

# Operating Instructions

## Picomag

### IO-Link

Electromagnetic flowmeter



- 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.

# Table of contents

|          |                                                       |           |           |                                                    |           |
|----------|-------------------------------------------------------|-----------|-----------|----------------------------------------------------|-----------|
| <b>1</b> | <b>About this document</b>                            | <b>5</b>  | <b>8</b>  | <b>System integration</b>                          | <b>20</b> |
| 1.1      | Document function                                     | 5         | 8.1       | Overview of device description files               | 20        |
| 1.2      | Symbols used                                          | 5         | 8.2       | Device master file                                 | 20        |
| 1.2.1    | Safety symbols                                        | 5         |           |                                                    |           |
| 1.2.2    | Electrical symbols                                    | 5         |           |                                                    |           |
| 1.2.3    | Communication symbols                                 | 5         |           |                                                    |           |
| 1.2.4    | Symbols for certain types of information              | 5         |           |                                                    |           |
| 1.2.5    | Symbols in graphics                                   | 6         |           |                                                    |           |
| 1.3      | Documentation                                         | 6         |           |                                                    |           |
| 1.4      | Registered trademarks                                 | 6         |           |                                                    |           |
| <b>2</b> | <b>Basic safety instructions</b>                      | <b>7</b>  | <b>9</b>  | <b>Commissioning</b>                               | <b>21</b> |
| 2.1      | Requirements for the personnel                        | 7         | 9.1       | Switching ON the measuring device                  | 21        |
| 2.2      | Designated use                                        | 7         | 9.2       | Overview of the operating menu                     | 21        |
| 2.3      | Workplace safety                                      | 7         | 9.3       | Configuring the measuring device                   | 21        |
| 2.4      | Operational safety                                    | 8         | 9.3.1     | Identification                                     | 21        |
| 2.5      | Product safety                                        | 8         | 9.3.2     | Configuring system units                           | 22        |
| 2.6      | IT security                                           | 8         | 9.3.3     | Setting the installation direction and measurement | 22        |
| 2.7      | Device-specific IT security                           | 8         | 9.3.4     | Configuring the IO modules                         | 23        |
| 2.7.1    | Access via the SmartBlue App                          | 8         | 9.3.5     | Totalizer                                          | 28        |
| 2.7.2    | Protecting access via a password                      | 8         | 9.3.6     | Configuring the display                            | 29        |
| 2.7.3    | Access via Bluetooth® wireless technology             | 9         | 9.3.7     | Security                                           | 30        |
|          |                                                       |           | 9.3.8     | Data management                                    | 30        |
|          |                                                       |           | 9.4       | Pending diagnostic events                          | 31        |
|          |                                                       |           | 9.4.1     | Simulation                                         | 31        |
|          |                                                       |           | 9.5       | System                                             | 31        |
| <b>3</b> | <b>Incoming acceptance and product identification</b> | <b>10</b> | <b>10</b> | <b>Operational</b>                                 | <b>33</b> |
| 3.1      | Incoming acceptance                                   | 10        | 10.1      | Offline quick view of the configuration            | 33        |
| 3.2      | Product identification                                | 10        |           |                                                    |           |
| 3.2.1    | Symbols on measuring device                           | 11        |           |                                                    |           |
| <b>4</b> | <b>Storage and transport</b>                          | <b>12</b> | <b>11</b> | <b>Diagnostics and troubleshooting</b>             | <b>35</b> |
| 4.1      | Storage conditions                                    | 12        | 11.1      | General troubleshooting                            | 35        |
| 4.2      | Transporting the product                              | 12        | 11.2      | Diagnostic information on local display            | 36        |
| 4.3      | Packaging disposal                                    | 12        | 11.2.1    | Diagnostic message                                 | 36        |
| <b>5</b> | <b>Installation</b>                                   | <b>13</b> | 11.3      | Overview of diagnostic events                      | 37        |
| 5.1      | Installation conditions                               | 13        | 11.4      | Device information                                 | 38        |
| 5.1.1    | Mounting position                                     | 13        | 11.5      | Firmware history                                   | 38        |
| 5.2      | Mounting the measuring device                         | 13        |           |                                                    |           |
| <b>6</b> | <b>Electrical connection</b>                          | <b>15</b> | <b>12</b> | <b>Accessories</b>                                 | <b>39</b> |
| 6.1      | Connection conditions                                 | 15        |           |                                                    |           |
| 6.1.1    | Requirements for connecting cables                    | 15        |           |                                                    |           |
| 6.1.2    | Pin assignment, device plug                           | 15        |           |                                                    |           |
| 6.2      | Connecting the measuring device                       | 18        |           |                                                    |           |
| 6.3      | Post-connection check                                 | 18        |           |                                                    |           |
| <b>7</b> | <b>Operation options</b>                              | <b>19</b> | <b>13</b> | <b>Technical data</b>                              | <b>41</b> |
| 7.1      | Access to the operating menu via the SmartBlue app    | 19        | 13.1      | Input                                              | 41        |
|          |                                                       |           | 13.2      | Output                                             | 41        |
|          |                                                       |           | 13.3      | Power supply                                       | 41        |
|          |                                                       |           | 13.4      | Performance characteristics                        | 41        |
|          |                                                       |           | 13.5      | Installation                                       | 41        |
|          |                                                       |           | 13.6      | Environment                                        | 42        |
|          |                                                       |           | 13.7      | Process                                            | 42        |
|          |                                                       |           | 13.8      | Mechanical construction                            | 42        |
|          |                                                       |           | 13.9      | Operability                                        | 43        |
|          |                                                       |           | 13.10     | Certificates and approvals                         | 44        |
|          |                                                       |           | <b>14</b> | <b>Appendix</b>                                    | <b>45</b> |
|          |                                                       |           | 14.1      | Radio approvals                                    | 45        |
|          |                                                       |           | 14.1.1    | Europe                                             | 45        |
|          |                                                       |           | 14.1.2    | Canada and USA                                     | 45        |
|          |                                                       |           | 14.1.3    | India                                              | 45        |

|              |                                   |           |
|--------------|-----------------------------------|-----------|
| 14.1.4       | Singapore .....                   | 45        |
| 14.1.5       | Thailand .....                    | 46        |
| 14.1.6       | Argentina .....                   | 46        |
| 14.1.7       | Taiwan .....                      | 46        |
| 14.1.8       | Brazil .....                      | 46        |
| 14.1.9       | South Korea .....                 | 47        |
| 14.1.10      | Other countries .....             | 47        |
| 14.2         | IO-Link process data .....        | 48        |
| 14.2.1       | Data structure .....              | 48        |
| 14.2.2       | Diagnostic information .....      | 48        |
| 14.3         | IO-Link ISDU parameter list ..... | 49        |
| <b>Index</b> | .....                             | <b>57</b> |

# 1 About this document

## 1.1 Document function

These Operating Instructions contain all the information that is required in 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.

## 1.2 Symbols used

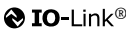
### 1.2.1 Safety symbols

| Symbol                                                                              | Meaning                                                                                                                                    |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|    | <b>DANGER!</b><br>This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury. |
|    | <b>WARNING!</b><br>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. |
|   | <b>CAUTION!</b><br>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.  |
|  | <b>NOTE!</b><br>This symbol contains information on procedures and other facts which do not result in personal injury.                     |

### 1.2.2 Electrical symbols

| Symbol                                                                              | Meaning             |
|-------------------------------------------------------------------------------------|---------------------|
|  | Direct current      |
|  | Alternating current |

### 1.2.3 Communication symbols

| Symbol                                                                              | Meaning                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Bluetooth®</b><br>Wireless data transmission between devices over a short distance.                                                                                                                                                                                                           |
|  | <b>IO-Link</b><br>Communications system for connecting intelligent sensors and actuators to an automation system. The IO-Link technology is standardized under the description "Single-drop digital communication interface for small sensors and actuators (SDCI)" in the IEC 61131-9 standard. |

### 1.2.4 Symbols for certain types of information

| Symbol                                                                              | Meaning                                                                  |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|  | <b>Permitted</b><br>Procedures, processes or actions that are permitted. |
|  | <b>Preferred</b><br>Procedures, processes or actions that are preferred. |

| Symbol                                                                            | Meaning                                                                  |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------|
|  | <b>Forbidden</b><br>Procedures, processes or actions that are forbidden. |
|  | <b>Tip</b><br>Indicates additional information.                          |
|  | Reference to documentation                                               |
|  | Reference to page                                                        |
|  | Reference to graphic                                                     |
|  | Notice or individual step to be observed                                 |
|  | Series of steps                                                          |
|  | Result of a step                                                         |

### 1.2.5 Symbols in graphics

| Symbol       | Meaning      |
|--------------|--------------|
| 1, 2, 3, ... | Item numbers |
| A, B, C, ... | Views        |

## 1.3 Documentation

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

- The *W@M Device Viewer*: Enter the serial number of the measuring device ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer))
- The *Endress+Hauser Operations App*: Enter the serial number of the measuring device or scan the 2-D matrix code on the measuring device.

## 1.4 Registered trademarks

### **IO-Link®**

Is a registered trademark. It may only be used in conjunction with products and services by members of the IO-Link Community or by non-members who hold an appropriate license. For more detailed information on the use of IO-Link, please refer to the rules of the IO-Link Community at: [www.io.link.com](http://www.io.link.com).

### **Bluetooth® wireless technology**



The Bluetooth® word mark and logos are registered trademarks owned by the Bluetooth SIG, Inc. and any use of such marks by Endress+Hauser is under license.

### **Apple®**

Apple, the Apple logo, iPhone, and iPod touch are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

### **Android®**

Android, Google Play and the Google Play logo are trademarks of Google Inc.

## 2 Basic 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 Designated use

#### Application and media

The measuring device described in these Brief Operating Instructions is intended only for flow measurement of liquids with a minimum conductivity of 20  $\mu\text{S}/\text{cm}$ .

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

- ▶ Use the measuring device only for media against which the process-wetted materials are adequately resistant.

#### Incorrect use

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

#### Residual risks

#### WARNING

#### **The electronics and the medium may cause the surfaces to heat up. This presents a burn hazard!**

- ▶ For elevated fluid temperatures, ensure protection against contact to prevent burns.

### 2.3 Workplace safety

For work on and with the device:

- ▶ Wear the required personal protective equipment according to federal/national regulations.

For welding work on the piping:

- ▶ Do not ground the welding unit via the measuring device.

## 2.4 Operational safety

Risk of injury!

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

## 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. Endress+Hauser confirms this by affixing the CE mark to the device.

## 2.6 IT security

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

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

## 2.7 Device-specific IT security

### 2.7.1 Access via the SmartBlue App

Two access levels (user roles) are defined for the device: the **Operator** user role and the **Maintenance** user role. The **Maintenance** user role is the default setting.

If a user-specific access code is not defined (in the **Set access code** parameter), the default setting **0000** continues to apply and the **Maintenance** user role is automatically enabled. The device's configuration data are not write-protected and can be edited at all times.

If a user-specific access code has been defined (in the **Set access code** parameter), all the parameters are write-protected and the device is accessed with the **Operator** user role. The previously defined access code must first be entered again before the **Maintenance** user role is enabled and all the parameters can be write-accessed.

### 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 Bluetooth® interface.

- User-specific access code

Protect write access to the device parameters via the SmartBlue app

- Bluetooth key

The password protects a connection between an operating device (e.g. smartphone, tablet) and the device via the Bluetooth® interface.

**General notes on the use of passwords**

- The access code and Bluetooth 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 Bluetooth key.
- The user is responsible for the management and careful handling of the access code and Bluetooth key.

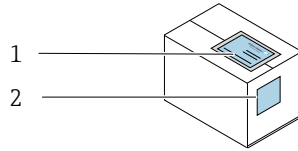
**2.7.3 Access via Bluetooth® wireless technology**

**Secure signal transmission via Bluetooth® wireless technology uses an encryption method tested by the Fraunhofer Institute.**

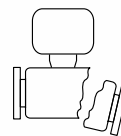
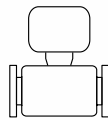
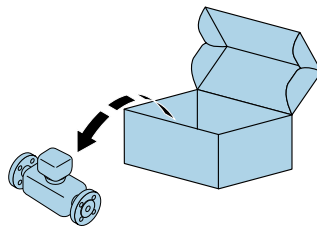
- The device is not visible via *Bluetooth®* wireless technology without the SmartBlue app.
- Only one point-to-point connection is established between the device and a smartphone or tablet.
- The *Bluetooth®* wireless technology interface can be disabled via SmartBlue.

## 3 Incoming acceptance and product identification

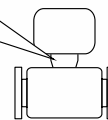
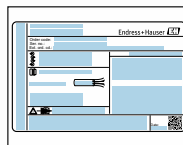
### 3.1 Incoming acceptance



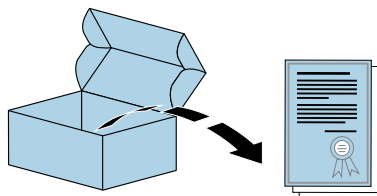
Are the order codes on the delivery note (1) and the product sticker (2) identical?



Are the goods undamaged?



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



Is the accompanying safety data sheet present?



- If one of the conditions is not satisfied, contact your Endress+Hauser Sales Center.
- Depending on the device version, the CD-ROM might not be part of the delivery! The Technical Documentation is available via the Internet or via the *Endress+Hauser Operations App*, see the "Product identification" section .

### 3.2 Product identification

The following options are available for identification of the measuring device:

- The device label
- Order code with breakdown of the device features on the delivery note
- Enter the serial number on the device label in *W@M Device Viewer* ([www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)): all the information about the measuring device is displayed.
- Enter the serial number on the device label into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the measuring device with the *Endress+Hauser Operations App*: all the information about the measuring device is displayed.

### 3.2.1 Symbols on measuring device

| Symbol                                                                            | Meaning                                                                                                                                    |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>WARNING!</b><br>This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury. |
|  | <b>Reference to documentation</b><br>Refers to the corresponding device documentation.                                                     |

## 4 Storage and transport

### 4.1 Storage conditions

Observe the following notes for storage:

- ▶ Store in the original packaging to ensure protection from shock.
- ▶ Store in a dry place.
- ▶ Do not store outdoors.

Storage temperature →  42

### 4.2 Transporting the product

Transport the 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.

### 4.3 Packaging disposal

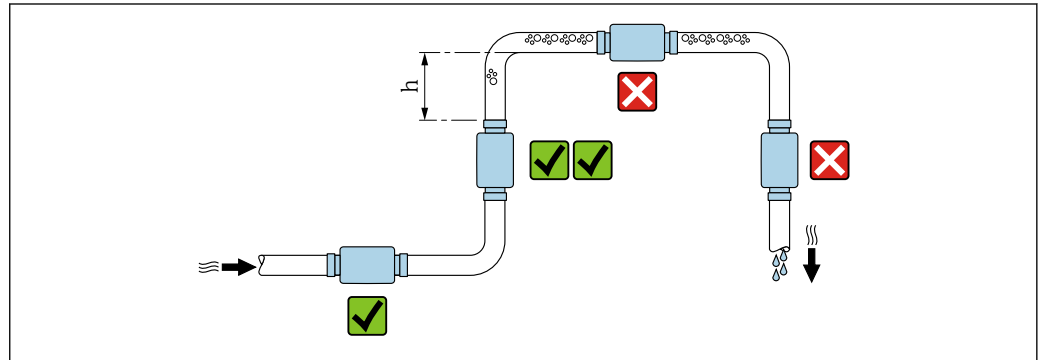
All packaging materials are environmentally friendly and 100% recyclable:  
Carton in accordance with European Packaging Directive 94/62EC; recyclability is confirmed by the affixed RESY symbol.

## 5 Installation

### 5.1 Installation conditions

#### 5.1.1 Mounting position

##### Mounting location

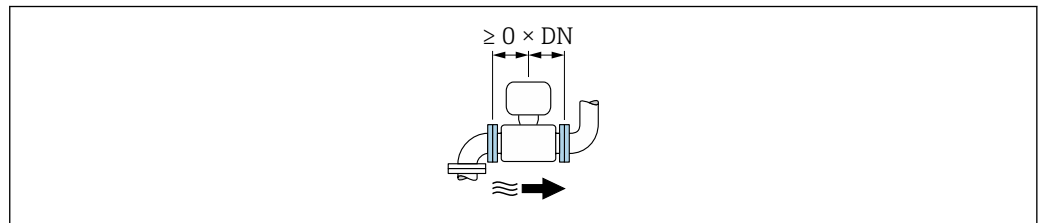


A0032998

Preferably install the sensor in an ascending pipe, and ensure a sufficient distance to the next pipe elbow:  $h \geq 2 \times DN$

##### Inlet and outlet runs

No inlet and outlet runs need to be considered.



A0032859

**i** Installation dimensions: information on the dimensions and installed lengths of the device → 42

**i** The arrow points in the preferred direction of flow. Measurement in the other direction is also possible. → 22

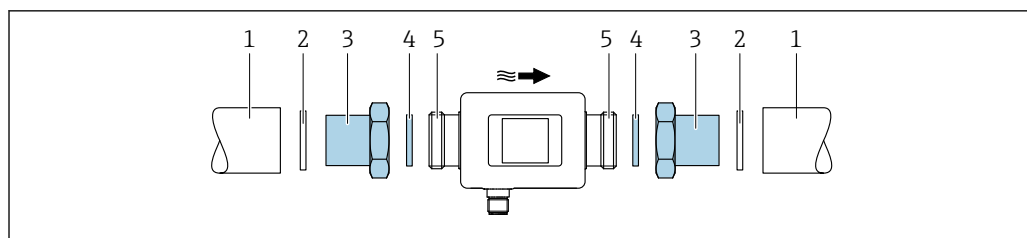
### 5.2 Mounting the measuring device

#### **⚠ WARNING**

##### Burn hazard!

If medium temperatures or ambient temperatures exceed 50 °C, areas of the housing can heat to over 65 °C.

- Safeguard the housing so that it cannot be touched accidentally.



A0033002

- 1 Pipe
- 2 Seal (not supplied)
- 3 Adapter: available adapters →  39
- 4 Seal (included in delivery)
- 5 Measuring device connection

## 6 Electrical connection

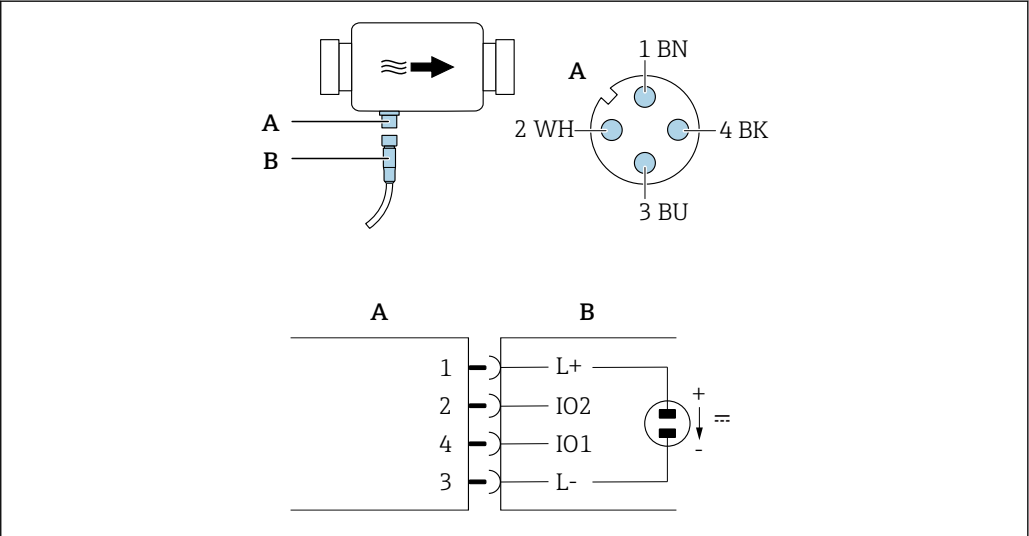
### 6.1 Connection conditions

#### 6.1.1 Requirements for connecting cables

National regulations and standards apply.

|                         |                                                                              |
|-------------------------|------------------------------------------------------------------------------|
| Connecting cable        | M12 × 1 A-coded                                                              |
| Conductor cross-section | At least 0.12 mm <sup>2</sup> (AWG26)                                        |
| Temperature range       | −10 to +90 °C (+14 to +194 °F)                                               |
| Degree of protection    | IP65/67, pollution degree 3                                                  |
| Humidity and moisture   | Suitable for indoor environments with up to 100% rh (wet and damp locations) |

#### 6.1.2 Pin assignment, device plug

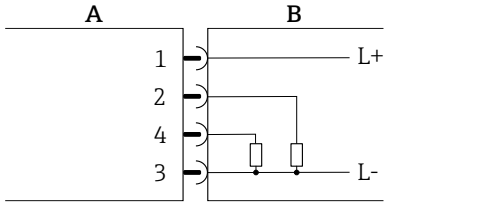
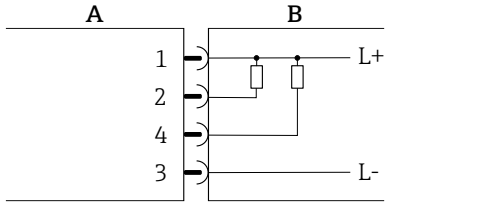


A Connector (Picomag)  
B Socket (Customer side)

| Pin | Assignment | Color | Description                                            |
|-----|------------|-------|--------------------------------------------------------|
| 1   | L+         | Brown | Supply voltage + (18 to 30 V <sub>DC</sub> /max. 3 W)  |
| 2   | IO2        | White | Input/output 2, can be configured independently of IO1 |
| 3   | L-         | Blue  | Supply voltage -                                       |
| 4   | IO1        | Black | Input/output 1, can be configured independently of IO2 |

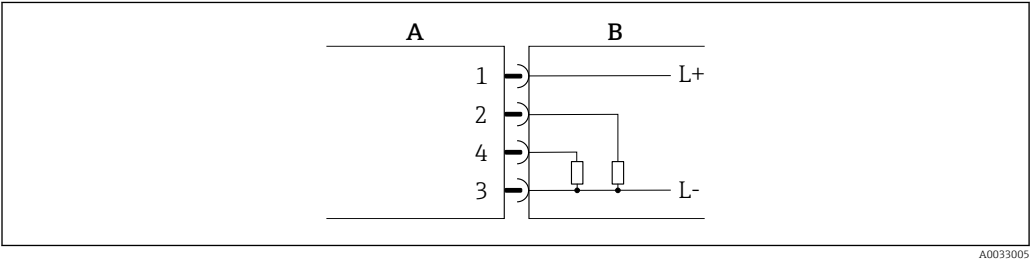
Switch output configuration version

The switching behaviour of IO1 and IO2 can be configured independently of one another.

| pnp <sup>1)</sup>                                                                                                                                                                                                                                                                                                                      | npn <sup>2)</sup>                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div><p>A0033005</p><p>A Connector (Picomag)<br/>B Socket (Customer side)<br/>L+ Supply voltage +<br/>L- Supply voltage -</p><p>The load is switched to high side L+. The maximum load current is 250 mA. The output is overload-resistant.</p></div> | <div><p>A0033006</p><p>A Connector (Picomag)<br/>B Socket (Customer side)<br/>L+ Supply voltage +<br/>L- Supply voltage -</p><p>The load is switched to low side L-. The maximum load current is 250 mA. The output is overload-resistant.</p></div> |

- 1) positive negative positive (high side switch)
- 2) negative positive negative (low side switch)

Pulse output configuration version

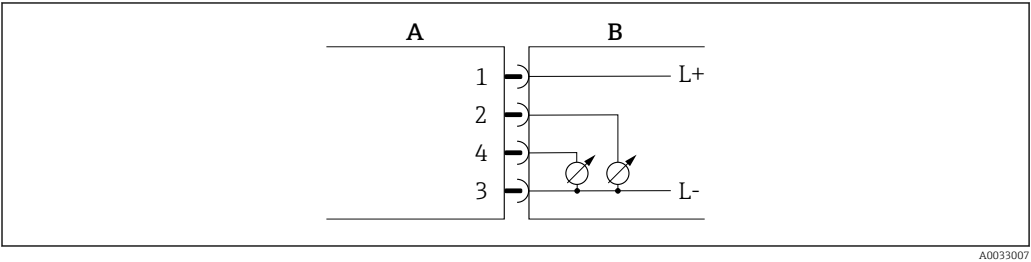


1 Pulse output with pnp switching behaviour

- A Connector (Picomag)
- B Socket (Customer side)
- L+ Supply voltage +
- L- Supply voltage -

The load is switched to high side L+. The maximum load current is 250 mA. The output is overload-resistant.

Current output configuration version

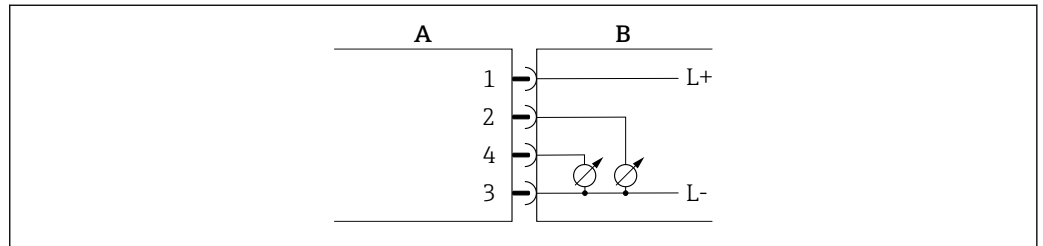


2 Current output, active, 4 to 20 mA

- A Connector (Picomag)
- B Socket (Customer side)
- L+ Supply voltage +
- L- Supply voltage -

The current flows from the output to L-. The maximum load may not exceed 500  $\Omega$ . A bigger load distorts the output signal.

### Voltage output configuration version



A0033007

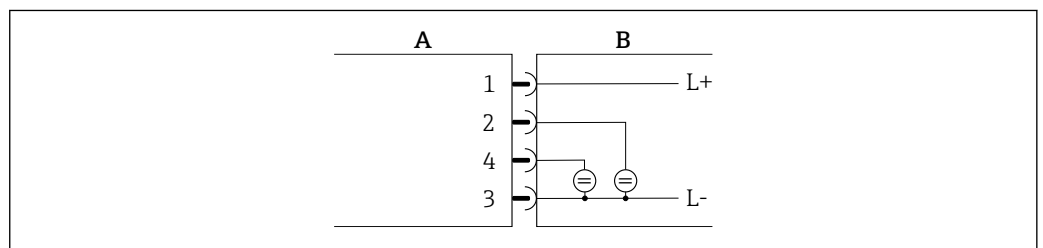
3 Voltage output, active, 2 to 10 V

A Connector (Picomag)  
 B Socket (Customer side)  
 L+ Supply voltage +  
 L- Supply voltage -

The voltage from the output applies to L-. The load must be at least 500  $\Omega$ . The output is overload-resistant.

### Status input configuration version

- 15 V (switch-on threshold)
- 5 V (switch-off threshold)



A0033008

4 Status input

A Connector (Picomag)  
 B Socket (Customer side)  
 L+ Supply voltage +  
 L- Supply voltage -

Internal resistance: 7.5 k $\Omega$

### IO-Link configuration version

 Option only available for output 1 in the **Output 1** →  23 submenu

The measuring device features an IO-Link communication interface with a baud rate of 38,400 and with a second IO function on pin 2. This requires an IO-Link compatible module (IO-Link master) for operation. The IO-Link communication interface allows direct access to the process and diagnostics data.

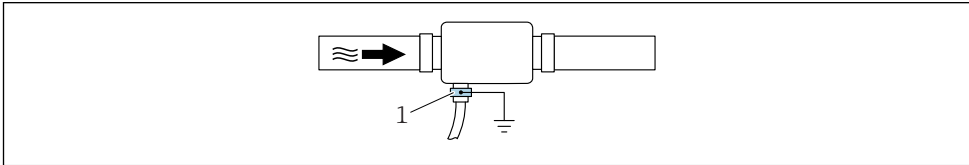
## 6.2 Connecting the measuring device

**NOTICE**

The measuring device may only be installed by properly trained technicians.

- ▶ Comply with national and international regulations regarding the installation of electrotechnical systems.
- ▶ Power supply according to EN 50178, SELV, PELV or Class 2.

1. De-energize the system.
2. Connect the measuring device via the connector.
- 3.



A0033003

In the case of non-grounded pipes:  
The device must be grounded using the ground terminal accessory.

## 6.3 Post-connection check

|                                                                           |                          |
|---------------------------------------------------------------------------|--------------------------|
| Are cables or the device undamaged (visual inspection)?                   | <input type="checkbox"/> |
| Do the cables have adequate strain relief?                                | <input type="checkbox"/> |
| Is the connector connected correctly?                                     | <input type="checkbox"/> |
| Does the supply voltage match the specifications on the measuring device? | <input type="checkbox"/> |
| Is the pin assignment of the connector correct?                           | <input type="checkbox"/> |
| Is the potential equalization established correctly?                      | <input type="checkbox"/> |

## 7 Operation options

### 7.1 Access to the operating menu via the SmartBlue app

The device can be operated and configured via the SmartBlue app. In this case, the connection is established via the Bluetooth® wireless technology interface.

#### Supported functions

- Device selection in Live List and access to the device (login)
- Configuration of the device
- Access to measured values, device status and diagnostics information

The SmartBlue app is available for free download for Android devices (Google Playstore) and iOS devices (iTunes Apple Shop) : *Endress+Hauser SmartBlue*

Directly to the app with the QR code:



#### System requirements

- Devices with iOS:  
iOS9.0 or higher
- Devices with Android:  
Android 4.4 KitKat or higher

Download the SmartBlue app:

1. Install and start the SmartBlue app.
  - ↳ A Live List shows all the devices available.  
The list displays the devices with the configured tag name. The default setting for the tag name is **EH\_DMA\_XYZZ** (XYZZ = the last 7 digits of the device serial number).
2. For Android devices, activate GPS positioning (not necessary for devices with IOS)
3. Select the device from the Live List.
  - ↳ The Login dialog box opens.

Logging in:

4. Enter the user name: **admin**.
  5. Enter the initial password: serial number of the device.
    - ↳ When you log in for the first time, a message is displayed advising you to change the password.
  6. Confirm your entry.
    - ↳ The main menu opens.
  7. Optional: Change the password:
-  Navigate through the various items of information about the device: swipe the screen to the side.

## 8 System integration

The measuring device has an IO-Link communication interface. The IO-Link interface allows direct access to process and diagnostics data and enables the user to configure the measuring device on the fly.

Properties:

- IO-Link Specification: Version 1.1
- IO-Link Smart Sensor Profile 2nd Edition
- SIO mode: yes
- Speed: COM2 (38.4 kBaud)
- Minimum cycle time: 10 ms
- Process data width: 120 bit
- IO-Link data storage: yes
- Block configuration: no
- Device operational: The measuring device is operational 4 seconds after the supply voltage is applied

 More information on IO-Link is available at [www.io-link.com](http://www.io-link.com)

 Overview of the entire IO-Link ISDU parameter list →  49

### 8.1 Overview of device description files

*Current version data for the device*

|                                  |                                                                                         |                                                                                                                                                                                        |
|----------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Firmware version                 | 01.01.zz                                                                                | <ul style="list-style-type: none"> <li>■ On the title page of the Operating Instructions</li> <li>■ On the device label</li> <li>■ <b>Firmware version</b> system parameter</li> </ul> |
| Release date of firmware version | 05.2019                                                                                 | ---                                                                                                                                                                                    |
| Profile version                  | <ul style="list-style-type: none"> <li>■ 1.1</li> <li>■ Smart Sensor Profile</li> </ul> | ---                                                                                                                                                                                    |

### 8.2 Device master file

In order to integrate field devices into a digital communication system, the IO-Link system needs a description of the device parameters, such as output data, input data, data format, data volume and supported transmission rate.

These data are available in the device master file (IODD <sup>1)</sup>) which is provided to the IO-Link Master via generic modules when the communication system is commissioned.

-  The IODD can be downloaded as follows:
- Endress+Hauser: [www.endress.com](http://www.endress.com)
  - IODDfinder: [ioddfinder.io-link.com](http://ioddfinder.io-link.com)

1) IO Device Description

## 9 Commissioning

### 9.1 Switching ON the measuring device

Once the supply voltage has been switched on, the measuring device adopts the normal mode after a maximum of 4 s. During the start-up phase, the outputs are in the same state as the measuring device in the switched-off state.

### 9.2 Overview of the operating menu

Overview of the operating menu

|             |                      |        |
|-------------|----------------------|--------|
| Guidance    | ► Identification     | → ⓘ 21 |
|             | ► System units       | → ⓘ 22 |
|             | ► Sensor             | → ⓘ 22 |
|             | ► Output 1           | → ⓘ 23 |
|             | ► Output 2           | → ⓘ 23 |
|             | ► Totalizer          | → ⓘ 28 |
|             | ► Display            | → ⓘ 29 |
|             | ► Security           | → ⓘ 30 |
|             | ► Data management    | → ⓘ 30 |
| Diagnostics | ► Actual diagnostics | → ⓘ 31 |
|             | ► Simulation         | → ⓘ 31 |
| System      | ► Data management    | → ⓘ 31 |
|             | ► Firmware           | → ⓘ 31 |

### 9.3 Configuring the measuring device

#### 9.3.1 Identification

The device tag and the user level can be changed in the **Identification** submenu.

##### Navigation

Menu: "Guidance" → Identification

### 9.3.2 Configuring system units

In the **System units** submenu, you can configure the units of all measured values.

#### Navigation

Menu: "Guidance" → System units

*Parameter overview with brief description*

| Parameter         | Description                       | Selection                                                                                                                                                       | Factory setting |
|-------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Volume flow unit  | Select volume flow unit.          | <ul style="list-style-type: none"> <li>l/s, m<sup>3</sup>/h, l/min, l/h</li> <li>gal/min (us), fl. oz/min</li> </ul>                                            | l/min           |
| Volume unit       | Select volume unit.               | <ul style="list-style-type: none"> <li>ml, l, m<sup>3</sup></li> <li>fl. oz (us), gal (us)</li> </ul>                                                           | ml              |
| Temperature unit  | Select temperature unit.          | <ul style="list-style-type: none"> <li>°C</li> <li>°F</li> </ul>                                                                                                | °C              |
| Totalizer unit    | Select totalizer unit.            | <ul style="list-style-type: none"> <li>l, m<sup>3</sup></li> <li>1 000 l, 1 000 m<sup>3</sup></li> <li>fl. oz (us), gal (us)</li> <li>1 000 gal (us)</li> </ul> | m <sup>3</sup>  |
| Conductivity unit | Select the unit for conductivity. | <ul style="list-style-type: none"> <li>µS/cm</li> <li>S/m</li> <li>ms/cm</li> </ul>                                                                             | µS/cm           |

### 9.3.3 Setting the installation direction and measurement

The **Sensor** submenu contains parameters for specific settings of the measuring device.

#### Navigation

Menu: "Guidance" → Sensor

*Parameter overview with brief description*

| Parameter              | Description                                                  | Selection/input                                                                                                                                                                                                                                                                                                                           | Factory setting                                                                                                                                                                                     |
|------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Installation direction | Select the installation direction.                           | <ul style="list-style-type: none"> <li>Flow in arrow direction (forwards)<br/>Positive flow measurement in the direction of the arrow.</li> <li>Flow against arrow direction (backwards)<br/>Positive flow measurement in the opposite direction of the arrow.</li> </ul>                                                                 | Flow in arrow direction (forwards)                                                                                                                                                                  |
| On value               | Enter the on value for low flow cut off.                     | Positive floating point number<br> A flow measured value that is less than the value of the on value forces the display to zero. In the event of plant downtime, this prevents the totalizer from continuing to totalize even though there is no flow. | Depends on the nominal diameter:<br>DN 15 (½"): 0.05 l/min (0.013 gal/min)<br>DN 20 (¾"): 0.1 l/min (0.026 gal/min)<br>DN 25 (1"): 0.2 l/min (0.052 gal/min)<br>DN 50 (2"): 1.5 l/min (0.4 gal/min) |
| Damping                | Enter the time constant for damping the flow measured value. | 0 to 10 s                                                                                                                                                                                                                                                                                                                                 | 0 s                                                                                                                                                                                                 |

### 9.3.4 Configuring the IO modules

The measuring device has two signal inputs or signal outputs that can be configured independently of one another:

- Current output →  23
- Pulse output →  24
- Switch output →  25
- Voltage output →  26
- Status input →  28

#### Navigation

Menu: "Guidance" → Output 1

Menu: "Guidance" → Output 2

#### Parameter overview with brief description

| Parameter | Description                            | Selection                                                                                                                                                                                                | Factory setting |
|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Output 1  | Select the operating mode of output 1. | <ul style="list-style-type: none"> <li>■ Pulse output</li> <li>■ Current output</li> <li>■ Switch output</li> <li>■ Voltage output</li> <li>■ Digital input</li> <li>■ IO-Link</li> <li>■ Off</li> </ul> | IO-Link         |
| Output 2  | Select the operating mode of output 2. | <ul style="list-style-type: none"> <li>■ Current output</li> <li>■ Switch output</li> <li>■ Voltage output</li> <li>■ Digital input</li> <li>■ Off</li> </ul>                                            | Off             |

### Configuring the current output

The Current output submenu contains all the parameters that must be configured for the configuration of the current output.

The output is used to output process variables by analog means in the form of a 4-20 mA current.

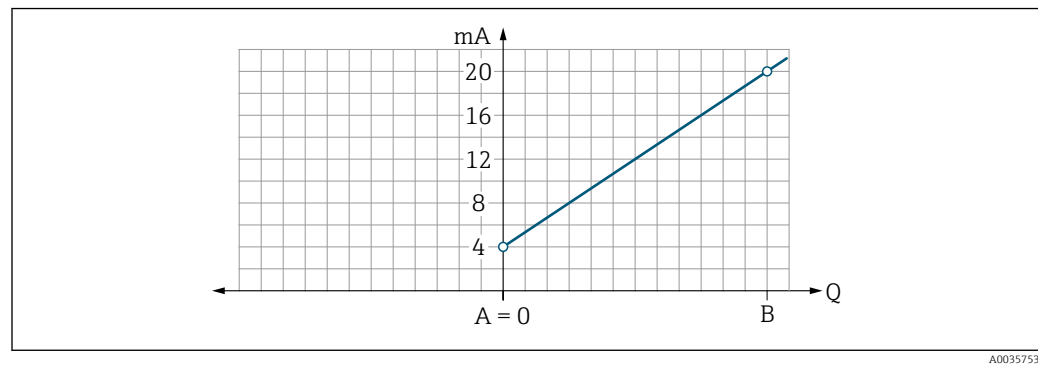
#### Navigation

Menu: "Guidance" → Output 1 → Current output

Menu: "Guidance" → Output 2 → Current output

#### Parameter overview with brief description

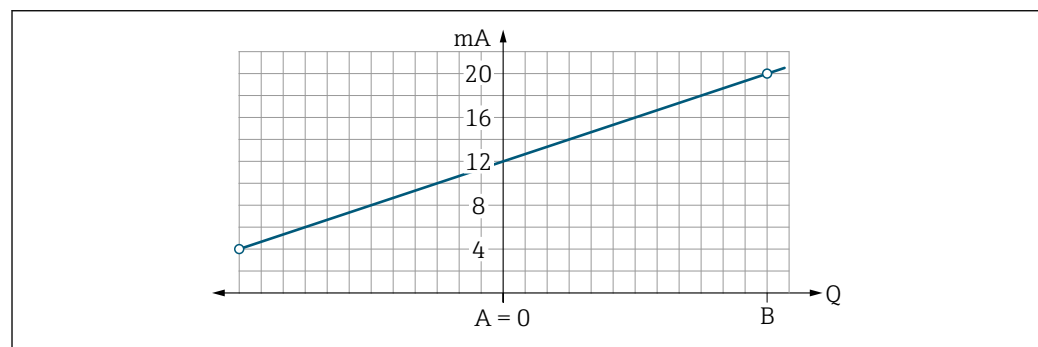
| Parameter             | Description                                 | Selection/input                                                                                                               | Factory setting                                                                                                                                                                                |
|-----------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Assign current output | Select process variable for current output. | <ul style="list-style-type: none"> <li>■ Off</li> <li>■ Volume flow</li> <li>■ Temperature</li> <li>■ Conductivity</li> </ul> | Volume flow                                                                                                                                                                                    |
| 4 mA value            | Enter 4 mA value.                           | Floating point number with sign                                                                                               | 0 l/min                                                                                                                                                                                        |
| 20 mA value           | Enter 20 mA value.                          | Floating point number with sign                                                                                               | Depends on the nominal diameter:<br>DN 15 (½"): 25 l/min (6.6 gal/min)<br>DN 20 (¾"): 50 l/min (13.2 gal/min)<br>DN 25 (1"): 100 l/min (26.4 gal/min)<br>DN 50 (2"): 750 l/min (198.1 gal/min) |

*Unidirectional flow measurement (Q), conductivity measurement*

A0035753

A Lower range value = 0  
 B Upper range value  
 Q Flow

- Current I is linearly interpolated between lower range value (A) and upper range value (B).
- The output range ends at 20.5 mA.

*Bidirectional flow measurement (Q), temperature measurement (T)*

A0035754

A Lower range value  
 B Upper range value  
 Q Flow

- Current I is linearly interpolated between lower range value (A) and upper range value (B).
- Rather than having a hard upper and lower limit, the output range ends at 20.5 mA at the top end and at 3.8 mA at the bottom end.

**Configuring the pulse output**

The Pulse output submenu contains all the parameters that must be configured for the configuration of the pulse output.

**Navigation**

Menu: "Guidance" → Output 1

Menu: "Guidance" → Output 2

*Parameter overview with brief description*

| Parameter       | Description                           | User entry                      | Factory setting                                                                                                           |
|-----------------|---------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Value per pulse | Enter the value for the pulse output. | Floating point number with sign | Depends on the nominal diameter:<br>DN 15 (½"): 0.5 ml<br>DN 20 (¾"): 1.0 ml<br>DN 25 (1"): 2.0 ml<br>DN 50 (2"): 10.0 ml |

The current pulse repetition frequency is calculated from the current flow and the configured pulse value:

Pulse repetition frequency = flow/pulse value

**Example**

- Flow: 300 ml/min
- Pulse value: 0.001 l
- Pulse repetition frequency = 5 000 Pulse/s

The pulse output only outputs positive flow components in the set installation direction. Negative flow components are ignored and not balanced.

**Configuring the switch output**

The Switch output submenu contains all the parameters that must be configured for the configuration of the switch output.

**Navigation**

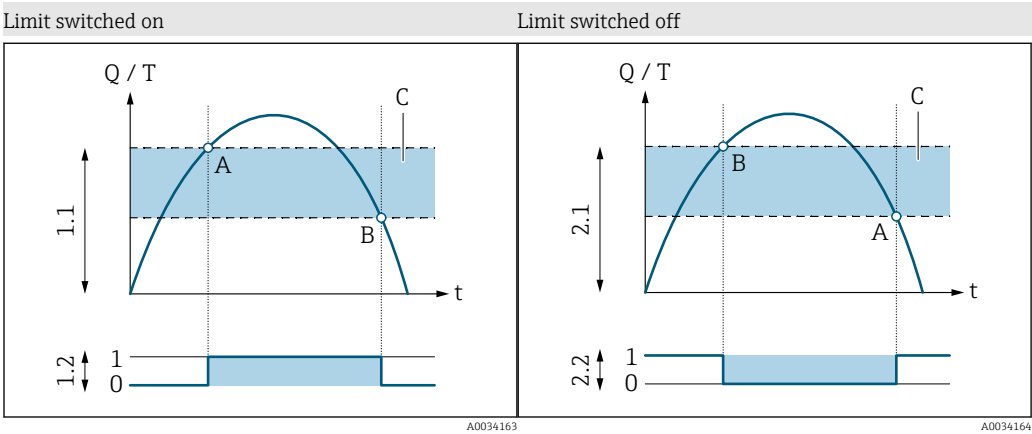
Menu: "Guidance" → Output 1

Menu: "Guidance" → Output 2

*Parameter overview with brief description*

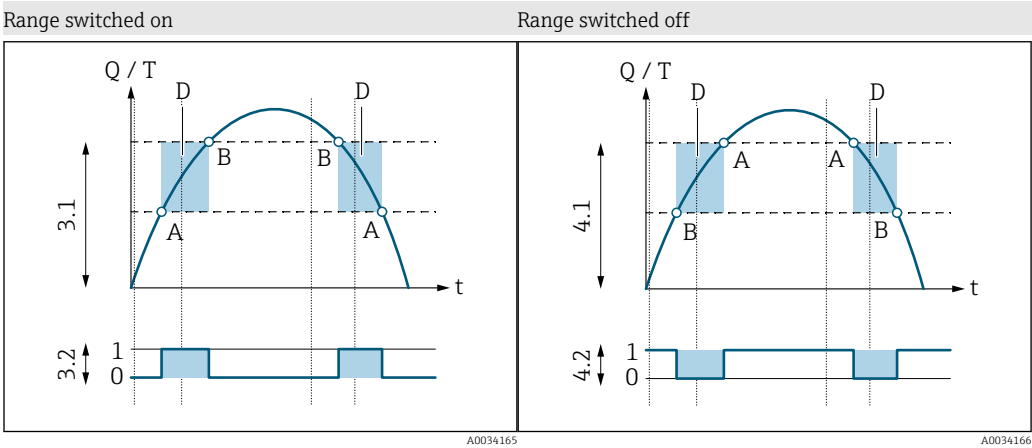
| Parameter              | Description                    | Selection/input                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Factory setting        |
|------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Polarity               | Select the switching behavior. | <ul style="list-style-type: none"> <li>■ NPN (low-side-switch)<br/>Switches load to low side to L-</li> <li>■ PNP (high-side-switch)<br/>Switches load to high side to L+</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | PNP (high-side-switch) |
| Switch output function |                                | <ul style="list-style-type: none"> <li>■ Off<br/>The switch output is permanently switched off (open, non-conductive).</li> <li>■ On<br/>The switch output is permanently switched on (closed, conductive).</li> <li>■ Diagnostic behavior<br/>The output switches when an event with the status signal F occurs</li> <li>■ Limit volume flow<br/>Indicates if a specified limit value is reached for the process variable.</li> <li>■ Limit temperature<br/>Indicates if a specified limit value is reached for the process variable.</li> <li>■ Limit conductivity. Indicates if a specified limit value is reached for the process variable.</li> <li>■ Limit volume totalizer Range volume totalizer</li> <li>■ Range volume flow</li> <li>■ Range temperature</li> <li>■ Range conductivity</li> <li>■ Range volume totalizer</li> <li>■ Empty pipe detection<br/>Output switches off if empty pipe detection is activated.</li> </ul> | Off                    |

| Parameter        | Description                                        | Selection/input                 | Factory setting |
|------------------|----------------------------------------------------|---------------------------------|-----------------|
| Switch-on value  | Enter the measured value for the switch-on value.  | Floating point number with sign | 1000 m³/h       |
| Switch-off value | Enter the measured value for the switch-off value. | Floating point number with sign | 1000 m³/h       |



- 1.1 Input variables
- 1.2 Switch output
- A Switch-on value
- B Switch-off value
- C Hysteresis

- 2.1 Input variables
- 2.2 Switch output
- A Switch-on value
- B Switch-off value
- C Hysteresis



- 3.1 Input variables
- 3.2 Switch output
- A On-value (lower range limit)
- B Off-value (upper range limit)
- D Window

- 4.1 Input variables
- 4.2 Switch output
- A On-value (lower range limit)
- B Off-value (upper range limit)
- D Window

Configuring the voltage output

The Voltage output submenu contains all the parameters that must be configured for the configuration of the voltage output.

Navigation

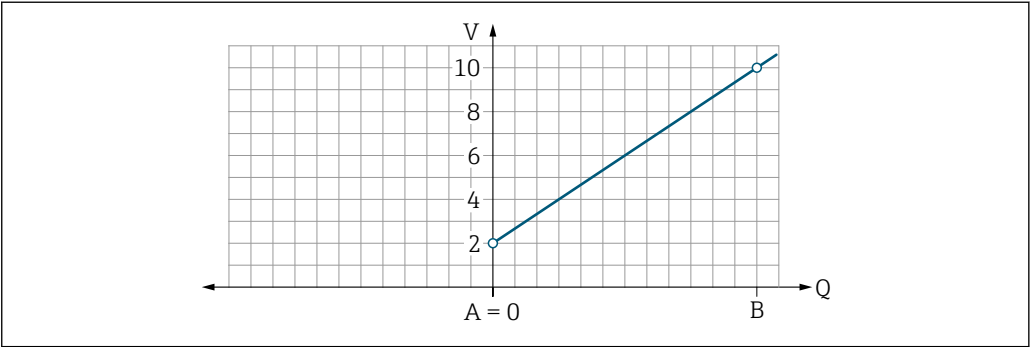
Menu: "Guidance" → Output 1

Menu: "Guidance" → Output 2

Parameter overview with brief description

| Parameter             | Description                                 | Selection/input                                                                                                                      | Factory setting                                                                                                                    |
|-----------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Assign voltage output | Select process variable for voltage output. | <div><div></div> Off</div> <div><div></div> Volume flow</div> <div><div></div> Temperature</div> <div><div></div> Conductivity</div> | Volume flow                                                                                                                        |
| 2 V value             | Enter the lower range value.                | Floating point number with sign                                                                                                      | 0 l/min                                                                                                                            |
| 10 V value            | Enter the upper range value.                | Floating point number with sign                                                                                                      | Depends on the nominal diameter:<br>DN 15 (½"): 25 l/min<br>DN 20 (¾"): 50 l/min<br>DN 25 (1"): 100 l/min<br>DN 50 (2"): 750 l/min |

Unidirectional flow measurement (Q), conductivity measurement

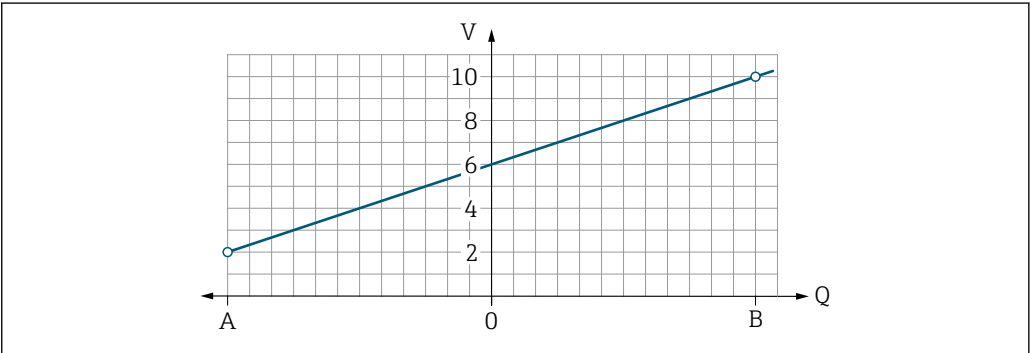


A0032995

- A Lower range value = 0
- B Upper range value
- Q Flow

- Voltage U is linearly interpolated between lower range value (A) and upper range value (B).
- The output range ends at 10.25 V.

Bidirectional flow measurement (Q), temperature measurement (T)



A0032996

- A Lower range value
- B Upper range value
- Q Flow

- Voltage U is linearly interpolated between lower range value (A) and upper range value (B).
- Rather than having a hard upper and lower limit, the output range ends at 10.25 V at the top end and at 1.9 V at the bottom end.

### Configuring the status input

The **Digital input** submenu contains all the parameters that must be configured for the configuration of the digital input.

The input is used to control an action with an external voltage signal. The minimum pulse duration is 100 ms.

### Navigation

Menu: "Guidance" → Output 1

Menu: "Guidance" → Output 2

#### Parameter overview with brief description

| Parameter           | Description                                         | Selection                                                                                                                                                                                                                                                                | Factory setting |
|---------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Active level        | Select the switching behavior of the digital input. | <ul style="list-style-type: none"> <li>■ High<br/>Input reacts to high level</li> <li>■ Low<br/>Input reacts to low level</li> </ul>                                                                                                                                     | High            |
| Assign status input | Select the function for the status input.           | <ul style="list-style-type: none"> <li>■ Off</li> <li>■ Reset totalizer<br/>Resets the totalizer</li> <li>■ Flow override <ul style="list-style-type: none"> <li>– Flow measured value = 0</li> <li>– Does not affect the temperature measurement</li> </ul> </li> </ul> | Reset totalizer |

## 9.3.5 Totalizer

The totalizer can be reset with the **Reset totalizer** submenu.

### Navigation

Menu: "Guidance" → Totalizer

#### Parameter overview with brief description

| Parameter        | Description          | Display/options                                                                                                                                    | Factory setting  |
|------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| Volume totalizer | Enter value.         | Floating point number with sign                                                                                                                    | 0 m <sup>3</sup> |
| Reset totalizer  | Reset the totalizer. | <ul style="list-style-type: none"> <li>■ Cancel<br/>The totalizer is not reset.</li> <li>■ Reset + totalize<br/>The totalizer is reset.</li> </ul> | Cancel           |

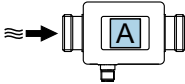
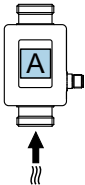
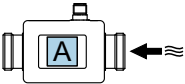
### 9.3.6 Configuring the display

The **Display** submenu contains all the parameters that can be configured for the configuration of the onsite display.

#### Navigation

Menu: "Guidance" → Display

#### Parameter overview with brief description

| Parameter        | Description                                          | Selection/input                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Factory setting           |
|------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Format display   | Select how measured values are shown on the display. | Display value 1st line + display value 2nd line: <ul style="list-style-type: none"> <li>■ Volume flow + temperature</li> <li>■ Volume flow + totalizer</li> <li>■ Temperature + totalizer</li> <li>■ Volume flow + conductivity</li> <li>■ Totalizer + conductivity</li> <li>■ Temperature + conductivity</li> </ul> 4 display values:<br>Volume flow + temperature + totalizer + conductivity<br>2 display values (multiplex):<br>Volume flow +totalizer / temperature + conductivity                                                                                                                                                                                                                                                                                                                                                                                                                                                | Volume flow + temperature |
| Rotation display | Select local display rotation.                       | <ul style="list-style-type: none"> <li>■ Auto (automatic)</li> <li>■ The display rotates automatically depending on the installation position</li> </ul> <div style="text-align: center;">  </div> <small>A0033013</small><br><ul style="list-style-type: none"> <li>■ 0°</li> <li>■ Can be read in the horizontal installation position with flow from left to right</li> </ul> <div style="text-align: center;">  </div> <small>A0033014</small><br><ul style="list-style-type: none"> <li>■ 180°</li> <li>■ Can be read in the horizontal installation position with flow from right to left</li> </ul> <div style="text-align: center;">  </div> <small>A0033015</small> | Auto                      |

| Parameter | Description                            | Selection/input                                                                                                                                                                                                                  | Factory setting |
|-----------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
|           |                                        | <ul style="list-style-type: none"> <li>270°</li> <li>Can be read in the vertical installation position with flow from top to bottom</li> </ul>  |                 |
| Backlight | Set the intensity of the backlighting. | 0 to 100 %                                                                                                                                                                                                                       | 50 %            |

### 9.3.7 Security

The **Security** submenu contains all the parameters required to define a new access code and to configure the Bluetooth connection.

#### Navigation

Menu: "Guidance" → Security

*Parameter overview with brief description*

| Parameter                 | Description                                                                                                                                                                                                                                  | Entry/selection/display                                                                                                                                                                                                         | Factory setting |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Define access code        | Enter a user-specific access code to restrict write access to parameters.                                                                                                                                                                    | Max. 4-digit string of numbers                                                                                                                                                                                                  | 0000            |
| Bluetooth                 | Enable or disable the <i>Bluetooth®</i> wireless technology interface.<br> If the interface is disabled, it can only be re-enabled by tapping the device. | <ul style="list-style-type: none"> <li>Disable               <ul style="list-style-type: none"> <li>Disable the interface.</li> <li>The connection to the measuring device is torn down.</li> </ul> </li> <li>Enable</li> </ul> | Enable          |
| Change Bluetooth password | Change Bluetooth password                                                                                                                                                                                                                    | Character string comprising numbers, letters and special characters                                                                                                                                                             | -               |

#### Enable Bluetooth by tapping the device

1. Activate Bluetooth by tapping on the housing three times.
2. Establish a connection to the device via the SmartBlue app.

### 9.3.8 Data management

#### Export configuration as report

The device configuration can be exported as a PDF report and saved in the mobile terminal or forwarded with this function.

#### Save configuration to file

The device configuration is saved in the app. The saved device configuration can be transferred to another Picomag using the System → "Load configuration from app" function.

#### Navigation

Menu: "Guidance" → Data management

## 9.4 Pending diagnostic events

### Navigation

Menu: "Diagnostics"

*Parameter overview with brief description*

| Parameter                   | Prerequisite                                                  | Description                                                                                                                                                                                                                                                                    | Display                                                            |
|-----------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Actual diagnostic           | A diagnostic event has occurred.                              | Displays the current diagnostic event along with the diagnostic information.<br> If two or more messages occur simultaneously, the message with the highest priority is shown on the display. | Symbol for diagnostic behavior, diagnostic code and short message. |
| Simulation process variable | Enable variables for the simulation of the process variables. | <ul style="list-style-type: none"> <li>■ Off<br/>Variables are disabled.</li> <li>■ On<br/>Variables are enabled.</li> </ul>                                                                                                                                                   | -                                                                  |
| Volume flow value           | Enter the value for volume flow simulation.                   | Positive floating point number                                                                                                                                                                                                                                                 | -                                                                  |
| Temperature value           | Enter the value for temperature simulation.                   | Positive floating point number                                                                                                                                                                                                                                                 | -                                                                  |
| Conductivity value          | Enter the value for conductivity simulation                   | Positive floating point number                                                                                                                                                                                                                                                 | -                                                                  |

### 9.4.1 Simulation

The **Simulation** submenu enables you to simulate, without a real flow situation, various process variables in the process and the device alarm mode and to verify downstream signal chains (switching valves or closed-control loops).

### Navigation

Menu: "Diagnostics"

*Parameter overview with brief description*

| Parameter                   | Description                                   | Selection/input                                                                                                                                                                                                                                                                         | Factory setting |
|-----------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Simulation process variable | Activate the simulation of process variables. | <ul style="list-style-type: none"> <li>■ Off<br/>Simulation is deactivated.</li> <li>■ On<br/>Simulation is activated.</li> </ul>  Deactivate the simulation again once the test has been performed. | Off             |
| Volume flow value           | Enter the value for volume flow simulation.   | Positive floating point number                                                                                                                                                                                                                                                          | -               |
| Temperature value           | Enter the value for temperature simulation.   | Positive floating point number                                                                                                                                                                                                                                                          | -               |
| Conductivity value          | Enter the value for conductivity simulation   | Positive floating point number                                                                                                                                                                                                                                                          | -               |

## 9.5 System

The **System** submenu contains all the parameters that can be used for the administration of the device.

### Navigation

## Menu: "System"

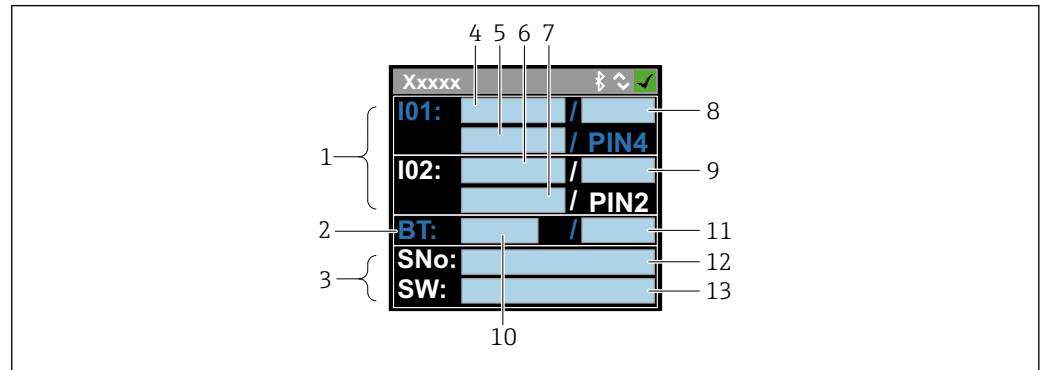
*Parameter overview with brief description*

| Parameter                      | Description                                                                                                                                                                    | Entry/selection/display                                                                                             | Factory setting |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------|
| Access status tooling          | Displays the access status.                                                                                                                                                    | <ul style="list-style-type: none"> <li>■ Operator</li> <li>■ Maintenance</li> </ul>                                 | Maintenance     |
| Enter access code              | Enter the access code.<br>Restrict write access to parameters in order to protect the device configuration from unauthorized modification.                                     | Max. 4-digit string of numbers                                                                                      | 0000            |
| Device reset                   | Reset the entire device configuration or some of the configuration to a defined state.                                                                                         | <ul style="list-style-type: none"> <li>■ Cancel</li> <li>■ To factory defaults</li> <li>■ Restart device</li> </ul> | Cancel          |
| Export configuration as report | The device configuration can be exported as a PDF report and saved in the mobile device or forwarded with this function.                                                       | -                                                                                                                   | -               |
| Save configuration to file     | The device configuration is saved in the app. The saved device configuration can be transferred to another Picomag using the System → "Load configuration from file" function. | -                                                                                                                   | -               |
| Load Configuration from file   | The saved device configuration can be uploaded to a new device with this function.                                                                                             | -                                                                                                                   | -               |
| Reset Device                   | -                                                                                                                                                                              | -                                                                                                                   | -               |
| Firmware version               | -                                                                                                                                                                              | -                                                                                                                   | -               |
| Firmware update                | -                                                                                                                                                                              | -                                                                                                                   | -               |

## 10 Operational

### 10.1 Offline quick view of the configuration

Tap the top of the housing (e.g. the arrow indicating the flow direction) with your knuckles or an object to display an overview of preconfigured parameters.



A0036432

5 Information in the status layout, overview of the preconfigured parameters

- 1 I/O area
- 2 Bluetooth area
- 3 Identification area
- 4 I/O type 1
- 5 I/O current value type 1
- 6 I/O type 2
- 7 I/O current value type 2
- 8 I/O assignment type 1
- 9 I/O assignment type 2
- 10 Bluetooth module status
- 11 Bluetooth connection status
- 12 Serial number
- 13 Software version

I/O area (in brackets: item number → 5, 33)

| I/O type ( 4, 6) | I/O assignment (8, 9)                                                                                                                    |                                                                                                                                      | I/O current value (5, 7)                                                    |                                                                               |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| S-Out            | <ul style="list-style-type: none"> <li>■ Alrt</li> <li>■ LimQ</li> <li>■ LimT</li> <li>■ LimV</li> <li>■ Lims</li> <li>■ WinQ</li> </ul> | <ul style="list-style-type: none"> <li>■ WinT</li> <li>■ WinV</li> <li>■ Wins</li> <li>■ EPD</li> <li>■ Off</li> <li>■ On</li> </ul> | <ul style="list-style-type: none"> <li>■ PNPOn</li> <li>■ PNPOff</li> </ul> | <ul style="list-style-type: none"> <li>■ NPNOOn</li> <li>■ NPNOOff</li> </ul> |
| I-Out            | <ul style="list-style-type: none"> <li>■ s</li> <li>■ Q</li> <li>■ T</li> </ul>                                                          | Off                                                                                                                                  | xx.x mA                                                                     |                                                                               |
| U-Out            | <ul style="list-style-type: none"> <li>■ s</li> <li>■ Q</li> <li>■ T</li> </ul>                                                          | Off                                                                                                                                  | xx.x V                                                                      |                                                                               |
| S-In             | <ul style="list-style-type: none"> <li>■ RsT</li> <li>■ OvrD</li> </ul>                                                                  | Off                                                                                                                                  | Low                                                                         | High                                                                          |
| P-Out            | Q                                                                                                                                        |                                                                                                                                      | PNPOn                                                                       | PNPOff                                                                        |
| IO-L             | PD                                                                                                                                       |                                                                                                                                      | <ul style="list-style-type: none"> <li>■ Dis.</li> <li>■ Start</li> </ul>   | <ul style="list-style-type: none"> <li>■ Preop.</li> <li>■ Oper.</li> </ul>   |
| Off              | –                                                                                                                                        |                                                                                                                                      | –                                                                           |                                                                               |

Bluetooth area (in brackets: item number →  5,  33)

| Bluetooth module status (12) | Bluetooth connection status (13) |
|------------------------------|----------------------------------|
| On                           | Dis./Con.                        |
| Off                          | Dis.                             |

# 11 Diagnostics and troubleshooting

## 11.1 General troubleshooting

*For local display*

| Error                                    | Possible causes                                                     | Solution                                             |
|------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------|
| Local display dark and no output signals | Supply voltage does not match the value indicated on the nameplate. | Apply the correct supply voltage → 41.               |
|                                          | The polarity of the supply voltage is wrong.                        | Correct the polarity.                                |
|                                          | The connecting cables are not connected correctly.                  | Check the cable connection and correct if necessary. |

*For output signals*

| Error                                                                                                   | Possible causes                                                    | Solution                                                                                                    |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Device shows correct value on local display, but signal output is incorrect, though in the valid range. | Configuration error                                                | Check and correct the parameter configuration.                                                              |
| Device measures incorrectly.                                                                            | Configuration error or device is operated outside the application. | 1. Check and correct parameter configuration.<br>2. Observe limit values specified in the "Technical Data". |

*For access*

| Error                                                  | Possible causes                                       | Solution                                                                                                                                               |
|--------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measuring device not in smartphone or tablet live list | Bluetooth communication is disabled                   | 1. Check whether the Bluetooth logo is visible on the local display or not.<br>2. Re-enable Bluetooth communication by tapping the device three times. |
| No communication with device via SmartBlue app         | No Bluetooth connection                               | Enable Bluetooth function on smartphone or tablet.                                                                                                     |
|                                                        |                                                       | The device is already connected with another smartphone/tablet.                                                                                        |
| Login via SmartBlue app not possible                   | Device is being put into operation for the first time | Enter initial password (device serial number) and change.                                                                                              |
| Device cannot be operated via SmartBlue app            | Incorrect password entered                            | Enter correct password.                                                                                                                                |
|                                                        | Password forgotten                                    | Contact Endress+Hauser Service.                                                                                                                        |
| No write access to parameters                          | Current user role has limited access authorization    | 1. Check user role<br>2. Enter correct customer-specific access code → 19.                                                                             |

## 11.2 Diagnostic information on local display

### 11.2.1 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.

| Diagnostic message                                                                            |                                                                                               |                                                                                                 |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Alarm                                                                                         | Function check                                                                                | Warning                                                                                         |
| <br>A0033011 | <br>A0033010 | <br>A0033009 |

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

### 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

| Symbol   | Meaning                                                                                                                                                                                                                                                                                                           |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>F</b> | <b>Failure</b><br>An operating error has occurred. The measured value is no longer valid.                                                                                                                                                                                                                         |
| <b>C</b> | <b>Function check</b><br>The device is in simulation mode.                                                                                                                                                                                                                                                        |
| <b>S</b> | <b>Out of specification</b><br>The device is being operated: <ul style="list-style-type: none"> <li>Outside its technical specification limits (e.g. outside the process temperature range)</li> <li>Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)</li> </ul> |

### Diagnostic behavior

| Diagnostic message                                                                  | Meaning                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>Alarm</b> <ul style="list-style-type: none"> <li>Measurement is interrupted.</li> <li>Signal outputs and totalizers assume the defined alarm condition.</li> <li>A diagnostic message is generated.</li> </ul>                                    |
|  | <b>Function check</b><br>Process measured values are simulated to test the outputs/wiring. <ul style="list-style-type: none"> <li>IO1/IO2 overload</li> <li>Flow override is active</li> </ul>                                                       |
|  | <b>Warning</b> <ul style="list-style-type: none"> <li>Measurement is resumed.</li> <li>Measuring operation with limited accuracy</li> <li>The signal outputs and totalizers are not affected.</li> <li>A diagnostic message is generated.</li> </ul> |

*Diagnostics behavior of outputs*

| Output         | Diagnostic behavior                                                                                                                                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Switch output  | <ul style="list-style-type: none"> <li>Setting for reporting events with the status signal F</li> <li>Switch output is switched on if an event occurs</li> <li>No further response to events with other status signals</li> </ul> |
| Pulse output   | <ul style="list-style-type: none"> <li>Pulse output stops if events with the status signal F occur</li> <li>No further response to events with other status signals</li> </ul>                                                    |
| Totalizer      | <ul style="list-style-type: none"> <li>Totalizing stops if events with the status signal F occur</li> <li>No further response to events with other status signals</li> </ul>                                                      |
| Current output | <ul style="list-style-type: none"> <li>3.5 mA output to report events with the status signal F</li> <li>No further response to events with other status signals</li> </ul>                                                        |
| Voltage output | <ul style="list-style-type: none"> <li>1.75 V output to report events with the status signal F</li> <li>No further response to events with other status signals</li> </ul>                                                        |
| IO-Link        | <ul style="list-style-type: none"> <li>All events reported to the Master</li> <li>Events read and processed further by the Master</li> </ul>                                                                                      |

**11.3 Overview of diagnostic events**

| Diagnostic event | Event text         | Reason                                                                | Remedial measures             | Status signal [ex-factory] |
|------------------|--------------------|-----------------------------------------------------------------------|-------------------------------|----------------------------|
| 181              | Coil. circ. fail.  | Coil/frequency failure<br>Coil current PWM<br>outside tolerance range | Replace the measuring device. | F                          |
| 180              | Temp. circ. fail.  | Temperature sensor<br>open circuit/short-circuit                      | Replace the measuring device. | F                          |
| 201              | Device fail.       | No communication to<br>ADC/Nordic/BMA                                 | Replace the measuring device. | F                          |
| 283              | Memory fail.       | CRC failure                                                           | Reset to factory settings.    | F                          |
| 446              | I/O 1 overload     | Overload at output 1                                                  | Increase load impedance.      | C                          |
| 447              | I/O 2 overload     | Overload at output 2                                                  | Increase load impedance.      | C                          |
| 485              | Simulation act.    | Measured value<br>simulation active (via<br>remote configuration)     | –                             | C                          |
| 453              | Flow override      | Flow override active (via<br>auxiliary input)                         | –                             | C                          |
| 441              | I-Out 1 range      | I-output 1 at range limit                                             | Adjust parameter or process.  | S                          |
| 444              | U-Out 1 range      | U-output 1 at range<br>limit                                          | Adjust parameter or process.  | S                          |
| 443              | P-Out 1 range      | P-output 1 at range<br>limit                                          | Adjust parameter or process.  | S                          |
| 442              | I-Out 2 range      | I-output 2 at range limit                                             | Adjust parameter or process.  | S                          |
| 445              | U-Out 2 range      | U-output 2 at range<br>limit                                          | Adjust parameter or process.  | S                          |
| 962              | Empty pipe         | Pipe is completely or<br>partially empty                              | Adjust the process.           | S                          |
| 834              | Temperat.<br>range | Medium temperature<br>outside the permitted<br>range                  | Adjust the process.           | S                          |
| 841              | Flow range         | Flow rate outside the<br>permitted range                              | Adjust the process.           | S                          |

## 11.4 Device information

The **Device info** submenu contains all parameters that display different information for device identification.

### Navigation

Menu: "System" → Device info

#### Parameter overview with brief description

| Parameter           | Description                                         | User interface                                                                        |
|---------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------|
| Device name         | Displays the name of the measuring device.          | Picomag                                                                               |
| Device tag          | Shows name of measuring point.                      | Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /).    |
| Serial number       | Displays the serial number of the measuring device. | Max. 11-digit character string comprising letters and numbers.                        |
| Firmware version    | Displays the device firmware version installed.     | Character string in the format xx.yy.zz                                               |
| Extended order code | Displays the extended order code.                   | Character string composed of letters, numbers and certain punctuation marks (e.g. /). |



The following information is shown on the display by tapping once on the housing:

- Status and values for output 1
- Status and values for output 2
- Bluetooth status (On/Off)
- Serial number
- Software version

## 11.5 Firmware history

| Release date | Firmware version | Firmware changes                                                                                                                                                          | Documentation type     | Documentation                                                        |
|--------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------|
| 09.2017      | 01.00.zz         | Original firmware                                                                                                                                                         | Operating Instructions | BA01697D/06/EN/01.17<br>BA01697D/06/EN/02.17<br>BA01697D/06/EN/03.17 |
| 05.2019      | 01.01.zz         | <ul style="list-style-type: none"> <li>▪ Conductivity measurement</li> <li>▪ Export configuration report</li> <li>▪ Save/load configuration</li> <li>▪ Bug fix</li> </ul> | Operating Instructions | BA01697D/06/EN/04.19                                                 |

## 12 Accessories

Various accessories are available for the device, and can be ordered with the device or at a later stage from Endress+Hauser. An up-to-date overview of accessories 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).

### Adapter set

| Order number | Description                                              |
|--------------|----------------------------------------------------------|
| 71355698     | G $\frac{1}{2}$ " to G $\frac{3}{8}$ " external thread   |
| 71355699     | G $\frac{1}{2}$ " to R $\frac{3}{8}$ " external thread   |
| 71355700     | G $\frac{1}{2}$ " to NPT $\frac{3}{8}$ " external thread |
| 71355701     | G $\frac{1}{2}$ " to G $\frac{1}{2}$ " internal thread   |
| 71355702     | G $\frac{1}{2}$ " to R $\frac{1}{2}$ " external thread   |
| 71355703     | G $\frac{1}{2}$ " to NPT $\frac{1}{2}$ " external thread |
| 71355704     | G $\frac{1}{2}$ " to $\frac{1}{2}$ " TriClamp            |
| 71355705     | G $\frac{3}{4}$ " to R $\frac{3}{4}$ " external thread   |
| 71355706     | G $\frac{3}{4}$ " to NPT $\frac{3}{4}$ " external thread |
| 71355707     | G $\frac{3}{4}$ " to G $\frac{3}{4}$ " internal thread   |
| 71355708     | G $\frac{3}{4}$ " to R $\frac{3}{4}$ " TriClamp          |
| 71355709     | G1" to R1" external thread                               |
| 71355710     | G1" to NPT1" external thread                             |
| 71355711     | G1" to G1" internal thread                               |
| 71355712     | G1" to 1" TriClamp                                       |
| 71355713     | G2" to R1" external thread                               |
| 71355714     | G2" to R2" external thread                               |
| 71355715     | G2" to NPT1 $\frac{1}{2}$ " external thread              |
| 71355716     | G2" to NPT2" external thread                             |
| 71355717     | G2" to G1 $\frac{1}{2}$ " external thread                |
| 71355718     | G2" to G2" internal thread                               |
| 71355719     | G2" to 2" TriClamp                                       |
| 71355720     | G2" to 2" Victaulic                                      |
| 71399930     | G2" to 54mm press fitting                                |

### Cable set

| Order number | Description                              |
|--------------|------------------------------------------|
| 71349260     | 2m/6.5ft, straight, 4x0.34, M12, PUR     |
| 71349261     | 5m/16.4ft, straight, 4x0.34, M12, PUR    |
| 71349262     | 10m/32.8ft, straight, 4x0.34, M12, PUR   |
| 71349263     | 2m/6.5ft, 90 degrees, 4x0.34, M12, PUR   |
| 71349264     | 5m/16.4ft, 90 degrees, 4x0.34, M12, PUR  |
| 71349265     | 10m/32.8ft, 90 degrees, 4x0.34, M12, PUR |

*Seal set*

| Order number | Description     |
|--------------|-----------------|
| 71354741     | DMA15 Cent.3820 |
| 71354742     | DMA20 Cent.3820 |
| 71354745     | DMA25 Cent.3820 |
| 71354746     | DMA50 Cent.3820 |

*Ground terminal set*

| Order number | Description     |
|--------------|-----------------|
| 71345225     | Ground terminal |

## 13 Technical data

### 13.1 Input

|                    |                                                                                                                                                                                                                           |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measured variables | <ul style="list-style-type: none"> <li>▪ Volume flow</li> <li>▪ Temperature</li> <li>▪ Totalizer</li> <li>▪ Conductivity</li> </ul>                                                                                       |
| Measuring range    | DN 15 (½"): 0.05 to 25 l/min (0.013 to 6.6 gal/min)<br>DN 20 (¾"): 0.1 to 50 l/min (0.026 to 13.2 gal/min)<br>DN 25 (1"): 0.2 to 100 l/min (0.052 to 26.4 gal/min)<br>DN 50 (2"): 1.5 to 750 l/min (0.4 to 198.1 gal/min) |
| Digital input      | <ul style="list-style-type: none"> <li>▪ High or low active</li> <li>▪ Switch-on level 15 V</li> <li>▪ Switch-off level 5 V</li> <li>▪ Internal resistance 7.5 kOhm</li> </ul>                                            |

### 13.2 Output

| Output          | Max. load                                                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Current output  | 500 Ω<br>Load must not be greater                                                                                                                         |
| Voltage output  | 500 Ω<br>Load resistance must not be smaller                                                                                                              |
| Signal on alarm | <ul style="list-style-type: none"> <li>▪ Status signal (as per NAMUR Recommendation NE 107)</li> <li>▪ Plain text display with remedial action</li> </ul> |
| Switch output   | <ul style="list-style-type: none"> <li>▪ Switching behaviour: pnp or npn</li> <li>▪ Max. load 250 mA</li> </ul>                                           |

### 13.3 Power supply

|                      |                                                                     |
|----------------------|---------------------------------------------------------------------|
| Supply voltage range | 18 to 30 V <sub>DC</sub> (SELV, PELV, Class 2)                      |
| Power consumption    | Max. 3 W [w/o outputs IO1 and IO2, 120 mA (+ 2 × 250 mA with I/Os)] |

### 13.4 Performance characteristics

|                                |                                                           |
|--------------------------------|-----------------------------------------------------------|
| Volume flow measurement        |                                                           |
| Maximum measured error         | ±0.8 % o.r. ±0.2 % o.f.s.                                 |
| Repeatability                  | ±0.2 % o.r.                                               |
| Response time                  | The response time depends on the configuration (damping). |
| Medium temperature measurement |                                                           |
| Maximum measured error         | ±2.5 °C                                                   |
| Repeatability                  | ±0.5 °C                                                   |
| Conductivity measurement       |                                                           |
| Repeatability                  | ±5 % o.r. ±5 µS/cm                                        |

### 13.5 Installation

→  13

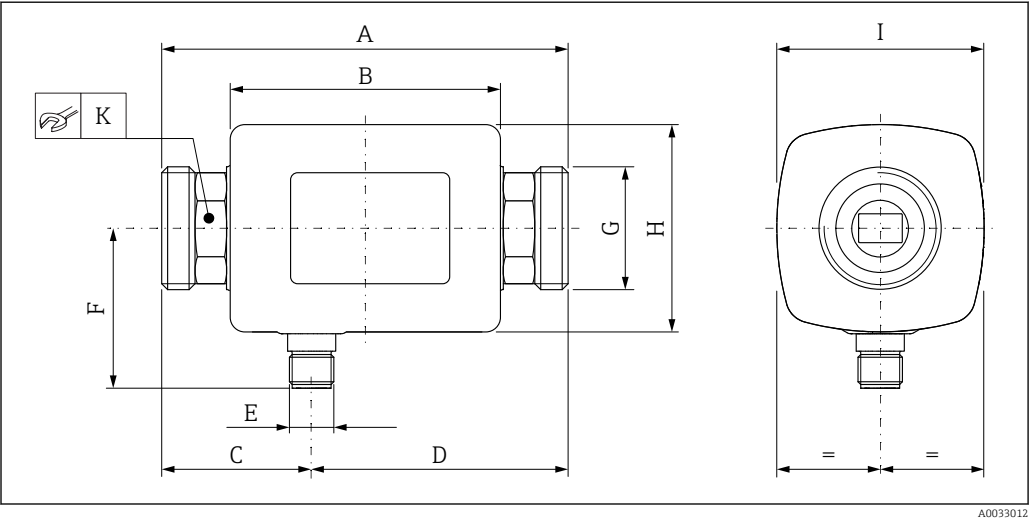
13.6 Environment

|                                     |                                                                              |
|-------------------------------------|------------------------------------------------------------------------------|
| Ambient temperature range           | -10 to +60 °C (+14 to +140 °F)                                               |
| Storage temperature                 | -25 to +85 °C (-13 to +185 °F)                                               |
| Degree of protection                | IP65/67, pollution degree 3                                                  |
| Humidity and moisture               | Suitable for indoor environments with up to 100% rh (wet and damp locations) |
| Operating altitude                  | up to 2 000 m                                                                |
| Shock resistance                    | 20 g (11 ms) in accordance with IEC/EN60068-2-27                             |
| Vibration resistance                | Acceleration up to 5 g (10 to 2 000 Hz) in accordance with IEC/EN60068-2-6   |
| Electromagnetic compatibility (EMC) | According to IEC/EN61326 and/or IEC/EN55011 (Class A)                        |

13.7 Process

|                          |                                                                                                                                                                                                          |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Medium temperature range | <ul style="list-style-type: none"><li>-10 to +70 °C (+14 to +158 °F)</li><li>Permissible short-term temperature, maximum one hour: 85 °C (185 °F)<br/>Repetition after 4 hours at the earliest</li></ul> |
| Medium properties        | Liquid, conductivity > 10 µS/cm                                                                                                                                                                          |
| Pressure                 | Max. 16 bar <sub>rel</sub>                                                                                                                                                                               |

13.8 Mechanical construction



Dimensions in SI units

| DN | A<br>[mm] | B<br>[mm] | C<br>[mm] | D<br>[mm] | E          | F<br>[mm] | G   | H<br>[mm] | I<br>[mm] | K<br>[mm] |
|----|-----------|-----------|-----------|-----------|------------|-----------|-----|-----------|-----------|-----------|
| 15 | 110       | 73        | 40.5      | 69.5      | M12 × 1 43 |           | G½" | 56        | 56        | 24        |
| 20 | 110       | 73        | 40.5      | 69.5      | M12 × 1 43 |           | G¾" | 56        | 56        | 27        |
| 25 | 110       | 73        | 40.5      | 69.5      | M12 × 1 43 |           | G1" | 56        | 56        | 27        |
| 50 | 200       | 113       | 80        | 120       | M12 × 1 58 |           | G2" | 86        | 86        | 52        |

Dimensions in US units

| DN | A<br>[in] | B<br>[in] | C<br>[in] | D<br>[in] | E          | F<br>[in] | G   | H<br>[in] | I<br>[in] | K<br>[mm] |
|----|-----------|-----------|-----------|-----------|------------|-----------|-----|-----------|-----------|-----------|
| 15 | 4.33      | 2.87      | 1.59      | 2.74      | M12 × 1 43 |           | G½" | 2.2       | 2.2       | 24        |
| 20 | 4.33      | 2.87      | 1.59      | 2.74      | M12 × 1 43 |           | G¾" | 2.2       | 2.2       | 27        |

| DN | A<br>[in] | B<br>[in] | C<br>[in] | D<br>[in] | E          | F<br>[in] | G   | H<br>[in] | I<br>[in] | K<br>[mm] |
|----|-----------|-----------|-----------|-----------|------------|-----------|-----|-----------|-----------|-----------|
| 25 | 4.33      | 2.87      | 1.59      | 2.74      | M12 × 1 43 |           | G1" | 2.2       | 2.2       | 27        |
| 50 | 7.87      | 4.45      | 3.15      | 4.72      | M12 × 1 58 |           | G2" | 3.39      | 3.39      | 52        |

Weight in SI units

| DN | [kg] |
|----|------|
| 15 | 0.34 |
| 20 | 0.35 |
| 25 | 0.36 |
| 50 | 1.55 |

Weight in US units

| DN | Weight<br>[lbs] |
|----|-----------------|
| 15 | 0.75            |
| 20 | 0.77            |
| 25 | 0.79            |
| 50 | 3.42            |

Materials

| Component                      | Material                 |
|--------------------------------|--------------------------|
| Measuring tube                 | PEEK                     |
| Electrodes, temperature sensor | 1.4435/316L              |
| Process connection             | 1.4404/316L              |
| Housing                        | 1.4404/316L, 1.4409/CF3M |
| Seal                           | FKM                      |
| Display window                 | Polycarbonate            |

13.9 Operability

Local display

The device has an onsite display:

1 Tag name (configurable)  
2 Measured variable 1 (configurable), with sign  
3 Measured variable 2 (configurable), with sign  
4 Active Bluetooth connection  
5 Active I/O-Link connection  
6 Device status

A0032991

**Display element**  
4 measured variables can be displayed (volume flow, temperature, totalizer, conductivity).

|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation             | <ul style="list-style-type: none"> <li>■ Via Bluetooth® wireless technology</li> <li>■ Via IO-Link</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |
| Digital communication | Via IO-Link                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| SmartBlue app         | <p>The device has a <i>Bluetooth</i>® wireless technology interface and can be operated and configured using the SmartBlue app.</p> <ul style="list-style-type: none"> <li>■ The range under reference conditions is 10 m (33 ft)</li> <li>■ Incorrect operation by unauthorized persons is prevented by means of encrypted communication and password encryption.</li> <li>■ The <i>Bluetooth</i>® wireless technology interface can be deactivated.</li> </ul> |

### 13.10 Certificates and approvals



Currently available certificates and approvals can be called up via the product configurator.

|                              |                                                                                                                                                                                                                                                                                                                                            |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CE mark                      | <p>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.</p> <p>Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.</p>                                                        |
| Radio approval               | <p>The measuring device has radio approval.</p> <p> For detailed information regarding radio approval, see appendix →  45</p>                                                                                                                                                                                                              |
| Pressure Equipment Directive | <p>Devices not bearing this marking (PED) are designed and manufactured according to good engineering practice. They meet the requirements of Article 4 paragraph 3 of the Pressure Equipment Directive 2014/68/EU. The range of application is indicated in tables 6 to 9 in Annex II of the Pressure Equipment Directive 2014/68/EU.</p> |
| cUL <sub>US</sub> listing    | The measuring device is UL-listed.                                                                                                                                                                                                                                                                                                         |

## 14 Appendix

### 14.1 Radio approvals

#### 14.1.1 Europe

This device meets the requirements of the Telecommunications Directive RED 2014/53/EU:

- EN 300 328 V2.1.1
- EN 301 489-1 V1.9.2
- EN 301 489-17 V2.2.1
- EN 62311: 2008

#### 14.1.2 Canada and USA

##### English

This device complies with Part 15 of the FCC Rules and with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

 Changes or modifications made to this equipment not expressly approved by Endress+Hauser Flowtec AG may void the user's authorization to operate this equipment.

##### Français

Le présent appareil est conforme aux CNR d'industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes :

- L'appareil ne doit pas produire de brouillage, et
- L'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

 Les changements ou modifications apportées à cet appareil non expressément approuvée par Endress+Hauser Flowtec AG peut annuler l'autorisation de l'utilisateur d'opérer cet appareil.

#### 14.1.3 India

ETA Certificate No: ETA - 1707/18-RLO(NE)

#### 14.1.4 Singapore

Complies with  
IMDA Standards  
DA 103787

A0035905

Complies with IMDA Standards  
DA 103787

### 14.1.5 Thailand

เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามข้อกำหนดของ กสทช.

(This telecommunication equipment is in compliance with NBTC requirements.)

### 14.1.6 Argentina



CNC ID: C-22455

### 14.1.7 Taiwan

#### 低功率電波輻射性電機管理辦法

|      |                                                                                                                 |
|------|-----------------------------------------------------------------------------------------------------------------|
| 第十二條 | 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。                                                       |
| 第十四條 | 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。 |
| 產品名稱 | Endress + Hauser                                                                                                |
| 產品型號 | Picomag                                                                                                         |
| 產地   | 瑞士                                                                                                              |
| 製造商  | Endress + Hauser Flowtec AG                                                                                     |

### 14.1.8 Brazil



A0037714

Modelo: Picomag Atendimento à Regulamentação Anatel Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados. Este produto está homologado pela Anatel, de acordo com os procedimentos regulamentados pela Resolução 242/2000, e atende aos requisitos técnicos aplicados. Para maiores informações, consulte o site da ANATEL [www.anatel.gov.br](http://www.anatel.gov.br)

ANATEL: 04366-18-07311

### 14.1.9 South Korea

#### KC 인증

적합성평가정보

R-C-EH7-Picomag

상호 : 한국엔드레스하우저 주식회사

기자재명칭(모델명): 특정소출력 무선기기(무선데이터통신시스템용무선기기)

/ Picomag

제조국 및 제조국가 : Endress+Hauser Flowtec AG / 프랑스

제조년월 : 제조년월로 표기

\*사용자안내문

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

### 14.1.10 Other countries

Other national approvals are available on request.

## 14.2 IO-Link process data

### 14.2.1 Data structure

| Bit number | 119 to 112                                               | 111 to 104 | 103 to 96 | 95 to 88 | 87 to 80                                                 | 79 to 72 | 71 to 64 | 63 to 56 | 55 to 48                                                 | 47 to 40 | 39 to 32 | 31 to 24 | 23 to 16                                      | 15 to 8 | 7 to 0 |
|------------|----------------------------------------------------------|------------|-----------|----------|----------------------------------------------------------|----------|----------|----------|----------------------------------------------------------|----------|----------|----------|-----------------------------------------------|---------|--------|
| Data       | Conductivity in $\mu\text{S}/\text{cm}$                  |            |           |          | Totalizer in l                                           |          |          |          | Volume flow in l/s                                       |          |          |          | Temperature in $\frac{1}{10}^{\circ}\text{C}$ |         | Status |
| Data type  | 32-bit single-precision floating-point number (IEEE 754) |            |           |          | 32-bit single-precision floating-point number (IEEE 754) |          |          |          | 32-bit single-precision floating-point number (IEEE 754) |          |          |          | 16-bit two's complement                       |         | 8-bit  |

*Data structure of the status bits 7 to 0*

| Bit | Description                     |
|-----|---------------------------------|
| 0   | Switches once per sampling rate |
| 1   | Reserved                        |
| 2   | Current status S-Out 1          |
| 3   | Current status S-Out 2          |
| 4   | Reserved                        |
| 5   | Reserved                        |
| 6   | Reserved                        |
| 7   | Reserved                        |

### 14.2.2 Diagnostic information

| Diagnostic code |                   | Display text    | Coding (hex) | PDValid Validity | Priority |
|-----------------|-------------------|-----------------|--------------|------------------|----------|
| Status NE 107   | Diagnostic number |                 |              |                  |          |
| –               |                   | SYSTEM OK       | 0x0000       | 1                | 1        |
| F               | 181               | COIL CIRC.FAIL. | 0x5000       | 0                | 2        |
| F               | 180               | TEMP.CIRC.FAIL. | 0x5000       | 0                | 3        |
| F               | 201               | DECICE FAIL.    | 0x5000       | 0                | 4        |
| F               | 283               | MEMORY FAIL.    | 0x8C00       | 0                | 5        |
| C               | 446               | I/O 1 OVERLOAD  | 0x180C       | 1                | 6        |
| C               | 447               | I/O 2 OVERLOAD  | 0x180C       | 1                | 7        |
| C               | 485               | SIMULATION ACT. | 0x8C01       | 1                | 8        |
| C               | 453               | FLOW OVERRIDE   | 0x180D       | 1                | 9        |
| S               | 441               | I-OUT 1 RANGE   | 0x180A       | 1                | 10       |
| S               | 444               | U-OUT 1 RANGE   | 0x1809       | 1                | 11       |
| S               | 443               | P-OUT 1 RANGE   | 0x180B       | 1                | 12       |
| S               | 442               | I-OUT 2 RANGE   | 0x180A       | 1                | 13       |
| S               | 445               | U-OUT 2 RANGE   | 0x1809       | 1                | 14       |
| S               | 962               | EMPTY PIPE      | 0x180E       | 1                | 15       |
| S               | 834               | TEMPERAT. RANGE | 0x8C20       | 1                | 16       |
| S               | 841               | FLOW RANGE      | 0x8C20       | 1                | 17       |

## 14.3 IO-Link ISDU parameter list

The individual parts of a parameter description are described in the following section:

| Designation                                                                                 | ISDU (dec) | ISDU (hex) | Size (Byte) | Data type | Access | Value range           | Factory setting | Range limits                        |
|---------------------------------------------------------------------------------------------|------------|------------|-------------|-----------|--------|-----------------------|-----------------|-------------------------------------|
| <b>Identification</b>                                                                       |            |            |             |           |        |                       |                 |                                     |
| <b>Device Tag</b><br>First 10 characters displayed (starting from left)                     | 0x0018     | 24         | 32 (max.)   | string    | r/w    |                       | EH_DMA_XXZZ     |                                     |
| <b>Device Name</b>                                                                          | 0x0012     | 18         | 16 (max.)   | string    | r      |                       | Picomag         |                                     |
| <b>Device ID1</b>                                                                           | 0x0009     | 9          | 1           | uint      | r      |                       | 0x01            |                                     |
| <b>Device ID2</b>                                                                           | 0x000A     | 10         | 1           | uint      | r      |                       | 0x01            |                                     |
| <b>Device ID3</b>                                                                           | 0x000B     | 11         | 1           | uint      | r      |                       | 0x00            |                                     |
| <b>Vendor Name</b>                                                                          | 0x0010     | 16         | 32 (max.)   | string    | r      |                       | Endress+Hauser  |                                     |
| <b>Vendor ID1</b>                                                                           | 0x0007     | 7          | 1           | uint      | r      |                       | 0x00            |                                     |
| <b>Vendor ID2</b>                                                                           | 0x0008     | 8          | 1           | uint      | r      |                       | 0x11            |                                     |
| <b>Device Serial No.</b><br>e.g. (YMXXXXZZ)                                                 | 0x0015     | 21         | 11 (max.)   | string    | r      |                       | see nameplate   |                                     |
| <b>Firmware Version</b><br>e.g. 01.00.00                                                    | 0x0017     | 23         | 8 (max.)    | string    | r      |                       |                 |                                     |
| <b>Order code</b><br>e.g. DMA15-AAAAA1                                                      | 0x0102     | 258        | 18 (max.)   | string    | r      |                       | see nameplate   |                                     |
| <b>Device Type</b>                                                                          | 0x0100     | 256        | 2           | uint      | r      |                       | 0x94FF          |                                     |
| <b>Diagnostics</b>                                                                          |            |            |             |           |        |                       |                 |                                     |
| <b>Actual Diagnostics</b><br>e.g. C485 (= SIMULATION ACT.)                                  | 0x0104     | 260        | 4           | string    | r      |                       |                 |                                     |
| <b>Last Diagnostics</b><br>e.g. S962 (= EMPTY PIPE)                                         | 0x0105     | 261        | 4           | string    | r      |                       |                 |                                     |
| <b>Simulation Proc. Var.</b>                                                                | 0x015F     | 351        | 2           | uint      | r/w    | enable=1<br>disable=0 |                 |                                     |
| <b>Sim.Proc.Var.Value Volumeflow</b><br>Unit selection list from <b>Unit Volumeflow</b>     | 0x0166     | 358        | 4           | float     | r/w    |                       | 0.0             | -10 <sup>6</sup><br>10 <sup>6</sup> |
| <b>Sim.Proc.Var.Value Temperature</b><br>Unit selection list from <b>Unit Temperature</b>   | 0x0168     | 360        | 4           | float     | r/w    |                       | 0.0             | -10 <sup>4</sup><br>10 <sup>4</sup> |
| <b>Sim.Proc.Var.Value Conductivity</b><br>Unit selection list from <b>Unit Conductivity</b> | 0x0167     | 359        | 4           | float     | r/w    |                       | 0.0             | 0<br>10 <sup>6</sup>                |
| <b>Measured Values</b>                                                                      |            |            |             |           |        |                       |                 |                                     |
| <b>Volumeflow</b><br>Current volume flow measured value                                     | 0x0161     | 353        | 4           | float     | r      |                       |                 |                                     |
| <b>Temperature</b><br>Current temperature measured value                                    | 0x0163     | 355        | 4           | float     | r      |                       |                 |                                     |
| <b>Conductivity</b><br>Current conductivity measured value                                  | 0x0164     | 365        | 4           | float     | r      |                       |                 |                                     |
| <b>Totalizer</b><br>Current totalizer measured value                                        | 0x0169     | 361        | 4           | float     | r/w    |                       | 0.0             |                                     |

| Designation                                                                                                                  | ISDU (dec) | ISDU (hex) | Size (Byte) | Data type | Access | Value range                                                                 | Factory setting        | Range limits                                |
|------------------------------------------------------------------------------------------------------------------------------|------------|------------|-------------|-----------|--------|-----------------------------------------------------------------------------|------------------------|---------------------------------------------|
| <b>System Units</b>                                                                                                          |            |            |             |           |        |                                                                             |                        |                                             |
| <b>Unit Volumeflow</b>                                                                                                       | 0x0226     | 550        | 2           | uint      | r/w    | l/s=0<br>l/h=5<br>fl. oz/min=4<br>m <sup>3</sup> /h=1<br>l/min=2<br>Usgpm=3 | l/min                  |                                             |
| <b>Unit Volume</b>                                                                                                           | 0x0227     | 551        | 2           | uint      | r/w    | ml=0<br>USozf=1<br>l=2<br>m <sup>3</sup> =3<br>Usgal=4                      | ml                     |                                             |
| <b>Unit Temperature</b>                                                                                                      | 0x0228     | 552        | 2           | uint      | r/w    | °C=0<br>°F=1                                                                | °C                     |                                             |
| <b>Unit Conductivity</b>                                                                                                     | 0x0229     | 553        | 2           | uint      | r/w    | µS/cm=0<br>S/m=1<br>mS/cm=2                                                 | µS/cm=0                |                                             |
| <b>Unit Totalizer</b>                                                                                                        | 0x016B     | 363        | 2           | uint      | r/w    | USozf=1<br>l=2<br>m <sup>3</sup> =3<br>Usgal=4<br>kl=5<br>Ml=6<br>kUsg=7    | m <sup>3</sup>         |                                             |
| <b>Sensor</b>                                                                                                                |            |            |             |           |        |                                                                             |                        |                                             |
| <b>Install. Direction</b><br>In relation to direction of arrow on the device                                                 | 0x015E     | 350        | 2           | uint      | r/w    | forward=0<br>reverse=1                                                      | forward                |                                             |
| <b>Low Flow Cut Off</b><br>The flow rate below the selected value is zero<br>Unit selection list from <b>Unit Volumeflow</b> | 0x0160     | 352        | 4           | float     | r/w    |                                                                             | 0.4/0.75/1.2/5.0 l/min | 0<br>10 <sup>6</sup>                        |
| <b>Damping</b><br>Volume flow damping via the PT1 element<br>Unit: s                                                         | 0x01A4     | 420        | 4           | float     | r/w    |                                                                             | 0 s                    | 0<br>100                                    |
| <b>Output 1</b>                                                                                                              |            |            |             |           |        |                                                                             |                        |                                             |
| <b>Operating Mode</b><br>IO-Link is set if connected to a master                                                             | 0x01F4     | 500        | 2           | uint      | r/w    | P-Out=0<br>I-Out=1<br>S-In=2<br>S-Out=3<br>IO-Link=4<br>U-Out=5<br>off=6    | IO-Link                |                                             |
| <b>Current output I-Out 1</b>                                                                                                |            |            |             |           |        |                                                                             |                        |                                             |
| <b>I - OUT Assign</b>                                                                                                        | 0x0258     | 600        | 2           | uint      | r/w    | off=0<br>volume flow=1<br>temperature=2<br>conductivity=4                   | volume flow            |                                             |
| <b>Q-Start-Value</b><br>ASP <sup>1)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b>                 | 0x0259     | 601        | 4           | float     | r/w    |                                                                             | 0 l/min                | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>Q-End-Value</b><br>AEP <sup>2)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b>                   | 0x025A     | 602        | 4           | float     | r/w    |                                                                             | 25/50/100/750 l/min    | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |

| Designation                                                                                                     | ISDU (dec) | ISDU (hex) | Size (Byte) | Data type | Access | Value range                                                                                                                                            | Factory setting                 | Range limits                                |
|-----------------------------------------------------------------------------------------------------------------|------------|------------|-------------|-----------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------------------|
| <b>T-Start-Value</b><br>ASP <sup>1)</sup> for temperature<br>Unit selection list from <b>Unit Temperature</b>   | 0x025F     | 607        | 4           | float     | r/w    |                                                                                                                                                        | -10 °C                          | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>T-End-Value</b><br>AEP <sup>2)</sup> for temperature<br>Unit selection list from <b>Unit Temperature</b>     | 0x0260     | 608        | 4           | float     | r/w    |                                                                                                                                                        | +70 °C                          | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>s-Start-Value</b><br>ASP <sup>1)</sup> for conductivity<br>Unit selection list from <b>Unit Conductivity</b> | 0x025D     | 605        | 4           | float     | r/w    |                                                                                                                                                        | 0                               | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>s-End-Value</b><br>AEP <sup>2)</sup> for conductivity<br>Unit selection list from <b>Unit Conductivity</b>   | 0x025E     | 606        | 4           | float     | r/w    |                                                                                                                                                        | 1000                            | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>Pulse output P-Out</b>                                                                                       |            |            |             |           |        |                                                                                                                                                        |                                 |                                             |
| <b>Pulse Value</b><br>Unit selection list from <b>Unit Volume</b>                                               | 0x03E8     | 1000       | 4           | float     | r/w    |                                                                                                                                                        | 0.5/1.0/2.0/10.0 ml             | 10 <sup>-9</sup><br>9.9·10 <sup>9</sup>     |
| <b>Switch output S-Out 1</b>                                                                                    |            |            |             |           |        |                                                                                                                                                        |                                 |                                             |
| <b>Switch Polarity</b>                                                                                          | 0x032B     | 811        | 2           | uint      | r/w    | pnp=0<br>npn=1                                                                                                                                         | pnp                             |                                             |
| <b>Switch Function</b>                                                                                          | 0x0320     | 800        | 2           | uint      | r/w    | alarm=0<br>off=1<br>on=2<br>lim.vol.flow=3,<br>lim.temp.=4<br>lim.vol.=5<br>lims=11<br>win.vol.flow=6<br>win.temp.=7<br>win.vol.=8<br>wins=13<br>epd=9 | alarm                           |                                             |
| <b>Q-ON-Value</b><br>Unit selection list from <b>Unit Volumeflow</b>                                            | 0x0321     | 801        | 4           | float     | r/w    |                                                                                                                                                        | 20/40/80/600 l/min              | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>Q-OFF-Value</b><br>Unit selection list from <b>Unit Volumeflow</b>                                           | 0x0322     | 802        | 4           | float     | r/w    |                                                                                                                                                        | 15/30/60/450 l/min              | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>T-ON-Value</b><br>Unit selection list from <b>Unit Temperature</b>                                           | 0x0327     | 807        | 4           | float     | r/w    |                                                                                                                                                        | + 60 °C                         | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>T-OFF-Value</b><br>Unit selection list from <b>Unit Temperature</b>                                          | 0x0328     | 808        | 4           | float     | r/w    |                                                                                                                                                        | + 50 °C                         | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>V-ON-Value</b><br>Unit selection list from <b>Unit Totalizer</b>                                             | 0x0329     | 809        | 4           | float     | r/w    |                                                                                                                                                        | 0.2/0.4/0.8/6.0 m <sup>3</sup>  | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>V-OFF-Value</b><br>Unit selection list from <b>Unit Totalizer</b>                                            | 0x032A     | 810        | 4           | float     | r/w    |                                                                                                                                                        | 0.15/0.3/0.6/4.5 m <sup>3</sup> | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>s-ON-Value</b><br>Unit selection list from <b>Unit Conductivity</b>                                          | 0x0325     | 805        | 4           | float     | r/w    |                                                                                                                                                        | 500                             | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |

| Designation                                                                                                     | ISDU (dec) | ISDU (hex) | Size (Byte) | Data type | Access | Value range                                               | Factory setting     | Range limits                                |
|-----------------------------------------------------------------------------------------------------------------|------------|------------|-------------|-----------|--------|-----------------------------------------------------------|---------------------|---------------------------------------------|
| <b>s-OFF-Value</b><br>Unit selection list from <b>Unit Conductivity</b>                                         | 0x0326     | 806        | 4           | float     | r/w    |                                                           | 200                 | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>Voltage output U-Out 1</b>                                                                                   |            |            |             |           |        |                                                           |                     |                                             |
| <b>U - OUT Assign</b>                                                                                           | 0x02BC     | 700        | 2           | uint      | r/w    | off=0<br>volume flow=1<br>temperature=2<br>conductivity=4 | volume flow         |                                             |
| <b>Q-Start-Value</b><br>ASP <sup>1)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b>    | 0x02BD     | 701        | 4           | float     | r/w    |                                                           | 0 l/min             |                                             |
| <b>Q-End-Value</b><br>AEP <sup>2)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b>      | 0x02BE     | 702        | 4           | float     | r/w    |                                                           | 25/50/100/750 l/min |                                             |
| <b>T-Start-Value</b><br>ASP <sup>1)</sup> for temperature<br>Unit selection list from <b>Unit Temperature</b>   | 0x02C3     | 707        | 4           | float     | r/w    |                                                           | -10 °C              |                                             |
| <b>T-End-Value</b><br>AEP <sup>2)</sup> for temperature<br>Unit selection list from <b>Unit Temperature</b>     | 0x02C4     | 708        | 4           | float     | r/w    |                                                           | +70 °C              |                                             |
| <b>s-Start-Value</b><br>ASP <sup>1)</sup> for conductivity<br>Unit selection list from <b>Unit Conductivity</b> | 0x02C1     | 705        | 4           | float     | r/w    |                                                           | 0 µS/cm             |                                             |
| <b>s-End-Value</b><br>AEP <sup>2)</sup> for conductivity<br>Unit selection list from <b>Unit Conductivity</b>   | 0x02C2     | 706        | 4           | float     | r/w    |                                                           | 1000 µS/cm          |                                             |

| Designation                                                                                                     | ISDU (dec) | ISDU (hex) | Size (Byte) | Data type | Access | Value range                                      | Factory setting     | Range limits                                |
|-----------------------------------------------------------------------------------------------------------------|------------|------------|-------------|-----------|--------|--------------------------------------------------|---------------------|---------------------------------------------|
| <b>Digital input D-In 1</b>                                                                                     |            |            |             |           |        |                                                  |                     |                                             |
| <b>D-IN Polarity</b>                                                                                            | 0x0385     | 901        | 2           | uint      | r/w    | low=0<br>high=1                                  | high                |                                             |
| <b>D-IN Function</b>                                                                                            | 0x0384     | 900        | 2           | uint      | r/w    | off=0<br>res.tot.=1<br>zero ret.=2               | res.tot.            |                                             |
| <b>IO-Link</b>                                                                                                  |            |            |             |           |        |                                                  |                     |                                             |
| <b>IO-LINK Vendor Name</b>                                                                                      | 0x0010     | 16         | 32 (max.)   | string    | r      |                                                  | Endress+Hauser      |                                             |
| <b>IO-LINK Product Name</b>                                                                                     | 0x0012     | 18         | 16 (max.)   | string    | r      |                                                  | Picomag             |                                             |
| <b>IO-LINK RevisionID</b>                                                                                       | 0x0004     | 4          | 1           | uint      | r      |                                                  | 0x11                |                                             |
| <b>Output 2</b>                                                                                                 |            |            |             |           |        |                                                  |                     |                                             |
| <b>Operating Mode</b>                                                                                           | 0x01F5     | 501        | 2           | uint      | r/w    | I-Out=1<br>S-In=2<br>S-Out=3<br>U-Out=5<br>off=6 | Off                 |                                             |
| <b>Current output I-Out 2</b>                                                                                   |            |            |             |           |        |                                                  |                     |                                             |
| <b>I - OUT Assign</b>                                                                                           | 0x028A     | 650        | 2           | uint      | r/w    | off=0<br>volume flow=1<br>temperature=2          | temperature         |                                             |
| <b>Q-Start-Value</b><br>ASP <sup>1)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b>    | 0x028B     | 651        | 4           | float     | r/w    |                                                  | 0 l/min             |                                             |
| <b>Q-End-Value</b><br>AEP <sup>2)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b>      | 0x028C     | 652        | 4           | float     | r/w    |                                                  | 25/50/100/750 l/min |                                             |
| <b>T-Start-Value</b><br>ASP <sup>1)</sup> for temperature<br>Unit selection list from <b>Unit Temperature</b>   | 0x0291     | 657        | 4           | float     | r/w    |                                                  | -10 °C              |                                             |
| <b>T-End-Value</b><br>AEP <sup>2)</sup> for temperature<br>Unit selection list from <b>Unit Temperature</b>     | 0x0292     | 658        | 4           | float     | r/w    |                                                  | +70 °C              |                                             |
| <b>s-Start-Value</b><br>ASP <sup>1)</sup> for conductivity<br>Unit selection list from <b>Unit Conductivity</b> | 0x028F     | 655        | 4           | float     | r/w    |                                                  | 0                   | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |
| <b>s-End-Value</b><br>AEP <sup>2)</sup> for conductivity<br>Unit selection list from <b>Unit Conductivity</b>   | 0x0290     | 656        | 4           | float     | r/w    |                                                  | 1000                | -9.9·10 <sup>9</sup><br>9.9·10 <sup>9</sup> |

| Designation                                                                                                  | ISDU (dec) | ISDU (hex) | Size (Byte) | Data type | Access | Value range                                                                                                                                            | Factory setting                 | Range limits |
|--------------------------------------------------------------------------------------------------------------|------------|------------|-------------|-----------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------|
| <b>Switch output S-Out 2</b>                                                                                 |            |            |             |           |        |                                                                                                                                                        |                                 |              |
| <b>Switch Polarity</b>                                                                                       | 0x035D     | 861        | 2           | uint      | r/w    | pnp=0<br>npn=1                                                                                                                                         | pnp                             |              |
| <b>Switch Function</b>                                                                                       | 0x0352     | 850        | 2           | uint      | r/w    | alarm=0<br>off=1<br>on=2<br>lim.vol.flow=3<br>lim.temp.=4<br>lim.vol.=5,<br>win.vol.flow=6<br>lims=11<br>win.temp.=7<br>win.vol.=8<br>wins=13<br>epd=9 | alarm                           |              |
| <b>Q-ON-Value</b><br>Unit selection list from <b>Unit Volumeflow</b>                                         | 0x0353     | 851        | 4           | float     | r/w    |                                                                                                                                                        | 20/40/80/600 l/min              |              |
| <b>Q-OFF-Value</b><br>Unit selection list from <b>Unit Volumeflow</b>                                        | 0x0354     | 852        | 4           | float     | r/w    |                                                                                                                                                        | 15/30/60/450 l/min              |              |
| <b>T-ON-Value</b><br>Unit selection list from <b>Unit Temperature</b>                                        | 0x0359     | 857        | 4           | float     | r/w    |                                                                                                                                                        | + 60 °C                         |              |
| <b>T-OFF-Value</b><br>Unit selection list from <b>Unit Temperature</b>                                       | 0x035A     | 858        | 4           | float     | r/w    |                                                                                                                                                        | + 50 °C                         |              |
| <b>V-ON-Value</b><br>Unit selection list from <b>Totalizer</b>                                               | 0x035B     | 859        | 4           | float     | r/w    |                                                                                                                                                        | 0.2/0.4/0.8/6.0 m <sup>3</sup>  |              |
| <b>V-OFF-Value</b><br>Unit selection list from <b>Totalizer</b>                                              | 0x035C     | 860        | 4           | float     | r/w    |                                                                                                                                                        | 0.15/0.3/0.6/4.5 m <sup>3</sup> |              |
| <b>s-ON-Value</b><br>Unit selection list from <b>Conductivity</b>                                            | 0x0357     | 855        | 4           | float     | r/w    |                                                                                                                                                        | 500                             |              |
| <b>s-OFF-Value</b><br>Unit selection list from <b>Conductivity</b>                                           | 0x0358     | 856        | 4           | float     | r/w    |                                                                                                                                                        | 200                             |              |
| <b>Voltage output U-Out 2</b>                                                                                |            |            |             |           |        |                                                                                                                                                        |                                 |              |
| <b>U - OUT Assign</b>                                                                                        | 0x02EE     | 750        | 2           | uint      | r/w    | off=0<br>volume flow=1<br>temperature=2                                                                                                                | temperature                     |              |
| <b>Q-Start-Value</b><br>ASP <sup>1)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b> | 0x02EF     | 751        | 4           | float     | r/w    |                                                                                                                                                        | 0 l/min                         |              |
| <b>Q-End-Value</b><br>AEP <sup>2)</sup> for volume flow<br>Unit selection list from <b>Unit Volumeflow</b>   | 0x02F0     | 752        | 4           | float     | r/w    |                                                                                                                                                        | 25/50/100/750 l/min             |              |
| <b>T-Start-Value</b><br>ASP <sup>1)</sup> for temperature from <b>Unit Temperature</b>                       | 0x02F5     | 757        | 4           | float     | r/w    |                                                                                                                                                        | -10 °C                          |              |
| <b>T-End-Value</b><br>AEP <sup>2)</sup> for temperature from <b>Unit Temperature</b>                         | 0x02F6     | 758        | 4           | float     | r/w    |                                                                                                                                                        | +70 °C                          |              |

| Designation                                                                 | ISDU (dec) | ISDU (hex) | Size (Byte) | Data type | Access | Value range                                                      | Factory setting | Range limits |
|-----------------------------------------------------------------------------|------------|------------|-------------|-----------|--------|------------------------------------------------------------------|-----------------|--------------|
| <b>s-Start-Value</b><br>ASP <sup>1)</sup> for temperature from Conductivity | 0x02F3     | 755        | 4           | float     | r/w    |                                                                  | 0 µS/cm         |              |
| <b>s-End-Value</b><br>AEP <sup>2)</sup> for temperature from Conductivity   | 0x02F4     | 756        | 4           | float     | r/w    |                                                                  | 1000 µS/cm      |              |
| <b>Digital input D-In 2</b>                                                 |            |            |             |           |        |                                                                  |                 |              |
| <b>D-IN Polarity</b>                                                        | 0x0395     | 917        | 2           | uint      | r/w    | low=0<br>high=1                                                  | high            |              |
| <b>D-IN Function</b>                                                        | 0x0394     | 916        | 2           | uint      | r/w    | off=0<br>res.tot.=1<br>zero ret.=2                               | res.tot.        |              |
| <b>Device info</b>                                                          |            |            |             |           |        |                                                                  |                 |              |
| <b>Device Name</b>                                                          |            |            |             |           |        |                                                                  |                 |              |
| <b>Device Tag</b>                                                           |            |            |             |           |        |                                                                  |                 |              |
| <b>Device Serial No.</b>                                                    |            |            |             |           |        |                                                                  |                 |              |
| <b>Firmware Version</b>                                                     |            |            |             |           |        |                                                                  |                 |              |
| <b>Order code</b>                                                           |            |            |             |           |        |                                                                  |                 |              |
| <b>Display</b>                                                              |            |            |             |           |        |                                                                  |                 |              |
| <b>Display Layout</b>                                                       | 0x01C3     | 451        | 2           | uint      | r/w    | QV=0<br>QT=1<br>Qs=3<br>VT=2, Vs=4<br>Ts=5<br>QVTs=6<br>QVTs_m=7 | QT              |              |
| <b>Display Rotation</b>                                                     | 0x01C4     | 452        | 2           | uint      | r/w    | 0 °=0<br>90 °=1<br>180 °=2<br>270 °=3<br>auto=4                  | Auto            |              |
| <b>Display Backlight</b>                                                    | 0x01C2     | 450        | 2           | uint      | r/w    | 0 - 100                                                          | 50              |              |
| <b>Bluetooth configuration</b>                                              |            |            |             |           |        |                                                                  |                 |              |
| <b>Bluetooth Function</b>                                                   | 0x041A     | 1050       | 2           | uint      | r/w    | on=1<br>off=0                                                    | On              |              |
| <b>Bluetooth Tx Pwr Level</b>                                               | 0x041B     | 1051       | 2           | uint      | r      | 0 - 4                                                            |                 |              |
| <b>Bluetooth Conn. Status</b>                                               | 0x041C     | 1052       | 1           | uint      | r      |                                                                  |                 |              |
| <b>Administration</b>                                                       |            |            |             |           |        |                                                                  |                 |              |
| <b>Set Access Code</b><br>Define access code                                | 0x0108     | 264        | 2           | uint      | w      |                                                                  | 0000            |              |
| <b>Access Code</b><br>Enter access code                                     | 0x0107     | 263        | 2           | uint      | w      |                                                                  |                 |              |
| <b>Reset Device</b>                                                         | 0x010E     | 270        | 2           | uint      | w      | cancel=0<br>restore fact.=1<br>restart=4                         | cancel          |              |

| Designation                     | ISDU<br>(dec) | ISDU<br>(hex) | Size<br>(Byte) | Data type | Access | Value range     | Factory setting | Range<br>limits |
|---------------------------------|---------------|---------------|----------------|-----------|--------|-----------------|-----------------|-----------------|
| Product Specific Process Values |               |               |                |           |        |                 |                 |                 |
| Status IO 1                     | 0x0386        | 902           | 2              | uint      | r      | low=0<br>high=1 |                 |                 |
| Status IO 2                     | 0x0396        | 918           | 2              | uint      | r      | low=0<br>high=1 |                 |                 |

- 1) Analog Start Point
- 2) Analog End Point

# Index

## A

|                           |    |
|---------------------------|----|
| About this document ..... | 5  |
| Accessories .....         | 39 |
| Appendix .....            | 45 |
| Application               |    |
| Media .....               | 7  |

## B

|                                                                       |        |
|-----------------------------------------------------------------------|--------|
| Basic safety instructions .....                                       | 7      |
| Bidirectional flow measurement (Q), temperature measurement (T) ..... | 24, 27 |

## C

|                                            |       |
|--------------------------------------------|-------|
| CE mark .....                              | 8, 44 |
| Commissioning .....                        | 21    |
| Configuring system units .....             | 22    |
| Configuring the current output .....       | 23    |
| Configuring the display .....              | 29    |
| Configuring the IO modules .....           | 23    |
| Configuring the measuring device .....     | 21    |
| Configuring the pulse output .....         | 24    |
| Configuring the status input .....         | 28    |
| Configuring the voltage output .....       | 26    |
| Connecting the measuring device .....      | 18    |
| Connection conditions .....                | 15    |
| Current output configuration version ..... | 16    |
| Current version data for the device .....  | 20    |

## D

|                                               |    |
|-----------------------------------------------|----|
| Data management .....                         | 30 |
| Declaration of Conformity .....               | 8  |
| Designated use .....                          | 7  |
| Device information .....                      | 38 |
| Device master file .....                      | 20 |
| Diagnostic behavior .....                     | 36 |
| Diagnostic information on local display ..... | 36 |
| Diagnostic message .....                      | 36 |
| Diagnostics and troubleshooting .....         | 35 |
| Dimensions in SI units .....                  | 42 |
| Document function .....                       | 5  |
| Documentation .....                           | 6  |

## E

|                             |    |
|-----------------------------|----|
| Electrical connection ..... | 15 |
|-----------------------------|----|

## F

|                        |    |
|------------------------|----|
| Field of application   |    |
| Residual risks .....   | 7  |
| Firmware history ..... | 38 |

## I

|                                        |    |
|----------------------------------------|----|
| Identification .....                   | 21 |
| Identifying the measuring device ..... | 10 |
| Incoming acceptance .....              | 10 |
| Inlet and outlet runs .....            | 13 |
| Inspection                             |    |
| Received goods .....                   | 10 |

|                                     |    |
|-------------------------------------|----|
| Installation .....                  | 13 |
| Installation conditions .....       | 13 |
| IO-Link configuration version ..... | 17 |

## M

|                                     |    |
|-------------------------------------|----|
| Materials .....                     | 43 |
| Mounting location .....             | 13 |
| Mounting position .....             | 13 |
| Mounting the measuring device ..... | 13 |

## O

|                                            |    |
|--------------------------------------------|----|
| Operation options .....                    | 19 |
| SmartBlue app .....                        | 19 |
| Operational .....                          | 33 |
| Operational safety .....                   | 8  |
| Overview of device description files ..... | 20 |
| Overview of diagnostic events .....        | 37 |
| Overview of the operating menu .....       | 21 |

## P

|                                    |    |
|------------------------------------|----|
| Packaging disposal .....           | 12 |
| Pending diagnostic events .....    | 31 |
| Pin assignment, device plug .....  | 15 |
| Post-connection check .....        | 18 |
| Pressure Equipment Directive ..... | 44 |
| Product safety .....               | 8  |

## R

|                                          |    |
|------------------------------------------|----|
| Radio approval .....                     | 44 |
| Radio approvals .....                    | 45 |
| Registered trademarks .....              | 6  |
| Requirements for connecting cables ..... | 15 |
| Requirements for personnel .....         | 7  |

## S

|                                                       |    |
|-------------------------------------------------------|----|
| Security .....                                        | 30 |
| Setting the installation direction and measurement .. | 22 |
| Status input configuration version .....              | 17 |
| Status signals .....                                  | 36 |
| Storage conditions .....                              | 12 |
| Storage temperature .....                             | 12 |
| Switch output configuration version .....             | 16 |
| Switch/pulse output configuration version .....       | 16 |
| Switching ON the measuring device .....               | 21 |
| Symbols used .....                                    | 5  |
| System integration .....                              | 20 |

## T

|                                   |    |
|-----------------------------------|----|
| Technical data .....              | 41 |
| Certificates and approvals .....  | 44 |
| Environment .....                 | 42 |
| Input .....                       | 41 |
| Installation .....                | 41 |
| Mechanical construction .....     | 42 |
| Operability .....                 | 43 |
| Output .....                      | 41 |
| Performance characteristics ..... | 41 |

|                                             |    |
|---------------------------------------------|----|
| Power supply . . . . .                      | 41 |
| Process . . . . .                           | 42 |
| Temperature range                           |    |
| Storage temperature . . . . .               | 12 |
| Tools                                       |    |
| Transport . . . . .                         | 12 |
| Totalizer . . . . .                         | 28 |
| Transporting the measuring device . . . . . | 12 |
| Troubleshooting                             |    |
| General . . . . .                           | 35 |

## U

|                                                                            |        |
|----------------------------------------------------------------------------|--------|
| Unidirectional flow measurement (Q), conductivity<br>measurement . . . . . | 24, 27 |
| Using the measuring device                                                 |        |
| Borderline cases . . . . .                                                 | 7      |
| Incorrect use . . . . .                                                    | 7      |

## V

|                                                |    |
|------------------------------------------------|----|
| Voltage output configuration version . . . . . | 17 |
|------------------------------------------------|----|

## W

|                              |    |
|------------------------------|----|
| W@M Device Viewer . . . . .  | 10 |
| Weight                       |    |
| Transport (notes) . . . . .  | 12 |
| Weight in SI units . . . . . | 43 |
| Weight in US units . . . . . | 43 |
| Workplace safety . . . . .   | 7  |



[www.addresses.endress.com](http://www.addresses.endress.com)

---