# JUMO dTRANS T1000

## Temperature sensor with IO-Link


Operating Manual

90291500T90Z001K000

V2.01/EN/00656441

The basic principles of IO-Link are available on the website **www.IO-Link.com**

# Contents

# 1 Introduction

## 1.1 Safety information

### General

This manual contains information that must be observed in the interest of your own safety and to avoid material damage. This information is supported by symbols which are used in this manual as indicated.

Please read this manual before starting up the device. Store this manual in a place that is accessible to all users at all times.

If difficulties occur during startup, please do not intervene in any way that could jeopardize your warranty rights!

### Warning symbols

**CAUTION!**

This symbol in connection with the signal word indicates that **material damage or data loss** will occur if the respective precautionary measures are not taken.

**READ THE DOCUMENTATION!**

This symbol, which is attached to the device, indicates that the associated **documentation for the device** must be **observed**. This is necessary to identify the nature of the potential hazard, and to take measures to prevent it.

### Note symbols

**NOTE!**

This symbol refers to **important information** about the product, its handling, or additional benefits.

**REFERENCE!**

This symbol refers to **additional information** in other sections, chapters, or other manuals.

**DISPOSAL!**

At the end of its service life, the device and any batteries present do not belong in the trash! Please ensure that they are **disposed of** properly and in an **environmentally friendly** manner.

## 1.2 Description

**NOTE!**

Please read this manual before starting up the device. Store this manual in a place that is accessible to all users at all times.

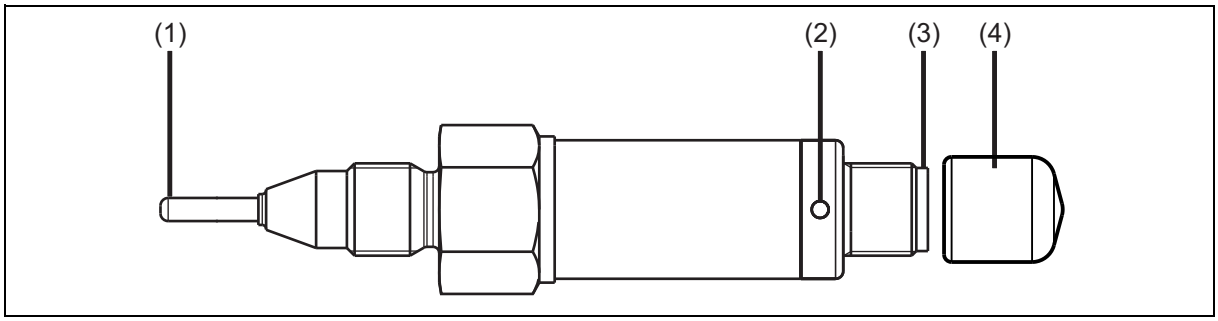
The temperature sensor is used for temperature measurement and monitoring. The effect of the temperature on a resistance RTD temperature probe generates a signal, which is amplified, digitalized and processed.

The temperature sensor is equipped with an IO-Link interface as per specification 1.1. IO-Link supports bidirectional communication and is used to exchange the process data, parameters, diagnostic information and status messages. The two green LEDs are permanently lit as soon as power is supplied to the device. Once an IO-Link connection is established, the LEDs flash.

The switching behavior and the switching thresholds of the switching outputs (max. 2 pcs.; p or n switching) can be individually configured, as can many other parameters. Any IO-Link master can be used for the configuration.

The temperature sensor is thus suitable for use in plant and mechanical engineering in connections to automation systems. Many process connections are available to the user.

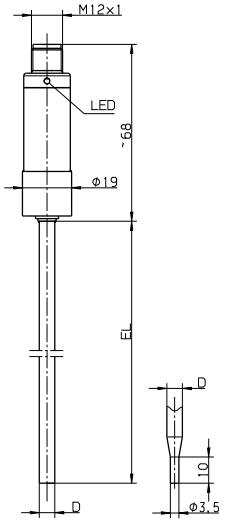
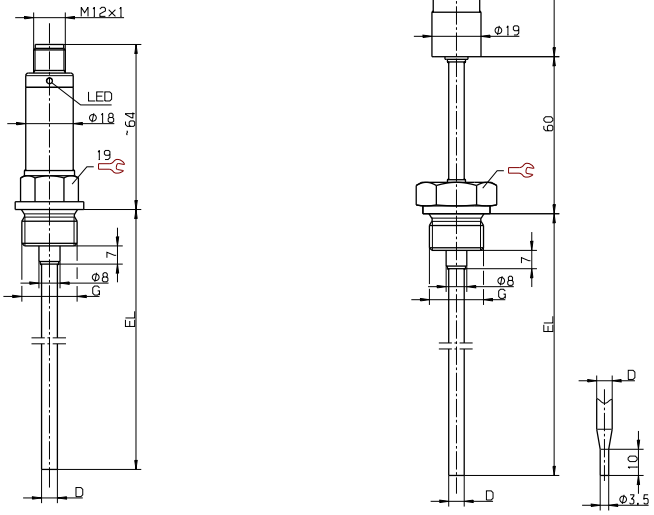
## 1.3 Display and connection elements

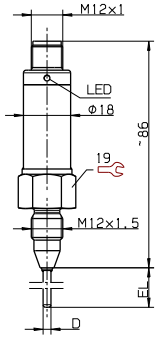
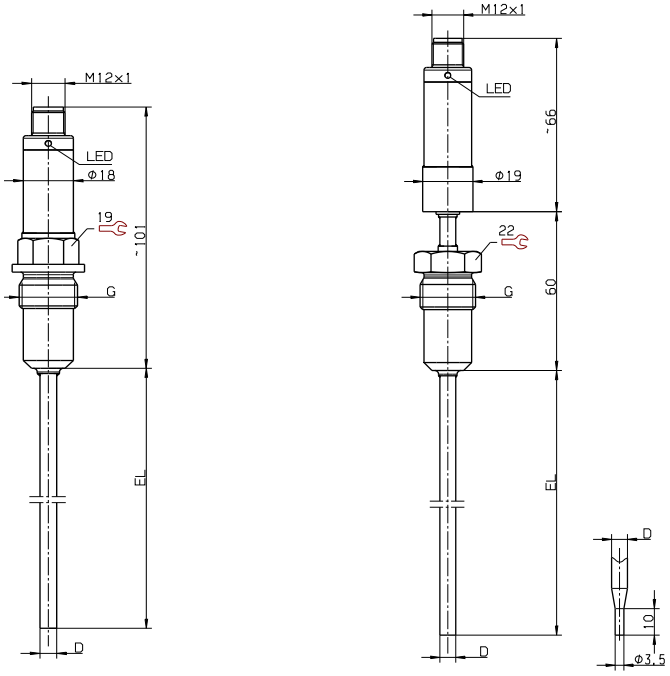



(1) Protection tube with RTD temperature probe
(2) Status LED (other identical LEDs opposite)
(3) M12 connection
(4) Protective cap for storage and transport

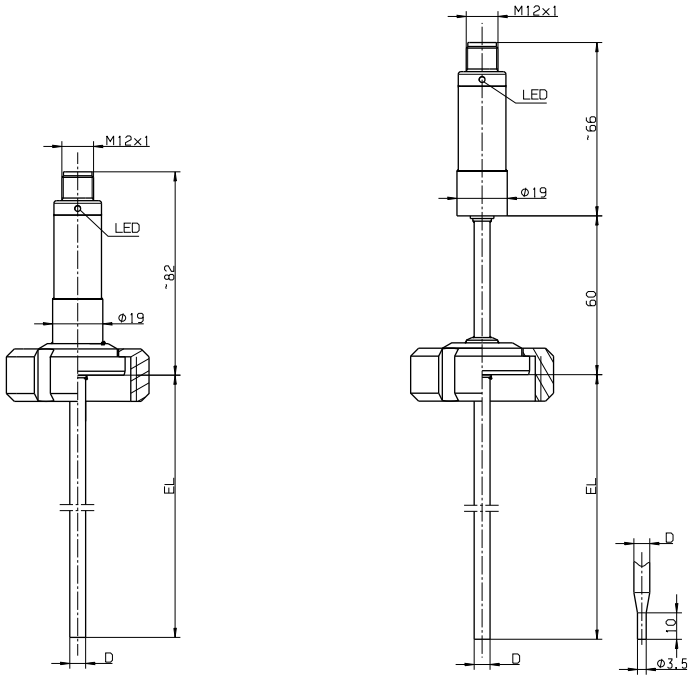
# 1 Introduction

## 1.4 Dimensions

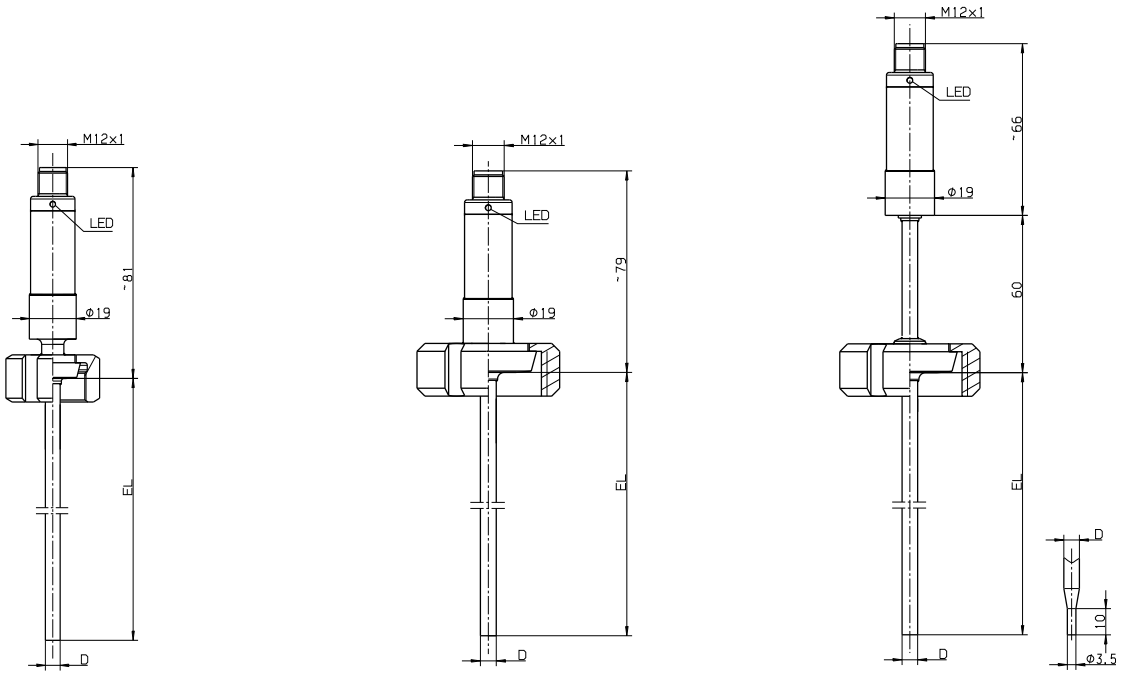
| Type 902915/10 and type 902915/30<br>Without process connection (PA) 000 | Type 902915/10 with PA 103-104 (left)<br>Type 902915/30 with PA 103-104 (right) |
|---|---|
|  |  |

| Type 902915/10 with PA 379 | Type 902915/10 with PA 380 (left)<br>Type 902915/30 with PA 380 (right) |
|---|---|
|  |  |

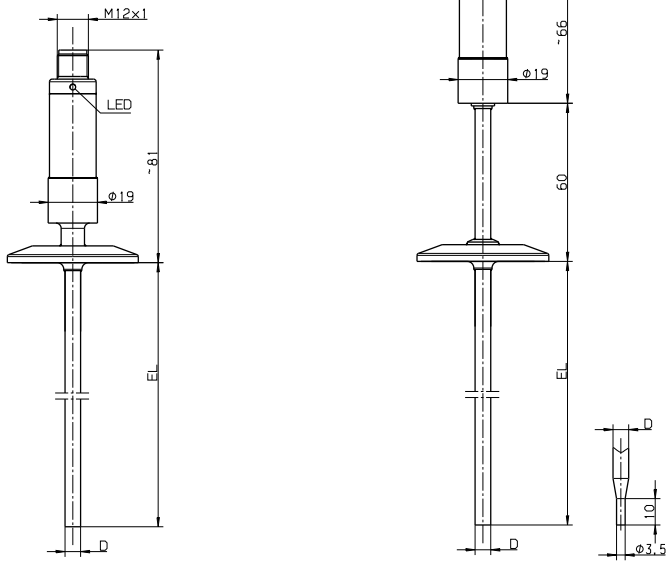
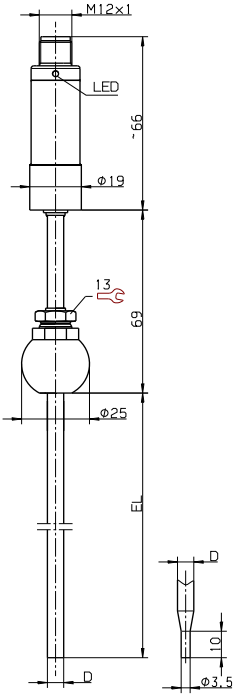
Type 902915/10 with PA 550-554 (left)
Type 902915/30 with PA 550-554 (right)

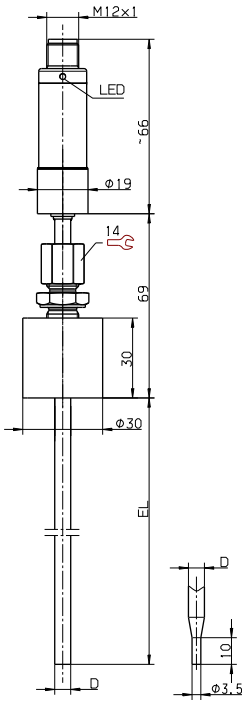
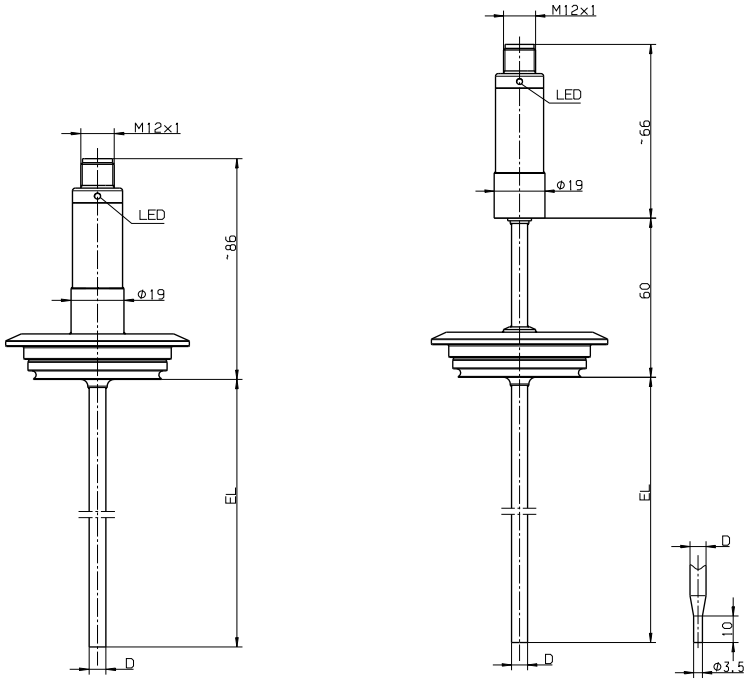


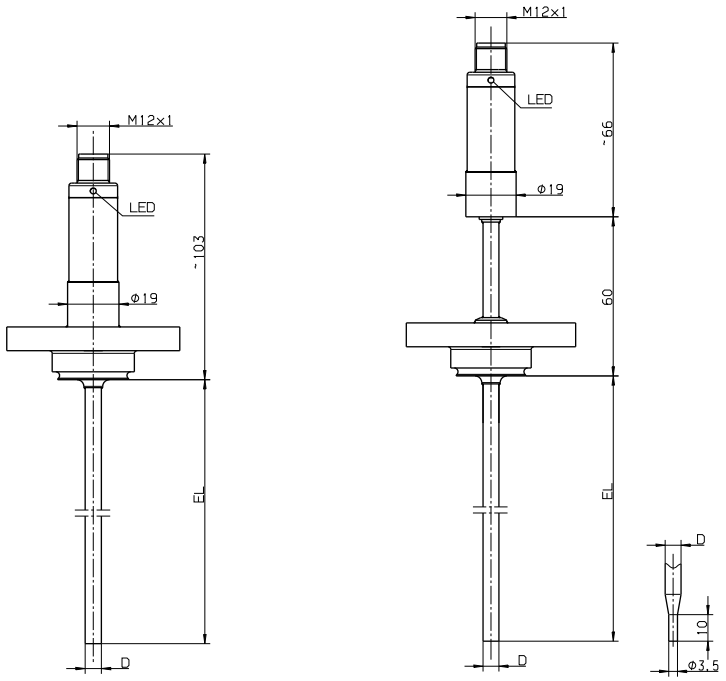
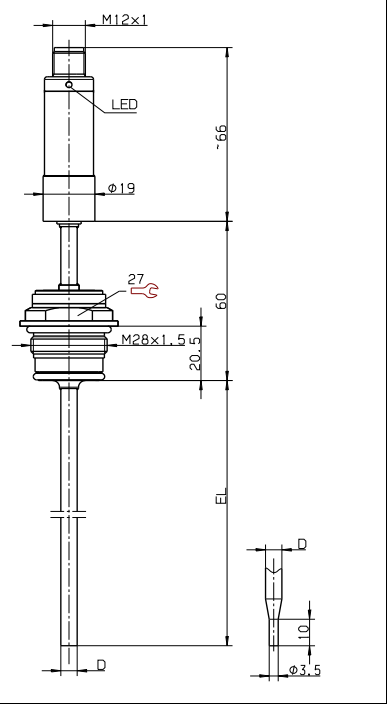

Type 902915/10 with PA 601 (left)
Type 902915/10 with PA 604-605 (center)
Type 902915/30 with PA 601-605 (right)



# 1 Introduction

| Type 902915/10 with PA 611-617 (left)<br>Type 902915/30 with PA 611-617 (right) | Type 902915/10 with PA 681 |
|---|---|
|  |  |

| Type 902915/10 with PA 682 | Type 902915/10 with PA 684-686 (left)<br>Type 902915/30 with PA 684-686 (right) |
|---|---|
|  |  |

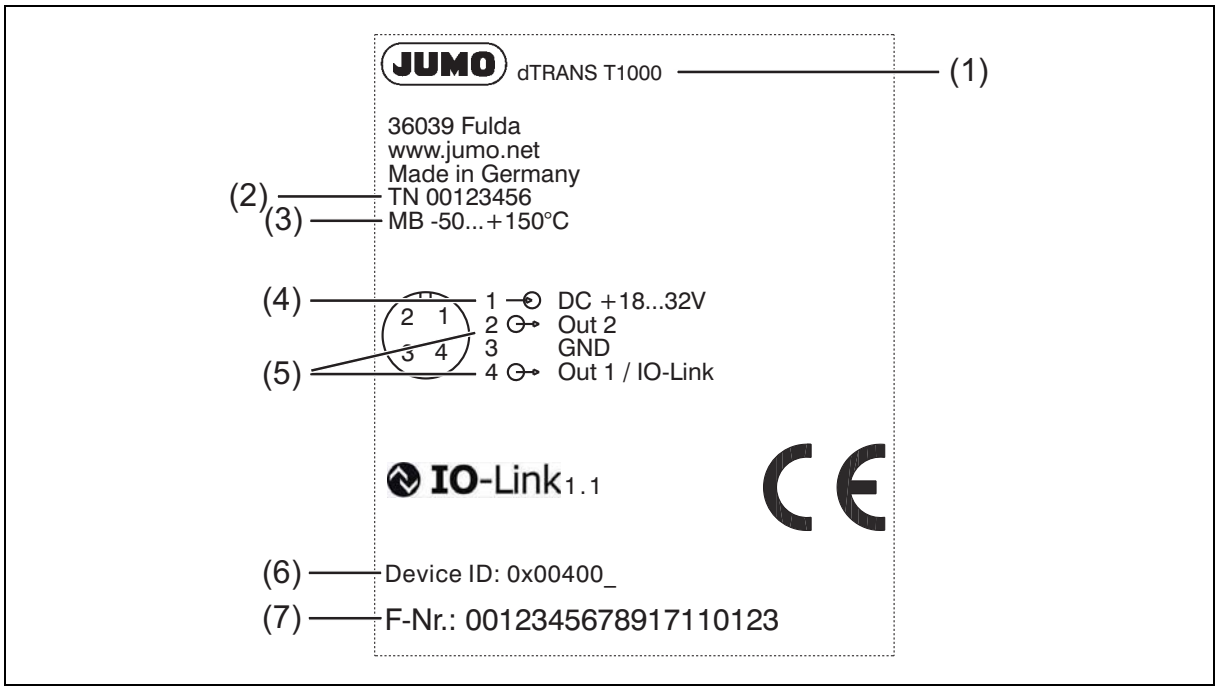
| Type 902915/10 with PA 755-758 (left)<br>Type 902915/30 with PA 755-758 (right) | Type 902915/30 with PA 997 |
| --- | --- |
|  |  |

# 2 Identifying the device version

## 2.1 Nameplate

**Position**

The nameplate is located on the housing surface.




(1) Device name
(2) Part no.
(3) Input – nominal measuring range
(4) Voltage supply
⇨For more in-depth information, see "Technical Data"
(5) Outputs
(6) Device ID
(7) Fabrication number

**Part no.**

The part no. clearly identifies an article in the catalog. It is important for communication between the customer and the sales department.

**Device ID**

The device ID can help when localizing the device description file (IODD), which can be found on the manufacturer's website and also downloaded if necessary.

***Downloading the IODD:***

1. Open the website www.jumo.de (change the language to English if necessary)
2. Use the search function to select the device
3. Under "Software", download the ZIP file containing the collection of IODDs
4. Extract all files from the ZIP folder
5. Use the device ID to locate the IODD and save it

*The IODD is now available for use with the IO-Link master's configuration tool. This can be used to configure and check the device.*

Instead of the manufacturer's website, you can also use the address: http://ioddfinder.io-link.com.

**Fabrication number (F-Nr)**

Among other things, the fabrication number indicates the date of manufacture (year/calendar week).

**Date of manufacture**

The device's date of manufacture (year and calendar week) is part of the fabrication number. Digits 12 to 15 denote the year of manufacture (in this case 17 for 2017) and the calendar week (11 in this case).

# 2 Identifying the device version

## 2.2 Order details

| | | |
|---|---|---|
| | **(1)** | **Basic type** |
| 902915 | | JUMO dTRANS T1000 – Temperature sensor with IO-Link |
| | **(2)** | **Basic type extension** |
| 10 | | IO-Link interface, M12 × 1 connector |
| 30 | | IO-Link interface, M12 × 1 connector, high-temperature |
| | **(3)** | **Operating temperature in °C** |
| 370 | | -50 to +150 °C |
| 386 | | -50 to +260 °C |
| | **(4)** | **Measuring insert** |
| 1013 | | 1 × Pt1000 in 4-wire circuit |
| | **(5)** | **Tolerance class of RTD temperature probe according to DIN EN 60751** |
| 2 | | Class A |
| 3 | | Class AA |
| | **(6)** | **Protection tube diameter D in mm** |
| 3 | | 3 mm[a] |
| 6 | | 6 mm |
| | **(7)** | **Insertion length** |
| 15 | | 15 mm[a] |
| 20 | | 20 mm[a] |
| 25 | | 25 mm[a] |
| 50 | | 50 mm |
| 100 | | 100 mm |
| 150 | | 150 mm |
| | **(8)** | **Process connection (PC)** |
| 000 | | None |
| 103 | | Screw connection G 3/8 |
| 104 | | Screw connection G 1/2 |
| 379 | | Screw connection M12 x 1.5 with CIP-compliant conical seal |
| 380 | | Screw connection G 1/2 with CIP-compliant conical seal |
| 550 | | Aseptic screw connection DN 20 DIN 11864-1 Form A |
| 551 | | Aseptic screw connection DN 25 DIN 11864-1 Form A |
| 552 | | Aseptic screw connection DN 32 DIN 11864-1 Form A |
| 553 | | Aseptic screw connection DN 40 DIN 11864-1 Form A |
| 554 | | Aseptic screw connection DN 50 DIN 11864-1 Form A |
| 601 | | Taper socket with union nut DN 10 DIN 11851 (dairy pipe fitting) |
| 604 | | Taper socket with union nut DN 25 DIN 11851 (dairy pipe fitting) |
| 605 | | Taper socket with union nut DN 32 DIN 11851 (dairy pipe fitting) |
| 611 | | Clamping socket (clamp) DN 10/20 DIN 32676 |
| 613 | | Clamping socket (clamp) DN 25/40 DIN 32676 |
| 616 | | Clamping socket (clamp) DN 50 DIN 32676 (2" ISO 2852) |
| 617 | | Clamping socket (clamp) 2 1/2" similar to DIN 32676 |
| 681 | | Ball welding socket with threaded fitting |
| 682 | | Welding socket with CIP-compliant conical seal |
| 684 | | VARIVENT® connection DN 15/10 |

| | | |
|---|---|---|
| 685 | | VARIVENT® connection DN 32/25 |
| 686 | | VARIVENT® connection DN 50/40 |
| 755 | | BioControl® D25 |
| 756 | | BioControl® D50 |
| 757 | | BioControl® D65 |
| 758 | | BioControl® D80 |
| 997 | | JUMO PEKA hygienic process connection |
| | **(9)** | **Protection tube material** |
| 24 | | Stainless steel 316L (material no. 1.4404/1.4435) |
| | **(10)** | **Extra code** |
| 000 | | None |
| 100 | | Customer-specific configuration (specifications in plain text) |
| 310 | | Protection tube offset[b] |
| 374 | | Inspection certificate 3.1 DIN EN 10204 (material) |
| 452 | | Wetted, electrolytically polished parts, surface roughness Ra ≤ 0.8 mm |
| 458 | | Surface roughness $R_a$ ≤ 0.4 µm for clamping socket (clamp) (area touching medium) |
| 774 | | DAkkS(DKD) calibration (standard, test points 0, 100 and 200 °C) |
| 775 | | DAkkS(DKD) calibration (service, please state desired test points in plain text) |
| 974 | | DAkkS(DKD) adjustment with calibration report (standard, test points 0, 100 and 200 °C) |
| 975 | | DAkkS(DKD) adjustment with calibration report (service, please state desired test points in plain text) |

[a] Only with screw connection M12 x 1.5 with CIP-compliant conical seal (process connection 379)

[b] Not for screw connection M12 x 1.5 with CIP-compliant conical seal (process connection 379)

| | **(1)** | | **(2)** | | **(3)** | | **(4)** | | **(5)** | | **(6)** | | **(7)** | | **(8)** | | **(9)** | | **(10)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Order code** | | / | | - | | - | | - | | - | | - | | - | | - | | / | |
| **Order example** | 902915 | / | 10 | - | 370 | - | 1013 | - | 2 | - | 3 | - | 15 | - | 379 | - | 24 | / | 452 |

## 2.3 Scope of delivery

| **Designation** |
|---|
| 1 temperature sensor in the ordered version |
| 1 installation instructions |

## 2.4 Accessories

| **Designation** | Part no. |
|---|---|
| IO-Link master upon request. | |
| Device data (IODD) at www.jumo.de or at http://ioddfinder.io-link.com | |
| Welding socket[a] G 1/2 for process connection 380 | 00378264 |
| Welding socket with collar[a] M12 × 1.5 for process connection 379 | 00614228 |
| Welding socket[a] M12 × 1.5 for process connection 379 | 00655051 |

[a] Welding sockets made of material 1.4404, parts touching the media electrolytically polished, surface roughness Ra ≤ 0.4 µm

# 3 Mounting

The temperature sensor may only be installed, connected and started up by qualified and authorized personnel observing these operating instructions, the applicable standards, and the legal requirements (depending on the application).

If you experience difficulties during installation and startup, please contact the manufacturer.

The device can be installed in any position.

**NOTE!**

The temperature sensor is not suitable for safety-critical applications.

**NOTE!**

The temperature sensor is not suitable for installation and application in potentially explosive areas.

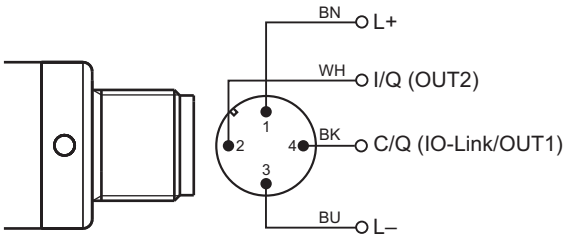
**NOTE!**

The temperature sensor must be connected to the potential equalization system of the plant via the process connection.

**Mounting the sensor**

- Insert the temperature sensor into the corresponding drilled hole and tighten it by hand, making sure the profile seal and/or O-ring (if fitted) are sitting correctly
- Tighten the temperature sensor with a suitable wrench

⇨ For the wrench size, see chapter 1.4 "Dimensions", page 6

| Connection | Terminal assignment | |
|---|---|---|
| |  | |
| | Round plug M12 × 1 (A-coded, non-rotating) | |
| **Switch operation** | | |
| Voltage supply[a] DC 9.6 to 32 V | 1 BN (brown)[b]<br>3 BU (blue) | L+<br>L- |
| Switching output 1 | 4 BK (black) | C/Q = OUT1 |
| Switching output 2 | 2 WH (white) | I/Q = OUT2 |
| **IO-Link operation** | | |
| Voltage supply[a] DC 18 to 32 V | 1 BN (brown)<br>3 BU (blue) | L+<br>L- |
| IO-Link | 4 BK (black) | C/Q = IO-Link |
| Switching output 2 | 2 WH (white) | I/Q = OUT2 |
| **Potential equalization** | | |
| Functional bonding conductor FB[c] | ⏚ | |

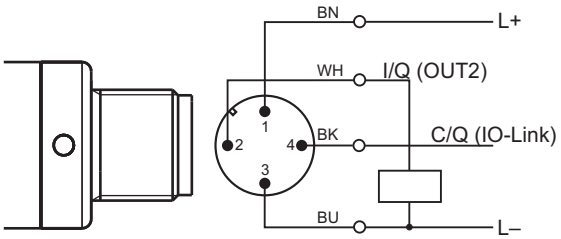
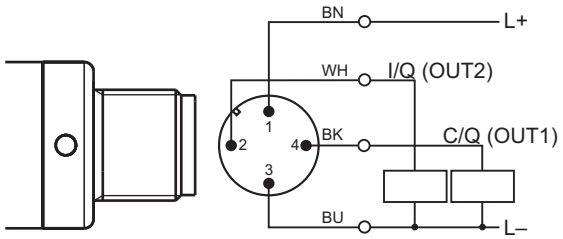
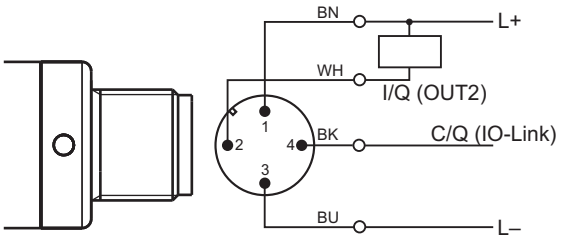
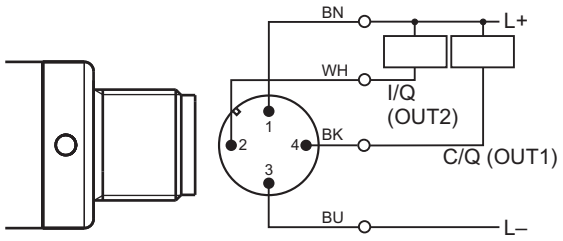
[a] The auxiliary energy of the pressure sensor must meet SELV requirements; optionally, an energy-limited current circuit according to section 9.3 of DIN EN 61010-1 and UL 61010-1 can be used.

[b] The colour coding is only valid for A-coded standard cables!

[c] The temperature sensor must be connected to the potential equalization system of the plant via the process connection.

# 4 Electrical connection

## 4.1 Connection examples

| IO-Link operation with 1 switching output | Switch operation with 2 switching outputs |
|---|---|
| p switching (PNP) | p switching (PNP) |
|  |  |
| n switching (NPN) | n switching (NPN) |
|  |  |

### Starting up the IO-Link master and configuration tool

If you are using a conventional IO-Link master, you must complete the following steps to configure the sensor.

1. Start up the hardware and software for the IO-Link master
2. Load the sensor's device description file (IODD)
   a) Open the website www.jumo.de (change the language to English if necessary)
   b) Use the search function to select the sensor
   c) Under "Software", download the ZIP file containing the collection of IODDs
   d) Extract all files from the ZIP folder
3. Start the configuation tool
4. Update the device catalog (import the IODD; localize using the "device ID" on the nameplate or the text file in the IODD collection)
5. Create a new project
6. Establish a connection
7. Configure, extract, monitor, etc., the sensor

Instead of the manufacturer's website, you can also use the address: http://ioddfinder.io-link.com.

### Configuration tool (overview)

Depending on the configuration tool, the menu structure contains different areas. The typical structure is listed below:

- Identification and information
  These areas show information on the manufacturer and device as well as general information.
- Parameters
  This section is used to configure the device.
  - General parameters
  - Switching points ⇨ chapter 6.1 "Switching points", page 18
  - Fine adjustment ⇨ chapter 6.2 "Fine adjustment", page 22
  - Event settings ⇨ chapter 6.4 "Fault signaling", page 25
  - Versions
  - Service information
- Monitoring
  In this area process data can be extracted (snapshot).
- Diagnosis and events
  These areas show diagnostic data and information about events.
- Process data
  This area shows the current process data, which is extracted cyclically.

# 6 Functions

**CAUTION!**

**Write operations to some R/W parameters result in them being saved to the EEPROM. This memory module has only a limited number of write cycles (approx. 100,000).**

Frequent writing of certain parameters can therefore result in a memory error.

▶ Fast writing cycles should thus be avoided.

## 6.1 Switching points

Depending on the operating mode, the sensor has 1 or 2 switching outputs. It automatically detects the connection type and responds accordingly. Separate parameters are available for both switching outputs.

| Operating mode | Output | Pin at the M12 connection |
|---|---|---|
| SIO mode<br>(SIO = Standard IO) | Switching output 1 | C/Q (OUT1) |
| | Switching output 2 | I/Q (OUT2) |
| IO-Link mode | IO-Link communication | C/Q (IO-Link) |
| | Switching output 2 | I/Q (OUT2) |

**Parameter**

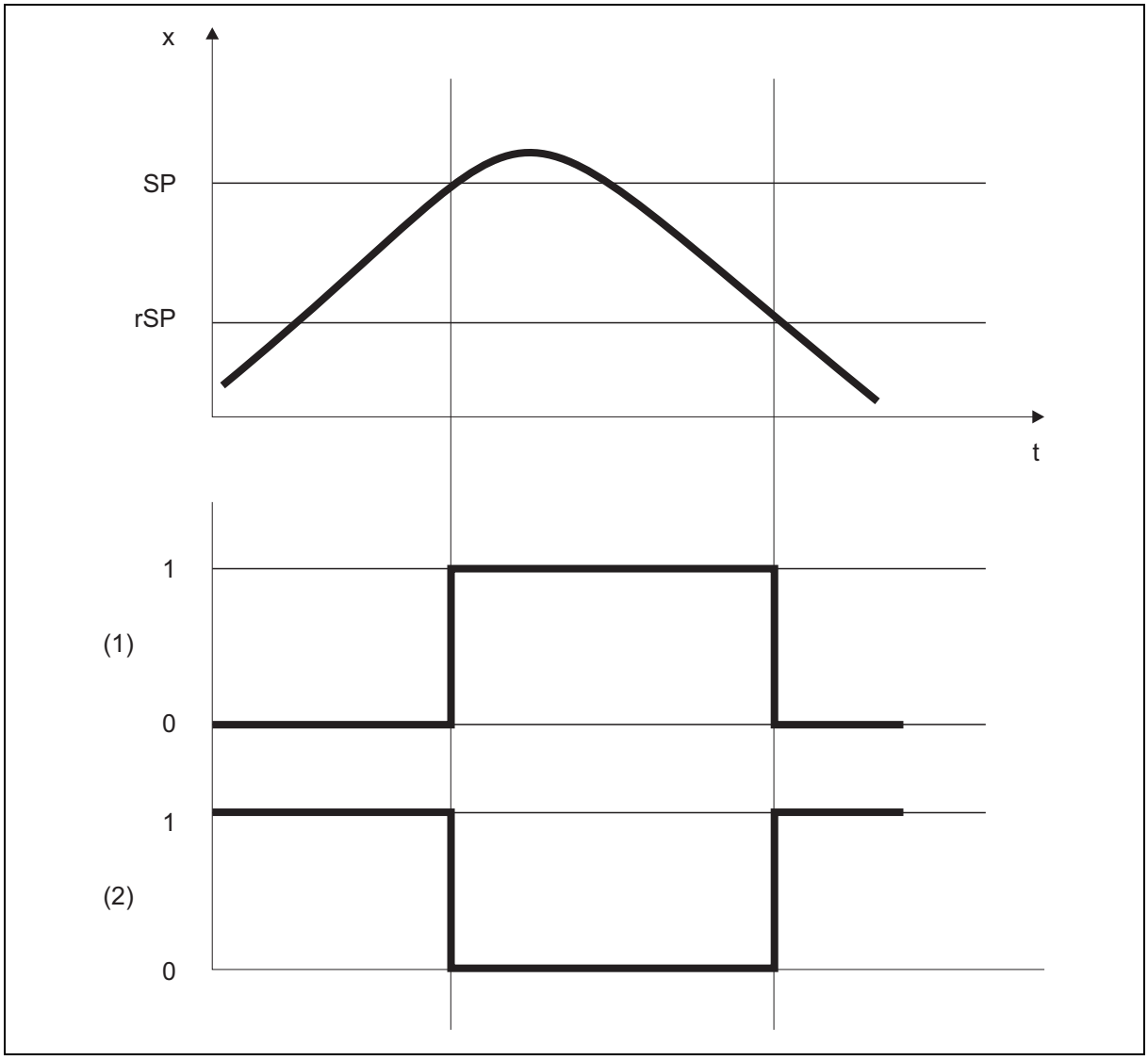
| Parameter | Selection/settings | Description |
|---|---|---|
| Switching behavior | **Inactive**<br>Hysteresis function, N/O Contact<br>Hysteresis function, N/C Contact<br>Window function, N/O Contact<br>Window function, N/C Contact | When inactive is selected, the selected switching output is not activated. |
| Switching point (SP) or window high (FH) | -999 to **0** to +999 | The selected switching output is only activated if rSP < SP or FL < FH.<br>⇨Chapter 6.1.1<br>⇨Chapter 6.1.2 |
| Release point (rSP) or window low (FL) | -999 to **0** to +999 | |
| Switch-on delay (VSP) | **0** to 100 s | ⇨Chapter 6.1.3 |
| Switch-off delay (VrSP) | **0** to 100 s | |
| Output driver mode | **p-switching**<br>n-switching | ⇨Chapter 4.1 |

### 6.1.1 Hysteresis function

The hysteresis function switches the output as soon as the switching point "SP" is reached. When the release point "rSP" is reached, the output switches again.

The hysteresis function distinguishes between N/C and N/O contacts.

Switching requirement: Switching point "SP" ≥ Release point "rSP"




x = Measured value
t = Time
SP = Switching point
rSP = Release point
(1) = N/O contact
(2) = N/C contact

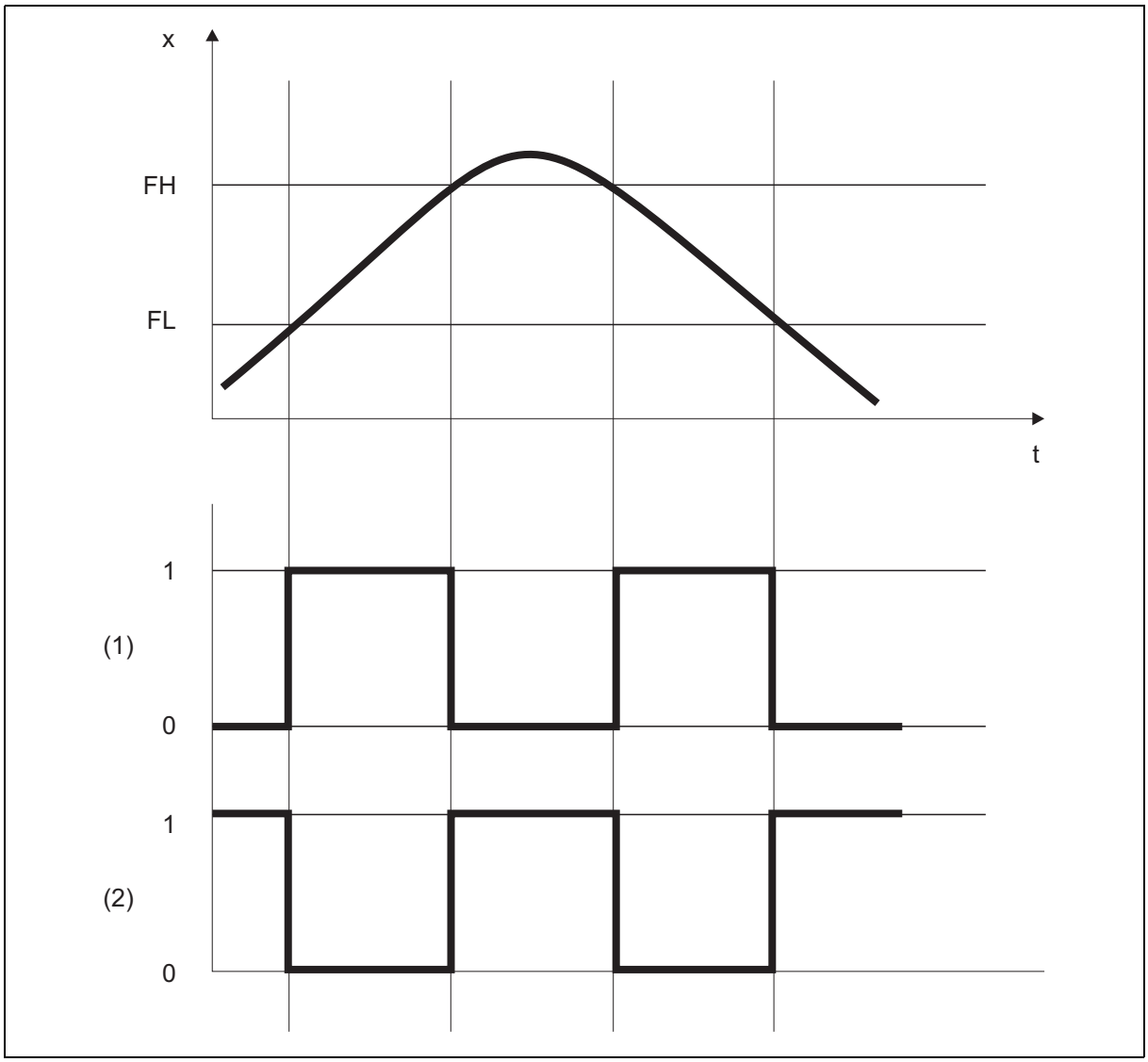
### 6.1.2 Window function

Under the window function, the window range is defined using the parameters window low "FL" (lower value) and window high "FH" (upper value). The output switches when the current measured value (x) is between the two limits [(x > FL) & (x < FH)].

The window function distinguishes between N/C and N/O contacts.

Requirement: Window high "FH" >= Window low "FL"

The window high "FH" and window low "FL" switching points have a fixed symmetrical hysteresis of ± 0.25 % of the measuring range.

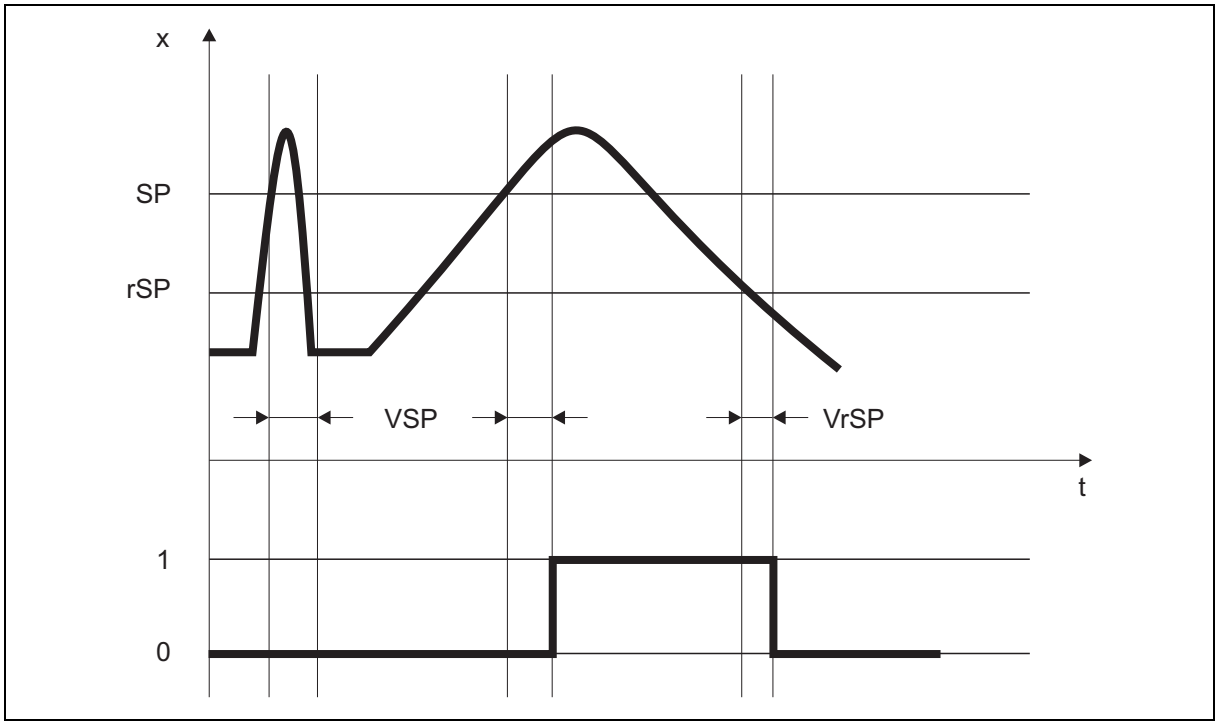



x = Measured value
t = Time
FH = Window high
FL = Window low
(1) = N/O contact
(2) = N/C contact

### 6.1.3 Switch-on delay/switch-off delay

The switch-on delay "VSP" and switch-off delay "VrSP" prevent switching of the output being triggered by peaks or drops in the measured values.

If the necessary measured value is no longer measured once the delay time has passed, the output is not switched.




x = Measured value
t = Time
SP = Switching point
rSP = Release point
VSP = Switch-on delay
VrSP = Switch-off delay

## 6.2 Fine adjustment

You can use customer-specific fine adjustment to correct the measured values of the sensor. In contrast to offsetting, which is used to specify a constant correction value for the entire characteristic line, fine adjustment can also be used to change the gradient of the characteristic line.

**NOTE!**

This data is not stored in the parameter manager.

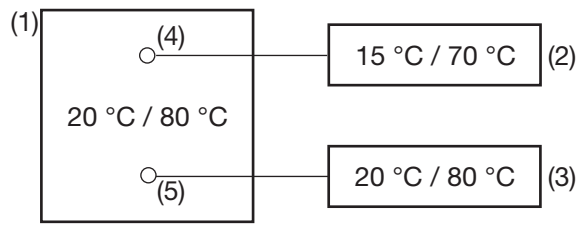
**Parameter**

| Parameter | Selection/settings | Description |
|---|---|---|
| Active | **No**, Yes | Fine adjustment is only active if you select Yes |
| Actual start value | -999 to **0** to +999 | Lower measured value |
| Target start value | -999 to **0** to +999 | Lower reference value |
| Actual end value | -999 to **0** to +999 | Upper measured value |
| Target end value | -999 to **0** to +999 | Upper reference value |

**Example**

The temperature inside a furnace is measured and displayed. Due to a deviation in the measurement, the sensor's measured value does not correspond to the actual value (reference measurement). The amount of deviation is different at the upper and lower measuring points, meaning an offset correction is not suitable.

Active: Yes
Actual start value: 15 °C (measured value)
Target start value: 20 °C (reference measurement)
Actual end value: 70 °C (measured value)
Target end value: 80 °C (reference measurement)




(1) Furnace
(2) Measured values from the sensor
(3) Reference values
(4) Sensor
(5) Reference measurement

### Performing fine adjustment

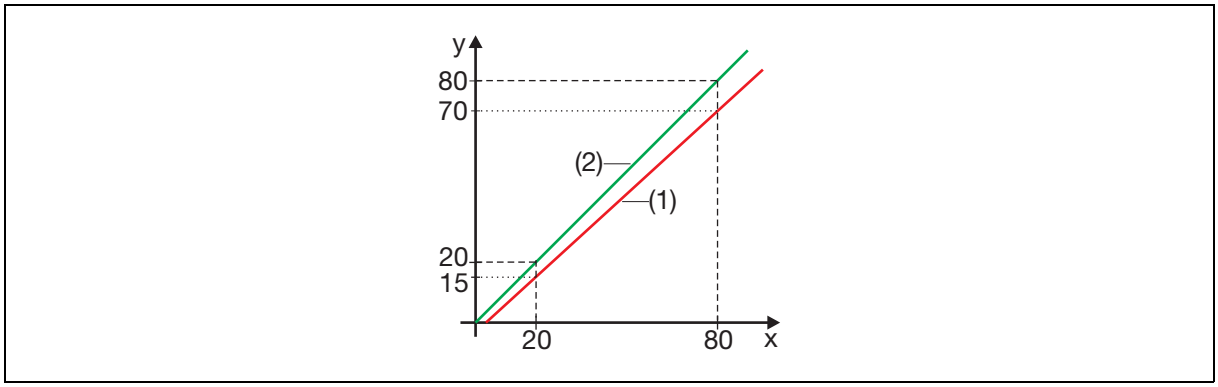
- Determine the lower value (as low and constant as possible) with the reference measuring device.
  Example: Set furnace temperature to 20 °C.
- Enter the measured value as the actual start value and the reference value as the target start value.
  Example: Enter 15 and 20.
- Determine the upper value (as high and constant as possible) with the reference measuring device.
  Example: Increase furnace temperature to 80 °C.
- Enter the measured value as the actual end value and the reference value as the target end value.
  Example: Enter 70 and 80.

**NOTE!**

The actual start value and actual end value can also be selected with the teach function.
⇨ chapter 6.3 "Teach functions", page 24

### Characteristic line

The following diagram shows the changes in the characteristic line caused by the fine adjustment (point of intersection with the x axis as well as the gradient).




| | |
|---|---|
| y | Measured value |
| x | Reference value |
| (1) | Characteristic line before fine adjustment |
| (2) | Characteristic line after fine adjustment |

### Resetting the fine adjustment

To reverse the fine adjustment, the "Active" parameter must be set to "No".

# 6 Functions

## 6.3 Teach functions

The teach functions can be used to transfer certain commands to the sensor.

**Teach functions in the area of "General parameters"**

| Teach function | Description |
|---|---|
| Reset to default settings | All parameters under "General parameters", "Switching points", "Fine adjustment" and "Event settings" are reset to the default settings.<br>The parameters under "Service information" stay the same. |

**Teach functions in the area of "Fine adjustment"**

| Teach function | Description |
|---|---|
| Set actual start value | The current measured value is adopted as the actual start value. |
| Set actual end value | The current measured value is adopted as the actual end value. |

**Teach functions in the area of "Service information"**

| Teach function | Description |
|---|---|
| Reset all | All parameters under "Service information" are reset to the default settings. |
| Reset operating hours counter | The operating hours counter is reset to the default settings. |
| Reset drag indicator min. | The stored minimum value is reset to the default settings. |
| Reset drag indicator max. | The stored maximum value is reset to the default settings. |

**NOTE!**

After executing a teach function, the data may have to be exported from the sensor again in certain circumstances.

## 6.4 Fault signaling

IO-Link offers a range of fault signaling options (device status, event codes, PDValid-Flag). Furthermore, malfunctions can also be signaled within the process data via the process value itself or the status of the process value.

**Overview**

| Description | Signaling via process value in PDI[a] | Process value status in PDI (1 byte) | Device status | Event code (Standard event) | Event activation or deactication possible | Event error type |
|---|---|---|---|---|---|---|
| No error | - | - | 0 (device is working properly) | - | - | - |
| Process value invalid | Yes | Bit0 (Process data invalid) | 4 (failure) | 0x1000 | Yes | Error |
| Overrange | Yes | | | 0x8C20 | Yes | Error |
| Underrange | Yes | | | | Yes | Error |
| Error in configuration data | No | Bit1 (Parameter error) | 4 (failure) | 0x6320 | No | Error |
| Error in calibration data | No | Bit2 (Device is defective) | 4 (failure) | 0x5000 | Yes | Error |
| Device is defective (Probe break, probe short circuit) | Yes | | | | | |
| Undervoltage | No | - | 2 (Outside the specification) | 0x5111 | No | Warning |
| Temperature error, overload | No | - | 4 (failure) | 0x4000 | No | Error |

[a] PDI = Process Data Input

**Device status and event codes**

Various events can be activated or deactivated via configuration parameters.

**PD-Valid Flag**

If the device status is 4 (failure), the PDValid-Flag is set to zero (false). This means that all of the process data is invalid. In order to determine the precise cause, the process value or status bits can be evaluated.

**Process value**

The fault signaling is displayed as a floating-point value or integer value. The following statuses are defined:

| Error | Error code for floating-point values (TFLOAT) | Error code for integer values (TINT32) |
|---|---|---|
| Measuring range underflow | $1.0 \times 10^{37}$ | 2147483638 |
| Measuring range overflow | $2.0 \times 10^{37}$ | 2147483639 |
| Not a valid input value | $3.0 \times 10^{37}$ | 2147483640 |
| Division by zero | $4.0 \times 10^{37}$ | 2147483641 |
| Mathematical error | $5.0 \times 10^{37}$ | 2147483642 |
| Probe short circuit | $7.0 \times 10^{37}$ | 2147483644 |
| Probe break | $8.0 \times 10^{37}$ | 2147483645 |

**Process value status**

⇨ See chapter 7.1 "Process data", page 27

## 7.1 Process data

The data is transferred in a cycle via the IO-Link interface to the IO-Link master (PDI = Process Data Input). The entire process data can be extracted via index 40 and subindex 0.

| Designation | Data type | Value range | Default | Description |
|---|---|---|---|---|
| Temperature process value | TFLOAT or TINT32 | | 0 | The "Data format" configuration parameter can be used to switch between the data type TFLOAT and TINT32.<br>⇨Chapter 7.2 |
| Temperature process value unit | TUINT8 | 0 = °C<br>1 = °F | °C | |
| Temperature process value status | TUINT8 (bit field) | Bit 0 = Process value invalid (overrange or underrange)<br>Bit 1 = Error in configuration data<br>Bit 2 = Error in calibration data (device is defective) | 0 | In order to provide a simple way to identify errors, alongside IO-Link's standard troubleshooting functions, a status byte is included in the process data. This signals errors in the sensor and is easy to analyze in the higher-level system. Errors are entered on a bit by bit basis but can also be combined to contain several device errors.<br>⇨Chapter 6.4 |
| Switching output | TUINT8 (bit field) | Bit 0 = Switching output 1<br>Bit 1 = Switching output 2 | 0 | 0 = Not switched<br>1 = Switched |

# 7 Parameter overview

## 7.2 Configuration data

The configuration is stored in the parameter manager and is transferred via the IO-Link interface in an acyclic process.

**General**

| Designation | Index | Sub-index | Data type | Value range | Default | Access right[a] | Description |
|---|---|---|---|---|---|---|---|
| Data format | 64 | 0 | TENUM (1 byte) | 0 = Floating point<br>1 = Integer | Floating point | RW | |
| Temperature process value unit | 120 | 0 | TENUM (1 byte) | 0 = °C<br>1 = °F | °C | RW | |
| Temperature process value offset | 121 | 0 | TFLOAT | -999 to 999 | 0 | RW | |
| Temperature filter time constant | 122 | 0 | TFLOAT | 0 to 100 s | 0 | RW | |
| Standard command | 2 | 0 | Button | 130 = Reset to default setting | - | WO | The default data is loaded. |

[a] RW = Read and write access
RO = Read-only access
WO = Write-only access

**Switching output 1 and 2**

| Designation | Index | Subindex | Data type | Value range | Default | Access right | Description |
|---|---|---|---|---|---|---|---|
| Switching behavior | 200 and 201 | 1 | TENUM | 0 = Inactive<br>1 = Hysteresis function N/O contact<br>2 = Hysteresis function N/C contact<br>3 = Window function N/O contact<br>4 = Window function N/C contact | Inactive | RW | Index 200 = Switching output 1<br>Index 201 = Switching output 2 |
| Switching point/ Window high | 200 and 201 | 2 | TFLOAT | -999 to 999 | 0 | RW | |
| Release point/ Window low | 200 and 201 | 3 | TFLOAT | -999 to 999 | 0 | RW | |
| Switch on Delay | 200 and 201 | 4 | TFLOAT | 0 to 100 s | 0 | RW | |
| Switch off Delay | 200 and 201 | 5 | TFLOAT | 0 to 100 s | 0 | RW | |
| Output mode | 200 and 201 | 6 | TENUM<br>(1 byte) | 0 = p-switching<br>1 = n-switching | p-switching | RW | |

**Events**

| Designation | Index | Subindex | Data type | Value range | Default | Access right | Description |
|---|---|---|---|---|---|---|---|
| Event settings | 111 | 0 | TUINT8 (bit field) | Bit 0 = Process data invalid<br>Bit 1 = Process data overrange<br>Bit 2 = Process data underrange<br>Bit 3 = Device hardware error | 0 | RW | 0 = Inactive<br>1 = Active |

# 7 Parameter overview

**Fine adjustment data**

| Designation | Index | Sub-index | Data type | Value range | Default | Access right | Description |
|---|---|---|---|---|---|---|---|
| Active | 220 | 0 | TENUM (1 byte) | 0 = No<br>1 = Yes | No | RW | |
| Actual start value | 221 | 0 | TFLOAT | -999 to 999 | 0 | RW | |
| Actual end value | 222 | 0 | TFLOAT | -999 to 999 | 0 | RW | |
| Target start value | 223 | 0 | TFLOAT | -999 to 999 | 0 | RW | |
| Target end value | 224 | 0 | TFLOAT | -999 to 999 | 0 | RW | |
| Standard command | 2 | 0 | Button | 160 = Set actual start value | - | WO | |
| Standard command | 2 | 0 | Button | 161 = Set actual end value | - | WO | |

**NOTE!**

This data is not stored in the parameter manager and is transferred via the IO-Link interface in an acyclic process.

## 7.3 Service data

The service data is written to the EEPROM in a cyclical process (every 10 minutes) and can be reset via the teach functions.

| Designation | Index | Sub-index | Data type | Value range | Access right | Description |
|---|---|---|---|---|---|---|
| Operating hours counter | 3000 | 0 | TUINT32 | | RO | |
| Drag indicator temperature process value min. | 3002 | 0 | TFLOAT | | RO | |
| Drag indicator temperature process value max. | 3003 | 0 | TFLOAT | | RO | |
| Reset all | 3100 | 0 | Device command | 1 = Reset | WO | Resets all drag indicators and the operating hours counter |
| Reset operating hours counter | 3100 | 0 | Device command | 2 = Reset | WO | |
| Reset drag indicator temperature min. | 3100 | 0 | Device command | 3 = Reset | WO | |
| Reset drag indicator temperature max. | 3100 | 0 | Device command | 4 = Reset | WO | |
| VDN version | 1000 | 0 | TSTRING | 12 byte | RO | |
| Bootloader version | 1001 | 0 | TSTRING | 14 byte | RO | |

# 8 Technical data

## 8.1 Input

| | |
|---|---|
| Sensor element | RTD temperature probe Pt1000 |
| Standard | DIN EN 60751 |
| Measuring range | 902915/10: -50 to +150 °C<br>902915/30: -50 to +260 °C |
| Sensor accuracy | Class A, ±(0.15 + 0.002 × ItI) °C[a]<br>Class AA, ±(0.10 + 0.0017 × ItI) °C[a] |
| Connection type | Resistance measurement 4-wire |
| Calibration accuracy of the electronic components | ≤ ±(0.08 %)[b] |
| Ambient temperature influence | ≤ 0.0025 %/K[b, c] |
| Measuring current | ≤ 500 µA |
| Sampling rate | 160 ms |
| Input filter | Digital filter, 2nd order; filter constant can be set |
| Galvanic isolation | to the protection tube;<br>no galvanic isolation between sensor and output |

[a] ItI = temperature value in °C regardless of the prefix sign.

[b] All accuracy specifications in % relative to the respective measuring range

[c] Relative to the temperature deviation at the calibration point (25 °C ±5 K)

**Measuring circuit monitoring**

| | |
|---|---|
| Process data invalid | IO-Link event configurable;<br>appears in the process value as an error value |
| Measuring range overflow | |
| Measuring range underflow | |
| Device hardware fault | |

## 8.2 Output

| | |
|---|---|
| Number | 1 output in IO-Link operation (output signal according to IO-Link communication standard version 1.1; see section 8.3 "Interface", page 33)<br>2 outputs for switch operation (SIO mode; SIO = standard IO) |
| Switching functions configurable | Hysteresis function or window function<br>N/C or N/O contact<br>Output p switching (PNP) or n switching (NPN)<br>Switch-on/switch-off delay |
| Switching current | ≤100 mA per output |
| Voltage drop at switching transistor | ≤2 V |
| Short-circuit proof | Yes (clocked) |
| Reverse polarity protected | Yes |
| Current limiting | Yes |
| Hysteresis | |
| For hysteresis function | Configurable |
| For window function | Fixed setting (symmetrical; ±0.25 % of the measuring range) |
| Switch-on, switch-off delay | 0 to 100 s |

| | | |
|---|---|---|
| Response time | In water 0.4 m/s | In air 3.0 m/s |
| Protection tube Ø 6 mm (standard) | $t_{0.5}$ = 5 s; $t_{0.9}$ = 12 s | $t_{0.5}$ = 40 s; $t_{0.9}$ = 110 s |
| Protection tube Ø 6 mm (offset by Ø 3.5 mm) | $t_{0.5}$ = 2 s; $t_{0.9}$ = 5 s | $t_{0.5}$ = 25 s; $t_{0.9}$ = 85 s |
| Protection tube Ø 3 mm (PA 379) | $t_{0.5}$ = 1.5 s; $t_{0.9}$ = 4 s | $t_{0.5}$ = 15 s; $t_{0.9}$ = 50 s |

## 8.3 Interface

| | |
|---|---|
| Communication interface | IO-Link device V 1.1, downward compatible to V 1.0 |
| Data transfer rate (baud rate) | COM 3 (230.4 kBaud) |
| Max. cable length | 20 m, unshielded |
| Min. cycle time | 2 ms |
| IO Device Description (IODD) | Depending on the ordered input range; available on the manufacturer's website www.jumo.de or at http://ioddfinder.io-link.com |

# 8 Technical data

## 8.4 Electrical data

| | |
|---|---|
| Voltage supply | |
| In IO-Link operation | DC 18 to 32 V |
| In switch operation | DC 9.6 to 32 V |
| Nominal voltage | DC 24 V |
| Current consumption | |
| In idle mode | ≤12 mA (at nominal voltage) |
| In IO-Link operation | ≤20 mA (at nominal voltage) |
| In switch operation | ≤200 mA (at nominal voltage) and with 2 switching outputs |
| Electrical safety | Protection rating III according to DIN EN 61140 |
| Intended use | Temperature measurement in industrial plants |

The auxiliary energy of the temperature sensor must meet SELV requirements; optionally, an energy-limited current circuit acc. to 9.3 of DIN EN 61010-1 and UL 61010-1 can be used.

## 8.5 Mechanical features

| | |
|---|---|
| Materials | |
| Protection tube | Stainless steel 1.4404 (1.4435 for clamp acc. to DIN 32676) |
| Process connection | Stainless steel 1.4404 (1.4435 for clamp acc. to DIN 32676) |
| Housing | Stainless steel |
| Installation position | Any |
| Weight[a] | 902915/10 with PA 104 and EL = 100 mm: approx. 80 g<br>902915/30 with PA 104 and EL = 100 mm: approx. 120 g |

[a] The weight of the temperature sensor depends on the process connection (PA) and the insertion length (EL).

## 8.6 Environmental influences

| | |
|---|---|
| Admissible temperatures | |
| Medium | 902915/10: -50 to +150 °C |
| | 902915/30: -50 to +260 °C |
| Ambient temperature[a] | -40 to +85 °C (ambient temperature range of the head) |
| Storage | -40 to +85 °C |
| Resistance to climatic conditions | |
| During operation | ≤100 % humidity without condensation on the outer skin of the device |
| During storage | ≤90 % relative humidity without condensation |
| Climate class | 3K7 acc. to DIN EN 60721-3-3 |
| Admissible mechanical load | |
| Vibration resistance | 10 g, at 10 to 500 Hz acc. to DIN EN 60068-2-6 |
| Shock resistance | 20 g for 11 ms according to DIN EN 60068-2-27 |
| | 50 g for 1 ms according to DIN EN 60068-2-27 |
| Process media | Liquid and gaseous media |
| Protection type | According to DIN EN 60529 |
| With mating connector | IP66/IP67/IP69 |
| Electromagnetic compatibility | According to EN 61326-2-3 |
| Interference emission | Class B[b] |
| Interference immunity | Industrial requirement |

[a] Basic type 902915/10: At process temperatures above 120 °C, the maximum admissible ambient temperature is 60 °C (stated at nominal voltage DC 24 V).
Basic type 902915/30: No restrictions (stated at nominal voltage DC 24 V).

[b] The product is suitable for industrial use as well as for households and small businesses.

| 部件名称<br>Product group: 902915 | 有毒有害物质或元素 Hazardous substances | | | | | |
|---|---|---|---|---|---|---|
| | 铅（Pb） | 汞（Hg） | 镉（Cd） | 六价铬（Cr(VI)） | 多溴联苯（PBB） | 多溴二苯醚（PBDE） |
| 外壳<br>Housing<br>(Gehäuse) | ○ | ○ | ○ | ○ | ○ | ○ |
| 过程连接<br>Process connection<br>(Prozessanschluss) | ○ | ○ | ○ | ○ | ○ | ○ |
| -螺母<br>Nut<br>(Mutter) | ○ | ○ | ○ | ○ | ○ | ○ |
| 螺钉<br>Screw<br>(Schraube) | ○ | ○ | ○ | ○ | ○ | ○ |

本表格依据 SJ/T 11364-2014的规定编制。

(This table is prepared in accordance with the provisions of SJ/T 11364-2014.)

O：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

(O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.)

X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

(X: Indicates that said hazardous substance contained in one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.)

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