JUMO dTRANS T07

Two-channel temperature transmitter with HART®/Ex/SIL for installation in terminal head, B form, and for mounting on DIN rails

Operating Manual

70708000T90Z001K000

V6.00/EN/00681617/2023-05-23

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1 Important information about this document

1.1 How this document works and how to use it

1.1.1 How this document works

These instructions contain information that is required in the various phases of the device's lifecycle: from product identification, product acceptance and storage to mounting, connection, basic operation, and startup, through to troubleshooting, maintenance and disposal.

1.1.2 Safety information

When using the device in potentially explosive areas, you must adhere to any relevant national standards. A separate Ex safety manual has been created for measuring systems that are used in potentially explosive areas; this safety manual forms an integral component of this operating manual. The installation regulations, connection values and safety information contained in this manual must also be observed at all times. Always make sure you are using the Ex safety manual that corresponds to your Ex-approved device. The number for the corresponding Ex safety manual can be found on the nameplate. You can only use an Ex safety manual when both numbers (on the Ex safety manual and on the nameplate) match completely.

1.1.3 Functional safety

NOTE!

Observe the SIL safety manual when using approved devices in safety-related systems according to IEC 61508.

1.2 Symbols

1.2.1 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.

CAUTION!

This symbol 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.

1.2.2 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.

1.3 Other applicable device documentation

Document	Purpose and content of the document
Data sheet 707080 JUMO dTRANS T07	**Planning aid for the device** The document provides all technical data related to the device and an overview of all accessories that can be ordered for the device.
Quick start guide JUMO dTRANS T07	**Quick approach to setting up your first measured value** These instructions contain all the important information needed from goods acceptance to initial startup.
Safety Manual SIL JUMO dTRANS T07	This manual for functional safety according to IEC 61508:2010 describes deviating requirements for device installation, startup, and operation of the safety function.
Safety Manual Ex JUMO dTRANS T07	Safety information and technical data for electrical equipment for potentially explosive areas according to Directive 2014/34/EU (ATEX).

NOTE!

The documents listed are available:
At www.jumo.net, under "Documentation" on the product page for the dTRANS T07.

1.4 Registered trademarks

HART® Trademark registered to the FieldComm Group™

2 Basic safety information

2.1 Requirements for personnel

Staff involved in installation, startup, diagnosis, and maintenance must meet the following criteria:

- Qualified personnel: Hold qualifications for their function and area of work
- Have been authorized by the system operator
- Are familiar with local regulations
- Prior to starting work: Have read and understood the instructions in this manual and additional documentation, as well as any certificates (depending on the application)
- Follow instructions and note underlying conditions

Operating staff must meet the following criteria:

- Have been authorized by the system operator and have received instructions in line with the requirements of the task at hand
- Follow the instructions in this manual

2.2 Intended use

The dTRANS T07 series is a range of universal and configurable transmitters with either one or two sensor inputs for RTD temperature probes (RTD), thermocouples (TC), potentiometers, and voltage sensors.

The devices are available in two versions: for installation in a B-form terminal head according to DIN EN 50446 or for DIN-rail mounting according to IEC 60715 (TH35). Using a mounting element available as an accessory, the head transmitter can also be mounted to DIN rail.

The manufacturer is not liable for any damage resulting from improper use or failure to observe the intended use.

2.3 Operational safety

NOTE!

The device must be in good technical working order and safe for operation during use.
The operator is responsible for operating the device without disruptions.

Areas that require approval

To prevent any risk to persons or the plant when the device is used in areas subject to approval requirements (e.g., explosion protection or safety-related systems):

- Use the technical data on the nameplate to check whether the ordered device can be used for its intended purpose in the approval-relevant area; the nameplate is located on the side of the transmitter housing
- Observe any specifications in separate documentation that forms an integral part of these instructions

Fault safety

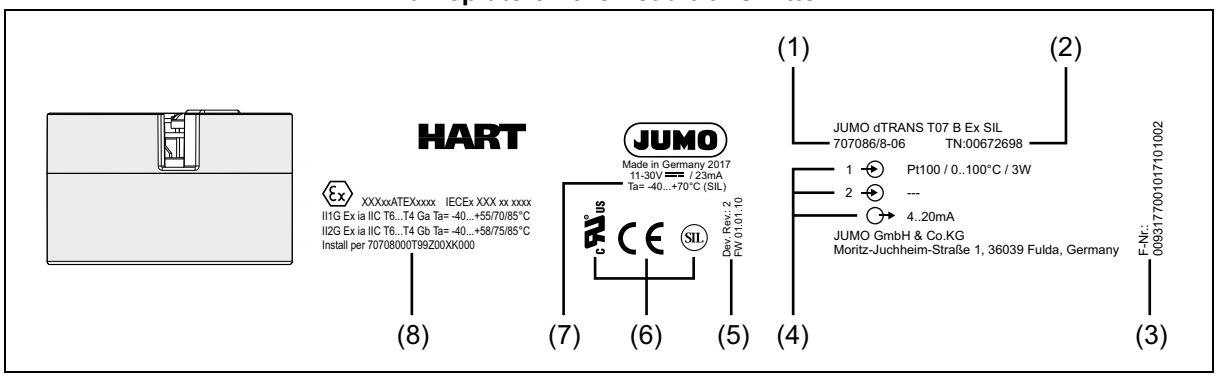
The measurement device meets all general safety requirements according to EN 61010-1, EMC requirements according to the IEC/EN 61326 series, and NAMUR recommendations NE 21 and NE 89.

NOTE!

Only an SELV voltage is admissible for external voltage supply. The device must be equipped with an electrical circuit that meets the requirements of EN 61010-1 with regard to "Limited-energy circuits".

3.1 Nameplate

Nameplate on the head transmitter



(1) Device type

Compare the specifications on the nameplate with your order documents. The supplied device version can be identified using the order code in 11.

Example: Type 707086/8-06 (dTRANS T07 B Ex SIL – Two-wire transmitter with Ex and SIL approval for installation in terminal head, form B)

(2) Part no. (TN)

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

(3) Fabrication number (F-Nr)

The date of manufacture (year/calendar week) and the hardware version number are some of the aspects specified in the fabrication number.

Example: 009317700101**710**1002
Here, we are looking at the 12th to the 15th digit (from the left).
The device was produced in the **10th** week of 20**17**.

(4) Inputs and output

Example: Input 1 configured for Pt100 in a 3-wire circuit for a temperature range of 0 to 100 °C, input 2 is not configured, output 4 to 20 mA.

(5) Device revision and firmware version

Example: Device revision 2, firmware version 01.01.10.

(6) Approvals and certificates

Example: Device is SIL and UL-approved and CE-compliant.

(7) Voltage supply and admissible ambient temperature in SIL mode

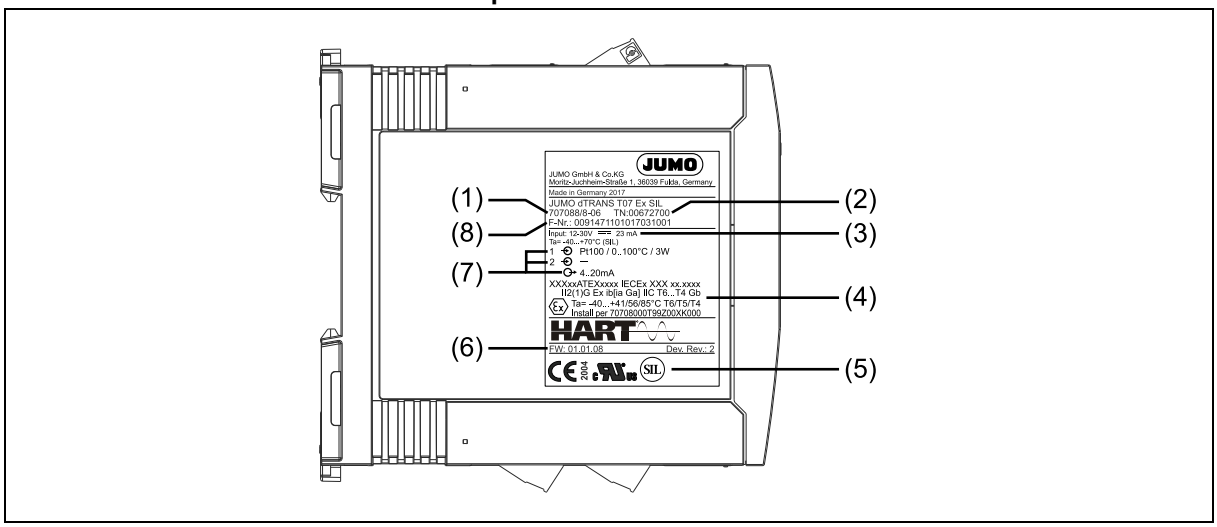
Example: Voltage range DC 11 to 30 V, current consumption 23 mA, admissible ambient temperature in SIL mode -40 to +70 °C.

(8) Ex-approvals

Identification marking for approval in potentially explosive areas according to the ATEX Directive and designation for the corresponding Ex safety manual (installation on ...)

3 Identifying the device version

Nameplate on DIN rail devices



(1) Device type

Compare the specifications on the nameplate with your order documents. The supplied device version can be identified using the order code in 11.

Example: Type 707088/8-06 (dTRANS T07 T Ex SIL – 2-wire transmitter with Ex and SIL approval for mounting on DIN rails)

(2) Part no. (TN)

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

(3) Voltage supply and admissible ambient temperature in SIL mode

Example: Voltage range DC 12 to 30 V, current consumption 23 mA, admissible ambient temperature in SIL mode -40 to +70 °C.

(4) Ex-approvals

Identification marking for approval in potentially explosive areas according to the ATEX Directive and designation for the corresponding Ex safety manual (installation on ...)

(5) Approvals and certificates

Example: Device is SIL and UL-approved and CE-compliant.

(6) Firmware version and device revision

Example: Firmware version 01.01.08, device revision 2.

(7) Inputs and output

Example: Input 1 configured for Pt100 in a 3-wire circuit for a temperature range of 0 to 100 °C, input 2 is not configured, output 4 to 20 mA.

(8) Fabrication number (F-Nr)

The date of manufacture (year/calendar week) and the hardware version number are some of the aspects specified in the fabrication number.

Example: 00914711010**1703**1001
Here, we are looking at the 12th to the 15th digit (from the left).
The device was produced in the **3rd** week of 20**17**.

3.2 Order details

									(1)	**Basic type**
								707080		dTRANS T07 B – Two-wire transmitter for installation in terminal head, form B
								707081		dTRANS T07 B SIL – Two-wire transmitter with SIL approval for installation in terminal head, form B
								707082		dTRANS T07 T – Two-wire transmitter for mounting on DIN rail
								707083		dTRANS T07 T SIL – Two-wire transmitter with SIL approval for mounting on DIN rail
								707085		dTRANS T07 B Ex – Two-wire transmitter with Ex approval for installation in terminal head, form B
								707086		dTRANS T07 B Ex SIL – Two-wire transmitter with Ex and SIL approval for installation in terminal head, form B
								707087		dTRANS T07 T Ex – Two-wire transmitter with Ex approval for mounting on DIN rail
								707088		dTRANS T07 T Ex SIL – Two-wire transmitter with Ex and SIL approval for mounting on DIN rail
									(2)	**Configuration**
X	X	X	X	X	X	X	X	8		Default settings (0 to 100 °C, Pt100 three-wire circuit, 4 to 20 mA)
									(3)	**Electrical connection type**
X	X	X	X	X	X	X	X	06		Screw terminals

	(1)		(2)		(3)
Order code		/		-	
Order example	707080	/	8	-	06

3.3 Scope of delivery

	Type							
	707080	707081	707082	707083	707085	707086	707087	707088
Transmitter in the version ordered	X	X	X	X	X	X	X	X
Operating manual	--	--	--	--	--	--	--	--
SIL safety manual	--	X	--	X	--	X	--	X
Ex safety manual	--	--	--	--	X	X	X	X
Mounting materials (for mounting in the terminal head)	X	X	--	--	X	X	--	--
Quick start guide	X	X	X	X	X	X	X	X

3 Identifying the device version

3.4 Accessories

Designation	Part no.
BD7 plug-in display for dTRANS T07 BD7	00672701
AB7 terminal head for dTRANS T07 B	00672702
FG7 field housing with display window for dTRANS T07 B	00672705
MW7 wall mounting set for field housing	00672707
MR7 tube mounting set for field housing	00672708
HART modem USB	00443447
Mounting element for mounting type 707080 B on DIN rail TH 35	00352463
End holder (screwable) for DIN rail TH 35	00528648

Ex-i repeater power supply/input isolating amplifier type 707530/38	00577948

3.5 Certificates and approvals

The device left the factory in perfectly safe working order. The device meets the requirements of the standard EN 61010-1 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use" as well as the EMC requirements under the IEC/EN 61326 series.

3.5.1 CE identification marking and declaration of conformity

The device meets the legal requirements of EU/EEU Directives. The manufacturer confirms compliance with the relevant directives with the use of the CE mark.

3.5.2 Certification of the HART® protocol

The temperature transmitter is registered by the FieldComm Group™. The device meets the requirements of HART® Communication Protocol Specifications, Revision 7.

3.5.3 Functional safety

Options for both device versions (head transmitter/DIN rail device) are available for use in safety-related systems according to IEC 61508.

- SIL 2: Hardware version
- SIL 3: Software version

4.1 Acceptance of goods, storage, and transport

4.1.1 Goods acceptance

- Is the packaging and its contents free from damage?
- Is the delivered product complete? Compare the scope of delivery with your order details.

4.1.2 Transport and storage

- The device must be packaged so that it is protected against impacts during storage (and transport). The original packaging offers optimal protection.
- Admissible storage temperature:
  Head transmitter -50 to +100 °C
  DIN rail device -40 to +100 °C

4.2 Conditions for installation

4.2.1 Dimensions

The device's dimensions are listed in chapter 13 "Dimensions", Page 67.

4.2.2 Mounting site

- Head transmitter:
  In terminal head, form B, according to DIN EN 50445 directly mounted to a measuring insert with a cable passage (central hole 7 mm), in field housing, offset from process , ⇨chapter 3.4 "Accessories", Page 12.
- DIN rail device:
  Designed to be mounted on DIN rails (IEC 60715 TH35)

NOTE!

Using the accessory "Mounting element for mounting type 707080 B onto DIN rails TH 35" (⇨ page 12), the head transmitter can also be mounted on DIN rails according to IEC 60715.

Information about the conditions that must be in place at the mounting site in order for the device to be mounted properly (ambient temperature, protection type, etc.) can be found in chapter 12.5 "Environmental influences", Page 64.

For application in potentially explosive areas, the limit values for the certificates and approvals (see Ex safety manual) must be met.

4.3 Mounting

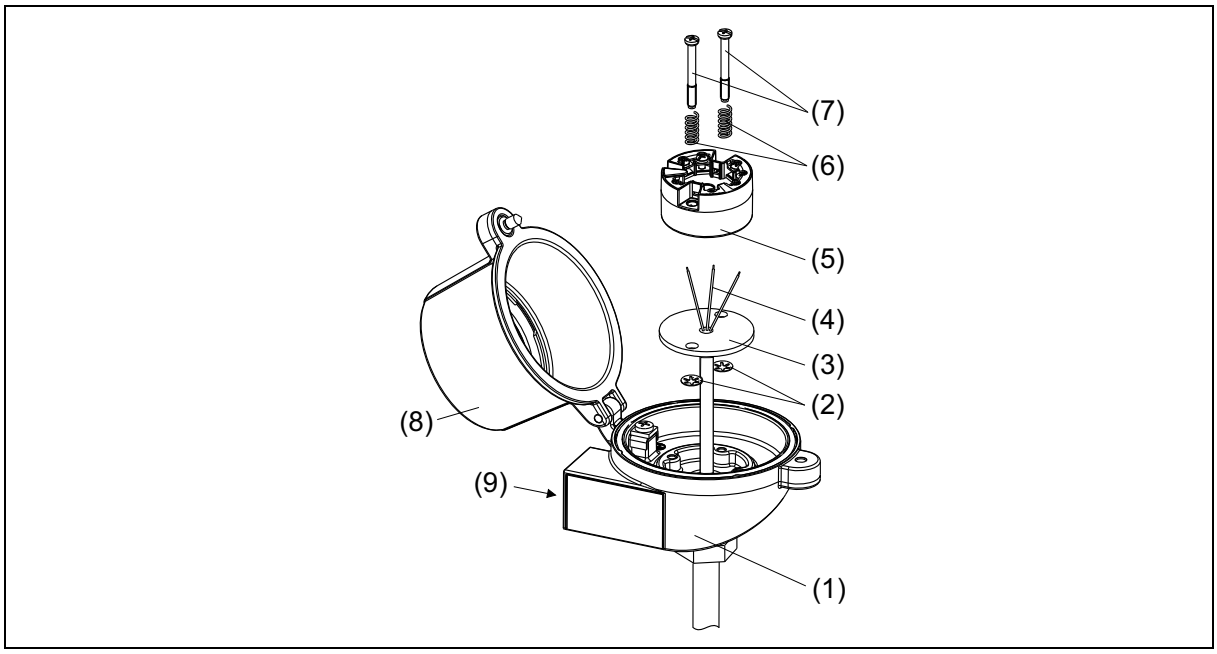
A cross-head screwdriver is required when mounting the head transmitter.

NOTE!

Do not screw the mounting screws too tight otherwise the head transmitter could be damaged, maximum torque = 1 Nm.

4.3.1 Mounting the head transmitter

Mounting a terminal head, form B, according to DIN 43729

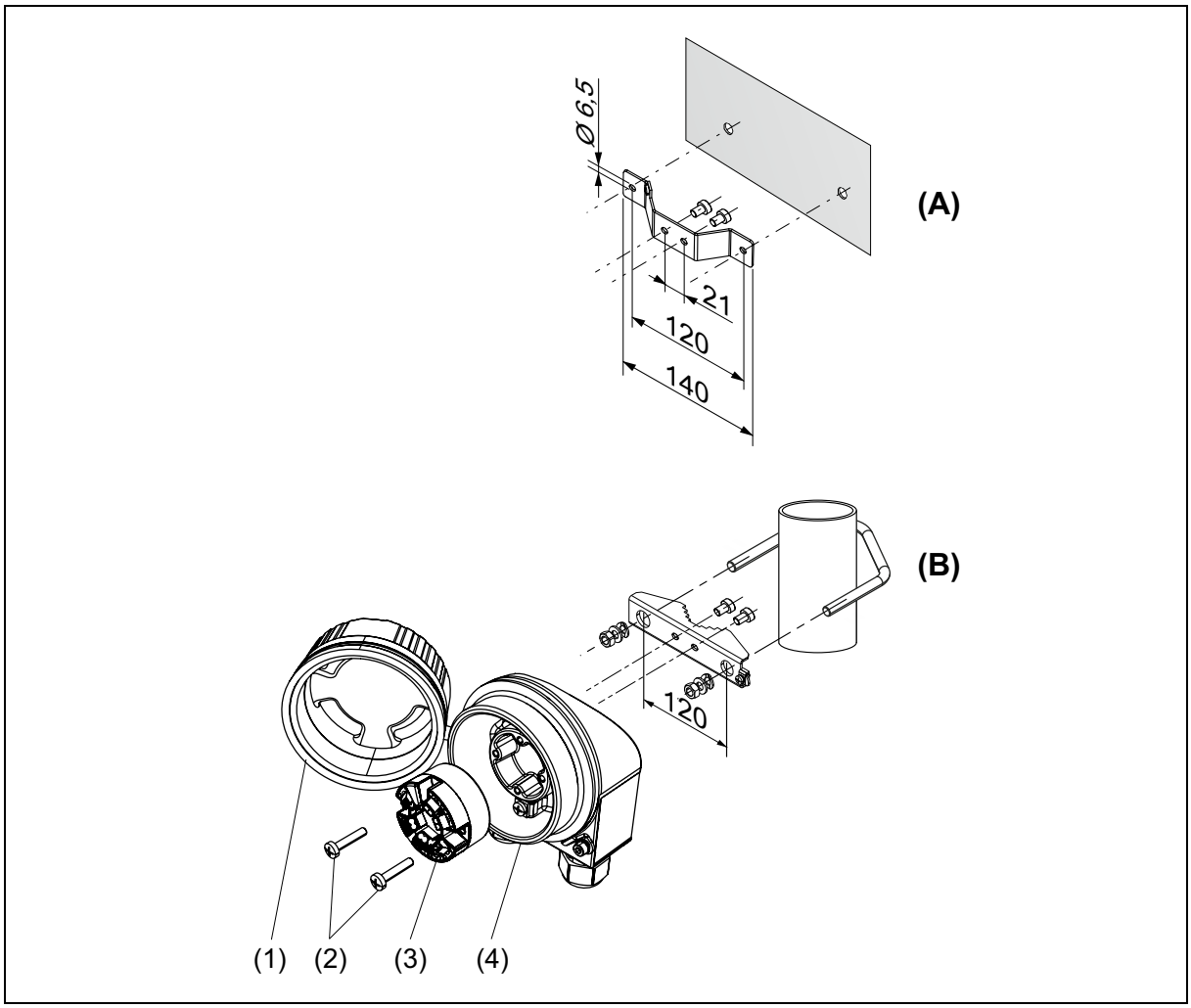


(1) Terminal head
(2) Retaining rings
(3) Measuring insert
(4) Connection wires
(5) Head transmitter
(6) Mounting springs
(7) Mounting screws
(8) Lid to terminal head
(9) Cable passage

Process:

1. Open the lid to the terminal head (8).
2. Guide the connecting wires (4) for the measuring insert (3) through the central hole in the head transmitter (5).
3. Place the mounting springs (6) onto the mounting screws (7).
4. Guide the mounting screws (7) through the side holes in the head transmitter and the measuring insert (3). Then secure both mounting screws with retaining rings (2).
5. Then tighten the head transmitter (5) with the measuring insert (3) in the terminal head.
6. After completing the wiring process, see page 17, close the lid to the terminal head (8) tightly.

Mounting in field housing for wall mounting (A) or pipe mounting (B)



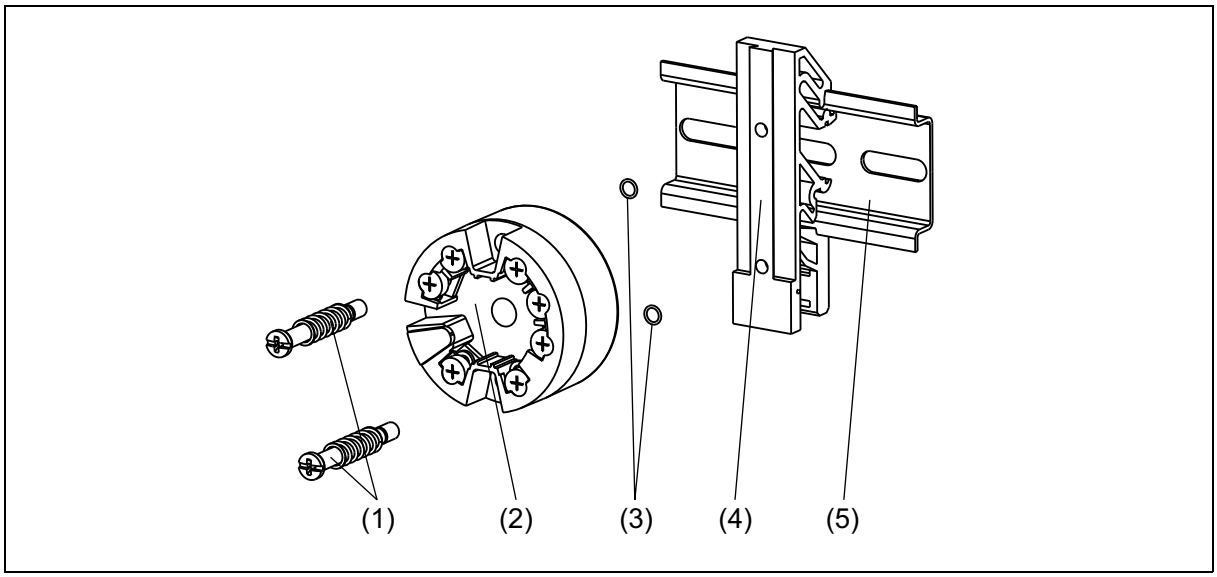
(1) Lid to field housing
(2) Mounting screws with springs
(3) Head transmitter
(4) Field housing

Process:

1. Open the lid (1) to the field housing (4).
2. Guide the mounting screws (2) through the side holes in the head transmitter (3).
3. Screw the head transmitter tightly onto the field housing.
4. After completing the wiring process, see page 17, close the lid to the field housing (1).

4 Mounting

Mounting on DIN rails according to IEC 60715

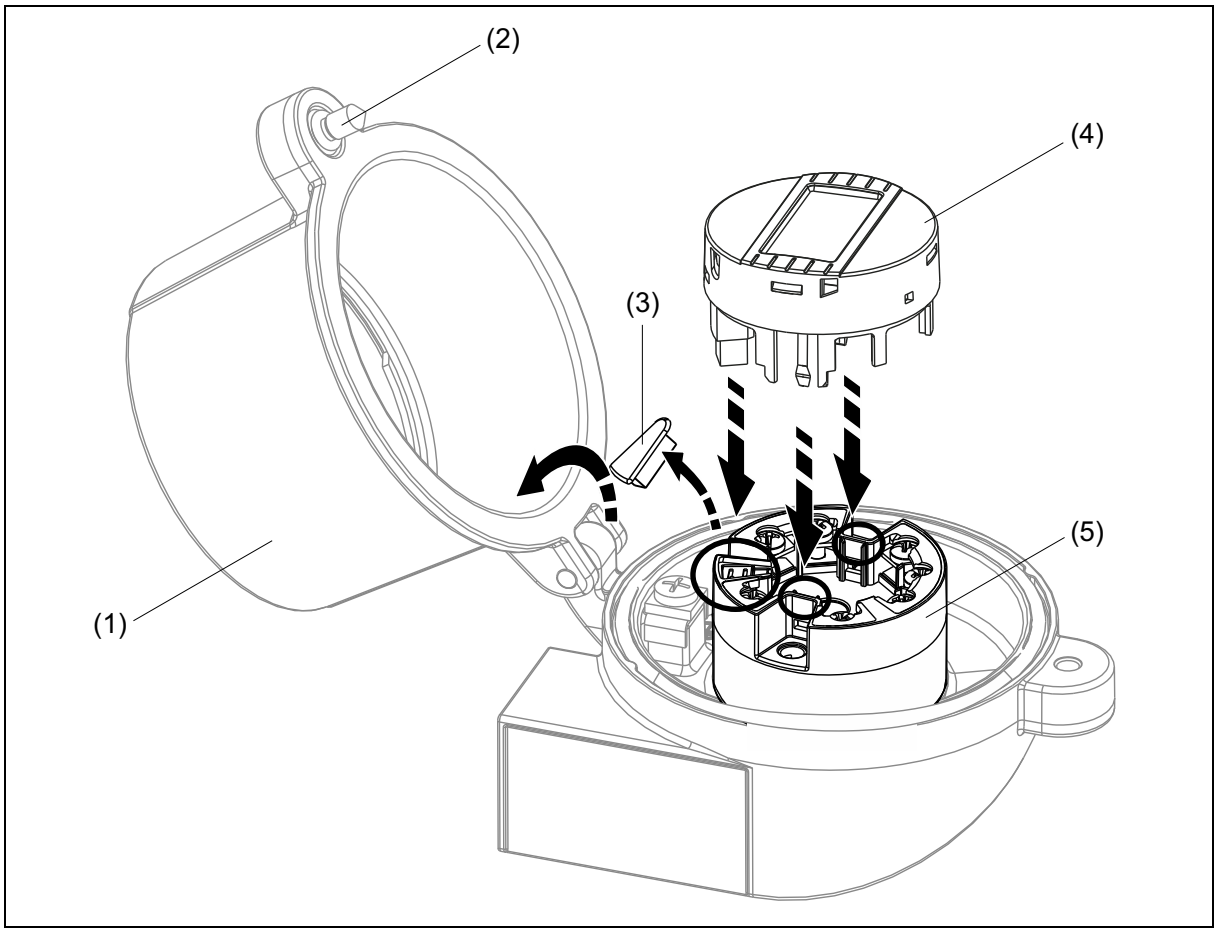


(1) Mounting screws with springs
(2) Head transmitter
(3) Retaining rings
(4) Mounting element for DIN rail
(5) DIN rail

Process:

1. Press the mounting element (4) onto the DIN rail (5) until it engages.
2. Place the mounting screws onto the mounting screws (1) and guide these through the side holes in the head transmitter (2). Then secure both the mounting screws with retaining rings (3).
3. Tightly screw the head transmitter (2) onto the mounting element for the DIN rail (4).

Mounting the plug-in display to the head transmitter



(1) Lid to terminal head
(2) Screw
(3) Cover
(4) Plug-in display
(5) Head transmitter

Process:

1. Undo the screw (2) on the lid to the terminal head (1). Open the lid.
2. Remove the cover (3) from the display connector.
3. Place the display module (4) on the mounted and wired head transmitter (5). The securing pins must engage securely in the head transmitter. When the display is fully mounted, tightly screw on the lid to the terminal head.

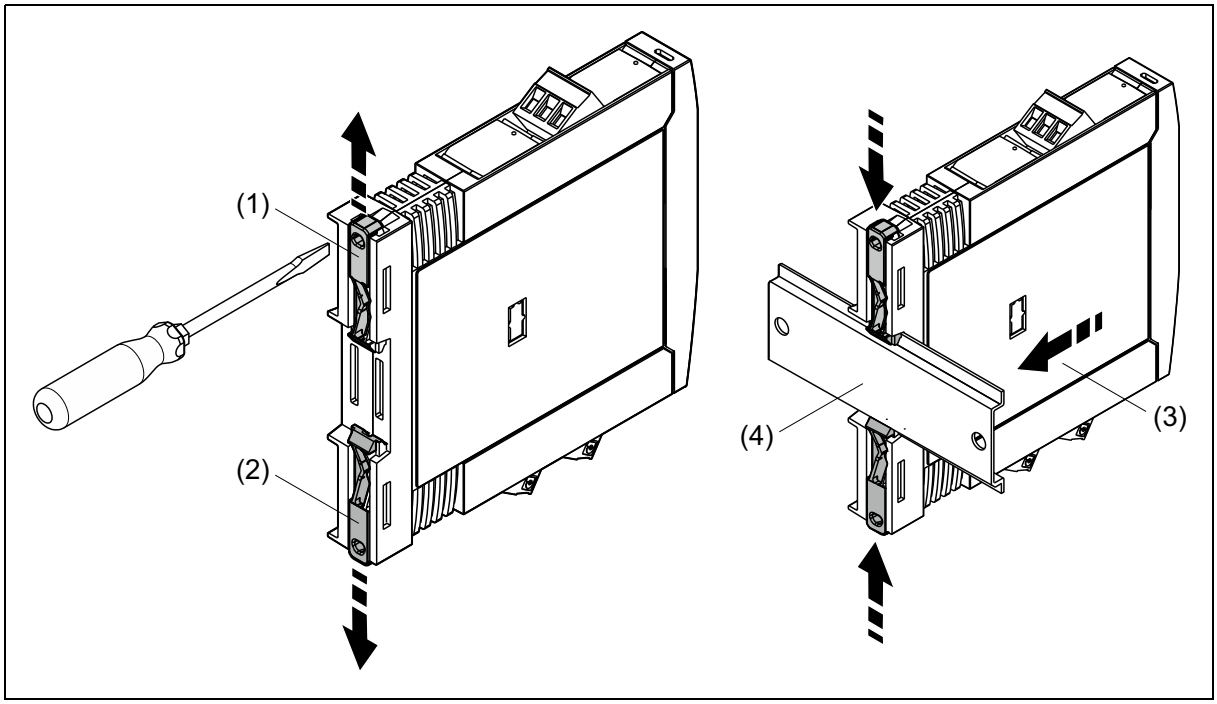
NOTE!

The plug-in display can only be used in conjunction with the suitable terminal head (AB 7 with display window) or field housing (FG 7 with display window).

4.3.2 DIN rail device installation

NOTE!

Mount the device **vertically** and make sure it is pointing in the **right direction** (sensor connection at the bottom/voltage supply at the top)!
If the installation position is wrong, the measurement will not meet the maximum measuring accuracy when connecting a thermocouple and when using the internal cold junction.



(1) Top DIN rail clip
(2) Bottom DIN rail clip
(3) DIN rail device
(4) DIN rail

1. Slide the top DIN rail clip (1) up and the bottom clip (2) down until they engage.
2. Place the device (3) onto the DIN rail (4) from the front.
3. Slide the two DIN rail clips toward the DIN rail until they engage.

4.4 Mounting checklist

Perform the following checks after mounting the device:

State and specifications of the device	Important information
Does the device show any signs of damage (visual check)?	-
Do the environmental influences meet the device's specifications (e.g., ambient temperature, measuring range)?	⇨ "Environmental influences ", Page 64

5.1 Installation notes

A cross-head screwdriver is required when wiring the head transmitter with screw terminals. Use a cross-head screwdriver to wire DIN rail devices.

CAUTION!

Destruction of electronic components or the entire electronics system

- ▶ Do not install or wire the device under operating voltage.
- ▶ Do not connect a third-party connection to the connector for the head transmitter's plug-in display.

CAUTION!

Failure to adhere to approval requirements for devices with Ex approval

- ▶ When connecting devices with Ex approval, observe the notes and connection diagrams in the Ex safety manual (additional documentation) for this device.

NOTE!

Do not screw the mounting screws too tight otherwise the transmitter could be damaged. Use a suitable screwdriver.
• Maximum torque for mounting screws = 1 Nm, screwdriver: Pozidriv PZ2
• Maximum torque for screw terminals = 0.35 Nm, screwdriver: Pozidriv PZ1

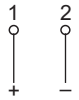
Always complete the following steps when wiring an installed head transmitter:

1. Open the cable fitting and case lid on the terminal head or field housing.
2. Guide the wires through the opening in the cable fitting.
3. Connect the wires according to the connection diagram on page 20.
4. Tighten the cable fitting again and then close the case lid.

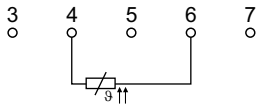
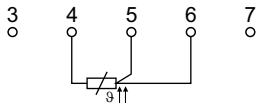
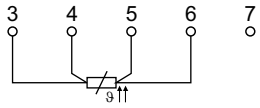
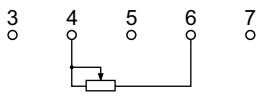
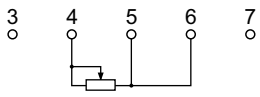
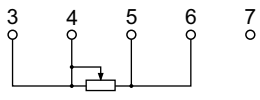
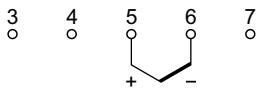
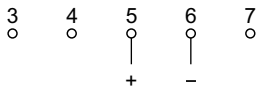
To prevent connection errors, always read the notes in the connection checklist prior to startup.

5 Electrical connection

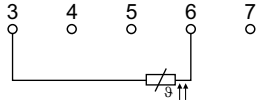
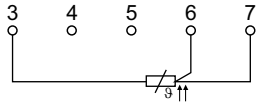
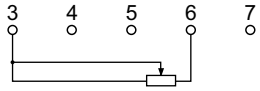
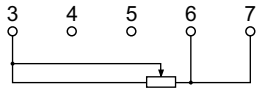
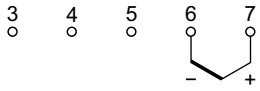
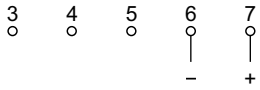
5.2 Terminal assignment for the head transmitter

Connection for	Explanations	Terminals
Voltage supply DC 11 to 42 V (standard) DC 11 to 32 V (SIL) Current output 4 to 20 mA HART communication	R_b max. = (U_b max. – 11 V) ÷ 0.023 A R_b = load resistance U_b = voltage supply Burden ≥ 250 Ω required in the signal circuit	

Analog input (sensor input) 1

RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
RTD temperature probe 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

Analog input (sensor input) 2

Connection for	Explanations	Terminals
RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

CAUTION!

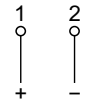
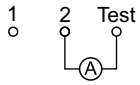
Electrostatic discharge!

Failure to observe this information could lead to parts of the electronics system being destroyed or malfunctioning.

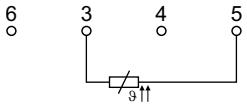
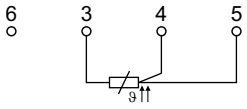
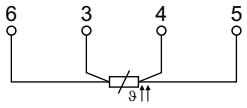
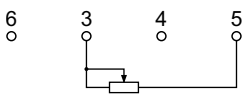
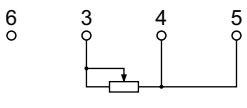
▶ Protect the terminals against electrostatic discharge.

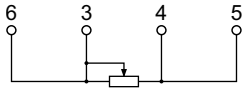
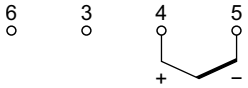
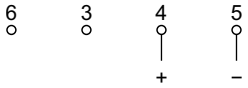
5 Electrical connection

5.3 Terminal assignment for DIN rail devices

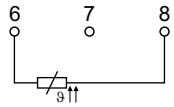
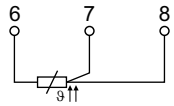
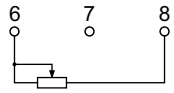
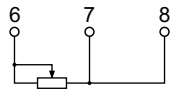
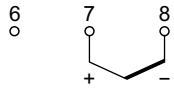
Connection for	Explanations	Terminals
Voltage supply DC 12 to 42 V (standard) DC 12 to 32 V (SIL) Current output 4 to 20 mA HART® communication	R_b max. = (U_b max. – 12 V) ÷ 0.023 A R_b = load resistance U_b = voltage supply Burden ≥ 250 Ω required in the signal circuit	
Ammeter	For testing the output current	
HART® communication	On the front of the unit, for field communicator or similar	

Analog input (sensor input) 1

RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
RTD temperature probe 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	

Connection for	Explanations	Terminals
Resistance/potentiometer 4-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

Analog input (sensor input) 2

RTD temperature probe 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
RTD temperature probe 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Resistance/potentiometer 2-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Compensation for the line resistance is possible (0 to 30 Ω)	
Resistance/potentiometer 3-wire circuit	▪ Sensor current ≤ 0.3 mA ▪ Sensor line resistance max. 50 Ω per line	
Thermocouple		
Voltage sensor		

CAUTION!

Electrostatic discharge!

Failure to observe this information could lead to parts of the electronics system being destroyed or malfunctioning.

▶ Protect the terminals against electrostatic discharge.

5 Electrical connection

5.4 Connecting sensor lines

Terminal assignment for sensor connections ⇨chapter 5.2 "Terminal assignment for the head transmitter", Page 20 and chapter 5.3 "Terminal assignment for DIN rail devices", Page 22.

NOTE!

When connecting two sensors, make sure that the sensors are not galvanically connected (e.g., due to sensor elements that are not isolated from the protection tube). The resulting compensating currents would significantly distort the measurement.
The sensors must remain galvanically isolated from one another; to achieve this, each sensor must be separately connected to a transmitter. The transmitter guarantees sufficient galvanic isolation (>2 kV AC) between the input and output.

If both sensor inputs are assigned then the following connection combinations are possible:

Sensor input 2	**Sensor input 1**			
	RTD or potentiometer, 2-wire	RTD or potentiometer, 3-wire	RTD or potentiometer, 4-wire	Thermocouple (TC), voltage sensor
RTD or potentiometer, 2-wire	X	X	-	X
RTD or potentiometer, 3-wire	X	X	-	X
RTD or potentiometer, 4-wire	-	-	-	-
Thermocouple (TC), voltage sensor	X	X	X	X

5.5 Connecting the voltage supply and signal cable

CAUTION!

Destruction of electronic components

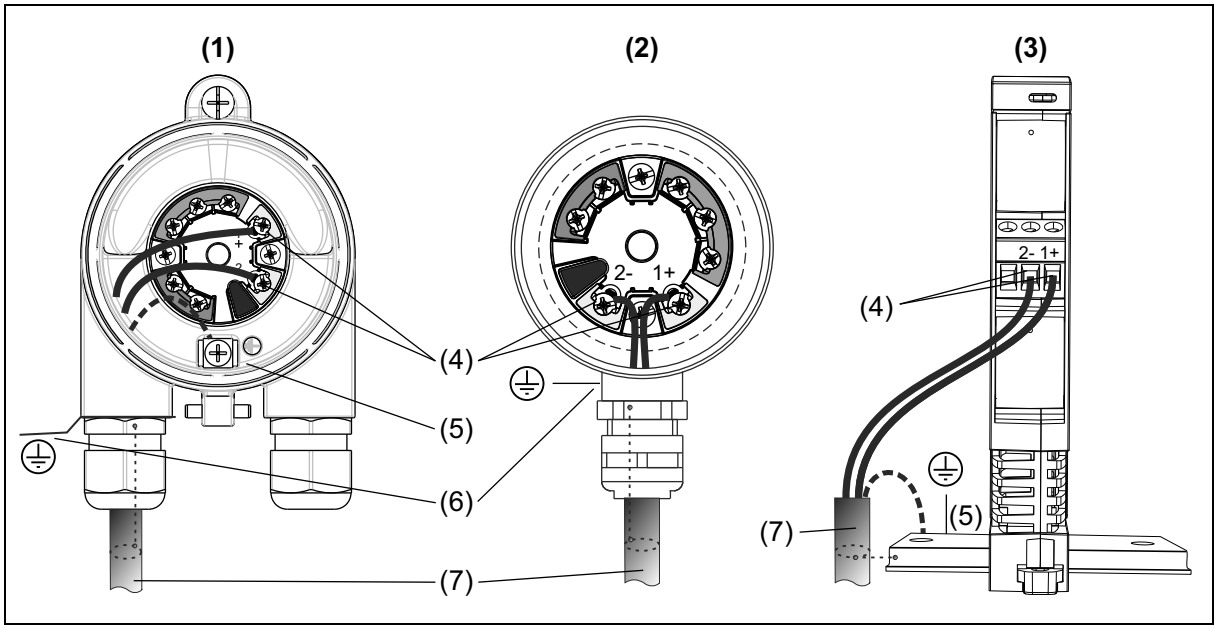
▶ Do not install or wire the transmitter under operating voltage.

NOTE!

Cable specification:

● A normal installation cable will suffice if you are only using the analog signal.
● We recommend using a shielded cable when using HART® communication. Observe the plant's earthing concept.
● When using 30-meter+ sensor lines with the DIN rail variant, always use a shielded cable. The use of shielded sensor wires is generally recommended.

Always observe the installation notes on 19.



(1) Head transmitter installed in field housing
(2) Head transmitter installed in terminal head
(3) DIN rail device mounted on a DIN rail
(4) Connection terminals for HART® protocol and voltage supply
(5) Internal earthing terminal
(6) External earthing terminal
(7) Shielded signal cable (recommended for HART® protocol)

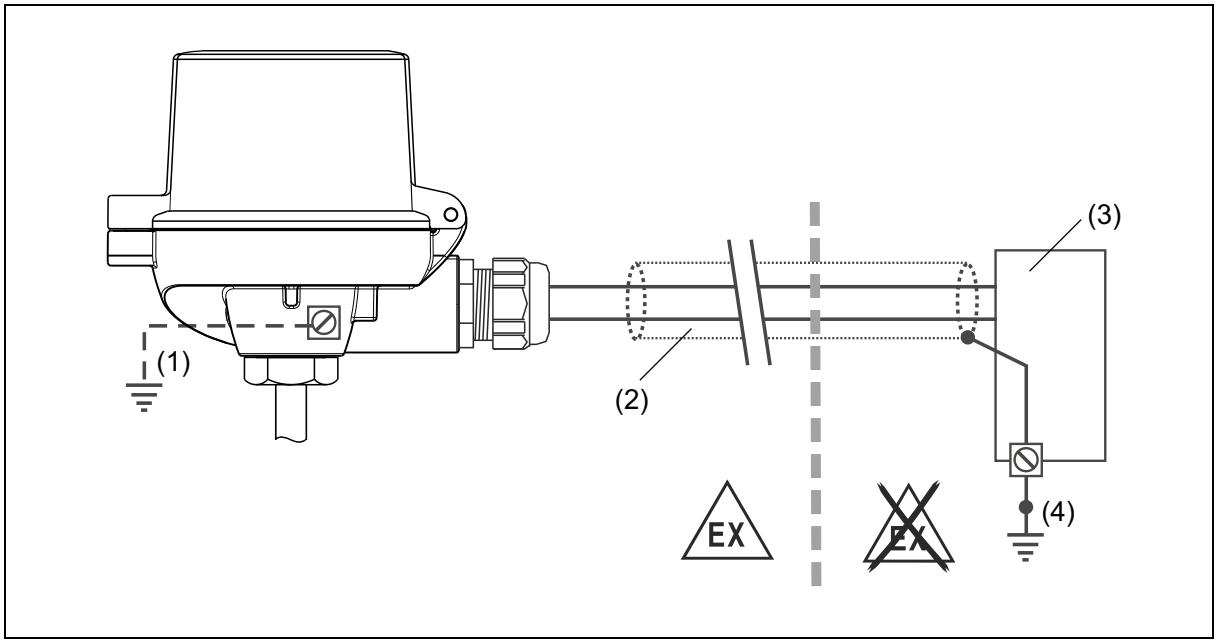
NOTE!

The terminals for the signal cable connection (1+ und 2-) are protected against polarity reversal. Line cross-section max. 2.5 mm^2. Length of wire to be stripped: at least 10 mm.

5 Electrical connection

5.6 Shielding and earthing

Always observe the specifications issued by the HART® FieldComm Group during installation.



(1) Optional earthing of the field device, insulated from shield
(2) One-sided earthing of the shield
(3) Power supply unit
(4) Earthing point for HART® communication shield

NOTE!

If the cable shield is grounded at several points in systems without potential equalization, mains-frequency equalization currents can occur that may damage the signal cable or significantly affect the signal transmission.

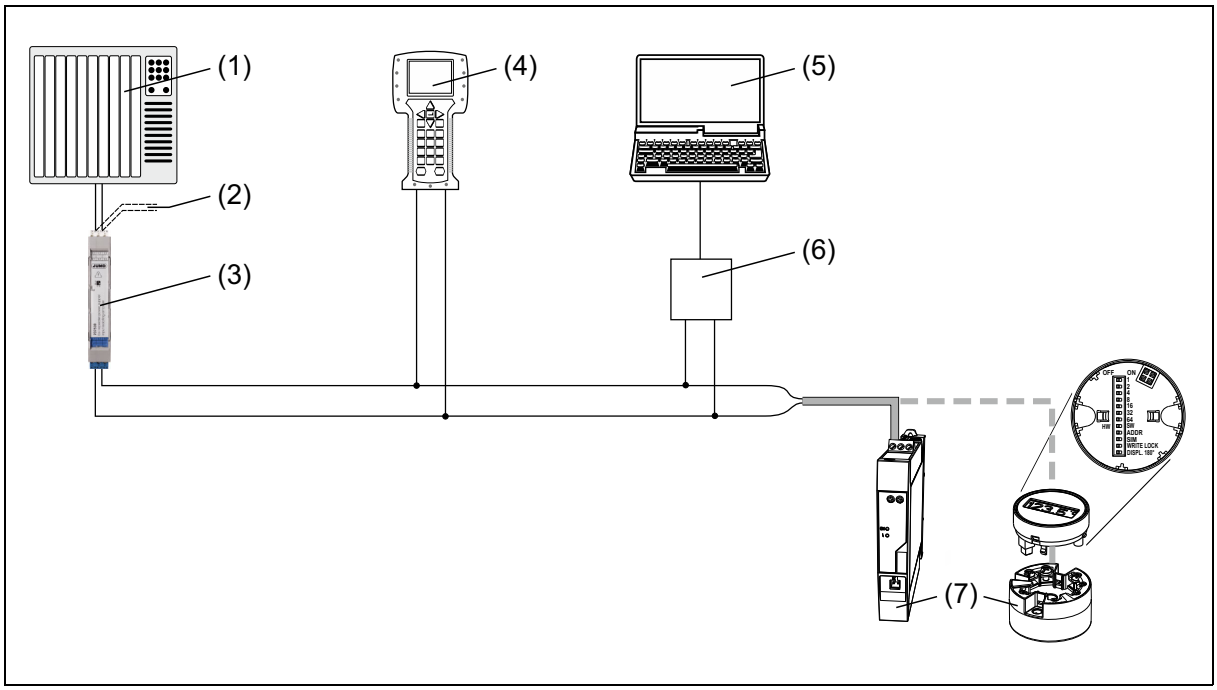
- Ground the shield of the signal cable on one side only (do not connect to the ground terminal of the terminal head or field housing).
- Insulate the shield that is not connected.

5.7 Connection checklist

State and specifications of the device	Important information
Do the device or cables show any signs of damage (visual check)?	-
Electrical connection	**Important information**
Does the voltage supply match the specifications on the nameplate?	Head transmitter: U = 11 to 42 V_{DC} DIN rail device: U = 12 to 42 V_{DC} SIL mode: U = 11 to 32 V_{DC} for head transmitters or U = 12 to 32 V_{DC} for DIN rail devices
Has tension been removed from the mounted cables?	-
Are the auxiliary energy supply and signal cable connected correctly?	⇨ Page 25
Are all the screw terminals tight enough?	-
Are all cable inlets mounted, tight enough, and sealed?	-
Are all case lids mounted and tight?	-

6 Operation

6.1 Overview of operating options



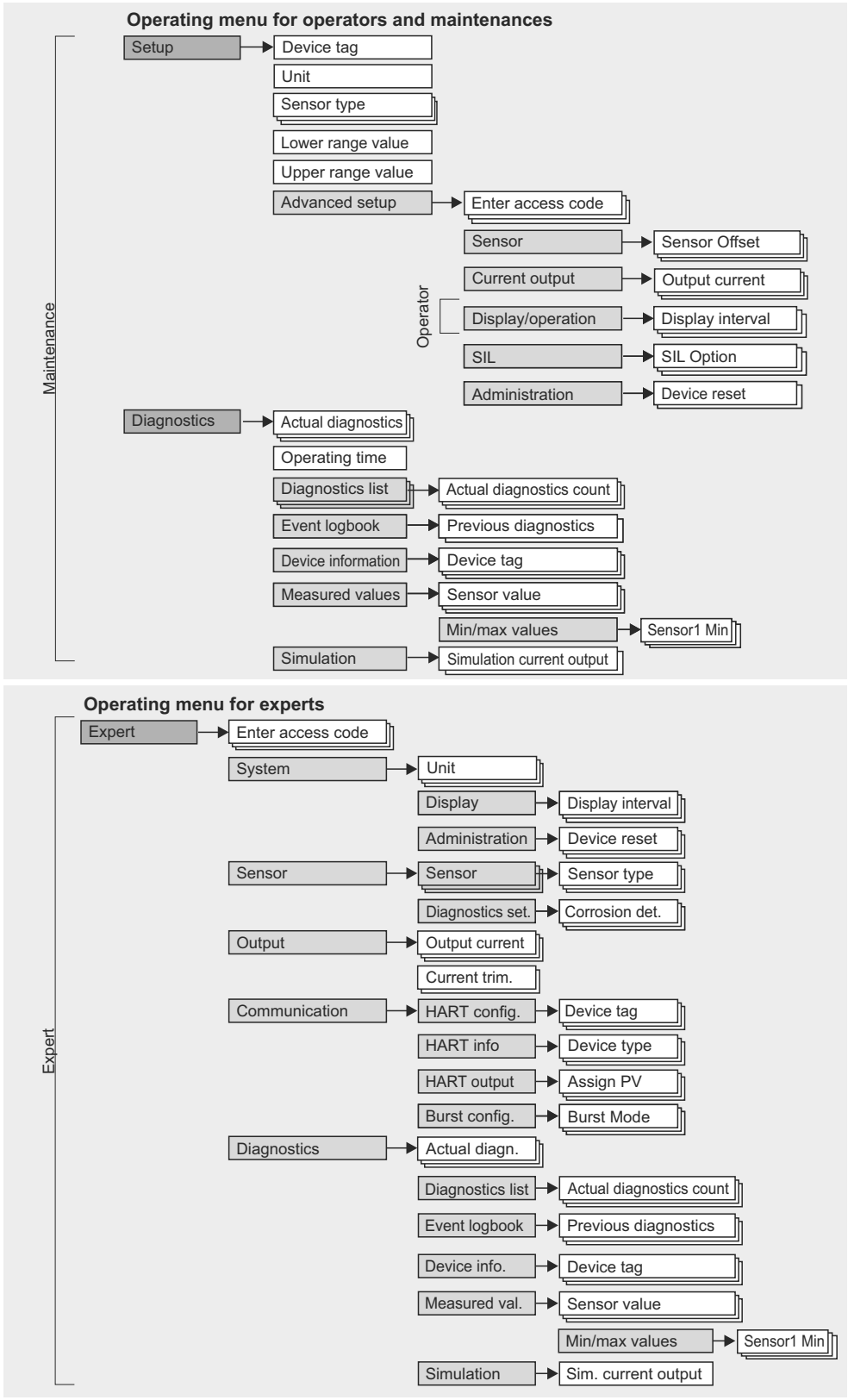
(1) PLC (Programmable Logic Controller)
(2) Connection for HART® modem
(3) Transmitter power supply unit, e.g., JUMO Ex-i repeater power supply/input isolating amplifier 707530
(4) Field communicator
(5) Computer with operating tool, e.g., PACTWare™ +DTM
(6) HART® modem
(7) Temperature transmitter as head transmitter or DIN rail device; on-site operation via DIP switch on the back of the optional BD7 plug-in display is only possible for the head transmitter variant

NOTE!

On-site display and control elements are only available for the head transmitter if they are ordered with the BD7 plug-in display.

6.2 Operating menu

6.2.1 Structure of the operating menu



NOTE!

Configuration for SIL mode differs from configuration for standard mode. This configuration is described in the SIL safety menu.

6.2.2 Sub-menus and user roles

Certain parts of the menu are assigned to certain user roles. Each user role contains typical tasks from within the device's lifecycle.

Maintenance engineer, operator

Typical tasks	Menu	Content/operation
Startup: • Measurement configuration • Configuration of measured value processing (scaling, linearization, etc.) • Configuration of analog measured value output Tasks in active measurement mode: • Configuring the display • Reading off measured values	Setup	Contains all parameters for startup: • **Setup parameters** After adjusting these parameters, the measurement is normally fully configured. • **"Advanced Setup" sub-menu** contains further sub-menus and parameters: For more accurate configuration of the measurement (adjustment for particular measuring conditions), for conversion of the measured value (scaling, linearization), for scaling the output signal that is required during active measurement mode: configuration of the measured value display (displayed values, display format, etc.)
Troubleshooting: • Diagnosing and rectifying process errors • Interpreting the device's error messages and rectifying the associated errors	Diagnostics	Contains all parameters for detecting and analyzing operating errors: • **Diagnosis list** eContains up to three current error messages • **Event log** Contains the last five (no longer valid) error messages • **"Device information" sub-menu** Contains information for identifying the device • **"Measured values" sub-menu** Contains all current measured values • **"Simulation" sub-menu** Is used to simulate measured values or output values • **"Reset device" sub-menu**

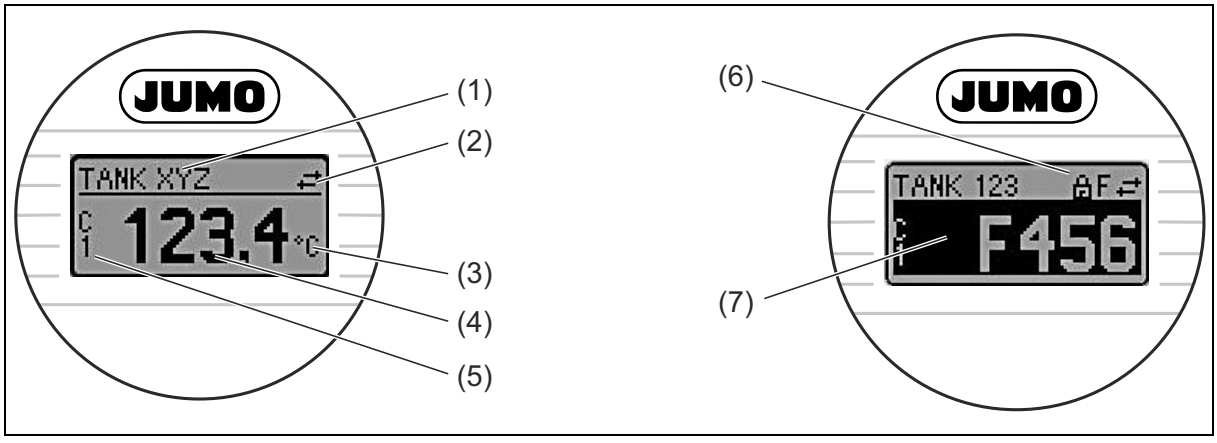
Expert

Typical tasks	Menu	Content/operation
Tasks that require detailed knowledge of how the device works: • Starting up measurements in difficult conditions • Adapting the measurement for the best possible results in difficult conditions • Configuring the communication interface in detail • Diagnosing faults in difficult circumstances	Expert	Contains all device parameters (including those that come under other menus). This menu's structure is based on the device's functional blocks: • **"System" sub-menu** Contains all higher-level device parameters that do not concern measurement or measured value communication • **"Sensor" sub-menu** Contains all parameters for configuring the measurement • **"Output" sub-menu** Contains all parameters for configuring the analog current output • **"Communication" sub-menu** Contains all parameters for configuring the digital communication interface • **"Diagnostics" sub-menu** Contains all parameters for detecting and analyzing operating errors

6.3 Measured value display and operating elements

6.3.1 Display elements

Head transmitter



Pos.	Function	Description
(1)	Measuring points TAG display	TAG for the measuring point, 32 characters long
(2)	"Communication" display	The communication symbol appears during read and write access via the fieldbus protocol.
(3)	Units display	Units display for the measured value displayed
(4)	Measured value display	Displays the current measured value
(5)	Values/channel display S1, S2, DT, PV, I, %	e.g., S1 for a measured value from channel 1 or DT for device temperature
(6)	"Configuration locked" display	When parameterization/configuration is locked using the hardware, the "Configuration locked" symbol appears.

(7)	Status signals	
	Symbols	**Meaning**
	F	**"Operating fault" message** An operating error has occurred. The measured value is no longer valid. An error message and "- - - -" (no valid measured value available) alternate in the display, ⇨ chapter 11.2 "Diagnostic events", Page 43.
	C	**"Service mode"** The device is in service mode (e.g., during a simulation).
	S	**"Outside of specification"** The device is being operated outside of its technical specifications (e.g., during launch phase or cleaning).
	M	**"Maintenance required"** Maintenance is required. The measured value is still valid. The measured value and status message alternate in the display.

DIN rail device

NOTE!

The DIN rail variant does not come with an interface for the plug-in display and therefore has no on-site display.

Two LEDs on the front indicate the device status according to NAMUR NE44.

Type	Function and features
Status LED (red)	The device status is displayed when the device contains no errors. This function can no longer be guaranteed in the event of a fault. • LED off: No diagnosis message • LED lit up: Diagnostic display, category F • LED flashing: Diagnostic display, category C, S, or M
Power LED (green) "ON"	The operating status is displayed when the device contains no errors. This function can no longer be guaranteed in the event of a fault. • LED off: Power cut or insufficient voltage supply • LED lit up: Voltage supply is OK

6.3.2 Operating on-site

Miniature switches (DIP switches) on the back of the optional BD7 plug-in display can be used to adjust hardware settings for the fieldbus interface.

NOTE!

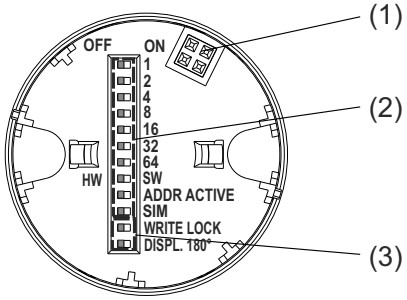
The BD7 plug-in display can be ordered as an accessory for the head transmitter or later for retroactive mounting, ⇨ page 40.

CAUTION!

Electrostatic discharge!

Failure to observe this information could lead to parts of the electronics system being destroyed or malfunctioning.

▶ Protect the terminals against electrostatic discharge.



(1)	Plug connection to the head transmitter
(2)	DIP switch (1 to 64, SW/HW, ADDR, and SIM = simulation mode) has no function for this head transmitter
(3)	DIP switch (WRITE LOCK DISPL. 180° = toggle, rotate the display by 180°)

Process for adjusting the DIP switch:

1. Open the lid on the terminal head or field housing.
2. Remove the plug-in display from the head transmitter.
3. Configure the DIP switch on the back of the display.
   In general: Switch to ON = Function is active; switch to OFF = Function is disabled.
4. Connect the plug-in display in the right position on the head transmitter. The head transmitter adopts the settings within one second.
5. Secure the lid back onto the terminal head or field housing.

Switching write protection on and off

Write protection is switched on or off using a DIP switch on the back of the optional plug-in display. If write protection is active, the parameters cannot be changed. A key symbol on the display indicates when write protection is active. Write protection prevents any write access to the parameters. Write protection remains in place even if the display is unplugged. To disable write protection, the device must be restarted when the display is plugged in and the DIP switch is disabled (WRITE LOCK = OFF).

Rotating the display

The display can be rotated 180° using the DIP switch "DISPL. 180°". The display remains rotated when the display is removed.

6 Operation

6.4 Access to the operating menu via the operating tool

6.4.1 PACTWare™

Functional range

PACTWare™ is a DTM-based device asset management tool
It can configure all intelligent field devices within a plant and provides administration support. By using status information, it also acts as a simple yet effective tool for checking devices' states. The HART® protocol is used for access.

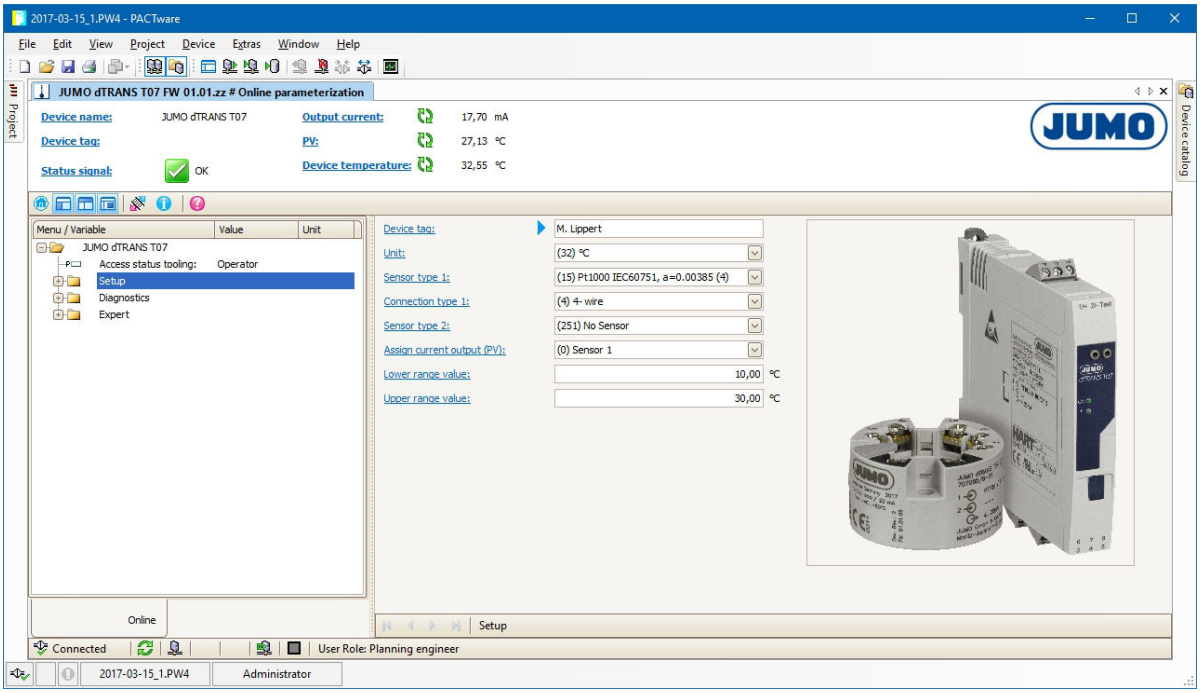
Typical functions:

- Parameterizing transmitters
- Loading and saving device data (upload and download)
- Documenting the measuring point

Providing a source for device description files

⇨ Page 35

User interface



6.4.2 Source for device description files

⇨Page 35

6.4.3 Field communicator 375/475

Functional range

Handheld industrial operating device by Emerson Process Management for remote parameterization and measured value access via HART® protocol.

Source for device description files

⇨Page 35

NOTE!

For secure HART® communication according to the functional safety requirements under IEC 61508 (SIL mode), measured values are transferred securely from the transmitter via the HART® protocol to a connected controller, where there are then processed safely. Secure HART® communication works on special HART® commands that are only available in SIL mode.

Data on the device version

Firmware version	01.01.zz	• On the nameplate, page 9 • Firmware version parameter Diagnostics - Device info - Firmware version
Manufacturer ID	24716	Manufacturer ID parameter Diagnostics - Device information - Manufacturer ID
Device name ID	JUMO dTRANS T07	Device type parameter Diagnostics - Device information - Device name
HART® protocol revision	7	-
Device revision	2	• On the transmitter nameplate, ⇨Page 9 • Device revision parameter Diagnostics - Device info - Device revision

The following section lists the corresponding device description file (DTM/DD) and its source for each individual operating tools.

Operating tools

Operating tool	Source of the device descriptions (DTM, DD)
PACTWare™	www.jumo.net, product page for the dTRANS T07
Field communicator 375/475	Use the field communicator's update function

7.1 HART® device variables and measured values

The following default measured values are assigned to the device variables:

Device variables for temperature measurements

Device variable	Measured value
First device variable (PV)	Sensor 1
Second device variable (SV)	Device temperature
Third device variable (TV)	Sensor 1
Fourth device variable (QV)	Sensor 1

NOTE!

You can adjust the device variables assigned to the process variables under the following menu: Expert - Communication - HART® output.

7 Integrating transmitters via HART® protocol

7.2 Device variables and measured values

The following default measured values are assigned to the individual device variables:

Device variable code	Measured value
0	Sensor 1
1	Sensor 2
2	Device temperature
3	Average value from sensor 1 and sensor 2
4	Difference between sensor 1 and sensor 2
5	Sensor 1 (backup sensor 2)
6	Sensor 1 with toggling to sensor 2 when a limit value is overrange
7	Average value from sensor 1 and sensor 2 with backup

NOTE!

Device variables can be accessed from a HART® master using HART® command 9 or 33.

7.3 Supported HART® commands

NOTE!

The HART® protocol enables measured values and device data to be transferred between the HART® master and corresponding field device for configuration and diagnosis purposes. HART® masters, e.g., a handheld device or PC-based operating programs (e.g., PACTWare™), need device description files (DTM = Device Type Manager; DD = Device Descriptions) to be able to access all information on a HART® device. This type of information is transferred exclusively using things known as "commands".

Commands are categorized into three different groups:

- Universal commands:
  Universal commands are supported and used by all HART® devices. They cover things like the following functionalities: Detecting HART® devices and reading digital measured values.
- Common practice commands:
  Common practice commands provide functions that are supported/can be executed by the majority, but not all, field devices.
- Device-specific commands:
  These commands provide access to device-specific functions not standard to HART®. These commands access information from individual field devices, for example.

Command no.	Designation
Universal commands	
0, Cmd0	Read unique identifier
1, Cmd001	Read primary variable
2, Cmd002	Read loop current and percent of range
3, Cmd003	Read dynamic variables and loop current
6, Cmd006	Write polling address
7, Cmd007	Read loop configuration
8, Cmd008	Read dynamic variable classifications
9, Cmd009	Read device variables with status
11, Cmd011	Read unique identifier associated with TAG

Command no.	Designation
12, Cmd012	Read message
13, Cmd013	Read TAG, descriptor, date
14, Cmd014	Read primary variable transducer information
15, Cmd015	Read device information
16, Cmd016	Read final assembly number
17, Cmd017	Write message
18, Cmd018	Write TAG, descriptor, date
19, Cmd019	Write final assembly number
20, Cmd020	Read long TAG (32-byte TAG)
21, Cmd021	Read unique identifier associated with long TAG
22, Cmd022	Write long TAG (32-byte TAG)
38, Cmd038	Reset configuration changed flag
48, Cmd048	Read additional device status
Common practice commands	
33, Cmd033	Read device variables
34, Cmd034	Write primary variable damping value
35, Cmd035	Write primary variable range values
36, Cmd036	Set primary variable upper range value
37, Cmd037	Set primary variable lower range value
40, Cmd040	Enter/Exit fixed current mode
42, Cmd042	Perform device reset
44, Cmd044	Write primary variable units
45, Cmd045	Trim loop current zero
46, Cmd046	Trim loop current gain
50, Cmd050	Read dynamic variable assignments
51, Cmd051	Write dynamic variable assignments
54, Cmd054	Read device variable information
59, Cmd059	Write number of response preambles
103, Cmd109	Write burst period
104, Cmd109	Write burst trigger
105, Cmd109	Read burst mode configuration
107, Cmd109	Write burst device variables
108, Cmd109	Write burst mode command number
109, Cmd109	Burst mode control

8 Startup

8.1 Installation checklist

Make sure that all final checks have been completed before starting up your measuring point:

- "Mounting" checklist, ⇨Page 18
- "Connection" checklist, ⇨Page 27

8.2 Switching on the transmitter

Once you have conducted the final checks, switch on the voltage supply. Once switched on, the transmitter runs through its built in test functions. After this process, all of the display's pixels are activated after around 7 seconds. The following sequence of messages then appears on the display:

Step	Display
1	"Display" text and display firmware version
2	Device name with firmware and hardware version
3	Sensor configuration display (sensor element and connection type)
4	Selected measuring range
5a	Current measured value or
5b	Current status message

NOTE!

If the switch-on process is not successful, the corresponding diagnostic event is displayed, depending on the cause. A detailed list of diagnostic events and the relevant troubleshooting process are provided in chapter 11 "Diagnosis and troubleshooting", Page 41.

In standard operation, the device works after around 30 s while the plugged in display works after 33 s. Normal measuring mode begins following a successful switch-on process. Measured and/or status values appear on the display.

8.3 Enabling parameterization

If the device is locked against parameterization, this has to be enabled using the hardware or software lock. If the lock symbol appears in the header in the measured value display, the device is read only.

To unlock

- Either switch the write protection switch located on the back of the plug-in display to the "OFF" position (hardware write protection), ⇨Page 32, or
- Deactivate software write protection using the operating tool, see description of the device parameter, "Defining the write protection code", ⇨"Reset device ", Page 93

NOTE!

When the hardware write protection is active (write protection switch on the back of the plug-in display is in the "ON" position), the write protection cannot be deactivated via the operating tool. The hardware write protection must always be deactivated before the software write protection can be activated or deactivated.

9 Maintenance

As a general rule, no special maintenance work is required for the device.

10 Accessories

Various accessories are available for the device; they can either be ordered with the device or at a later date. Detailed information regarding the corresponding order code is available from the supplier or on the device product page at www.jumo.net.

Accessories included in the scope of delivery:

- Multilingual quick start guide in paper form
- Optional SIL safety manual in paper form
- Optional Ex safety manual in paper form
- Attachment material for head transmitters

Designation	Part no.
BD7 plug-in display for dTRANS T07 BD7	00672701
AB7 terminal head for dTRANS T07 B	00672702
FG7 field housing with display window for dTRANS T07 B	00672705
MW7 wall mounting set for field housing	00672707
MR7 tube mounting set for field housing	00672708
HART modem USB	00443447
Mounting element for mounting type 707080 B on DIN rail TH 35	00352463
End holder (screwable) for DIN rail TH 35	00528648

Ex-i repeater power supply/input isolating amplifier type 707530/38	00577948

11.1 Troubleshooting in the event of faults

Always start the troubleshooting process with the following checklists if any faults occur following startup or during measurement mode. The various questions will help you to effectively locate the source of the fault and find the corresponding solutions.

NOTE!

Due to its design type, the device cannot be repaired. However, you can still send the device in to be checked, ⇨chapter 11.3 "Returns", Page 47.

General errors

Error	Possible cause	Remedy
Device is not responding	Voltage supply does not match the data on the nameplate	Apply the right voltage
	The connecting cables have no contact with the terminals.	Check the contact of the cables and correct if necessary.
Output current <3.6 mA	Signal line is wired incorrectly	Check the wiring
	The electronics system is faulty	Replace the device
HART® communication is not working	The communication resistor is wrong or installed incorrectly	Install the right communication resistor (250 Ω)
	HART® modem is not connected properly	Connect the HART® modem correctly
Status LED is lit up or flashing red (DIN rail devices only)	Diagnostic events according to NAMUR NE107, ⇨Page 43	Check diagnostic events: • LED lit up: Diagnostic display, category F • LED flashing: Diagnostic display, category C, S, or M
Power LED is not lighting up green (DIN rail devices only)	Power cut or insufficient voltage supply	Check the voltage supply and make sure the wiring is correct

Check the plug-in display (option in conjunction with head transmitters)

Error	Possible cause	Remedy
No display visible	No voltage supply	• Check the voltage supply to the head transmitter, terminals + and - • Check that the brackets are in the right position and check the connection between the display module and the head transmitter, ⇨Page 14 • If available, test the display module with another suitable head transmitter
	Display module is defective	Replace the module
	The head transmitter's electronics system is defective	Replace the head transmitter

11 Diagnosis and troubleshooting

Application error without status messages for RTD sensor connection

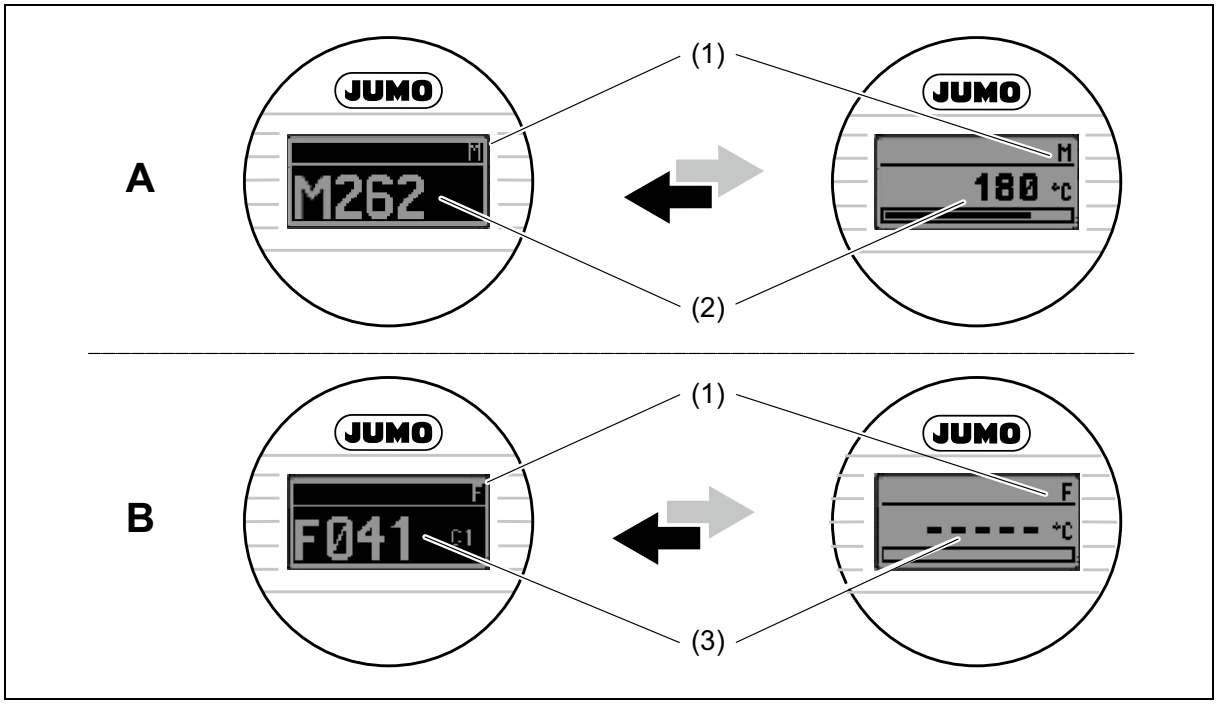
Error	Possible cause	Remedy
Measured value is wrong/inaccurate	The sensor's installation position is defective	Install the sensor correctly
	Heat lost through sensor	Note the sensor's insertion length
	Device programming is faulty (number of wires).	Change the device function **Connection type**
	Device programming is faulty (scaling)	Change the scaling
	Wrong RTD selected	Change the device function **Sensor type**
	Sensor connection	Check the sensor's connection
	Line resistance of the sensor (2-wire) has not been offset	Offset the line resistance
	Offset setting is wrong	Check the offset
Error current (≤ 3.6 mA or ≥ 21 mA)	The sensor is faulty	Check the sensor
	The RTD connection is wrong	Connect the connecting wires properly (terminal plan)
	Device programming is faulty (e.g., number of wires).	Change the device function **Connection type**
	Incorrect programming	The wrong type of sensor has been selected in the **Sensor type** device function; change it to the right type of sensor

Application error without status messages for TC sensor connection

Error	Possible cause	Remedy
Measured value is wrong/inaccurate	The sensor's installation position is defective	Install the sensor correctly
	Heat lost through sensor	Note the sensor's insertion length
	Device programming is faulty (scaling)	Change the scaling
	The wrong type of thermocouple TC has been selected	Change the device function **Sensor type**
	Wrong cold junction point set up	Configure the cold junction point correctly, ⇨ "Cold junction n ", Page 76
	Fault caused by the thermal wire welded into the protection tube (coupling of interference voltages)	Use a sensor where the thermal wire is not welded
	Offset setting is wrong	Check the offset
Error current (≤ 3.6 mA or ≥ 21 mA)	The sensor is faulty	Check the sensor
	Sensor is not connected correctly	Connect the connecting wires correctly ⇨chapter 5 "Electrical connection", Page 19
	Incorrect programming	The wrong type of sensor has been selected in the **Sensor type** device function; change it to the right type of sensor

11.2 Diagnostic events

11.2.1 Diagnostic event display



A Display for warning diagnostic response

B Display for alarm diagnostic response

(1) Status signal in the header

(2) Status is displayed alternately with the main measured value in the form of the corresponding letter (M, C or S) plus the defined error number.

(3) Status is displayed alternately with "- - - -" (no valid measured value available) in the form of the corresponding letter (F) plus the defined error number.

Status signals

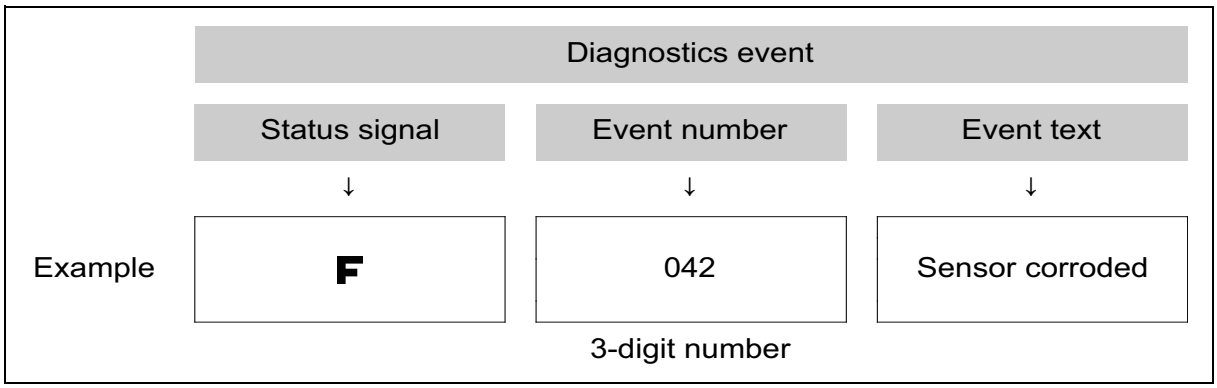
Symbol	Event category	Meaning
F	Operating fault	An operating fault has occurred. The measured value is no longer valid.
C	Service mode	The device is in service mode (e.g., during a simulation).
S	Outside the specification	The device is being operated outside of its technical specifications (e.g., during launch phase or cleaning).
M	Maintenance required	Maintenance is required. The measured value is still valid.

Diagnostic response

Alarm	Measurement interrupted. The signal outlets assume the defined alarm status. A diagnosis message is generated (status signal F).
Warning	The device continues to measure. A diagnosis message is generated (status signals M, C, or S).

Diagnostic event and event text

The fault can be identified with the diagnostic event. The event text helps by providing an indication of the fault.



If multiple diagnostic events occur at the same time, only the diagnosis message with the highest priority is displayed. Any other diagnosis messages are displayed in the **Diagnosis list** sub-menu, ⇨Page 95.

NOTE!

Previous diagnosis messages that are no longer valid are displayed in the **Event log** sub-menu, ⇨Page 95.

11.2.2 Overview of diagnostic events

Each diagnostic event is assigned to a particular event response at the factory. The user is able to change this allocation for certain diagnostic events.

NOTE!

The sensor input relevant for these diagnostic events can be identified with the **Current diagnostic channel** parameter or on the optional plug-in display.

Diagnosis no.	Brief text	Remedy	Status signal set at factory Can be changed to	Diagnostic response set at factory
Diagnosis for the sensor				
001	Device error	1) Restart the device. 2) Check the electrical connection to sensor 1. 3) Check/replace sensor 1. 4) Replace the electronics system.	F	Alarm
006	Redundancy active	1) Check the electrical wiring. 2) Replace the sensor. 3) Check the configuration of the connection type.	M	Warning

Diagnosis no.	Brief text	Remedy	Status signal set at factory Can be changed to	Diagnostic response set at factory
041	Sensor break	1) Check the electrical wiring. 2) Replace the sensor. 3) Check the configuration of the connection type.	F	Alarm
042	Sensor corrosion	1) Check the electrical wiring. 2) Replace the sensor.	M F	Warning[a]
043	Short-circuit	1) Check the electrical wiring. 2) Replace the sensor.	F	Alarm
044	Sensor drift	1) Check the sensors. 2) Check the process temperatures.	M F, S	Warning[a]
045	Working range	1) Check ambient temperature. 2) Check external reference measuring point.	F	Alarm
062	Sensor connection	1) Check the electrical wiring. 2) Replace the sensor. 3) Check the configuration of the connection type. 4) Contact service.	F	Alarm
101	Working range underrange	1) Check the process temperatures. 2) Check the sensor. 3) Check the sensor type.	S F	Warning
102	Working range overrange	1) Check the process temperatures. 2) Check the sensor. 3) Check the sensor type.	S F	Warning
104	Backup active	1) Check the electrical wiring for sensor 1. 2) Replace sensor 1. 3) Check the configuration of the connection type.	M	Warning
105	Calibration interval	1) Perform calibration and reset the calibration interval. 2) Switch off the calibration counter.	M F	Warning[a]
106	Backup not available	1) Check the electrical wiring for sensor 2. 2) Replace sensor 2. 3) Check the configuration of the connection type.	M	Warning
Diagnosis for electronics system				
201	Device error	Replace the electronics system.	F	Alarm
221	Reference measurement	Replace the electronics system.	F	Alarm
241	Software	1) Restart the device. 2) Reset the device. 3) Replace the device.	F	Alarm

Diagnosis no.	Brief text	Remedy	Status signal set at factory Can be changed to	Diagnostic response set at factory
242	Software incompatible	Contact service.	F	Alarm
261	Electronics module	Replace the electronics system.	F	Alarm
262	Short circuit in module connection	1) Check the position of the display module on the head transmitter. 2) Test the display module with another suitable head transmitter 3) Display module defective? Replace the module.	M	Warning
282	Memory	Replace the device.	F	Alarm
283	Content of memory	Replace the electronics system.	F	Alarm
301	Voltage supply	1) Increase the voltage supply. 2) Check the connection wires for corrosion.	F	Alarm
Diagnosis for configuration				
401	Factory reset	Please wait until the reset process is complete.	C	Warning
402	Initialization	Please wait until the start process is complete.	C	Warning
410	Data transmission	Check HART® communication.	F	Alarm
411	Download active	Please wait until the upload/download process is complete.	F, M or C[b]	-
431	Factory calibration[c]	Replace the electronics system.	F	Alarm
435	Linearization	1) Check the configuration of the sensor parameters. 2) Check the configuration of the particular sensor linearization. 3) Contact service. 4) Replace the electronics system.	F	Alarm
437	Configuration	1) Check the configuration of the sensor parameters. 2) Check the configuration of the particular sensor linearization. 3) Contact service. 4) Replace the electronics system.	F	Alarm
438	Data record	Complete a new, secure parameterization process.	F	Alarm
451	Data processing	Please wait until data processing is complete.	C	Warning

Diagnosis no.	Brief text	Remedy	Status signal set at factory Can be changed to	Diagnostic response set at factory
483	Simulation Input	Switch off simulation.	C	Warning
485	Simulation Measured value			
491	Simulation Current output			
525	HART® communication	1) Check the communication path. 2) Check the HART® master. 3) Enough power? 4) Check HART® communication settings. 5) Contact service.	F	Alarm
Diagnosis for processes				
803	Loop current	1) Check the wiring. 2) Replace the electronics system.	F	Alarm
842	Process limit value	Check the scaling of the analog output.	M F, S	Warning[a]
925	Device temperature	Maintain an ambient temperature in line with specification.	S F	Warning

[a] Diagnostic response can be changed: "Alarm" or "Warning"

[b] The status signal depends on the communications system used and cannot be changed.

[c] For this diagnostic event, the device always emits the alarm state "low" (output current ≤ 3.6 mA).

11.3 Returns

The device must be returned to the factory for repairs, factory calibration, delivery problems, or order problems. As an ISO-certified company and due to legal requirements, the manufacturer is obliged to apply special handling techniques to all products that are sent back to the factory and come into contact with media.

To make sure your device is sent back safely, correctly, and quickly, please read about the process and underlying conditions on the website http://www.jumo.net.

11.4 Disposal

The device contains electronic components and therefore needs to be treated as electronic waste upon disposal. Please also note any local disposal regulations in your country.

11 Diagnosis and troubleshooting

11.5 Software history and overview of compatibility

Change status

The firmware version (FW) on the nameplate and in the operating manual specifies the device's change status: XX.YY.ZZ (example 01.01.10).

XX Change to the main version, compatibility is no longer guaranteed, the device and operating manual have been changed.

YY Change to functions and operating principles, compatibility is guaranteed, the operating manual has been changed.

ZZ Errors have been rectified and internal changes have been made, the operating manual has not changed.

Date	Firmware version	Modifications	Operating manual
06/17	01.01.zz	Original firmware	70708000T90Z000K000 (DE) 70708000T90Z001K000 (EN) 70708000T90Z002K000 (FR)

12.1 Analog input

General information

Measurand	Temperature (temperature-linear transmission behavior), resistance and voltage.
Measuring range	It is possible to connect two mutually independent sensors.[a]. The measurement inputs are not galvanically isolated from each other.

[a] With a 2-channel measurement, the same measurement unit must be configured on both channels (e.g. both °C, °F, or K). Mutually independent 2-channel measurement of resistance/potentiometer (ohm) and voltage sensor (mV) is not possible. In this case, either both channels must be configured to "ohm" or both channels must be configured to "mV" .

RTD temperature probe

Standard	Designation[a]	α	Measuring range limits	Minimum measuring span
IEC 60751:2008	Pt100 (1)	0.003851 K^{-1}	-200 to +850 °C	10 K
	Pt200 (2)		-200 to +850 °C	
	Pt500 (3)		-200 to +500 °C	
	Pt1000 (4)		-200 to +250 °C	
JIS C1604:1984	Pt100 (5)	0.003916 K^{-1}	-200 to +510 °C	10 K
DIN 43760 IPTS-68	Ni100 (6)	0.006180 K^{-1}	-60 to +250 °C	10 K
	Ni120 (7)		-60 to +250 °C	
GOST 6651-94	Pt50 (8)	0.003910 K^{-1}	-85 to +1100 °C	10 K
	Pt100 (9)		-200 to +850 °C	
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	0.004280 K^{-1}	-180 to +200 °C	10 K
	Cu100 (11)		-180 to +200 °C	
	Ni100 (12)	0.006170 K^{-1}	-60 to +180 °C	
	Ni120 (13)		-60 to +180 °C	
OIML R84: 2003, GOST 6651-94	Cu50 (14)	0.004260 K^{-1}	-50 to +200 °C	10 K
-	Pt100 (Callendar–Van Dusen) nickel polynomial copper polynomial	-	The measuring range limits are defined by entering the limit values, which depend on the coefficients A to C and R0.	10 K
	• Connection type: two-wire, three-wire or four-wire connection, sensor current: ≤ 0.3 mA • On a two-wire circuit compensation for the wire resistance is possible (0 to 30 Ω) • On three-wire and four-wire connections: sensor wire resistance of up to 50 Ω max. per wire			

[a] The digits after the designations are used to clarify distinctions, e.g. for distinguishing the same sensors on the basis of different standards. They are also used for configuration and safe parameterization of the transmitter.

Resistance/potentiometer (Ω)

Standard	Designation	α	Measuring range limits	Minimum measuring span
-	Resistance (Ω)	-	10 to 400 Ω	10 Ω
			10 to 2000 Ω	10 Ω

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Thermocouples (TC)

Standard	Designation[a]	Measuring range limits		Minimum measuring span
		Possible temperature range	Recommended temperature range	
IEC 60584, part 1	Type A (W5Re-W20Re) (30)	0 to +2500 °C	0 to +2500 °C	50 K
	Type B (PtRh30-PtRh6) (31)	+40 to +1820 °C	+500 to +1820 °C	50 K
	Type E (NiCr-CuNi) (34)	-270 to +1000 °C	-150 to +1000 °C	50 K
	Type J (Fe-CuNi) (35)	-210 to +1200 °C	-150 to +1200 °C	50 K
	Type K (NiCr-Ni) (36)	-270 to +1372 °C	-150 to +1200 °C	50 K
	Type N (NiCrSi-NiSi) (37)	-270 to +1300 °C	-150 to +1300 °C	50 K
	Type R (PtRh13-Pt) (38)	-50 to +1768 °C	+50 to +1768 °C	50 K
	Type S (PtRh10-Pt) (39)	-50 to +1768 °C	+50 to +1768 °C	50 K
	Type T (Cu-CuNi) (40)	-260 to +400 °C	-150 to +400 °C	50 K
IEC 60584, part 1 ASTM E988-96	Type C (W5Re-W26Re) (32)	0 to +2315 °C	0 to +2000 °C	50 K
ASTM E988-96	Type D (W3Re-W25Re) (33)	0 to +2315 °C	0 to +2000 °C	50 K
DIN 43710	Type L (Fe-CuNi) (41)	-200 to +900 °C	-150 to +900 °C	50 K
	Type U (Cu-CuNi) (42)	-200 to +600 °C	-150 to +600 °C	50 K
GOST R8.8585-2001	Type L (NiCr-CuNi/Chromel-Copel) (43)	-200 to +800 °C	-200 to +800 °C	50 K
-	• Internal cold junction (Pt100) • External cold junction: adjustable value from -40 to +85 °C • Maximum sensor wire resistance 10 kΩ (if the sensor wire resistance is greater than 10 kΩ then an error message will be output in accordance with NAMUR NE89)			

[a] The digits after the designations are used to clarify distinctions, e.g. for distinguishing the same sensors on the basis of different standards. They are also used for configuration and safe parameterization of the transmitter.

Voltage sensor (mV)

Standard	Designation	α	Measuring range limits	Minimum measuring span
-	Millivolt sensor (mV)	-	-20 to 100 mV	5 mV

Connection combinations

If both sensor inputs are assigned then the following connection combinations are possible:

		Sensor input 1			
		RTD or resistance/ potentiometer, two-wire	RTD or resistance/ potentiometer, three-wire	RTD or resistance/ potentiometer, four-wire	Thermocouple (TC), voltage sensor
Sensor input 2	RTD or resistance/ potentiometer, two-wire	☑	☑	☐	☑
	RTD or resistance/ potentiometer, three-wire	☑	☑	☐	☑
	RTD or resistance/ potentiometer, four-wire	☐	☐	☐	☐
	Thermocouple (TC), voltage sensor	☑	☑	☑	☑

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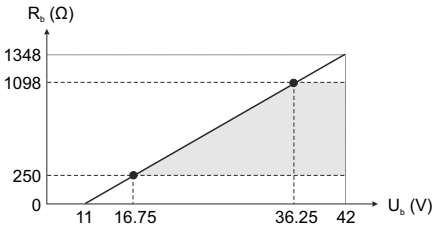
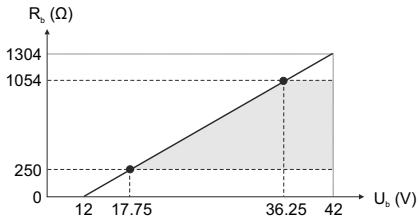
12.2 Output

Output signal	4 to 20 mA, 20 to 4 mA (invertible)	
Signal coding	FSK ±0.5 mA via current signal	
Data transmission speed	1200 baud	
Galvanic isolation	U = AC 2 kV (input/output)	
Failure information in accordance with NAMUR NE43	Is generated if the measurement information is invalid or missing. A complete list of all errors that have occurred in the measurement device is emitted.	
Measuring range underflow	Linear drop from 4.0 to 3.8 mA	
Measuring range overflow	Linear rise from 20.0 to 20.5 mA	
Failure (sensor breakage, sensor short circuit, ...)	≤ 3.6 mA ("low") or ≥ 21 mA ("high") can be selected. The alarm setting "high" is adjustable between 21.5 mA and 23 mA and thus offers the flexibility required to meet the requirements of different control systems. In SIL mode only the alarm setting "low" is possible.	
Burden	Head transmitter: $R_{b\ max.} = (U_{b\ max.} – 11\ V) / 0.023\ A$ (current output) 	DIN rail device: $R_{b\ max.} = (U_{b\ max.} – 12\ V) / 0.023\ A$ (current output) 
Linearization/transmission behavior	Temperature-linear, resistance-linear, voltage-linear	
Mains frequency filter	50/60 Hz	
Filter	Digital 1st-order filter: 0 to 120 s	
Protocol-specific data		
HART version	7	
Device address in multidrop mode[a]	Software setting addresses 0 to 63	
Device description files (DD)	Information and files freely available on the Internet from: www.jumo.net	
Burden (communication resistance)	At least 250 Ω	
Write protection for device parameters		
Hardware	On the optional BD7 plug-in display of the head transmitter via DIP switch	
Software	Via password	
Switch-on delay	• Approx. 10 s[b] Until the start of HART communication; I_a ≤ 3.8 mA during switch-on delay • Approx. 28 s until the first valid measured value signal is present at the current output; I_a ≤ 3.8 mA during the switch-on delay	

[a] Not possible in SIL mode; refer to the safety manual for the JUMO dTRANS T07 series (SIL versions).

[b] Does not apply to SIL mode; refer to the safety manual for the JUMO dTRANS T07 series (SIL versions).

12.3 Features

Physical input measuring range of the sensors

Cu50, Cu100, RTD polynomial, Pt50, Pt100, Ni100, Ni120	10 to 400 Ω
Pt200, Pt500, Pt1000	10 to 2000 Ω
Thermocouple types: A, B, C, D, E, J, K, L, N, R, S, T, U	-20 to 100 mV

Response time

The update of the measured value depends on the sensor type and the circuit type, and is in the following ranges:

RTD temperature probe	0.9 to 1.3 s (depending on the circuit type two/three/four-wire)
Thermocouples (TC)	0.8 s
Reference temperature	0.9 s

When recording step responses, it must be taken into account that, where applicable, the times for the measurement of the second channel and the internal reference measuring point are added to the stated times.

Reference conditions

Calibration temperature	+25 °C ±3 K
Voltage supply	DC 24 V
Electrical circuit	Four-wire circuit for resistance calibration

12.3.1 Measurement deviation

Measurement deviation according to DIN EN 60770 and the reference conditions stated above. The specifications for the measurement deviation correspond to ±2 σ (Gaussian normal distribution). The specification includes nonlinearities and repeatability.

Typical measurement deviation for RTD temperature probes

Standard	**Designation**	**Measuring range**	**Typical measurement deviation** (±)	
			Digital value[a]	**Value at the current output**
IEC 60751:2008	Pt100 (1)	0 to +200 °C	0.08 °C	0.1 °C
IEC 60751:2008	Pt1000 (4)		0.08 °C	0.1 °C
GOST 6651-94	Pt100 (9)		0.07 °C	0.09 °C

[a] Measured value transferred via HART®.

Typical measurement deviation for thermocouples (TC)

Standard	**Designation**	**Measuring range**	**Typical measurement deviation** (±)	
			Digital value[a]	**Value at the current output**
Thermocouples (TC) compliant with the standard				
IEC 60584, part 1	Type K (NiCr-Ni) (36)	0 to +800 °C	0.31 °C	0.39 °C
IEC 60584, part 1	Type S (PtRh10-Pt) (39)		0.97 °C	1.0 °C
GOST R8.8585-2001	Type L (NiCr-CuNi) (43)		2.18 °C	2.2 °C

[a] Measured value transferred via HART®.

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Maximum measurement deviation for RTD temperature probes

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value[d]	
IEC 60751:2008	Pt100 (1)	-200 to +850 °C	≤ 0.12 °C	0.06 °C + 0.006 % × (MV - MRS)	0.03 % (≙ 4.8 µA)
	Pt200 (2)	-200 to +850 °C	≤ 0.28 °C	0.12 °C + 0.015 % × (MV - MRS)	
	Pt500 (3)	-200 to +500 °C	≤ 0.15 °C	0.05 °C + 0.014 % × (MV - MRS)	
	Pt1000 (4)	-200 to +250 °C	≤ 0.09 °C	0.03 °C + 0.013 % × (MV - MRS)	
JIS C1604:1984	Pt100 (5)	-200 to +510 °C	≤ 0.09 °C	0.05 °C + 0.006 % × (MV - MRS)	
DIN 43760 IPTS-68	Ni100 (6)	-60 to +250 °C	≤ 0.05 °C	0.05 °C - 0.006 % × (MV - MRS)	
	Ni120 (7)	-60 to +250 °C	≤ 0.05 °C	0.05 °C - 0.006 % × (MV - MRS)	
GOST 6651-94	Pt50 (8)	-85 to +1100 °C	≤ 0.21 °C	0.10 °C + 0.008 % × (MV - MRS)	
	Pt100 (9)	-200 to +850 °C	≤ 0.11 °C	0.05 °C + 0.006 % × (MV - MRS)	
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	-180 to +200 °C	≤ 0.12 °C	0.10 °C + 0.006 % × (MV - MRS)	
	Cu100 (11)	-180 to +200 °C	≤ 0.06 °C	0.05 °C + 0.003 % × (MV - MRS)	
	Ni100 (12)	-60 to +180 °C	≤ 0.06 °C	0.06 °C - 0.006 % × (MV - MRS)	
	Ni120 (13)	-60 to +180 °C	≤ 0.05 °C	0.05 °C - 0.006 % × (MV - MRS)	
OIML R84: 2003, GOST 6651-94	Cu50 (14)	-50 to +200 °C	≤ 0.11 °C	0.10 °C + 0.004 % × (MV - MRS)	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Maximum measurement deviation for resistors/potentiometers

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value	
-	Resistance Ω	10 to 400 Ω	33 mΩ	21 mΩ + 0.003 % × (MV - MRS)	0.03 % (≙ 4.8 µA)
		10 to 2000 Ω	310 mΩ	35 mΩ + 0.010 % × (MV - MRS)	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

Maximum measurement deviation for thermocouples (TC)

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value[d]	
IEC 60584-1	Type A (30)	0 to +2500 °C	≤ 1.33 °C	0.80 °C + 0.021 % × (MV - MRS)	0.03 % (≙ 4.8 µA)
	Type B (31)	+500 to +1820 °C	≤ 1.43 °C	1.43 °C - 0.060 % × (MV - MRS)	
IEC 60584-1/ ASTM E988-96	Type C (32)	0 to +2000 °C	≤ 0.66 °C	0.55 °C + 0.055 % × (MV - MRS)	
ASTM E988-96	Type D (33)		≤ 0.75 °C	0.85 °C - 0.008 % × (MV - MRS)	
IEC 60584-1	Type E (34)	-150 to +1000 °C	≤ 0.22 °C	0.22 °C - 0.006 % × (MV - MRS)	
	Type J (35)	-150 to +1200 °C	≤ 0.27 °C	0.27 °C - 0.005 % × (MV - MRS)	
	Type K (36)		≤ 0.35 °C	0.35 °C - 0.005 % × (MV - MRS)	
	Type N (37)	-150 to +1300 °C	≤ 0.48 °C	0.48 °C - 0.014 % × (MV - MRS)	
	Type R (38)	+50 to +1768 °C	≤ 1.12 °C	1.12 °C - 0.030 % × (MV - MRS)	
	Type S (39)		≤ 1.15 °C	1.15 °C - 0.022 % × (MV - MRS)	
	Type T (40)	-150 to +400 °C	≤ 0.35 °C	0.35 °C - 0.040 % × (MV - MRS)	
DIN 43710	Type L (41)	-150 to +900 °C	≤ 0.29 °C	0.29 °C - 0.009 % × (MV - MRS)	
	Type U (42)	-150 to +600 °C	≤ 0.33 °C	0.33 °C - 0.028 % × (MV - MRS)	
GOST R8.8585-2001	Type L (43)	-200 to +800 °C	≤ 2.20 °C	2.20 °C - 0.015 % × (MV - MRS)	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Maximum measurement deviation for voltage sensor (mV)

Standard	Designation	Measuring range	Measurement deviation (±)		
			Digital[a]		D/A[b]
			Maximum[c]	Related to the measured value[d]	
-	-	-20 to +100 mV	10,7 µV	7,7 µV + 0.0025 % × (MV – MRS)	4.8 µA

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Calculation examples for measurement deviations

Sample calculation 1 with Pt100 (1) and the following parameters:

- Measured value (MV) = +200 °C
- Ambient temperature = +25 °C (same as reference conditions)
- Voltage supply = DC 24 V (same as reference conditions)

Measurement deviation digital = 0.06 °C + 0.006 % × (200 °C – (-200 °C))	0.084 °C
Measurement deviation D/A = 0.03 % × 200 °C	0.06 °C

This results in:

Measurement deviation of digital value (HART)	**0.084 °C**
Measurement deviation of analog value (current output) $\sqrt{(\text{measurement deviation digital}^2 + \text{measurement deviation D/A}^2)}$	**0.103 °C**

Sample calculation 2 with Pt100 (1) and the following parameters:

- Measured value (MV) = +200 °C
- Ambient temperature = +35 °C (10 K higher than reference conditions)
- Voltage supply = DC 30 V (6 V higher than reference conditions)

Measurement deviation digital = 0.06 °C + 0.006 % × (200 °C – (-200 °C))	0.084 °C
Measurement deviation D/A = 0.03 % × 200 °C	0.06 °C
Influence of the ambient temperature[a] Digital = (35 – 25) × (0.002 % × 200 °C – (-200 °C)), at least 0.005 °C	0.08 °C
Influence of ambient temperature[a] D/A = (35 – 25) × (0.001 % × 200 °C)	0.02 °C
Influence of voltage supply[a] digital = (30 – 24) × (0.002 % × 200 °C – (-200 °C)), at least 0.005 °C	0.048 °C
Influence of voltage supply[a] D/A = (30 – 24) × (0.001 % × 200 °C)	0.012 °C

[a] See table "Operating influences ", Page 57.

This results in:

Measurement deviation of digital value (HART) = $\sqrt{(\text{measurement deviation digital}^2 + \text{influence of ambient temperature digital}^2 + \text{influence of voltage supply digital}^2)}$	**0.126 °C**
Measurement deviation of analog value (current output) = $\sqrt{(\text{measurement deviation digital}^2 + \text{measurement deviation D/A}^2 + \text{influence of ambient temperature digital}^2 + \text{influence of ambient temperature D/A}^2 + \text{influence of voltage supply digital}^2 + \text{influence of voltage supply D/A}^2)}$	**0.141 °C**

The specifications for the measurement deviation correspond to 2 σ (Gaussian normal distribution).

Different measurement deviations apply in SIL mode ⇨ SIL safety manual for dTRANS T07 series (SIL designs).

12.3.2 Operating influences

The specifications for the measurement deviation correspond to 2 σ (Gaussian normal distribution).

Operating influences 'ambient temperature' and 'voltage supply' for RTD temperature probes

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value[d]		Maximum[c]	Related to the measured value[d]	
IEC 60751:2008	Pt100 (1)	≤ 0.02 °C	0.002 % × (MV – MRS), at least 0.005 °C	0.001 %	≤ 0.12 °C	0.002 % × (MV – MRS), at least 0.005 °C	0.001 %
	Pt200 (2)	≤ 0.026 °C			≤ 0.26 °C		
	Pt500 (3)	≤ 0.014 °C	0.002 % × (MV – MRS), at least 0.009 °C		≤ 0.14 °C	0.002 % × (MV – MRS), at least 0.009 °C	
	Pt1000 (4)	≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.004 °C		≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.004 °C	
JIS C1604:1984	Pt100 (5)	≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.005 °C		≤ 0.01 °C	0.002 % × (MV – MRS), at least 0.005 °C	
DIN 43760, IPTS-68	Ni100 (6)	≤ 0.005 °C			≤ 0.005 °C		
	Ni120 (7)	≤ 0.005 °C			≤ 0.005 °C		
GOST 6651-94	Pt50 (8)	≤ 0.03 °C	0.002 % × (MV – MRS), at least 0.01 °C		≤ 0.03 °C	0.002 % × (MV – MRS), at least 0.01 °C	
	Pt100 (9)	≤ 0.02 °C	0.002 % × (MV – MRS), at least 0.005 °C		≤ 0.02 °C	0.002 % × (MV – MRS), at least 0.005 °C	
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	≤ 0.008 °C			≤ 0.008 °C		
	Cu100 (11)	≤ 0.008 °C	0.002 % × (MV – MRS), at least 0.004 °C		≤ 0.008 °C	0.002 % × (MV – MRS), at least 0.004 °C	
	Ni100 (12)	≤ 0.004 °C			≤ 0.004 °C		
	Ni120 (13)	≤ 0.004 °C			≤ 0.004 °C		
OIML R84: 2003, GOST 6651-94	Cu50 (14)	≤ 0.008 °C			≤ 0.008 °C		

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

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Operating influences 'ambient temperature' and 'voltage supply' for resistors/potentiometers (Ω)

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value[d]		Maximum[c]	Related to the measured value[d]	
-	10 to 400 Ω	≤ 6 mΩ	0.015 % × (MV – MRS), at least 1.5 mΩ	0.001 %	≤ 6 mΩ	0.015 % × (MV – MRS), at least 1.5 mΩ	0.001 %
-	10 to 2000 Ω	≤ 30 mΩ	0.015 % × (MV – MRS), at least 15 mΩ		≤ 30 mΩ	0.015 % × (MV – MRS), at least 15 mΩ	

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

Operating influences 'ambient temperature' and 'voltage supply' for thermocouples (TC)

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value[d]		Maximum[c]	Related to the measured value[d]	
IEC 60584-1	Type A (30)	≤ 0.14 °C	0.0055 % × (MV – MRS), at least 0.03 °C	0.001 %	≤ 0.14 °C	0.0055 % × (MV – MRS), at least 0.03 °C	0.001 %
	Type B (31)	≤ 0.06 °C			≤ 0.06 °C		
IEC 60584-1/ ASTM E988-96	Type C (32)	≤ 0.09 °C	0.0045 % × (MV – MRS), at least 0.03 °C		≤ 0.09 °C	0.0045 % × (MV – MRS), at least 0.03 °C	
ASTM E988-96	Type D (33)	≤ 0.08 °C	0.004 % × (MV – MRS), at least 0.035 °C		≤ 0.08 °C	0.004 % × (MV – MRS), at least 0.035 °C	
IEC 60584-1	Type E (34)	≤ 0.03 °C	0.003 % × (MV – MRS), at least 0.016 °C		≤ 0.03 °C	0.003 % × (MV – MRS), at least 0.016 °C	
	Type J (35)	≤ 0.02 °C	0.0028 % × (MV – MRS), at least 0.02 °C		≤ 0.02 °C	0.0028 % × (MV – MRS), at least 0.02 °C	
	Type K (36)	≤ 0.04 °C	0.003 % × (MV – MRS), at least 0.013 °C		≤ 0.04 °C	0.003 % × (MV – MRS), at least 0.013 °C	
	Type N (37)	≤ 0.04 °C	0.0028 % × (MV – MRS), at least 0.02 °C		≤ 0.04 °C	0.0028 % × (MV – MRS), at least 0.02 °C	
	Type R (38)	≤ 0.06 °C	0.0035 % × (MV – MRS), at least 0.047 °C		≤ 0.06 °C	0.0035 % × (MV – MRS), at least 0.047 °C	
	Type S (39)	≤ 0.05 °C			≤ 0.05 °C		
	Type T (40)	≤ 0.01 °C			≤ 0.01 °C		
DIN 43710	Type L (41)	≤ 0.02 °C			≤ 0.02 °C		
	Type U (42)	≤ 0.01 °C			≤ 0.01 °C		
GOST R8.8585-2001	Type L (43)	≤ 0.01 °C			≤ 0.01 °C		

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

[d] MV = measured value; MRS = measuring range start of the relevant sensor.

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Operating influences 'ambient temperature' and 'voltage supply' for voltage sensors (mV)

Standard	Designation	Ambient temperature: Effect (±) per 1 °C change			Voltage supply: Effect (±) per 1 V change		
		Digital[a]		D/A[b]	Digital[a]		D/A[b]
		Maximum[c]	Related to the measured value		Maximum[c]	Related to the measured value	
-	-20 to 100 mV	≤ 3 µV		0.001 %	≤ 3 µV		0.001 %

[a] Measured value transferred via HART®.

[b] Percentage data related to the configured measuring span of the analog output signal.

[c] Maximum measurement deviation related to the stated measuring range.

12.3.3 Long-term drift

Long-term drift of RTD temperature probe

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	After 3 years	After 5 years
		Related to the measured value		
IEC 60751:2008	Pt100 (1)	≤ 0.016 % × (VM - DEM) or 0.04 °C	≤ 0.025 % × (VM - DEM) or 0.05 °C	≤ 0.028 % × (VM - DEM) or 0.06 °C
	Pt200 (2)	0.25 °C	0.41 °C	0.50 °C
	Pt500 (3)	≤ 0.018 % × (VM - DEM) or 0.08 °C	≤ 0.03 % × (VM - DEM) or 0.14 °C	≤ 0.036 % × (VM - DEM) or 0.17 °C
	Pt1000 (4)	≤ 0.0185 % × (VM - DEM) or 0.04 °C	≤ 0.031 % × (VM - DEM) or 0.07 °C	≤ 0.038 % × (VM - DEM) or 0.08 °C
JIS C1604:1984	Pt100 (5)	≤ 0.015 % × (VM - DEM) or 0.04 °C	≤ 0.024 % × (VM - DEM) or 0.07 °C	≤ 0.027 % × (VM - DEM) or 0.08 °C
DIN 43760, IPTS-68	Ni100 (6)	0.04 °C	0.05 °C	0.06 °C
	Ni120 (7)	0.04 °C	0.05 °C	0.06 °C
GOST 6651-94	Pt50 (8)	≤ 0.017 % × (VM - DEM) or 0.07 °C	≤ 0.027 % × (VM - DEM) or 0.12 °C	≤ 0.030 % × (VM - DEM) or 0.14 °C
	Pt100 (9)	≤ 0.016 % × (VM - DEM) or 0.04 °C	≤ 0.025 % × (VM - DEM) or 0.07 °C	≤ 0.028 % × (VM - DEM) or 0.07 °C
OIML R84: 2003, GOST 6651-2009	Cu50 (10)	0.06 °C	0.09 °C	0.11 °C
	Cu100 (11)	≤ 0.015 % × (VM - DEM) or 0.04 °C	≤ 0.024 % × (VM - DEM) or 0.06 °C	≤ 0.027 % × (VM - DEM) or 0.06 °C
	Ni100 (12)	0.03 °C	0.05 °C	0.06 °C
	Ni120 (13)	0.03 °C	0.05 °C	0.06 °C
OIML R84: 2003, GOST 6651-94	Cu50 (14)	0.06 °C	0.09 °C	0.10 °C

[a] The higher value is valid.

Long-term drift for resistors/potentiometers (Ω)

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	After 3 years	After 5 years
		Related to the measured value		
-	10 to 400 Ω	≤ 0.0122 % × (MV - MRS) or 12 mΩ	≤ 0.02 % × (MV - MRS) or 20 mΩ	≤ 0.022 % × (MW - MBA) or 22 mΩ

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	After 3 years	After 5 years
		Related to the measured value		
-	10 to 2000 Ω	≤ 0.015 % × (MV - MRS) or 144 mΩ	≤ 0.024 % × (MV - MRS) or 240 mΩ	≤ 0.03 % × (MV - MRS) or 295 mΩ

[a] The higher value is valid.

Long-term drift for thermocouples (TC)

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	After 3 years	After 5 years
		Related to the measured value		
IEC 60584-1	Type A (30)	≤ 0.048 % × (MV - MRS) or 0.46 °C	≤ 0.072 % × (MV - MRS) or 0.69 °C	≤ 0.1 % × (MV - MRS) or 0.94 °C
	Type B (31)	1.08 °C	1.63 °C	2.23 °C
IEC 60584-1/ ASTM E988-96	Type C (32)	≤ 0.038 % × (MV - MRS) or 0.41 °C	≤ 0.057 % × (MV - MRS) or 0.62 °C	≤ 0.078 % × (MV - MRS) or 0.85 °C
ASTM E988-96	Type D (33)	≤ 0.035 % × (MV - MRS) or 0.57 °C	≤ 0.052 % × (MV - MRS) or 0.86 °C	≤ 0.071 % × (MV - MRS) or 1.17 °C
IEC 60584-1	Type E (34)	≤ 0.024 % × (MV - MRS) or 0.15 °C	≤ 0.037 % × (MV - MRS) or 0.23 °C	≤ 0.05 % × (MV - MRS) or 0.31 °C
	Type J (35)	≤ 0.025 % × (MV - MRS) or 0.17 °C	≤ 0.037 % × (MV - MRS) or 0.25 °C	≤ 0.051 % × (MV - MRS) or 0.34 °C
	Type K (36)	≤ 0.027 % × (MV - MRS) or 0.23 °C	≤ 0.041 % × (MV - MRS) or 0.35 °C	≤ 0.056 % × (MV - MRS) or 0.48 °C
	Type N (37)	0.36 °C	0.55 °C	0.75 °C
	Type R (38)	0.83 °C	1.26 °C	1.72 °C
	Type S (39)	0.84 °C	1.27 °C	1.73 °C
	Type T (40)	0.25 °C	0.37 °C	0.51 °C
DIN 43710	Type L (41)	0.20 °C	0.31 °C	0.42 °C
	Type U (42)	0.24 °C	0.37 °C	0.50 °C
GOST R8.8585-2001	Type L (43)	0.22 °C	0.33 °C	0.45 °C

[a] The higher value is valid.

Long-term drift for voltage sensor (mV)

Standard	Designation	Long-term drift (±)[a]		
		After 1 year	After 3 years	After 5 years
		Related to the measured value		
-	-20 to 100 mV	≤ 0.027 % × (MV - MRS) or 5.5 µV	≤ 0.041 % × (MV - MRS) or 8.2 µV	≤ 0.056 % × (MV - MRS) or 11.2 µV

[a] The higher value is valid.

Long-term drift for analog output

Long-term drift[a] (±)		
After 1 year	**After 3 years**	**After 5 years**
0.021 %	0.029 %	0.031 %

[a] Percentages related to the configured span of the analog output signal.

Influence of the reference point

Pt100 DIN IEC 60751 class B (internal cold junction on thermocouples (TC)).

12.3.4 Sensor calibration

Sensor transmitter matching	RTD sensors are among the most linear of all temperature measuring elements. Nonetheless, it is still necessary to linearize the output. For significant improvement of the temperature measurement accuracy, the device enables the use of two methods: • **Callendar–Van Dusen coefficient (Pt100 RTD temperature probe)** The Callendar–Van Dusen equation is described as follows: $R_T = R_0 [1 + AT + BT^2 + C (T–100) T^3]$ Coefficients A, B, and C are used to adapt sensors (platinum) and transmitters in order to improve the accuracy of the measuring system. The coefficients for a standard sensor are specified in IEC 60751. If no standard sensor is available or if you require even higher accuracy, the coefficients for each sensor can be calculated specifically with the help of sensor calibration. • **Linearization for copper/nickel RTD temperature probes** The equation for the polynomial for copper/nickel is described as follows: $R_T = R_0 (1 + AT + BT^2)$ The coefficients A and B serve to linearize nickel or copper RTD temperature probes. The exact values for the coefficients are taken from the calibration data and are specific to every sensor. The sensor-specific coefficients are then transmitted to the transmitter. Sensor/transmitter matching with one of the methods stated above significantly improves the accuracy of the temperature measurement of the overall system. This results from the fact that the transmitter uses the specific data of the connected sensor rather than the standardized sensor curve data for calculation of the measured temperature.
Single-point calibration (offset)	Shift of the sensor value
Two-point calibration (sensor trimming)	Correction (slope and offset) of the measured sensor value at the input of the transmitter.

Calibration of the current output

Correction of the 4 or 20 mA current output value (not possible in SIL operation).

12.4 Voltage supply

Devices without Ex-approval

Voltage supply	(protected against polarity reversal)
Head transmitter	DC 11 V ≤ V_{cc} ≤ 42 V (standard)
	DC 11 V ≤ V_{cc} ≤ 32 V (SIL operation)
DIN rail device	DC 12 V ≤ Vcc ≤ 42 V (standard)
	DC 12 V ≤ Vcc ≤ 32 V (SIL operation)
Current consumption	
Typical	3.6 to 23 mA
Minimum current consumption	3.5 mA (4 mA in multidrop mode, not possible in SIL operation)
Current limit	≤ 23 mA
Residual ripple	Permanent residual ripple U_{ss} ≤ 3 V with U_b ≥ 13.5 V, f_{max} = 1 kHz

Head transmitters with Ex-approval

	Sensor circuit			Auxiliary energy circuit
Max. voltage U_0	DC 7,6 V			--
Max. current I_0	13 mA			--
Max. power P_0	24.7 mW			--
Max. voltage U_i	--			30 V
Max. current I_i	--			130 mA
Max. power P_i	--			800 mW
Max. internal inductance L_i	negligible			negligible
Max. internal capacitance C_i	negligible			negligible
Gas group	Ex ia IIC	Ex ia IIB	Ex ia IIA	--
Max. external inductance L_o	10 mH	50 mH	50 mH	--
Max. external capacitance C_o	1 µF	4.5 µF	6.7 µF	--

DIN rail devices with Ex-approval

	Sensor circuit			Auxiliary energy circuit
Max. voltage U_0	DC 9 V			--
Max. current I_0	13 mA			--
Max. power P_0	29.3 mW			--
Max. voltage U_i	--			30 V
Max. current I_i	--			130 mA
Max. power P_i	--			770 mW
Max. internal inductance L_i	negligible			negligible
Max. internal capacitance C_i	negligible			negligible
Gas group	Ex ia IIC	Ex ia IIB	Ex ia IIA	--
Max. external inductance L_o	5 mH	20 mH	50 mH	--
Max. external capacitance C_o	0.93 µF	3.8 µF	4.8 µF	--

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12.5 Environmental influences

Ambient temperature for all devices **without** Ex-approval

Standard operation	-40 to +85 °C
SIL operation	-40 to +70 °C

Ambient temperature for head transmitters **with** Ex-approval (**without** display)

Temperature class	**Ambient temperature zone 1**	**Ambient temperature zone 0**
T6	-40 to +58 °C	-40 to +46 °C
T5	-40 to +75 °C	-40 to +60 °C
T4	-40 to +85 °C	-40 to +60 °C

Ambient temperature for head transmitters **with** Ex-approval (**with** display[a])

Temperature class	**Ambient temperature zone 1**	**Ambient temperature zone 0**
T6	-40 to +55 °C	--
T5	-40 to +70 °C	--
T4	-40 to +85 °C	--

[a] At temperatures below -20 °C the display may react sluggishly; at temperatures below -30 °C the display may no longer be readable.

Ambient temperature for DIN rail devices **with** Ex-approval

Temperature class	**Ambient temperature zone 1**	**Ambient temperature zone 0**
T6	-40 to +46 °C	--
T5	-40 to +61 °C	--
T4	-40 to +85 °C	--

Storage temperature	
Head transmitter	-50 to +100 °C
DIN rail device	-40 to +100 °C
Altitude	Up to 4000 m above mean sea level in accordance with IEC 61010-1, CAN/CSA C22.2 No. 61010-1
Climate class	
Head transmitter	Climate class C1 in accordance with EN 60654-1
DIN rail device	Climate class B2 in accordance with EN 60654-1
Humidity	
Condensation in accordance with IEC 60 068-2-33	Permissible for head transmitter in terminal head form B, not permissible for DIN rail device
Maximum relative humidity	95 % in accordance with IEC 60068-2-30
Protection type	
Head transmitter	IP00
Head transmitter in the field enclosure	IP66/67 (NEMA Type 4x encl.)
DIN rail device	IP20
Shock and vibration resistance	Shock resistance in accordance with KTA 3505 (section 5.8.4 Shock test)
Head transmitter	2 to 100 Hz at 4 g (increased vibration stress)
DIN rail device	2 to 100 Hz at 0.7 g (general vibration stress)

Electromagnetic compatibility (EMC)	In accordance with all relevant requirements of the IEC/EN 61326 series and the NAMUR EMC Recommendation (NE21). Details can be found in the declaration of conformity. All tests were passed both with and without the digital HART communication running. Maximum measurement deviation < 1 % of the measuring range
Interference immunity	Industrial requirement
Interference emission	Class B – Households and small businesses
Measurement category	Measurement category II in accordance with IEC 61010-1. The measurement category is intended for measurements in electrical circuits that are electrically connected directly to the low-voltage network.
Pollution degree	Pollution degree 2 in accordance with IEC 61010-1

12.6 Case

All materials used are RoHS compliant.

	Versions for B-head mounting	**Versions for DIN-rail mounting**
Material of enclosure body	Polycarbonate (PC), corresponds to UL94, V-2 UL recognized	
Material of connection terminals	Nickel-plated brass with gold-plated contacts	
Potting material	WEVO PU 403 FP / FL	-
Terminal design	Screw terminals	
Wire design	Rigid or flexible[a]	
Conductor cross section	≤ 2.5 mm^2 (14 AWG)	
Mounting types	In terminal head, form B	On DIN-rail
	In field enclosure (wall or pipe mounting)	
	On DIN rail (with mounting element)	
Installation position	Any	
Weight	~ 40 to 50 g	~ 100 g

[a] Recommendation: do not use ferrules.

12 Technical data

12.7 Approvals and approval marks

The current editions of all safety-relevant standards can be found in the declarations of conformity, which are shown in the safety manuals for the device. The declarations of conformity are also available for download on the manufacturer's website.

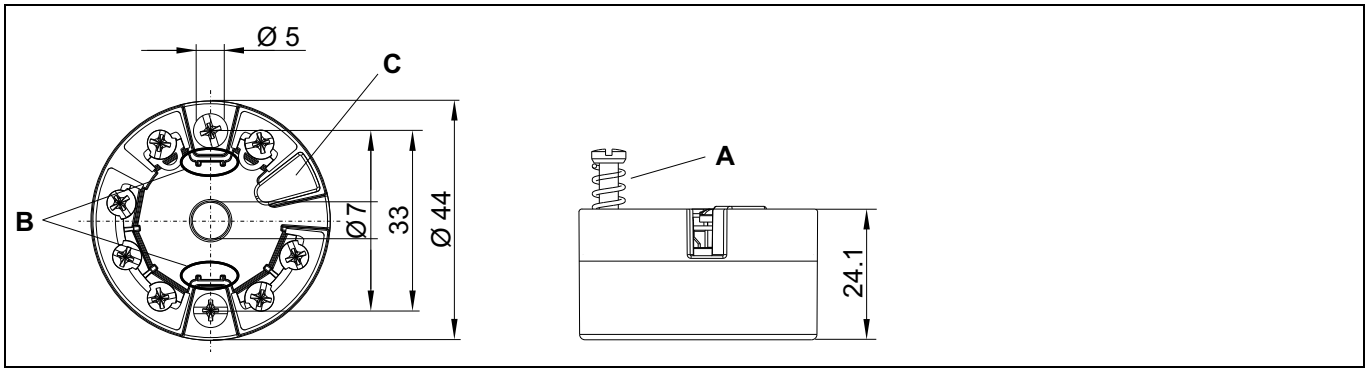
Transmitter dTRANS T07

Approval mark		Test facility	Certificate/ Certification number	Inspection basis	Valid for
ATEX	II1G Ex ia IIC T6…T4 Ga	Buero Veritas	EPS 17 ATEX 1 129 X	EN 60079-0	Type 707085/... Type 707086/...
	II2G Ex ia IIC T6…T4 Gb				
	II2(1)G Ex ib [ia Ga] IIC T6…T4 Gb				Type 707087/... Type 707088/...
IECEx	Ex ia IIC T6…T4 Ga	Buero Veritas	IECEx EPS 17.0075X	IEC 60079-0	Type 707085/... Type 707086/...
	Ex ia IIC T6…T4 Gb				
	Ex ib [ia Ga] IIC T6…T4 Gb				Type 707087/... Type 707088/...
SIL	2/3	TÜV Süd	Z10 17 05 01028 0001	IEC 61508	Type 707081/... Type 707083/... Type 707086/... Type 707088/...
c UL us		Underwriters Laboratories	E201387	UL 61010-1, CAN/ CSA-22.2 No. 61010-1	All types

Plug-in display BD7

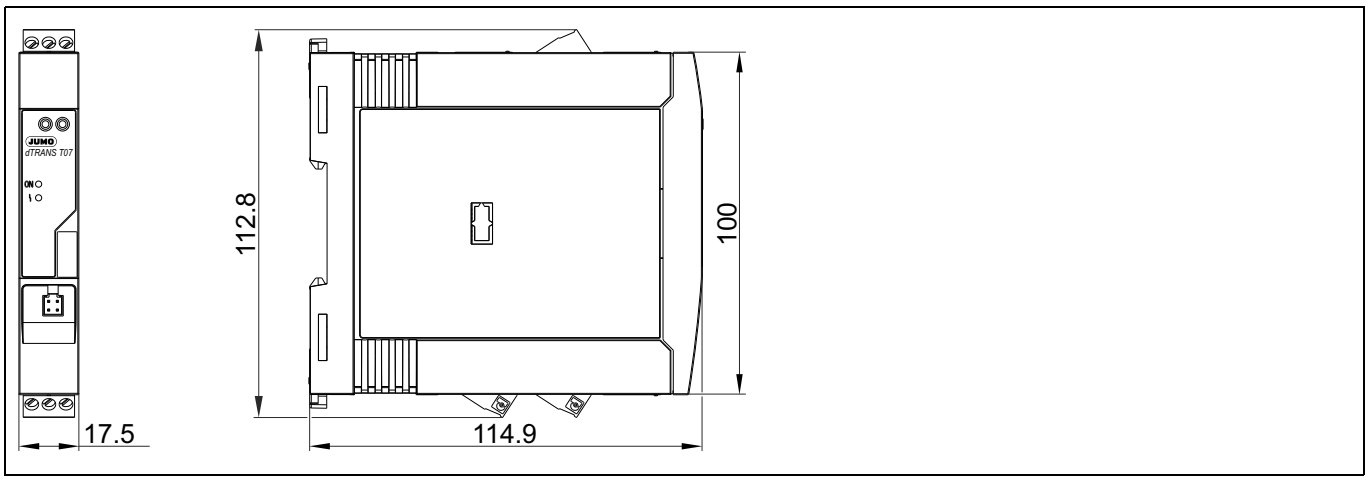
Approval mark		Test facility	Certificate/ Certification number	Inspection basis	Valid for
ATEX	II2G Ex ia IIC T6…T4 Gb	Buero Veritas	EPS 18 ATEX 1 113 X	EN 60079-0	BD7
IECEx	Ex ia IIC T6…T4 Gb	Buero Veritas	IECEx EPS 18.0048X	IEC 60079-0	

Head transmitter

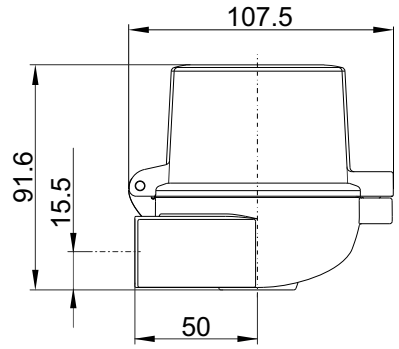


A Spring deflection mounting screws ≥ 5 mm (not with US-M4 mounting screws)
B Mounting elements for plug-on display BD7
C internal service interface (not intended for use)

DIN rail device

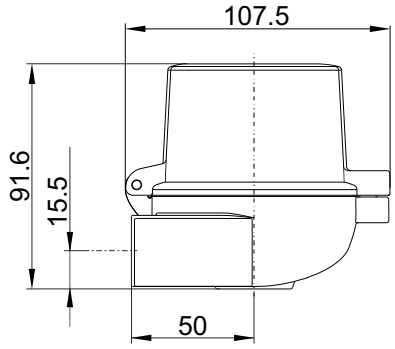


Terminal head for dTRANS T07

AB 7 with display window in the cap	**Specifications**	
	Cable inlets	1
	Ambient temperature	-50 to +150 °C without cable fitting
	Material	
	Enclosure	Aluminum, polyester powder coating
	Seals	Silicone
	Cable inlet screw connections	M20 × 1.5
	Protective fitting connection	M24 × 1.5
	Color	
	Head	Light gray
	Cap	Light gray
	Weight	420 g

13 Dimensions

Field enclosure for dTRANS T07

FG 7 with display window in the cap	**Specifications**	
	Cable inlets	2
	Ambient temperature	-50 to +150 °C without cable fitting
	Material	
	Enclosure	Aluminum, polyester powder coating
	Seals	Silicone
	Cable inlet screw connections	M20 × 1.5 (2×)
	Color	
	Head	Light gray
	Cap	Light gray
	Weight	420 g

14 Operating menu and description of parameters

14.1 Overview of the operating menu

NOTE!

The following tables list all parameters included in the "Setup, diagnosis, and expert" operating menus. The page number refers to the relevant description of the parameter.
Depending on the parameterization, not all sub-menus and parameters are available in every device. Further details can be found in the description of the parameters under the "Pre-requisite" category. The parameter groups for Expert setup contain all parameters in the operating menus: Setup, diagnosis, and additional parameters that are reserved exclusively for experts.
Parameterization for SIL mode is different than standard mode and is described in the SIL safety manual.

NOTE!

n = Placeholder for sensor inputs (1 or 2)

Setup	Measuring point identifier	⇨Page 75
	Unit	⇨Page 76
	Sensor type 1	⇨Page 76
	Connection type 1	⇨Page 76
	2-wire compensation 1	⇨Page 76
	Cold junction 1	⇨Page 76
	Cold junction reference 1	⇨Page 77
	Sensor type 2	⇨Page 76
	Connection type 2	⇨Page 76
	2-wire compensation 2	⇨Page 76
	Cold junction 2	⇨Page 76
	Cold junction reference 2	⇨Page 77
	Assign current output (PV)	⇨Page 78
	Start measur. range	⇨Page 78
	End measur. range	⇨Page 79

Setup	**Advanced setup**	Enter access code	⇨Page 80
		Access rights for operating software	⇨Page 81
		Locking status	⇨Page 81
		Device temperature alarm	⇨Page 81

Setup	**Advanced setup**	**Sensor technology**	Sensor offset 1	⇨Page 81
			Sensor offset 2	⇨Page 81
			Corrosion detection	⇨Page 82
			Drift/difference monitoring	⇨Page 82
			Drift/difference alarm category	⇨Page 82
			Drift/difference alarm delay	⇨Page 83
			Drift/difference limit value	⇨Page 83
			Sensor toggle limit value	⇨Page 83

Setup	**Advanced setup**	**Current output**	Output current	⇨Page 84
			Measurement mode	⇨Page 84
			Out of range category	⇨Page 85
			Error behavior	⇨Page 85
			Error current	⇨Page 85
			Current trimming 4 mA	⇨Page 85
			Current trimming 20 mA	⇨Page 86

Setup	**Advanced setup**	**Display**	Display interval	⇨Page 86
			Display format	⇨Page 87
			1st display value	⇨Page 87
			Decimal places for 1st display value	⇨Page 88
			2nd display value	⇨Page 88
			Decimal places for 2nd display value	⇨Page 88
			3rd display value	⇨Page 89
			Decimal places for 3rd display value	⇨Page 89

Setup	**Advanced setup**	**SIL**	SIL option	⇨Page 90
			Operating status	⇨Page 90
			Enter SIL checksum	⇨Page 91
			SIL checksum	⇨Page 91
			SIL configuration timestamp	⇨Page 92
			SIL startup mode	⇨Page 92
			SIL HART® mode	⇨Page 92
			Force safe state	⇨Page 92

Setup	**Advanced setup**	**Administration**	Reset device	⇨Page 93
			Define write protection code	⇨Page 93

Diagnostics	Current diagnosis	⇨Page 94
	Remedy[a]	⇨Page 94
	Last diagnosis 1	⇨Page 94
	Operating time	⇨Page 94

[a] When an error occurs, this appears as a "Tooltip" at the end of the pointer when you move the pointer to the error code (e.g., "F043 short-circuit").

Diagnostics	**Diagnosis list**	Number of current diagnosis messages	⇨Page 95
		Current diagnosis	⇨Page 95

		Current diagnosis channel		⇨Page 95

Diagnostics	**Event log**	Last diagnosis n		⇨Page 95
		Last diagnosis channel n		⇨Page 96

Diagnostics	**Device information**	Measuring point identifier		⇨Page 96
		Serial number		⇨Page 96
		Firmware version		⇨Page 96
		Device name		⇨Page 96
		Order code		⇨Page 97
		Configuration counter		⇨Page 97

Diagnostics	**Measured values**	Value sensor 1		⇨Page 97
		Value sensor 2		⇨Page 97
		Device temperature		⇨Page 97

Diagnostics	**Measured values**	**Min./max. values**	Sensor n min. value	⇨Page 97
			Sensor n max. value	⇨Page 98
			Reset min./max. sensor values	⇨Page 98
			Min. device temperature	⇨Page 98
			Max. device temperature	⇨Page 98
			Reset min./max. device temperature	⇨Page 98

Diagnostics	**Simulation**	Current output simulation		⇨Page 99
		Current output value		⇨Page 99

Expert	Enter access code			⇨Page 80
	Access rights for operating software			⇨Page 81
	Locking status			⇨Page 81

Expert	**System**	Unit		⇨Page 76
		Attenuation		⇨Page 99
		Alarm delay		⇨Page 100
		Mains frequency filter		⇨Page 100
		Device temperature alarm		⇨Page 100

Expert	**System**	**Display**	Display interval	⇨Page 86
			Display format	⇨Page 87
			1st display value	⇨Page 87
			Decimal places for 1st display value	⇨Page 88
			2nd display value	⇨Page 88
			Decimal places for 2nd display value	⇨Page 88
			3rd display value	⇨Page 89
			Decimal places for 3rd display value	⇨Page 89

Expert	**System**	**Administration**	Reset device	⇨Page 93
			Define write protection code	⇨Page 93

Expert	**Sensor technology**	**Sensor n**	Sensor type n	⇨Page 76
			Connection type n	⇨Page 76
			2-wire compensation n	⇨Page 76
			Cold junction n	⇨Page 76
			Cold junction reference	⇨Page 77
			Sensor offset n	⇨Page 81
			Lower sensor limit n	⇨Page 100
			Upper sensor limit n	⇨Page 100
			Sensor serial number	⇨Page 100

Expert	**Sensor technology**	**Sensor n**	**Sensor trimming**	Sensor trimming	⇨Page 101
				Sensor trimming start value	⇨Page 101
				Sensor trimming end value	⇨Page 102
				Sensor trimming min. span	⇨Page 102

Expert	**Sensor technology**	**Sensor n**	**Linearization**	Lower sensor limit n	⇨Page 102
				Upper sensor limit n	⇨Page 103
				Call./v. Dusen coeff. R0, A, B, C	⇨Page 103
				Polynomial coeff. R0, A, B	⇨Page 103

Expert	**Sensor technology**	**Diagnosis settings**	Corrosion detection	⇨Page 82
			Drift/difference monitoring	⇨Page 82
			Drift/difference alarm category	⇨Page 82
			Drift/difference alarm delay	⇨Page 83
			Drift/difference limit value	⇨Page 83
			Sensor toggle limit value	⇨Page 83
			Calibration counter start	⇨Page 104
			Calibration counter alarm category	⇨Page 104
			Calibration counter start value	⇨Page 104
			Calibration countdown	⇨Page 104

Expert	**Output**	Output current	⇨Page 84
		Measurement mode	⇨Page 105
		Start measur. range	⇨Page 78
		End measur. range	⇨Page 79
		Out of range category	⇨Page 85
		Error behavior	⇨Page 85
		Error current	⇨Page 85
		Current trimming 4 mA	⇨Page 85
		Current trimming 20 mA	⇨Page 86

Expert	**Communication**	**HART® configuration**	Measuring point identifier	⇨Page 105
			Mark instr.	⇨Page 105
			HART® address	⇨Page 105
			Preamble number	⇨Page 106
			Configuration changed	⇨Page 106
			Reset configuration changed flag	⇨Page 106

Expert	**Communication**	**HART® info**	Device type	⇨Page 106
			Device revision	⇨Page 106
			Manufacturer ID	⇨Page 106
			HART® revision	⇨Page 107
			Description	⇨Page 107
			Message	⇨Page 107
			Hardware revision	⇨Page 107
			RevSW	⇨Page 107
			Date	⇨Page 107

Expert	**Communication**	**HART® output**	Assign current output (PV)	⇨Page 107
			PV	⇨Page 108
			Assign SV	⇨Page 108
			SV	⇨Page 108
			Assign TV	⇨Page 108
			TV	⇨Page 108
			Assign QV	⇨Page 109
			QV	⇨Page 109

Expert	**Communication**	**Burst configuration**	Burst mode	⇨Page 109
			Burst command	⇨Page 109
			Burst variables 0 to 3	⇨Page 110
			Burst trigger mode	⇨Page 110
			Burst trigger value	⇨Page 111
			Burst min. time frame	⇨Page 111
			Burst max. time frame	⇨Page 112

Expert	**Diagnostics**	Current diagnosis	⇨Page 94
		Remedy[a]	⇨Page 94
		Last diagnosis 1	⇨Page 94
		Operating time	⇨Page 94

[a] When an error occurs, this appears as a "Tooltip" at the end of the pointer when you move the pointer to the error code (e.g., "F043 short-circuit").

Expert	**Diagnostics**	**Diagnosis list**	Number of current diagnosis messages	⇨Page 95
			Current diagnosis	⇨Page 95
			Current diagnosis channel	⇨Page 95

Expert	**Diagnostics**	**Event log**	Last diagnosis n	⇨Page 95
			Last diagnosis channel	⇨Page 96

Expert	**Diagnostics**	**Device information**	Measuring point identifier	⇨Page 75
			Serial number	⇨Page 96
			Firmware version	⇨Page 96
			Device name	⇨Page 96
			Order code	⇨Page 97
			Advanced order code	⇨Page 112
			Advanced order code 2	⇨Page 112
			Advanced order code 3	⇨Page 112
			ENP version	⇨Page 112
			Device revision	⇨Page 112

			Manufacturer ID		⇨Page 112
			Manufacturer		⇨Page 113
			Hardware revision		⇨Page 113
			Configuration counter		⇨Page 97

Expert	**Diagnostics**	**Measured values**	Value sensor n		⇨Page 97
			Sensor n raw value		⇨Page 113
			Device temperature		⇨Page 97

Expert	**Diagnostics**	**Measured values**	**Min./ max.values**	Sensor n min. value	⇨Page 97
				Sensor n max. value	⇨Page 98
				Reset min./max. sensor values	⇨Page 98
				Min. device temperature	⇨Page 98
				Max. device temperature	⇨Page 98
				Reset min./max. device temperature	⇨Page 98

Expert	**Diagnostics**	**Simulation**	Current output simulation	⇨Page 99
			Current output value	⇨Page 99

14.2 Setup menu

This menu contains all parameters for the device's basic settings. This restricted parameter block can be used to start up the transmitter.

NOTE!

n = Placeholder for sensor inputs (1 or 2)

Measuring point identifier

Navigation	***Setup > Measuring point identifier*** ***Diagnosis > Device information > Measuring point identifier*** ***Expert > Diagnosis > Device information > Measuring point identifier***
Description	Specifies a unique identifier for the measuring point so that it can be quickly identified in the plant. It is displayed in the header of the plug-in display, ⇨chapter 6.3 "Measured value display and operating elements", Page 31.
Input	Max. 32 characters, such as letters, numbers, or special characters (e.g., @, %, /)

Default setting	None

Unit

Navigation	***Setup > Unit*** ***Expert > System > Unit***
Description	Selects the measuring unit for all measured values
Selection	°C, °F, K, °R, Ohm, mV
Default setting	°C

Sensor type

Navigation	***Setup > Sensor type n*** ***Expert > Sensors > Sensor n > Sensor type n***
Description	Selects the sensor type for the sensor input in question • Sensor type 1: Settings for sensor input 1 • Sensor type 2: Settings for sensor input 2
Selection	A list of all possible sensor types is provided in chapter 12 "Technical data", Page 49.
Default setting	Sensor type 1: Pt100 IEC 60751 Sensor type 2: No sensor

NOTE!

Note the terminal assignment when connecting the individual sensors, ⇨chapter 5 "Electrical connection", Page 19. The possible connection combinations also have to be observed for 2-channel operation.

Connection type n

Navigation	***Setup > Connection type n*** ***Expert > Sensors > Sensor n > Connection type n***
Prerequisite	An RTD sensor must be specified as the sensor type.
Description	Selects the sensor's connection type
Selection	Sensor 1 (connection type 1): 2-wire, 3-wire, 4-wire Sensor 2 (connection type 2): 2-wire, 3-wire
Default setting	Sensor 1 (connection type 1): 4-wire Sensor 2 (connection type 2): 2-wire

2-wire compensation n

Navigation	***Setup > 2-wire compensation n*** ***Expert > Sensors > Sensor n > 2-wire compensation n***
Prerequisite	An RTD sensor with 2-wire connection type must be specified as the sensor type.
Description	Defines the resistance value for 2-wire compensation in RTDs
Input	0 to 30 Ω
Default setting	0

Cold junction n

Navigation	***Setup > Cold junction n***

	Expert > Sensors > Sensor n > Cold junction n
Prerequisite	A thermocouple (TC) sensor must be specified as the sensor type.
Description	Selects the cold junction measurement for the temperature compensation of thermocouples (TC).
Selection	• No compensation: No temperature compensation is used • Internal measurement: Internal cold junction temperature is used • Reference: Fixed reference is used • Sensor 2 measured value: The measured value from sensor 2 is used
Default setting	Internal measurement

NOTE!

When **Reference** is selected, the compensation value is defined by means of the **Cold junction reference** parameter.
When **Measured value sensor 2** is selected, temperature measurement for channel 2 has to be configured.

NOTE!

Measured value sensor 2 cannot be selected for the **Cold junction 2** parameter.

Cold junction reference n

Navigation	***Setup > Cold junction reference*** ***Expert > Sensors > Sensor n > Cold junction reference***
Prerequisite	When **Cold junction n** is selected, the parameter **Reference** must be adjusted.
Description	Defines the fixed reference for temperature compensation
Selection	-50 to +85 °C
Default setting	0.00

Assign current output (PV)

Navigation	***Setup > Assign current output (PV)*** ***Expert > Communication > HART® output > Assign current output (PV)***
Description	Assigns a measurand to the first HART® value (PV).
Selection	• Sensor 1 (measured value) • Sensor 2 (measured value) • Device temperature • Average of both measured values: 0.5 × (SV1 + SV2) • Difference between sensor 1 and sensor 2: SV1 - SV2 • Sensor 1 (backup sensor 2): When sensor 1 fails, the value from sensor 2 automatically becomes the first HART® value (PV): Sensor 1 (OR-sensor 2) • Sensor toggle: When the selected threshold value T for sensor 1 is exceeded, the measured value from sensor 2 becomes the first HART® value (PV); the system switches back to sensor 1 when the measured value from sensor 1 is at least 2 K below T: sensor 1 (sensor 2, if sensor 1 > T) • Average value: 0.5 × (SV1 + SV2) with backup (measured value from sensor 1 or sensor 2 in the event of a sensor error in the other sensor)
Default setting	Sensor 1

NOTE!

The threshold value can be adjusted with the **Sensor toggle limit value** parameter ⇨Page 83. Temperature-dependent toggling allows two sensors to be combined with advantages for various temperature ranges.

Start measur. range

Navigation	***Setup > Start measur. range*** ***Expert > Output > Start measur. range***
Description	Allocates a measured value to the current value 4 mA.
Input	Depends on the sensor type and the assignment for the current output (PV)
Default setting	0

NOTE!

The adjustable limit value depends on the type of sensor used in the **Sensor type** parameter ⇨ Page 76 and the value assigned to the **Assign current output (PV)** parameter.

End measur. range

Navigation	***Setup > End measur. range*** ***Expert > Output > End measur. range***
Description	Allocates a measured value to the current value 20 mA.
Input	Depends on the sensor type and the assignment for the current output (PV)
Default setting	100

NOTE!

The adjustable limit value depends on the type of sensor used in the **Sensor type** parameter ⇨ Page 76 and the value assigned to the **Assign current output (PV)** parameter.

14.2.1 "Advanced setup" sub-menu

Corrosion monitoring

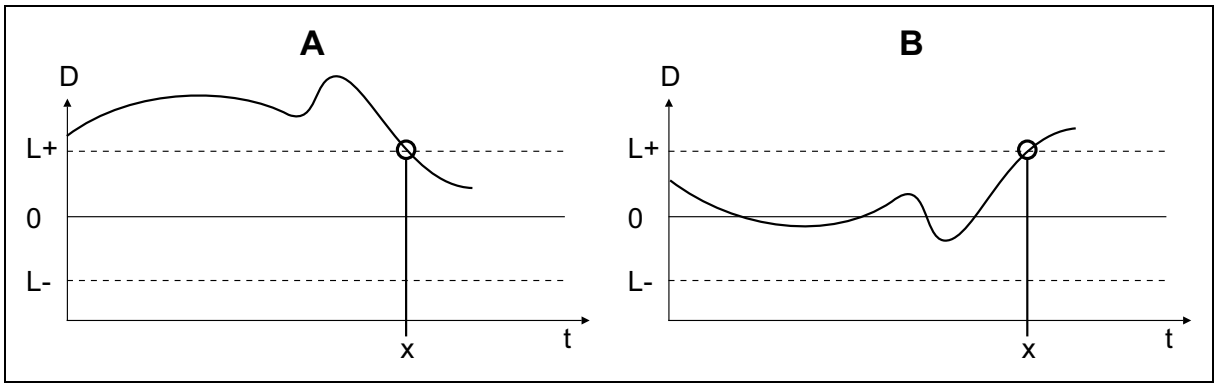
Corrosion of sensor connection wires can lead to the measured value being distorted. The device therefore enables you to detect corrosion before distortion of the measured values can occur. Corrosion monitoring is only possible for RTDs with 4-wire connections and thermocouples.

Drift/difference monitoring

If the measured values differ by a specified value when two sensors are connected, a status signal is generated as a diagnostic event. The drift/difference monitoring function can be used to verify that measured values are correct and enable the connected sensors to monitor one another. Drift/difference monitoring can be activated with the **Drift/difference monitoring** parameter. There are two different modes. When underrange (ISV1 - SV2I < Drift/difference limit value) is selected, a status message is emitted if the value falls below the limit value; when overrange (drift) (ISV1 - SV2I > Drift/difference limit value) is selected, a message is emitted when the value rises above the limit value.

Process for configuring drift/different monitoring

1.	Start
2.	Under drift/difference monitoring, select **Overrange** for drift detection or **Underrange** for difference monitoring.
3.	Set the alarm category for drift/difference monitoring to **Outside of specification (S)**, **Maintenance required (M)**, or **Failure (F)** as required.
4.	Adjust the limit value for drift/difference monitoring to the required value.
5.	End



A Limit value undercut
B Limit value exceedance
D Drift
L+ Upper limit value
L- Lower limit value
t Time
x Diagnostic event, status signal is generated

Enter access code

Navigation	***Setup > Advanced setup > Enter access code*** ***Expert > Enter access code***
Description	Activates the service parameters via the operating tool; if the wrong access code is entered, the user keeps his current access rights.
Additional information	This parameter is used to switch the software device write protection on and off. Software device write protection in conjunction with a download from an operating tool that can be used offline: ■ Download, the device does not have a defined write protection code: the download is carried out as normal ■ Download, defined write protection code, device is not locked – The **Enter access code** parameter (offline) contains the correct write protection code: The download takes place and the device is not locked when the download is complete. The write protection code is set to 0 under the Enter access code parameter. – The **Enter access code** parameter (offline) does not contain the correct write protection code: The download takes place and the device is locked when the download is complete. The write protection code is reset to 0 under the Enter access code parameter. ■ Download, defined write protection code, device is locked – The **Enter access code** parameter (offline) contains the correct write protection code: The download takes place and the device is locked when the download is complete. The write protection code is reset to 0 under the Enter access code parameter. – The **Enter access code** parameter (offline) does not contain the correct write protection code: The download does not take place. None of the values in the device are changed. The value of the **Enter access code** parameter (offline) is not changed either.
Input	0 to 9999
Default setting	0

NOTE!

If a value that does not correspond to the access code is entered, the parameter is automatically set to **0**. Any changes to the service parameters must be carried out by the service organization.

Access rights for operating software

Navigation	***Setup > Advanced setup > Access rights for operating software*** ***Expert > Access rights for operating software***
Description	Displays the access rights for the parameters
Additional information	If additional write protection is activated, this places further restrictions on current access rights. Write protection can be displayed under the **Locking status** parameter.
Selection	• Operator • Service
Default setting	Operator

Locking status

Navigation	***Setup > Advanced setup > Locking status*** ***Expert > Locking status***
Description	Displays the status of the device lock The DIP switch for the hardware lock is attached to the display module. When write protection is active, write access to the parameters is inhibited, ⇨ Page 32.

Device temperature alarm

Navigation	***Setup > Advanced setup > Device temperature alarm***
Description	Selects the category (status signal) for how the device responds if the temperature of the transmitter's electronics is < -40 °C or > +85 °C
Selection	• Off • Outside the specification (S) • Failure (F)
Default setting	Outside the specification (S)

Sensors sub-menu

Sensor offset n

NOTE!

n = Placeholder for the number of sensor inputs (1 and 2)

Navigation	***Setup > Advanced Setup > Sensors > Sensor offset n*** ***Expert > Sensors > Sensor n > Sensor offset n***
Description	Sets the zero-point correction (offset) for the sensor measured value; the specified value is added to the measured value.
Input	-10.0 to +10.0
Default setting	0.0

Corrosion detection

Navigation	***Setup > Advanced Setup > Sensors > Corrosion detection*** ***Expert > Sensors > Diagnosis settings > Corrosion detection***
Description	Selects the category (status signal) that is displayed when corrosion is detected in the sensor connection lines
Selection	• Maintenance required (M) • Failure (F)
Default setting	Maintenance required (M)

NOTE!

Only possible for RTD sensors with 4-wire connections and thermocouples (TC).

Drift/difference monitoring

Navigation	***Setup > Advanced setup > Sensors > Drift/difference monitoring*** ***Expert > Sensors > Diagnosis settings > Drift/difference monitoring***
Description	Selects whether the device responds if the drift/difference limit value is overrange/underrange
Additional information	• When Overrange (drift) is selected, a status signal is displayed when the absolute value of the difference value exceeds the drift/difference limit value • When Underrange is selected, a status signal is displayed when the absolute value of the difference value undercuts the drift/difference limit value
Selection	• Off • Overrange (drift) • Underrange
Default setting	Off

NOTE!

Can only be selected for 2-channel operation.

Drift/difference alarm category

Navigation	***Setup > Advanced setup > Sensors > Drift/difference alarm category*** ***Expert > Sensors > Diagnosis settings > Drift/difference alarm category***
Prerequisite	The parameter **Drift/difference monitoring** must be active with the option **Overrange (Drift)** or **Underrange**.
Description	Selects the category (status signal) for how the device responds when drift/difference is detected between sensor 1 and sensor 2.

Selection	• Outside the specification (S) • Maintenance required (M) • Failure (F)
Default setting	Maintenance required (M)

Drift/difference alarm delay

Navigation	***Setup > Advanced setup > Sensors > Drift/difference alarm delay*** ***Expert > Sensors > Diagnosis settings > Drift/difference alarm delay***
Prerequisite	The parameter **Drift/difference monitoring** must be active with the option **Overrange (Drift)** or **Underrange**, ⇨ Page 79.
Description	Alarm delay for drift detection monitoring
Input	0 to 255 s
Default setting	0 s

NOTE!

Helpful, for example, when the sensors have different thermal masses in conjunction with a high temperature gradient in the process.

Drift/difference limit value

Navigation	***Setup > Advanced setup > Sensors > Drift/difference limit value*** ***Expert > Sensors > Diagnosis settings > Drift/difference limit value***
Prerequisite	The parameter **Drift/difference monitoring** must be active with the option **Overrange (Drift)** or Underrange.
Description	Selects the maximum admissible deviation in measured values between sensor 1 and sensor 2 that leads to a drift/difference being detected.
Selection	0.1 to 999.0 K
Default setting	999.0

Sensor toggle

Navigation	***Setup > Advanced Setup > Sensors > Sensor toggle limit value*** ***Expert > Sensors > Diagnosis settings > Sensor toggle limit value***
Description	Selects the threshold value for sensor toggling, ⇨ Page 78
Additional information	The threshold value is relevant when the sensor toggling function is assigned to a HART® variable (PV, SV, TV, QV).
Selection	Depends on the selected sensor type
Default setting	850 °C

Current output sub-menu

Analog output calibration (4 and 20 mA current trimming)

Current trimming is used to compensate the analog output (D/A conversion). This enables the transmitter's output current to be adjusted so that this meets the expected value in the higher-level system.

NOTE!

Current trimming does not affect the digital HART® value. As a result, the measured value displayed on the plugged in display may differ slightly from the displayed value in the higher-level system.
Digital measured values can be adapted with the Sensor trimming parameter in the Expert - Sensors - Sensor trimming menu.

Procedure

1.	Start
2.	Install an accurate ammeter (accuracy is higher than the transmitter) in the current loop.
3.	Switch on current output simulation and adjust the simulation value to 4 mA.
4.	Measure the loop current with the ammeter and note the result.
5.	Adjust the simulation value to 20 mA.
6.	Measure the loop current with the ammeter and note the result.
7.	Enter the measured currents as calibration values under the parameters **Current trimming 4 mA** and **Current trimming 20 mA.**
8.	End

Output current

Navigation	***Setup > Advanced setup > Current output > Output current*** ***Expert > Output > Output current***
Description	Displays the calculated output current in mA.

Measurement mode

Navigation	***Setup > Advanced setup > Current output > Measurement mode*** ***Expert > Output > Measurement mode***
Description	Enables the output signal to be inverted
Additional information	• **Standard** The output current rises as the temperature rises • **Inverted** The output current drops as the temperature rises
Selection	• Standard • Inverted
Default setting	Standard

Out of range category

Navigation	***Setup > Advanced setup > Current output > Out of range category*** ***Expert > Output > Out of range category***
Description	Selects the category (status signal) for how the device responds when the selected measuring range is breached
Selection	• Outside the specification (S) • Maintenance required (M) • Failure (F)
Default setting	Maintenance required (M)

Error behavior

Navigation	***Setup > Advanced setup > Current output > Error behavior*** ***Expert > Output > Error behavior***
Description	Selects the failure signal level that the current output emits in the event of a fault
Additional information	When **Max.** is selected, the failure signal level is defined by the **Error current** parameter.
Selection	• Min. • Max.
Default setting	Max.

Error current

Navigation	***Setup > Advanced setup > Current output > Error current*** ***Expert > Output > Error current***
Prerequisite	The **Max.** option is selected under the **Error behavior** parameter.
Description	Adjusts the current value that the current output emits in the event of an error.
Input	21.5 to 23.0 mA
Default setting	22.5

Current trimming 4 mA

Navigation	***Setup > Advanced setup > Current output > Current trimming 4 mA*** ***Expert > Output > Current trimming 4 mA***
Description	Adjusts the correction value for the current output at the measuring range start at 4 mA, ⇨"Analog output calibration (4 and 20 mA current trimming) ", Page 84
Input	3.85 to 4.15 mA
Default setting	4 mA

Current trimming 20 mA

Navigation	***Setup > Advanced setup > Current output > Current trimming 20 mA*** ***Expert > Output > Current trimming 20 mA***
Description	Adjusts the correction value for the current output at the measuring range start at 20 mA, ⇨ "Drift/difference monitoring ", Page 79
Input	19.850 to 20.15 mA
Default setting	20.000 mA

Display sub-menu

The "Display" menu is used to adjust settings for the measured value display on the optional plug-in display (for head transmitters only).

NOTE!

These settings do not affect the transmitter's output values. The only thing they affect is the display format on the display.

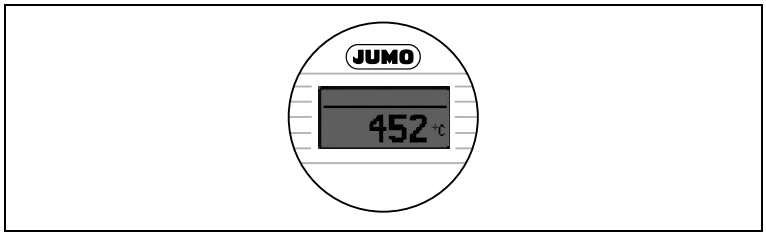
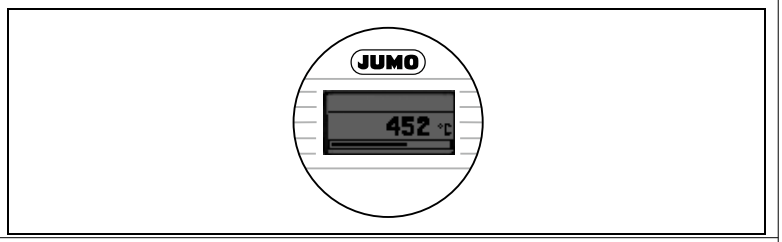
Display interval

Navigation	***Setup > Advanced setup > Display > Display interval*** ***Expert > System > Display > Display interval***
Description	Adjusts the period for which measured values are displayed on the on-site display if these are alternating. Alternating displays are only generated automatically if several measured values are defined.
Input	4 to 20 s
Default setting	4 s

NOTE!

The measured values that appear on the on-site display are defined in the parameters **1st display value to 3rd display value**, ⇨ Page 87.
The display format for the displayed measured values is defined in the **Display format** parameter.

Display format

Navigation	***Setup > Advanced setup > Display > Display format*** ***Expert > System > Display > Display format***
Description	Selects the measured value display on the on-site display. The measured value display format or measured value bar graph can be adjusted.
Additional information	Value  Value + bar graph 
Selection	• Value • Value + bar graph
Default setting	Value

1st display value

Navigation	***Setup > Advanced setup > Display > 1st display value*** ***Expert > System > Display > 1st display value***
Description	Selects one of the measured values displayed on the on-site display
Selection	• Process value • Sensor 1 • Sensor 2 • Output current • % measuring span • Device temperature
Default setting	Process value

NOTE!

The **Display format** parameter is used to define how the measured values are displayed ⇨ Page 87.

Decimal places for 1st display value

Navigation	***Setup > Advanced setup > Display > Decimal places for 1st display value*** ***Expert > System > Display > Decimal places for 1st display value***
Prerequisite	A measured value has been defined for the **1st display value** parameter, ⇨87
Description	Selects the number of decimal places for the displayed value; this setting does not affect the accuracy of the device's measurements or calculations
Selection	• x • x.x • x.xx • x.xxx • x.xxxx • Automatic
Default setting	Automatic

NOTE!

If **Automatic** is selected, the maximum possible number of decimal places always appears on the display.

2nd display value

Navigation	***Setup > Advanced setup > Display > 2nd display value*** ***Expert > System > Display > 2nd display value***
Description	Selects one of the measured values displayed on the on-site display
Selection	• Off • Process value • Sensor 1 • Sensor 2 • Output current • % measuring span • Device temperature
Default setting	Off

NOTE!

The **Display format** parameter is used to define how the measured values are displayed.

Decimal places for 2nd display value

Navigation	***Setup > Advanced setup > Display > Decimal places for 2nd display value*** ***Expert > System > Display > Decimal places for 2nd display value***
Prerequisite	A measured value has been defined for the **2nd display value** parameter, ⇨ Page 88.

Description	Selects the number of decimal places for the displayed value; this setting does not affect the accuracy of the device's measurements or calculations
Selection	• x • x.x • x.xx • x.xxx • x.xxxx • Automatic
Default setting	Automatic

NOTE!

If **Automatic** is selected, the maximum possible number of decimal places always appears on the display.

3rd display value

Navigation	***Setup > Advanced setup > Display > 3rd display value*** ***Expert > System > Display > 3rd display value***
Description	Selects one of the measured values displayed on the on-site display
Selection	• Off • Process value • Sensor 1 • Sensor 2 • Output current • % measuring span • Device temperature
Default setting	Off

NOTE!

The **Display format** parameter is used to define how the measured values are displayed.

Decimal places for 3rd display value

Navigation	***Setup > Advanced setup > Display > Decimal places for 3rd display value*** ***Expert > System > Display > Decimal places for 3rd display value***
Prerequisite	A measured value has been defined for the **3rd display value** parameter, ⇨ Page 89.
Description	Selects the number of decimal places for the displayed value; this setting does not affect the accuracy of the device's measurements or calculations

Selection	• x • x.x • x.xx • x.xxx • x.xxxx • Automatic
Default setting	Automatic

NOTE!

If **Automatic** is selected, the maximum possible number of decimal places always appears on the display.

SIL sub-menu

NOTE!

This menu only appears if you have ordered a device type with SIL approval. The **SIL option** parameter indicates whether the device can be operated in SIL mode. To activate SIL mode for the device, you must follow the menu-guided process for **Activate SIL**.
Please see the SIL safety manual for a detailed description of this process.

SIL option

Navigation	***Setup > Advanced setup > SIL > SIL option***
Description	Displays whether a device with SIL approval has been ordered
Selection	• No • Yes
Default setting	No

NOTE!

The SIL option is a prerequisite for the device's SIL mode.

Operating status

Navigation	***Setup > Advanced setup > SIL > Operating status***
Description	Displays the device's operating status in SIL mode

Selection	• Check SIL option • Startup in standard operation • Wait for checksum • Self-diagnosis • Standard operation • Download active • SIL mode active • Start secure parameterization • Secure parameterization active • Save parameter values • Parameter check • Restart imminent • Reset checksum • Safe state - Active • Test download • Upload active • Safe state - Passive • Safe state - Panic
Default setting	Check SIL option

NOTE!

When the device is restarted with the setting **SIL startup mode - Not active**, the display **Wait for checksum** appears for this parameter. The SIL checksum must be entered manually.

Enter SIL checksum

Navigation	***Setup > Advanced setup > SIL > Enter SIL checksum***
Description	Enters the SIL checksum during secure parameterization and the restart process in conjunction with the parameter setting **SIL startup mode - Not active**
Input	0 to 65535
Default setting	0

NOTE!

When the value 0 is entered in conjunction with the parameter setting **SIL startup mode - Active**, the automatic restart process is terminated and the SIL settings are discarded.

SIL checksum

Navigation	***Setup > Advanced setup > SIL > SIL checksum***
Description	Displays the entered SIL checksum

NOTE!

The displayed **SIL checksum** can be used to check the device settings. If the device settings for two devices are identical, the SIL checksums are then identical as well. This can be used as a simple way to exchange devices as identical device configurations are guaranteed when the checksums are the same.

SIL configuration timestamp

Navigation	***Setup > Advanced setup > SIL > SIL configuration timestamp***
Description	Enters the date and time at which secure parameterization was completed or when the SIL checksum was calculated
Input	DD.MM.YYYY hh:mm
Default setting	0

NOTE!

This information is not automatically created by the device; the date and time have to be entered manually.

SIL startup mode

Navigation	***Setup > Advanced setup > SIL > SIL startup mode***
Description	Selects an automatic device restart in SIL mode, e.g., after a power cycle (restart)
Selection	• Not active • Active
Default setting	Not active

NOTE!

The **Not active** setting requires the SIL checksum to be entered manually to be able to restart the device in SIL mode.

SIL HART® mode

Navigation	***Setup > Advanced setup > SIL > SIL HART® mode***
Description	Adjusts HART® communication during SIL mode; the setting **HART® not active** deactivates HART® communication in SIL mode (only 4 to 20 mA communication is active).
Selection	• HART® not active • HART® active
Default setting	HART® active

Force safe state

Navigation	***Setup > Advanced setup > SIL > Force safe state***
Prerequisite	The **Operating status** parameter shows **SIL mode active**.
Description	Tests error detection and the device's safe state during the device's repeat test.
Selection	• On • Off
Default setting	Off

NOTE!

Please consult the SIL safety manual for a detailed description of the SIL repeat test.

Administration sub-menu

Reset device

Navigation	***Setup > Advanced setup > Administration > Reset device*** ***Expert > System > Reset device***
Description	Resets all device configurations or parts thereof to a defined state.
Selection	• **Not active** The parameter is closed without action. • **To default settings** All parameters are reset to the default settings. • **To delivery settings** All parameters are reset to the delivery settings. The delivery settings may deviate from the default settings if customer-specific parameter values were specified during the order process. • **Restart device** The device restarts without any changes to the device configuration.
Default setting	Not active

Define write protection code

Navigation	***Setup > Advanced setup > Administration > Define write protection code*** ***Expert > System > Define write protection code***
Description	Selects a device write protection code
Additional information	• Activating device write protection A value is entered into the **Enter access code** parameter that does not match the write protection code defined here • Deactivating device write protection When device write protection is active, enter the defined write protection code under the **Enter access code** parameter • If the device has been reset to its default settings or configured delivery settings, the defined write protection code is no long valid; the code changes to the default setting (0) • Hardware write protection (DIP switch) is active – The hardware write protection has a higher priority than the software write protection described here. – No values can be entered under the **Enter access code** parameter; the parameter is read-only. – The device write protection function cannot be defined and activated using software until the hardware write protection lock has been deactivated using the DIP switch, ⇨84.
Input	0 to 9999
Default setting	0

NOTE!

If the code is stored in the device firmware, this code is saved in the device and the operating tool displays the value 0 to make sure the defined write protection code is not freely readable.

NOTE!

The device write protection function is not active if the device is delivered with the default settings.

NOTE!

If you have forgotten the write protection code, it can be deleted or overwritten by the service organization.

14.3 Menu: Diagnostics

Any information that describe the device, the device status, and the process conditions can be found in this group.

Current diagnosis 1

Navigation	***Diagnosis > Current diagnosis*** ***Expert > Diagnosis > Current diagnosis***
Description	Displays the current diagnosis message; if multiple messages occur at the same time, only the message with the highest priority is displayed
Additional information	Example for the display format: F261 electronics module
Display	Symbol for event response and diagnostic event

Remedy

When an error occurs, the remedy appears as a "Tooltip" at the end of the pointer when you move the pointer to the error code (e.g., "F043 short-circuit").

Navigation	***Diagnosis > Remedy*** ***Expert > Diagnosis > Remedy***
Description	Displays the remedy for the current diagnosis message

Last diagnosis 1

Navigation	***Diagnosis > Last diagnosis 1*** ***Expert > Diagnosis > Last diagnosis 1***
Description	Displays the most recent diagnosis message with the highest priority
Additional information	Example for the display format: F261 electronics module
Display	Symbol for event response and diagnostic event

Operating time

Navigation	***Diagnosis > Operation time*** ***Expert > Diagnosis > Operation time***
Description	Displays the length of time for which the device has been running until the current point in time
Display	Hours (h)

14.3.1 "Diagnosis list" sub-menu

This sub-menu shows up to three of the most recent diagnosis messages. If more than three messages occur at the same time, the three with the highest priority are displayed.

Information on the device's diagnosis mechanisms and all diagnosis messages at a glance: ⇨ chapter 11 "Diagnosis and troubleshooting", Page 41.

Number of current diagnosis messages

Navigation	***Diagnosis > Diagnosis list > Number of current diagnosis messages*** ***Expert > Diagnosis > Diagnosis list > Number of current diagnosis messages***
Description	Displays the number of diagnosis messages currently in place in the device

Current diagnosis

Navigation	***Diagnosis > Diagnosis list > Current diagnosis*** ***Expert > Diagnosis > Diagnosis list > Current diagnosis***
Description	Displays the most recent diagnosis messages with the highest to the third highest priority
Additional information	Example for the display format: F261 electronics module
Display	Symbol for event response and diagnostic event

Current diagnosis channel

Navigation	***Diagnosis > Diagnosis list > Current diagnosis channel*** ***Expert > Diagnosis > Diagnosis list > Current diagnosis channel***
Description	Displays the sensor input to which the diagnosis message applies
Display	• Sensor 1 • Sensor 2 • ...

14.3.2 "Event log" sub-menu

NOTE!

n = Number of diagnosis messages (n = 1 to 5)

Last diagnosis n

Navigation	***Diagnosis > Diagnosis list > Last diagnosis n*** ***Expert > Diagnosis > Diagnosis list > Last diagnosis n***
Description	Displays diagnosis messages that occurred in the past; the last five messages are listed in chronological order
Additional information	Example for the display format: F261 electronics module
Display	Symbol for event response and diagnostic event

Last diagnosis channel

Navigation	***Diagnosis > Diagnosis list > Last diagnosis channel*** ***Expert > Diagnosis > Diagnosis list > Last diagnosis channel***
Description	Displays the possible sensor input to which the diagnosis message applies
Display	• Sensor 1 • Sensor 2 • ...

14.3.3 "Device information" sub-menu

Measuring point identifier

Navigation	***Setup > Measuring point identifier*** ***Diagnosis > Device information > Measuring point identifier*** ***Expert > Diagnosis > Device information > Measuring point identifier***
Description	Specifies a unique identifier for the measuring point so that it can be quickly identified in the plant; it is displayed in the header of the plug-in display, ⇨chapter 6.3 "Measured value display and operating elements", Page 31
Input	Max. 32 characters, such as letters, numbers, or special characters (e.g., @, %, /)
Default setting	None

Serial number

Navigation	***Diagnosis > Device information > Serial number*** ***Expert > Diagnosis > Device information > Serial number***
Description	Displays the device's serial number; it is located on the nameplate
Display	Max. 11 characters made up of letters and numbers.

NOTE!

The serial number is a useful way to quickly identify the device, e.g., when contacting the manufacturer.

Firmware version

Navigation	***Diagnosis > Device information > Firmware version*** ***Expert > Diagnosis > Device information > Firmware version***
Description	Shows the device firmware version installed
Display	Sequence of max. 6 digits in the format xx.yy.zz.

Device name

Navigation	***Diagnosis > Device information > Device name*** ***Expert > Diagnosis > Device information > Device name***
Description	Displays the device name; it is located on the nameplate

Order code

Navigation	***Diagnosis > Device information > Order code*** ***Expert > Diagnosis > Device information > Order code***
Description	This function is not used at this time.

Configuration counter

Navigation	***Diagnosis > Device information > Configuration counter*** ***Expert > Diagnosis > Device information > Configuration counter***
Description	Displays the counter status for changes to device parameters

NOTE!

Static parameters whose values change during optimization or configuration adjust the incrementation of this parameter by 1. This supports parameter version management. When adjusting multiple parameters, e.g., by loading PACTWare™ parameters onto the device, the counter may display a higher value. The counter can never be reset and is not reset to a default value, even after a device reset. If the counter exceeds (16 bit), it starts from 1 again.

14.3.4 "Measured values" sub-menu

NOTE!

n = Placeholder for the number of sensor inputs (1 and 2)

Value sensor n

Navigation	***Diagnosis > Measured values > Value sensor n*** ***Expert > Diagnosis > Measured values > Value sensor n***
Description	Displays the current measured value for the sensor input in question

Device temperature

Navigation	***Diagnosis > Measured values > Device temperature*** ***Expert > Diagnosis > Measured values > Device temperature***
Description	Displays the current electronics temperature

"Min./max.values" sub-menu

Sensor n min. value

Navigation	Diagnosis > Measured values > Min./max. values > Sensor n min. value ***Expert > Diagnosis > Measured values > Min./max. values > Sensor n min. value***
Description	Displays the minimum temperature measured in the past at sensor input 1 or 2 (drag indicator)

Sensor n max. value

Navigation	***Diagnosis > Measured values > Min./max. values > Sensor n max. value*** ***Expert > Diagnosis > Measured values > Min./max. values > Sensor n max. value***
Description	Displays the minimum temperature measured in the past at sensor input 1 or 2 (drag indicator)

Reset min./max. sensor values

Navigation	***Diagnosis > Measured values > Min./max. values > Reset min./max. sensor values*** ***Expert > Diagnosis > Measured values > Min./max. values > Reset min./max. sensor values***
Description	Resets the drag indicator for the minimum and maximum temperatures measured at the sensor inputs
Selection	• No • Yes
Default setting	No

Min. device temperature

Navigation	***Diagnosis > Measured values > Min./max. values > Min. device temperature*** ***Expert > Diagnosis > Measured values > Min./max. values > Min. device temperature***
Description	Displays the minimum electronics temperature measured in the past (drag indicator)

Max. device temperature

Navigation	***Diagnosis > Measured values > Min./max. values > Max. device temperature*** ***Expert > Diagnosis > Measured values > Min./max. values > Max. device temperature***
Description	Displays the maximum electronics temperature measured in the past (drag indicator)

Reset min./max. device temperature

Navigation	***Diagnosis > Measured values > Min./max. values > Reset min./max. device temp.*** ***Expert > Diagnosis > Measured values > Min./max. values > Reset min./max. device temp.***
Description	Resets the drag indicator for the minimum and maximum electronics temperatures measured
Selection	• No • Yes
Default setting	No

14.3.5 "Simulation" sub-menu

Current output simulation

Navigation	***Diagnosis > Simulation > Current output simulation*** ***Expert > Diagnosis > Simulation > Current output simulation***
Description	Switches the current output simulation on and off; when simulation is active, the display alternates between the measured value and a diagnostic message from the functional control category (C)
Additional information	The required simulation value is defined in the **Current output value** parameter.
Display	Measured value display - C491 (current output simulation)
Selection	• Off • On
Default setting	Off

Current output value

Navigation	***Diagnosis > Simulation > Current output value*** ***Expert > Diagnosis > Simulation > Current output value***
Description	Selects a current value for the simulation; this can be used to check that the current output has been adjusted correctly and that the downstream evaluation devices are working properly
Additional information	The option **On** must be selected for the **Current output simulation** parameter.
Input	3.59 to 23.0 mA
Default setting	3.59

14.4 Menu: Expert

NOTE!

The parameter groups for Expert setup contain all parameters in the operating setup and diagnosis menus, and additional parameters that are reserved exclusively for experts. This chapter describes all additional parameters. All basic parameter settings for startup and diagnosis evaluation of the transmitter are described in the chapters **"Setup" menu**, ⇨75, and **"Diagnosis" menu** ⇨94.

14.4.1 "System" sub-menu

Attenuation

Navigation	***Expert > System > Attenuation***
Description	Selects the time constant for the attenuation of the current output
Additional information	Fluctuating measured values affect the current output with an exponential delay, the time constant for which is specified by this parameter. If the time constant is low, the current output follows quickly on from the measured value; if the constant is high, the output is delayed.
Input	0 to 120 s
Default setting	0.00 s

Alarm delay

Navigation	***Expert > System > Alarm delay***
Description	Selects the delay time period applied to the diagnosis signal before it is emitted
Input	0 to 5 s
Default setting	2 s

Mains frequency filter

Navigation	***Expert > System > Mains frequency filter***
Description	Selects the mains filter for A/D conversion
Selection	• 50 Hz • 60 Hz
Default setting	50 Hz

Device temperature alarm

Navigation	***Expert > System > Device temperature alarm***
Description	⇨Page 81

"Display" sub-menu

⇨Page 86

"Administration" sub-menu

⇨Page 93

14.4.2 "Sensors" sub-menu

Sensor 1/2 sub-menu

NOTE!

n = Placeholder for the number of sensor inputs (1 and 2)

Lower sensor limit n

Navigation	***Expert > Sensors > Sensor n > Lower sensor limit n***
Description	Displays the minimum physical end of the measuring range

Upper sensor limit n

Navigation	***Expert > Sensors > Sensor n > Upper sensor limit n***
Description	Displays the maximum physical end of the measuring range

Sensor serial number

Navigation	***Expert > Sensors > Sensor n > Sensor serial number***
Description	Displays the serial number for the connected sensor

Input	Number and text-based entry up to 12 characters long
Default setting	"_" (No text)

"Sensor trimming" sub-menu

Sensor error calibration (sensor trimming)

Sensor trimming is used to adjust the actual sensor signal to the linearization of the selected sensor type stored in the transmitter. In contrast to sensor/transmitter matching, sensor trimming is only performed for the start and end values and therefore does not achieve the same level of accuracy.

NOTE!

Sensor trimming is not used to adjust the measuring range but instead adjusts the sensor signal to the linearization stored in the transmitter.

Procedure

1.	Start
2.	Select the **Customer-specific** option for the **Sensor trimming** parameter.
3.	Use a water/oil bath or furnace to bring the sensor connected to the transmitter up to a familiar and stable temperature. We recommend selecting a temperature close to the selected measuring range start.
4.	Enter the reference temperature for the value at the measuring range start under the **Sensor trimming start value** parameter. Using the difference between the specified reference temperature and the temperature actually measured at the input, the transmitter internally calculates a correction factor that is then used for the linearization of the input signal.
5.	Use a water/oil bath or furnace to bring the sensor connected to the transmitter up to a familiar and stable temperature close to the selected measuring range end.
6.	Enter the reference temperature for the value at the measuring range end under the **Sensor trimming end value** parameter.
7.	End

Sensor trimming

Navigation	***Expert* > *Sensors* > *Sensor n* > *Sensor trimming* > *Sensor trimming***
Description	Selects which linearization method is used for the connected sensor
Selection	• Default setting • Customer-specific
Default setting	Default setting

NOTE!

Resetting this parameter to the **Default setting** option enables you to restore the original linearization.

Sensor trimming start value

Navigation	***Expert* > *Sensors* > *Sensor n* > *Sensor trimming* > *Sensor trimming start value***
Prerequisite	The **Customer-specific** option is active under the **Sensor trimming** parameter, ⇨Page 101

Description	Lower point for linear characteristic line calibration (this affects offset and slope)
Input	Depends on the selected sensor type and the assignment for the current output (PV)
Default setting	-200 °C

Sensor trimming end value

Navigation	***Expert > Sensors > Sensor n > Sensor trimming > Sensor trimming end value***
Prerequisite	The **Customer-specific** option is active under the **Sensor trimming** parameter, ⇨Page 101
Description	Upper point for linear characteristic line calibration (this affects offset and slope)
Input	Depends on the selected sensor type and the assignment for the current output (PV)
Default setting	850 °C

Sensor trimming min. span

Navigation	***Expert > Sensors > Sensor n > Sensor trimming > Sensor trimming min. span***
Prerequisite	The **Customer-specific** option is active under the **Sensor trimming** parameter, ⇨Page 101
Description	Displays the minimum possible span between the sensor trimming start and end values

"Linearization" sub-menu

Procedure for adjusting linearization using Callendar/Van-Dusen coefficients specified in calibration certificate

1.	Start
2.	**Assign current output (PV)** = Adjust sensor 1 (measured value)
3.	Select a unit.
4.	Select the sensor type (linearization type) "RTD platinum (Callendar/Van-Dusen)".
5.	Select a connection type, e.g., 3-wire.
6.	Select lower and upper sensor limits.
7.	Enter the four coefficients A, B, C, and R0.
8.	If special linearization is used for a second sensor, repeat steps 2 to 6.
9.	End

Lower sensor limit n

Navigation	***Expert > Sensors > Sensor n > Linearization > Lower sensor limit n***
Prerequisite	The option RTD Platinum, RTD Poly Nickel, or RTD Polynomial Copper is active under the **Sensor type** parameter.
Description	Adjusts the lower calculation limit for special sensor linearization
Input	Depending on the sensor type selected

Default setting	-200 °C

Upper sensor limit n

Navigation	***Expert > Sensors > Sensor n > Linearization > Upper sensor limit n***
Prerequisite	The option RTD Platinum, RTD Poly Nickel, or RTD Polynomial Copper is active under the **Sensor type** parameter.
Description	Adjusts the lower calculation limit for special sensor linearization
Input	Depending on the sensor type selected
Default setting	850 °C

Call./v. Dusen coeff. R0

Navigation	***Expert > Sensors > Sensor n > Linearization > Call./v. Dusen coeff. R0***
Prerequisite	The option RTD Platinum (Callendar/Van-Dusen) is active under the **Sensor type** parameter.
Description	Adjusts the R0 value for linearization according to the Callendar/ Van-Dusen method
Input	40.000 to 1050.000
Default setting	100.000 Ohm

Call./v. Dusen coeff. A, B, and C

Navigation	***Expert > Sensors > Sensor n > Linearization > Call./v. Dusen coeff. A, B, C***
Prerequisite	The option RTD Platinum (Callendar/Van-Dusen) is active under the **Sensor type** parameter.
Description	Adjusts the coefficients for linearization according to the Callendar/Van-Dusen method
Default setting	• A: 3.910000e-003 • B: -5.780000e-007 • C: -4.180000e-012

Polynomial coeff. R0

Navigation	***Expert > Sensors > Sensor n > Linearization > Polynomial coeff. R0***
Prerequisite	The option RTD Poly Nickel or RTD Polynomial Copper is active under the **Sensor type** parameter.
Description	Adjusts the R0 value for the linearization of copper/nickel RTD temperature probes
Input	40.000 to 1050.000 Ohm
Default setting	100.00 Ohm

Polynomial coeff. A, B

Navigation	***Expert > Sensors > Sensor n > Linearization > Polynomial coeff. A, B***
Prerequisite	The option RTD Poly Nickel or RTD Polynomial Copper is active under the **Sensor type** parameter.
Description	Adjusts the coefficients for the linearization of copper/nickel RTD temperature probes

Default setting	Polynomial coeff. A = 5.49630e-003 Polynomial coeff. B = 6.75560e-006

"Diagnosis settings" sub-menu

Calibration counter start

Navigation	***Expert > Sensors > Diagnosis settings > Calibration counter start***
Description	Manages the calibration counter
Selection	• Off: Stops the calibration counter • On: Starts the calibration counter • Reset + start: Resets to the selected start value and starts the calibration counter
Default setting	Off

NOTE!

The countdown length (in days) is defined with the **Calibration counter start value** parameter.
The status signal used when the limit value is reached is defined with the parameter **Calibration counter alarm category**.

Calibration counter alarm category

Navigation	***Expert > Sensors > Diagnosis settings > Calibration counter alarm category***
Description	Selects the category (status signal) for how the device responds when the selected calibration countdown has expired
Selection	• Maintenance required (M) • Failure (F)
Default setting	Maintenance required (M)

Calibration counter start value

Navigation	***Expert > Sensors > Diagnosis settings > Calibration counter start value***
Description	Selects the start value for the calibration counter
Input	0 to 365 days
Default setting	365

Calibration countdown

Navigation	***Expert > Sensors > Diagnosis settings > Countdown to calibration***
Description	Displays the remaining time left until the next calibration

NOTE!

The calibration countdown counter only runs when the device is active. Example: If the calibration counter was set to 365 days on January 1, 2017 and the device has been without power for 100 days, the calibration alarm would appear on April 11, 2018.

14.4.3 "Output" sub-menu

Measurement mode

Navigation	***Expert > Output > Measurement mode***
Description	Enables the output signal to be inverted
Additional information	• **Standard** The output current rises as the temperature rises • **Inverted** The output current drops as the temperature rises
Selection	• Standard • Inverted
Default setting	Standard

14.4.4 "Communication" sub-menu

HART® configuration sub-menu

Measuring point identifier

Navigation	***Diagnosis > Device information > Measuring point identifier*** ***Expert > Communication > HART® configuration > Measuring point identifier***
Description	⇨Page 96

Mark instr.

Navigation	***Expert > Communication > HART® configuration > Mark instr.***
Description	Defines a brief description for the measuring point
Input	Up to 8 alpha-numerical characters (letters, numbers, special characters)
Default setting	SHORTTAG

HART® address

Navigation	***Expert > Communication > HART® configuration > HART® address***
Description	Defines the device's HART® address
Additional information	Measured values can only be transmitted over the current value when the address is 0. The current is fixed at 4.0 mA for all other addresses (multidrop mode).
Input	0 to 63
Default setting	0

Preamble number

Navigation	***Expert > Communication > HART® configuration > Preamble number***
Description	Defines the preamble number in the HART® telegram
Input	2 to 20
Default setting	5

Configuration changed

Navigation	***Expert > Communication > HART® configuration > Configuration changed***
Description	Displays whether the device configuration has been changed by a master (primary or secondary)

Reset configuration changed flag

Navigation	***Expert > Communication > HART® configuration > Reset configuration changed flag***
Description	Resets the information **Configuration changed** by a master (primary or secondary)

"HART® info" sub-menu

Device type

Navigation	***Expert > Communication > HART® info > Device type***
Description	Displays the device type under which the device is registered with the FieldComm Group™. The device type is issued by the manufacturer. It is needed to assign the device to the corresponding device description file (DD).
Display	4-digit hexadecimal figure (may be transcoded in device names by DD/DTM).
Default setting	0xE389 (JUMO dTRANS T07)

Device revision

Navigation	***Expert > Communication > HART® info > Device revision***
Description	Displays the device revision under which the device is registered with the FieldComm Group™. It is needed to assign the device to the corresponding device description file (DD).
Default setting	2

Manufacturer ID

Navigation	***Expert > Communication > HART® info > Manufacturer ID*** ***Expert > Diagnosis > Device information > Manufacturer ID***
Description	Displays the manufacturer ID under which the device is registered with the FieldComm Group™.
Display	5-digit decimal figure
Default setting	24716

HART® revision

Navigation	***Expert > Communication > HART® info > HART® revision***
Description	Displays the device's HART® revision

Description

Navigation	***Expert > Communication > HART® info > Description***
Description	Defines a description for the measuring point
Input	Up to 32 alpha-numerical characters (letters, numbers, special characters)
Default setting	The corresponding device name

Message

Navigation	***Expert > Communication > HART® info > Message***
Description	Defines a HART® message that is sent via the HART® protocol when requested by the master
Input	Up to 32 alpha-numerical characters (letters, numbers, special characters)
Default setting	The corresponding device name

Hardware revision

Navigation	***Expert > Diagnosis > Device information > Hardware revision*** ***Expert > Communication > HART® info > Hardware revision***
Description	Displays the device's hardware revision

SWRev

Navigation	***Expert > Communication > HART® info > SWRev***
Description	Displays the device's software revision

Date

Navigation	***Expert > Communication > HART® info > Date***
Description	Defines a piece of date-based information for individual use
Input	Date in the format of year-month-day (YYYY-MM-DD)
Default setting	2010-01-01

"HART® output" sub-menu

Assign current output (PV)

Navigation	***Expert > Communication > HART® output > Assign current output (PV)***
Description	Assigns a measurand to the first HART® value (PV)

Selection	• Sensor 1 (measured value) • Sensor 2 (measured value) • Device temperature • Average of both measured values: 0.5 × (SV1 + SV2) • Difference between sensor 1 and sensor 2: SV1 - SV2 • Sensor 1 (backup sensor 2): When sensor 1 fails, the value from sensor 2 automatically becomes the first HART® value (PV): Sensor 1 (OR-sensor 2) • Sensor toggle: When the selected threshold value T for sensor 1 is exceeded, the measured value from sensor 2 becomes the first HART® value (PV); the system switches back to sensor 1 when the measured value from sensor 1 is at least 2 K below T: sensor 1 (sensor 2, if sensor 1 > T) • Average value: 0.5 × (SV1 + SV2) with backup (measured value from sensor 1 or sensor 2 in the event of a sensor error in the other sensor)
Default setting	Sensor 1

NOTE!

The threshold value can be adjusted with the **Sensor toggle limit value** parameter. Temperature-dependent toggling allows two sensors to be combined with advantages for various temperature ranges.

PV

Navigation	***Expert > Communication > HART® output > PV***
Description	Displays the first HART® value

Assign SV

Navigation	***Expert > Communication > HART® output > Assign SV***
Description	Assigns a measurand to the second HART® value (SV)
Selection	See parameter **Assign current output (PV)**, ⇨Page 107
Default setting	Device temperature

SV

Navigation	***Expert > Communication > HART® output > SV***
Description	Displays the second HART® value

Assign TV

Navigation	***Expert > Communication > HART® output > Assign TV***
Description	Assigns a measurand to the third HART® value (TV)
Selection	See parameter **Assign current output (PV)**, ⇨Page 107
Default setting	Sensor 1

TV

Navigation	***Expert > Communication > HART® output > TV***
Description	Displays the third HART® value

Assign QV

Navigation	***Expert > Communication > HART® output > Assign QV***
Description	Assigns a measurand to the fourth HART® value (QV)
Selection	See parameter **Assign current output (PV)**, ⇨Page 107
Default setting	Sensor 1

QV

Navigation	***Expert > Communication > HART® output > QV***
Description	Displays the fourth HART® value

"Burst configuration" sub-menu

Burst mode

Navigation	***Expert > Communication > Burst configuration > Burst mode***
Description	Activates HART® burst mode for burst message X, message 1 has highest priority, message 2 second-highest, etc.
Selection	• **Off** The device only sends data to the bus when requested by a HART® master • **On** The device sends data to the bus on a regular basis without being requested to do so
Default setting	Off

Burst command

Navigation	***Expert > Communication > Burst configuration > Burst command***
Prerequisite	This parameter can only be selected when the **Burst mode** option is active.
Description	Selects the command whose response is sent to the HART® master when burst mode is active
Additional information	Commands 1, 2, 3, and 9 are universal HART® commands. Command 33 is a common practice HART® command. Details on these commands are defined in the HART® specifications.
Selection	• Command 1 Extract the primary variable • Command 2 Extract the current and the main measured value as a percentage • Command 3 Extract the dynamic HART® variable and the current • Command 9 Extract the dynamic HART® variable including the associated status • Command 33 Extract the dynamic HART® variable including the associated unit
Default setting	Command 2

Burst variable n

Navigation	***Expert > Communication > Burst configuration > Burst variable n***
Prerequisite	This parameter can only be selected when the **Burst mode** option is active.
Description	Assigns a measurand to slots 0 to 3
Selection	• Sensor 1 (measured value) • Sensor 2 (measured value) • Device temperature • Average of both measured values: 0.5 × (SV1 + SV2) • Difference between sensor 1 and sensor 2: SV1 - SV2 • Sensor 1 (backup sensor 2): When sensor 1 fails, the value from sensor 2 automatically becomes the first HART® value (PV): Sensor 1 (OR-sensor 2) • Sensor toggle: When the selected threshold value T for sensor 1 is exceeded, the measured value from sensor 2 becomes the first HART® value (PV); the system switches back to sensor 1 when the measured value from sensor 1 is at least 2 K below T: sensor 1 (sensor 2, if sensor 1 > T) • Average value: 0.5 × (SV1 + SV2) with backup (measured value from sensor 1 or sensor 2 in the event of a sensor error in the other sensor)
Default setting	• Burst variable 0: Sensor 1 • Burst variable 1: Device temperature • Burst variable 2: Sensor 1 • Burst variable 3: Sensor 1

NOTE!

This assignment is only relevant for burst mode. The measurands are assigned to the four HART® variables (PV, SV, TV, QV) in the menu **HART® output**, ⇨Page 107.

NOTE!

The threshold value can be adjusted with the **Sensor toggle limit value** parameter. Temperature-dependent toggling allows two sensors to be combined with advantages for various temperature ranges.

NOTE!

n = Number of burst variables 0 to 3

Burst trigger mode

Navigation	***Expert > Communication > Burst configuration > Burst trigger mode***
Prerequisite	This parameter can only be selected when the **Burst mode** option is active.

Description	Selects the event triggered by burst message X: • Continuous dThe message is triggered in a time-controlled manner but, at the very least, in accordance with the time span specified in the parameter "Burst min. time span X" • Interval dThe message is triggered when the defined measured value changes by the value specified in the parameter "Burst trigger value X" • Rising dThe message is triggered when the defined measured value exceeds the value specified in the parameter "Burst trigger value X" • Falling dThe message is triggered when the defined measured value undercuts the value specified in the parameter "Burst trigger value X" • When changed dThe message is triggered when any measured value changes the message
Selection	• Continuous • Interval • Rising • Falling • When changed
Default setting	Continuous

Burst trigger value

Navigation	***Expert > Communication > Burst configuration > Burst trigger value***
Prerequisite	This parameter can only be selected when the **Burst mode** option is active.
Description	Specifies the value that defines the time of burst message 1 in conjunction with the trigger mode; this value determines the time of the message.
Input	-10000 to +10000
Default setting	-10000

Burst min. time frame

Navigation	***Expert > Communication > Burst configuration > Burst min. time frame***
Prerequisite	This parameter can only be selected when the **Burst mode** option is active.
Description	Specifies the minimum time span between two burst commands from burst message X; the data is specified in the unit of 1/32 of a millisecond.
Input	500 to [value specified for the maximum time span under the parameter **Burst max. time frame**] as whole numbers
Default setting	1000

Burst max. time frame

Navigation	***Expert > Communication > Burst configuration > Burst max. time frame***
Prerequisite	This parameter can only be selected when the **Burst mode** option is active.
Description	Specifies the maximum time span between two burst commands from burst message X; the data is specified in the unit of 1/32 of a millisecond.
Input	[Value specified for the minimum time span under the parameter **Burst min. time frame**] to 3,600,000 as whole numbers
Default setting	2000

14.4.5 "Diagnosis" sub-menu

"Diagnosis list" sub-menu

Detailed description ⇨Page 95

"Event log" sub-menu

Detailed description ⇨Page 95

"Device information" sub-menu

Advanced order code 1 to 3

Navigation	***Expert > Diagnosis > Device information > Advanced order code 1 to 3***
Description	This parameter is not used for this device.

ENP version

Navigation	***Expert > Diagnosis > Device information > ENP version***
Description	Displays the version of the electronic nameplate
Display	6-digit number in the format xx.yy.zz.

Device revision

Navigation	***Expert > Diagnosis > Device information > Device revision*** ***Expert > Communication > HART® info > Device revision***
Description	Displays the device revision under which the device is registered with the FieldComm Group™. It is needed to assign the device to the corresponding device description file (DD).

Manufacturer ID

Navigation	***Expert > Communication > HART® info > Manufacturer ID*** ***Expert > Diagnosis > Device information > Manufacturer ID***

Manufacturer

Navigation	***Expert > Diagnosis > Device information > Manufacturer***
Description	Displays the manufacturer's name

Hardware revision

Navigation	***Expert > Diagnosis > Device information > Hardware revision*** ***Expert > Communication > HART® info > Hardware revision***
Description	Displays the device's hardware revision

"Measured values" sub-menu

NOTE!

n = Placeholder for sensor inputs (1 or 2)

Sensor n raw value

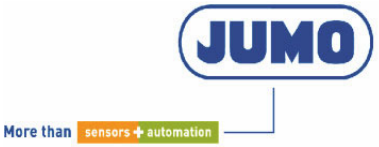
Navigation	***Expert > Diagnosis > Measured values > Sensor n raw value***
Description	Displays the non-linearized mV/Ohm value at the corresponding sensor input

Min./max.values sub-menu

Detailed description ⇨Page 97

Simulation sub-menu

Detailed description on page 99



产品组别 Product group: 707080-81-82-83-84-85-86-87-88	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
部件名称 Component Name	铅 （Pb）	汞 （Hg）	镉 （Cd）	六价铬 （Cr(VI)）	多溴联苯 （PBB）	多溴二苯醚 （PBDE）
外壳 Housing (Gehäuse)	X	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	X	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○
螺栓 Screw (Schraube)	○	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。
This table is prepared in accordance with the provisions SJ/T 11364.
○：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。
Indicate the hazardous substances in all homogeneous materials' for the part is below the limit of the GB/T 26572.

×：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。
Indicate the hazardous substances in at least one homogeneous materials' of the part is exceeded the limit of the GB/T 26572.

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