BA01697D/06/EN/02.18
71390334
Valid as of version
01.00.zz (Device firmware)

Products   Solutions   Services

Operating Instructions
Picomag
IO-Link

Electromagnetic flowmeter

IO-Link

Endress+Hauser

People for Process Automation

- 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

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
⚠ DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
⚠ WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
⚠ CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTE!** 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
✳	**Bluetooth®** Wireless data transmission between devices over a short distance.
⦾ IO-Link®	**IO-Link** 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
✓	**Permitted** Procedures, processes or actions that are permitted.
✓✓	**Preferred** Procedures, processes or actions that are preferred.

Symbol	Meaning
✕	**Forbidden** Procedures, processes or actions that are forbidden.
ℹ	**Tip** Indicates additional information.
📖	Reference to documentation
📄	Reference to page
🖼	Reference to graphic
▶	Notice or individual step to be observed
1. , 2. , 3. ...	Series of steps
↳	Result of a step

1.2.5   Symbols in graphics

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

1.3   Documentation

ℹ 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)
- 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.

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 µS/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!
▶ 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
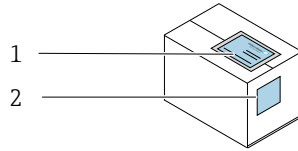
Are the order codes on the delivery note (1) and the product sticker (2) identical?
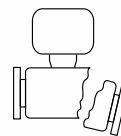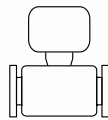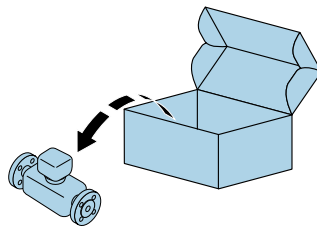
Are the goods undamaged?
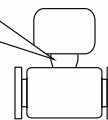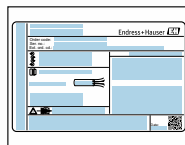
Do the nameplate data match the ordering information on the delivery note?
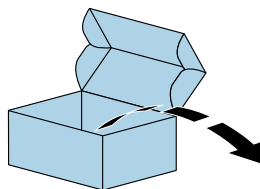
Is the accompanying safety data sheet present?

- 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): 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
⚠	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
📖	**Reference to documentation** 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→ 📖 38

4.2   Transporting the product

Transport the device to the measuring point in the original packaging.

ℹ️   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
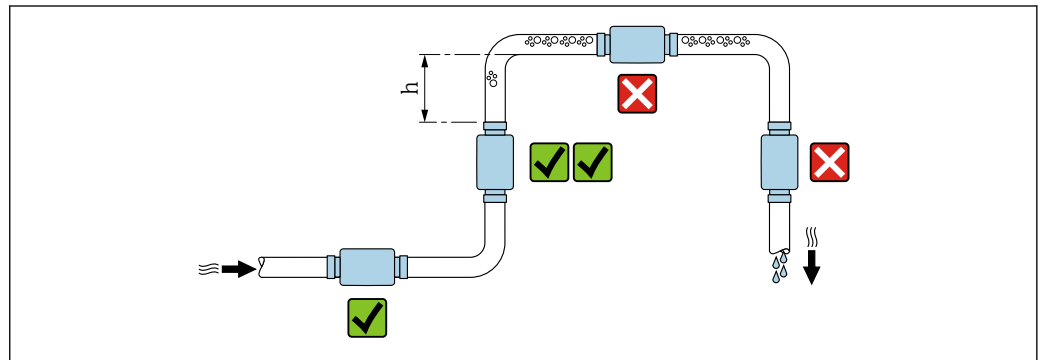
A0032998

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

Observe the following inlet and outlet runs to comply with accuracy specifications:
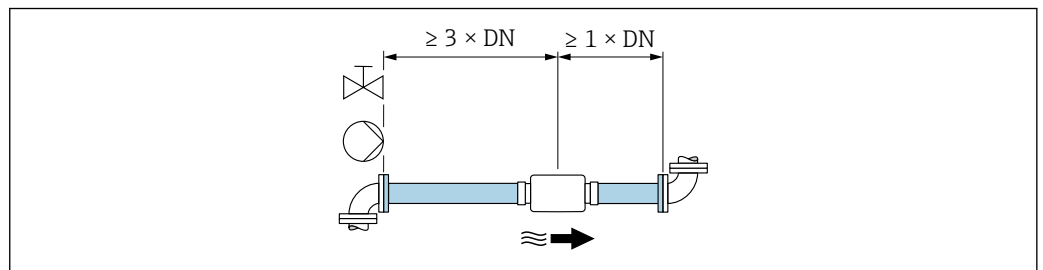
A0032997

ℹ️ Installation dimensions: information on the dimensions and installed lengths of the device → 🔖 39

ℹ️ The arrow points in the preferred direction of flow. Measurement is also possible in the other direction.→ 🔖 23

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.
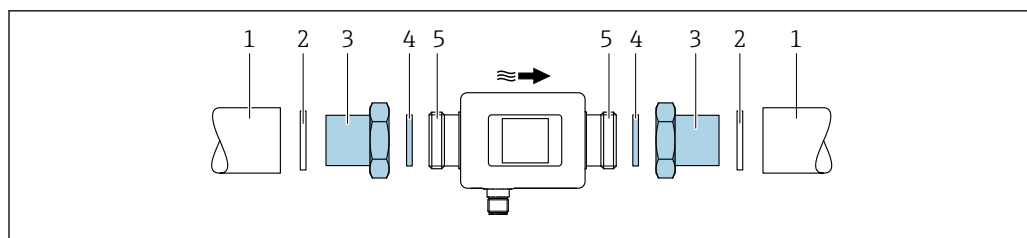
A0033002

1   Pipe
2   Seal (not supplied)
3   Adapter: available adapters → 🖺 36
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^2 (AWG26)
Temperature range	−10 to +80 ℃ (+14 to +176 ℉)
Degree of protection	IP65/67

6.1.2 Pin assignment, device plug

A0033004
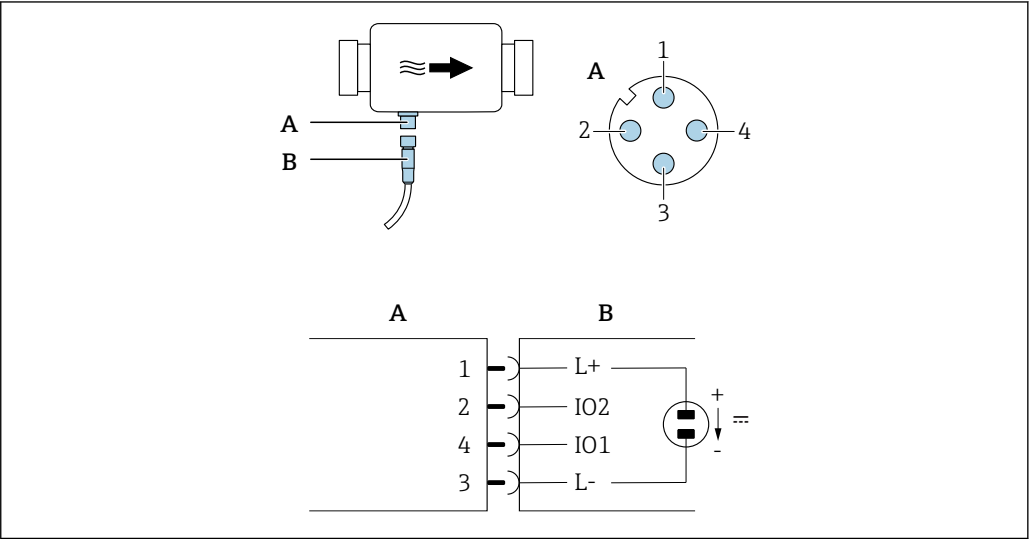
A *Connector (Picomag)*
B *Socket (Customer side)*

Pin	Assignment	Description
1	L+	Supply voltage + (18 to 30 V$_{DC}$/max. 3 W)
2	IO2	Input/output 2, can be configured independently of IO1
3	L-	Supply voltage -
4	IO1	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 [1]	npn [2]
A0033005	A0033006
A *Connector (Picomag)* *B* *Socket (Customer side)* *L+* *Supply voltage +* *L-* *Supply voltage -*	*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.	The load is switched to low side L-. The maximum load current is 250 mA. The output is overload-resistant.

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

Pulse output configuration version

A0033005
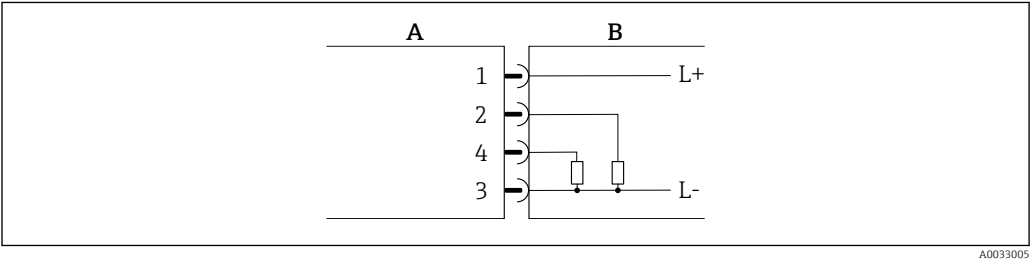
🔲 *1   Pulse output with pnp switching behaviour*

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

A0033007
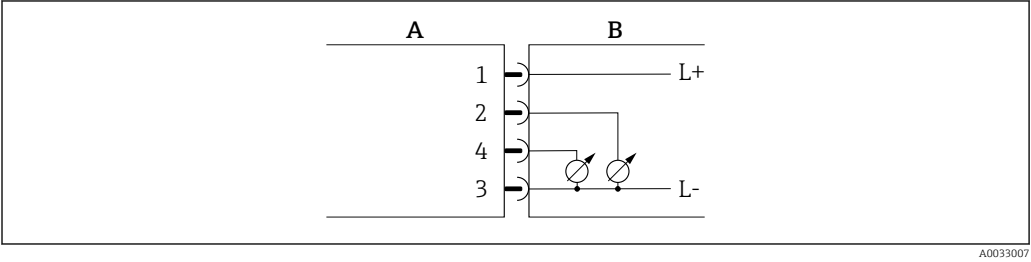
🔲 *2   Current output, active, 4 to 20 mA*

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 Ω. A bigger load distorts the output signal.

Voltage output configuration version
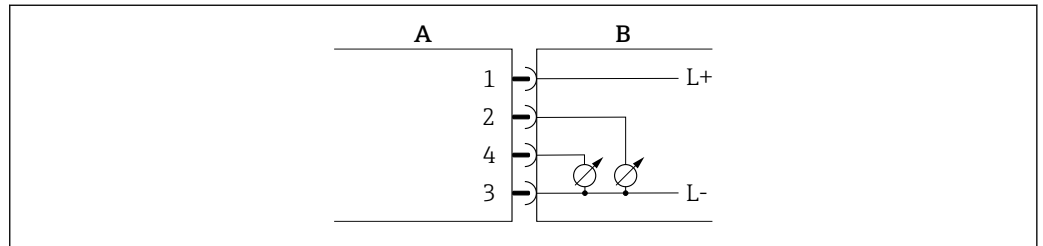
A0033007

🖭 *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 Ω. The output is overload-resistant.

Status input configuration version

- 15 V (switch-on threshold)
- 5 V (switch-off threshold)
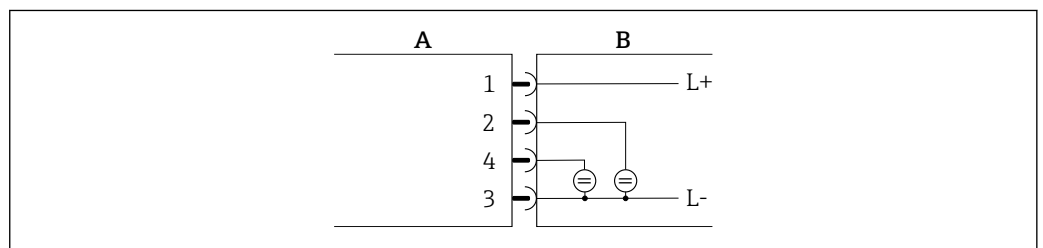
A0033008

🖭 *4   Status input*

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

Internal resistance: 5 kΩ

IO-Link configuration version

ℹ️   Option only available for output 1 in the **Output 1**→ 📖 24 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.
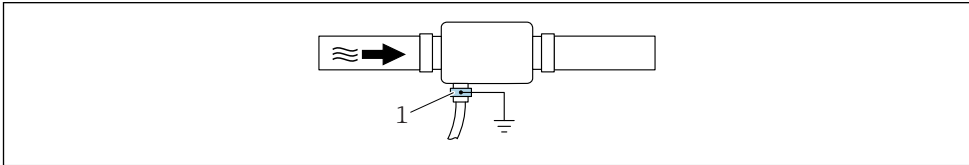
A0033003

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)?	❑
Do the cables have adequate strain relief?	❑
Is the connector connected correctly?	❑
Does the supply voltage match the specifications on the measuring device?	❑
Is the pin assignment of the connector correct?	❑
Is the potential equalization established correctly?	❑

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:

A0033202

System requirements
- Devices with iOS:
  - iPhone 4S or higher, from iOS9.0
  - iPad2 or higher, from iOS9.0
  - iPod Touch 5th generation or higher, from iOS9.0
- 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. Select the device from the Live List.
   ↳ The Login dialog box opens.

Logging in:

3. Enter the user name: **admin**.

4. Enter the initial password: serial number of the device.

5. Confirm your entry.
   ↳ The main menu opens.

6. Change the password: Setup → Communication → Bluetooth configuration → Change Bluetooth 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: 80 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

Overview of the entire IO-Link ISDU parameter list → 🖺 45

8.1 Overview of device description files

Current version data for the device

Firmware version	01.00.zz	• On the title page of the Operating instructions • On the device label • Parameter **Firmware version** System → Device info → Firmware version
Release date of firmware version	09.2017	---
Profile version	• 1.1 • Smart Sensor Profile	---

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 [1]) 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
- IODDfinder: ioddfinder.io-link.com

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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 5 s. During the start-up phase, the outputs are in the same state as the measuring device in the switched-off state.

9.2   Configuring the measuring device

Overview of the operating menu

Diagnostics		
	‣ Actual diagnostics	→ 🖹 35
	‣ Simulation	→ 🖹 29
Application		
	‣ System units	→ 🖹 23
	‣ Sensor	→ 🖹 23
	‣ Output 1	→ 🖹 24
	‣ Output 2	→ 🖹 24
	‣ Display	→ 🖹 22
	‣ Measured values	→ 🖹 30
System		
	‣ Administration	→ 🖹 31
	‣ Device information	→ 🖹 35
	‣ Bluetooth configuration	→ 🖹 31
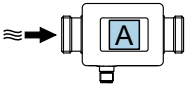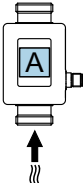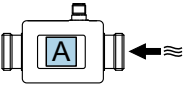
9.2.1 Configuring the display

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

Navigation

Menu: "System" → 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: • Volume flow + temperature • Volume flow + totalizer • Temperature + totalizer	Volume flow + temperature
Rotation display	Select local display rotation.	• Auto (automatic) • The display rotates automatically depending on the installation position	Auto
		• 0° • Can be read in the horizontal installation position with flow from left to right A0033013	
		• 90° • Can be read in the vertical installation position with flow from bottom to top A0033014	
		• 180° • Can be read in the horizontal installation position with flow from right to left A0033015	
		• 270° • Can be read in the vertical installation position with flow from top to bottom A0033016	
Backlight	Set the intensity of the backlighting.	0 to 100 %	50 %

9.2.2   Configuring system units

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

Navigation

Menu: "Application" → System units

Parameter overview with brief description

Parameter	Description	Options	Factory setting
Volume flow unit	Select volume flow unit.	• l/s, m³/h, l/min • gal/min (us)	l/min
Volume unit	Select volume unit.	• ml, l, m³ • fl. oz (us), gal (us)	ml
Temperature unit	Select temperature unit.	• ℃ • ℉	℃
Totalizer unit	Select totalizer unit.	• l, m³ • 1 000 l, 1 000 m³ • fl. oz (us), gal (us) • 1 000 gal (us)	m³

9.2.3   Setting the installation direction and measurement

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

Navigation

Menu: "Application" → Sensor

Parameter overview with brief description

Parameter	Description	Selection/input	Factory setting
Installation direction	Select the installation direction.	• Flow in arrow direction (forwards) Positive flow measurement in the direction of the arrow. • Flow against arrow direction (backwards) Positive flow measurement in the opposite direction of the arrow.	Flow in arrow direction (forwards)
On value	Enter the on value for low flow cut off.	Positive floating point number ℹ 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: DN 15 (½"): 0.4 l/min (0.1 gal/min) DN 20 (¾"): 0.75 l/min (0.2 gal/min) DN 25 (1"): 1.2 l/min (0.3 gal/min) DN 50 (2"): 5.0 l/min (1.3 gal/min)
Damping	Enter the time constant for damping the flow measured value.	0 to 10 s	0 s

9.2.4 Configuring the IO modules

The measuring device has two signal inputs or signal outputs that can be configured independently of one another:
- Current output→ 📄 24
- Pulse output→ 📄 25
- Switch output→ 📄 26
- Voltage output→ 📄 27
- Status input → 📄 28

Navigation

Menu: "Application" → Output 1

Menu: "Application" → Output 2

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
I/O module 1 type	Select the operating mode of output 1.	• Pulse output • Current output • Switch output • Voltage output • Digital input • IO-Link • Off	IO-Link
I/O module 2 type	Select the operating mode of output 2.	• Current output • Switch output • Voltage output • Digital input • Off	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: "Application" → Output 1 → Current output

Menu: "Application" → Output 2 → Current output

Parameter overview with brief description

Parameter	Description	Selection/input	Factory setting
Assign current output	Select process variable for current output.	• Off • Volume flow • Temperature	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: DN 15 (½"): 25 l/min (6.6 gal/min) DN 20 (¾"): 50 l/min (13.2 gal/min) DN 25 (1"): 100 l/min (26.4 gal/min) DN 50 (2"): 750 l/min (198.1 gal/min)

Unidirectional flow measurement (Q)
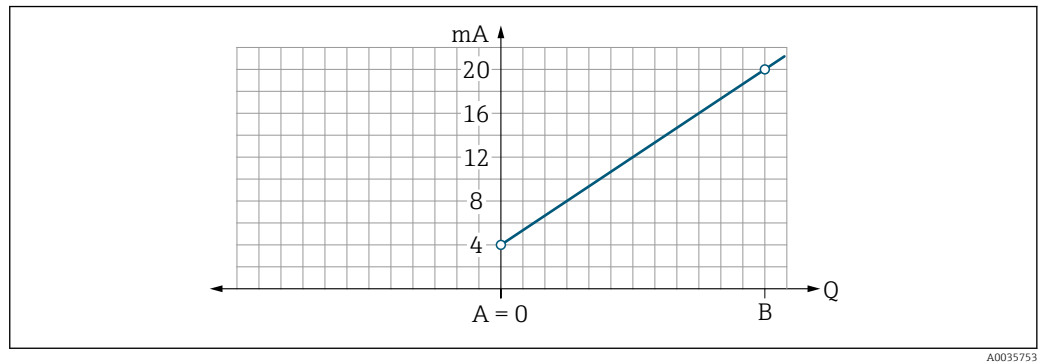
A0035753

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) or temperature measurement (T)
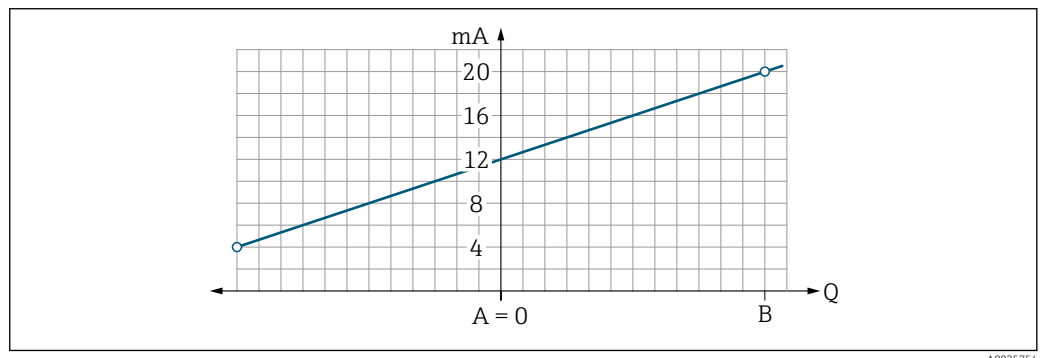
A0035754

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: "Application" → Output 1 → Pulse output

Menu: "Application" → Output 2→ Pulse output

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: DN 15 (½"): 0.5 ml/min DN 20 (¾"): 1.0 ml/min DN 25 (1"): 2.0 ml/min DN 50 (2"): 10.0 ml/min

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 maximum pulse repetition frequency is 10 kHz.

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: "Application" → Output 1 → Switch output

Menu: "Application" → Output 2 → Switch output

Parameter overview with brief description

Parameter	Description	Selection/input	Factory setting
Polarity	Select the switching behavior.	• NPN (low-side-switch) Switches load to low side to L- • PNP (high-side-switch) Switches load to high side to L+	PNP (high-side-switch)
Switch output function		• Diagnostic behavior The output switches when an event with the status signal F occurs • Off The switch output is permanently switched off (open, non-conductive). • On The switch output is permanently switched on (closed, conductive). • Limit volume flow Indicates if a specified limit value has been reached for the process variable. • Limit temperature Indicates if a specified limit value has been reached for the process variable. • Range volume flow • Range temperature • Empty pipe detection Output switches off if empty pipe detection is activated.	Off
Switch-on value	Enter the measured value for the switch-on value.	Floating point number with sign	1 000 m³/h
Switch-off value	Enter the measured value for the switch-off value.	Floating point number with sign	1 000 m³/h

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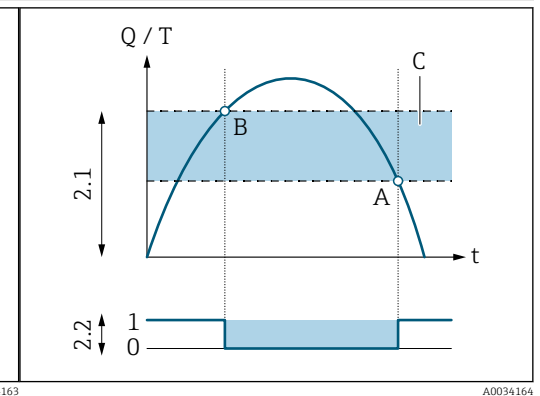
1.1 *Input variables*
1.2 *Switch output*
A *Switch-on point*
B *Switch-off value*
C *Hysteresis*

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

Range switched on	Range switched off
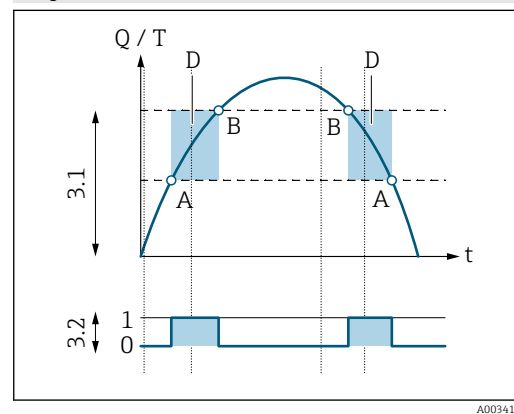
3.1 *Input variables*
3.2 *Switch output*
A *On-value (lower range limit)*
B *Off-value (upper range limit)*
D *Window*
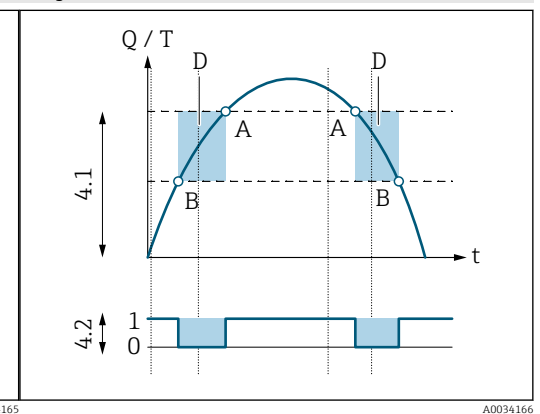
4.1 *Input variables*
4.2 *Switch output*
A *On-value (lower range limit)*
B *Off-value (upper range limit)*
D *Window*

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: "Application" → Output 1 → Voltage output

Menu: "Application" → Output 2 → Voltage output

Parameter overview with brief description

Parameter	Description	Selection/input	Factory setting
Assign voltage output	Select process variable for voltage output.	• Off • Volume flow • Temperature	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: DN 15 (½"): 25 l/min DN 20 (¾"): 50 l/min DN 25 (1"): 100 l/min DN 50 (2"): 750 l/min

Unidirectional flow measurement (Q)
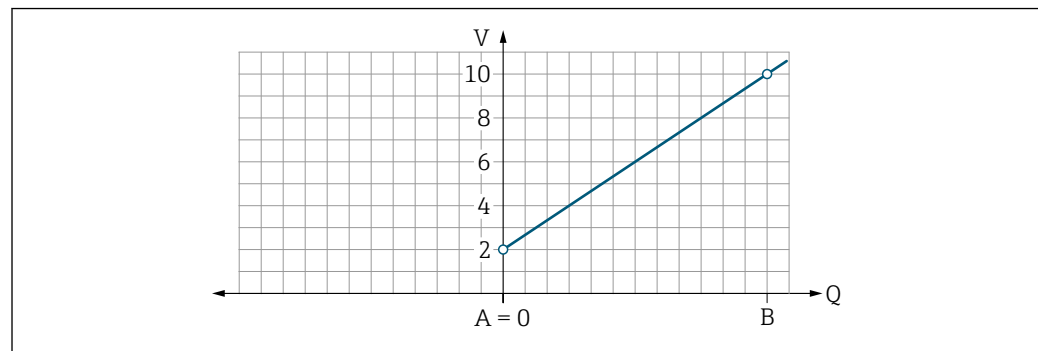
A0032995

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) or temperature measurement (T)
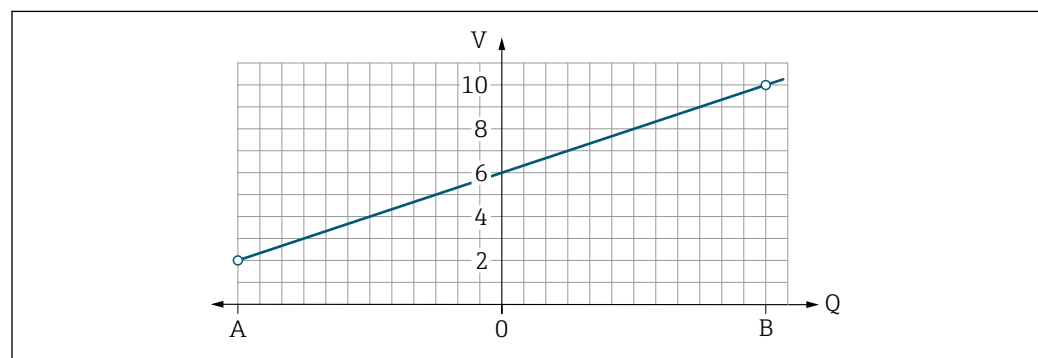
A0032996

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.
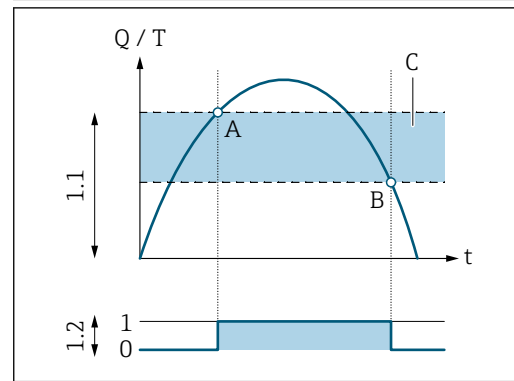
Navigation

Menu: "Application" → Output 1 → Digital input

Menu: "Application" → Output 2 → Digital input

Parameter overview with brief description

Parameter	Description	Selection	Factory setting

Active level	Select the switching behavior of the digital input.	• High
		  Input reacts to high level
		• Low
		  Input reacts to low level
			High

Assign status input	Select process variable for status input.	• Off
		• Reset totalizer
		  Resets the totalizer
		• Flow override
		  – Flow measured value = 0
		  – Does not affect the temperature measurement
			Reset totalizer

9.2.5   Simulation

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

Navigation

Menu: "Diagnostics" → Simulation 1

Parameter overview with brief description

Parameter	Description	Selection/input	Factory setting

Simulation process variable	Activate the simulation of process variables.	• Off
		  Simulation is deactivated.
		• On
		  Simulation is activated.
		
		  [i] 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	–

10 Operation

10.1 Reading measured values

You can read all measured values using the **Measured values** submenu.

Navigation

Menu: "Application" → Measured values

Parameter overview with brief description

Parameter	Description	Display/options	Factory setting
Volume flow	Displays the volume flow currently measured.	Floating point number with sign	–
Temperature	Displays the temperature currently measured.	Floating point number with sign	–
Totalizer	The totalizer adds up positive and negative flow measured values with the correct signs: Positive flow measured values increase the totalizer reading while negative values decrease it.	Floating point number with sign	–

Reset totalizer	Reset the totalizer.	▪ Cancel
		  The totalizer is not reset.
		▪ Reset + totalize
		  The totalizer is reset.
			Cancel

10.2   Configuring Bluetooth

The **Bluetooth configuration** submenu contains all the parameters to configure the Bluetooth connection.

Navigation

Menu: "System" → Bluetooth configuration

Parameter overview with brief description

Parameter	Description	Selection	Factory setting
Bluetooth	Enable or disable the *Bluetooth*® wireless technology interface. ℹ️ If the interface is disabled, it can only be re-enabled by tapping the device.	• Disable – Disable the interface. – The connection to the measuring device is torn down. • Enable	Enable

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.

10.3   Administration

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

Navigation

Menu: "System" → Administration

Parameter overview with brief description

Parameter	Description	Entry/selection/display	Factory setting
Set access code	Enter a user-specific access code to restrict write access to parameters.	Max. 4-digit character string comprising numbers, letters and special characters	0000
Enter access code	Enter the access code. Restrict write access to parameters in order to protect the device configuration from unauthorized modification.	Max. 4-digit character string comprising numbers, letters and special characters	0000
Device reset	Reset the entire device configuration or some of the configuration to a defined state.	• Cancel • To factory defaults • Restart device	Cancel
Access status tooling	Displays the access status.	• Operator • Maintenance	Maintenance

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 → 🖺 38.
	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. 2. Observe limit values specified in the "Technical Data".
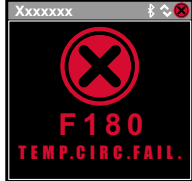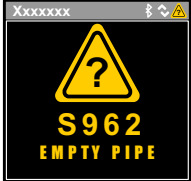
For access

Error	Possible causes	Solution
No connection established via Bluetooth	Bluetooth communication is disabled	1. Check whether the Bluetooth logo is visible on the local display or not. 2. Re-enable Bluetooth communication by tapping the device.
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 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**
A0033011	A0033010	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
F	**Failure** An operating error has occurred. The measured value is no longer valid.
C	**Function check** The device is in simulation mode.
S	**Out of specification** The device is being operated: • Outside its technical specification limits (e.g. outside the process temperature range) • Outside of the configuration carried out by the user (e.g. maximum flow in parameter 20 mA value)

Diagnostic behavior

Diagnostic message	Meaning
	Alarm • Measurement is interrupted. • Signal outputs and totalizers assume the defined alarm condition. • A diagnostic message is generated.
	Function check Process measured values are simulated to test the outputs/wiring. • IO1/IO2 overload • Flow override is active
	Warning • Measurement is resumed. • Measuring operation with limited accuracy • The signal outputs and totalizers are not affected. • A diagnostic message is generated.

Diagnostics behavior of outputs

Output	Diagnostic behavior
Switch output	• Setting for reporting events with the status signal F • Switch output is switched on if an event occurs • No further response to events with other status signals
Pulse output	• Pulse output stops if events with the status signal F occur • No further response to events with other status signals
Totalizer	• Totalizing stops if events with the status signal F occur • No further response to events with other status signals
Current output	• 3.5 mA output to report events with the status signal F • No further response to events with other status signals
Voltage output	• 1.75 V output to report events with the status signal F • No further response to events with other status signals
IO-Link	• All events reported to the Master • Events read and processed further by the Master

11.3   Overview of diagnostic events

Diagnostic event	Event text	Reason	Remedial measures	Status signal [ex-factory]
181	Coil. circ. fail.	Coil/frequency failure Coil current PWM outside tolerance range	Replace the measuring device.	F
180	Temp. circ. fail.	Temperature sensor open circuit/short-circuit	Replace the measuring device.	F
201	Device fail.	No communication to 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 simulation active (via remote configuration)	–	C
453	Flow override	Flow override active (via 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 limit	Adjust parameter or process.	S
443	P-Out 1 range	P-output 1 at range 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 limit	Adjust parameter or process.	S
962	Empty pipe	Pipe is completely or partially empty	Adjust the process.	S
834	Temperat. range	Medium temperature outside the permitted range	Adjust the process.	S
841	Flow range	Flow rate outside the permitted range	Adjust the process.	S

11.4   Pending diagnostic events

Navigation

Menu: "Diagnostics" → 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. ℹ️ 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.

11.5   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. /).

ℹ️ 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

11.6   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

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.

Adapter set

Order number	Description
71355698	G½" to G⅜" external thread
71355699	G½" to R⅜" external thread
71355700	G½" to NPT⅜" external thread
71355701	G½" to G½" internal thread
71355702	G½" to R½" external thread
71355703	G½" to NPT½" external thread
71355704	G½" to ½" TriClamp
71355705	G¾" to R¾" external thread
71355706	G¾" to NPT¾" external thread
71355707	G¾" to G¾" internal thread
71355708	G¾" to R¾" 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 NPT1½" external thread
71355716	G2" to NPT2" external thread
71355717	G2" to G1½" external thread
71355718	G2" to G2" internal thread
71355719	G2" to 2" TriClamp
71355720	G2" to 2" Victaulic

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 values	• Volume flow • Temperature • Totalizer
Measuring range	DN 15 (½"): 0.4 to 25 l/min (0.1 to 6.6 gal/min) DN 20 (¾"): 0.75 to 50 l/min (0.2 to 13.2 gal/min) DN 25 (1"): 1.2 to 100 l/min (0.32 to 26.4 gal/min) DN 50 (2"):5 to 750 l/min (1.32 to 198.1 gal/min)
Digital input	• High or low active • Switch-on level 15 V • Switch-off level 5 V • Internal resistance 5 kOhm

13.2 Output

Output	Max. load
Current output	500 Ω Load must not be greater
Voltage output	500 Ω Load resistance must not be smaller
Signal on alarm	• Status signal (as per NAMUR Recommendation NE 107) • Plain text display with remedial action
Switch output	• Switching behaviour: pnp or npn • Max. load 250 mA

13.3 Power supply

Supply voltage range	18 to 30 V_{DC} (SELV, PELV, Class 2)
Power consumption	Max. 3 W (excluding outputs IO1 and IO2)

13.4 Performance characteristics

Volume flow measurement	
Maximum measured error	±2 % o.r. and ±0.5 % 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 ℃
Repeatability	±0.5 ℃

13.5 Installation

→ 🖺 13

13.6 Environment

Ambient temperature range	−10 to +60 ℃ (+14 to +140 ℉)
Storage temperature	−25 to +85 ℃ (−13 to +185 ℉)
Degree of protection	IP65/67

Shock resistance	20 g (11 ms) as per IEC/EN60068-2-27
Vibration resistance	Acceleration up to 5 g (10 to 2 000 Hz) as per IEC/EN60068-2-6
Electromagnetic compatibility (EMC)	In accordance with IEC/EN61326 and/or IEC/EN55011 (Class A)

13.7   Process

Medium temperature range	• −10 to +70 ℃ (+14 to +158 ℉)
	• Permissible short-term temperature, maximum one hour:
	  85 ℃ (185 ℉)
	  Repetition after 4 hours at the earliest

Medium properties	Liquid, conductivity > 20 μS/cm
Pressure	Max. 16 bar$_{rel}$

13.8   Mechanical construction

A0033012
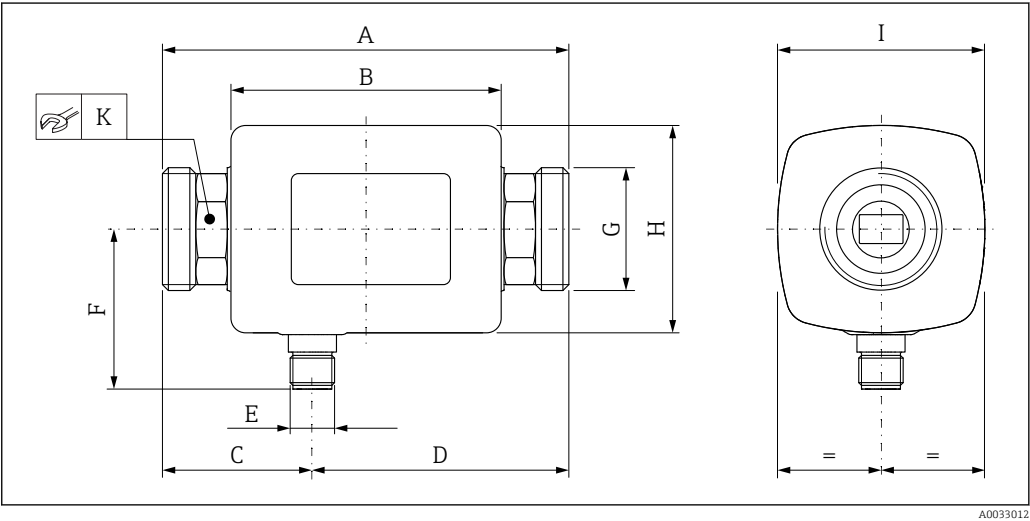
Dimensions in SI units

DN	A [mm]	B [mm]	C [mm]	D [mm]	E	F [mm]	G	H [mm]	I [mm]	K [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 [in]	B [in]	C [in]	D [in]	E	F [in]	G	H [in]	I [in]	K [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
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 [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
Seal	FKM
Display window	Polycarbonate

13.9   Operability

Local display

The device has an onsite display:

A0032991
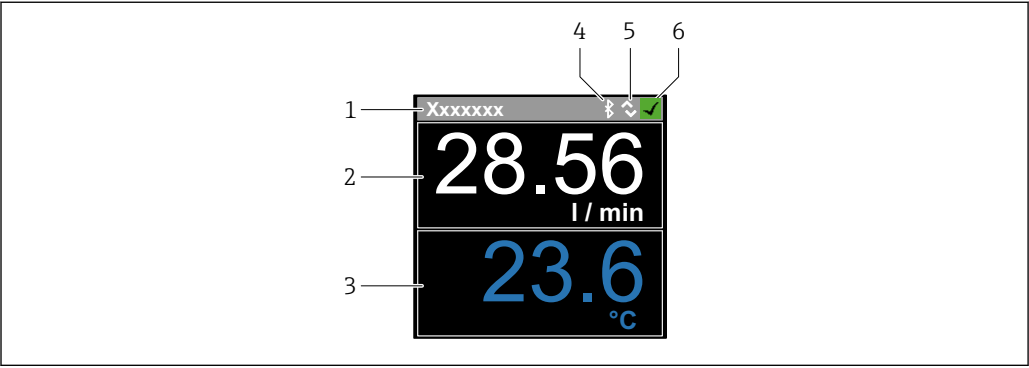
1   Tag name (configurable)
2   Measured variable 1 (configurable), with sign
3   Measured variable 2 (configurable), with sign
4   Active Bluetooth connection
5   Active I/O-Link connection
6   Device status

Display element
A maximum of 2 readings from the 3 measured variables (volume flow, temperature, totalizer) can be displayed

Operation

- Via Bluetooth® wireless technology
- Via IO-Link

Digital communication

Via IO-Link

SmartBlue app

The device has a *Bluetooth*® wireless technology interface and can be operated and configured via this interface using the SmartBlue app.

- The range under reference conditions is 10 m (33 ft)
- Incorrect operation by unauthorized persons is prevented by means of encrypted communication and password encryption.
- The *Bluetooth*® wireless technology interface can be deactivated.

13.10   Configuration interface

SmartBlue app

Bluetooth® wireless technology
The device has a *Bluetooth*® wireless technology interface and can be operated and configured via this interface using the SmartBlue app.
- The range under reference conditions is 10 m (33 ft)
- Incorrect operation by unauthorized persons is prevented by means of encrypted communication and password encryption.
- The *Bluetooth*® wireless technology interface can be deactivated.

13.11   Certificates and approvals

CE mark	The device meets the legal requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.
	Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.
Radio approval	The measuring device has radio approval.
	For detailed information on the radio approval, see the Appendix → 🔖 42
Pressure Equipment Directive	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.
$_C$UL$_{US}$ 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.

[i] 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.

[i] 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   Singapore

**Complies with
IMDA Standards
DA 103787**
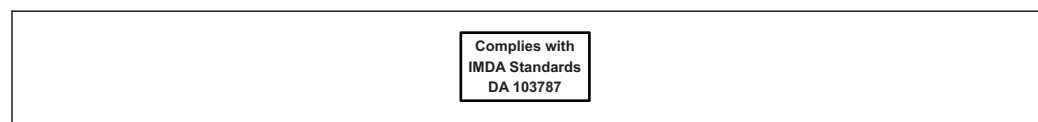
A0035905

Complies with IMDA Standards

DA 103787

14.1.4   Thailand

เครื่องโทรคมนาคมและอุปกรณ์นี้ มีความสอดคล้องตามข้อกำหนดของ กสทช.

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

14.1.5 Other countries

Other national approvals are available on request.

14.2   IO-Link process data

14.2.1   Data structure

Byte number	0 - 3	4 - 7	8 - 15	16 - 23	24 - 31	32 - 39	40 - 47	48 - 55	56 - 63	64 - 71	72 - 79
Data	Static	Temperature in $\frac{1}{10}$ °C		Volume flow in l/s				Totalizer in l			
Data type	4-bit	12-bit two's complement		32-bit single-precision floating-point number (IEEE 754)				32-bit single-precision floating-point number (IEEE 754)			

Data structure of static byte 0 - 3

Bit	Description
0	Switches once per sampling rate
1	Reserved
2	Current status S-Out 1
3	Current status S-Out 2

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
Identification								
Device Tag First 10 characters displayed (starting from left)	0x0018	24	32 (max.)	string	r/w		EH_DMA_XXZZ	
Device Name	0x0012	18	16 (max.)	string	r		Picomag	
Device ID1	0x0009	9	1	uint	r		0x01	
Device ID2	0x000A	10	1	uint	r		0x01	
Device ID3	0x000B	11	1	uint	r		0x00	
Vendor Name	0x0010	16	32 (max.)	string	r		Endress+Hauser	
Vendor ID1	0x0007	7	1	uint	r		0x00	
Vendor ID2	0x0008	8	1	uint	r		0x11	
Device Serial No. E.g. (YMXXXXZZ)	0x0015	21	11 (max.)	string	r		see nameplate	
Firmware Version E.g. 01.00.00	0x0017	23	8 (max.)	string	r			
Order code E.g. DMA15-AAAAA1	0x0102	258	18 (max.)	string	r		see nameplate	
Device Type	0x0100	256	2	uint	r		0x94FF	
Diagnostics								
Actual Diagnostics E.g. C485 (= SIMULATION ACT.)	0x0104	260	4	string	r			
Last Diagnostics E.g. S962 (= EMPTY PIPE)	0x0105	261	4	string	r			
Simulation Proc. Var.	0x015F	351	2	uint	r/w	enable=1 disable=0		
Sim.Proc.Var.Value Volumeflow Unit selection list from **Unit Volumeflow**	0x0166	358	4	float	r/w		0.0	-10^6 10^6
Sim.Proc.Var.Value Temperature Unit selection list from **Unit Temperature**	0x0168	360	4	float	r/w		0.0	-10^4 10^4
Measured Values								
Volumeflow Unit selection list from **Unit Volumeflow**	0x0161	353	4	float	r			
Temperature Unit selection list from **Unit Temperature**	0x0163	355	4	float	r			
Totalizer Unit selection list from **Unit Totalizer**	0x0169	361	4	float	r/w		0.0	

Designation	ISDU (dec)	ISDU (hex)	Size (Byte)	Data type	Access	Value range	Factory setting	Range limits
System Units								
Unit Volumeflow	0x0226	550	2	uint	r/w	l/s=0 m³/h=1 l/min=2 Usgpm=3	l/min	
Unit Volume	0x0227	551	2	uint	r/w	ml=0 USozf=1 l=2 m³=3 Usgal=4	ml	
Unit Temperature	0x0228	552	2	uint	r/w	℃=0 ℉=1	℃	
Unit Totalizer	0x016B	363	2	uint	r/w	USozf=1 l=2 m³=3 Usgal=4 kl=5 Ml=6 kUsg=7	m³	
Sensor								
Install. Direction In relation to direction of arrow on the device	0x015E	350	2	uint	r/w	forward=0 reverse=1	forward	
Low Flow Cut Off The flow rate below the selected value is zero Unit selection list from **Unit Volumenflow**	0x0160	352	4	float	r/w		0.4/0.75/1.2/5.0 l/min	0 10^6
Damping Volume flow damping via the PT1 element Unit: s	0x01A4	420	4	float	r/w		0 s	0 100
Output 1								
Operating Mode IO-Link is set if connected to a master	0x01F4	500	2	uint	r/w	P-Out=0 I-Out=1 S-In=2 S-Out=3 IO-Link=4 U-Out=5 off=6	IO-Link	
Current output I-Out 1								
I - OUT Assign	0x0258	600	2	uint	r/w	off=0 volume flow=1 temperature=2	volume flow	
Q-Start-Value ASP [1] for volume flow Unit selection list from **Unit Volumeflow**	0x0259	601	4	float	r/w		0 l/min	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
Q-End-Value AEP [2] for volume flow Unit selection list from **Unit Volumeflow**	0x025A	602	4	float	r/w		25/50/100/750 l/min	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
T-Start-Value ASP [1] for temperature Unit selection list from **Unit Temperature**	0x025F	607	4	float	r/w		-10 ℃	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$

Designation	ISDU (dec)	ISDU (hex)	Size (Byte)	Data type	Access	Value range	Factory setting	Range limits
T-End-Value AEP [2)] for temperature Unit selection list from **Unit Temperature**	0x0260	608	4	float	r/w		+70 ℃	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
Pulse output P-Out								
Pulse Value Unit selection list from **Unit Volume**	0x03E8	1000	4	float	r/w		0.5/1.0/2.0/10.0 ml	10^{-9} $9.9 \cdot 10^9$
Switch output S-Out 1								
Switch Polarity	0x032B	811	2	uint	r/w	pnp=0 npn=1	pnp	
Switch Function	0x0320	800	2	uint	r/w	alarm=0 off=1 on=2 lim.vol.flow=3, lim.temp.=4 lim.vol.=5 win.vol.flow=6 win.temp.=7 win.vol.=8 epd=9	alarm	
Q-ON-Value Unit selection list from **Unit Volumeflow**	0x0321	801	4	float	r/w		20/40/80/600 l/min	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
Q-OFF-Value Unit selection list from **Unit Volumeflow**	0x0322	802	4	float	r/w		15/30/60/450 l/min	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
T-ON-Value Unit selection list from **Unit Temperature**	0x0327	807	4	float	r/w		+ 60 ℃	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
T-OFF-Value Unit selection list from **Unit Temperature**	0x0328	808	4	float	r/w		+ 50 ℃	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
V-ON-Value Unit selection list from **Unit Totalizer**	0x0329	809	4	float	r/w		0.2/0.4/0.8/6.0 m³	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
V-OFF-Value Unit selection list from **Unit Totalizer**	0x032A	810	4	float	r/w		0.15/0.3/0.6/4.5 m³	$-9.9 \cdot 10^9$ $9.9 \cdot 10^9$
Voltage output U-Out 1								
U - OUT Assign	0x02BC	700	2	uint	r/w	off=0 volume flow=1 temperature=2	volume flow	
Q-Start-Value ASP [1)] for volume flow Unit selection list from **Unit Volumeflow**	0x02BD	701	4	float	r/w		0 l/min	
Q-End-Value AEP [2)] for volume flow Unit selection list from **Unit Volumeflow**	0x02BE	702	4	float	r/w		25/50/100/750 l/min	
T-Start-Value ASP [1)] for temperature Unit selection list from **Unit Temperature**	0x02C3	707	4	float	r/w		-10 ℃	

Designation	ISDU (dec)	ISDU (hex)	Size (Byte)	Data type	Access	Value range	Factory setting	Range limits
T-End-Value AEP [2)] for temperature Unit selection list from **Unit Temperature**	0x02C4	708	4	float	r/w		+70 ℃	
				Digital input D-In 1				
D-IN Polarity	0x0385	901	2	uint	r/w	low=0 high=1	high	
D-IN Function	0x0384	900	2	uint	r/w	off=0 res.tot.=1 zero ret.=2	res.tot.	
IO-Link								
IO-LINK Vendor Name	0x0010	16	32 (max.)	string	r		Endress+Hauser	
IO-LINK Product Name	0x0012	18	16 (max.)	string	r		Picomag	
IO-LINK RevisionID	0x0004	4	1	uint	r		0x11	
				Output 2				
Operating Mode	0x01F5	501	2	uint	r/w	P-Out=0 I-Out=1 S-In=2 S-Out=3 IO-Link=4 U-Out=5 off=6	S-Out	
				Current output I-Out 2				
I - OUT Assign	0x028A	650	2	uint	r/w	off=0 volume flow=1 temperature=2	temperature	
Q-Start-Value ASP [1)] for volume flow Unit selection list from **Unit Volumeflow**	0x028B	651	4	float	r/w		0 l/min	
Q-End-Value AEP [2)] for volume flow Unit selection list from **Unit Volumeflow**	0x028C	652	4	float	r/w		25/50/100/750 l/min	
T-Start-Value ASP [1)] for temperature Unit selection list from **Unit Temperature**	0x0291	657	4	float	r/w		-10 ℃	
T-End-Value AEP [2)] for temperature Unit selection list from **Unit Temperature**	0x0292	658	4	float	r/w		+70 ℃	

Designation	ISDU (dec)	ISDU (hex)	Size (Byte)	Data type	Access	Value range	Factory setting	Range limits
Switch output S-Out 2								
Switch Polarity	0x035D	861	2	uint	r/w	pnp=0 npn=1	pnp	
Switch Function	0x0352	850	2	uint	r/w	alarm=0 off=1 on=2 lim.vol.flow=3 lim.temp.=4 lim.vol.=5, win.vol.flow=6 win.temp.=7 win.vol.=8 epd=9	alarm	
Q-ON-Value Unit selection list from **Unit Volumeflow**	0x0353	851	4	float	r/w		20/40/80/600 l/min	
Q-OFF-Value Unit selection list from **Unit Volumeflow**	0x0354	852	4	float	r/w		15/30/60/450 l/min	
T-ON-Value Unit selection list from **Unit Temperature**	0x0359	857	4	float	r/w		+ 60 ℃	
T-OFF-Value Unit selection list from **Unit Temperature**	0x035A	858	4	float	r/w		+ 50 ℃	
V-ON-Value Unit selection list from **Totalizer**	0x035B	859	4	float	r/w		0.2/0.4/0.8/6.0 m³	
V-OFF-Value Unit selection list from **Totalizer**	0x035C	860	4	float	r/w		0.15/0.3/0.6/4.5 m³	
Voltage output U-Out 2								
U - OUT Assign	0x02EE	750	2	uint	r/w	off=0 volume flow=1 temperature=2	temperature	
Q-Start-Value ASP [1] for volume flow Unit selection list from **Unit Volumeflow**	0x02EF	751	4	float	r/w		0 l/min	
Q-End-Value AEP [2] for volume flow Unit selection list from **Unit Volumeflow**	0x02F0	752	4	float	r/w		25/50/100/750 l/min	
T-Start-Value ASP [1] for temperature from **Unit Temperature**	0x02F5	757	4	float	r/w		-10 ℃	
T-End-Value AEP [2] for temperature from **Unit Temperature**	0x02F6	758	4	float	r/w		+70 ℃	

Designation	ISDU (dec)	ISDU (hex)	Size (Byte)	Data type	Access	Value range	Factory setting	Range limits
				Digital input D-In 2				
D-IN Polarity	0x0395	917	2	uint	r/w	low=0 high=1	high	
D-IN Function	0x0394	916	2	uint	r/w	off=0 res.tot.=1 zero ret.=2	res.tot.	
Device info								
Device Name								
Device Tag								
Device Serial No.								
Firmware Version								
Order code								
				Display				
Display Layout	0x01C3	451	2	uint	r/w	QV=0 QT=1 Qs=3 VT=2, Vs=4 Ts=5	QT	
Display Rotation	0x01C4	452	2	uint	r/w	0 °=0 90 °=1 180 °=2 270 °=3 auto=4	Auto	
Display Backlight	0x01C2	450	2	uint	r/w	0 - 100	50	
				Bluetooth configuration				
Bluetooth Function	0x041A	1050	2	uint	r/w	on=1 off=0	On	
Bluetooth Tx Pwr Level	0x041B	1051	2	uint	r	0 - 4		
Bluetooth Conn. Status	0x041C	1052	1	uint	r			
Administration								
Set Access Code Define access code	0x0108	264	2	uint	w		0000	
Access Code Enter access code	0x0107	263	2	uint	w			
Reset Device	0x010E	270	2	uint	w	cancel=0 restore fact.=1 restart=4	cancel	
				Product Specific Process Values				
Status IO 1	0x0386	902	2	uint	r	low=0 high=1		
Status IO 2	0x0396	918	2	uint	r	low=0 high=1		
Temperature Unit selection list from **Unit Temperature**	0x0163	355	4	float	r			

Designation	ISDU (dec)	ISDU (hex)	Size (Byte)	Data type	Access	Value range	Factory setting	Range limits
VolumeFlow Unit selection list from **Unit Volumeflow**	0x0161	353	4	float	r			
Totalizer Unit selection list from **Unit Totalizer**	0x0169	361	4	float	r			

1)   Analog Start Point
2)   Analog End Point

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