JUMO DELOS T

Electronic temperature switch
with display and analog output

B 90.2940.0
Operating Manual

JUMO

2010-12-01/00536581

Contents

Contents

Contents

1.1 Safety information

General information

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

Please read this manual before commissioning the device. Keep the manual in a place accessible to all users at all times.

If difficulties occur during commissioning, please refrain from carrying out any manipulations that could jeopardize your warranty rights.

Warning signs

DANGER!
This symbol indicates that **injury to persons caused by electrical shock** may occur, if the respective protective measures are not carried out.

WARNING!
This symbol in connection with the signal word indicates that i**njury of persons** may occur, if the respective protective measures are not carried out.

CAUTION!
This symbol in combination with the signal word indicates that **damage to assets or data loss** will occur if suitable precautions are not taken.

CAUTION!
This sign indicates that **components could be destroyed** by electrostatic discharge (ESD = Electro Static Discharge), if the respective cautionary measures are not taken.
Only use the ESD packages intended for this purpose to return device inserts, assembly groups or assembly components.

Note signs

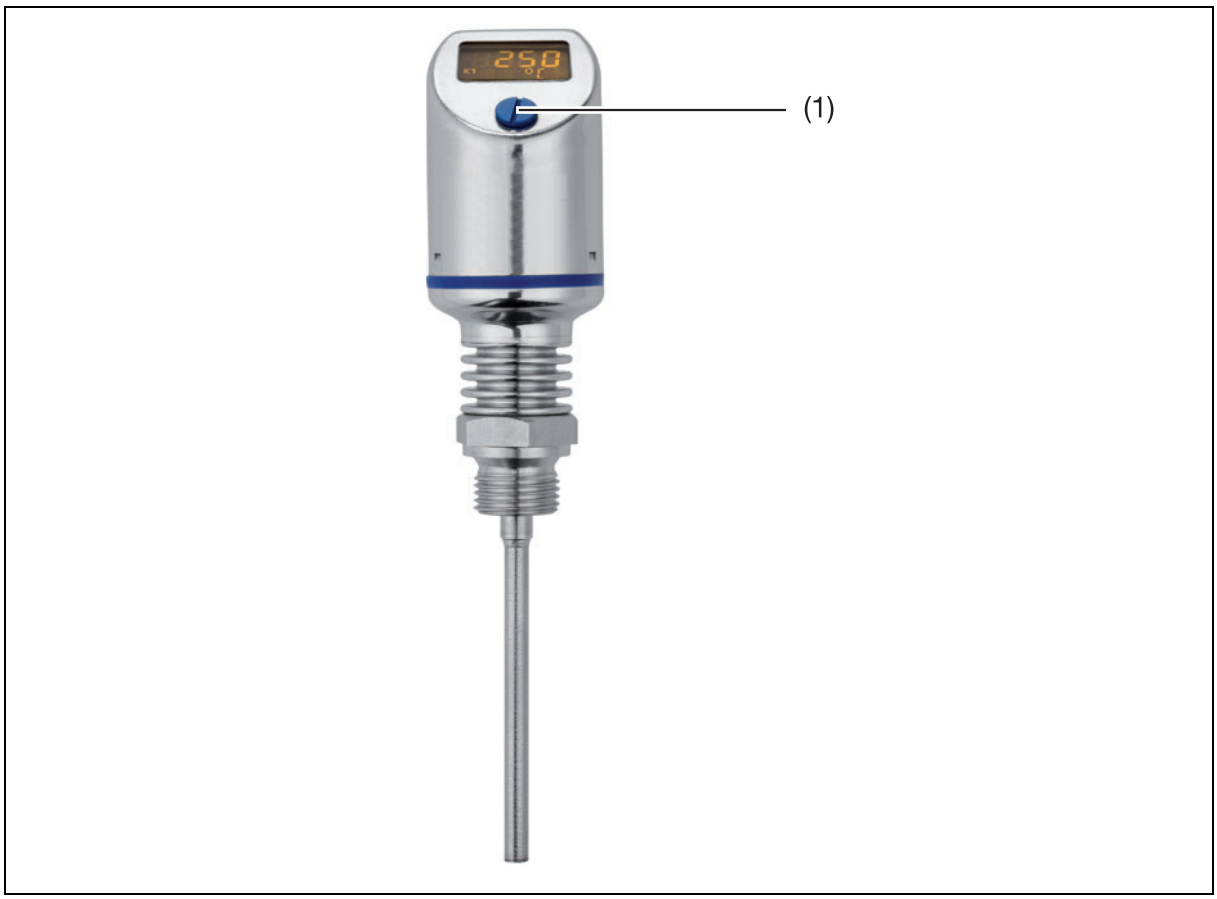
TIP!
This symbol refers to **important information** about the product or its handling or additional use.

REFERENCE!
This symbol refers to **further information** in other sections, chapters or manuals.

DISPOSAL!
This device and, if installed, the batteries must not be disposed of in the garbage can after use! Please ensure that they are disposed of properly and in an **environmentally friendly manner**.

1 Introduction

1.2 General information



(1) Locking screw for operation

- The device measures the temperature in liquids and gases.
- The temperature is displayed digital.
- Depending on the version, the following outputs are available:
  - 1x PNP switching output
  - 2x PNP switching outputs
  - 1x PNP switching output and 1x analog output 0 to 20 mA, configurable
  - 1x PNP switching output and 1x analog output 4 to 20 mA, configurable
  - 1x PNP switching output and 1x analog output 0 to 10 V, configurable
- The device is also available in a version for use in increased medium temperatures.
- The device is additionally available in a version equipped with M 12x1 connection for RTD temperature probes.
- The device can be set directly on site or configured via the setup program with a notebook/ PC.

CAUTION!
The protection class specified for the device is only achieved when the locking screw is inserted and tightened.

1.3 Description

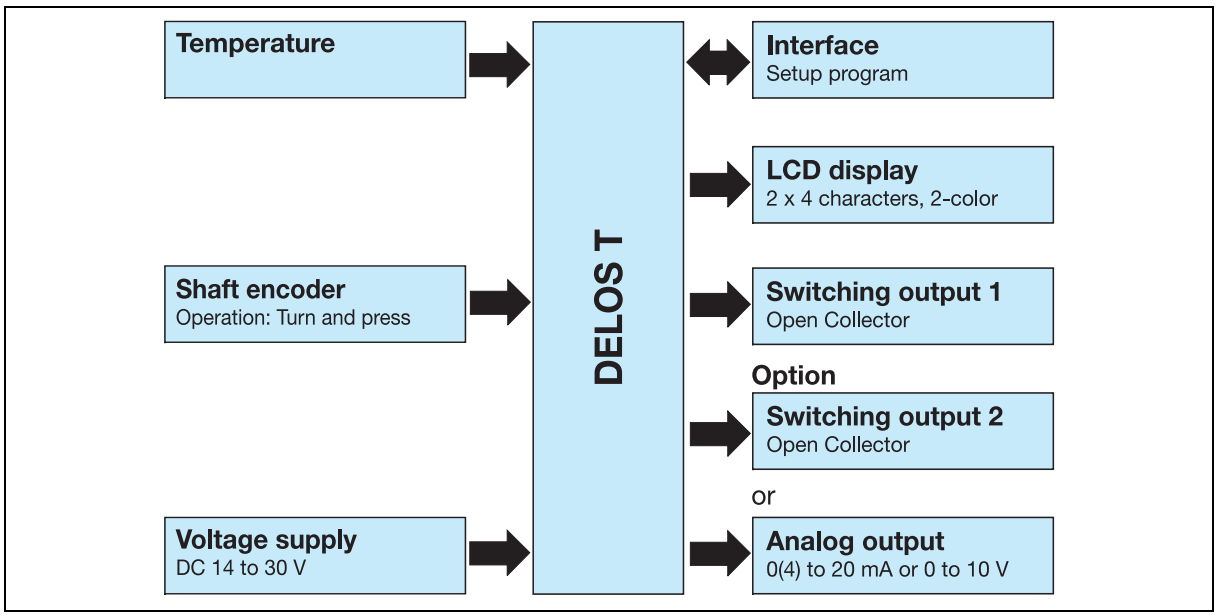
The highly precise, electronic temperature switch comprises a sheath with built-in temperature probe, a process connection as well as an attached case with LCD display for the electronics. Depending on the application, the following output variants are available: 1x PNP or 2x PNP switching output (binary output) or 1x PNP switching output and 1x analog output.

The configuration of the output signal and the measuring range can be customized.

Depending on the version, the electronic temperature switch can be used in an operating temperature range from -50 to +150 °C, -50 to +260 °C and -50 to +500 °C. The analog output signal 4 to 20 mA, 0 to 20 mA, 0 to 10 V or reversed 20 to 4 mA, 20 to 0 mA and 10 to 0 V is available linearized (temperature linear).

The electronic temperature probe is designed for industrial applications and complies with the European Standards to guarantee electromagnetic compatibility (EMC).

1.4 Block diagram



2.1 Type specifications

Position

A laser has been used to label the type specifications on the device display case.

Contents

The specifications contain important information. Amongst others:

Description	Example
Basic type	902940/10
Voltage supply	DC 14 to 30 V
Output signal	4 to 20 mA
Measuring range (MB)	-50 to +150 °C
Switching output	1x PNP 250 mA

Fabrication No. (F No.)

The serial number is used by the manufacturer to identify the device.

The F-No. is **not** located on the device but on the package.

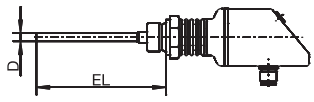
The F-No. contains the production date (year and week) on position 12 to 15 (counted from the left).

Example: F-No. = 014967870101**044**0
The device was produced in the 44th calendar week in 2010.

2 Device identification

2.2 Type description for basic type 902940/10

		(1)	**Basic type**
	902940/10		DELOS T Electronic temperature switch with display and analog output Ambient temperature on the display case: -20 to +75 °C Parts coming into contact with the medium are electropolished, roughness depth Ra ≤ 0.8 µm
		(2)	**Version**
x	8		Standard, with factory settings
x	9		Customer-specific configuration (specifications in plain text)
		(3)	**Operating temperature in °C**
x	370		-50 to +150 °C
		(4)	**Measuring insert**
x	1013		1x Pt1000 in 4-wire circuit
		(5)	**Tolerance class as per DIN EN 60751**
x	2		Class A (standard)
x	3		Class AA (1/3 DIN B)
		(6)	**Output**
x	470		1x PNP switching output
x	471		2x PNP switching output
x	475		1x PNP switching output and 1x analog output 4 to 20 mA, configurable
x	476		1x PNP switching output and 1x analog output 0 to 20 mA, configurable
x	477		1x PNP switching output and 1x analog output 0 to 10 V, configurable
		(7)	**Sheath diameter D in mm**
x	6		∅ 6 mm
		(8)	**Fitting length EL in mm (EL 50 to 1000 mm)**
x	50		50 mm
x	100		100 mm
x	150		150 mm
x	...		Please specify in plain text (50 mm steps)
		(9)	**Process connection PA**
x	000		None (plain sheath made of stainless steel 316L)
x	102		Screw connection G 1/4 (stainless steel 316Ti)
x	103		Screw connection G 3/8 (stainless steel 316Ti)
x	104		Screw connection G 1/2 (stainless steel 316Ti)
x	118		Screw connection M 12x1.5 (stainless steel 316Ti)
x	126		Screw connection M 18x1.5 (stainless steel 316Ti)
x	128		Screw connection M 20x1.5 (stainless steel 316Ti)
x	144		Screw connection 1/2-14NPT (stainless steel 316Ti)
x	163		Union nut G 3/8 (stainless steel 316Ti)
x	380		Screw connection G 1/2 with CIP-conforming sealing cone and EHEDG certificate (stainless steel 316L)
x	601		Conical port with union nut DN 10 DIN 11851 (milk pipe union) (stainless steel 316L)
x	604		Conical port with union nut DN 25 DIN 11851 (milk pipe union) (stainless steel 316L)



x	605	Conical port with union nut DN 32 DIN 11851 (milk pipe union) (stainless steel 316L)
x	613	Clamp DN 25/40 (1“/1.5“) DIN 32676 (stainless steel 316L)
x	616	Clamp DN 50 (2“) DIN 32676 (stainless steel 316L)
x	617	Clamp 2.5“ similar to DIN 32676 (stainless steel 316L)
x	681	Spherical welding socket with clamp screw connection (stainless steel 316L)
x	682	Welding socket with CIP-conforming sealing cone (stainless steel 316L)
x	685	Varivent connection DN 32/25 with EHEDG certificate (stainless steel 316L)
x	686	Varivent connection DN 50/40 with EHEDG certificate (stainless steel 316L)
x	840	Spherical welding sleeve (stainless steel 316Ti)
x	997	JUMO PEKA with EHEDG certificate (stainless steel 316L) (compatible process connection adapter, see data sheet 40.9711)

	(10)	**Extra codes**
x	000	None
x	310	Sheath ∅ 6 mm stepped down to ∅ 3.8 mm (fitting length EL max. 800 mm)
x	810	Welding socket (only for process connection 380)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)	
Order code		-		-		-		-		-		-		-		-		/		, ...[1]
Order example	902940/10	-	8	-	370	-	1013	-	2	-	475	-	6	-	50	-	000	/	000	

[1] State extra codes one after another, separated by commas.

2 Device identification

2.2.1 Scope of delivery for basic type 902940/10

Our scope of delivery includes:

- 1 device in the version ordered
- 1 combination tool
  (required for operation on the device and to turn the display case through ± 160°)
- 1 operating instructions B 90.2940.0

In the event of questions, please contact your supplier.

2.2.2 Accessories, process connection for basic type 902940/10

The following articles must be ordered separately and with costs:

Article	Part No.
Pipe screw connection G 1/4 (stainless steel 316Ti) for sheath screw connections	90/00080811
Pipe screw connection G 1/2 (stainless steel 316Ti) for sheath screw connections	90/00305445

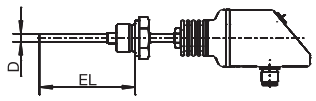
2.2.3 Accessories for basic type 902940/10

The following articles must be ordered separately and with costs:

Article	Part No.
Setup program on CD-ROM, multilingual	90/00550018
PC interface with USB/TTL converter and adapter (USB connection line) (required for the configuration with the setup program)	70/00456352
Connection line (Y cable) (required for the configuration with the setup program)	40/00507861
Combination tool (required for operation on the device and after installation to turn the display case through ± 160°to the LH or RH side)	40/00526614
Cable box, 4-pin (straight) M 12x1 with PVC connection line length 2000 mm (can be used for individual assembling)	40/00404585
Cable box, 4-pin (angled) M 12x1 with PVC connection line length 2000 mm (can be used for individual assembling)	40/00409334

2.3 Type description for basic type 902940/30

		(1)	**Basic type**
	902940/30		DELOS T Electronic temperature switch with display and analog output with neck pipe for higher medium temperatures Ambient temperature on the display case: -20 to +75 °C Parts coming into contact with the medium are electropolished, roughness depth Ra ≤ 0.8 µm
		(2)	**Version**
x	8		Standard, with factory settings
x	9		Customer-specific configuration (specifications in plain text)
		(3)	**Operating temperature in °C**
x	386		-50 to +260 °C
		(4)	**Measuring insert**
x	1013		1x Pt1000 in 4-wire circuit
		(5)	**Tolerance class as per DIN EN 60751**
x	2		Class A (standard)
x	3		Class AA (1/3 DIN B)
		(6)	**Output**
x	470		1x PNP switching output
x	471		2x PNP switching output
x	475		1x PNP switching output and 1x analog output 4 to 20 mA, configurable
x	476		1x PNP switching output and 1x analog output 0 to 20 mA, configurable
x	477		1x PNP switching output and 1x analog output 0 to 10 V, configurable
		(7)	**Sheath diameter D in mm**
x	6		∅ 6 mm
		(8)	**Fitting length EL in mm (EL 50 to 1000 mm)**
x	50		50 mm
x	100		100 mm
x	...		Please specify in plain text (50 mm steps)
		(9)	**Process connection PA**
x	000		None (plain sheath made of stainless steel 316L)
x	102		Screw connection G 1/4 (stainless steel 316Ti)
x	103		Screw connection G 3/8 (stainless steel 316Ti)
x	104		Screw connection G 1/2 (stainless steel 316Ti)
x	118		Screw connection M 12x1.5 (stainless steel 316Ti)
x	126		Screw connection M 18x1.5 (stainless steel 316Ti)
x	128		Screw connection M 20x1.5 (stainless steel 316Ti)
x	144		Screw connection 1/2-14NPT (stainless steel 316Ti)
x	163		Union nut G 3/8 (stainless steel 316Ti)
x	380		Screw connection G 1/2 with CIP-conforming sealing cone and EHEDG certificate (stainless steel 316L)
x	601		Conical port with union nut DN 10 DIN 11851 (milk pipe union) (stainless steel 316L)
x	604		Conical port with union nut DN 25 DIN 11851 (milk pipe union) (stainless steel 316L)



x	605	Conical port with union nut DN 32 DIN 11851 (milk pipe union) (stainless steel 316L)
x	611	Clamp DN 10/20 DIN 32676 (stainless steel 316L)
x	613	Clamp DN 25/40 (1“/1.5“) DIN 32676 (stainless steel 316L)
x	616	Clamp DN 50 (2“) DIN 32676 (stainless steel 316L)
x	617	Clamp 2.5“ similar to DIN 32676 (stainless steel 316L)
x	681	Spherical welding socket with clamp screw connection (stainless steel 316L)
x	682	Welding socket with CIP-conforming sealing cone (stainless steel 316L)
x	684	Varivent connection DN 15/10 with EHEDG certificate (stainless steel 316L)
x	685	Varivent connection DN 32/25 with EHEDG certificate (stainless steel 316L)
x	686	Varivent connection DN 50/40 with EHEDG certificate (stainless steel 316L)
x	840	Spherical welding sleeve (stainless steel 316Ti)
x	997	JUMO PEKA with EHEDG certificate (stainless steel 316L) (compatible process connection adapter, see data sheet 40.9711)

	(10)	**Extra codes**
x	000	None
x	310	Sheath ∅ 6 mm stepped down to ∅ 3.8 mm (fitting length EL max. 700 mm)
x	810	Welding socket (only for process connection 380)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)	
Order code		-		-		-		-		-		-		-		-		/		, ...[1]
Order example	902940/30	-	8	-	386	-	1013	-	2	-	475	-	6	-	50	-	102	/	000	

[1] State extra codes one after another, separated by commas.

2.3.1 Scope of delivery for basic type 902940/30

Our scope of delivery includes:

- 1 device in the version ordered
- 1 combination tool
  (required for operation on the device and to turn the display case through ± 160°)
- 1 operating instructions B 90.2940.0

In the event of questions, please contact your supplier.

2.3.2 Accessories, process connection for basic type 902940/30

The following articles must be ordered separately and with costs:

Article	Part No.
Pipe screw connection G 1/4 (stainless steel 316Ti) for sheath screw connections	90/00080811
Pipe screw connection G 1/2 (stainless steel 316Ti) for sheath screw connections	90/00305445

2.3.3 Accessories for basic type 902940/30

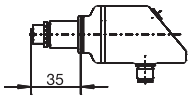
The following articles must be ordered separately and with costs:

Article	Part No.
Setup program on CD-ROM, multilingual	90/00550018
PC interface with USB/TTL converter and adapter (USB connection line) (required for the configuration with the setup program)	70/00456352
Connection line (Y cable) (required for the configuration with the setup program)	40/00507861
Combination tool (required for operation on the device and after installation to turn the display case through ± 160° to the LH or RH side)	40/00526614
Cable box, 4-pin (straight) M 12x1 with PVC connection line length 2000 mm (can be used for individual assembling)	40/00404585
Cable box, 4-pin (angled) M 12x1 with PVC connection line length 2000 mm (can be used for individual assembling)	40/00409334

2 Device identification

2.4 Type description for basic type 902940/50

		(1)	**Basic type**
	902940/50		DELOS T Electronic temperature switch with display and analog output and M 12x1 connection for RTD temperature probes Ambient temperature on the display case: -20 to +75 °C
		(2)	**Version**
x	8		Standard, with factory settings
x	9		Customer-specific configuration (specifications in plain text)
		(3)	**Operating temperature in °C**
x	408		-50 to +500 °C
		(4)	**Measuring input**
x	1013		1x Pt1000 in 4-wire circuit
		(5)	**Tolerance class as per DIN EN 60751**
x	0		None (not relevant)
		(6)	**Output**
x	470		1x PNP switching output
x	471		2x PNP switching output
x	475		1x PNP switching output and 1x analog output 4 to 20 mA, configurable
x	476		1x PNP switching output and 1x analog output 0 to 20 mA, configurable
x	477		1x PNP switching output and 1x analog output 0 to 10 V, configurable
		(7)	**Sheath diameter D in mm**
x	0		None (not relevant)
		(8)	**Fitting length EL in mm**
x	000		None (not relevant)
		(9)	**Process connection PA**
x	000		None (not relevant)
		(10)	**Extra codes**
x	000		None



	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)
Order code		-		-		-		-		-		-		-		-		/	
Order example	902940/50	-	8	-	408	-	1013	-	0	-	475	-	0	-	000	-	000	/	000

2.4.1 Scope of delivery for basic type 902940/50

Our scope of delivery includes:

- 1 device in the version ordered
- 1 combination tool
  (required for operation on the device and to turn the display case through ± 160°)
- 1 operating instructions B 90.2940.0

In the event of questions, please contact your supplier.

2.4.2 Accessories for basic type 902940/50

The following articles must be ordered separately and with costs:

Article	Part No.
Setup program on CD-ROM, multilingual	90/00550018
PC interface with USB/TTL converter and adapter (USB connection line) (required for the configuration with the setup program)	70/00456352
Connection line (Y cable) (required for the configuration with the setup program)	40/00507861
Combination tool (required for operation on the device and after installation to turn the display case through ± 160° to the LH or RH side)	40/00526614
Cable box, 4-pin (straight) M 12x1 with PVC connection line length 2000 mm (can be used for individual assembling)	40/00404585
Cable box, 4-pin (angled) M 12x1 with PVC connection line length 2000 mm (can be used for individual assembling)	40/00409334
Machine connector M 12x1, 4-pin as per IEC 60947-5-2	90/00404727
Wall holder for DELOS T with M 12x1 connector	90/00555129
Push-in RTD temperature probe with Pt1000 temperature probe and machine connector M 12x1 902150/99-386-1006-2-6-100-56-2500/315 Sheath diameter 6 mm, fitting length 100 mm, connection cable length 2500 mm	90/00551310
Push-in RTD temperature probe with Pt1000 temperature probe and machine connector M 12x1 902150/99-386-1006-2-6-200-56-2500/315 Sheath diameter 6 mm, fitting length 200 mm, connection cable length 2500 mm	90/00551311

2 Device identification

3.1 Installation notes

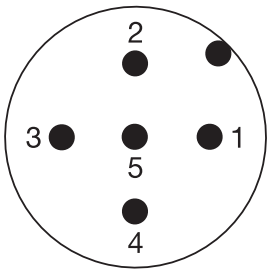
CAUTION!
The electrical connection must only be carried out by qualified personnel!

- Ensure that the fuses of the load circuits are suitable for the maximum loads to avoid damage to the device.
- The electromagnetic compatibility meets standard EN 61326.
- Do not connect any additional consumers to the voltage supply of the device.
- The device is not suitable for use in areas with an explosion hazard (Ex areas).
- In addition to a faulty installation, also incorrectly set values on the device could impair the orderly function of the following process or lead to damage. For this reason, always provide safety devices/guards independent of the device, the setting of which is restricted to expert personnel.

3.2 Device connection assignment for M 12x1 machine connector

The connection is located on the device rear!

TIP!
The assignment **only** applies to A-coded standard cables.

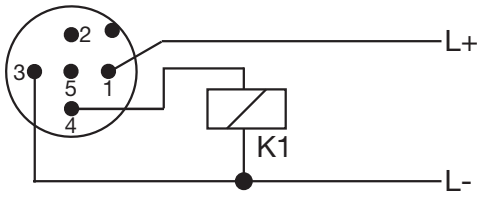
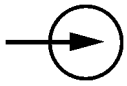
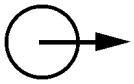


1	brown (bn)	2	white (wh)
3	blue (bu)	4	black (bk)
5	gray (gy)		

3 Electrical connection

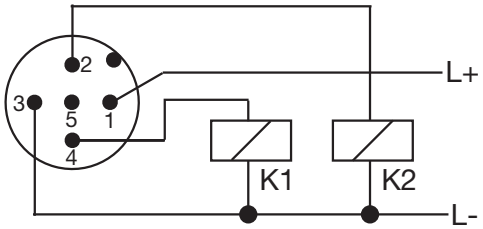
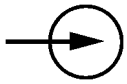
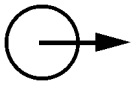
3.3 Connection assignment for order code 470

The connection is located on the device rear!

<table>
<tr><td colspan="2">1x PNP switching output
 
</td></tr>
<tr><td>Voltage supply</td><td>  </td></tr>
<tr><td>1 L+</td><td>DC 14 to 30 V</td></tr>
<tr><td>3 L-</td><td>GND</td></tr>
<tr><td>Output</td><td>  </td></tr>
<tr><td>4 K1</td><td>Highside open collector
max. 0.25 A</td></tr>
<tr><td>2</td><td>nc</td></tr>
<tr><td>5</td><td>Interface</td></tr>
</table>

3.4 Connection assignment for order code 471

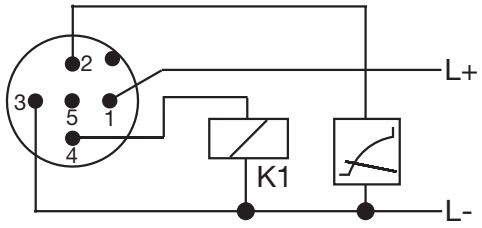
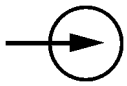
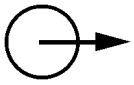
The connection is located on the device rear!

<table>
<tr><td colspan="2">2× PNP switching output
 
</td></tr>
<tr><td>Voltage supply</td><td>  </td></tr>
<tr><td>1 L+</td><td>DC 14 to 30 V</td></tr>
<tr><td>3 L-</td><td>GND</td></tr>
<tr><td>Output</td><td>  </td></tr>
<tr><td>4 K1</td><td rowspan="2">Highside open collector
max. 0.25 A</td></tr>
<tr><td>2 K2</td></tr>
<tr><td>5</td><td>Interface</td></tr>
</table>

3 Electrical connection

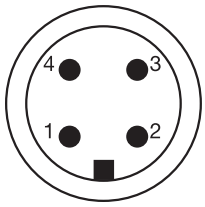
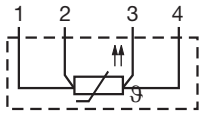
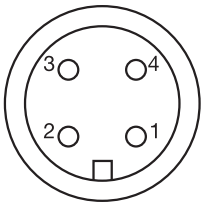
3.5 Connection assignment for order code 475, 476 and 477

The connection is located on the device rear!

<table>
<tr><td colspan="2">1x PNP switching output and 1x analog output
 
</td></tr>
<tr><td>Voltage supply</td><td>  </td></tr>
<tr><td>1 L+</td><td>DC 14 to 30 V</td></tr>
<tr><td>3 L-</td><td>GND</td></tr>
<tr><td>Output</td><td>  </td></tr>
<tr><td>4 K1</td><td>Highside open collector
max. 0.25 A</td></tr>
<tr><td>2 analog</td><td>0(4) to 20 mA/0 to 10 V</td></tr>
<tr><td>5</td><td>Interface</td></tr>
</table>

3.6 Connection assignment for RTD temperature probe for basic type 902940/50

TIP!
Please ensure that this connection is not mixed up with the connection on the device rear (only for analog or switching output, voltage supply and interface)!

Machine connector M 12x1, 4-pole as per IEC 60947-5-2 Top view to the machine connector on the corresponding RTD temperature probe!  	**Connection assignment for RTD temperature probe in 4-wire circuit (input)** 
Top view to the installed socket at the device bottom!  	

3 Electrical connection

4.1 General information

CAUTION!
Check that the device is compatible with the medium to be measured.

Installation site

- Ensure that the device is easily accessible for the later operation.
- Ensure that the device is fastened safely and with low vibrations.
- Avoid direct sun radiation!
- Ensure an admissible ambient temperature at the installation site.

Installation position

The device can be installed in any position.
We recommend the "vertical" installation position.

4.1.1 Turning the LCD display

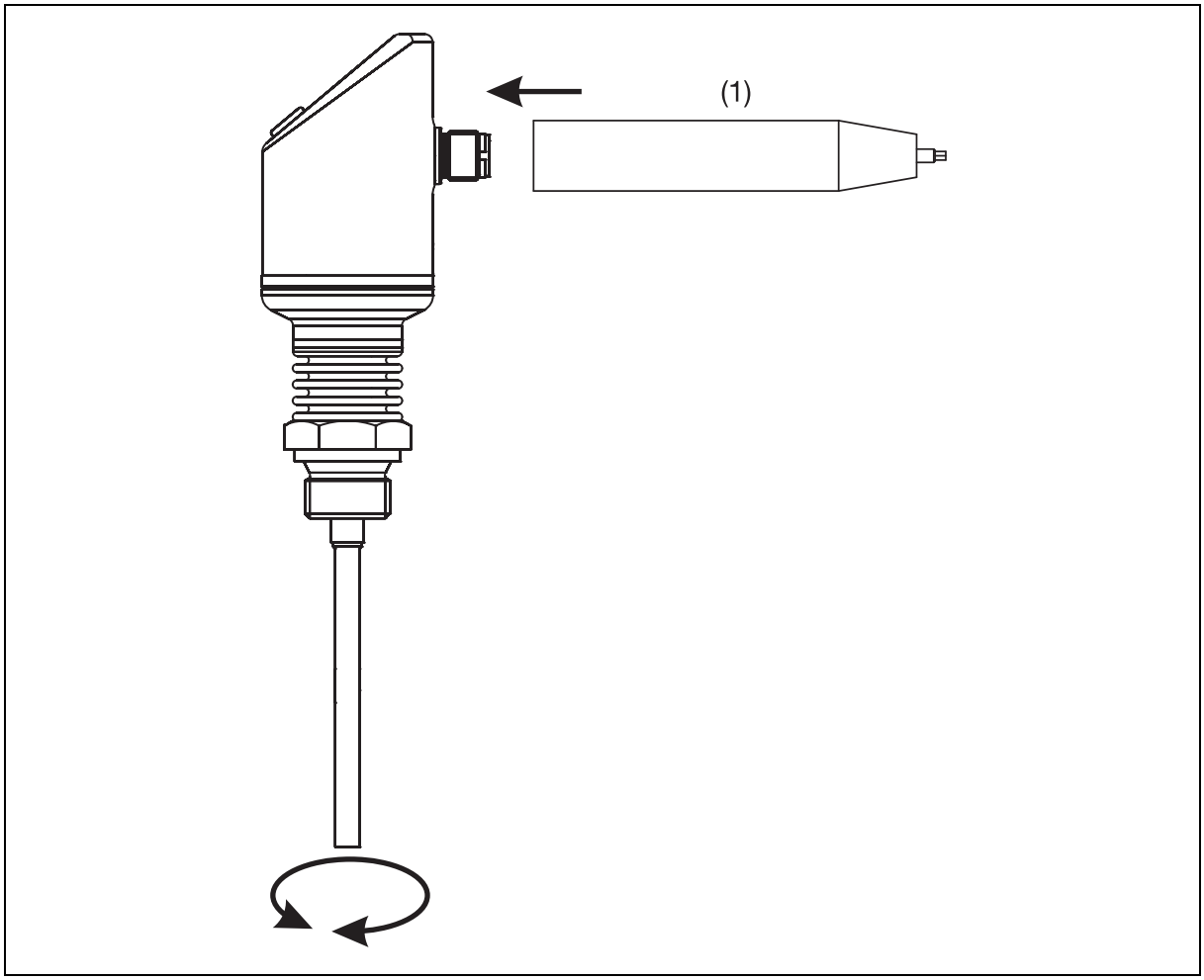
The device LCD display can be turned through 180°. (Either via the setting on the device or the optional setup program).

This will facilitate reading when, for example, the device is installed turned through 180°.

⇨ Chapter 6.17 "Setting the display alignment (D.Dir)", page 63

4.1.2 Turning the display case

The display case of the device can be turned to the LH or RH side through ±160° using the supplied combination tool (1).



(1) Combination tool

4.2 Device dimensions

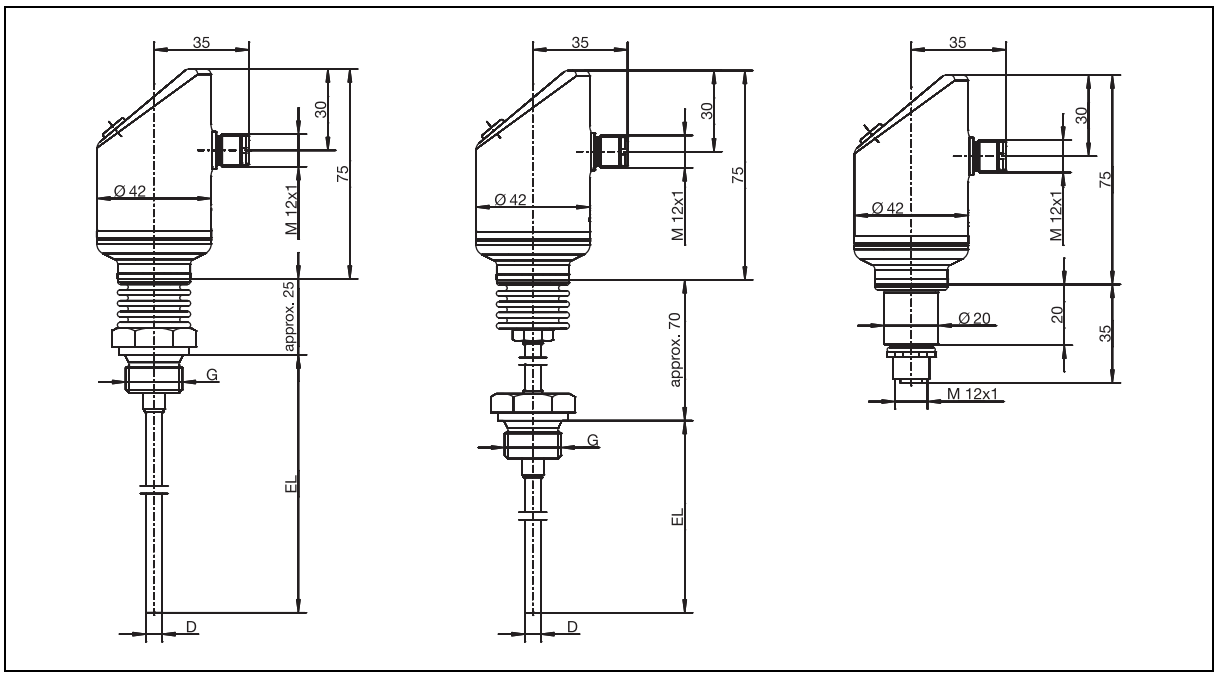
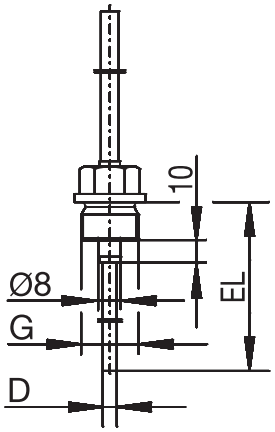


Figure 1: Basic type 902940/10 with process connection (LH)
Basic type 902940/30 with neck pipe and process connection (center)
Basic type 902940/50 with M 12x1 connection for RTD temperature probe (RH)

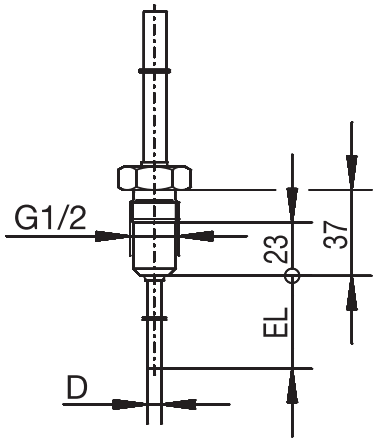
4.3 Process connection dimensions (PA)

Screw connection



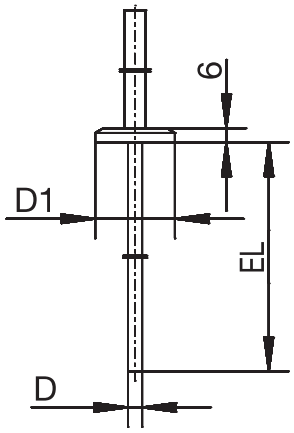
PA	G
103	3/8
104	1/2

Screw connection with CIP-conforming sealing cone



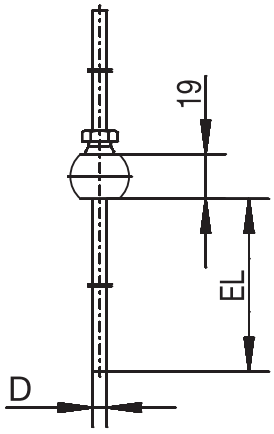
PA	
380	

Clamp as per DIN 32676



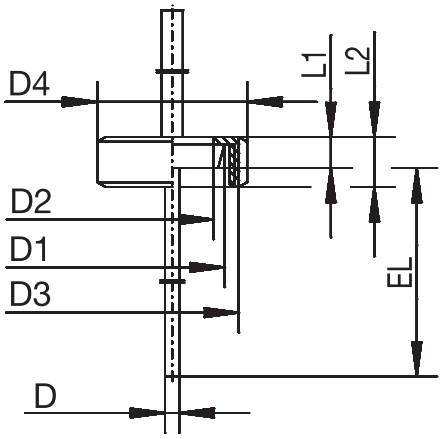
PA	DN	D1
-	-	∅ 25
611	10/20	∅ 34
613	25/1“	∅ 50.5
613	40/1.5“	∅ 50.5
616	50/2“	∅ 64
617	2.5“	∅ 77.5

Spherical welding socket with clamping screws



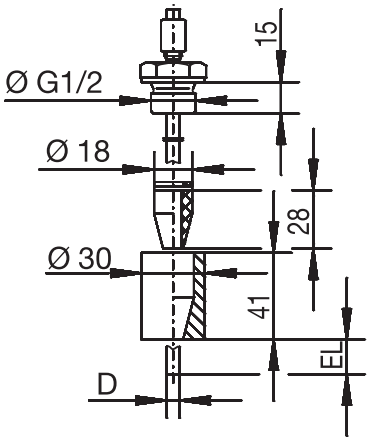
PA		
681		

Clamp with union nut as per DIN 11851 (milk pipe union)



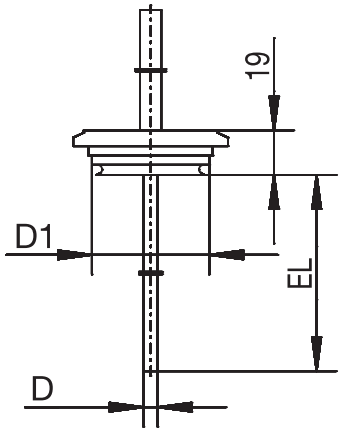
PA	DN	D1	D2	D3	D4	L1	L2
601	10	∅ 22	∅ 18	RD 28x1/8	∅ 38	9	18
604	25	∅ 44	∅ 35	RD 52x1/6	∅ 63	13	21
605	32	∅ 50	∅ 41	RD 58x1/6	∅ 70	13	21

Welding socket with CIP-conforming sealing cone

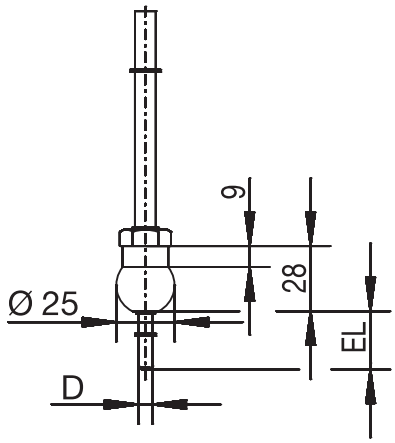
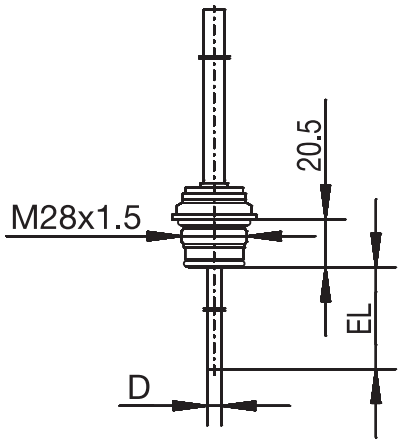


PA		
682		

Varivent connection



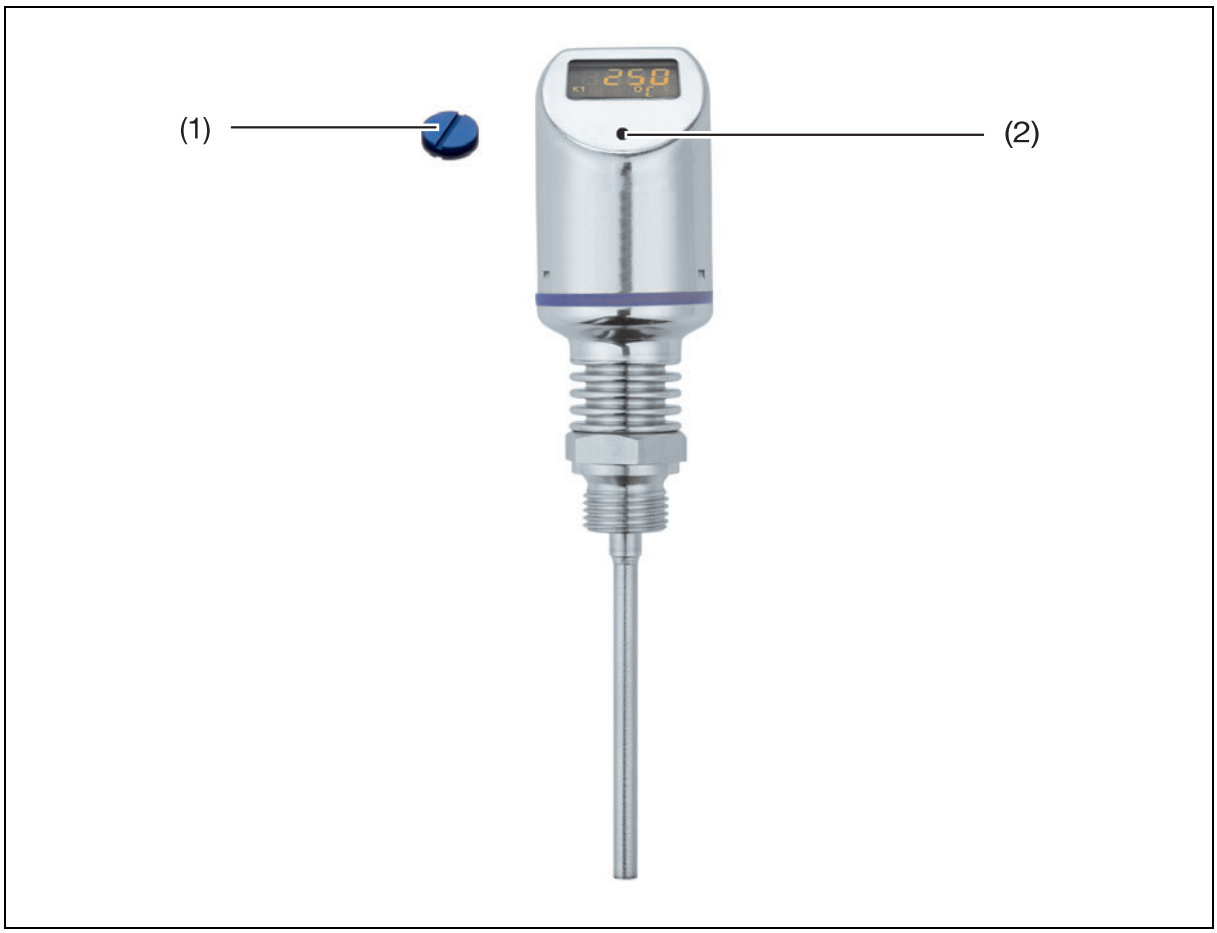
PA	DN	D1
684	15/10	∅ 31
685	32/25	∅ 50
686	50/40	∅ 68

Spherical welding socket	Process connection adapter 997 JUMO PEKA
	

PA			Varivent	Clamp	Aseptic	Welding socket
681			DN 25/32	DN 25/32/40	DN 40	∅ 55 mm
			DN 40-125	DN 50	DN 50	-
			-	-	NKS DN 40	-

TIP!
The 997 JUMO PEKA process connection adapter is EHEDG certified.
For detail information on this process connection adapter, refer to data and price sheet 40.9711.

5.1 Operating element



(1) Locking screw

(2) Operating element

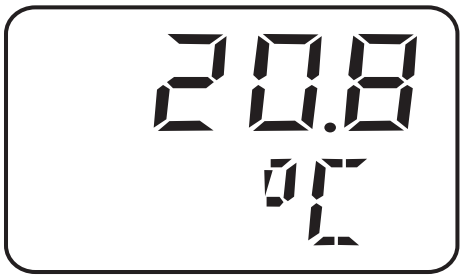
How to proceed:

Step	Activity
1	Remove the locking screw (1) using a suitable screwdriver.
2	Use the supplied combination tool (or a 0.5 x 3 mm screwdriver or Allen key, width across flats 2) to "Turn/press" the operating element (2).

5 Operation

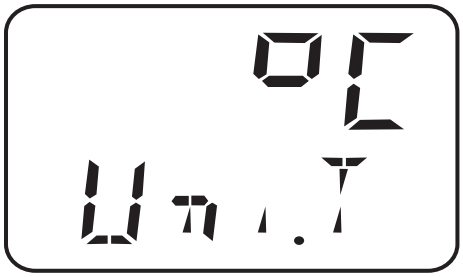
5.2 LCD display

5.2.1 Measuring mode (normal display)



Example:
The LCD display is lit yellow.

5.2.2 Setting mode



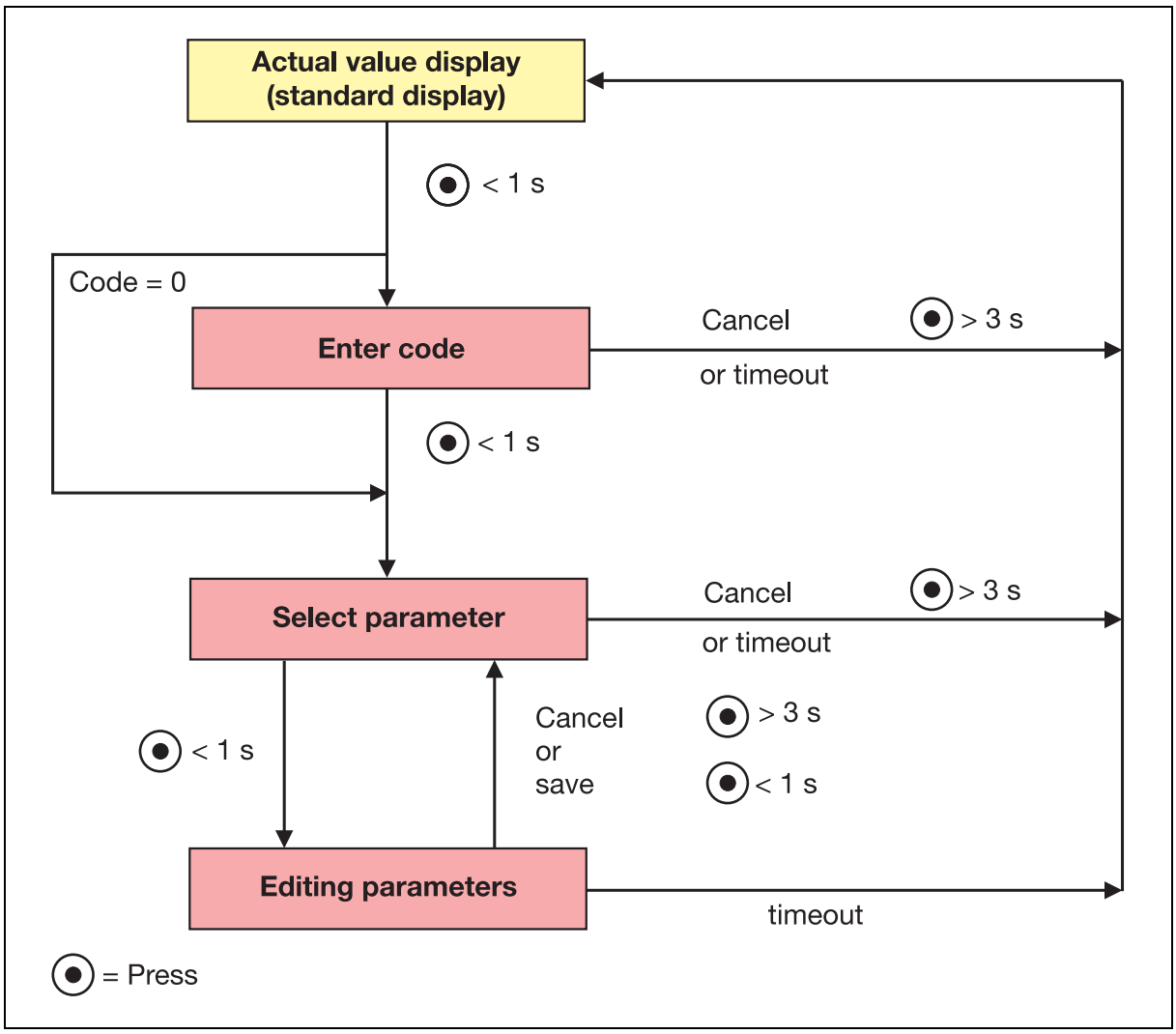
Example:
The LCD display is lit red.

Operation

Continue	Press the combination tool for less than 1 second (< 1 s)
Yes (take-over)	Press the combination tool for less than 1 second (< 1 s)
No (cancel)	Press the combination tool for more than 3 seconds (> 3 s)
Time out	no action for more than 60 seconds (> 60 s)

TIP!
To change over from the setting mode to the measuring mode:
- "No" (Cancel) or
- Wait for "Timeout" = No actions for 60 seconds.

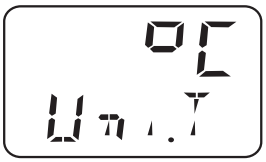
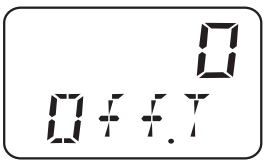
5.3 Levels


Actual value display
(standard display)
< 1 s
Code = 0
Enter code
Cancel
> 3 s
or timeout
< 1 s
Select parameter
Cancel
> 3 s
or timeout
< 1 s
Cancel
or
save
> 3 s
< 1 s
Editing parameters
timeout
= Press

5 Operation

5.4 Parameters

5.4.1 Input

Parameters	Display	Setting range[1]
Temperature unit		**°C** °F
Decimal place temperature values		**0** 1
Offset (zero point correction)		-100.0 to **0** to +100.0 °C
Damping (filter time constant)		0.00 to **0.10** to 99.99 s
Mains frequency (Hz)		**50 H** 60 H

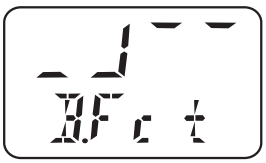
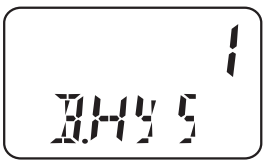
[1] The standard setting is displayed bold.

5.4.2 Analog output

Parameters	Display	Setting range[1]
Type of signal (only with analog output)		**4 to 20 mA** 0 to 20 mA 0 to 10 V
Scaling start (only with analog output)		**-50 °C**
Scaling end (only with analog output)		150 °C/260 °C/500 °C **Note:** Depending on the device ordered.
Error signal (only with analog output)		3.4 mA or 22 mA with output signal 4 ... 20 mA 0 mA or 22 mA with output signal 0 ... 20 mA 0 V or 10.7 V with output signal 0 ... 10 V ⇨ Chapter 6.10 "Setting the error signal of the analog output (S.Err)", page 53 **Note:** Depending on the configured output signal.

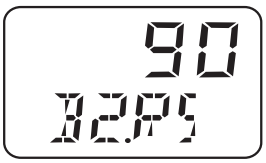
[1] The standard setting is displayed bold.

5.4.3 Binary output 1

Parameters	Display	Setting range[1]
Switching function		**= Hysteresis, N/O contact** = Hysteresis, N/C contact = Window, N/O contact = Window, N/C contact ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55
Switching point		100 °C ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55
Release point		90 °C ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55
Hysteresis (only with configured switching point and release point)		0 to **1** to 500 °C ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55 **Note:** Application exclusively with window switching functions.
Switch-on delay		**0.00** to 99.99 s ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55

[1] The standard setting is displayed bold.

5.4.4 Binary output 2

Parameters	Display	Setting range[1]
Switching function (only with second switching output)		**= Hysteresis, N/O contact** = Hysteresis, N/C contact = Window, N/O contact = Window, N/C contact ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55
Switching point (only with second switching output)		100 °C ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55
Release point (only with second switching output)		90 °C ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55
Hysteresis (only with second switching output and configured switching point and release point)		0 to **1** to 500 °C ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55 **Note:** Application exclusively with window switching functions.
Switch-on delay (only with second switching output)		**0.00** to 99.99 s ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55

[1] The standard setting is displayed bold.

5.4.5 Display and operation

Parameters	Display	Setting range[1]
Display alignment		**Std** = standard (for standard operation) turn = turned through 180° (for operation turned through 180°) ⇨ Chapter 6.17 "Setting the display alignment (D.Dir)", page 63
Unit of the actual value display (only with analog output)		**Uni.T** = Temperature unit (Uni.T) Proz = % from the scaled range (Sc.Lo and Sc.Hi) ⇨ Chapter 6.18 "Setting the display unit (D.Uni)", page 64
Software version of the operating unit (cannot be edited)		Display of the software version of the operating unit ⇨ Chapter 6.19 "Displaying the software version of the operating unit (SW.Di)", page 65
Software version of the signal unit (cannot be edited)		Display of the software version of the signal unit ⇨ Chapter 6.20 "Displaying the software version of the signal unit (SW.Si)", page 66
Code (can only be programmed via the setup program)		0000 to **0072** to 9999 ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42

[1] The standard setting is displayed bold.

6.1 Quick introduction

TIP!
This is a proposal to be able to configure the device reliably within a short time. When checking the setting possibilities specified in this list prior to starting configuration, timeouts can be avoided during configuration.

How to proceed:

Step	Activity
1	Install the device. ⇨ Chapter 4 "Installation", page 27
2	Connect the device. ⇨ Chapter 3 "Electrical connection", page 21
3	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
4	Select the unit of the measured value. ⇨ Chapter 6.4 "Setting the unit of the measured value (Uni.T)", page 44
5	Set the output signal. ⇨ Chapter 6.8 "Setting the output signal (S.Type)", page 47
6	Set the output signal scaling. ⇨ Chapter 6.9 "Setting the output signal scaling", page 48
7	Set the switching function. ⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55
8	Set the switching point. ⇨ Chapter 6.13 "Setting the switching point (B.Sp)", page 59
9	Set the release point. ⇨ Chapter 6.14 "Setting the release point (B.RSp)", page 60

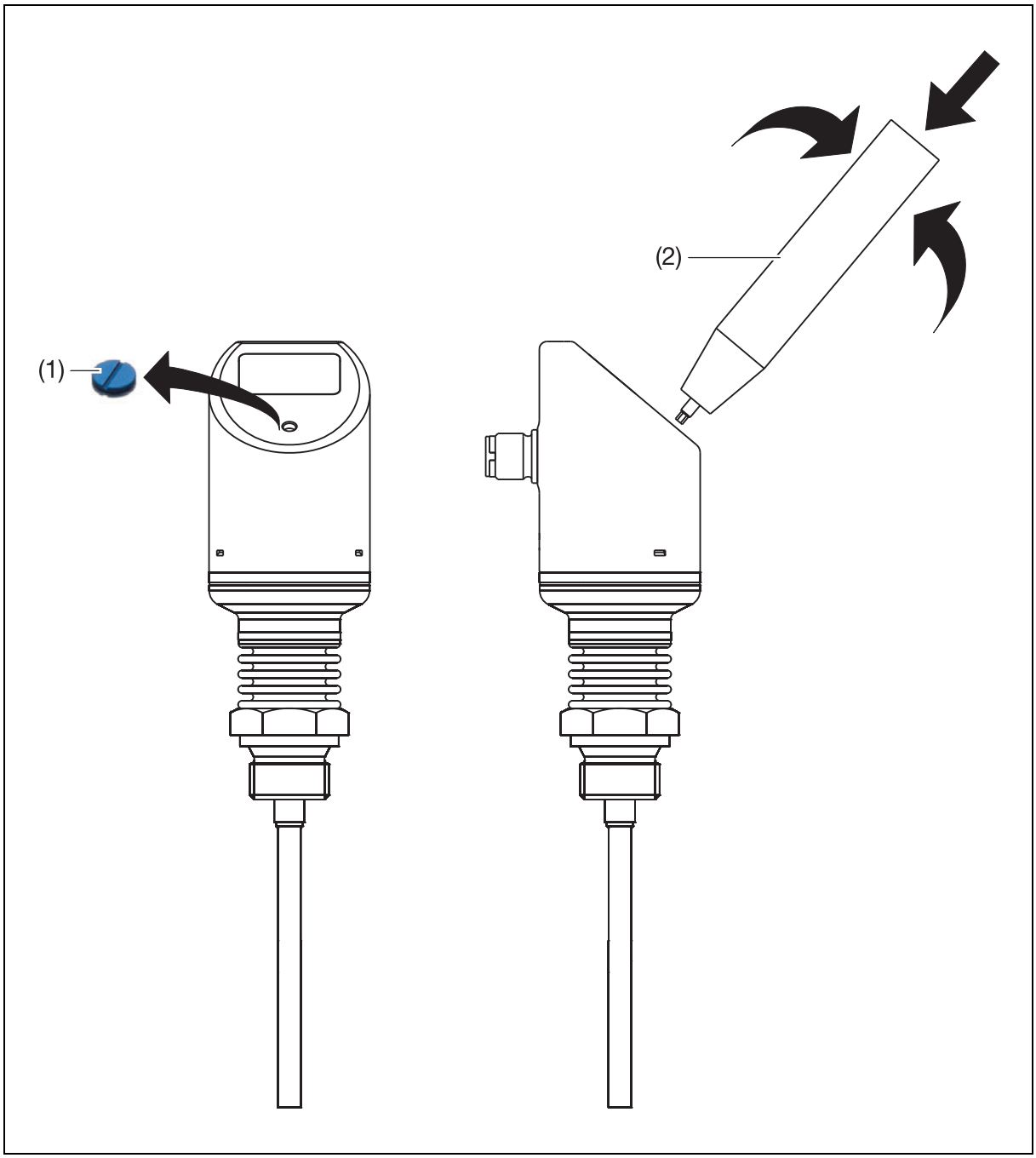
6 Commissioning/start-up

6.2 Unlocking the device (enter the code).

The device is protected against unauthorized operation by a code.

Code is set to 0072 (factory setting). Changes are only possible with the setup program. The device will become unprotected when the setup program is used to set the code to 0000.

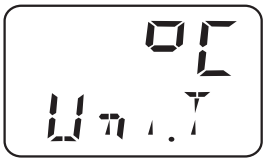
Unlocking



(1) Locking screw

(2) Combination tool

How to proceed:

Step	Activity
1	Remove the locking screw (1) using a suitable screwdriver.
2	Briefly press the combination tool (2) until the third "0" (counted from the left) flashes. Display previously changes to "red".
3	Turn the combination tool until "7" appears. Briefly press the combination tool.
4	Briefly press the combination tool until the fourth "0" (counted from the left) flashes.
5	Turn the combination tool until "2" appears. Briefly press the combination tool. 
6	The device automatically changes over to the parameter level.  If an incorrect code was entered:  The display automatically changes over to the code entry after 3 seconds (or press the combination tool). Repeat steps 2 to 5.

6.3 Operation cancellation

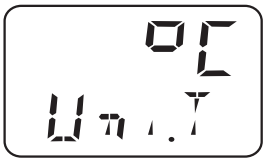
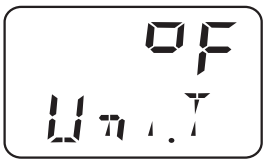
How to proceed:

Step	Activity
1	Press the combination tool for more than 3 seconds or
2	wait for "Timeout" (no action for more than 60 seconds).

6 Commissioning/start-up

6.4 Setting the unit of the measured value (Uni.T)

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "Uni.T" appears in the bottom line.
3	"Press"  flashing fixed The measured temperature is displayed in °C.
4	"Turn"  The measured temperature is displayed in °F. **Setting:** °C = Temperature unit °C (factory setting) °F = Temperature unit °F
5	Confirm the setting: "Press" until the display stops flashing.

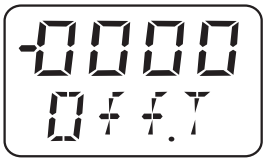
6.4.1 Display and setting possibilities of the device

Measuring range	Temperature unit	Display	
		Start	End
-50 to +150 °C	°C	-50	+150
-50 to +260 °C	°C	-50	+260
-50 to +500 °C	°C	-50	+500
-58 to +302 °F	°F	-58	+302
-58 to +500 °F	°F	-58	+500
-58 to +932 °F	°F	-58	+932

6.5 Setting the offset (zero point) (Off.T)

6.5.1 Edited offset setting

With this setting, the measured temperature can be increased by an adjustable value.
How to proceed:

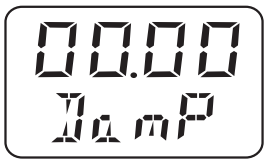
Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "Off.T" appears in the bottom line.
3	"Press"  flashing fixed

TIP!
"-" means: the offset is negative - the measured temperature is reduced.
The value is entered "digit-by-digit".

6.6 Setting the filter time constant (damping) (DamP)

The filter time constants (damping) can be used to "damp" the measured value.
Small filter time constant: the measured value is updated faster.
Large filter time constant: the measured value is updated slower.
The value is entered in seconds with two decimal places.

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "DamP" appears in the bottom line.
3	"Press" 

6.7 Setting the mains frequency (Freq)

This setting can be used to change the mains frequency from 50 Hz to 60 Hz.

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "Freq" appears in the bottom line.
3	"Press"  **Setting:** 50H = Mains frequency 50 Hz (factory setting) 60H = Mains frequency 60 Hz

6.8 Setting the output signal (S.Type)

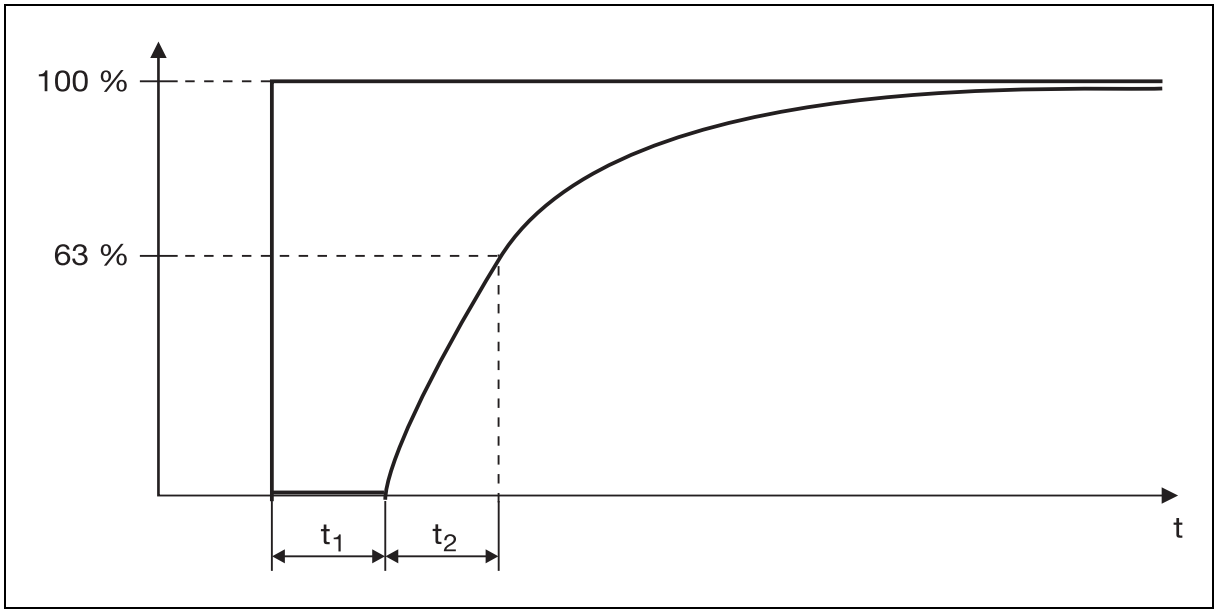
How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "S.Type" appears in the bottom line.
3	"Press"  **Setting:** 4.20A = Output signal 4 to 20 mA 0.20A = Output signal 0 to 20 mA 0.10U = Output signal 0 to 10 V

6.8.1 Output performance

The output signal behavior in the event of an abrupt change of the input signal is specified in the following table and the figure.

Output	Dead time t1	Time constant t2
Current output	< 200 ms at 50 Hz mains frequency < 320 ms at 60 Hz mains frequency	70 ms
Voltage output	< 200 ms at 50 Hz mains frequency < 320 ms at 60 Hz mains frequency	80 ms



6 Commissioning/start-up

6.9 Setting the output signal scaling

The output signal scaling describes how the measured temperature is "converted" to an output signal.

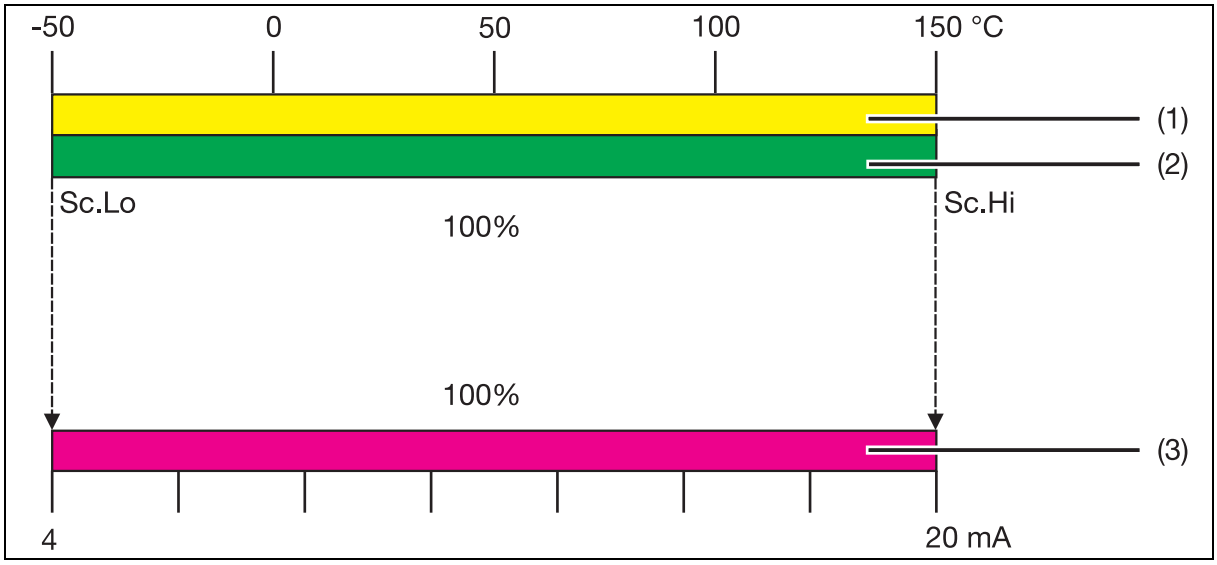
Simple example:

Actual

The device has a measuring range (1) from -50 to +150 °C and the output signal 4 to 20 mA (3).

Set point

The customer wants that the "Customer measuring range“ (2) -50 to +150 °C (100 % from the measuring range (1)) complies with the 4 to 20 mA (100 %) output signal (3).



(1) Measuring range

(2) Customer specific measuring range

(3) Output signal

Customer specific scaling

It is frequently desired that a part of the measuring range is scaled to the output signal.

Example:

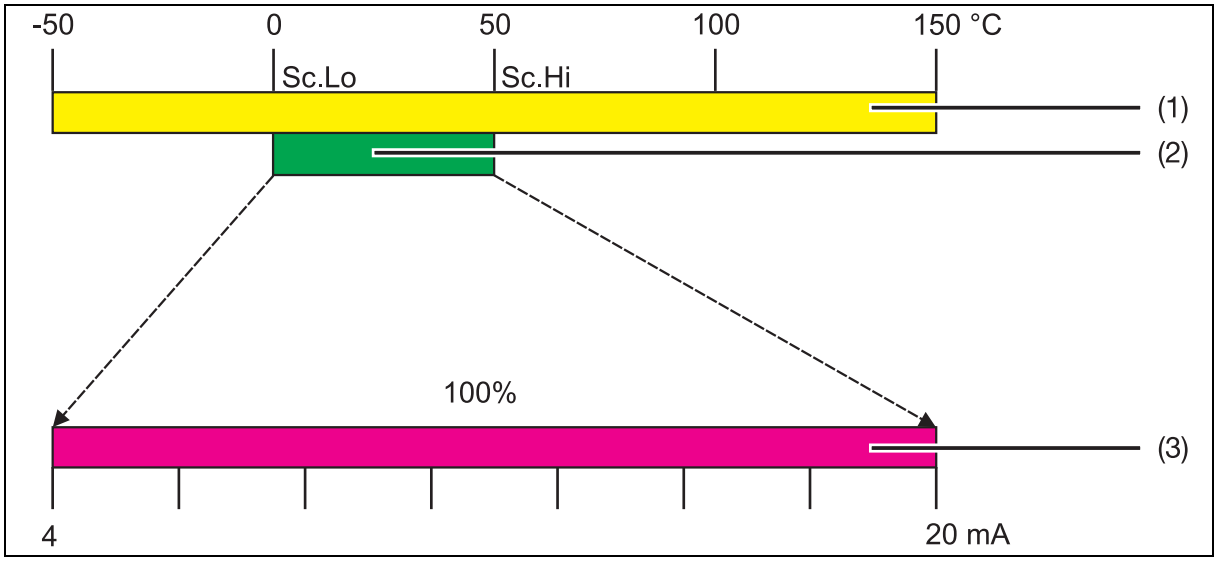
Actual

The device has a measuring range (1) from -50 to +150 °C and the output signal 4 to 20 mA (3).

Set point

The customer wants that the "Customer scaling range“ (2) 0 to 50 °C (25 % from the measuring range (1)) complies with the 4 to 20 mA (100 %) output signal.

Scaling is 1 : 4 (25 % : 100 %).



(1) Measuring range

(2) Customer scaling range

(3) Output signal

Inverting the output signal

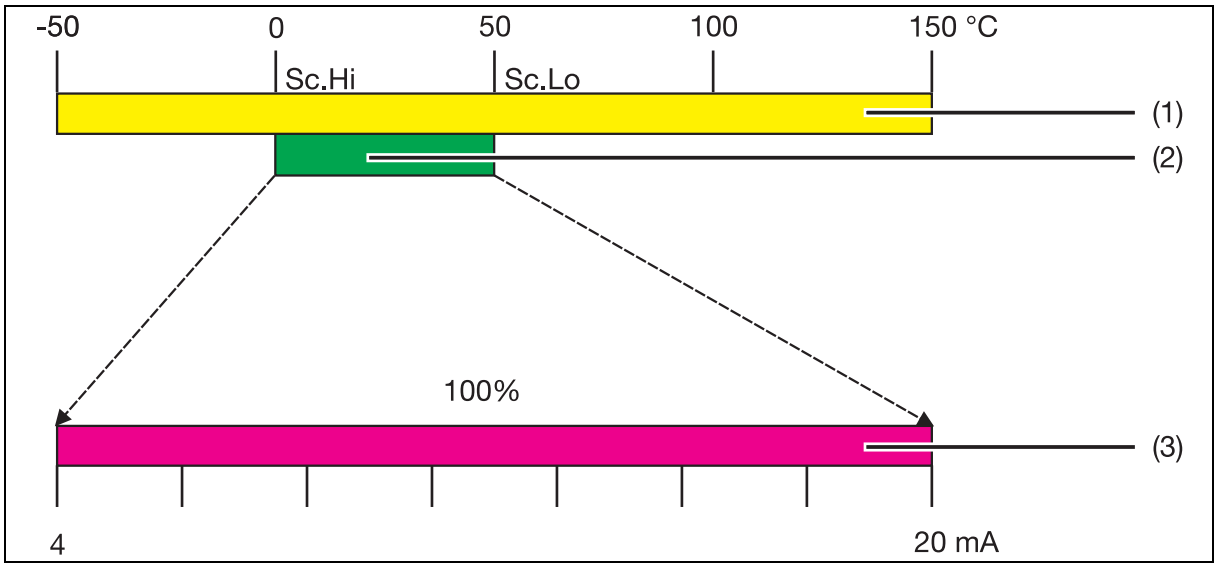
The device offers the possibility to invert the output signal (3).

During this process the output signal

- 0 to 20 mA is inverted to the output signal 20 to 0 mA
- 4 to 20 mA is inverted to the output signal 20 to 4 mA
- 0 to 10 V is inverted to the output signal 10 to 0 V

Example:

20 to 4 mA



(1) Measuring range

(2) Customer scaling range

(3) Output signal

6.9.1 Setting the scaling start value (Sc.Lo)

TIP!
The output signal can only be scaled on devices with analog output.

Setting range:	Measuring range
Factory-setting:	Measuring range start

Example:
The device has a measuring range from -50 to +150 °C.
The device output signal is 0 to 20 mA.

Objective:	The range from 0 to 100 °C (customer scaling) is to be displayed on the output side by 0 to 20 mA.
Setting:	Scaling start value (Sc.Lo) = 0 Scaling end value (Sc.Hi) = 100
Result:	At a temperature below 0 °C, the device indicates an error (measuring range gone below) and provides the respective error signal (0 mA) on the analog output. At a temperature of 0 °C, the device provides 0 mA on the analog output. At a temperature of 100 °C, the device provides 20 mA on the analog output. At a temperature exceeding 100 °C, the device indicates an error (measuring range exceeded) and provides the respective error signal (22 mA) on the analog output.

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "Sc.Lo" appears in the bottom line.
3	"Press"  "-" flashing fixed

TIP!
The value is entered "digit-by-digit"!

6.9.2 Setting the scaling end value (Sc.Hi)

TIP!
The output signal can only be scaled on devices with analog output.

Setting range:	Measuring range
Factory-setting:	Measuring range end

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "Sc.Hi" appears in the bottom line.
3	"Press"  "-" flashing fixed

TIP!
The value is entered "digit-by-digit"!

6.10 Setting the error signal of the analog output (S.Err)

TIP!
An error signal for overrange or underrange is only transmitted on devices with analog output.

In the event of errors (e.g. probe break or probe short-circuit), the analog output transmits the signal configured here.

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "S.Err" appears in the bottom line.
3	"Press" 

Setting:

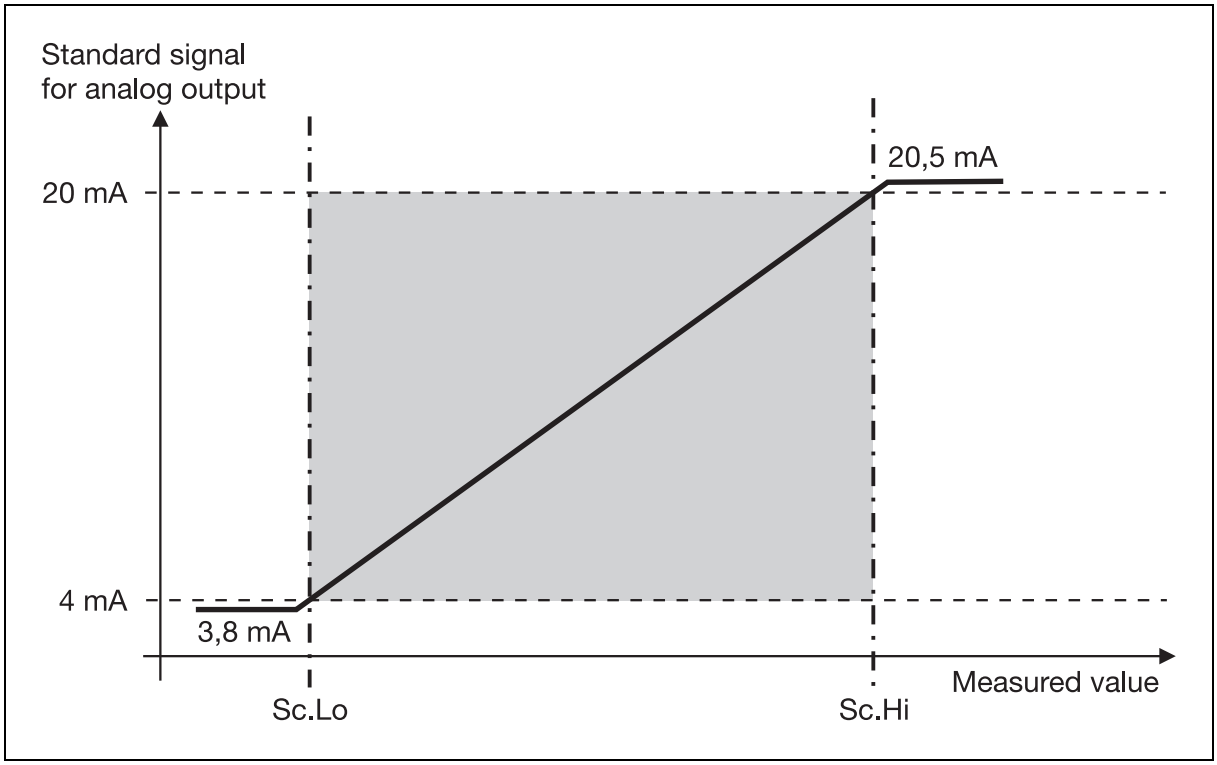
Type of signal	Setting
4 to20 mA	 = 3.4 mA  = 22 mA
0 to 20 mA	 = 0 mA  = 22 mA
0 to 10 V	 = 0 V  = 10.7 V

6.11 Behavior when the scaling range is exceeded

The standard signal range of the analog output is limited as per recommendation of Namur NE 43.

Type of signal	lower limit	upper limit
4 to 20 mA	3.8 mA	20.5 mA
0 to 20 mA	0 mA	20.5 mA
0 to 10 V	0 V	10.2 V

Example:
4 to 20 mA (factory setting)



6.12 Setting the switching function (B.Fct)

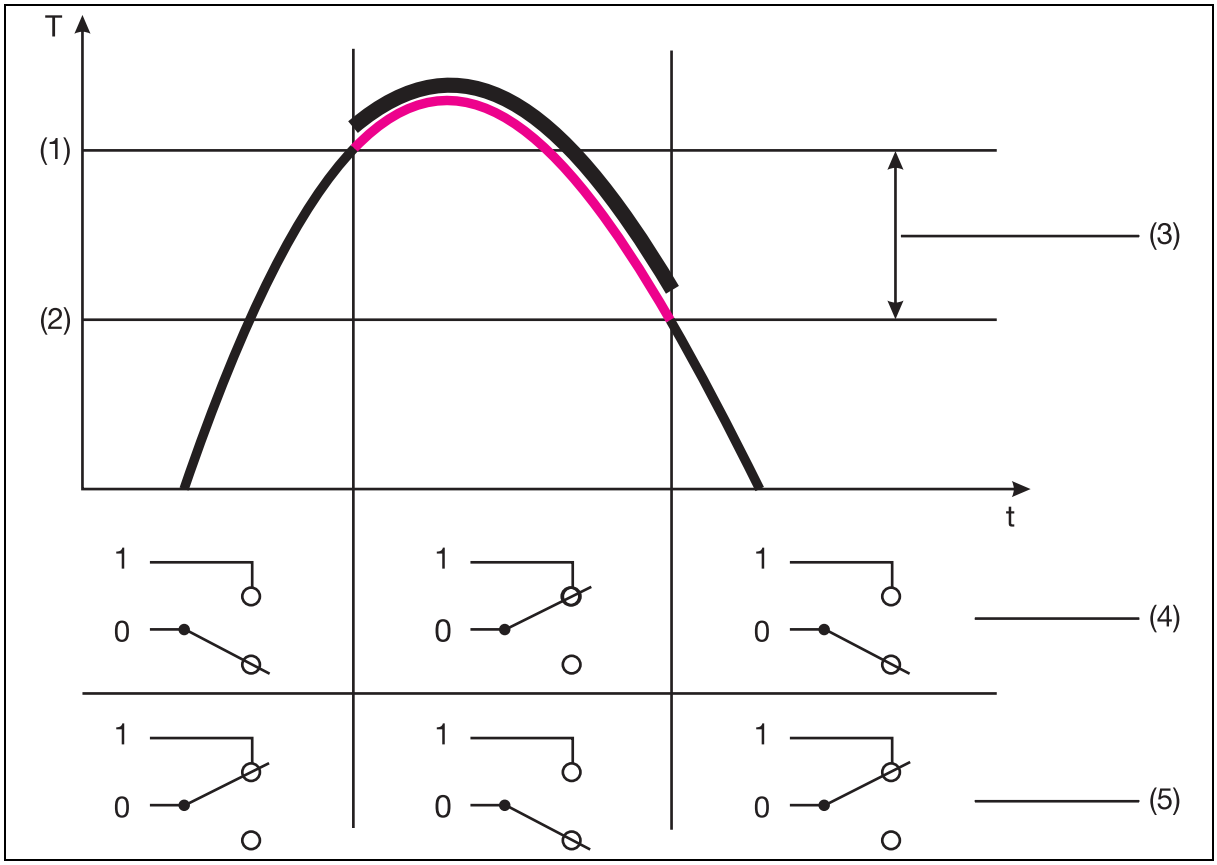
General information

The switching output behavior of the device can be set.

6.12.1 Hysteresis (switching difference)

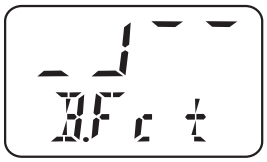
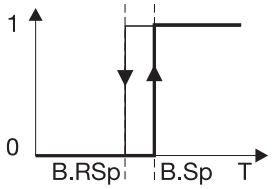
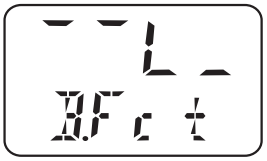
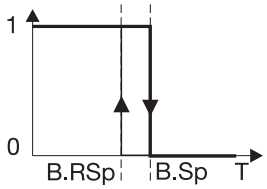
Relay behavior

- Hysteresis, N/O contact
- Hysteresis, N/C contact



(1) Switching point (Sp)
(2) Release point (RSp)
(3) Hysteresis (switching difference)
(4) N/O contact
(5) N/C contact

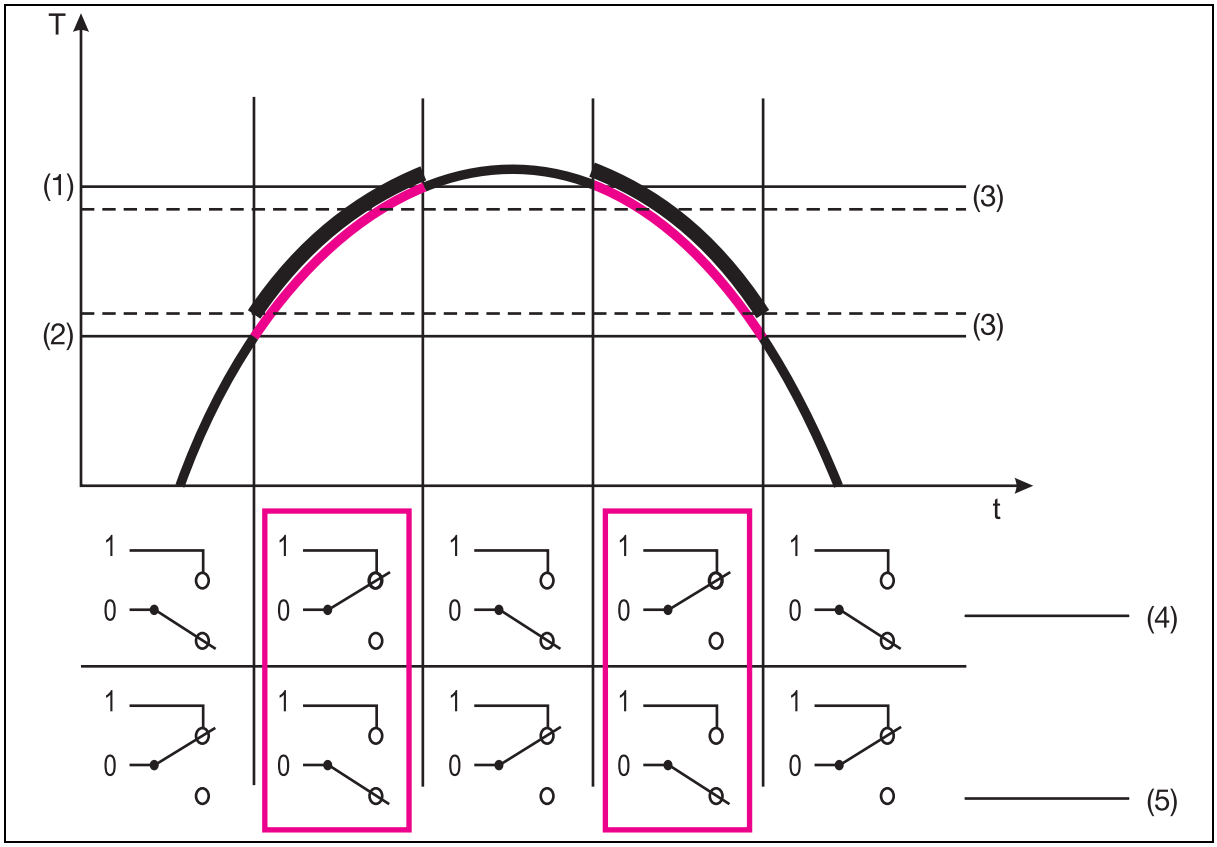
How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "B.Fct" appears in the bottom line.
3	"Press"   Hysteresis N/O contact = Max. contact (factory setting)   Hysteresis, N/C contact = Min. contact

6.12.2 window

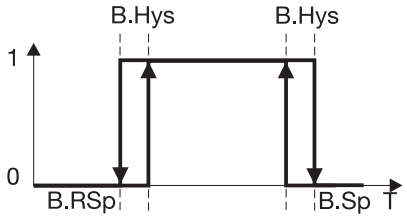
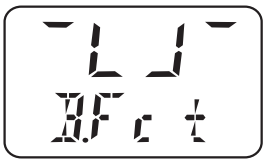
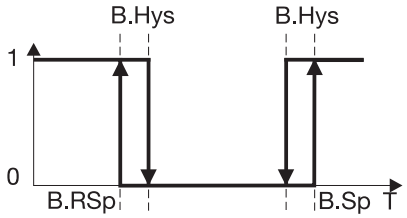
Relay behavior

- Window function, N/O contact
- Window function, N/C contact



(1) Switching point (Sp)
(2) Release point (RSp)
(3) Hysteresis (switching difference)
(4) N/O contact
(5) N/C contact

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "B.Fct" appears in the bottom line.
3	"Press"   Window function, N/O contact   Window function, N/C contact

6.13 Setting the switching point (B.Sp)

⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55

Setting range:	Measuring range (> B.RSp)
Factory-setting:	100 °C

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "B.Sp" appears in the bottom line.
3	"Press" 

TIP!
The value is entered "digit-by-digit“!

6.14 Setting the release point (B.RSp)

⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55

Setting range:	Measuring range (> B.Sp)
Factory-setting:	90 °C

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "B.RSp" appears in the bottom line.
3	"Press" 

TIP!
The value is entered "digit-by-digit“!

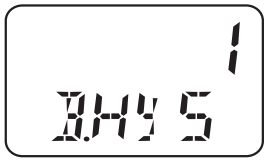
6.15 Setting the hysteresis (B.HyS)

TIP!
Only with the window switching function.

⇨ Chapter 6.12 "Setting the switching function (B.Fct)", page 55

Setting range:	0 to 500 °C
Factory-setting:	1 °C

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "B.HyS" appears in the bottom line.
3	"Press" 

TIP!
The value is entered "digit-by-digit“!

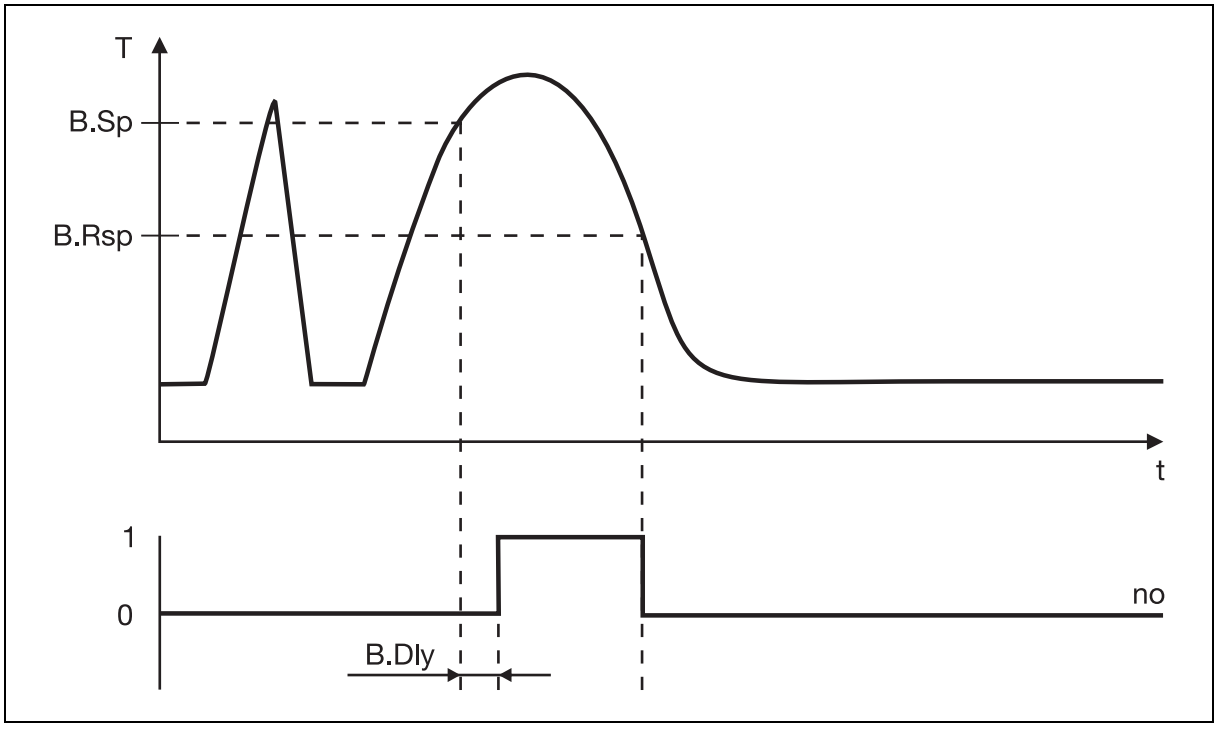
6.16 Setting the switch-on delay time (B.Dly)

Setting range:	0.00 to 99.99 s
Factory-setting:	0.00 s

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "B.Dly" appears in the bottom line.
3	"Press"  "-" flashing fixed

TIP!
The value is entered "digit-by-digit"!



6.17 Setting the display alignment (D.Dir)

Setting range:	Std = Standard = Device vertical
	turn = turned = Device turned through 180°
Factory-setting:	Std

How to proceed:

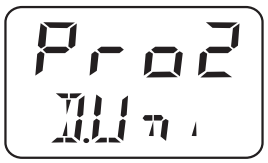
Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "D.Dir" appears in the bottom line.
3	"Press"  or 

6 Commissioning/start-up

6.18 Setting the display unit (D.Uni)

Setting range:	Uni.t = Temperature unit set as for "Uni.T" ⇨ Chapter 6.4 "Setting the unit of the measured value (Uni.T)", page 44 Pro2 = Percent of the scaled measuring range = "Sc.Hi" minus "Sc.Lo" ⇨ Chapter 6.9.1 "Setting the scaling start value (Sc.Lo)", page 51 and ⇨ Chapter 6.9.2 "Setting the scaling end value (Sc.Hi)", page 52
Factory-setting:	Uni.t

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "D.Uni" appears in the bottom line.
3	"Press"  Uni.t = The measured value is displayed in the selected unit. ⇨ Chapter 6.4 "Setting the unit of the measured value (Uni.T)", page 44 or  Pro2 = The measured value is displayed in percent of the scaling range. ⇨ Chapter 6.9.1 "Setting the scaling start value (Sc.Lo)", page 51 and ⇨ Chapter 6.9.2 "Setting the scaling end value (Sc.Hi)", page 52

Example:
The device scaling range was set to 0 to 150 °C.
When the device measures a temperature of 75 °C, 50 % is displayed.

6.19 Displaying the software version of the operating unit (SW.Di)

Setting range: Read only!

Factory-setting: -

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "SW.Di" appears in the bottom line.
3	 "alternating"

6.20 Displaying the software version of the signal unit (SW.Si)

Setting range:	Read only!
Factory-setting:	-

How to proceed:

Step	Activity
1	Unlock the device. ⇨ Chapter 6.2 "Unlocking the device (enter the code).", page 42
2	"Turn" until "SW.Si" appears in the bottom line.
3	 “alternating”

7.1 General information about the setup program

The setup program optionally available permits a comfortable and clearly structured setting of the large number of device parameters. Settings made once can be saved on a data carrier as a file and transmitted one to one to several devices.

Configurable parameters

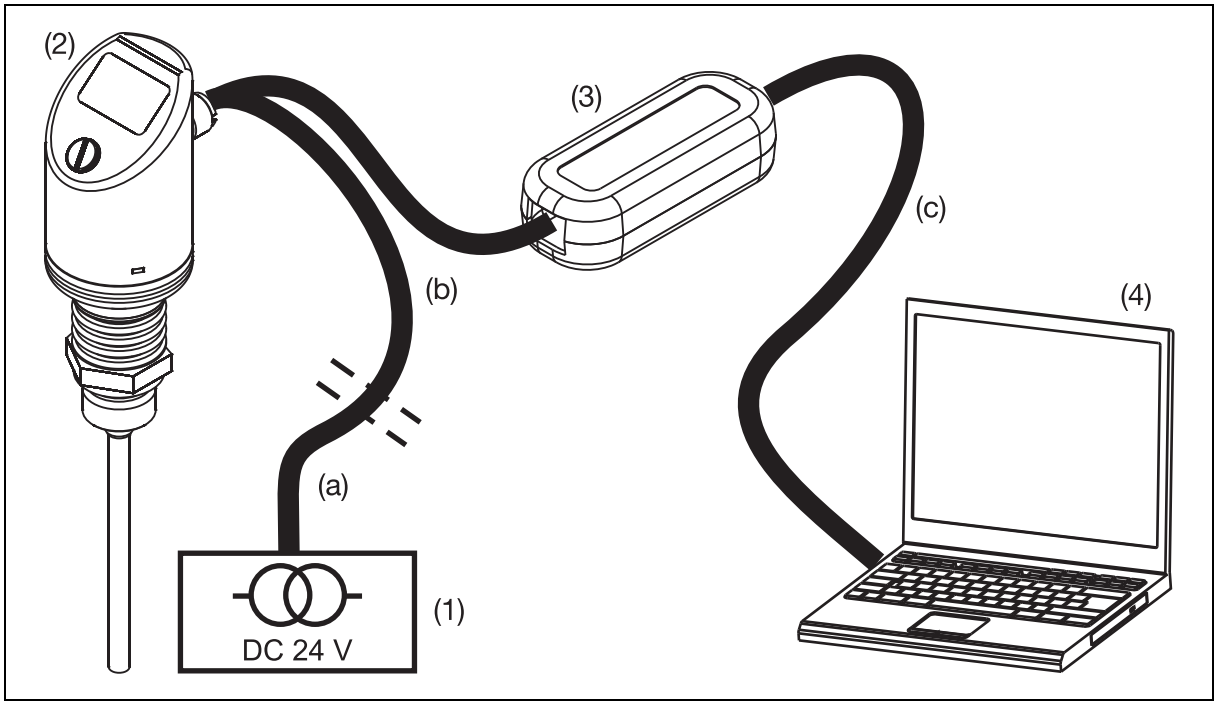
Depending on the device, it is possible to set, for example:

- Measuring range and range limits
- Output behavior in the event of an overrange or underrange
- Functions of the K1 and K2 switching outputs

TIP!
For configuration, the device must be connected to the power supply.

⇨ Chapter 3 "Electrical connection", page 21

Connection



(1) Rated voltage supply DC 24 V

(2) Device

(3) USB/TTL converter
included in VARTN 70/00456352

(4) Notebook/PC

(a) Cable box 4-pin (straight) M 12x1
with PVC connection cable length 2000 mm
VARTN 40/00404585 or
Cable box 4-pin (angled) M 12x1
with PVC connection cable length 2000 mm
VARTN 40/00409334

(b) Connection cable (Y cable)
VARTN 70/00507861

(c) PC interface cable (gray)
Part of (3)

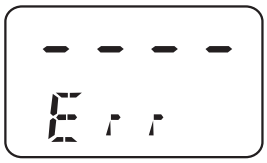
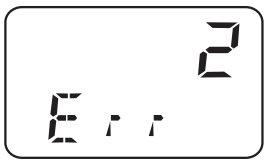
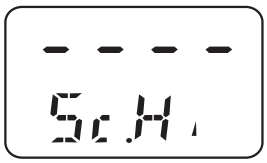
7 Setup program

How to proceed:

Step	Activity
1	Install the setup program on the notebook/PC.
2	Screw-fit the connection cable (b) to the connector of the device (2).
3	Connect the USB/TTL converter (3) to the connection cable (b) and PC interface cable (gray) (c).
4	Connect the PC interface cable (gray) (c) to the notebook/PC.
5	Connect the cable box to the rated voltage supply (1) and the connection cable (b) using the PVC connection cable (a).

TIP!
During installation, the driver for the USB/TTL converter is also installed on the notebook/PC.

8.1 Possible errors

Display	Possible causes	Measure
	• Overrange or underrange • Probe break	Check temperature and/or probe.
	Device error • 1 = Internal communication error • 2 = Error, analog output • 3 = Short circuit, switching output 1 • 4 = Short circuit, switching output 2 • 5 = VCC 8 V outside the working range • 6 ... 8 = Internal communication error • 9 = Invalid configuration	1, 6, 7, 8: Contact the service. 2: Check ambient temperature. Check output for cable break. Output load too high (for current output) or too low (for voltage output). 3, 4: Check the switching output. 5: Check voltage supply. 9: Check the configuration.
	Display overrun: Upper display: „- - - -“ Bottom display: Parameter name Value is smaller than -9999 or exceeds +9999.	Check switching output. Check voltage supply.

8 Overcoming errors and malfunctions

9.1 Technical data

Electrical connection	Machine connector M 12x1, 4-pin as per IEC 60947-5-2
Process connections	Screw connection G 1/4, G 3/8 and G 1/2 Screw connection M 12x1.5; M 18x1.5 and M 20x1.5 Screw connection 1/2-14NPT Union nut G 3/8 Pipe screw connection G 1/4 and G 1/2 Screw connection G 1/2 with CIP-conforming sealing cone and EHEDG certificate Conical port with union nut (milk pipe union) Clamp Spherical welding socket with clamp screw connection Welding socket with CIP-conforming sealing cone Varivent connections with EHEDG certificate JUMO PEKA with EHEDG certificate
Sheath	Stainless steel 316 L Material No. 1.4404/1.4435 Stainless steel 316 Ti Material No. 1.4571
Protection rating	IP65 as per DIN EN 60529 with the machine connector inserted
Response time	$t_{0.5}$: 3 s in water 0.4 m/s $t_{0.9}$: 8 s in water 0.4 m/s
Measuring insert	Pt1000 temperature probe, DIN EN 60751, class A or AA (1/3 DIN B), 4-wire circuit

9.1.1 General information

Reference conditions	DIN 16086 and DIN EN 60770
Display	positively lit LCD display
Alignment	The display can be mirror-imaged by 180° using the setup program
	after installation, the display case can be swivelled to the LH or RH side by ± 160° (use the combination tool)
Size	Display 16 x 26 mm / font size 7 mm / 2x 4-digit
Color	Standard operation: amber
	Error: red (text "Err", error code 1 to 9 flashes)
	Setup interface occupied: red
Switching status display	K1, K2
Temperature unit	°C or °F
Operation	
on the device	with the rev transmitter beneath the locking screw with combination tool or screwdriver 0.5 x 3 mm or Allen key, width across flats 2
with PC	with the setup program with PC interface

9.1.2 Input

Measuring input	1x Pt1000 temperature probe, 4-wire circuit
Measuring range	Basic type 902940/10: -50 to +150 °C Basic type 902940/30: -50 to +260 °C Basic type 902940/50: -50 to +500 °C
Limit value deviation	0.15 + 0.002 x t, class A 0.10 + 0.017 x t, class AA (1/3 DIN B)

9 Supplement

9.1.3 Measuring circuit monitoring

Probe short-circuit, probe and cable break, measuring range gone below, measuring range exceeded	Analog output 0 to 20 mA, 0 mA or 22 mA configurable Analog output 4 to 20 mA, 3.4 mA or 22 mA configurable Analog output 0 to 10 V, 0 V or 10.7 V configurable Switching outputs, low Additional error message on the LCD display

9.1.4 Outputs

All analog outputs in 3-wire circuit/Open Collector, PNP switching output

Analog output	
can be freely configured	4 to 20 mA and 1x PNP switching output 0 to 20 mA and 1x PNP switching output 0 to 10 V and 1x PNP switching output
Switching output	
Number	1x PNP switching output 2x PNP switching output
Switching type	N/C / N/O
Switching function	Window / hysteresis
Switching capacity	
- Voltage drop from UB	PNP ≤ 2 V
- Contact rating	ON ≤ 250 mA/OFF ≤ 1 mA
- Switching cycles	> 10 million
Reaction time	at 50 Hz: ≤ 200 ms at 60 Hz: ≤ 320 ms
Short-circuit proof	Yes
Load check, current	
- Period duration	2 s; T_{ON} 40 ms
- Periodic protection circuitry for overcurrent	f = 0.5 Hz LCD display: Err3 switching output K1, Err4 switching output K2
Scaling range	
Analog output	Scaling can be freely selected within the measuring range
Behavior when the scaling range is gone below	Analog output 0 to 20 mA, linear drop to 0 mA Analog output 4 to 20 mA, linear drop to 3.8 mA Analog output 0 to 10 V, linear drop to 0 V
Behavior when the scaling range is exceeded	Analog output 0 to 20 mA, linear increase up to 20.5 mA Analog output 4 to 20 mA, linear increase up to 20.5 mA Analog output 0 to 10 V, linear increase up to 10.2 V
Switching output	
- Switching point	Measuring range (> Release point)
- Release point	Measuring range (< Switching point)
- Damping	0.00 to 99.99 s
- Switch-on delay	0.00 to 99.99 s
Apparent ohmic resistance	
4 to 20 mA	$R_l \geq (U_B - 6.5\ V)/0.022\ A$
0 to 20 mA	$R_l \geq (U_B - 6.5\ V)/0.022\ A$
0 to 10 V	R ≥ 10 kΩ

9.1.5 Ambient conditions

Admissible temperatures	
Ambient temperature, display case	-25 to +75 °C
Ambient temperature	-50 °C; restricted function only stationary use, risk of cable break, LCD display without function
Storage temperature	-40 to +85 °C
Admissible air humidity	
- during operation	100 % including condensation on the device outer case
- during storage	90 % without condensation
Admissible mechanical load	refering to basic type 902940/10 and 902940/30 with fitting length 100 mm
- Vibration resistance	10 g, 10 to 2000 Hz as per IEC 60068-2-6
- Shock resistance	50 g for 11 ms / 100 g for 1 ms as per IEC 60068-2-27
Electromagnetic compatibility	(only with 4-pin connection line and ground case)
- emitted interference	Class A as per EN 61326
- interference resistance	Performance characteristic A as per EN 61326
Protection rating	IP65 as per DIN EN 60529
Ambient temperature error	≤ 0.05 %/K

9.1.6 Auxiliary energy

Voltage supply	DC 14 to 30 V (nominal voltage supply DC 24 V) Ripple: ensure that the voltage peaks do **not** exceed or go below the specified values
- for output 0(4) to 20 mA	DC 12 to 30 V
- for output 0 to 10 V	DC 14 to 30 V
Reverse voltage protection	Yes
Power consumption	≤ 45 mA without load, ≤ 545 mA with 2x PNP switching output
Electrical connection	Machine connector M 12x1, 4-pin as per IEC 60947-5-2, A-coded
Circuit	SELV
Influence of the voltage supply	≤ 0.02 %/V deviation from DC 24 V

9.1.7 Approval/approval marks

Approval marks	Inspection authority	Certificate/ Inspection number	Inspection basics	valid for
EHEDG	TUM MAK	No. 03/2006	Document No. 8	Process connection 997 JUMO PEKA
EHEDG	TNO	No. C03-5145	Document No. 8	380 Varivent process connection

9 Supplement

JUMO GmbH & Co. KG
Street address:
Moritz-Juchheim-Straße 1
36039 Fulda, Germany
Delivery address:
Mackenrodtstraße 14
36039 Fulda, Germany
Postal address:
36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
e-mail: mail@jumo.net
Internet: www.jumo.net

JUMO Instrument Co. Ltd.
JUMO House
Temple Bank, Riverway
Harlow, Essex CM20 2DY, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.
8 Technology Boulevard
Canastota, NY 13032, USA
Phone: 315-697-JUMO
1-800-554-JUMO
Fax: 315-697-5867
e-mail: info@jumo.us
Internet: www.jumo.us