitted with a rupture disk. This prevents excessively high pressure from forming inside the sensor housing. Therefore, the use of a rupture disk is strongly recommended in applications involving high gas pressures, and particularly in applications in which the process pressure is greater than $2/3$ of the sensor housing burst pressure.

High-pressure devices are always fitted with a rupture disk: order code for "Measuring tube mat., wetted surface", option HB

### Burst pressure of the sensor housing

If the device is fitted with a rupture disk (order code for "Sensor option", option CA "Rupture disk"), the rupture disk trigger pressure is decisive.

The sensor housing burst pressure refers to a typical internal pressure which is reached prior to mechanical failure of the sensor housing and which was determined during type testing. The corresponding type test declaration can be ordered with the device (order code for "Additional approval", option LN "Sensor housing burst pressure, type test").

<table>
<thead>
<tr>
<th>DN</th>
<th>[mm]</th>
<th>[in]</th>
<th>Sensor housing burst pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\frac{1}{8}$</td>
<td>220</td>
<td>3190</td>
</tr>
<tr>
<td>2</td>
<td>$\frac{1}{4}$</td>
<td>140</td>
<td>2030</td>
</tr>
<tr>
<td>4</td>
<td>$\frac{3}{8}$</td>
<td>105</td>
<td>1520</td>
</tr>
</tbody>
</table>

For information on the dimensions: see the "Mechanical construction" section of the "Technical Information" document

Rupture disk

To increase the level of safety, a device version with a rupture disk with a trigger pressure of 10 to 15 bar (145 to 217.5 psi) can be used (order code for "Sensor option", option CA "rupture disk").

### Drain connection for rupture disk

To allow any escaping medium to drain in a controlled manner in the event of an error, an optional drain connection can be ordered in addition to the rupture disk.

The function of the rupture disk is not compromised in any way.

Flow limit

Select the nominal diameter by optimizing between the required flow range and permissible pressure loss.

For an overview of the full scale values for the measuring range, see the "Measuring range" section →  284
Technical data

- The minimum recommended full scale value is approx. 1/20 of the maximum full scale value.
- In most applications, 20 to 50% of the maximum full scale value can be considered ideal.
- A low full scale value must be selected for abrasive media (such as liquids with entrained solids): flow velocity < 1 m/s (< 3 ft/s).
- For gas measurement the following rules apply:
  - The flow velocity in the measuring tubes should not exceed half the sound velocity (0.5 Mach).
  - The maximum mass flow depends on the density of the gas: formula.

To calculate the flow limit, use the Applicator sizing tool → 281

Pressure loss

To calculate the pressure loss, use the Applicator sizing tool → 281

System pressure → 24

16.10 Mechanical construction

Design, dimensions

For the dimensions and installation lengths of the device, see the Technical Information document, Mechanical construction section.

Weight

All values (weight exclusive of packaging material) refer to devices with VCO couplings.

Transmitter

- Proline 500 – digital polycarbonate: 1.4 kg (3.1 lbs)
- Proline 500 – digital aluminum: 2.4 kg (5.3 lbs)
- Proline 500 aluminum: 6.5 kg (14.3 lbs)
- Proline 500 cast, stainless: 15.6 kg (34.4 lbs)

Sensor

Sensor with aluminum connection housing version:

Weight in SI units

<table>
<thead>
<tr>
<th>DN [mm]</th>
<th>Weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.75</td>
</tr>
<tr>
<td>2</td>
<td>4.3</td>
</tr>
<tr>
<td>4</td>
<td>6.15</td>
</tr>
</tbody>
</table>

Weight in US units

<table>
<thead>
<tr>
<th>DN [in]</th>
<th>Weight [lbs]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/24</td>
<td>6</td>
</tr>
<tr>
<td>1/12</td>
<td>9</td>
</tr>
<tr>
<td>1/8</td>
<td>14</td>
</tr>
</tbody>
</table>
Materials

Transmitter housing

Housing of Proline 500 – digital transmitter
Order code for "Transmitter housing":
- Option A "Aluminum coated": aluminum, AlSi10Mg, coated
- Option D "Polycarbonate": polycarbonate

Housing of Proline 500 transmitter
Order code for "Transmitter housing":
- Option A "Aluminum coated": aluminum, AlSi10Mg, coated
- Option L "Cast, stainless": cast, stainless steel, 1.4409 (CF3M) similar to 316L

Window material
Order code for "Transmitter housing":
- Option A "Aluminum, coated": glass
- Option D "Polycarbonate": plastic
- Option L "Cast, stainless": glass

Fastening components for mounting on a post
- Screws, threaded bolts, washers, nuts: stainless A2 (chrome-nickel steel)
- Metal plates: stainless steel, 1.4301 (304)

Sensor connection housing
Order code for "Sensor connection housing":
- Option A "Aluminum coated": aluminum, AlSi10Mg, coated
- Option B "Stainless": stainless steel 1.4301 (304)
- Option C "Ultra-compact, stainless": stainless steel 1.4301 (304)
- Option L "Cast, stainless": 1.4409 (CF3M) similar to 316L

Cable entries/cable glands

<table>
<thead>
<tr>
<th>Cable entries and adapters</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable gland M20 × 1.5</td>
<td>Plastic</td>
</tr>
<tr>
<td>Adapter for cable entry with female thread G ½&quot;</td>
<td>Nickel-plated brass</td>
</tr>
<tr>
<td>Adapter for cable entry with female thread NPT ¾&quot;</td>
<td>Nickel-plated brass</td>
</tr>
</tbody>
</table>

Only available for certain device versions:
- Order code for "Transmitter housing":
  - Option A "Aluminum, coated"
  - Option D "Polycarbonate"
- Order code for "Sensor connection housing":
  - Proline 500 – digital:
    - Option A "Aluminum coated"
    - Option B "Stainless"
  - Proline 500:
    - Option B "Stainless"

Connecting cable

UV rays can impair the cable outer sheath. Protect the cable from exposure to sun as much as possible.

Connecting cable for sensor - Proline 500 – digital transmitter
PVC cable with copper shield
Connecting cable for sensor - Proline 500 transmitter
PVC cable with copper shield

Sensor housing
- Acid and alkali-resistant outer surface
- Stainless steel, 1.4404 (316L)

Measuring tubes
Order code for 'Measuring tube mat., wetted surface', option BB, BF, SA
Stainless steel, 1.4435 (316/316L)
Order code for 'Measuring tube mat., wetted surface', option HA, HB, HC, HD
Alloy C22, 2.4602 (UNS N06022)

Process connections
Order code for 'Measuring tube mat., wetted surface', option SA

<table>
<thead>
<tr>
<th>VCO coupling</th>
<th>Stainless steel, 1.4404 (316/316L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G¼&quot;, G½&quot; female thread</td>
<td>Stainless steel, 1.4404 (316/316L)</td>
</tr>
<tr>
<td>NPT¼&quot;, NPT½&quot; female thread</td>
<td>Stainless steel, 1.4404 (316/316L)</td>
</tr>
<tr>
<td>Tri-Clamp¼&quot;</td>
<td>Stainless steel, 1.4435 (316L)</td>
</tr>
<tr>
<td>Fixed flange EN 1092-1, ASME B16.5, JIS B2220</td>
<td>Stainless steel, 1.4404 (316/316L)</td>
</tr>
</tbody>
</table>

Order code for 'Measuring tube mat., wetted surface', option BB, BF

<table>
<thead>
<tr>
<th>VCO coupling</th>
<th>Stainless steel, 1.4404 (316/316L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tri-Clamp¼&quot;</td>
<td>Stainless steel, 1.4435 (316L)</td>
</tr>
</tbody>
</table>

Order code for 'Measuring tube mat., wetted surface', option HC, HD

<table>
<thead>
<tr>
<th>VCO coupling</th>
<th>Alloy C22, 2.4602 (UNS N06022)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tri-Clamp¼&quot;</td>
<td>Alloy C22, 2.4602 (UNS N06022)</td>
</tr>
</tbody>
</table>

Order code for 'Measuring tube mat., wetted surface', option HA

<table>
<thead>
<tr>
<th>VCO coupling</th>
<th>Alloy C22, 2.4602 (UNS N06022)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G¼&quot;, G½&quot; female thread</td>
<td>Alloy C22, 2.4602 (UNS N06022)</td>
</tr>
<tr>
<td>NPT¼&quot;, NPT½&quot; female thread</td>
<td>Alloy C22, 2.4602 (UNS N06022)</td>
</tr>
<tr>
<td>Fixed flange EN 1092-1, ASME B16.5, JIS B2220</td>
<td>Alloy C22, 2.4602 (UNS N06022)</td>
</tr>
<tr>
<td>Lap joint flange EN 1092-1, ASME B16.5, JIS B2220</td>
<td>Stainless steel, 1.4301 (F304), wetted parts Alloy C22, 2.4602 (UNS N06022)</td>
</tr>
</tbody>
</table>

Order code for 'Measuring tube mat., wetted surface', option HB (high-pressure option)
Proline Promass A 500 PROFINET with Ethernet-APL

Technical data

VCO coupling
| Alloy C22, 2.4602 (UNS N06022) |

G¼", G½" female thread
| Alloy C22, 2.4602 (UNS N06022) |

NPT¼", NPT½" female thread
| Alloy C22, 2.4602 (UNS N06022) |

Fixed flange EN 1092-1, ASME B16.5, JIS B2220
| Stainless steel, 1.4404 (316/316L); Alloy C22, 2.4602 (UNS N06022) |

Available process connections

Seals

Welded process connections without internal seals

Accessories

Sensor holder
Stainless steel, 1.4404 (316L)

Heating jacket
- Heating jacket housing: stainless steel, 1.4571 (316Ti)
- NPT adapter ½": stainless steel, 1.4404 (316)
- G½" adapter: stainless steel, 1.4404

Protective cover
Stainless steel, 1.4404 (316L)

External WLAN antenna
- Antenna: ASA plastic (acrylonitrile styrene acrylate) and nickel-plated brass
- Adapter: Stainless steel and nickel-plated brass
- Cable: Polyethylene
- Plug: Nickel-plated brass
- Angle bracket: Stainless steel

Process connections
- Fixed flange connections:
  - EN 1092-1 (DIN 2501) flange
  - EN 1092-1 (DIN 2512N) flange
  - ASME B16.5 flange
  - JIS B2220 flange
- Clamp connections:
  - Tri-Clamp (OD tubes), DIN 11866 series C
- VCO connections:
  - 4-VCO-4
- Female thread:
  - Cylindrical female thread BSPP (G) in accordance with ISO 228-1
  - NPT

Process connection materials

Surface roughness

All data refer to parts in contact with the medium. The following surface roughness categories can be ordered.
- Not polished
- $R_{a_{max}} = 0.76 \, \mu m$ (30 \, \mu in) mechanically polished
- $R_{a_{max}} = 0.38 \, \mu m$ (15 \, \mu in) mechanically polished
16.11 Operability

Languages
Can be operated in the following languages:
- Via local operation
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Korean, Vietnamese, Czech, Swedish
- Via Web browser
  English, German, French, Spanish, Italian, Dutch, Portuguese, Polish, Russian, Turkish, Chinese, Japanese, Vietnamese, Czech, Swedish
- Via 'FieldCare', 'DeviceCare' operating tool: English, German, French, Spanish, Italian, Chinese, Japanese

Local operation

Via display module
Equipment:
- Order code for "Display; operation", option F "4-line, illuminated, graphic display; touch control"
- Order code for "Display; operation", option G "4-line, illuminated, graphic display; touch control + WLAN"

Information about WLAN interface → 91

Display elements
- 4-line, illuminated, graphic display
- White background lighting; switches to red in event of device errors
- Format for displaying measured variables and status variables can be individually configured

Operating elements
- External operation via touch control (3 optical keys) without opening the housing: 
- Operating elements also accessible in the various zones of the hazardous area

Remote operation → 90

Service interface → 91
Different operating tools can be used for local or remote access to the measuring device. Depending on the operating tool used, access is possible with different operating units and via a variety of interfaces.

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</tr>
<tr>
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<td>Notebook, PC or tablet with Microsoft Windows system</td>
<td>CDI-RJ45 service interface, WLAN interface</td>
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</tr>
<tr>
<td>FieldCare SFE500</td>
<td>Notebook, PC or tablet with Microsoft Windows system</td>
<td>CDI-RJ45 service interface, WLAN interface, Fieldbus protocol</td>
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</tr>
<tr>
<td>Field Xpert</td>
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<td>Operating Instructions BA01202S, Device description files: Use update function of handheld terminal</td>
</tr>
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<td>SmartBlue app</td>
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</table>

Other operating tools based on FDT technology with a device driver such as DTM/iDTM or DD/EDD can be used for device operation. These operating tools are available from the individual manufacturers. Integration into the following operating tools, among others, is supported:

- Field Device Manager (FDM) from Honeywell → www.process.honeywell.com
- FieldMate from Yokogawa → www.yokogawa.com
- PACTWare → www.pactware.com

The related device description files are available: www.endress.com → Download Area

**Web server**

With the integrated web server, the device can be operated and configured via a web browser via Ethernet-APL, the service interface (CDI-RJ45) or via the WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, device status information is also displayed and allows users to monitor the status of the device. Furthermore the device data can be managed and the network parameters can be configured.

Access to the network is required for the Ethernet-APL connection.

A device that has a WLAN interface (can be ordered as an option) is required for the WLAN connection: order code for 'Display; operation', option G '4-line, illuminated; touch control + WLAN'. The device acts as an Access Point and enables communication by computer or a mobile handheld terminal.

**Supported functions**

Data exchange between the operating unit (such as a notebook for example) and the measuring device:

- Upload the configuration from the measuring device (XML format, configuration backup)
- Save the configuration to the measuring device (XML format, restore configuration)
- Export event list (.csv file)
- Export parameter settings (.csv file or PDF file, document the measuring point configuration)
Export the Heartbeat verification log (PDF file, only available with the ‘Heartbeat Verification’ application package)
- Flash firmware version for device firmware upgrade, for instance
- Download driver for system integration
- Visualize up to 1000 saved measured values (only available with the Extended HistoROM application package → 312)

Web server special documentation → 314

HistoROM data management
The measuring device features HistoROM data management. HistoROM data management comprises both the storage and import/export of key device and process data, making operation and servicing far more reliable, secure and efficient.

When the device is delivered, the factory settings of the configuration data are stored as a backup in the device memory. This memory can be overwritten with an updated data record, for example after commissioning.

Additional information on the data storage concept

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<td>• Current parameter data record (used by firmware at run time)</td>
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<td>• Driver for system integration for exporting via Web server, e.g. GSDML for PROFINET</td>
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<td>• Totalizer values</td>
<td>• Device configuration (e.g. SW options, fixed I/O or multi I/O)</td>
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<td></td>
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<tr>
<td>Fixed on the user interface board in the connection compartment</td>
<td>Attachable to the user interface board in the connection compartment</td>
<td>In the sensor plug in the transmitter neck part</td>
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Data backup

Automatic
- The most important device data (sensor and transmitter) are automatically saved in the DAT modules
- If the transmitter or measuring device is replaced: once the T-DAT containing the previous device data has been exchanged, the new measuring device is ready for operation again immediately without any errors
- If the sensor is replaced: once the sensor has been replaced, new sensor data are transferred from the S-DAT in the measuring device and the measuring device is ready for operation again immediately without any errors
- If exchanging the electronics module (e.g. I/O electronics module): Once the electronics module has been replaced, the software of the module is compared against the current device firmware. The module software is upgraded or downgraded where necessary. The electronics module is available for use immediately afterwards and no compatibility problems occur.

Manual
Additional parameter data record (complete parameter settings) in the integrated device memory HistoROM backup for:
- Data backup function
  Backup and subsequent restoration of a device configuration in the device memory HistoROM backup
- Data comparison function
  Comparison of the current device configuration with the device configuration saved in the device memory HistoROM backup
Data transmission
Manual
- Transfer of a device configuration to another device using the export function of the specific operating tool, e.g. with FieldCare, DeviceCare or Web server: to duplicate the configuration or to store in an archive (e.g. for backup purposes)
- Transmission of the drivers for system integration via Web server, e.g.: GSDML for PROFINET

Event list
Automatic
- Chronological display of up to 20 event messages in the events list
- If the Extended HistoROM application package (order option) is enabled: up to 100 event messages are displayed in the events list along with a time stamp, plain text description and remedial measures
- The events list can be exported and displayed via a variety of interfaces and operating tools e.g. DeviceCare, FieldCare or Web server

Data logging
Manual
If the Extended HistoROM application package (order option) is enabled:
- Record up to 1000 measured values via 1 to 4 channels
- User configurable recording interval
- Record up to 250 measured values via each of the 4 memory channels
- Export the measured value log via a variety of interfaces and operating tools e.g. FieldCare, DeviceCare or web server

16.12 Certificates and approvals
Current certificates and approvals that are available for the product can be selected via the Product Configurator at www.endress.com:
1. Select the product using the filters and search field.
2. Open the product page.
3. Select Configuration.

CE mark
The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.
Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

UKCA marking
The device meets the legal requirements of the applicable UK regulations (Statutory Instruments). These are listed in the UKCA Declaration of Conformity along with the designated standards. By selecting the order option for UKCA marking, Endress+Hauser confirms a successful evaluation and testing of the device by affixing the UKCA mark.
Contact address Endress+Hauser UK:
Endress+Hauser Ltd.
Floats Road
Manchester M23 9NF
United Kingdom
www.uk.endress.com

Ex approval
The devices are certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate.
Hygienic compatibility

- 3-A approval
- Only measuring devices with the order code for "Additional approval", option LP '3A' have 3-A approval.
- The 3-A approval refers to the measuring device.
- When installing the measuring device, ensure that no liquid can accumulate on the outside of the measuring device.
  A remote display module must be installed in accordance with the 3-A Standard.
- Accessories (e.g. heating jacket, weather protection cover, wall holder unit) must be installed in accordance with the 3-A Standard.
  Each accessory can be cleaned. Disassembly may be necessary under certain circumstances.
- FDA
- Food Contact Materials Regulation (EC) 1935/2004

Pharmaceutical compatibility

- FDA 21 CFR 177
- USP <87>
- USP <88> Class VI 121 °C
- TSE/BSE Certificate of Suitability
- cGMP
  Devices with the order code for "Test, certificate", option JG 'Conformity with cGMP-derived requirements, declaration' comply with the requirements of cGMP with regard to the surfaces of parts in contact with the medium, design, FDA 21 CFR material conformity, USP Class VI tests and TSE/BSE conformity.
  A serial number-specific declaration is generated.

Certification PROFINET with Ethernet-APL

PROFINET interface

The measuring device is certified and registered by the PNO (PROFIBUS Nutzerorganisation e.V. / PROFIBUS User Organization). The measuring system meets all the requirements of the following specifications:
- Certified according to:
  - Test specification for PROFINET devices
  - PROFINET PA Profile 4
  - PROFINET Netload Robustness Class 2 10 Mbps
  - APL conformance test
- The device can also be operated with certified devices of other manufacturers (interoperability)
- The device supports PROFINET S2 system redundancy.

Radio approval

The measuring device has radio approval.

For detailed information on the radio approval, see the Special Documentation → 314

Additional certification

CRN approval

Some device versions have CRN approval. A CRN-approved process connection with a CSA approval must be ordered for a CRN-approved device.

Tests and certificates

- EN10204-3.1 material certificate, wetted parts and sensor housing
- Pressure test, internal process, inspection certificate
- PMI test (XRF), internal procedure, wetted parts, test report
- Compliance with requirements derived from cGMP, Declaration
- NACE MR0175 / ISO 15156
- NACE MR0103 / ISO 17945
### Testing of welded connections

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<td>DR</td>
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<tr>
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<td></td>
<td>x</td>
<td></td>
<td>DR</td>
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<td>K8</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>DR</td>
</tr>
</tbody>
</table>

RT = Radiographic testing, DR = Digital radiography
All options with test report

### Other standards and guidelines
- EN 60529
  Degrees of protection provided by enclosures (IP code)
- IEC/EN 60068-2-6
  Environmental influences: Test procedure - Test Fc: vibrate (sinusoidal).
- IEC/EN 60068-2-31
  Environmental influences: Test procedure - Test Ec: shocks due to rough handling, primarily for devices.
- EN 61010-1
  Safety requirements for electrical equipment for measurement, control and laboratory use - general requirements
- IEC/EN 61326-2-3
  Emission in accordance with Class A requirements. Electromagnetic compatibility (EMC requirements).
- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment
- NAMUR NE 32
  Data retention in the event of a power failure in field and control instruments with microprocessors
- NAMUR NE 43
  Standardization of the signal level for the breakdown information of digital transmitters with analog output signal.
- NAMUR NE 53
  Software of field devices and signal-processing devices with digital electronics
- NAMUR NE 105
  Specifications for integrating fieldbus devices in engineering tools for field devices
- NAMUR NE 107
  Self-monitoring and diagnosis of field devices
- NAMUR NE 131
  Requirements for field devices for standard applications
- NAMUR NE 132
  Coriolis mass meter
- ETSI EN 300 328
  Guidelines for 2.4 GHz radio components.
- EN 301489
  Electromagnetic compatibility and radio spectrum matters (ERM).
16.13 Application packages

Many different application packages are available to enhance the functionality of the device. Such packages might be needed to address safety aspects or specific application requirements.

The application packages can be ordered with the device or subsequently from Endress+Hauser. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Detailed information on the application packages:
Special Documentation for the device → 314

Diagnostic functionality

Order code for 'Application package', option EA "Extended HistoROM"

Comprises extended functions concerning the event log and the activation of the measured value memory.

Event log:
Memory volume is extended from 20 message entries (standard version) to up to 100 entries.

Data logging (line recorder):
- Memory capacity for up to 1000 measured values is activated.
- 250 measured values can be output via each of the 4 memory channels. The recording interval can be defined and configured by the user.
- Measured value logs can be accessed via the local display or operating tool e.g. FieldCare, DeviceCare or Web server.

For detailed information, see the Operating Instructions for the device.

Heartbeat Technology

Order code for 'Application package', option EB 'Heartbeat Verification + Monitoring'

**Heartbeat Verification**
Meets the requirement for traceable verification to DIN ISO 9001:2008 Chapter 7.6 a) 'Control of monitoring and measuring equipment'.
- Functional testing in the installed state without interrupting the process.
- Traceable verification results on request, including a report.
- Simple testing process via local operation or other operating interfaces.
- Clear measuring point assessment (pass/fail) with high test coverage within the framework of manufacturer specifications.
- Extension of calibration intervals according to operator's risk assessment.

**Heartbeat Monitoring**
Continuously supplies data, which are characteristic of the measuring principle, to an external condition monitoring system for the purpose of preventive maintenance or process analysis. These data enable the operator to:
- Draw conclusions - using these data and other information - about the impact process influences (e.g. corrosion, abrasion, formation of buildup etc.) have on the measuring performance over time.
- Schedule servicing in time.
- Monitor the process or product quality, e.g. gas pockets.

For detailed information, see the Special Documentation for the device.

Concentration measurement

Order code for 'Application package', option ED 'Concentration'
Calculation and outputting of fluid concentrations.
The measured density is converted to the concentration of a substance of a binary mixture using the 'Concentration' application package:
- Choice of predefined fluids (e.g. various sugar solutions, acids, alkalis, salts, ethanol etc.).
- Common or user-defined units (°Brix, °Plato, % mass, % volume, mol/l etc.) for standard applications.
- Concentration calculation from user-defined tables.

For detailed information, see the Special Documentation for the device.

Special density
Order code for "Application package", option EE "Special density"

Many applications use density as a key measured value for monitoring quality or controlling processes. The device measures the density of the fluid as standard and makes this value available to the control system.

The 'Special Density' application package offers high-precision density measurement over a wide density and temperature range particularly for applications subject to varying process conditions.

For detailed information, see the Operating Instructions for the device.

16.14 Accessories
Overview of accessories available for order → 279

16.15 Supplementary documentation
For an overview of the scope of the associated Technical Documentation, refer to the following:
- Device Viewer (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- Endress+Hauser Operations app: Enter serial number from nameplate or scan matrix code on nameplate.

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<td>Promass A</td>
<td>KA01282D</td>
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Brief Operating Instructions

Brief Operating Instructions for the sensor

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<th>Measuring device</th>
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<td>Proline Promass A</td>
<td>KA01282D</td>
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Brief Operating Instructions for the transmitter

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<td>Promass 500</td>
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Supplementary device-dependent documentation

**Safety instructions**
Safety instructions for electrical equipment for hazardous areas.

Special Documentation

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