# WAGO I/O System Field

1-Channel Analog Input; IO-Link Converter; 4 ... 20 mA;
2 × M12 connector

765-2701/200-000


Product manual | Version 2.0.0

# Table of Contents

# Provisions

This document applies to the following product:

**765-2701/200-000** (1AI FLD IOL CONV 4-20mA) 1-Channel Analog Input; IO-Link Converter; 4 ... 20 mA; 2 x M12 Connector

| | |
|---|---|
| Product detail page | **www.wago.com/765-2701/200-000** |

The product must only be installed and operated in accordance with the operating instructions. Knowledge of the operating instructions is required for proper use. You can find all documents and information on the detailed product page.

### Additional document

- 🕮 **WAGO IO-Link Configurator**

## 1.1 Intended Use

The product 765-2701/200-000 is used to evaluate analog signals from connected sensors or other devices within a measuring range from 4 to 20 mA.

- The product is intended for indoor use.
- Operation of the product in other application areas is only permitted when corresponding approvals and labeling are present.

### Improper Use

Improper use of the product is not permitted. The following cases in particular constitute improper use:

- Non-observance of the intended use
- Use without protective measures in an environment in which salt water, salt spray mist, icing, corrosive fumes, explosive gases, direct sunlight and ionizing radiation can occur
- Use of the product in areas with special risk that require continuous fault-free operation and in which failure of or operation of the product can result in an imminent risk to life, limb or health or cause serious damage to property or the environment (such as the operation of nuclear power plants, weapons systems, aircraft and motor vehicles)

### Warranty and Liability

The provisions of the latest WAGO General Terms and Conditions of Deliveries and Services (GTC) apply as well as the Software License Terms for Standard Software (SW-License) applicable to software products und software embedded in WAGO hardware products, both available at: **www.wago.com**.

In particular, the warranty is void if:

- The product is improperly used.
- The deficiency (hardware and software configurations) is due to special instructions.
- Modifications to the hardware or software have been made by the user or third parties that are not described in this documentation and that has contributed to the fault.

Individual agreements always have priority.

### Obligations of Installers/Operators

The installers and operators bear responsibility for the safety of an installation or a system assembled with the product. The installer/operator is responsible for the proper installation and safety of the system. All laws, standards, guidelines, local regulations and accepted technology standards and practices applicable at the time of installation, and the instructions in the the products' Instructions for Use, must be complied with. In addition, the installment requirements for licensing must be observed. In the event of non-compliance, the product may not be operated within the scope of the approval.

## 1.2 Typographical Conventions

### Number Notation

| | |
|---|---|
| 100 | Decimals: Normal notation |
| 0x64 | Hexadecimals: C-notation |
| '100' | Binary: In single quotation marks |
| '0110.0100' | Nibbles separated by a period |

### Text Formatting

| | |
|---|---|
| *italic* | Names of paths or files |
| **bold** | Menu items, entry or selection fields, emphasis |
| `Code` | Sections of program code |
| > | Selection of a menu point from a menu |
| "Value" | Value entries |
| **[F5]** | Identification of buttons or keys |

### Cross References / Links

| | |
|---|---|
|  | Cross references/links to a topic in a document |
|  | Cross references / links to a separate document |
|  | Cross references / links to a website |
|  | Cross references / links to an email address |

### Sequence of Action

✓ This symbol identifies a precondition.

1. Action step
2. Action step

   ⇨ This symbol identifies an intermediate result.

⇨ This symbol identifies the result of an action.

- Individual action step

### Lists

- Lists, first level
  - Lists, second level

### Figures

Figures in this documentation are for better understanding and may differ from the actual product design.

### Warning Messages

**⚠ DANGER**

**Type and source of hazard**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

- Action step to reduce risk

**⚠ WARNING**

**Type and source of hazard**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

- Action step to reduce risk

**⚠ CAUTION**

**Type and source of hazard**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

- Action step to reduce risk

***NOTICE***

**Type and source of malfunction (property damage only)**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

- Action step to reduce risk

### Information Notices

**Note**

**Information**

Indicates information, clarifications, recommendations, referrals, etc.

## 1.3 Legal Information

### Intellectual property

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Third-party trademarks are referred to in the product documentation. The "®" and "™" symbols are omitted hereinafter. The trademarks are listed in the Appendix: **Protected Rights [▶ 63]**.

### Subject to Change

The instructions, guidelines, standards, etc., in this manual correspond to state of the art at the time the documentation was created and are not subject to updating service. The installer and operator bear sole responsibility to ensure they are complied with in their currently applicable form. WAGO GmbH & Co. KG retains the right to carry out technical changes and improvements of the products and the data, specifications and illustrations of this manual. All claims for change or improvement of products that have already been delivered – excepting change or improvement performed under guarantee agreement – are excluded.

### Licenses

The products may contain open-source software. The requisite license information is saved in the products. This information is also available under: **www.wago.com**.

# Safety

## 2.1 General Safety Regulations

- This documentation is part of the product. Therefore, retain the documentation during the entire service life of the product. Pass on the documentation to any subsequent user of the product. In addition, ensure that any supplement to this documentation is included, if necessary.
- The product must only be installed and put into operation by qualified electrical specialists per EN 50110-1/-2 and IEC 60364.
- Comply with the laws, standards, guidelines, local regulations and accepted technology standards and practices applicable at the time of installation.

## 2.2 Electrical Safety

- Disconnect all power supplies from the product before performing any installation, repair or maintenance.
- Make sure the product does not carry any voltage before starting work.

### Power Supply

- For non-hazardous active voltage per EN/UL/IEC 61010-1, SELV/PELV power supplies shall be used.
- Connecting impermissible current or frequency values may destroy the product.

### Grounding/Protection/Fuses

- When handling the product, please ensure that environmental factors (personnel, work space and packaging) are properly equalized. Do not touch any conducting parts.
- Take suitable measures to protect against overload (e.g., a supply module with fuse or an external fuse).

### Cables

- Always use connecting cables designed for the maximum current load.
- Additional heat can be produced at the clamping point by high currents and inherent heat generated by the product. Plan a higher tenmperature range for the conductors, or reduce inherent heat by selecting larger conductor cross-sections.
- The specified conductor cross-sections refer exclusively to the mechanical connection capacity of the clamping points. Always use connecting cables designed for the maximum current load.
- Use appropriate strain relief.

## 2.3 Mechanical Safety

- Before startup, please check the product for any damage that may have occurred during shipping. Do not put the product into operation in the event of mechanical damage.
- Do not open the product housing.

## 2.4 Indirect Safety

- Only use a dry or cloth or a clothed dampened with water to clean the product. Do not use cleaning agents, e.g., abrasive cleaners, alcohols or acetone.
- Only permit skilled personnel approved by WAGO to perform repair work.
- Replace any defective or damaged devices.
- Use only UL-approved category CYJV 2/7/8 cables to connect the product in UL-approved systems.
- Only use accessories authorized by WAGO.

# Overview

The Analog/IO-Link Converter provides an economical, compact solution for easily incorporating conventional analog sensors and actuators into an IO-Link-capable system like the WAGO I/O System Field, depending on their type. This allows reliable, cost-effective, interference-immune acquisition and output of analog signals. Digital communication can easily be introduced (retrofitted) when old systems are modernized. The converter can be configured directly on the device via IO-Link. A compact design, IP67 protection and the high operating temperature range make the Analog/IO-Link Converter ideal for automation without control cabinets.

The product is used for evaluation of an analog signal, a connected sensor or another device with an analog output. The product has one analog current input and two outputs. Output 1 is digital, and output 2 can optionally be used as analog current output.

The product can be operated in stand-alone mode and IO-Link mode.

# Properties

## 4.1 View

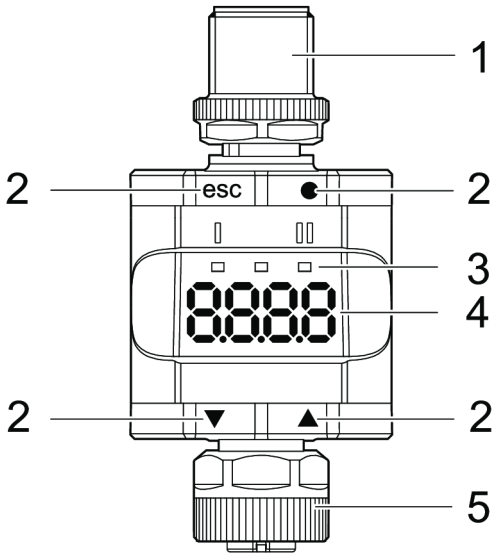



*Figure 1: View*

*Table 1: Legend for Figure "View"*

| No. | Designation | |
|---|---|---|
| 1 | M12 A plug | IO-Link Side/Evaluation Side [▶ 15] |
| 2 | Tactile rings | Controls [▶ 14] |
| 3 | LEDs | LEDs [▶ 13] |
| 4 | Display | Display [▶ 13] |
| 5 | M12 A socket | Sensor Side [▶ 15] |

## 4.2 Indicators

The product has a display for measured values and three LEDs to indicate the operating state.

### 4.2.1 Display

*Figure 2: Indicators – Display*

*Table 2: Legend for Figure “Indicators – Display”*

| Color | Description |
|---|---|
| Red/green | • 7-segment LED display<br>• 4-digit<br>• With color change |

In operating mode, the display shows the input current value. The scaling of the current value depends on the ScAL parameter.

### 4.2.2 LEDs

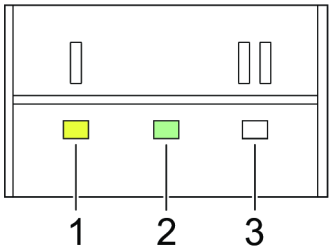



*Figure 3: Indicators – LEDs*

*Table 3: Legend for Figure “Indicators – LEDs”*

| No. | LED | | Color |
|---|---|---|---|
| 1 | I | OUT1 | Yellow |
| 2 | POWER | | Green |
| 3 | II | - | - |

## 4.3 Controls

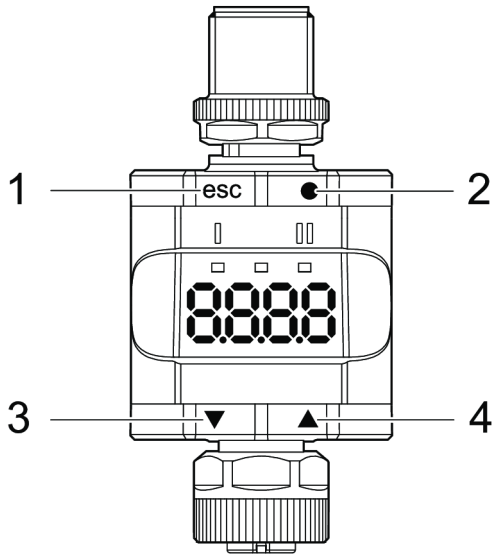



*Figure 4: Controls*

*Table 4: Legend for Figure "Controls"*

| No. | Button | | Description |
|---|---|---|---|
| 1 | [esc] | Quit | • Back to the previous menu<br>• Quit parameterization without saving the new value |
| 2 | [●] | Input | • Open menu mode<br>• Select the parameter and confirm a parameter value |
| 3 | [▼] | Down | • Select a parameter<br>• Set a parameter value<br>(holding the button down changes the value continuously; a single button press changes it incrementally)<br>• Indicates the unit<br>(press for one second in operating mode) |
| 4 | [▲] | Up | |

## 4.4 Connections

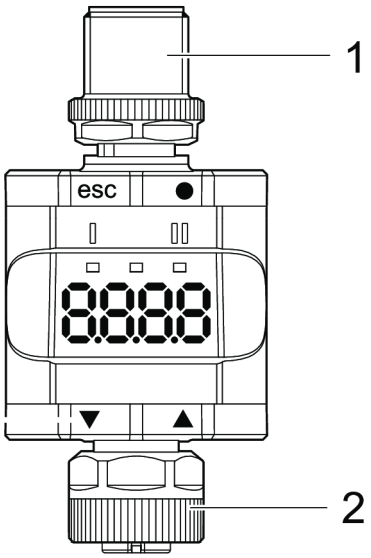


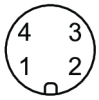

*Figure 5: Connections*

*Table 5: Legend for Figure "Connections"*

| No. | Designation | |
|---|---|---|
| 1 | IO-Link side (M12 A plug) | **IO-Link Side/Evaluation Side [▶ 15]** |
| 2 | Sensor side (M12 A socket) | **Sensor Side [▶ 15]** |

### 4.4.1 IO-Link Side/Evaluation Side

*Table 6: IO-Link Side/Evaluation Side (M12 A Plug)*

| Connection | Pin | Signal | Description |
|---|---|---|---|
|  M12 A plug, 4-pole | 1 | 1L+ | 24 VDC power supply |
| | 2 | OUT2 | Analog output |
| | 3 | 1L− | 0 V power supply |
| | 4 | OUT1 | Digital Output (SIO)/C/Q IO-Link |



### 4.4.2 Sensor Side

*Table 7: Sensor Side (M12 A Socket)*

| Connection | Pin | Signal | Description |
|---|---|---|---|
|  M12 A socket, 5-pole | 1 | 1L+ | Sensor power supply |
| | 2 | AI 4 ... 20 mA | Analog input |
| | 3 | 1L− | Sensor power supply |
| | 4 | - | Not assigned |
| | 5 | - | Not assigned |

## 4.5 Dimensional Drawings

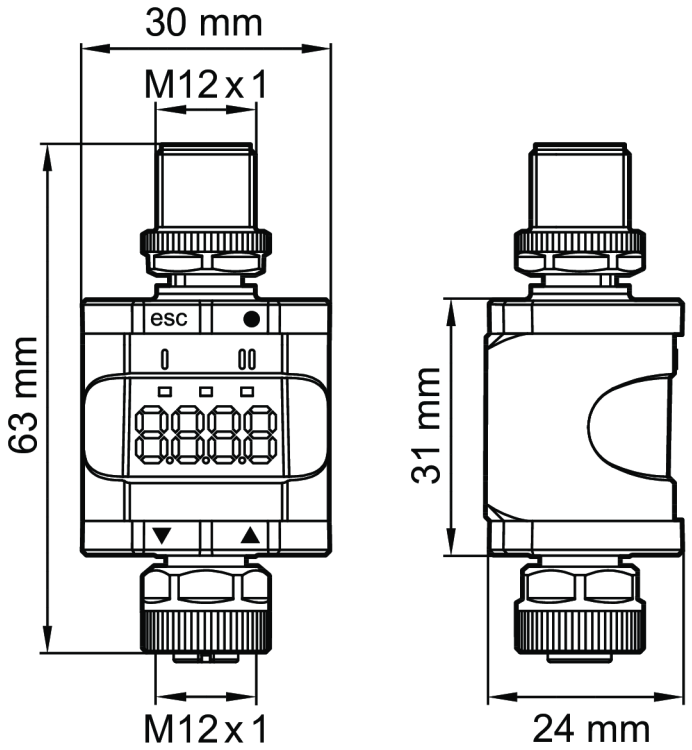



*Figure 6: Dimensional Drawings*

## 4.6 Circuit Diagram

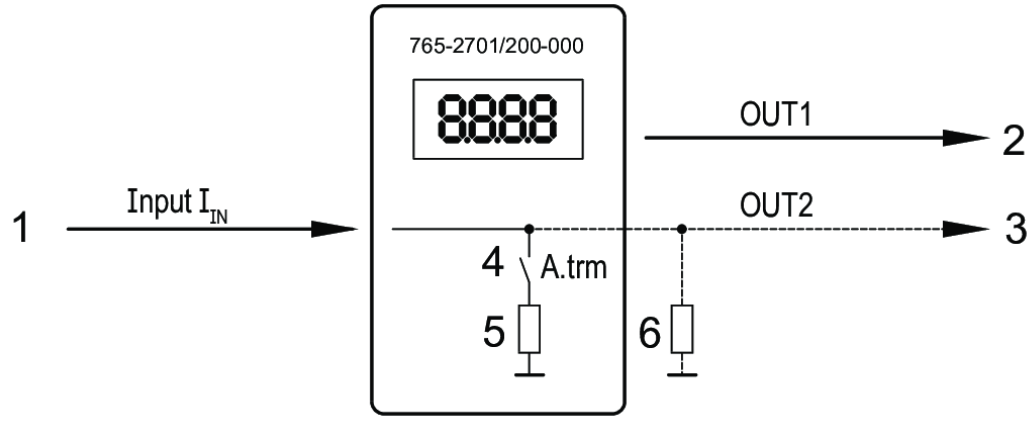



*Figure 7: Schematic Circuit Diagram*

*Table 8: Legend for Figure “Schematic Circuit Diagram”*

| No. | Designation |
|---|---|
| 1 | Analog input ($I_{IN}$) |
| 2 | Digital Output SIO/IO-Link (OUT1) |
| 3 | Analog output $I_{OUT}$ = $I_{IN}$ (OUT2) |
| 4 | Analog termination for OUT2 (A.trm) |
| 5 | Switchable internal load impedance |
| 6 | External load impedance (optional) |

## 4.7 Technical Data

### ⓘ Note

**Read technical data sheet!**

You can find technical data on the product in the appendix under Technical Data, Approvals, Guidelines and Standards.

*Table 9: Technical Data – Communication*

| Name | Value |
|---|---|
| Manufacturer ID | 285 / 0x011D<br>Bytes 01 29 / 0x01 0x1D |
| Product ID | 8391309 / 0x800A8D<br>Bytes 128 10 141 / 0x80 0x0A 0x8D |
| Manufacturer | WAGO GmbH & Co. KG |
| Manufacturer text | WAGO IO-Link Converter |
| Manufacturer URL | https://www.wago.com/765-2701/200-000 |
| IO-Link revision | V1.1 |
| Bit rate | COM2 |
| Minimum cycle time | 3.2 ms |
| SIO mode supported | Yes |
| Block parameterization | Yes |
| Data management | Yes |

# Functions

## 5.1 Operating Modes

The product supports the following operating modes:

- Stand-Alone Mode (without IO-Link) [▶ 19]
- IO-Link Mode [▶ 19]

### 5.1.1 Stand-Alone Mode (without IO-Link)

The product compares the measured current value with the parameter settingss and switches the output according to the selected parameters. The measured value is shown on the alphanumeric display. The user can scale the displayed value (two-point scaling). This mode lacks IO-Link functionality. The parameters can be set either directly on the product itself or using an IO-Link tool, such as WAGO IO-Link Configurator.

### 5.1.2 IO-Link Mode

IO-Link is a communication system for connecting intelligent sensors and actuators to automation systems. IO-Link is governed by the IEC 61131-9 standard.

The product has an IO-Link communication interface that requires an IO-Link-capable module (IO-Link master) for interoperation.

The IO-Link interface allows direct access to the process data and diagnostic data and allows product parameters to be set during operation.

For more information about IO-Link and all the necessary information about the required IO-Link hardware and software, see www.wago.com/<item number>.

In IO-Link SIO mode, the product has the same functionality as in stand-alone mode. The measured value is also displayed.

#### IO Device Description (IODD)

The IODD (Input Output Device Description) required for configuration can be downloaded from the IO-Link community's website: www.io-link.com.

## 5.2 Operational Functions

### 5.2.1 "Output 1" Functions

OUT1 (plug, pin 4):

- Digital output (state according to switching function setting)
- IO-Link interface

Selectable switching function:

- Hysteresis functions, make contact/break contact (see SP1/rP1 – Switching Point/Reverse Switching Point for OUT1 [▶ 21])
- Window functions, make contact/break contact (see FH1/FL1 – Upper/Lower Switching Limiting Values for Window Function for OUT1 [▶ 23])

OUT1 changes state when the input signal is above or below the switching limit settings. First switching point SP1 is set, then reset point rP1 (see **SP1/rP1 – Switching Point/ Reverse Switching Point for OUT1 [▶ 21]**).

**ⓘ Note**

**Hysteresis change when rP1 parameter changes**

The hysteresis defined in this way is retained even if SP1 is changed again. If the rP1 parameter is changed, the hysteresis also changes.

The width of the window is adjustable by the distance between FH1 and FL1.
- FH1 = upper value
- FL1 = lower value

### 5.2.2 “Output 2” Functions

OUT2 (plug, pin 2):
- Analog output (looping the analog input signal)

## 5.3 Parameter Description

Parameters are set through the ISDU mechanism (ISDU = Indexed Service Data Units) described in the IO-Link specification. This allows read and write access to the ISDU objects.

Regardless of the operating mode, there are two ways to parameterize the product:
- **Directly on the product via the integrated product menu [▶ 21]**
- **Via an IO-Link tool [▶ 29]**

Access via an IO-Link tool has a higher priority than parameterization via the product menu.

The ScAL scaling parameter only influences the display representation, not the transmitted process data or the actual switching threshold values.

Via IO-Link, the current value is always transmitted in µA. The switching thresholds can be set in 0.01 mA steps.

If a scaling is set, then the menu settings of the switching thresholds (SP, rP etc. ) are also scaled. Via IO-Link, however, the settings continue to be displayed and executed in 0.01 mA steps (resolution: 14 bits).

If the product has been locked via IO-Link, then it can only be unlocked via the IO-Link interface.

Some parameters can only be set via the IO-Link interface.

The following parameters are available.

### 5.3.1 Product Menu Parameters

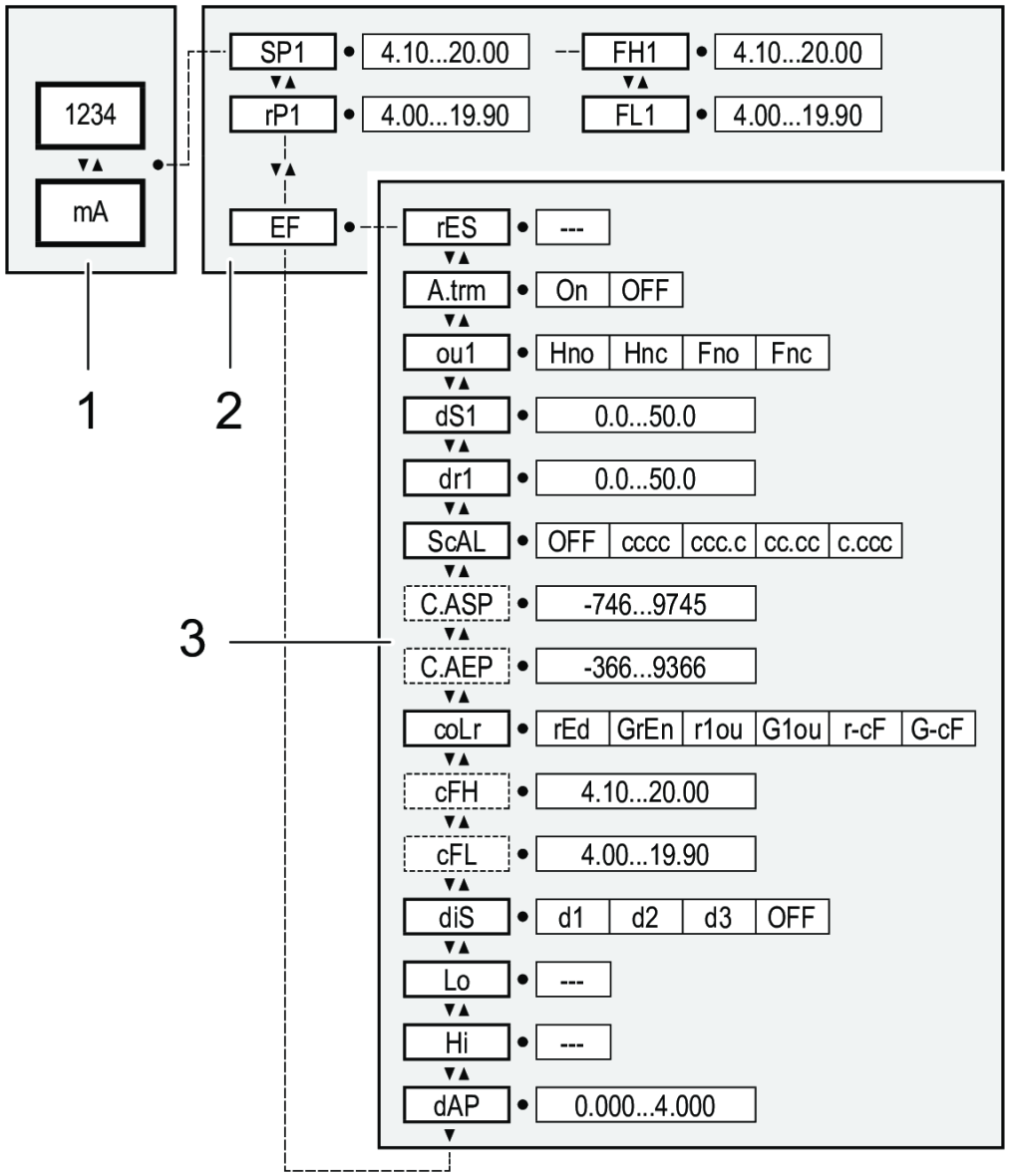



*Figure 8: Product Menu Structure*

*Table 10: Legend for Figure "Product Menu Structure"*

| No. | Designation |
|---|---|
| 1 | Operating mode |
| 2 | Main menu |
| 3 | Advanced functions |

#### 5.3.1.1 Main Menu Parameters

##### 5.3.1.1.1 SP1/rP1 – Switching Point/Reverse Switching Point for OUT1

Upper/lower limiting value for measured current at which OUT1 switches when hysteresis is set; only displayed when hysteresis function [Hno] or [Hnc] is set in [ou1].

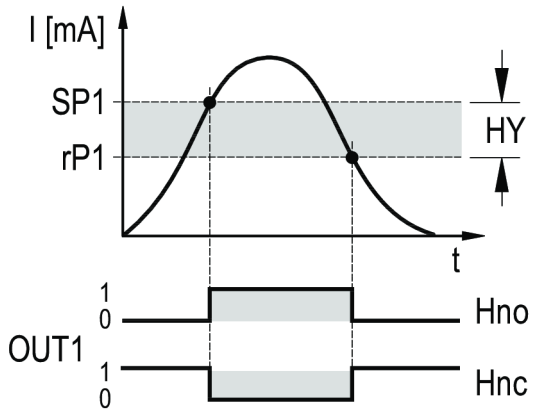



*Figure 9: SP1/rP1 – Switching Point/Reverse Switching Point for OUT1 – Hysteresis Functions*

*Table 11: Legend for Figure "SP1/rP1 – Switching Point/Reverse Switching Point for OUT1 – Hysteresis Functions"*

| Designation | Description |
|---|---|
| SP | Switching point |
| rP | Reverse switching point |
| HY | Hysteresis |
| Hno | Hysteresis function, make contact |
| Hnc | Hysteresis function, break contact |

- Select [SP1] and set the value at which output OUT1 switches.
- Select [rP1] and set value at which output OUT1 switches back.

[rP1] is always less than [SP1]. Only values lower than the value for [SP1] can be entered.

[rP1] follows changes from [SP1] and maintains the hysteresis setting.

#### 5.3.1.1.2 FH1/FL1 – Upper/Lower Switching Limiting Values for Window Function for OUT1

Upper/lower limiting value for measured current at which OUT1 switches within the window setting; the parameters are displayed only if window function [Fno] or [Fnc] has been set in [ou1].

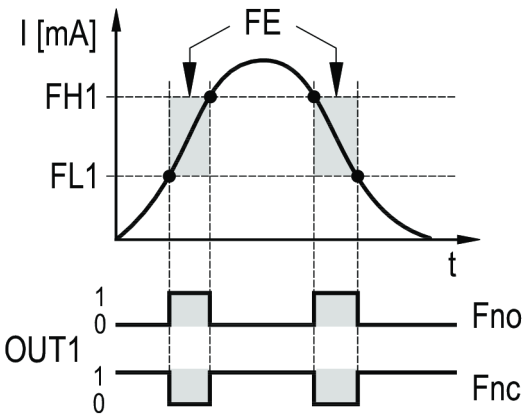



*Figure 10: FH1/FL1 – Upper/Lower Switching Limiting Values for Window Function for OUT1*

*Table 12: Legend for Figure "FH1/FL1 – Upper/Lower Switching Limiting Values for Window Function for OUT1"*

| Designation | Description |
|---|---|
| FH | Window, upper limiting value |
| FL | Window, lower limiting value |
| FE | Window |
| Fno | Window function, make contact |
| Fnc | Window function, break contact |

- Select [FH1] and set upper limiting value.
- Select [FL1] and set lower limiting value.

[FL1] is always less than [FH1]. Only values lower than the value for [FH1] can be entered.

[FL1] follows changes from [FH1] and maintains the hysteresis setting.

#### 5.3.1.1.3 EF – Advanced Functions

This parameter opens the advanced functions menu.

### 5.3.1.2 Advanced Function Parameters

#### 5.3.1.2.1 rES – Restore Default Settings

This parameter resets all parameters to the factory settings.

1. Select [rES].
2. Press [●].
3. Press and hold down [▲] or [▼] until [----] appears.
4. Press [●] briefly.

#### 5.3.1.2.2 A.trm – Analog Termination for OUT2

**Note**

**Note the following for current measurement and evaluation:**

If the internal analog termination is set to [On], output OUT2 must not be connected.

*Table 13: A.trm – Analog Termination for OUT2*

| Parameters | Description |
|---|---|
| [OFF] | OUT2 is connected externally, e.g., to the analog input of another device. |
| [On] | OUT2 is not connected and the current path is terminated internally. |

#### 5.3.1.2.3 ou1 – Output Function for OUT1

Switching signal for the current limiting value

*Table 14: ou1 – Output Function for OUT1*

| Parameters | Description |
|---|---|
| [Hno] | Hysteresis function/make contact |
| [Hnc] | Hysteresis function/break contact |
| [Fno] | Window function/make contact |
| [Fnc] | Window function/break contact |

#### 5.3.1.2.4 dS1/dr1 – Switching Delay/Reverse Switching Delay for OUT1

*Table 15: dS1/dr1 – Switching Delay/Reverse Switching Delay for OUT1*

| Parameters | Description |
|---|---|
| Value 0.0 ... 50.0 s | Switching delay/reverse switching delay is enabled. |
| Value 0.0 s | Delay is disabled. |

#### 5.3.1.2.5 ScAL – Displayed Value Scaling

This setting acts as a multiplier for the parameters [C.ASP/C.AEP].

*Table 16: ScAL – Displayed Value Scaling*

| Parameters | Description |
|---|---|
| [OFF] | The measured current value is not scaled. |
| [cccc] | Scaling without decimal place (×0001) |
| [ccc.c] | Scaling with one decimal place (×000.1) |
| [cc.cc] | Scaling with two decimal places (×00.01) |

| Parameters | Description |
|---|---|
| [c.ccc] | Scaling with three decimal places (×0.001) |

#### 5.3.1.2.6 C.ASP/C.AEP – Customer-Specific Analog Starting Point/Endpoint

Settings for scaled display values.
The parameters are only displayed if [ScAL] is set to [cccc], [ccc. c], [cc. cc] or [c. ccc].

- C.ASP value: −746 ... 9745 corresponds to 4 mA.
- C.AEP value: −366 ... 9366 corresponds to 20 mA.

If scaling is set via [ScAL], the C.AEP value must also be adjusted accordingly:

- For [ScAL] = [ccc.c] → C.AEP value × 10
- For [ScAL] = [cc.cc] → C.AEP value × 100
- For [ScAL] = [c.ccc] → C.AEP value × 1000

All displayed current values are interpolated on the basis of a two-point approximation ([SP1]+[rP1], [FH1]+[FL1], [cFH]+[cFL], [Lo]+[Hi]). IO-Link process data and parameters are not affected by the scaling.

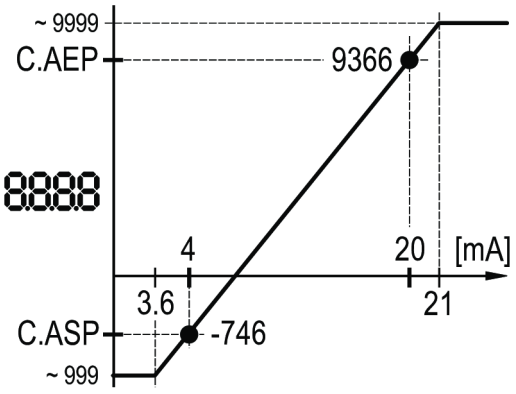



*Figure 11: C.ASP = min. value; C.AEP = max. value*

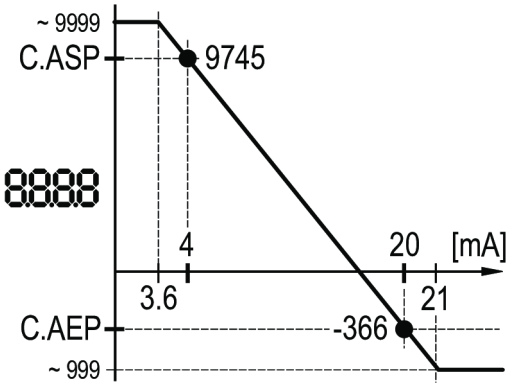



*Figure 12: C.ASP = max. value; C.AEP = min. value*

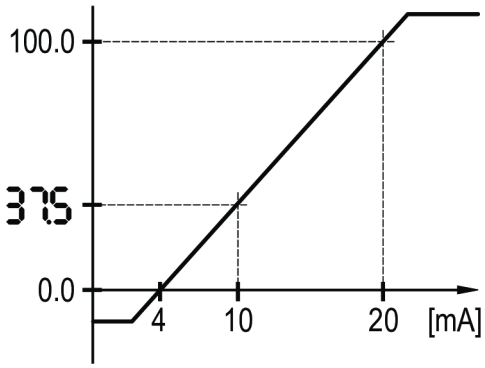



*Figure 13: C.ASP/C.AEP – Example with Scaled Display Value*

*Table 17: Example Menu Setting for Figure "C.ASP/C.AEP – Example with Scaled Display Value"*

| Example Menu Setting | |
|---|---|
| ScAL | ccc.c |
| C.ASP | 0.0 |
| C.AEP | 100.0 |
| Input | 10 mA |
| Indicator | 37.5 |

#### 5.3.1.2.7 coLr – Display Colors and Color Change

Assignment of the display colors "red" and "green" within the measurement range.

*Table 18: coLr – Display Colors and Color Change*

| Parameters | Description |
|---|---|
| [rEd] | Continuously red (independent of the measured value) |
| [GrEn] | Continuously green (independent of the measured value) |
| [r1ou] | Red when OUT1 switches |
| [G1ou] | Green when OUT1 switches |
| [r-cF] | Red when the measured value is between the [cFL] and [cFH] values |
| [G-cF] | Green when the measured value is between the [cFL] and [cFH] values |

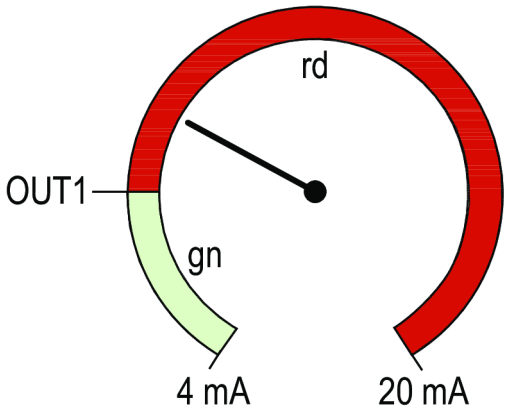



*Figure 14: Hysteresis function with [r1ou]*

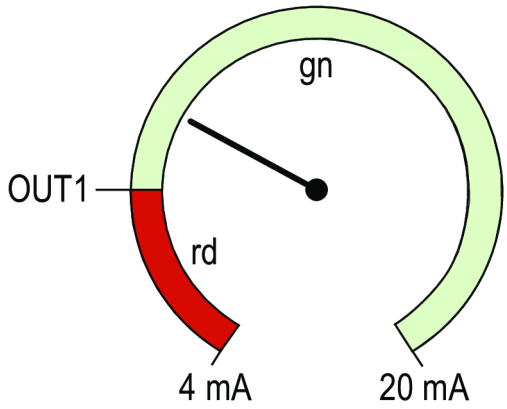



*Figure 15: Hysteresis function with [G1ou]*

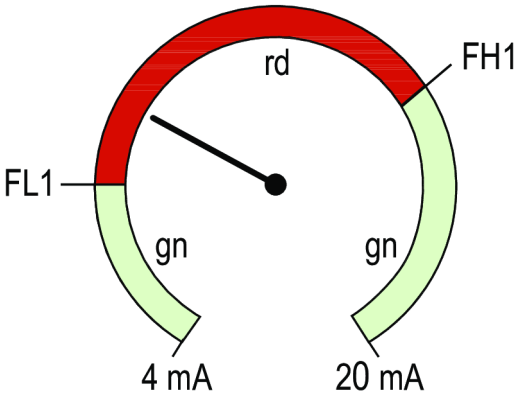



*Figure 16: Window function with [r1ou]*

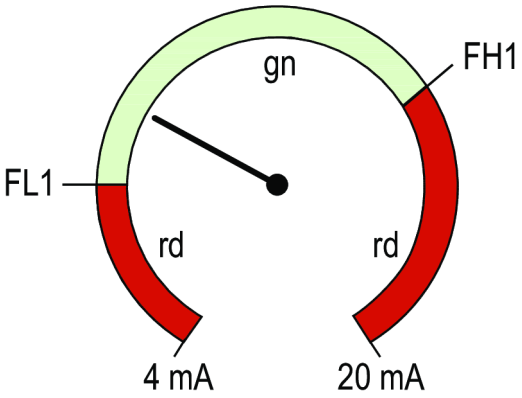



*Figure 17: Window function with [G1ou]*

#### 5.3.1.2.8 cFH/cFL – Upper/Lower Value for Color Change

If the [coLr] parameters are set to [r-cF] or [G-cF], it is necessary to select the [cFH] parameter and set the corresponding upper limiting value, and also to select the [cFL] parameter and set the corresponding lower limiting value. The setting range corresponds to the measured values.

The lower setting value is the parameter [cFL].

The upper setting value is the parameter [cFH].

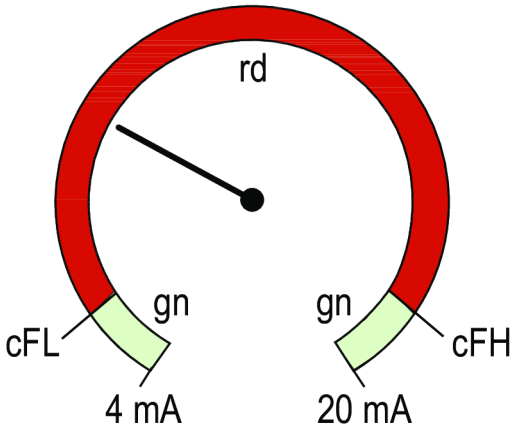



*Figure 18: [r-cF] Function*

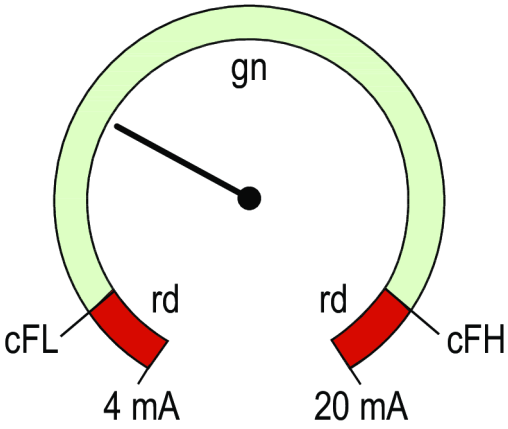



*Figure 19: [G-cF] Function*

#### 5.3.1.2.9 diS – Displayed Value Update Rate

*Table 19: diS – Displayed Value Update Rate*

| Parameters | Description |
|---|---|
| [OFF] | In operating mode, the measured value display is switched off. |
| [d1] | Measured value update every 50 ms |
| [d2] | Measured value update every 200 ms |
| [d3] | Measured value update every 600 ms |

Even with an unstable current value, [d1] provides optimal readability.

#### 5.3.1.2.10 Lo/Hi – Lower/Upper Input Measured Values

*Table 20: Lo/Hi – Lower/Upper Input Measured Values*

| Parameters | Description |
|---|---|
| [Lo] | Lower measured value |
| [Hi] | Upper measured value |

Clear memory:

1. Select [Hi] or [Lo] parameter.
2. Press and hold down [▲] or [▼] until [----] appears.
3. Press [●] briefly.

⇨ Memory is cleared.

#### 5.3.1.2.11 dAP – Damping

Damping of the analog measured value
The setting also affects the switching point, the IO-Link process data and the display.

*Table 21: dAP – Damping*

| Parameters | Description |
|---|---|
| Value<br>0.000 ... 4.000 s | T value: 63 % |
| Value 0.000 s | Damping is disabled. |

### 5.3.2 Parameters via IO-Link

The terms “index” and “subindex” used in the following tables refer to Indexed Service Data Units (ISDUs).

The following parameters are available.

You can find product diagnostic parameters in **Diagnostics via IO-Link [▶ 55]**.

#### 5.3.2.1 C.uni – Customer-Specific Unit

Customer-specific unit with max. 4 characters

#### 5.3.2.2 S.Loc – Software Lock

Value: ON/OFF

The product is locked for local menu settings.

It can only be unlocked via IO-Link.

#### 5.3.2.3 Resetting [Hi] and [Lo] Memory

Reset both memories: [Hi] and [Lo].

#### 5.3.2.4 Default Command

*Table 22: Variables – Default Command – General*

| | |
|---|---|
| **Index** | 2 |
| **Access rights** | Write-only |

*Table 23: Variables – Default Command*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Default command | - | Sub 0 | UIntegerT | 8 bits | - | (130) Restore factory default |
| | | | | | | (161) Reset [Hi] and [Lo] memory |
| | | | | | | (162) Reset [Lo] memory |
| | | | | | | (163) Reset [Hi] memory |
| | | | | | | (240) IO-Link 1.1 system test command 240, event 8DFE appears |
| | | | | | | (241) IO-Link 1.1 system test command 241, event 8DFE disappears |
| | | | | | | (242) IO-Link 1.1 system test command 242, event 8DFF appears |
| | | | | | | (243) IO-Link 1.1 system test command 243, event 8DFF disappears |
| | | | | | | (255) Command with no effect – for internal use only |

### 5.3.2.5 Product Access Blocks

*Table 24: Variables – Product Access Blocks – General*

| | |
|---|---|
| **Index** | 12 |
| **Access rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 25: Variables – Product Access Blocks*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Product Access Blocks | - | Sub 0 | RecordT | 16 bits | - | - |
| Data management | - | bitOffs 1 | BooleanT | 1 bit | (false) | (false) open |
| | | | | | | (true) locked |
| Local user interface | - | bitOffs 3 | BooleanT | 1 bit | (false) | (false) open |
| | | | | | | (true) locked |

### 5.3.2.6 Manufacturer

*Table 26: Variables – Manufacturer Name – General*

| | |
|---|---|
| **Index** | 16 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 27: Variables – Manufacturer Name*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Manufacturer | - | Sub 0 | StringT | 19 bytes | WAGO GmbH & Co. KG | - |

### 5.3.2.7 Manufacturer Text

*Table 28: Variables – Manufacturer Text – General*

| | |
|---|---|
| **Index** | 17 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 29: Variables – Manufacturer Text*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Manufacturer text | - | Sub 0 | StringT | 11 bytes | WAGO IO-Link Converter | - |

### 5.3.2.8 Product Name

*Table 30: Variables – Product Name – General*

| | |
|---|---|
| **Index** | 18 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 31: Variables – Product Name*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Product name | - | Sub 0 | StringT | 6 bytes | 765-2701/0200 -0000 Con- verter | - |

### 5.3.2.9 Product ID

*Table 32: Variables – Product ID – General*

| | |
|---|---|
| **Index** | 19 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 33: Variables – Product ID*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Product ID | - | Sub 0 | StringT | 6 bytes | 0765-2701 | - |

#### 5.3.2.10 Product Text

*Table 34: Variables – Product Text – General*

| | |
|---|---|
| **Index** | 20 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 35: Variables – Product Text*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Product Text | - | Sub 0 | StringT | 30 bytes | 1AI FLD IOL CONV 4-20 mA | - |

#### 5.3.2.11 Serial Number

*Table 36: Variables – Serial Number – General*

| | |
|---|---|
| **Index** | 21 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 37: Variables – Serial Number*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Serial number | - | Sub 0 | StringT | 12 bytes | - | - |

#### 5.3.2.12 Hardware Version

*Table 38: Variables – Hardware Version – General*

| | |
|---|---|
| **Index** | 22 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 39: Variables – Hardware Version*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Hardware version | - | Sub 0 | StringT | 2 bytes | - | - |

#### 5.3.2.13 Firmware Version

*Table 40: Variables – Firmware Version – General*

| | |
|---|---|
| **Index** | 23 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 41: Variables – Firmware Version*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Firmware Version | - | Sub 0 | StringT | 5 bytes | - | - |

#### 5.3.2.14 Application-Specific Attribute

*Table 42: Variables – Application-Specific Attribute – General*

| | |
|---|---|
| **Index** | 24 |
| **Access rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 43: Variables – Application-Specific Attribute*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Application-Specific Attribute | - | Sub 0 | StringT | 32 bytes | *** | - |

#### 5.3.2.15 Device Access

##### dAP

*Table 44: Variables – dAP – General*

| | |
|---|---|
| **Index** | 510 |
| **Access Rights** | Read/write |
| **Factor** | 0.001 |
| **Offset** | 0 |
| **Unit** | s |

*Table 45: Variables – dAP*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| dAP | Damping of the measurement signal | Sub 0 | UIntegerT | 16 bits | 60 | 0 … 4000 |

##### BitCoded_ActiveEvents

*Table 46: Variables – BitCoded_ActiveEvents – General*

| | |
|---|---|
| **Index** | 545 |
| **Access Rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 47: Variables – BitCoded_ActiveEvents*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| BitCoded_ActiveEvents | Bit mask for currently pending events | Sub 0 | RecordT | 32 bits | - | - |
| Bit_31 | Bit 31 indicates the assigned pending event. | bitOffs 31 | BooleanT | 1 bits | 0 | (0) noEv<br>(1) 0x8DFF |
| Bit_30 | Bit 30 indicates the assigned pending event. | bitOffs 30 | BooleanT | 1 bits | 0 | (0) noEv<br>(1) 0x8DFE |
| Bit_10 | Bit 10 indicates the assigned pending event. | bitOffs 10 | BooleanT | 1 bits | 0 | (0) noEv<br>(1) 0x8CBA |
| Bit_9 | Bit 9 indicates the assigned pending event. | bitOffs 9 | BooleanT | 1 bits | 0 | (0) noEv<br>(1) 0x8C30 |
| Bit_8 | Bit 8 indicates the assigned pending event. | bitOffs 8 | BooleanT | 1 bits | 0 | (0) noEv<br>(1) 0x8C10 |
| Bit_1 | Bit 1 indicates the assigned pending event. | bitOffs 1 | BooleanT | 1 bits | 0 | (0) noEv<br>(1) 0x6320 |
| Bit_0 | Bit 0 indicates the assigned pending event. | bitOffs 0 | BooleanT | 1 bits | 0 | (0) noEv<br>(1) 0x5000 |

### ParaConfigFaultCollection

*Table 48: Variables – ParaConfigFaultCollection – General*

| | |
|---|---|
| **Index** | 546 |
| **Access Rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 49: Variables – ParaConfigFaultCollection*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| ParaConfigFaultCollection | Indicates the parameter that was set incorrectly at the time of downloading. | Sub 0 | - | - | 0 | - |

### Loc

*Table 50: Variables – Loc – General*

| | |
|---|---|
| **Index** | 550 |
| **Access Rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 51: Variables – Loc*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Loc | [Loc] locks sensor operation to protect against unintentional adjustment. It can be reset on the product. | Sub 0 | UIntegerT | 8 bits | 1 | (0) Loc |
| | | | | | | (1) uLoc |

## diS

*Table 52: Variables – diS – General*

| | |
|---|---|
| **Index** | 552 |
| **Access Rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 53: Variables – diS*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| diS | Display settings | Sub 0 | RecordT | 16 bits | - | - |
| Display ON/OFF | - | bitOffs 7 | BooleanT | 1 bits | ON | (False) ON |
| | | | | | | (True) OFF |
| Update rate | - | bitOffs 0 | UIntegerT | 6 bits | 2 | (1) d1 / fast |
| | | | | | | (2) d2 / medium |
| | | | | | | (4) d3 / slow |

## coLr

*Table 54: Variables – coLr – General*

| | |
|---|---|
| **Index** | 554 |
| **Access Rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 55: Variables – coLr*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| coLr | Assignment of display colors “red” and “green” within the measurement range | Sub 0 | UIntegerT | 8 bits | 3 | (2) rEd/display color red (independent of measured value) |
| | | | | | | (3) GrEn/display color green (independent of measured value) |
| | | | | | | (4) r1ou/display color red when OUT1 switches |
| | | | | | | (5) G1ou/display color green when OUT1 switches |

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| | | | | | | (10) r-cF/display color red when the measured value is between the freely definable limiting values [cFL] and [cFH] |
| | | | | | | (11) G-cF/display color green when the measured value is between the freely definable limiting values [cFL] and [cFH] |

## cFL

*Table 56: Variables – cFL – General*

| | |
|---|---|
| **Index** | 555 |
| **Access Rights** | Read/write |
| **Factor** | 0.001 |
| **Offset** | 0 |
| **Unit** | mA |

*Table 57: Variables – cFL*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| cFL | Lower value for color change. This parameter is only active if a freely definable color window is selected in the coLr parameter: [r-cF] or [G-cF]. The setting range corresponds to the measurement range and is limited at the upper end by [cFH]. | Sub 0 | IntegerT | 16 bits | 4000 | 4000 … 19900 |

## cFH

*Table 58: Variables – cFH – General*

| | |
|---|---|
| **Index** | 556 |
| **Access Rights** | Read/write |
| **Factor** | 0.001 |
| **Offset** | 0 |
| **Unit** | mA |

*Table 59: Variables – cFH*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| cFH | Upper value for color change; this parameter is only active if a freely definable color window is selected in the coLr parameter: [r-cF] or [G-cF]. The setting range corresponds to the measure range and is limited on the lower end by [cFL]. | Sub 0 | IntegerT | 16 bits | 20000 | 4100 … 20000 |

## Hi

*Table 60: Variables – Hi – General*

| | |
|---|---|
| **Index** | 560 |
| **Access Rights** | Read-only |
| **Factor** | 0.001 |
| **Offset** | 0 |
| **Unit** | mA |

*Table 61: Variables – Hi*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Hi | Maximum value memory | Sub 0 | IntegerT | 16 bits | - | 3600 … 21000 |
| | | | | | | (32764) no data |
| | | | | | | (−32760) UL |
| | | | | | | (32760) OL |

## Lo

*Table 62: Variables – Lo – General*

| | |
|---|---|
| **Index** | 561 |
| **Access Rights** | Read-only |
| **Factor** | 0.001 |
| **Offset** | 0 |
| **Unit** | mA |

*Table 63: Variables – Lo*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Lo | Minimum value memory | Sub 0 | IntegerT | 16 bits | - | 3600 … 21000 |
| | | | | | | (32764) no data |
| | | | | | | (−32760) UL |
| | | | | | | (32760) OL |

### ou1

*Table 64: Variables – ou1 – General*

| | |
|---|---|
| **Index** | 580 |
| **Access Rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 65: Variables – ou1*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| ou1 | Output configuration [OUT1] | Sub 0 | UIntegerT | 8 bits | 3 | (3) Hno/hysteresis function, make contact |
| | | | | | | (4) Hnc/hysteresis function, break contact |
| | | | | | | (5) Fno/window function, make contact |
| | | | | | | (6) Fnc/window function, break contact |

### dS1

*Table 66: Variables – dS1 – General*

| | |
|---|---|
| **Index** | 581 |
| **Access Rights** | Read/write |
| **Factor** | 0.1 |
| **Offset** | 0 |
| **Unit** | s |

*Table 67: Variables – dS1*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| dS1 | Switching delay for [OUT1] | Sub 0 | UIntegerT | 16 bits | 0 | 0 … 500 |

### dr1

*Table 68: Variables – dS1 – General*

| | |
|---|---|
| **Index** | 582 |
| **Access Rights** | Read/write |
| **Factor** | 0.1 |
| **Offset** | 0 |
| **Unit** | s |

*Table 69: Variables – dS1*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| dS1 | Reverse switching delay for [OUT1] | Sub 0 | UIntegerT | 16 bits | 0 | 0 … 500 |

### SP_FH1

*Table 70: Variables – SP_FH1 – General*

| | |
|---|---|
| **Index** | 583 |
| **Access Rights** | Read/write |
| **Factor** | 0.001 |
| **Offset** | 0 |
| **Unit** | mA |

*Table 71: Variables – SP_FH1*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| SP_FH1 | Switching point 1; [SP1] must be greater than [rP1]. Take the current [rP1] value into account. If [SP1] is set below [rP1], this is rejected. [SP] = [FH] and [rP] = [FL] for [OU1] = Fno, Fnc | Sub 0 | IntegerT | 16 bits | 6000 | 4100 … 20000 |

### rP_FL1

*Table 72: Variables – rP_FL1 – General*

| | |
|---|---|
| **Index** | 584 |
| **Access Rights** | Read/write |
| **Factor** | 0.001 |
| **Offset** | 0 |
| **Unit** | mA |

*Table 73: Variables – rP_FL1*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| rP_FL1 | Reverse switching point 1; [rP1] must be less than [SP1]. Take the current [SP1] value into account. If [rP1] is set below [SP1], this is rejected. [rP] = [FL] and [SP] = [FH] for [OU1] = Fno, Fnc | Sub 0 | IntegerT | 16 bits | 5000 | 4000 … 19900 |

### ScAL

*Table 74: Variables – ScAL – General*

| | |
|---|---|
| **Index** | 900 |

| | |
|---|---|
| **Access Rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 75: Variables – ScAL*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| ScAL | Decimal place setting | Sub 0 | UIntegerT | 8 bits | 0 | (0) OFF |
| | | | | | | (1) cccc |
| | | | | | | (2) ccc.c |
| | | | | | | (3) cc.cc |
| | | | | | | (4) c.ccc |

## A.Trm

*Table 76: Variables – A.Trm – General*

| | |
|---|---|
| **Index** | 901 |
| **Access Rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 77: Variables – A.Trm*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| A.Trm | Activation of the internal termination of the measuring circuit.<br>If OUT2 is not connected, then this internal terminating resistor must be switched on. | Sub 0 | UIntegerT | 8 bits | 1 | (0) OFF |
| | | | | | | (1) ON |

## C.ASP

*Table 78: Variables – C.ASP – General*

| | |
|---|---|
| **Index** | 910 |
| **Access Rights** | Read/write |
| **Factor** | 1 |
| **Offset** | 0 |
| **Unit** | - |

*Table 79: Variables – C.ASP*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| C.ASP | Customer-specific starting point; this value is assigned to the lower value of the analog input. This parameter is active only when ScAL is set to [ON]. | Sub 0 | IntegerT | 16 bits | 400 | −746 … 9745 |

## C.AEP

*Table 80: Variables – C.AEP – General*

| | |
|---|---|
| **Index** | 911 |
| **Access Rights** | Read/write |
| **Factor** | 1 |
| **Offset** | 0 |
| **Unit** | - |

*Table 81: Variables – C.AEP*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| C.AEP | Customer-specific endpoint; this value is assigned to the upper value of the analog input. This parameter is active only when ScAL is set to [ON]. | Sub 0 | IntegerT | 16 bits | 2000 | −366 … 9366 |

## C.uni

*Table 82: Variables – C.uni – General*

| | |
|---|---|
| **Index** | 922 |
| **Access Rights** | Read/write |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 83: Variables – C.uni*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| C.uni | Customer-specific unit with max. 4 characters This function is only available via IO-Link. | Sub 0 | StringT | 4 bits | mA | - |

## 5.4 Process Image

### Note

**Process data is shown from the product's perspective!**

The following process data is presented from the product's perspective. Some controllers swap the high and low byte when addressing byte by byte.

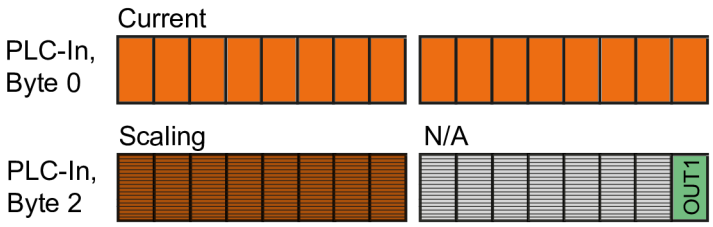



*Figure 20: Input Process Data*

### 5.4.1 Input Process Data

*Table 84: Input Process Data*

| Byte | Data Type (Bits) | Bit Offset | Content | Value Range | Description | Factor | Unit |
|---|---|---|---|---|---|---|---|
| 0 | IntegerT (16) | 0 | Current value | −32760 | Underrange | 0.001 | mA |
| | | | | 3600 … 21000 | 3.6 … 21.0 mA | | |
| | | | | 32760 | Overrange | | |
| | | | | 32764 | No data | | |
| 2 | BooleanT (1) | 0 | Status of OUT1 | 0 | Inactive | 0.001 | mA |
| | | | | 1 | Enabled | | |
| 2 | (7) | 1 | Reserved | | | - | - |
| 2 | (8) | 8 | Scaling | - | - | - | - |

You can find an example calculation for the scaling in **Application Example [▶ 60]**.

### 5.4.2 Representation of the Current Value on the Input

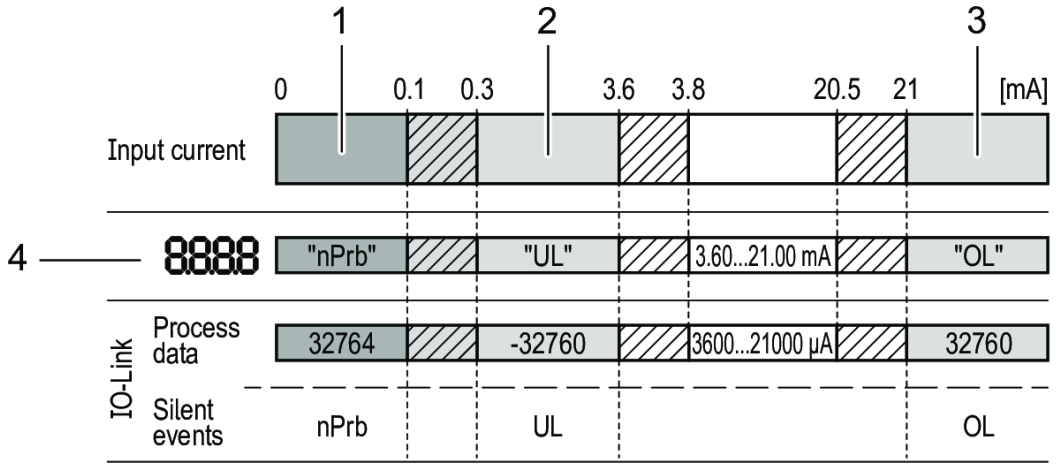



*Figure 21: Display – Analog Value Representation*

*Table 85: Legend for Figure "Display – Analog Value Representation"*

| No. | Description |
|---|---|
| 1 | No measurement data |
| 2 | Input current outside range (−) |
| 3 | Input current outside range (+) |
| 4 | Displayed message or value. The input current is not represented in scaled form here. |
| nPrb | No sensor |
| UL | Process value too low |
| OL | Process value too high |
|  | Hysteresis range |

# Planning

## 6.1 Structure Guidelines

### 6.1.1 Overcurrent Protection

#### Protecting the Power Supply

Use a fuse to protect the supply voltage.

*Table 86: Protecting the Power Supply*

| Potential | M12 Plug | Fuse |
|---|---|---|
| 1L+ / power supply | Pin 1 | ≤2 A, slow |
| C/Q IO-Link (if not fused via IO-Link master) | Pin 4 | ≤2 A |

Required trip characteristics of the fuses: Tfuse ≤ 120 s at max. 6.25 A (fire protection)

Alternatively, the product can be powered by a limited-energy circuit per IEC 61010-1 or Class 2 per UL 1310.

The current loop of the analog input must be terminated. Only one load impedance may be connected – either an internal or an external one (see **A.trm – Analog Termination for OUT2 [▶ 24]**).

### 6.1.2 EMC Installation

- **Keep data and signal lines separate from interference sources.**
  Route data and signal lines separately from all power supply cables and other sources of high electromagnetic emissions (e.g., frequency converters or drives).
- **Observe maximum cable lengths**
  The maximum lengths of the connecting cables are as follows:
  – Without IO-Link communication on each connection side of the product: 30 m
  – With IO-Link communication on the product master side: 20 m

## 6.2 Behavior in the Event of a Communication Interruption

In case of communication interruption, the transmitted values are delivered to ZERO.

## 6.3 Aids

Depending on the operating mode, parameters can be set either directly on the product via a menu, via the PLC or with an IO-Link tool like WAGO IO-Link Configurator.

**ⓘ Note**

**Take parameterization differences into account**

Parameterization via IO-Link tools or a PLC deviates in some points from parameterization via the product menu.

You can obtain the WAGO IO-Link Configurator software, as well as the associated product manual with a detailed description of the software, from **www.wago.com**.

## 6.4 Connection Examples

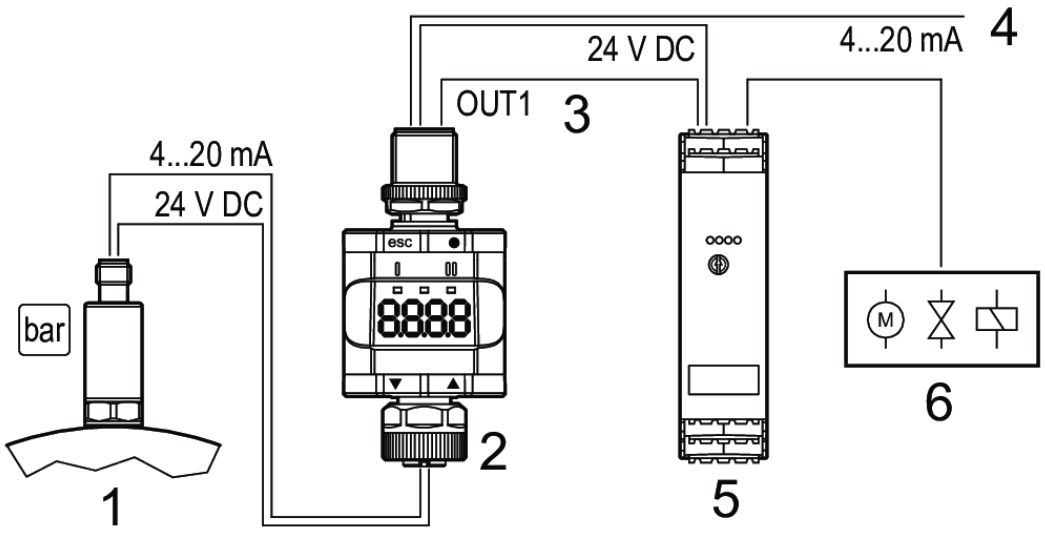



*Figure 22: Connection Example without IO-Link Master*

*Table 87: Legend for Figure "Connection Example without IO-Link Master"*

| No. | Description |
|---|---|
| 1 | Sensor with analog output (e.g., pressure sensor) |
| 2 | Measured value/limiting value display |
| 3 | Digital output |
| 4 | Looping the analog signal |
| 5 | Switching amplifier |
| 6 | Relay output for switching electric motors, valves etc. |

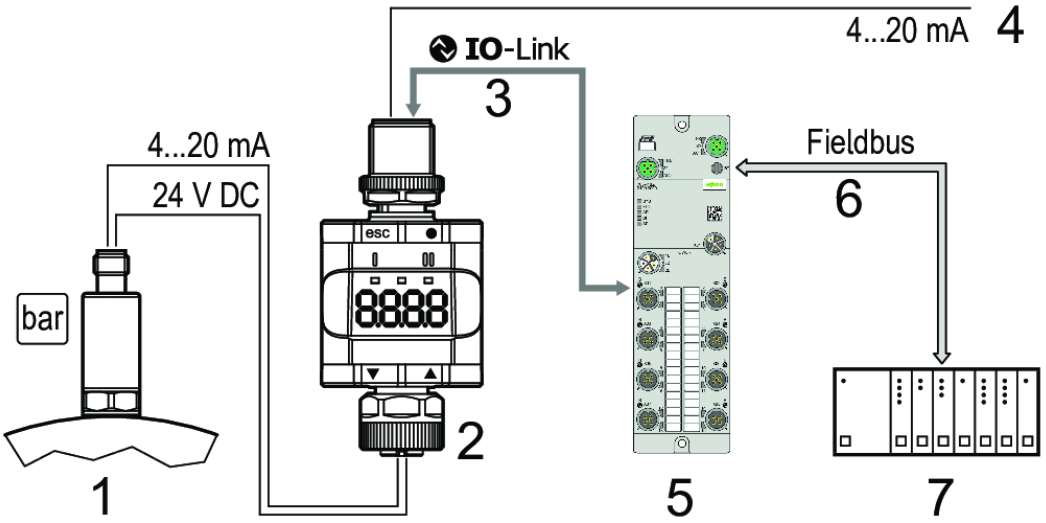



*Figure 23: Connection Example with IO-Link Master*

*Table 88: Legend for Figure "Connection Example with IO-Link Master"*

| No. | Description |
|---|---|
| 1 | Sensor with analog output (e.g., pressure sensor) |
| 2 | WAGO Analog IO-Link Converter |
| 3 | Complete bidirectional IO-Link communication<br>• Remote display: Read and display measured current.<br>• Remote parameterization: Read and change parameter setting. |
| 4 | Looping the analog signal |
| 5 | IO-Link master |
| 6 | Feldbus (Profinet, EtherCAT, EtherNet/IP etc.) |
| 7 | PLC |

# Installation and Removal

## 7.1 Mounting

### 7.1.1 Mounting the Product on a Mounting Clip

The product can be secured with a Mounting Clip.

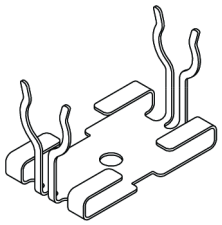


*Figure 24: Mounting Clip (Secured with an M4 Screw or Cable Tie)*

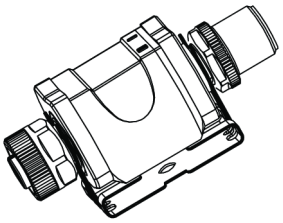


*Figure 25: Mounting Clip with Product Attached*

The Mounting Clip is not included upon delivery. You can find more information in **Accessories [▶ 60]**.

# Connection

## 8.1 Connecting the Plug

The mounting method must not cause mechanical stress on the M12 connection parts. Depending on the conditions of use, it may also be necessary to protect the product against mechanical stresses (shock/vibration) through appropriate mounting.

✓ The circuit must be protected by the use of a fuse or powered by a limited-energy circuit.

1. Connect the pluggable connectors of the connecting cables to the product.
2. Tighten the cap nut with a tightening torque of at least 1.0 Nm.

Once the power supply is applied, the product is in the operating mode. It performs its measurement and evaluation functions and provides output signals according to the parameter settingss (see **Parameter Description [▶ 20]**).

# Commissioning

## 9.1 Configuration and Parameterization

**ⓘ Note**

**The product is in operating mode during parameterization**

During the parameterization process, the product remains in operating mode. It continues to perform its monitoring functions with the existing parameters until the parameterization is completed.

### 9.1.1 Parameterization Process – General

Every parameterization process involves six steps. The basic procedure for a parameterization process is described below.

1. Use the ***[●]*** button to switch from operating mode to parameterization mode.
2. Select the desired parameter – [SP1], [rP1] etc. – with the ***[▼]*** or ***[▲]*** button.
3. Select the parameter's programming mode with the ● button.
4. Select or modify the parameter value with the ***[▼]*** or ***[▲]*** button > 2 s.
5. Use the ***[●]*** button to confirm the parameter value setting.
6. Return to operating mode with the ***[esc]*** button.

### 9.1.2 Locking/Unlocking the Product

To prevent incorrect entries, the product can be locked electronically. Parameter values and other settings can be displayed but not modified.

When delivered, the product is unlocked.

**Locking**

✓ Make sure that the product is in normal operating mode.

- Hold the [esc] and [▲] buttons down at the same time for 10 s.

  ⇨ [Loc] appears on the display.

⇨ The product is locked.

When it is in the locked state, the product always shows [Loc] on the display if an attempt is made to change parameter values.

**Unlocking**

- Hold the [esc] and [▲] buttons down at the same time for 10 s.

  ⇨ [uLoc] appears on the display.

⇨ The product is unlocked.

**ⓘ Note**

**Customer-side locking**

If [C.Loc] is displayed when attempt is made to change a parameter value, IO-Link communication is active (temporary locking).

**ⓘ Note**

**Software locking**

If [S.Loc] is displayed, the sensor is permanently locked by software. This locking can only be removed by IO-Link parameterization software.

### 9.1.3 Triggering the Timeout

If no button is pressed for 30 s during the parameter setting process, the product returns to operating mode and the value remains unchanged.

### 9.1.4 Switching from the Main Menu to the Advanced Functions Menu

1. Press the [●] button to switch to the menu.
2. Press the [▼] or [▲] button until [EF] appears on the display.
3. Press the [●] button to confirm.
   ⇨ The first parameter of the advanced function menu is displayed ([rES]).

⇨ You are now in the advanced functions menu.

### 9.1.5 Entering Parameter Values/Numbers

1. Press the [▼] or [▲] button for at least 2 s.
2. Holding the button down changes the value continuously; a single button press changes it incrementally.
   ⇨ [▼] reduces the value and [▲] increases it incrementally.
3. Press the [●] button briefly to confirm the value setting.
   ⇨ The new value is saved.

⇨ The parameter value is now set.

### 9.1.6 [ou1] Programming Example – Output Function for OUT1

**(1) Switch from operating mode to parameterization mode**

- Press the [●] button to switch to the menu.
  ⇨ The first parameter of the menu appears: [SP1].

**(2) Select the relevant parameter (here: [ou1])**

1. Press the [▼] button until the [EF] parameter appears on the display.


2. Press the [●] button to switch to the advanced function menu.
   ⇨ The first parameter of the advanced function menu appears: [rES].


3. Press the [▼] button until the relevant parameter, [ou1], appears on the display.


**(3) Switch to the parameter's programming mode**

- Press the [●] button to switch to programming mode.
  ⇨ The parameter that is currently being set appears: [Hno].


**(4) Select or modify the parameter (for example, in this case: [Fnc])**

1. Press the [▼] button for at least 2 s.
   ⇨ The parameter that is currently being set flashes: [Hno].


   ⇨ After 2 s, the value can be changed.
2. Holding the button down changes the value continuously; a single button press changes it incrementally.


You can find more information on entering numbers in **Entering Parameter Values/ Numbers [▶ 50]**.

**(5) Confirm the parameter value setting**

1. Press the [●] button briefly.
   ⇨ The parameter appears again.
   ⇨ The new setting value is saved.


2. To set more parameters, press the [▼] or [▲] button until the relevant parameter appears.

**(6) Return to operating mode**

1. Press the [esc] button.

2. Press the [▼] or [▲] button until the current measured value appears, or wait 30 s for the timeout function. The display then automatically switches back to the display of the current measured value.

   ⇨ The current measured value is displayed.

⇨ The product is back in operating mode.

# Operation

## 10.1 Operation via Buttons

The product has two tactile rings with a total of four buttons on them. Each button can be pressed separately. To execute a command, press the corresponding corner of one of the two tactile rings: [esc], [●], [▼] or [▲].

- Press one of the buttons to move through the product menu and parameterize the product.

  ⇨ The functions and meanings of the buttons can be found in Controls [▶ 14].

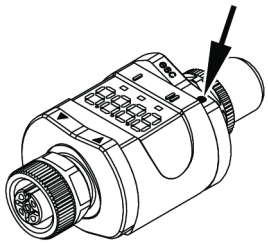


*Figure 26: Pushing a Button*

⇨ Depending on button selected, the corresponding result appears in the display.

### ⓘ Note

**Do not place product on mounting surfaces while pressing tactile ring**

To ensure correct operation of the tactile rings (buttons), do not attach or place the product directly on a mounting surface. For installation, use the 765-101/000-000 Mounting Clip (see Accessories [▶ 60]).

# Transport and Storage

The original packaging offers optimal protection during transport and storage.

- Store the product in suitable packaging, preferably the original packaging.
- Only transport the product in suitable containers/packaging.
- Make sure the product contacts are not contaminated or damaged during packing or unpacking.
- Observe the specified ambient climatic conditions for transport and storage.

# Diagnostics

## 12.1 Diagnostics via Indicators

*Table 89: Diagnostics via Indicators – LEDs*

| LED | LED State | Explanation |
|---|---|---|
| I | On | Output 1 is switched. |
| POWER | On | The power supply is OK.<br>The product is in operating mode. |
| | Off | The product in programming mode. |
| II | - | No function |

*Table 90: Diagnostics via Indicators – Display*

| Display Status | LED State I | LED State Power | Explanation |
|---|---|---|---|
| OFF | Off | Off | The supply voltage is too low |
| SC1 | Flashing | Any | Overcurrent at the OUT1 switching output. |
| C.Loc | Any | Any | Parameterization via buttons is locked due to active IO-Link transmission. |
| S.Loc | Any | Any | Parameterization via buttons has been disabled by the software. |
| Loc | Any | Any | Parameterization via buttons is disabled. |
| OL | Any | On | The process value is too high (measured current > 21 mA). |
| UL | Any | On | The process value is too low (measured current < 3.6 mA). |
| nPrb | Any | On | No sensor is connected to the analog input. |

## 12.2 Diagnostics via IO-Link

### 12.2.1 Diagnostics

*Table 91: Variables – Diagnostics – General*

| | |
|---|---|
| **Index** | 36 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 92: Variables – Diagnostics*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range |
|---|---|---|---|---|---|---|
| Device status | - | Sub 0 | UIntegerT | 8 bits | 0 | (0) Product is OK |
| | | | | | | (1) Maintenance required |
| | | | | | | (2) Outside specification |
| | | | | | | (3) Function test |
| | | | | | | (4) Error |
| | | | | | | 5 ... 255 (reserved) |

### 12.2.2 Detailed Diagnostics

*Table 93: Variables – Detailed Diagnostics – General*

| | |
|---|---|
| **Index** | 37 |
| **Access rights** | Read-only |
| **Factor** | - |
| **Offset** | - |
| **Unit** | - |

*Table 94: Variables – Detailed Diagnostics*

| Name | Description | Subindex | Data Type | Length | Factory Setting | Value Range [h] |
|---|---|---|---|---|---|---|
| Detailed device status | - | Sub 0 | - | 21 bytes | 00 00 00 | - |

### 12.2.3 Error Types

*Table 95: Process Image – Error Types*

| Error Code | Name | Description |
|---|---|---|
| 32768 d / 0x8000 | Application error in product – no details | Access was denied by the product. No detailed information is available. |
| 32785 d / 0x8011 | Index does not exist | Access to an index that does not exist |
| 32786 d / 0x8012 | Subindex does not exist | Access to a subindex that does not exist |
| 32800 d / 0x8020 | Service is currently unavailable | The parameter cannot be accessed. The product does not allow this in its current state. |
| 32803 d / 0x8023 | Access denied | Write access to a read-only parameter |
| 32816 d / 0x8030 | Parameter value outside valid range | The parameter value that was written is outside the permissible value range. |
| 32819 d / 0x8033 | Parameter too long | The length of the parameter that was written is greater than is allowed. |
| 32820 d / 0x8034 | Parameter too short | The length of the parameter that was written is less than is allowed. |
| 32821 d / 0x8035 | Function unavailable | The product does not support the command that was written |
| 32822 d / 0x8036 | Function currently unavailable | The product does not support the command that was written in the current state. |
| 32832 d / 0x8040 | Invalid parameter set | The individual parameter value that was written collides with the other parameter settings. |
| 32833 d / 0x8041 | Inconsistent parameter set | Inconsistencies were detected at the end of the block parameter transfer. The product plausibility check failed. |
| 32898 d / 0x8082 | Application not ready | Access was denied because the product is not currently ready. |

### 12.2.4 Events

*Table 96: Process Image – Events*

| Code | Device status | Type | Description |
|---|---|---|---|
| 20480 d / 0x5000 | Hardware fault in product | Error | Replace the product. |
| 25376 d / 0x6320 | Parameter error | Error | Check the datasheet and values. |

| Code | Device status | Type | Description |
|---|---|---|---|
| 35856 d / 0x8C10 | Process value above valid range | Warning | Process value uncertain.<br>**Note: This event will not be transferred on the event channel. It can only be read out via index 37 (detailed diagnostics) or 545 (Bit-Coded_ActiveEvents).** |
| 35888 d / 0x8C30 | Process value below valid range | Warning | Process value uncertain.<br>**WARNING! This event is not transferred on the event channel. It can only be read out via index 37 (detailed diagnostics) or 545 (Bit-Coded_ActiveEvents).** |
| 36026 d / 0x8CBA | Probe fell off | Error | Fix problem. |
| 36350 d / 0x8DFE | Test event 1 | Warning | Event appears when index 2 is set to a value of 240; event disappears when index 2 is set to a value of 241. |
| 36351 d / 0x8DFF | Test event 2 | Warning | Event appears when index 2 is set to a value of 242; event disappears when index 2 is set to a value of 243. |

# Decommissioning

## 13.1 Disposal and Recycling

| | |
|---|---|
|  | **WEEE Mark**<br>Electrical and electronic equipment may not be disposed of with household waste. This also applies to products without this mark. |

Electrical and electronic equipment contain materials and substances that can be harmful to the environment and health. Electrical and electronic equipment must be disposed of properly after use. Environmentally friendly disposal benefits health, protects the environment from harmful substances in electrical and electronic equipment and enables sustainable and efficient use of resources.

- Observe the national and local regulations for the disposal of electrical and electronic equipment, lithium-ion batteries, lead–acid batteries and packaging.
- Clear any data stored on electrical and electronic equipment.
- Remove lithium-ion batteries, lead–acid batteries or memory cards that are added to the electrical and electronic equipment.
- Wear appropriate personal protective equipment when removing the lithium-ion batteries/lead–acid batteries.
- Dispose of the removed lithium-ion batteries/lead–acid batteries according to your local waste regulations (e. g. collection boxes at the retail or local collection points).
- Have electrical and electronic equipment sent to a local collection point.
- Dispose of all types of packaging to ensure a high level of recovery, reuse and recycling.
- Transport packages from the B2B area can be taken back free of charge via a return system in accordance with the Packaging Act. Please contact our service provider Interseroh directly. The corresponding certificate can be found at: **corporate-certificates**
- Throughout Europe, Directives 2006/66/EC, 94/62/EC and 2012/19/EU (WEEE) apply. National directives and laws may differ.

# Service

## 14.1 Factory Settings

*Table 97: Factory Settings*

| Parameters | | Factory Settings | Possible Settings |
|---|---|---|---|
| SP1/FH1 | Switching point for OUT1 | 6.00 | - |
| rP1/FL1 | Reverse switching point for OUT1 | 5.00 | - |
| A.trm | Analog termination for OUT2 | ON | ON |
| | | | OFF |
| ou1 | Output function for OUT1 | Hno | Hno |
| | | | Hnc |
| | | | Fno |
| | | | Fnc |
| dS1 | Switching delay for OUT1 | 0.0 s | - |
| dr1 | Reverse switching delay for OUT1 | 0.0 s | - |
| ScAL | Scaling value | OFF | OFF |
| | | | cccc |
| | | | ccc.c |
| | | | cc.cc |
| | | | c.ccc |
| C.ASP | Customer-specific analog starting point | - | - |
| C.AEP | Customer-specific analog endpoint | - | - |
| C.uni* | Customer-specific unit | mA | - |
| coLr | Color display | GrEn | rEd |
| | | | GrEn |
| | | | r1ou |
| | | | G1ou |
| | | | r-cF |
| | | | G-cF |
| cFH | Color change, upper limiting value | 20.00 | - |
| cFL | Color change, lower limiting value | 4.00 | - |
| diS | Display update rate | d2 (200 ms) | OFF |
| | | | d1 (50 ms) |
| | | | d2 (200 ms) |
| | | | d3 (600 ms) |
| Lo | Lower input measured value | - | - |
| Hi | Upper input measured value | - | - |
| dAP | Analog measured value damping | 0.060 s (= 60 ms) | - |

** Only configurable via IO-Link and parameterization software*

## 14.2 Application Example

### Scaling Example

✓ 0xFD corresponds to −3 as a signed integer value

• Multiply the measured value by $10^{-3}$ (= to the power of the desired scaling value).

⇨ As a result, you get the value in mA.

## 14.3 Accessories

*Table 98: Accessories*

| Item No. | Product |
|---|---|
| 765-101/000-000 | Mounting Clip |

# Appendix

## 15.1 Technical Data, Approvals, Guidelines and Standards

**Note**

**Subject to changes!**

Please also observe the further product documentation! You can generate the current datasheet at any time at: www.wago.com /<item number>.

**See also**

Data_sheet_765-2701/200-000 [▶ 62]

## 15.1.1 Data_sheet_765-2701/200-000

765-2701/200-000

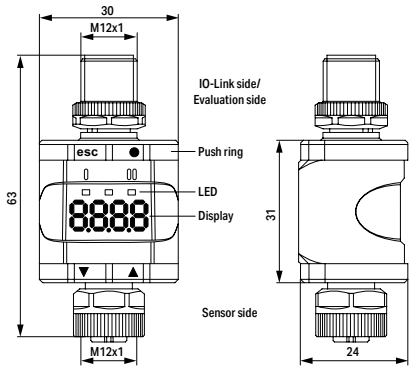
### 1-Channel Analog Input; IO-Link Converter; 4 … 20 mA; 2 x M12 Connection


M12-A plug; 4-pole

1: 24 VDC: Supply 1L+
2: OUT2: Analog output
3: 0 V: Supply 1L–
4: C/Q IO-Link;
OUT1: Digital output (SIO)


M12-A socket; 5-pole

1: Sensor supply 1L+
2: Analog input (4 … 20 mA)
3: Sensor supply 1L–
4: not used
5: not used




Application:
Decentralized display, preprocessing and conversion of analog signals.
The device is used for signal acquisition of a connected sensor or another device with an analog output (4 … 20 mA).
The device has an analog current input and a display with controls for status indication and parameterization.

Use as an IO-Link device:
The device has an IO-Link communication interface that requires an IO-Link-capable module (IO-Link master) for interoperation.
The IO-Link interface allows direct access to the process and diagnostic data and enables setting of the device parameters during operation.

Use as a stand-alone device without IO-Link:
The device compares the measured current value with the set parameters and switches the output according to the selected function.
This mode is without IO-Link functionality. Parameterization is performed either via the push ring or with the WAGO IO-Link Configurator.

| Description | Item No. | PU |
|---|---|---|
| 1AI FLD IOL CONV 4-20mA | 765-2701/200-000 | 1 |

| Accessories | Item No. | PU |
|---|---|---|
| Mounting clip | 765-101/000-000 | 1 |
| IO Device Description (IODD) | Download: www.wago.com | |

| Approvals/Tests | |
|---|---|
| Conformity marking | CE |
| UL listed | Pending |
| IO-Link | |
| MTTF | 373 years |

| Technical Data | |
|---|---|
| Ambient temperature (operation) | –25 … 60 °C (70 °C with display switched off) |
| Ambient temperature (storage) | –25 … +70 °C |
| Relative humidity (without condensation) | max. 90 % (31 °C); linearly decreasing to 50 % (40 °C) |
| Operating altitude | 0 … 2000 m |
| Protection type | IP67 |
| Pollution degree | 3 |
| Weight | 108 g |
| Dimensions | 63 x 30 x 24 mm |
| Housing material | PA |
| Indicators | Digital output: 1 x LED yellow; Power: 1 x LED green; Display: 7-segment LED, red/green |
| Length of connection cables | 30 m without IO-Link on each side; 20 m with IO-Link on the master side |

| Technical Data | |
|---|---|
| Supply voltage | 24 VDC; –25 … +25 %; (18 … 30 VDC) |
| Power consumption | 1 W |
| Operating modes | SIO; IO-Link |
| Inputs | |
| Number of analog inputs | 1 |
| Connection technology | M12-A socket; 5-pole |
| Signal type (current) | 4 … 20 mA |
| Sensor supply | 24 VDC |
| Sensor current | ≤ 800 mA |
| Precision | 0.5 % of the upper-range value |
| Outputs | |
| Digital output (OUT 1) | |
| Number of digital outputs | 1 |
| Connection technology | M12-A plug; 4-pole |
| Current carrying capacity per output | 50 mA |
| Signal type (voltage) | 10 … 30 VDC |
| Output circuit design | Make/break contact; parameterizable |
| Analog output (OUT 2) | |
| Number of analog outputs | 1 |
| Signal type (current) | 4 … 20 mA |
| Precision | 0.5 % of the upper-range value |
| Resolution | 10 bits |
| IO-Link | |
| Communication interface | IO-Link Class A |
| Transmission type | COM2 (38.4 kBaud) |
| IO-Link revision | 1.1 |
| Process data | 1 x 16-bit IN (analog) |
| Process cycle time (min.) | 3.2 ms |
| Parameters via IO-Link | Operating mode, switching point, delay, scaling, etc. |

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## 15.2 Installation Regulations Specified by Approvals

**For the Scope of cULus:**

Electricity can only be supplied by via SELV/PELV circuits. Device powered according to “Limited Energy” per UL 61010-1, chapter 9.4. External circuits must be isolated per UL 61010-2-201, figure 102.

The device is safe at least under the following conditions:

- Indoor use
- Altitude up to 2000 m
- Maximum relative humidity of 90 %, non-condensing
- Pollution degree 3
- Use UL-certified category CYJV 2/7/8 connection cables with suitable data to connect the device to the IO-Link devices.
- No evaluation of the IP class has been performed by UL.
- No special treatment is required when cleaning the device.

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