azbil

CM2-ATT082-2001

ATT082

Temperature transmitter

User's Manual

Azbil Corporation

NOTICE

While the information in this manual is presented in good faith and believed to be accurate, Azbil Corporation disclaims any implied warranty of merchantability or fitness for a particular purpose and makes no express warranty except as may be stated in its written agreement with and for its customer.

In no event shall Azbil Corporation be liable to anyone for any indirect, special or consequential damages. This information and specifications in this document are subject to change without notice.

Safety

Precautions for Use

For safe use of the product, the following symbols are used in this manual.

⚠WARNING	Warnings are indicated when mishandling the product might result in the death or serious injury of the user.
⚠CAUTION	Cautions are indicated when mishandling the product might result in minor injury to the user or damage to property.

■ In describing the product, this manual uses the icons and conventions listed below.

Use caution when handling the product.

The indicated action is prohibited.

Be sure to follow the indicated instructions.

Handling Precautions:

Handling Precautions indicate items that the user should pay attention to when handling the ATT.

To use this product correctly and safely, always observe the following precautions.
We are not responsible for damage or injury caused by the use of the product in violation of these precautions.

Handling Precautions for This Product

Installation Precautions

	⚠WARNING
	When installing, use proper fittings and proper tightening torque for connections to the process and to the exhaust. Gas leakage is dangerous because process gas and calibration gas are flammable. Please refer to the leak check instructions in this manual and verify that there is no gas leakage.
	Do not use the product except at the rated pressure, specified connection standards, and rated temperature. Use under other circumstances might cause damage that leads to a serious accident.
	For wiring work in an explosion-proof area, follow the work method stated in the explosion-proof policy.

⚠CAUTION
After installation, do not step or stand on this unit. Doing so may damage the device or cause injury.
Bumping the glass of the display with a tool may cause damage or injury. Be careful.
Install the device correctly. Incorrect or incomplete installation will cause output errors and violation of regulations.
This product is quite heavy. Protect your feet with safety shoes when working.
Do not subject the product to shock or impact.

Wiring Precautions

⚠WARNING
Do not do wiring work with wet hands or while electricity is being supplied to the product. There is a danger of electric shock. When working, keep hands dry or wear gloves, and turn off the power.

⚠CAUTION
When wiring, check the specifications carefully and make sure to wire correctly. Incorrect wiring can cause device damage or malfunction.
Supply electric power correctly according to the specifications. Supplying power that differs from the specifications can damage the device.
Use a DC power supply that has overload protection.

Maintenance Precautions

⚠WARNING
When removing this device for maintenance, be careful of residual pressure or residual process gas. Leakage of process gas is dangerous.
When working on the vent, check its direction so that people do not come into contact with vented gas. There is a danger of burns or other physical harm.
When the device is being used in an explosion-proof area, do not open the cover. Opening the cover may cause an explosion.

⚠CAUTION
This product was kept under carefully controlled conditions until it was shipped. Never try to modify this device. Doing so could damage it.

Table of Contents

Chapter 1. Important document information

1-1. About this document

1-1-1. Document function

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

1-1-2. Additional standard documentation on the device

Document	Purpose and content of the document
Technical Information SS2-ATT082-0100	Planning aid for your device The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
Brief Operating Instructions CM2-ATT082-2002	Guide that takes you quickly to the 1st measured value The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

1-1-3. Safety Instructions

When using in hazardous areas, the national safety requirements must be met. Separate Ex documentation is contained in these Operating Instructions for measurement systems that are to mounted in hazardous areas. Strict compliance with the installation instructions, ratings and safety instructions as listed in this supplementary documentation is mandatory. Ensure you are using the correct Ex documentation for the relevant Ex-approved device. The number of the related Ex documentation is indicated on the nameplate. You can use this Ex documentation if the two numbers (i.e. in the Ex documentation and on the nameplate) are identical.

1-1-4. Functional safety

Please refer to Safety Manual CM2-ATT082-2003 for the use of approved devices in protective systems according to IEC 61508.

Chapter 2. Basic safety instructions

2-1. Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- ▶ Trained, qualified specialists must have a relevant qualification for this specific function and task
- ▶ Are authorized by the plant owner/operator
- ▶ Are familiar with federal/national regulations
- ▶ Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- ▶ Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

- ▶ Being instructed and authorized according to the requirements of the task by the facility's owner-operator
- ▶ Following the instructions in these Operating Instructions

2-2. Designated use

The device is a universal and user-configurable temperature transmitter with either one or two sensor inputs for a resistance thermometer (RT), thermocouples (TC), resistance and voltage transmitters. The head transmitter version of the device is intended for mounting in a flat-face terminal head as per DIN EN 50446.
The manufacturer is not liable for damage caused by improper or non-designated use.

2-3. Operational safety

- ▶ Operate the device in proper technical condition and fail-safe condition only.
- ▶ The operator is responsible for interference-free operation of the device.

Hazardous area

To eliminate a danger for persons or for the facility when the device is used in the hazardous area (e.g. explosion protection or safety equipment):

- ▶ Based on the technical data on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area. The nameplate can be found on the side of the transmitter housing.
- ▶ Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

Electromagnetic compatibility

The measuring system complies with the general safety requirements in accordance with EN 61010, the EMC requirements of IEC/EN 61326 and NAMUR Recommendation NE 21 and NE 89.

Note: The unit must only be powered by a power supply that operates using an energy-limited electric circuit that is compliant with IEC 61010-1, "SELV or Class 2 circuit".

Chapter 3. Identification

3-1. Device designation

The following options are available for identification of the device:

- Nameplate specifications

3-1-1. Nameplate

The right device?

Compare and check the data on the nameplate of the device against the requirements of the measuring point:

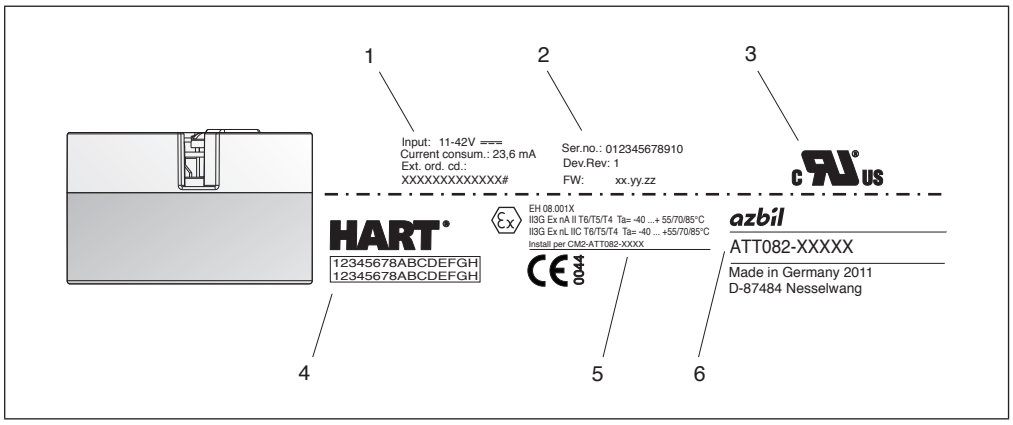


Fig 3-1. Nameplate of the head transmitter (example, Ex version)

1 Power supply, current consumption and extended order code
2 Serial number, device revision and firmware version
3 Approvals with symbols
4 2 lines for the TAG name
5 Approval in hazardous area with number of the relevant Ex documentation
6 Order code and manufacturer ID

3-2. Scope of delivery

The scope of delivery of the device comprises:

- Temperature transmitter
- Mounting material
- Hard copy of Brief User's Manual
- Additional documentation for devices which are suitable for use in hazardous areas such as Safety Instructions.

3-3. Certificates and approvals

The device left the factory in a safe operating condition. The device complies with the standards EN 61 010-1 "Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures" and with the EMC requirements of IEC/EN 61326.

3-3-1. CE mark, Declaration of Conformity

The device therefore meets the legal requirements of the EC guidelines. The manufacturer confirms that the device is compliant with the relevant guidelines by applying the CE mark.

3-3-2. HART® protocol certification

The temperature transmitter is registered by HART® Communication. The device meets the requirements of the HART Communication Protocol Specifications, Revision 7.0.

3-3-3. Functional safety

The device is optionally available for use in safety systems as per IEC 61508.

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

3-3-4. Registered trademarks

- HART®
  Registered trademark of the HART® Communication Foundation

Chapter 4. Installation instructions

4-1. Incoming acceptance, transport, storage

4-1-1. Incoming acceptance

- Is the packaging or content damaged?
- Is the delivery complete? Compare the scope of delivery against the information on your order form.

4-1-2. Transport and storage

- Pack the device in such a way as to protect it reliably against impact for storage (and transportation). The original packaging provides optimum protection.
- Permitted storage temperature:
  – Head transmitter: –50 to +100 °C (–58 to +212 °F)

4-2. Installation conditions

4-2-1. Dimensions

The dimensions of the device are provided in the "Technical data" section (Refer to page 33.).

4-2-2. Mounting location

- Head transmitter:
  – In the terminal head, flat face, as per DIN EN 50446, direct mounting on insert with cable entry (middle hole 7 mm)
  – In the field housing, separated from the process (Refer to page 25)

Information about the conditions (such as the ambient temperature, degree of protection, climate class etc.) that must be present at the installation point so that the device can be mounted correctly, is provided in the "Technical data" section (Refer to page 37).
When using in hazardous areas, the limit values of the certificates and approvals must be observed (see Ex Safety Instructions).

4-3. Installation instructions

A Phillips head screwdriver is required to mount the head transmitter.

Handling Precautions:

Do not overtighten the mounting screws as this could damage the head transmitter.

▶ Maximum torque = 1 Nm (¾ pound-feet).

4-3-1. Mounting the head transmitter

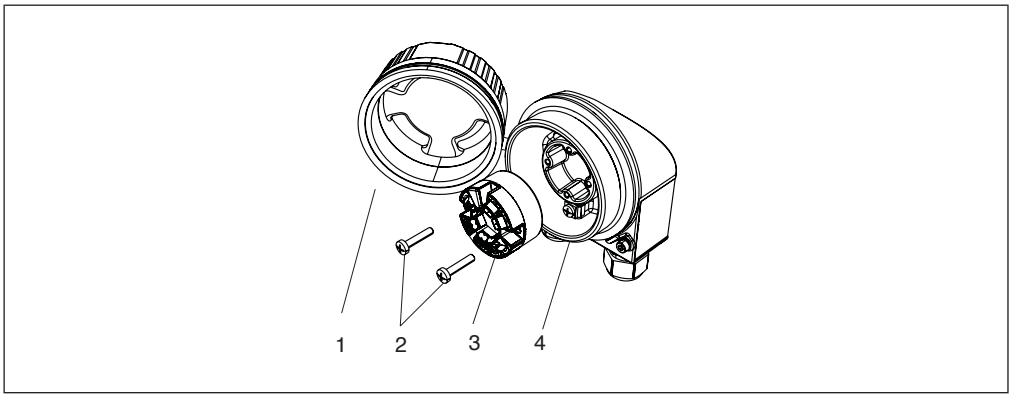


Fig 4-1. Head transmitter mounting

	Mounting in a field housing
1	Field housing cover
2	Mounting screws with springs
3	Head transmitter
5	Field housing

Procedure for mounting in a field housing, pos. B:

1. Open the cover (1) of the field housing (4).
2. Guide the mounting screws (2) through the lateral bores of the head transmitter (3).
3. Screw the head transmitter to the field housing.
4. After wiring, close the field housing cover (1) again. (Refer to page 8)

Mounting the display on the head transmitter

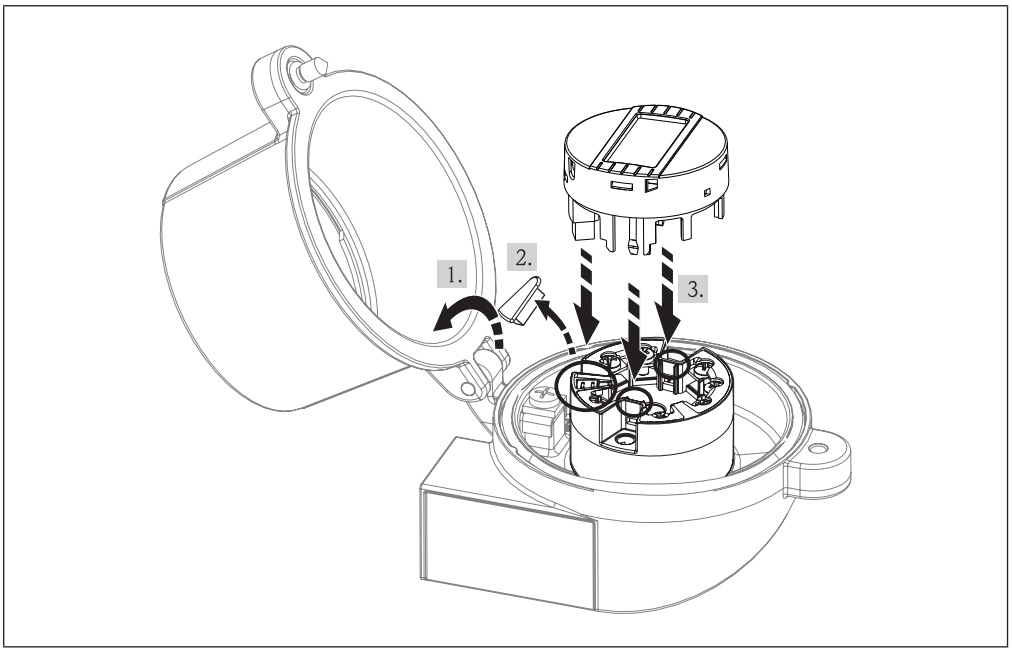


Fig 4-2. Mounting the display

1. Remove the terminal head cover.
2. Remove the cover of the display connection area.
3. Fit the display module onto the mounted and wired head transmitter. The fastening pins must click securely into place on the head transmitter. After mounting, securely tighten the terminal head cover.

! Handling Precautions:

The display can only be used with the appropriate terminal heads - cover with viewing window.

4-4. Post-installation check

After installing the device, always run the following final checks:

Device condition and specifications	Notes
Is the device undamaged (visual inspection)?	-
Do the ambient conditions match the device specification (e.g. ambient temperature, measuringrange, etc.)?	See 'Technical data' section (Refer to page 37)

! Handling Precautions:

Make sure the sensor type.
Make sure that the sensor type and model are correct.
Use of the incorrect sensor and model might cause temperature errors or abnormal outputs.

Chapter 5. Wiring

⚠CAUTION
Switch off power supply before installing or connecting the device. Failure to observe this may result in destruction of parts of the electronics.
When installing Ex-approved devices in a hazardous area please take special note of the instructions and connection schematics in the respective Ex documentation added to these Operating Instructions. Your supplier is available for assistance if required.
Do not occupy the display connection. An incorrect connection can destroy the electronics.

A Phillips head screwdriver is required to wire the head transmitter with screw terminals.

Handling Precautions:

Do not overtighten the screw terminals, as this could damage the transmitter.

▶ Maximum torque = 1 Nm (¾ pound-feet).

For wiring a mounted head transmitter, proceed as follows:

1. Open the cable gland and the housing cover on the terminal head or the field housing.
2. Feed the cables through the opening in the cable gland.
3. Connect the cables as shown in (Refer to page 9). If the head transmitter is fitted with springterminals.
4. Retighten the cable gland and close the housing cover.

In order to avoid connection errors always take note of the hints given in the section "connection check"!

5-1. Quick wiring guide

Terminal assignment of head transmitter

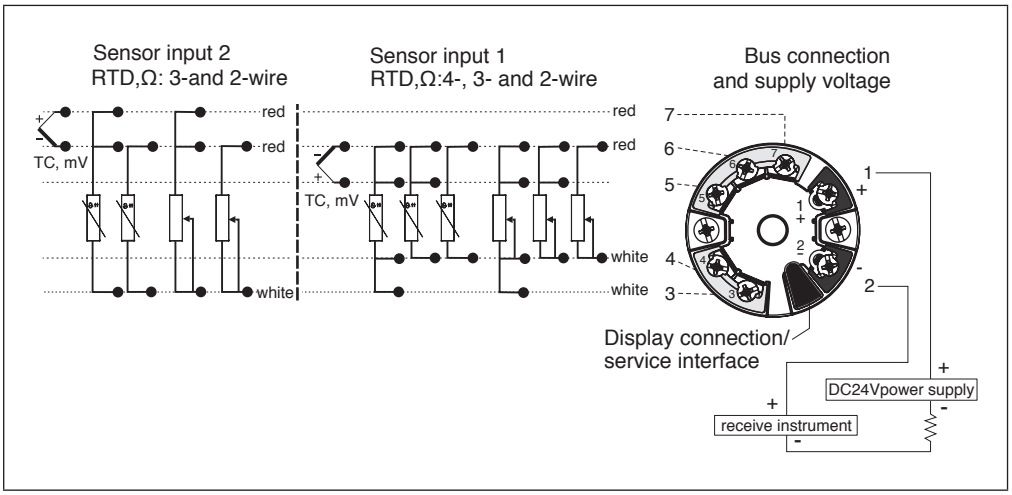


Fig 5-1. Wiring the head transmitter

To operate the device via the HART® protocol (terminals 1 and 2), a minimum load of 250 W is required in the signal circuit.

⚠ Handling Precautions:

ESD - electrostatic discharge. Protect the terminals from electrostatic discharge. Failure to observe this may result in destruction or malfunction of parts of the electronics.

5-2. Connecting the sensor cables

Terminal assignment of the sensor terminals (Refer to fig 5-1, page 9).

! Handling Precautions:

When connecting 2 sensors ensure that there is no galvanic connection between the sensors (e.g. caused by sensor elements that are not isolated from the thermowell). The resulting equalizing currents distort the measurements considerably.

- The sensors must remain galvanically isolated from one another by connecting each sensor separately to a transmitter. The transmitter provides sufficient galvanic isolation (> 2 kV AC) between the input and output.

The following connection combinations are possible when both sensor inputs are assigned:

		Sensor input 1			
		RTD or resistance transmitter, 2-wire	**RTD or resistance transmitter, 3-wire**	**RTD or resistance transmitter, 4-wire**	**Thermocouple (TC), voltage transmitter**
Sensor input 2	**RTD or resistance transmitter, 2-wire**	✓	✓	-	✓
	RTD or resistance transmitter, 3-wire	✓	✓ 1)	-	✓ 1)
	RTD or resistance transmitter, 4-wire	-	-	-	-
	Thermocouple (TC), voltage transmitter	✓	✓ 1)	✓ 1)	✓ 1)

1) Permitted combinations in the SIL mode, see Functional Safety Manual CM2-ATT082-2003

5-3. Connecting the power supply and signal cables

⚠CAUTION

Switch off power supply before installing or connecting the transmitter. Failure to observe this may result in destruction of parts of the electronics.

Cable specification

- A normal device cable suffices if only the analog signal is used.
- A shielded cable is recommended for HART® communication. Observe grounding concept of the plant.

Please also observe the general procedure on (Refer to page 8.).

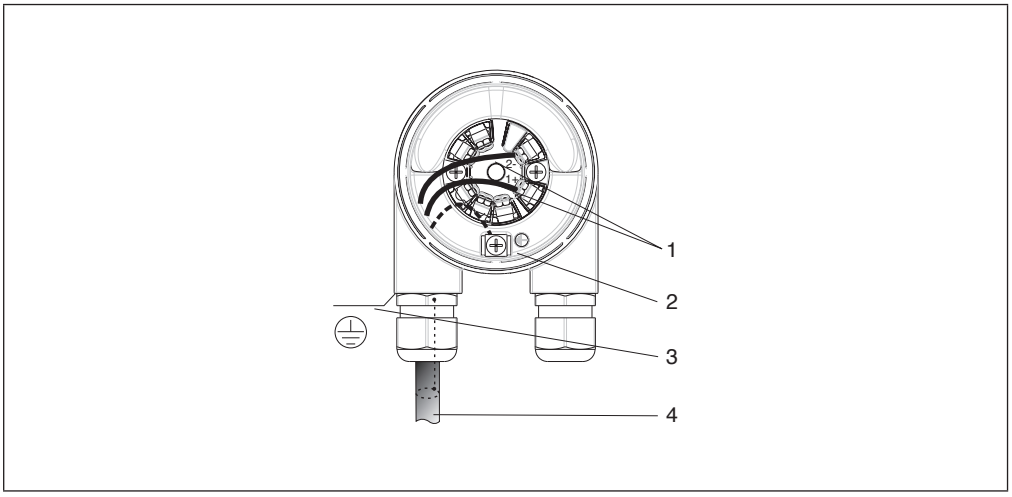


Fig 5-2. Connecting the signal cables and power supply

1 Terminals for HART® protocol and power supply
2 Internal ground connection
3 External ground connection
4 Shielded signal cable (recommended for HART® protocol)

- The terminals for connecting the signal cable (1+ and 2-) are protected against reverse polarity.
- Conductor cross-section:
  – Max. 2.5 mm2 for screw terminals
  – max. 1.5 mm2 for spring terminals. Min. stripping length of wire 10 mm (0.39 in).

5-4. Shielding and grounding

Optimum electromagnetic compatibility (EMC) can only be guaranteed if the system components and, in particular, the lines are shielded and the shield forms as complete a cover as possible. A shield coverage of 90% is ideal.

- To ensure an optimum EMC protective effect when communicating with HART®, connect the shield as often as possible to the reference ground.
- For reasons of explosion protection, you should refrain from grounding however.

To comply with both requirements, three different types of shielding are possible when communicating with HART®:

- Shielding at both ends
- Shielding at one end on the feed side with capacitance termination at the field device
- Shielding at one end on the feed side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with one-sided shielding on the feed side (without capacitance termination at the field device). Appropriate measures with regard to input wiring must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed. Where applicable, national installation regulations and guidelines must be observed during the installation! Where there are large differences in potential between the individual grounding points, only one point of the shielding is connected directly with the reference ground. In systems without potential equalization, therefore, cable shielding of fieldbus systems should only be grounded on one side, for example at the supply unit or at safety barriers.

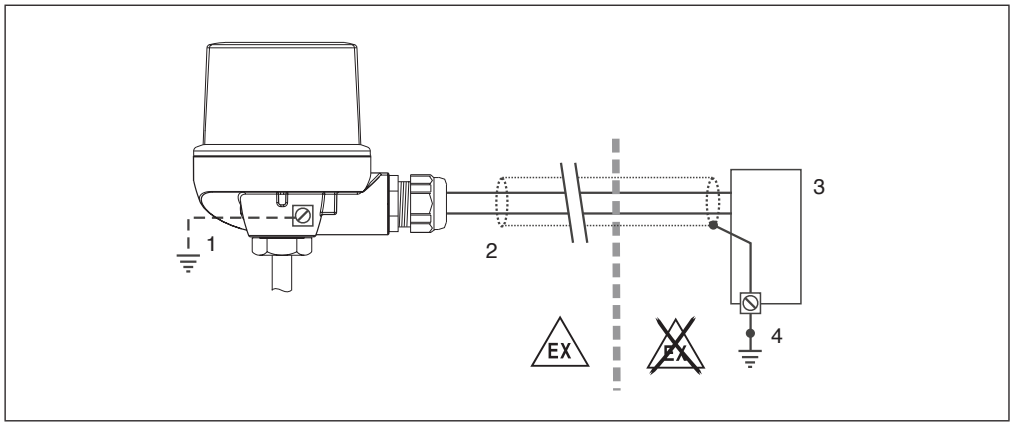


Fig 5-3. Shielding and grounding the signal cable at one end with HART® communication

1 Optional grounding of the field device, isolated from cable shielding
2 Grounding of the cable shield at one end
3 Supply unit
4 Grounding point for HART® communication cable shield

! Handling Precautions:

If the shielding of the cable is grounded at more than one point in systems without potential matching, power supply frequency equalizing currents can occur that damage the signal cable or have a serious effect on signal transmission.

- ▶ In such cases the shielding of the signal cable is to be grounded on only one side, i.e. it must not be connected to the ground terminal of the housing (terminal head, field housing). The shield that is not connected should be insulated!

5-5. Post-connection check

Device condition and specifications	Notes
Is the device or cable undamaged (visual check)?	--
Electrical connection	**Notes**
Does the supply voltage match the specifications on the nameplate?	■ Head transmitter: U = 11 to 42 V_{DC} ■ SIL mode: U = 11 to 32 V_{DC} for the head transmitter or U = 12 to 32 V_{DC} for the DIN rail transmitter
Do the cables have adequate strain relief?	--
Are the power supply and signal cables correctly connected?	(Refer to page 8.)
Are all the screw terminals well tightened and have the connections of the spring terminals been checked?	--
Are all the cable entries installed, tightened and sealed?	--
Are all housing covers installed and firmly tightened?	--

Chapter 6. Operating options

6-1. Overview of operation options

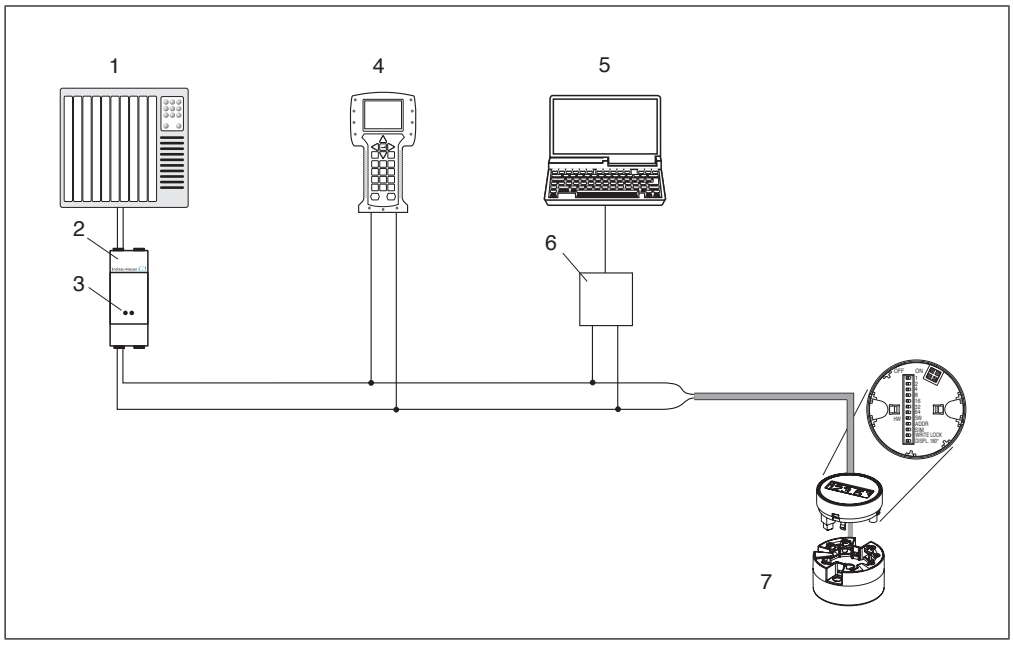


Fig 6-1. Operating options of the head transmitter

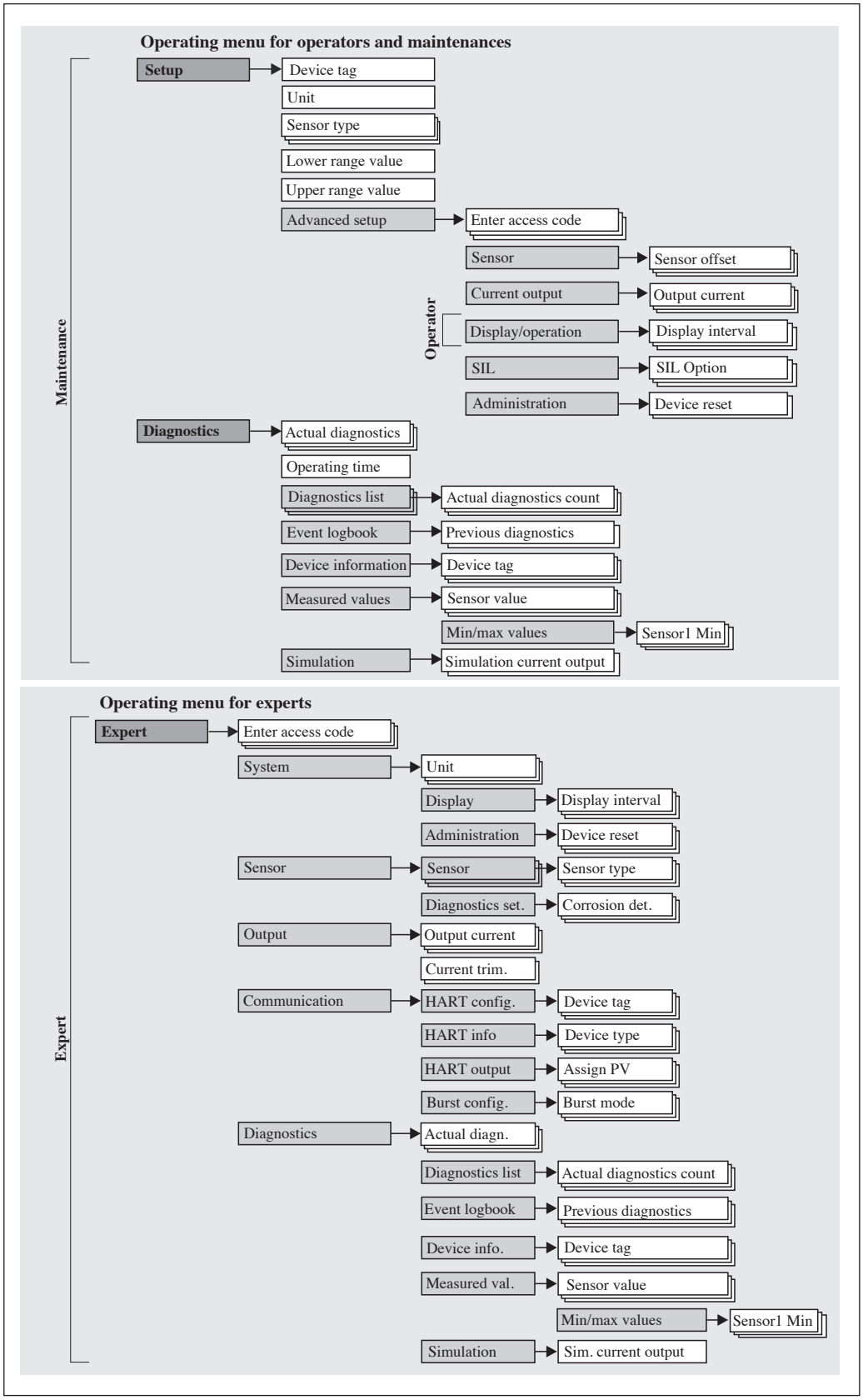
1 PLC (programmable logic control)
2 Transmitter power supply unit
3 HART® modem
4 Field Communicator 375, 475
5 Computer with operating tool (e.g. FieldCare, AMS Device Manager, SIMATIC PDM)
6 HART® modem
7 Temperature transmitter as head transmitter, onsite operation via DIP switches on the rear of the optional display possible only for head transmitter

Handling Precautions:

For the head transmitter, display and operating elements are available locally only if the head transmitter was ordered with a display unit!

6-2. Structure and function of the operating menu

6-2-1. Structure of the operating menu



6-2-2. Submenus and user roles

■ Certain parts of the menu are assigned to certain user roles. Each user role corresponds to typical tasks within the lifecycle of the device.

User role	Typical tasks	Menu	Content/meaning
Maintenance Operator	Commissioning: ■ Configuration of the measurement. ■ Configuration of data processing (scaling, linearization, etc.). ■ Configuration of the analog measured value output. Tasks during operation: ■ Configuration of the display. ■ Reading measured values.	"Setup"	Contains all parameters for commissioning: ■ **Setup parameters** Once values have been set for these parameters, the measurement should generally be completely configured. ■ **"advanced setup" submenu** Contains additional submenus and parameters: – For more accurate configuration of the measurement (adaptation to special measuring conditions). – For converting the measured value (scaling, linearization). – For scaling the output signal. – Required in ongoing operation: configuration of the measured value display (displayed values,display format, etc.).
	Fault elimination: ■ Diagnosing and eliminating process errors. ■ Interpretation of device error messages and correcting associated errors.	"Diagnostics"	Contains all parameters for detecting and analyzing errors: ■ **Diagnostics list** Contains up to 3 currently pending error messages. ■ **Event logbook** Contains the last 5 error messages (no longer pending). ■ **"Device information" submenu** Contains information for identifying the device. ■ **"Measured values" submenu** Contains all current measured values. ■ **"Simulation" submenu** Is used to simulate measured values or output values. ■ **"Device reset" submenu**
Expert	Tasks that require detailed knowledge of the function of the device: ■ Commissioning measurements under difficult conditions. ■ Optimal adaptation of the measurement to difficult conditions. ■ Detailed configuration of the communication interface. ■ Error diagnostics in difficult cases.	"Expert"	Contains all parameters of the device (including those that are already in one of the other menus). The structure of this menu is based on the function blocks of the device: ■ **"System" submenu** Contains all higher-order device parameters that do not pertain either to measurement or the measured value communication. ■ **"Sensor" submenu** Contains all parameters for configuring the measurement. ■ **"Output" submenu** Contains all parameters for configuring the analog current output. ■ **"Communication" submenu** Contains all parameters for configuring the digital communication interface. ■ **"Diagnostics" submenu** Contains all parameters for detecting and analyzing errors.

6-3. Measured value display and operating elements

6-3-1. Display elements

Head transmitter

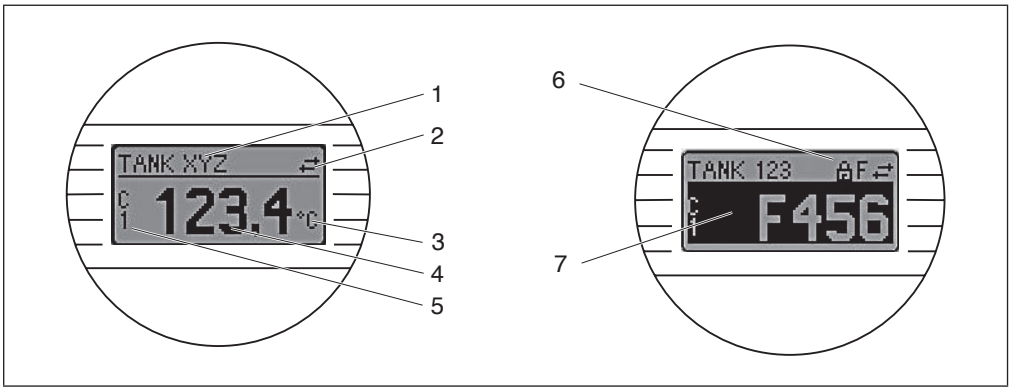


Fig 6-2. Optional LC display for head transmitter

Item No.	Function	Description
1	Displays the TAG	TAG, 32 characters long.
2	'Communication' symbol	The communication symbol appears when read and write-accessing via the fieldbus protocol.
3	Unit display	Unit display for the measured value displayed.
4	Measured value display	Displays the current measured value.
5	Value/channel display S1, S2, DT, PV, I, %	e.g. S1 for a measured value from channel 1 or DT for the device temperature
6	'Configuration locked' symbol	The 'configuration locked' symbol appears when configuration is locked via the hardware.

7	Status signals	
	Symbols	Meaning
	F	Error message "Failure detected" An operating error has occurred. The measured value is no longer valid. The display alternates between the error message and "- - - -" (no validmeasured value present), see "Diagnostics events" (Refer to page 32) section.
	C	"Service mode" The device is in service mode (e.g. during a simulation).
	S	"Out of specification" The device is being operated outside its technical specifications (e.g. during warm-up or cleaning processes).
	M	"Maintenance required" Maintenance is required. The measured value is still valid. The display alternates between the measured value and the status message.

6-3-2. Local operation

You can make hardware settings for the fieldbus interface using miniature switches (DIP switches) on the rear of the optional display .

Note: The user has the option of ordering the display with the head transmitter, or as an accessory for subsequent mounting. (Refer to page 25)

! Handling Precautions:

ESD - electrostatic discharge. Protect the terminals from electrostatic discharge. Failure to observe this may result in destruction or malfunction of parts of the electronics.

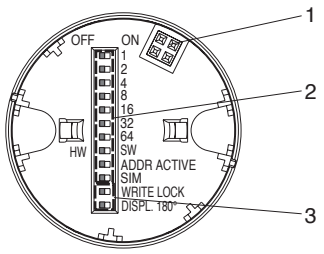


Fig 6-3. Hardware settings via DIP switches

1: Connection to head transmitter
2: DIP switch (1 - 64, SW/HW, ADDR and SIM = simulation mode) no function for this head transmitter
3: DIP switch (WRITE LOCK = write protection; DISPL. 180° = switch, turn the display monitor 180°)

Procedure for setting the DIP switch:

1. Open the cover of the terminal head or field housing.
2. Remove the attached display from the head transmitter.
3. Configure the DIP switch on the rear of the display accordingly. In general: switch to ON = function enabled, switch to OFF = function disabled.
4. Fit the display onto the head transmitter in the correct position. The head transmitter accepts the settings within one second.
5. Secure the cover back onto the terminal head or field housing.

Switching write protection on/off

Write protection is switched on and off via a DIP switch on the rear of the optional attachable display. When write protection is active, parameters cannot be modified. A key symbol on the display indicates that the write protection is on. Write protection prevents any write access to the parameters. The write protection remains active even when the display is removed. To deactivate the write protection, the device must be restarted with the display attached and the DIP switch deactivated (WRITE LOCK = OFF).

Turning the display

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

Chapter 7. Integrating the transmitter via HART® protocol

Note: For secure HART® communication in accordance with functional safety as defined in IEC 61508 (SIL mode), measured values are sent securely from the transmitter via the HART® protocol to a connected control system where they are processed further in a secure manner. Secure HART® communication works using special HART® commands that are only available in the SIL mode.

For more information please refer to the Functional Safety Manual CM2-ATT082-2003.

Version data for the device

Firmware version	02.00.zz	■ On the title page of the Operating instructions ■ On nameplate (Refer to fig 3-1, page 3.). ■ Parameter firmware version Diagnostics → Device info → Firmware version
Manufacturer ID	0x11	Manufacturer ID parameter Diagnostics → Device info → Manufacturer ID
Device type ID	0xCC	Device type parameter Diagnostics → Device info → Device type
HART protocol revision	7.0	---
Device revision	2	■ On transmitter nameplate (Refer to fig 3-1, page 3.). ■ Device revision parameter Diagnostics → Device info → Device revision

7-1. HART device variables and measured values

The following measured values are assigned to the device variables at the factory:

Device variables for temperature measurement

Device variable	Measured value
Primary device variable (PV)	Sensor 1
Secondary device variable (SV)	Device temperature
Tertiary device variable (TV)	Sensor 1
Quaternary device variable (QV)	Sensor 1

Note: It is possible to change the assignment of device variables to process variables in the **Expert → Communication → HART output** menu.

7-2. Device variables and measured values

The following 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 of sensor 1 and sensor 2
4	Difference between sensor 1 and sensor 2
5	Sensor 1 (backup sensor 2)
6	Sensor 1 with switchover to sensor 2 if a limit value is exceeded
7	Average of sensor 1 and sensor 2 with backup

Note: The device variables can be queried from a HART® master using HART® command 9 or 33.

7-3. Supported HART® commands

Note: The HART® protocol enables the transfer of measuring data and device data between the HART® master and the field device for configuration and diagnostics purposes.HART® masters such as the handheld terminal or PC-based operating programs need device description files (DD, DTM) which are used to access all the information in a HART® device. This information is transmitted exclusively via "commands".

There are three different types of command

- Universal commands:
  All HART® devices support and use universal commands. These are associated with the following functionalities for example:
  – Recognition of HART® devices
  – Reading digital measured values
- Common practice commands:
  Common practice commands offer functions which are supported and can be executed by many but not all field devices.
- Device-specific commands:
  These commands allow access to device-specific functions which are not HART® standard. Such commands access individual field device information, among other things.

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
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

Command No.	Designation
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, Cmd103	Write burst period
104, Cmd104	Write burst trigger
105, Cmd105	Read burst mode configuration
107, Cmd107	Write burst device variables
108, Cmd108	Write burst mode command number
109, Cmd109	Burst mode control

Chapter 8. Commissioning

8-1. Function check

Before commissioning the measuring point make sure that all final checks have been carried out:

- Checklist “Post-installation check”, (Refer to page 7.)
- Checklist “Post-connection check”, (Refer to page 13.)

8-2. Switching on the transmitter

Once the final checks have been successfully completed, it is time to switch on the supply voltage. The transmitter performs a number of internal test functions after power-up. As this procedure progresses, the following sequence of messages appears on the display:

Step	Display
1	"Display" text and firmware version of the display
2	Firm logo
3	Device name with firmware and hardware versions
4	Information on the sensor configuration (sensor element and type of connection)
5	Set measuring range
6a	Current measured value or
6b	Current status message If the switch-on procedure is not successful, the relevant diagnostics event, depending on the cause, is displayed. A detailed list of diagnostic events and the corresponding troubleshooting instructions can be found in the "Diagnostics and troubleshooting" section (Refer to page 29).

The device is operational after approx. 30 seconds, and the plug-in display after approx. 33 seconds in normal operating mode! Normal measuring mode commences as soon as the switch-on procedure is completed. Measured values and status values appear on the display.

8-3. Enabling configuration

If the device is locked and the parameter settings cannot be changed, it must first be enabled via the hardware lock. The device is locked using the hardware if the keyhole symbol appears in the header of the measured value display.

To unlock the device

- either switch the write protection switch on the back of the display to the "OFF" position (hardware write protection), (Refer to page 29) or
- deactivate the software write protection via the operating tool. See the description for the 'Define device write protection' parameter. (Refer to page 81)

Note: When hardware write protection is active (write protection switch on the back of the display to the "ON" position), write protection cannot be disabled via the operating tool. Hardware write protection must always be disabled before software write protection can be enabled or disabled.

Chapter 9. Maintenance

In general, no specific maintenance is required for this device.

Chapter 10. Accessories

Different accessories are available for the device. These may be ordered separately from your supplier. Contact your service organization for detailed information on the relevant order code.
When ordering accessories, please quote the serial number of the device!

Accessories included in the scope of delivery:

- Brief User's manual
- Operating Instructions and optional Functional Safety Manual (SIL mode)
- ATEX supplementary documentation ATEX: ATEX Safety instructions, Control Drawings
- Mounting material for head transmitter

Chapter 11. Diagnostics and troubleshooting

11-1. Troubleshooting

Always start troubleshooting with the checklists below if faults occur after start up or during operation. This takes you directly (via various queries) to the cause of the problem and the appropriate remedial measures.

Note: Due to its design, the device cannot be repaired. However, it is possible to send the device in for examination.

General errors

Problem	Possible cause	Remedy
Device is not responding.	Supply voltage does not match that specified on the nameplate.	Apply correct voltage.
	Connecting cables are not in contact with the terminals.	Check the contacting of the cables and correct if necessary.
Output current < 3.6 mA	Signal line is not wired correctly.	Check wiring.
	Electronics unit is defective.	Replace the device.
HART communication is not working.	Missing or incorrectly installed communication resistor.	Install the communication resistor (250 Ω) correctly.
	Commubox is not properly connected.	Connect Commubox correctly.
	Commubox is not set to "HART".	Set Commubox selector switch to "HART".

Check display (optional in conjunction with head transmitter)

Problem	Possible cause	Remedy
No display visible	No supply voltage	■ Check the supply voltage at the head transmitter, terminals + and -. ■ Ensure that the display module holders are correctly seated and that the display module is properly connected to the head transmitter. (Refer to page 5). ■ If possible, test the display module with other suitable head transmitters.
	The display module is defective.	Replace the module.
	The electronics of the head transmitter are defective.	Replace the head transmitter.

Application errors without status messages for RTD sensor connection

Problem	Possible cause	Remedy
Measured value is incorrect / inaccurate	Incorrect sensor orientation.	Install the sensor correctly.
	Heat conducted by sensor.	Observe the face-to-face length of the sensor.
	Device programming is incorrect (number of wires).	Change the Connection type device function.
	Device programming is incorrect (scaling).	Change scaling.
	Incorrect RTD configured.	Change the Sensor type device function.
	Sensor connection.	Check that the sensor is connected correctly.
	The cable resistance of the sensor (twowire) was not compensated.	Compensate the cable resistance.
	Offset incorrectly set.	Check offset.

Failure current (≤ 3.6 mA or ≥ 21 mA)	Faulty sensor.	Check the sensor.
	RTD connected incorrectly.	Connect the connecting cables correctly (terminal diagram).
	Incorrect device programming (e.g. number of wires).	Change the Connection type device function.
	Incorrect programming.	Incorrect sensor type set in the Sensor type device function. Set the correct sensor type.

Application errors without status messages for TC sensor connection

Problem	Possible cause	Remedy
Measured value is incorrect / inaccurate	Incorrect sensor orientation.	Install the sensor correctly.
	Heat conducted by sensor.	Observe the face-to-face length of the sensor.
	Device programming is incorrect (scaling).	Change scaling.
	Incorrect thermocouple type (TC) configured.	Change the Sensor type device function.
	Incorrect comparison measuring point set.	Set the correct comparison measuring point (Refer to page 59).
	Interference via the thermocouple wire welded in the thermowell (interference voltage coupling).	Use a sensor where the thermocouple wire is not welded.
	Offset incorrectly set.	Check offset.

Failure current (≤ 3.6 mA or ≥ 21 mA)	Faulty sensor.	Check the sensor.
	Sensor is connected incorrectly.	Connect the connecting cables correctly (terminal diagram).
	Incorrect programming.	Incorrect sensor type set in the Sensor type device function. Set the correct sensor type.

11-2. Diagnostics events

11-2-1. Displaying diagnostics events

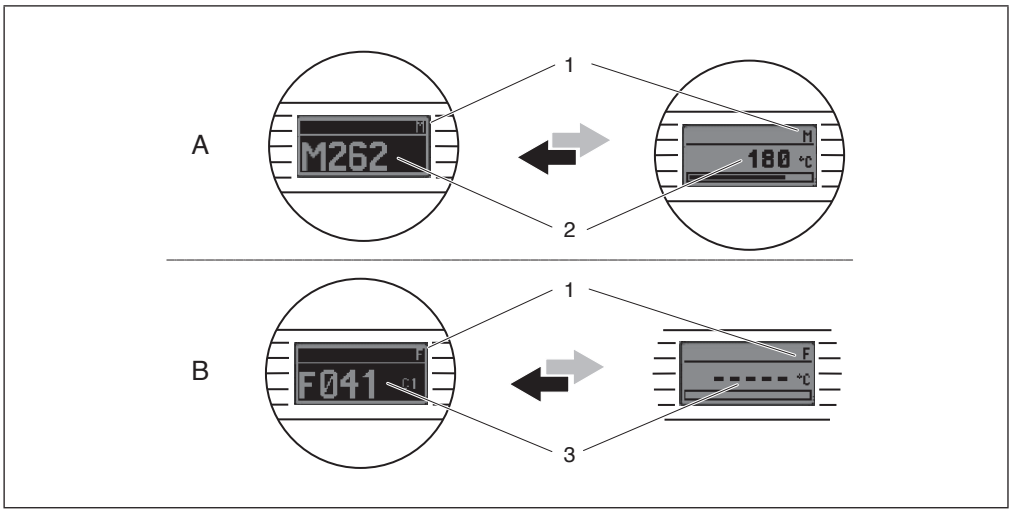


Fig 11

Procedure for setting the DIP switch:

A Display in the event of a warning

B Display in the event of an alarm

1 Status signal in the header

2 The display alternates between the primary measured value and the status - indicated by the appropriate letter (M, C or S) - plus the defined error number.

3 The display alternates between "- - - -" (no valid measured value) and the status - indicated by the appropriate letter (F) - plus the defined error number.

Status signals

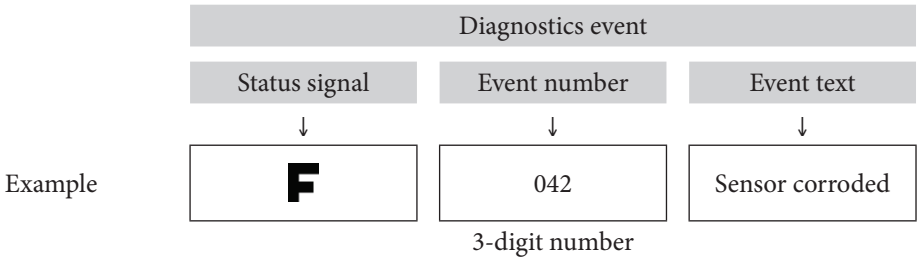
Symbol	Event category	Meaning
F	Operating error	An operating error has occurred. The measured value is no longer valid.
C	Service mode	The device is in service mode (e.g. during a simulation).
S	Out of specification	The device is being operated outside its technical specifications (e.g. during warm-up or cleaning processes).
M	Maintenance required	Maintenance is required. The measured value is still valid.

Diagnostic behavior

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

Diagnostics event and event text

The fault can be identified by means of the diagnostics event. The event text helps you by providing information about the fault.



If two or more diagnostics events are pending simultaneously, only the message with the highest priority is shown. Additional pending diagnostic messages are shown in the Diagnostics list submenu (Refer to page 84).

Note: Past diagnostic messages that are no longer pending are shown in the Event logbook submenu (Refer to page 85).

11-2-2. Overview of diagnostics events

Each diagnostics event is assigned a certain event level at the factory. The user can change this assignment for certain diagnostics events.

Note: Valid for diagnostics numbers 006, 041, 042, 043, 101 and 102.
The relevant sensor input for these diagnostics events can be identified by the Actual diag. channel parameter or on the optional attachable display.

Diagnostic number	Short text	Corrective measure	Status signal from the factory / Can be changed to	Diagnostic behavior from the factory
Diagnostics for the sensor				
001	Device malfunction	Replace electronics.	F	Alarm
006	Redundancy active	1. Check electrical wiring. 2. Replace sensor. 3. Check connection type.	M	Warning
041	Sensor broken	1. Check electrical wiring. 2. Replace sensor. 3. Check connection type.	F	Alarm
042	Sensor corroded	1. Check electrical wiring of sensor. 2. Replace sensor.	M F	Warning [1)]
043	Short circuit	1. Check electronic wiring. 2. Replace sensor.	F	Alarm

Diagnostic number	Short text	Corrective measure	Status signal from the factory / Can be changed to	Diagnostic behavior from the factory
044	Sensor drift	1. Check sensors. 2. Check process temperatures.	M F, S	Warning [1)]
045	Working area	1. Check ambient temperature. 2. Check external reference measuring point.	F	Alarm
062	Sensor connection	1. Check electrical connection of sensor. 2. Replace sensor. 3. Check sensor configuration. 4. Contact service.	F	Alarm
101	Sensor value too low	1. Check process temperatures. 2. Inspect sensor. 3. Check sensor type.	F	Alarm
102	Sensor value toohigh	1. Check process temperatures. 2. Inspect sensor. 3. Check sensor type.	F	Alarm
104	Backup active	1. Check electrical wiring of sensor 1. 2. Replace sensor 1. 3. Check connection type.	M	Warning
105	Calibration interval	1. Execute calibration and reset calibration interval. 2. Switch off calibration counter.	M F	Warning [1)]
106	Backup not available	1. Check electrical wiring of sensor 2. 2. Replace sensor 2. 3. Check connection type.	M	Warning
Diagnostics for the electronics				
201	Device malfunction	Replace electronics.	F	Alarm
221	Reference measurement	Replace electronics.	F	Alarm
241	Software	1. Restart device. 2. Perform device reset. 3. Replace device.	F	Alarm
242	Software incompatible	Contact service.	F	Alarm
261	Electronic modules	Replace electronics.	F	Alarm

Diagnostic number	Short text	Corrective measure	Status signal from the factory	Diagnostic behavior from the factory
			Can be changed to	
262	Module connection short circuit	1. Ensure that display module is correctly seated on the head transmitter. 2. Test the display module using other suitable head transmitters. 3. Display module defective? Replace module.	M	Warning
282	Electronic memory	Replace device.	F	Alarm
283	Memory content	Replace electronics.	F	Alarm
301	Supply voltage	1. Increase supply voltage. 2. Check connection wires for corrosion.	F	Alarm
Diagnostics for the configuration				
401	Factory reset	Please wait until the reset procedure is complete.	C	Warning
402	Initialization	Please wait until the start-up procedure is complete.	C	Warning
410	Data transfer	Check HART communication.	F	Alarm
411	Up-/download	Please wait until the up-/download is complete.	C	Warning
431	Factory calibration [2)]	Replace electronics.	F	Alarm
435	Linearization	1. Check configuration of sensor parameters. 2. Check configuration of special sensor linearizion. 3. Contact service. 4. Replace electronics.	F	Alarm
437	Configuration	1. Check configuration of sensor parameters. 2. Check configuration of special sensor linearizion. 3. Check configuration of transmitter settings. 4. Contact service.	F	Alarm
438	Dataset	Repeat the safe parameterization.	F	Alarm
451	Data processing	Please wait until data processing is complete.	C	Warning

Diagnostic number	Short text	Corrective measure	Status signal from the factory / Can be changed to	Diagnostic behavior from the factory
483	Simulation input	Deactivate simulation.	C	Warning
485	Measured value simulation			
491	Simulation current output			
501	CDI connection	Unplug CDI-connector.	C	Warning
525	HART communication	1. Check communication path (Hardware). 2. Check HART- master. 3. Check if power is sufficent. 4. Check HART communication settings. 5. Contact service organisation.	F	Alarm
Diagnostics for the process				
803	Current loop	1. Check wiring. 2. Replace electronics.	F	Alarm
842	Process limit value	Check scaling of analog output.	M	Warning [1]
			F, S	
925	Device temperature	Observe ambient temperature in accordance with specification.	S	Warning
			F	

1) Diagnostic behavior can be changed in: "Alarm" or "Warning"
2) Status signal depends on used communication system and cannot be changed.
3) In the case of this diagnostics event, the device always issues a "low" alarm status (output current ≤ 3.6 mA).

11-3. Disposal

The device contains electronic components and must therefore be disposed of as electronic waste.
Please pay particular attention to the national disposal regulations in your country.

Chapter 12. Technical data

Note: For secure HART® communication in accordance with functional safety as defined in IEC 61508 (SIL mode), measured values are sent securely from the transmitter via the HART® protocol to a connected control system where they are processed further in a secure manner. Secure HART® communication works using special HART® commands that are only available in the SIL mode.

For more information please refer to the Functional Safety Manual CM2-ATT082-2003

12-1. Input

Measured variable

Temperature (temperature-linear transmission behavior), resistance and voltage.

Type of input

Two independent sensors can be connected. The measuring inputs are not galvanically isolated from each other.

Resistance thermometer (RTD) as per standard	Designation	α	Measuring range limits	Min. span
IEC 60751:2008	Pt100 (1) Pt200 (2) Pt500 (3) Pt1000 (4)	0.003851	–200 to +850 °C (–328 to +1 562 °F) –200 to +850 °C (–328 to +1 562 °F) –200 to +500 °C (–328 to +932 °F) –200 to +250 °C (–328 to +482 °F)	10 K (18 °F)
JIS C1604:1984	Pt100 (5)	0.003916	–200 to +510 °C (–328 to +950 °F)	10 K (18 °F)
-	Pt100 (Callendar van Dusen) Nickel polynomial Copper polynomial	-	The measuring range limits are specified by entering the limit values that depend on the coefficients A to C and R0.	10 K (18 °F)
	■ Type of connection: 2-wire, 3-wire or 4-wire connection, sensor current: ≤ 0.3 mA ■ With 2-wire circuit, compensation of wire resistance possible (0 to 30 Ω) ■ With 3-wire and 4-wire connection, sensor wire resistance up to max. 50 Ω per wire			
Resistance transmitter	Resistance Ω		10 to 400 Ω 10 to 2 000 Ω	10 Ω 10 Ω

Thermocouples (TC) as per standard	Designation	Measuring range limits		Min. span
IEC 60584, Part 1			Recommended temperature range:	
	Type A (W5Re-W20Re) (30)	0 to +2 500 °C (+32 to +4 532 °F)	0 to +2 500 °C (+32 to +4 532 °F)	50 K (90 °F)
	Type B (PtRh30-PtRh6) (31)	+40 to +1 820 °C (+104 to +3 308 °F)	+100 to +1 500 °C (+212 to +2 732 °F)	50 K (90 °F)
	Type E (NiCr-CuNi) (34)	–270 to +1 000 °C (–454 to +1 832 °F)	0 to +750 °C (+32 to +1 382 °F)	50 K (90 °F)
	Type J (Fe-CuNi) (35)	–210 to +1 200 °C (–346 to +2 192 °F)	+20 to +700 °C (+68 to +1 292 °F)	50 K (90 °F)
	Type K (NiCr-Ni) (36)	–270 to +1 372 °C (–454 to +2 501 °F)	0 to +1 100 °C (+32 to +2 012 °F)	50 K (90 °F)
	Type N (NiCrSi-NiSi) (37)	–270 to +1 300 °C (–454 to +2 372 °F)	0 to +1 100 °C (+32 to +2 012 °F)	50 K (90 °F)
	Type R (PtRh13-Pt) (38)	–50 to +1 768 °C (–58 to +3 214 °F)	0 to +1 400 °C (+32 to +2 552 °F)	50 K (90 °F)
	Type S (PtRh10-Pt) (39)	–50 to +1 768 °C (–58 to +3 214 °F)	0 to +1 400 °C (+32 to +2 552 °F)	50 K (90 °F)
	Type T (Cu-CuNi) (40)	–260 to +400 °C (–436 to +752 °F)	–185 to +350 °C (–301 to +662 °F)	50 K (90 °F)
IEC 60584, Part 1; ASTM E988-96	Type C (W5Re-W26Re) (32)	0 to +2 315 °C (+32 to +4 199 °F)	0 to +2 000 °C (+32 to +3 632 °F)	50 K (90 °F)
ASTM E988-96	Type D (W3Re-W25Re) (33)	0 to +2 315 °C (+32 to +4 199 °F)	0 to +2 000 °C (+32 to +3 632 °F)	50 K (90 °F)
Voltage transmitter (mV)	Millivolt transmitter (mV)	-20 to 100 mV		5 mV

The following connection combinations are possible when both sensor inputs are assigned:

		Sensor input 1			
		RTD or resistance transmitter, 2-wire	RTD or resistance transmitter, 3-wire	RTD or resistance transmitter, 4-wire	Thermocouple (TC), voltage transmitter
Sensor input 2	RTD or resistance transmitter, 2-wire	✓	✓	-	✓
	RTD or resistance transmitter, 3-wire	✓	✓ 1)	-	✓ 1)
	RTD or resistance transmitter, 4-wire	-	-	-	-
	Thermocouple (TC), voltage transmitter	✓	✓ 1)	✓ 1)	✓ 1)

1) Permitted combinations in the SIL mode, see Functional Safety Manual CM2-ATT082-2003

12-2. Output

Output signal

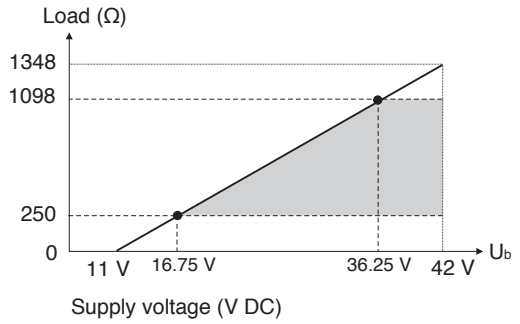
Analog output	4 to 20 mA, 20 to 4 mA (can be inverted)
Signal encoding	FSK ±0.5 mA via current signal
Data transmission rate	1200 baud
Galvanic isolation	U = 2 kV AC (input/output)

Failure information

Failure information as per NAMUR NE43:
Failure information is created if the measuring information is missing or not valid. A complete list of all the errors occurring in the measuring system is created.

Underranging	Linear drop from 4.0 to 3.8 mA
Overranging	Linear increase from 20.0 to 20.5 mA
Failure, e.g. sensor breakage, sensor short-circuit	≤ 3.6 mA ("low") or ≥ 21 mA ("high"), can be selected The "high" alarm setting can be set between 21.5 mA and 23 mA, thus providing the flexibility needed to meet the requirements of various control systems.

Load

$Rb_{max.} = (Ub_{max.} - 11\ V) / 0.023\ A$ (current output)	

Linearization/transmission behavior

Temperature-linear, resistance-linear, voltage-linear

Network frequency filter

50/60 Hz

Filter

1st order digital filter: 0 to 120 s

Protocol-specific data

HART® version	7
Device address in multi-drop mode [1)]	Software setting addresses 0 to 63
Device description files (DD)	Information and files are available free of charge at: www.azbil.com www.hartcomm.org
Load (communication resistor)	min.250 Ω

1) Not possible in the SIL mode, see Functional Safety Manual CM2-ATT082-2003

Write protection for device parameters

- Hardware: Write protection on optional display using DIP switch
- Software: Write protection using password

Switch-on delay

- Until start of HART® communication, approx. 10 s [2)], with switch-on delay = $I_a \leq 3.8$ mA
- Until the first valid measured value signal is present at the current output, approx. 28 s, with switch-on delay = $I_a \leq 3.8$ mA

2) Does not apply for the SIL mode, see Functional Safety Manual CM2-ATT082-2003

12-3. Power supply

Supply voltage

Values for non-hazardous areas, protected against polarity reversal:

– 11 V ≤ Vcc ≤ 42 V (standard)

– I: < 22.5 mA

Values for hazardous areas, see Ex documentation (Refer to page 43).

Current consumption

- 3.6 to 23 mA
- Minimum current consumption 3.5 mA, multidrop mode 4 mA
- Current limit ≤ 23 mA

Terminals

Terminal for sensor and fieldbus cables:

Terminal version	Cable version	Cable cross-section
Screw terminals	Rigid or flexible	≤ 2.5 mm^2 (14 AWG)

Residual ripple

Permanent residual ripple $U_{ss} \leq 3$ V at $U_b \geq 13.5$ V, $f_{max.} = 1$ kHz

12-4. Accuracy

Response time

The measured value update depends on the type of sensor and connection method and moves within the following ranges:

Resistance thermometer (RTD)	0.9 to 1.3 s (depends on the connection method 2/3/4-wire)
Thermocouples (TC)	0.8 s
Reference temperature	0.9 s

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

Reference conditions

- Calibration temperature: +25 °C ±5 K (77 °F ±9 °F)
- Supply voltage: 24 V DC
- 4-wire circuit for resistance adjustment

Maximum measured error

According to DIN EN 60770. The data concerning the various measured errors are typical values and correspond to a standard deviation of ±3 σ (normal distribution).
Over-all measured error of the device at current output = digital measured error + measured error D/A.

Resistance thermometer (RTD) according to standard	Designation	Measuring range limits	Measured error (±)		Repeatability (±)	
			Digital [1]	D/A [2]	Digital [1]	D/A [3]
IEC 60751:2008	Pt100 (1)	–200 to +850 °C (–328 to +1 562 °F)	≤ 0.14 K (0.25 °F)	0.03 %	≤ 0.05 K (0.09 °F)	0.01 % (≙ 2 µA)
	Pt200 (2)		≤ 0.86 K (1.55 °F)		≤ 0.13 K (0.23 °F)	
	Pt500 (3)	–200 to +500 °C (–328 to +932 °F)	≤ 0.30 K (0.54 °F)		≤ 0.08 K (0.14 °F)	
	Pt1000 (4)	–200 to +250 °C (–328 to +482 °F)	≤ 0.14 K (0.25 °F)		≤ 0.05 K (0.09 °F)	
JIS C1604:1984	Pt100 (5)	–200 to +510 °C (–328 to +950 °F)	≤ 0.12 K (0.22 °F)		≤ 0.04 K (0.07 °F)	
Resistance transmitters	Resistance Ω	10 to 400 Ω 10 to 2 000 Ω	40 mΩ 500 mΩ		15 mΩ ≤ 200 mΩ	

1) Using HART® transmitted measured value.
2) Percentage data refer to the configured span of the analog output signal.
3) Percentage data refer to the current range of the analog output signal (20 mA).

Thermocouples (TC) according to standard	Designation	Measuring range limits	Measured error (±)		Repeatability (±)	
			Digital [1]	D/A [2]	Digital [1]	D/A [3]
IEC 60584, part 1	Typ A (W5Re-W20Re) (30)	0 to +2 500 °C (+32 to +4 532 °F)	≤ 1.62 K (2.92 °F)	0.03 %	≤ 0.52 K (0.94 °F)	0.01 % (≙ 2 µA)
	Typ B (PtRh30-PtRh6) (31)	+500 to +1 820 °C (+932 to +3 308 °F)	≤ 2.02 K (3.64 °F)		≤ 0.67 K (1.21 °F)	
	Typ E (NiCr-CuNi) (34)	–40 to +1 000 °C (–40 to +1 832 °F)	≤ 0.21 K (0.38 °F)		≤ 0.07 K (0.13 °F)	
	Typ J (Fe-CuNi) (35)	–40 to +1 200 °C (–40 to +2 192 °F)	≤ 0.26 K (0.47 °F)		≤ 0.08 K (0.14 °F)	
	Typ K (NiCr-Ni) (36)	–40 to +1 200 °C (–40 to +2 192 °F)	≤ 0.32 K (0.58 °F)		≤ 0.11 K (0.20 °F)	
	Typ N (NiCrSi-NiSi) (37)	–40 to +1 300 °C (–40 to +2 372 °F)	≤ 0.43 K (0.77 °F)		≤ 0.16 K (0.29 °F)	
	Typ R (PtRh13-Pt) (38)	0 to +1 768 °C (+32 to +3 214 °F)	≤ 1.92 K (3.46 °F)		≤ 0.76 K (1.37 °F)	
	Typ S (PtRh10-Pt) (39)	0 to +1 768 °C (+32 to +3 214 °F)	≤ 1.9 K (3.42 °F)		≤ 0.74 K (1.33 °F)	
	Typ T (Cu-CuNi) (40)	–40 to +400 °C (–40 to +752 °F)	≤ 0.32 K (0.58 °F)		≤ 0.11 K (0.20 °F)	
IEC 60584, part 1; ASTM E988-96	Typ C (W5Re-W26Re) (32)	0 to +2 000 °C (+32 to +3 632 °F)	≤ 0.86 K (1.55 °F)		≤ 0.33 K (0.59 °F)	
ASTM E988-96	Typ D (W3Re-W25Re) (33)	0 to +2 000 °C (+32 to +3 632 °F)	≤ 1.05 K (1.89 °F)		≤ 0.41 K (0.74 °F)	
Voltage transmitter	Millivolt transmitter (mV)	–20 to 100 mV	10 µV		4 µV	

1) Using HART® transmitted measured value.
2) Percentage data refer to the configured span of the analog output signal.
3) Percentage data refer to the current range of the analog output signal (20 mA).

Sample calculation with Pt100, measuring range 0 to +200 °C (+32 to +392 °F), ambienttemperature 25 °C (77 °F), supply voltage 24 V:

Measured error digita	l0.14 K (0.25 °F)
Repeatability digital	0.05 K (0.09 °F)
Measured error D/A = 0.03 % of 200 K (360 °F)	0.06 K (0.108 °F)
Repeatability D/A = 0.01 % of 200 K (360 °F)	0.02 K (0.036 °F)
Measured error digital value (HART): $\sqrt{}$(Measured error digital^2 + repeatability^2)	0.15 K (0.27 °F)
Measured error analog value (current output): $\sqrt{}$(Measured error digital^2 + repeatability^2+ Measured error D/A^2)	0.16 K (0.29 °F)

Physical input measuring range of sensors	
10 to 400Ω	Cu50, Cu100, polynomial RTD, Pt50, Pt100, Ni100, Ni120
10 to 2 000 Ω	Pt200, Pt500, Pt1000
–20 to 100 mV	Thermocouples type: A, B, C, D, E, J, K, L, N, R, S, T, U

Note: In the SIL mode other measured errors are applied.

Detailed information see Functional Safety Manual CM2-ATT082-2003

Sensor adjustment

Sensor transmitter matching

RTD sensors are one of the most linear temperature measuring elements. Nevertheless, the output must be linearized. To significantly improve temperature measurement accuracy, the device allows the use of two methods:

- Callendar-Van-Dusen coefficients (Pt100 resistance thermometer)
  The Callendar-Van-Dusen equation is described as:
  $R_T = R_0 [1 + AT + BT^2 + C (T - 100) T^3]$

  The coefficients A, B and C are used to match the sensor (platinum) and transmitter in order to improve the accuracy of the measuring system. The coefficients for a standard sensor are specified in IEC 751. If no standard sensor is available or if greater accuracy is required, the coefficients for each sensor can be determined specifically with the aid of sensor calibration.
- Linearization for copper/nickel resistance thermometers (RTD)
  The polynomial equation for copper/nickel is as follows:
  $R_T = R_0 (1 + AT + BT^2)$

  The coefficients A and B are used for the linearization of nickel or copper resistance thermometers (RTD). The exact values of the coefficients derive from the calibration data and are specific to each sensor. The sensor-specific coefficients are then sent to the transmitter.

Sensor transmitter matching using one of the methods explained above significantly improves the temperature measurement accuracy of the entire system. This is because the transmitter uses the specific data pertaining to the connected sensor to calculate the measured temperature, instead of using the standardized sensor curve data.

1-point adjustment (offset)
Shifts the sensor value

2-point adjustment (sensor trimming)
Correction (slope and offset) of the measured sensor value at transmitter input

Current output adjustment

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

Operational influences

The data concerning the various measured errors are typical values and correspond to a standard deviation of ±3 σ (normal distribution). Over-all measured error of the device at current output = digital measured error + measured error D/A.

Considered operational influences:
- Long term drift
- Influence of ambient temperature
- Influence of the supply voltage

Resistance thermometer(RTD) according tostandard	Designation	Ambient temperature: effect (±) when ambient temperaturechanges by 1 °C (1.8 °F)		Supply voltage: effect (±) when supply voltage changes by 1 V		Long term drift: effect (±) per year	
2-, 3-, 4-wire RTD		Digital [1]	D/A [2]	Digital [1]	D/A [2]	Digital [1]	D/A [2]
IEC 60751:2008	Pt100 (1)	≤ 0.02 K (0.04 °F)	0.001 %	≤ 0.02 K (0.04 °F)	0.001 %	≤ 0.16 K (0.29 °F)	0.017 %
	Pt200 (2)	≤ 0.03 K (0.05 °F)		≤ 0.03 K (0.05 °F)		≤ 0.5 K (0.9 °F)	
	Pt500 (3)	≤ 0.01 K (0.02 °F)		≤ 0.01 K (0.02 °F)		≤ 0.2 K (0.36 °F)	
	Pt1000 (4)					≤ 0.1 K (0.18 °F)	
JIS C1604:1984	Pt100 (5)					≤ 0.14 K (0.25 °F)	
Resistance transmitters	10 to 400 Ω	≤ 6 mΩ		≤ 6 mΩ		48 mΩ	
	10 to 2 000 Ω	≤ 30 mΩ		≤ 30 mΩ		290 mΩ	

1) Using HART® transmitted measured value.
2) Percentage data refer to the configured span of the analog output signal.

Thermocouple (TC) according to standard	Designation	Ambient temperature: effect (±) when ambient temperature changes by 1 °C (1.8 °F)		Supply voltage: effect (±) when supply voltage changes by 1 V		Long term drift: effect (±) per year	
		Digital [1]	D/A [2]	Digital [1]	D/A [2]	Digital [1]	D/A [2]
IEC 60584, part 1	Typ A (W5Re-W20Re) (30)	≤ 0.13 K (0.23 °F)	0.001 %	≤ 0.13 K (0.23 °F)	0.001 %	≤ 1.3 K (2.34 °F)	0.017 %
	Typ B (PtRh30-PtRh6) (31)	≤ 0.01 K (0.02 °F)		≤ 0.01 K (0.02 °F)		≤ 1.7 K (3.06 °F)	
	Typ E (NiCr-CuNi) (34)	≤ 0.03 K (0.05 °F)		≤ 0.03 K (0.05 °F)		≤ 0.2 K (0.36 °F)	
	Typ J (Fe-CuNi) (35)	≤ 0.04 K (0.07 °F)		≤ 0.04 K (0.07 °F)			
	Typ K (NiCr-Ni) (36)	≤ 0.04 K (0.07 °F)		≤ 0.04 K (0.07 °F)		≤ 0.3 K (0.54 °F)	
	Typ N (NiCrSi-NiSi) (37)					≤ 0.4 K (0.72 °F)	
	Typ R (PtRh13-Pt) (38)	≤ 0.01 K (0.02 °F)		≤ 0.05 K (0.09 °F)		≤ 1.9 K (3.42 °F)	
	Typ S (PtRh10-Pt) (39)						
	Typ T (Cu-CuNi) (40)	≤ 0.01 K (0.02 °F)		≤ 0.01 K (0.02 °F)		≤ 0.3 K (0.54 °F)	
IEC 60584, part 1; ASTM E988-96	Typ C (W5Re-W26Re) (32)	≤ 0.08 K (0.14 °F)		≤ 0.08 K (0.14 °F)		≤ 0.8 K (1.44 °F)	
ASTM E988-96	Typ D (W3Re-W25Re) (33)					≤ 1 K (1.8 °F)	
Voltage transmitter	Millivolt transmitter (mV)	≤ 3 µV		≤ 3 µV		≤ 10 µV	

1) Using HART® transmitted measured value.
2) Percentage data refer to the configured span of the analog output signal.

Sample calculation with Pt100, measuring range 0 to +200 °C (+32 to +392 °F), ambient temperature 35 °C (95 °F), supply voltage 30 V:

Measured error digital	0.14 K (0.25 °F)
Repeatability digital	0.05 K (0.09 °F)
Measured error D/A = 0.03 % of 200 K (360 °F)	0.06 K (0.108 °F)
Repeatability D/A = 0.01 % of 200 K (360 °F)	0.02 K (0.036 °F)
Influence of ambient temperature (digital), 0.02 °C/K: (35 °C - 25 °C) x 0.02 °C/K	0.2 K (0.36 °F)
Influence of ambient temperature (D/A), 0.001 %/K: (35 °C - 25 °C) x (0.001 % of 200 °C)	0.02 K (0.036 °F)
Influence of supply voltage (digital), 0.02 K/V: (30 V - 24 V) x 0.02 K/V	0.12 K (0.216 °F)

Influence of supply voltage (D/A), 0.001 %/V: (30 V - 24 V) x (0.001 % of 200 °C)	0.012 K (0.0216 °F)
Measured error digital value (HART): $\sqrt{}$(Measured error digital^2 + repeatability^2 + influence of ambient temperature (digital)^2 + influence of supply voltage (digital)^2)	0.28 K (0.50 °F)
Measured error analog value (current output): $\sqrt{}$(Measured error digital^2 + repeatability^2+ influence of ambient temperature (digital)^2 + influence of ambient temperature (D/A)^2 + influence of supply voltage (digital)^2 + influence of supply voltage (D/A)^2)	0.29 K (0.52 °F)

Influence of the reference junction (internal cold junction)

Pt100 DIN IEC 60751 Cl. B (internal cold junction with thermocouples TC)

12-5. Environment

Ambient temperature

- –40 to +85 °C (–40 to +185 °F), for hazardous areas see Ex documentation (Refer to page 50)
- SIL operation –40 to +70 °C (–40 to +158 °F)

Storage temperature

–50 to +100 °C (–58 to +212 °F)

Altitude

Up to 4000 m (4374.5 yards) above mean sea level as per IEC 61010-1, CAN/CSA C22.2 No.61010-1

Climate class

As per IEC 60654-1, Class C

Humidity

- Condensation permitted as per IEC 60068-2-33
- Max. rel. humidity: 95% as per IEC 60068-2-30

Degree of protection

When installing in field housing: IP 66/67 (NEMA Type 4x encl.)

Shock and vibration resistance

■ Head transmitter: 25 to 100 Hz for 4g (increased vibration stress), as per GL guideline, section2, issue 3B, paragraph 9. Vibration and IEC 60068-2-27 and IEC 60068-2-6

Electromagnetic compatibility (EMC)

CE compliance

Electromagnetic compatibility in accordance with all the relevant requirements of the EN 61326 series and NAMUR Recommendation EMC (NE21). For details refer to the Declaration of Conformity. All tests were passed both with and without ongoing digital HART® communication.

ESD (electrostatic discharge)	EN/IEC 61000-4-2		6 kV cont., 8 kV air
Electromagnetic fields	EN/IEC 61000-4-3	0.08 to 2.7 GHz	10 V/m
Burst (fast transients)	EN/IEC 61000-4-4		2 kV
Surge (surge voltage)	EN/IEC 61000-4-5		0.5 kV sym. 1 kV assym.
Conducted RF	EN/IEC 61000-4-6	0.01 to 80 MHz	10 V

Maximum measured error < 1% of the measuring range.

Measuring category

Measuring category II as per IEC 61010-1. The measuring category is provided for measuring on power circuits that are directly connected electrically with the low-voltage network.

Degree of contamination

Pollution degree 2 as per IEC 61010-1.

12-6. Mechanical construction

Design, dimensions

Dimensions in mm (in)

Head transmitter

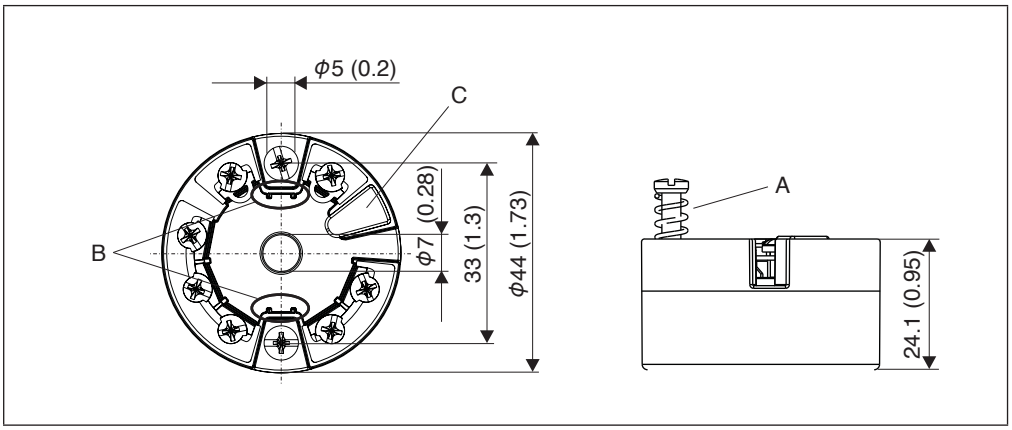
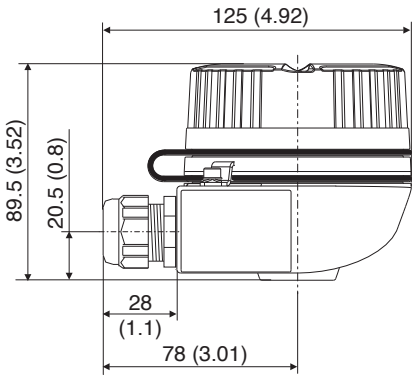


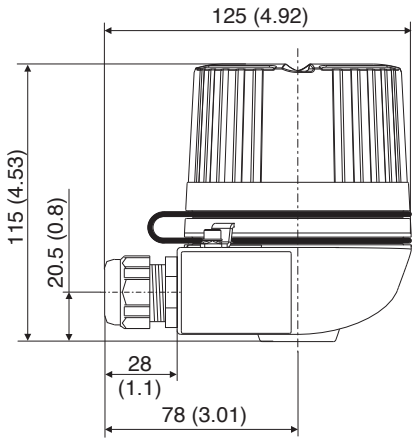
Fig 12-1. Version with screw terminals

A Spring travel L ≥ 5 mm (not for US - M4 securing screws)
B Fasteners for attachable measured value display
C Interface for contacting the measured value display

Field housings

All terminal heads have an internal shape and size in accordance with DIN EN 50446, flat face and a thermometer connection of M24x1.5. Cable glands as shown in figures: M20x1.5.

Without display	Specification
	■ Flameproof (XP) version, explosion-protected, captive screw cap, with two cable entries ■ Temperature: –50 to +150 °C (–58 to +302 °F) for rubber seal without cable gland (observe max. permitted temperature of the cable gland!) ■ Material: aluminum; polyester powder coated ■ Cable entry glands: ½"NPT, M20x1.5 ■ Head color: gray RAL 7035 ■ Cap color: gray RAL 7035 ■ Weight: 640 g (22.6 oz)

with display window in cover	Specification
	■ Flameproof (XP) version, explosion-protected, captive screw cap, with two cable entries ■ Temperature: –50 to +150 °C (–58 to +302 °F) for rubber seal without cable gland (observe max. permitted temperature of the cable gland!) ■ Material: aluminum; polyester powder coated ■ Cable entry glands: ½"NPT, M20x1.5 ■ Head color: gray RAL 7035 ■ Cap color: gray RAL 7035 ■ Weight: 860 g (30.33 oz)

Weight

- Head transmitter: approx. 40 to 50 g (1.4 to 1.8 oz)
- Field housing: see specifications

Material

All materials used are RoHS-compliant.

- Housing: polycarbonate (PC), complies with UL94, V-2 UL recognized
- Terminals: nickel-plated brass and gold-plated contact
- Potting (head transmitter): WEVO PU 403 FP / FL

Field housing: see specifications

12-7. Certificates and approvals

CE mark

The measuring system meets the legal requirements of the EC guidelines. The manufacturer confirms that the device conforms to all relevant guidelines by affixing the CE mark.

Ex approval

Information about currently available Ex versions (ATEX, FM, etc.) can be supplied by your sales representative on request. All explosion protection data are given in separate documentation which is available upon request.

Functional safety

SIL 2/3 (hardware/software) certified to:

- IEC 61508-1:2010 (Management)
- IEC 61508-2:2010 (Hardware)
- IEC 61508-3:2010 (Software)

HART® communication

The temperature transmitter is registered by HART® Communication. The device meets the requirements of the HART® Communication Protocol Specifications, Revision 7.0.

Chapter 13. Operating menu and parameter description

Note: The following table lists all parameters the menus "Display/operation, Setup, Diagnostics and Expert" may contain. The page number refers to where a description of the parameter can be found.

Depending on the device version and parametrization some parameters will not be available in a given situation. For details on the conditions refer to the "Prerequisite" category in the description of the respective parameter. All the configuration options of the menus "Display/operation, Setup, Diagnostics" are available in the "Expert" setup mode as well as additional parameters that are reserved for experienced users.

Menu 1	Parameter	Page
Setup →	Device tag	61
	Unit	61
	Sensor type 1	62
	Connection type 1	62
	2-wire compensation 1	63
	Reference junction 1	63
	RJ preset value 1	64
	Sensor type 2	62
	Connection type 2	62
	2-wire compensation 2	63
	Reference junction 2	63
	RJ preset value 2	64
	Assign current output (PV)	64
	Lower range value	65
	Upper range value	65

Menu 1	Menu 2	Parameter	Page
Setup →	advanced setup →	Enter access code	67
		Access status tooling	67
		Device temperature Alarm	68
		Locking status	68

Menu 1	Menu 2	Menu 3	Parameter	Page
Setup →	advanced setup →	Sensors →	Sensor offset 1	69
			Sensor offset 2	69
			Corrosion detection	69
			Drift/difference mode	69
			Drift/difference alarm category	70
			Drift/difference set point	71
			Sensor switch set point	72

Menu 1	Menu 2	Menu 3	Parameter	Page
Setup →	advanced setup →	Current output →	Output current	73
			Measuring mode	74
			Out of range category	74
			Failure mode	75
			Failure current	75
			Current trimming 4 mA	75
			Current trimming 20 mA	76

Menu 1	Menu 2	Menu 3	Parameter	Page
Setup →	advanced setup →	Display →	Display interval	76
			Format display	77
			Value 1 display	77
			Decimal places 1	78
			Value 2 display	79
			Decimal places 2	79
			Value 3 display	80
			Decimal places 3	80

Menu 1	Menu 2	Menu 3	Parameter	Page
Setup →	advanced setup →	SIL →	SIL option	81
			Operational state	81
			Enter SIL checksum	82
			Timestamp SIL configuration	83
			SIL startup mode	83
			SIL HART mode	83
			Force safe state	84

Menu 1	Menu 2	Menu 3	Parameter	Page
Setup →	advanced setup →	Administration →	Device reset	85
			Define device write protection code	85

Menu 1	Parameter	Page
Diagnostics →	Actual diagnostics	88
	Remedy information	87
	Previous diagnostics 1	87
	Operating time	87

Menu 1	Menu 2	Parameter	Page
Diagnostics →	Diagnostics list →	Actual diagnostics count	88
		Actual diagnostics	88
		Actual Diag Channel	88

Menu 1	Menu 2	Parameter	Page
Diagnostics →	Event logbook →	Previous diagnostics n	89
		Previous diag n channel	89

Menu 1	Menu 2	Parameter	Page
Diagnostics →	Device information →	Device tag	90
		Serial number	90
		Firmware version	90
		Device name	91
		Order code	91
		Configuration counter	91

Menu 1	Menu 2	Parameter	Page
Diagnostics →	Measured values →	Sensor 1 value	92
		Sensor 2 value	92
		Device temperature	92

Menu 1	Menu 2	Menu 3	Parameter	Page
Diagnostics →	Measured values →	Min/max values →	Sensor n min value	92
			Sensor n max value	92
			Reset sensor min/max values	93
			Device temperature max.	93
			Device temperature min.	93
			Reset device temp. min/max values	94

Menu 1	Menu 2	Parameter	Page
Diagnostics →	Simulation →	Simulation current output	94
		Value current output	95

Menu 1	Parameter	Page
Expert →	Enter access code	67
	Access status tooling	67
	Locking status	68

Menu 1	Menu 2	Parameter	Page
Expert →	System →	Unit	61
		Damping	95
		Alarm delay	96
		Mains filter	96
		Device temperature alarm	96

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	System →	Display →	Display interval	76
			Format display	77
			Value 1 display	77
			Decimal places 1	78
			Value 2 display	79
			Decimal places 2	79
			Value 3 display	80
			Decimal places 3	80

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	System →	Administration →	Device reset	85
			Define device write protection code	85

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Sensors →	Sensor n [1] →	Sensor type n	62
			Connection type n	62
			2-wire compensation n	63
			Reference junction n	63
			RJ preset value	64
			Sensor offset n	69
			Sensor n lower limit	97
			Sensor n upper limit	97
			Serial no. sensor	97

1) n = number of the sensor inputs (1 or 2)

Menu 1	Menu 2	Menu 3	Menu 4	Parameter	Page
Expert →	Sensors →	Sensor n [1] →	Sensor Trimming →	Sensor trimming	98
				Sensor trimming lower value	99
				Sensor trimming upper value	99
				Sensor trimming min span	99

1) n = number of the sensor inputs (1 or 2)

Menu 1	Menu 2	Menu 3	Menu 4	Parameter	Page
Expert →	Sensors →	Sensor n [1] →	Linearization →	Sensor n lower limit	100
				Sensor n upper limit	101
				Call./v. Dusen coeff. R0, A, B, C	101
				Polynom coeff. R0, A, B	102

1) n = number of the sensor inputs (1 or 2)

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Sensors →	Diagnostic settings →	Corrosion detection	69
			Drift/difference mode	69
			Drift/difference alarm category	70
			Drift/difference set point	71
			Sensor switch set point	72
			Calibration counter start	103
			Calibration alarm category	103
			Calibration counter start value	104
			Calibration countdown	104

Menu 1	Menu 2	Parameter	Page
Expert →	Output →	Output current	73
		Measuring mode	74
		Lower range value	65
		Upper range value	65
		Out of range category	74
		Failure mode	75
		Failure current	75
		Current trimming 4 mA	75
		Current trimming 20 mA	76

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Communication →	HART configuration →	Device tag	105
			HART short tag	105
			HART address	105
			No. of preambles	106
			Configuration changed	106
			Reset Configuration Changed Flag	106

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Communication →	HART info →	Device type	107
			Device revision	107
			HART revision	107
			HART descriptor	107
			HART message	108
			Hardware revision	108
			Software revision	108
			HART date code	109

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Communication →	HART output →	Assign current output (PV)	109
			PV	110
			Assign SV	110
			SV	110
			Assign TV	110
			TV	111
			Assign QV	111
			QV	111

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Communication →	Burst configuration n [2] →	Burst mode	111
			Burst command	112
			Burst variables 0-3	113
			Burst trigger mode	114
			Burst trigger level	114
			Min. update period	115
			Max. update period	115

2) n = number of the configuration (1 to 3)

Menu 1	Menu 2	Parameter	Page
Expert →	Diagnostics →	Actual diagnostics 1	86
		Remedy information	87
		Previous diagnostics 1	87
		Operating time	87

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Diagnostics →	Diagnostics list →	Actual diagnostics count	88
			Actual diagnostics	88
			Actual Diag Channel	88

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Diagnostics →	Event logbook →	Previous diagnostics n	89
			Previous diag channel	89

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Diagnostics →	Device information →	Device tag	90
			Serial number	90
			Firmware version	90
			Device name	91
			Order code	91
			Extended order code	116
			Extended order code 2	116
			Extended order code 3	116
			ENP version	116
			Device revision	116
			Manufacturer ID	117
			Manufacturer	117
			Hardware revision	117
			Configuration counter	91

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Diagnostics →	Measured values →	Sensor n value	92
			Sensor n raw value	118
			Device temperature	92

Menu 1	Menu 2	Menu 3	Menu 4	Parameter	Page
Expert →	Diagnostics →	Measured values →	Min/max values →	Sensor n min value	92
				Sensor n max value	92
				Reset sensor min/max values	93
				Device temperature max.	93
				Device temperature min.	93
				Reset device temp. min/ max values	94

Menu 1	Menu 2	Menu 3	Parameter	Page
Expert →	Diagnostics →	Simulation →	Simulation current output	94
			Value current output	95

13-1. "Setup" menu

This menu contains all the parameters that are needed to configure the basic settings of the device. The transmitter can be put into operation with this limited parameter set.

Note: n = Stands for the number of sensor inputs (1 and 2)

Device tag

Navigation

Setup → Device tag
Diagnostics → Device information → Device tag
Expert → Diagnostics → Device information → Device tag

Description

Use this function to enter a unique name for the measuring point so it can be identified quickly within the plant. The name is displayed in the header of the plug-in display.
(Refer to fig 6-2, page 17)

User entry

Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /)

Factory setting

-none-

Unit

Navigation

Setup → Unit
Expert → System → Unit

Description

Use this function to select the engineering unit for all the measured values.

Options:

- °C
- °F
- K
- °R
- Ohm
- mV

Factory settings

°C

Sensor type n

Navigation

Setup → Sensor type n
Expert → Sensors → Sensor n → Sensor type n

Description

Use this function to select 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

Note: Please observe the terminal assignment (Refer to fig 5-1, page 9) when connecting the individual sensors. In the case of 2-channel operation, the possible connection options also have to be observed.

Options:

A list of all the possible sensor types is provided in the 'Technical data' section (Refer to page 33).

Factory settings

Sensor type 1: Pt100 IEC751
Sensor type 2: No sensor

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

Use this function to select the connection type for the sensor.

Options:

- Sensor 1 (connection type 1): 2-wire, 3-wire, 4-wire
- Sensor 2 (connection type 2): 2-wire, 3-wire

Factory settings

- Sensor 1 (connection type 1): 4-wire
- Sensor 2 (connection type 2): 3-wire

2-wire compensation n

Navigation

Setup → 2-wire compensation n
Expert → Sensors → Sensor n → 2-wire compensation n

Prerequisite

An RTD sensor with a 2-wire connection type must be specified as the sensor type.

Description

Use this function to specify the resistance value for two-wire compensation in RTDs.

User input

0 to 30 Ohm

Factory settings

0

Reference junction n

Navigation

Setup → Reference junction n
Expert → Sensors → Sensor n → Reference junction n

Prerequisite

A thermocouple (TC) sensor must be selected as the sensor type.

Description

Use this function to select reference junction measurement for temperature compensation of thermocouples (TC).

Note:
- If Fixed value is selected, the compensation value is specified via the RJ preset value parameter.
- Temperature measurement must be configured for channel 2 if Sensor 2 value is selected.

Options:

- No compensation: no temperature compensation is used.
- Internal measurement: the internal reference junction temperature is used.
- Fixed value: a fixed preset value is used.
- Sensor 2 value: the measured value of sensor 2 is used.

Note: It is not possible to select the Sensor 2 value option for the Reference junction 2 parameter.

Factory settings

Internal measurement

RJ preset value n

Navigation

Setup → RJ preset value
Expert → Sensors → Sensor n → RJ preset value

Prerequisite

The Preset value parameter must be set if the Reference junction n option is selected.

Description

Use this function to define the fixed preset value for temperature compensation.

User input

–50 to +85 °C

Factory settings

0.00

Assign current output (PV)

Navigation

Setup → Assign current output (PV)
Expert → Communication → HART output → Assign current output (PV)

Description

Use this function to assign a measured variable to the primary HART® value (PV).

Options:

- Sensor 1 (measured value)
- Sensor 2 (measured value)
- Average of the two measured values: 0.5 x (SV1+SV2)
- Difference between sensor 1 and sensor 2: SV1-SV2
- Sensor 1 (backup sensor 2): If sensor 1 fails, the value of sensor 2 automatically becomes the primary HART® value (PV): sensor 1 (OR sensor 2)
- Sensor switching: If the value exceeds the configured threshold value T for sensor 1, the measured value of sensor 2 becomes the primary HART® value (PV). The system switches back to sensor 1 when the measured value of sensor 1 is at least 2 K below T: sensor 1 (sensor 2, if sensor 1 > T)
- Average: 0.5 x (SV1+SV2) with backup (measured value of sensor 1 or sensor 2 in the event of a sensor error in the other sensor)

Note: The threshold value can be set with the Sensor switch set point (Refer to page 66) parameter.
With temperature-dependent switching, it is possible to combine 2 sensors that offer advantages in different temperature ranges.

Factory settings

Sensor 1

Lower range value

Navigation

Setup → Lower range value
Expert → Output → Lower range value

Description

Use this function to assign a measured value to the current value 4 mA.

Note: The set point that can be set depends on the sensor type used in the Sensor type (Refer to page 56) parameter and the measured variable assigned in the Assign current output (PV) parameter.

User input

Depends on the sensor type and the setting for "Assign current output (PV)."

Factory settings

0

Upper range value

Navigation

Setup → Upper range value
Expert → Output → Upper range value

Description

Use this function to assign a measured value to the current value 20 mA.
The set point that can be set depends on the sensor type used in the Sensor type (Refer to page 56) parameter and the measured variable assigned in the Assign current output (PV) parameter.

User input

Depends on the sensor type and the setting for "Assign current output (PV)."

Factory settings

100

13-1-1. "advanced setup" submenu

Corrosion monitoring

Sensor connection cable corrosion can lead to false measured value readings. Therefore the unit offers the possibility of recognizing any corrosion before a measured value is affected. Corrosion monitoring is only possible for RTDs with a 4-wire connection and thermocouples.

Drift/difference mode

If two sensors are connected and the measured values differ by a specified value, a status signal is generated as a diagnostic event. The drift/difference mode can be used to verify the correctness of the measured values and for mutual monitoring of the connected sensors. The drift/difference mode is enabled with the Drift/difference mode parameter. A distinction is made between two specific modes. If the In band option is selected (ISV1-SV2I < drift/difference set point), a status message is output if the value drops below the set point, or if the value exceeds the set point if the Out band (drift) option is selected (ISV1-SV2I > drift/difference set point).

Procedure for configuring the drift/difference mode

1. Start
⇓
2. For drift/difference monitoring, select Out band for drift detection and In band for difference monitoring.
⇓
3. Set the alarm category for drift/difference monitoring to Out of specification (S), Maintenance required (M) or Failure (F) as required.
⇓
4. Set the set point for drift/difference monitoring to the desired value.
⇓
5. End

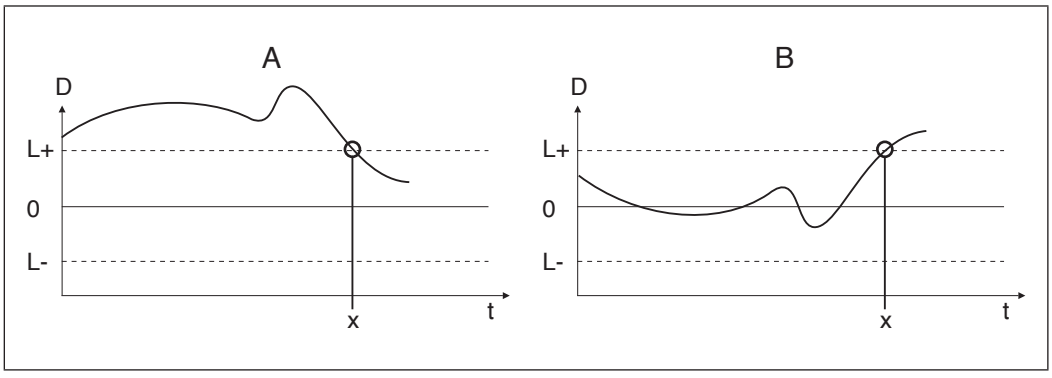


Fig 13-1. Drift/difference mode

A Value under range
B Value over range
D Drift
L+, L Upper (+) or lower (-) set point
t Time
x Diagnostics event, status signal is generated

Enter access code

Navigation

Setup → Advanced setup → Enter access code
Expert → Enter access code

Description

Use this function to enable the service parameters via the operating tool. If an incorrect access code is entered, the user retains his current access authorization.

Note: If a value is entered that is not to equal to the access code, the parameter is automatically set to 0. The service parameters should only be modified by the service organization.

User input

0 to 9 999

Factory settings

0

Access status tooling

Navigation

Setup → Advanced setup → Access status tooling
Expert → Access status tooling

Description

Use this function to show access authorization to the parameters.

Additional information

If additional write protection is active, this restricts the current access authorization even further.
The write protection status can be viewed via the Locking status parameter.

Options:

- Operator
- Service

Factory settings

Operator

Locking status

Navigation

Setup → Advanced setup → Locking status
Expert → Locking status

Description

Use this function to view the device locking status. The DIP switch for hardware locking is fitted on the display module. When write protection is activated, write access to the parameters is disabled. (Refer to page 19)

Device temperature alarm

Navigation

Setup → Advanced setup → Device temperature alarm

Description

Use this function to select the category (status signal) as to how the device reacts when the electronics temperature of the transmitter exceeds or falls below the limit value < -40 °C (-40 °F) or > +85 °C (+185 °F).

Options:

- Off
- Out of specification (S)
- Failure (F)

Factory settings

Out of specification (S)

"Sensor" submenu

Sensor offset n

Note: n = Stands for the number of sensor inputs (1 and 2)

Navigation

Setup → Advanced setup → Sensor → Sensor offset n
Expert → Sensor → Sensor n ° Sensor offset n

Description

Use this function to set the zero point correction (offset) of the sensor measured value. The value indicated is added to the measured value.

User input

-10.0...+10.0

Factory settings

0.0

Corrosion detection

Navigation

Setup → Advanced setup → Sensor → Corrosion detection
Expert → Sensor → Diagnostic settings → Corrosion detection

Description

Use this function to select the category (status signal) which is displayed when corrosion of the sensor connection cables is detected.

Note: Only possible for RTD sensors with 4-wire connection and thermocouples (TC).

Options:

- Maintenance required (M)
- Failure (F)

Factory settings

Maintenance required (M)

Drift/difference mode

Navigation

Setup → Advanced setup → Sensor → Drift/difference mode
Expert → Sensor → Diagnostic settings → Drift/difference mode

Description

Use this function to choose whether the device reacts to the value exceeding or dropping below the drift/difference set point.

Note: Can only be selected for 2-channel operation.

Additional information

- If the Out band (drift) option is selected, a status signal is displayed if the absolute value for the differential value exceeds the drift/difference set point.
- If the In band option is selected, a status signal is displayed if the absolute value for the differential value drops below the drift/difference set point.

Options:

- Off
- Out band (drift)
- In band

Factory settings

Off

Drift/difference alarm category

Navigation

Setup → Advanced setup → Sensor → Drift/difference alarm category
Expert → Sensor → Diagnostic settings → Drift/difference alarm category

Prerequisite

The Drift/difference mode parameter must be activated with the Out band (drift) or In band option.

Description

Use this function to select the category (status signal) as to how the device reacts when a drift/difference is detected between sensor 1 and sensor 2.

Options:

- Out of specification (S)
- Maintenance required (M)
- Failure (F)

Factory settings

Maintenance required (M)

Drift/difference alarm delay

Navigation

Setup → Advanced setup → Sensor → Drift/difference alarm delay
Expert → Sensor → Diagnostic settings → Drift/difference alarm delay

Prerequisite

The Drift/difference mode parameter must be activated with the Out band (drift) or In band option. (Refer to page 69)

Description

Alarm delay for drift detection monitoring.

Note: Useful for example in the event of different thermal mass ratings for the sensors in conjunction with a high temperature gradient in the process.

User entry

0 to 255 s

Factory setting

0 s

Drift/difference set point

Navigation

Setup → Advanced setup → Sensor → Drift/difference set point
Expert → Sensor → Diagnostic settings → Drift/difference set point

Prerequisite

The Drift/difference mode parameter must be activated with the Out band (drift) or In band option.

Description

Use this function to configure the maximum permissible measured value deviation between sensor 1 and sensor 2 which results in drift/difference detection.

Options:

1.0...999.0 K (0.18 to 1798.2 °F)

Factory settings

999.0

Sensor switch set point

Navigation

Setup → Advanced setup → Sensor → Sensor switch set point
Expert → Sensor → Diagnostic settings → Sensor switch set point

Description

Use this function to set the threshold value for sensor switching (Refer to page 60).

Additional information

The threshold value is relevant if the sensor switching function is assigned to a HART® variable (PV, SV, TV, QV).

Options:

Depends on the sensor types selected.

Factory settings

850 °C

"Current output" submenu

Adjustment of the analog output (4 and 20 mA current trimming)

Current trimming is used to compensate the analog output (D/A conversion). Here, the output current of the transmitter can be adapted so that it suits the value expected at the higher-order system.

Handling Precautions:

Current trimming does not affect the digital HART® value. This can cause the measured value shown on the plug-in display to differ from the value displayed in the higherorder system.

- The digital measured values can be adapted with the sensor trimming parameter in the menu
  Expert → Sensor → Sensor trimming.

Procedure

1. Start
⇓
2. Install an accurate amperemeter (more accurate than the transmitter) in the current loop.
⇓
3. Switch on current output simulation and set the simulation value to 4 mA.
⇓
4. Measure the loop current with the amperemeter and make a note of the value.
⇓
5. Set the simulation value to 20 mA.
⇓
6. Measure the loop current with the amperemeter and make a note of the value.
⇓
7. Enter the current values determined as adjustment values in the Current trimming 4 mA / 20 mA parameters.
⇓
8. End

Output current

Navigation

Setup → Advanced setup → Current output → Output current
Expert → Output → Output current

Description

Use this function to view the calculated output current in mA.

Measuring mode

Navigation

Setup → Advanced setup → Current output → Measuring mode
Expert → Output → Measuring mode

Description

Enables the inversion of the output signal.

Additional information

- Standard
  The output current increases with increasing temperatures
- Inverse
  The output current decreases with increasing temperatures

Options:

- Standard
- Inverse

Factory settings

Standard

Out of range category

Navigation

Setup → Advanced setup → Current output → Out of range category
Expert → Output → Out of range category

Description

Use this function to select the category (status signal) as to how the device reacts when the value is outside the set measuring range.

Options:

- Out of specification (S)
- Maintenance required (M)
- Failure (F)

Factory settings

Maintenance required (M)

Failure mode

Navigation

Setup → Advanced setup → Current output → Failure mode
Expert → Output → Failure mode

Description

Use this function to select the signal on alarm level of the current output in the event of an error.

Additional information

If Max. is selected, the signal on alarm level is specified using the Failure current parameter.

Options:

- Min.
- Max.

Factory settings

Max.

Failure current

Navigation

Setup → Advanced setup → Current output → Failure current
Expert → Output → Failure current

Prerequisite

The Max. option is enabled in the Failure mode parameter.

Description

Use this function to set the value the current output adopts in an alarm condition.

User input

21.5 to 23.0 mA

Factory settings

22.5

Current trimming 4 mA

Navigation

Setup → Advanced setup → Current output → Current trimming 4 mA
Expert → Output → Current trimming 4 mA

Description

Use this function to set the correction value for the current output at the start of the measuring range at 4 mA (Refer to page 67).

User input

3.85 to 4.15 mA

Factory settings

4 mA

Current trimming 20 mA

Navigation

Setup → Advanced setup → Current output → Current trimming 20 mA
Expert → Output → Current trimming 20 mA

Description

Use this function to set the correction value for the current output at the end of the measuring range at 20 mA (Refer to page 69).

User input

19.850 to 20.15 mA

Factory settings

20.000 mA

Display interval

Navigation

Setup → Advanced setup → Display → Display interval
Expert → System → Display → Display interval

Description

Use this function to set the length of time the measured values are displayed if the values alternate on the display. The display only alternates between values if more than one measured value is defined.

Note:
- The Value 1 display - Value 3 display parameters are used to specify what measured values are shown on the display (Refer to page 73).
- The display format of the displayed measured values is specified using the Format display parameter.

User input

4 to 20 s

Factory settings

4 s

Format display

Navigation

Setup → Advanced setup → Display → Format display
Expert → System → Display → Format display

Description

Use this function to select how the measured value is shown on the local display. The display format Measured value or Measured value with bar graph can be configured.

Options:

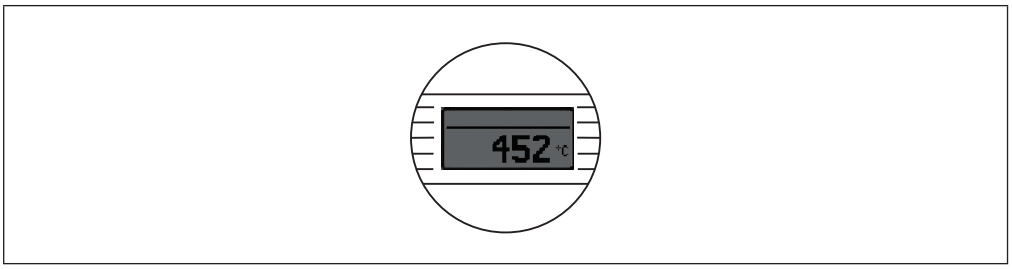
- Value only
- Value + Bargraph

Factory settings

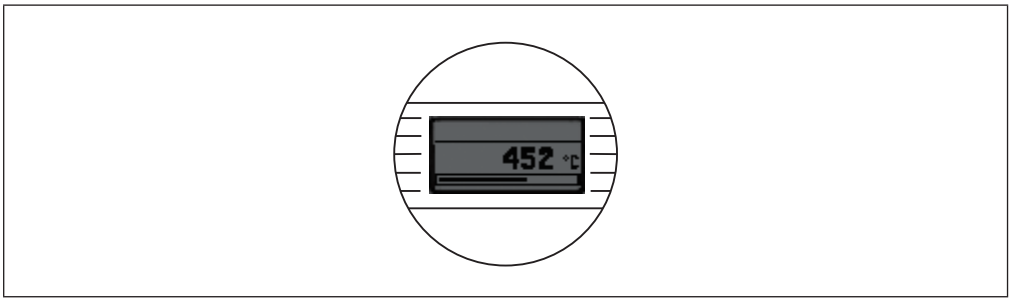
Value only

Additional information

Value only



Value + Bargraph



Value 1 display

Navigation

Setup → Advanced setup → Display → Value 1 display
Expert → System → Display → Value 1 display

Description

Use this function to select one of the measured values to be shown on the local display.

Note: The Format display parameter is used to specify how the measured values are displayed (Refer to page 73).

Options:

- Process value
- Sensor 1
- Sensor 2
- Output current
- Percent of range
- Device temperature

Factory settings

Process value

Decimal places 1

Navigation

Setup → Advanced setup → Display → Decimal places 1
Expert → System → Display → Decimal places 1

Prerequisite

A measured value is specified in the Value 1 display parameter (Refer to page 73).

Description

Use this function to select the number of decimal places displayed for the display value.
This setting does not affect the accuracy of the device for measuring or calculating the value.

Note: If Automatic is selected, the maximum possible number of decimal places is always shown on the display.

Options:

- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- Automatic

Factory settings

Automatic

Value 2 display

Navigation

Setup → Advanced setup → Display → Value 2 display
Expert → System → Display → Value 2 display

Description

Use this function to select one of the measured values to be shown on the local display.

Note: The Format display parameter is used to specify how the measured values are displayed.

Options:

- Off
- Process value
- Sensor 1
- Sensor 2
- Output current
- Percent of range
- Device temperature

Factory settings

Off

Decimal places 2

Navigation

Setup → Advanced setup → Display → Decimal places 2
Expert → System → Display → Decimal places 2

Prerequisite

A measured value is specified in the Value 2 display parameter.

Description

Use this function to select the number of decimal places displayed for the display value.
This setting does not affect the accuracy of the device for measuring or calculating the value.

Note: If Automatic is selected, the maximum possible number of decimal places is always shown on the display.

Options:

- x
- x.x
- x.xx
- x.xxx
- x.xxxx

■ Automatic

Factory settings

Automatic

Value 3 display

Navigation

Setup → Advanced setup → Display → Value 3 display
Expert → System → Display → Value 3 display

Description

Use this function to select one of the measured values to be shown on the local display.

Note: The Format display parameter is used to specify how the measured values are displayed.

Options:

■ Off
■ Process value
■ Sensor 1
■ Sensor 2
■ Output current
■ Percent of range
■ Device temperature

Factory settings

Off

Decimal places 3

Navigation

Setup → Advanced setup → Display → Decimal places 3
Expert → System → Display → Decimal places 3

Prerequisite

A measured value is specified in the Value 3 display parameter.

Description

Use this function to select the number of decimal places displayed for the display value.
This setting does not affect the accuracy of the device for measuring or calculating the value.

Note: If Automatic is selected, the maximum possible number of decimal places is always shown on the display.

Options:

- x
- x.x
- x.xx
- x.xxx
- x.xxxx
- Automatic

Factory settings

Automatic

"SIL" submenu

Note: This menu only appears if the device was ordered with the 'SIL mode' option. The SIL option parameter indicates whether the device can be operated in the SIL mode. To enable the SIL mode for the device, menu-guided operation for Enable SIL must be performed.

A detailed description is provided in the Functional Safety Manual CM2-ATT082-2003.

SIL option

Navigation

Setup → Advanced setup → SIL → SIL option

Description

Indicates whether the device has been ordered with SIL certification. SIL certificate of the device.

Note: The SIL option is required to operate the device in the SIL mode.

Options

- No
- Yes

Factory setting

No

Operational state

Navigation

Setup → Advanced setup → SIL → Operational state

Description

Displays the device operational state in the SIL mode.

Display

- Checking SIL option
- Startup normal mode
- Wait for checksum
- Self diagnostic
- Normal mode
- Download active
- SIL mode active
- Safe para start
- Safe param running
- Save parameter values
- Parameter check
- Reboot pending
- Reset checksum
- Safe state - Active
- Download verification
- Upload active
- Safe state - Passive
- Safe state - Panic

Note: If the device is restarted with the setting "SIL startup mode → Not active", "Wait for checksum" appears in this parameter. The SIL checksum must be entered manually here.

Factory setting

Checking SIL option

Enter SIL checksum

Navigation

Setup → Advanced setup → SIL → Enter SIL checksum

Description

Use this function to enter the SIL checksum during safe parameterization and startup in conjunction with the parameter setting "SIL startup mode → Not active".

Note: If the parameter setting is "SIL startup modus → Active" and the value '0' is entered, automatic startup is aborted and the SIL settings are discarded.

User entry

0 ... 65535

Factory setting

0

Timestamp SIL configuration

Navigation

Setup → Advanced setup → SIL → Timestamp SIL configuration

Description

Use this function to enter the date and time when safe parameterization has been completed and the SIL checksum has been calculated.

Note: The date and time must be entered manually. This information is not generated automatically by the device.

User entry

DD.MM.YYYY hh:mm

Factory setting

0

SIL startup mode

Navigation

Setup → Advanced setup → SIL → SIL startup mode

Description

Setting for repeated automatic device startup in the SIL mode, e.g. after a power-cycle.

Note: The "Not active" setting requires the user to enter the SIL checksum manually in order to be able to start the device again in SIL mode.

Options

- Not active
- Active

Factory setting

Not active

SIL HART mode

Navigation

Setup → Advanced setup → SIL → SIL HART mode

Description

Setting for HART® communication in the SIL mode. The "HART not active" setting disables HART® communication in the SIL mode (only 4 to 20 mA communication is active).

Options

- HART not active
- HART active

Factory setting

HART active

Force safe state

Navigation

Setup → Advanced setup → SIL → Force safe state

Prerequisite

The Operational state parameter displays SIL mode active.

Description

During SIL proof testing this parameter is used to test error detection and the safe state of the device.

A detailed description of SIL proof testing is provided in the Functional Safety Manual CM2-ATT082-2003.

Options

- On
- Off

Factory setting

Off

"Administration" submenu

Device reset

Navigation

Setup → Advanced setup → Administration → Device reset
Expert → System → Device reset

Description

Use this function to reset the device configuration - either entirely or in part - to a defined state.

Options

- Not active
  No action is executed and the user exits the parameter.
- To factory defaults
  All the parameters are reset to the factory setting.
- To delivery settings
  All the parameters are reset to the order configuration. The order configuration can differ from the factory setting if customer-specific parameter values were defined when the device was ordered.
- Restart device
  The device is restarted but the device configuration remains unchanged.

Factory setting

Not active

Define device write protection code

Navigation

Setup → Advanced setup → Administration → Define device write protection code
Expert → System → Define device write protection code

Description

Sets a write protection code for the device.

Note: If the code is programmed into the device firmware it is saved in the device and the operating tool displays the value 0 so that the defined write protection code is not openly displayed for viewing.

User entry

0 to 9 999

Factory setting

0

Note: If the device is delivered with this factory setting the device write protection is not active.

Additional information

- Activating device write protection: device write protection is activated via the software by entering a 4-digit code in the Enter access code parameter. This code and the defined write protection code may not be the same!
- Deactivating device write protection: if device write protection is activated, enter the defined write protection code in the Enter access code parameter.
- Once the device has been reset to the factory setting or the order configuration, the defined write protection code is no longer valid. The code adopts the factory setting (= 0).
- Hardware write protection (DIP switches) is active:
  - Hardware write protection has priority over the software write protection described here.
  - No value can be entered in the Enter access code parameter. The parameter is a read only parameter.
  - Device write protection via software can only be defined and activated if hardware write protection via the DIP switches is disabled.

13-2. "Diagnostics" menu

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

Actual diagnostics 1

Navigation

Diagnostics → Actual diagnostics
Expert → Diagnostics → Actual diagnostics 1

Description

Use this function to display the current diagnostics message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

Display

Symbol for event behavior and diagnostic event.

Additional information

Example for display format:
F261-Electronic modules

Remedy information

Navigation

Diagnostics → Remedy information
Expert → Diagnostics → Remedy information

Description

Use this function to display the remedial action to be taken for the current diagnostics message.

Previous diagnostics 1

Navigation

Diagnostics → Previous diagnostics 1
Expert → Diagnostics → Previous diagnostics 1

Description

Use this function to display the last diagnostics message with the highest priority.

Display

Symbol for event behavior and diagnostic event.

Additional information

Example for display format:
F261-Electronic modules

Operating time

Navigation

Diagnostics → Operating time
Expert → Diagnostics → Operating time

Description

Use this function to display the length of time the device has been in operation up to now.

Display

Hours (h)

13-2-1. "Diagnostics list" submenu

SUp to 3 diagnostics messages currently pending are displayed in this submenu. If more than 3 messages are pending, the messages with the highest priority are shown on the display.
Information on diagnostics measures in the device and an overview of all the diagnostics message (Refer to page 29).

Actual diagnostics count

Navigation

Diagnostics → Diagnostics list → Actual diagnostics count
Expert → Diagnostics → Diagnostics list → Actual diagnostics count

Description

Use this function to display the number of diagnostics messages currently pending in the device.

Actual diagnostics

Navigation

Diagnostics → Diagnostics list → Actual diagnostics
Expert → Diagnostics → Diagnostics list → Actual diagnostics

Description

Use this function to display the current diagnostics messages with the highest priority to the thirdhighest priority.

Display

Symbol for event behavior and diagnostic event.

Additional information

Example for display format:
F261-Electronic modules

Actual diag channel

Navigation

Diagnostics → Diagnostics list → Actual diag channel
Expert → Diagnostics → Diagnostics list → Actual diag channel

Description

Use this function to display the sensor input to which the diagnostics message refers.

Display

- Sensor 1
- Sensor 2
- - - - - -

13-2-2. "Event logbook" submenu

Previous diagnostics n

Note: n = Number of diagnostics messages (n = 1 to 5)

Navigation

Diagnostics → Diagnostics list → Previous diagnostics n
Expert → Diagnostics → Diagnostics list → Previous diagnostics n

Description

Use this function to display the diagnostics messages that occurred in the past. The last 5 messages are listed in chronological order.

Display

Symbol for event behavior and diagnostic event.

Additional information

Example for display format:
F261-Electronic modules

Previous diag channel

Navigation

Diagnostics → Diagnostics list → Previous diag channel
Expert → Diagnostics → Diagnostics list → Previous diag channel

Description

Use this function to display the possible sensor input to which the diagnostics message refers.

Display

- Sensor 1
- Sensor 2
- - - - - -

13-2-3. "Device information" submenu

Device tag

Navigation

Setup → Device tag
Diagnostics → Device information → Device tag
Expert → Diagnostics → Device information → Device tag

Description

Use this function to enter a unique name for the measuring point so it can be identified quickly within the plant. The name is displayed in the header of the plug-in display.
(Refer to fig 6-2, page 17)

User entry

Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /)

Factory setting

-none-

Serial number

Navigation

Diagnostics → Device information → Serial number
Expert → Diagnostics → Device information → Serial number

Description

Use this function to display the serial number of the device. It can also be found on the nameplate.

Display

Max. 11-digit character string comprising letters and numbers

Firmware Version

Navigation

Diagnostics → Device information → Firmware version
Expert → Diagnostics → Device information → Firmware version

Description

Use this function to view the device firmware version installed.

Display

Max. 6-digit character string in the format xx.yy.zz

Device name

Navigation

Diagnostics → Device information → Device name
Expert → Diagnostics → Device information → Device name

Description

Use this function to display the device name. It can also be found on the nameplate.

Order code

Navigation

Diagnostics → Device information → Order code
Expert → Diagnostics → Device information → Order code

Description

Use this function to display the order code of the device. It can also be found on the nameplate.
The order code is generated from the extended order code, which defines all the device features of the product structure. In contrast, the device features cannot be read directly from the order code.

Note: Uses of the order code
- To order an identical spare device.
- To identify the device quickly and easily, e.g. when contacting the supplier.

Configuration counter

Navigation

Diagnostics → Device information → Configuration counter
Expert → Diagnostics → Device information → Configuration counter

Description

Use this function to display the counter reading for changes to device parameters.

Note: Static parameters, whose values change during optimization or configuration, cause this parameter to increment by 1. This supports parameter version management. If several parameters change, e. g. due to loading of parameters from FieldCare, etc. in the device, the counter can show a higher value. The counter can never be reset and is not reset to a default value after a device reset. If the counter overflows, (16 bit), it starts again at 1.

13-2-4. "Measured values" submenu

Sensor n value

Note: n = Stands for the number of sensor inputs (1 and 2)

Navigation

Diagnostics → Measured values → Sensor n value
Expert → Diagnostics → Measured values → Sensor n value

Description

Use this function to display the current measured value at the sensor input.

Device temperature

Navigation

Diagnostics → Measured values → Device temperature
Expert → Diagnostics → Measured values → Device temperature

Description

Use this function to display the current electronics temperature.

"Min/max values" submenu

Sensor n min value

Note: n = Stands for the number of sensor inputs (1 and 2)

Navigation

Diagnostics → Measured values → Min/max values → Sensor n min value
Expert → Diagnostics → Measured values → Min/max values → Sensor n min value

Description

Use this function to display the minimum temperature measured in the past at sensor input 1 or 2 (peakhold indicator).

Sensor n max value

Note: n = Stands for the number of sensor inputs (1 and 2)

Navigation

Diagnostics → Measured values → Min/max values → Sensor n max value
Expert → Diagnostics → Measured values → Min/max values → Sensor n max value

Description

Use this function to display the maximum temperature measured in the past at sensor input 1 or 2 (maximum indicator).

Reset sensor min/max values

Navigation

Diagnostics → Measured values → Min/max values → Reset sensor min/max values
Expert → Diagnostics → Measured values → Min/max values → Reset sensor min/max values

Description

Reset the maximum indicators for the minimum and maximum temperatures measured at the sensor inputs.

Options:

- No
- Yes

Factory setting

No

Device temperature min.

Navigation

Diagnostics → Measured values → Min/max values → Device temperature min.
Expert → Diagnostics → Measured values → Min/max values → Device temperature min.

Description

Use this function to display the minimum electronics temperature measured in the past (peakhold indicator).

Device temperature max.

Navigation

Diagnostics → Measured values → Min/max values → Device temperature max.
Expert → Diagnostics → Measured values → Min/max values → Device temperature max.

Description

Use this function to display the maximum electronics temperature measured in the past (peakhold indicator).

Reset device temp. min/max values

Navigation

Diagnostics → Measured values → Min/max values → Reset device temp. min/max values
Expert → Diagnostics → Measured values → Min/max values → Reset device temp. min/max values

Description

Resets the maximum indicators for the minimum and maximum electronic temperatures measured.

Options:

- No
- Yes

Factory settings

No

13-2-5. "Simulation" submenu

Simulation current output

Navigation

Diagnostics → Simulation → Simulation current output
Expert → Diagnostics → Simulation → Simulation current output

Description

Use this function to switch simulation of the current output on and off. The display alternates between the measured value and a diagnostics message of the "function check" category (C) while simulation is in progress.

Display

Measured value display ↔ C491 (simulation current output)

Options:

- Off
- On

Factory settings

Off

Additional information

The simulation value is defined in the Value current output parameter.

Value current output

Navigation

Diagnostics → Simulation → Value current output
Expert → Diagnostics → Simulation → Value current output

Additional information

The Simulation current output parameter must be set to On.

Description

Use this function to set a current value for the simulation. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.

User input

3.59 to 23.0 mA

Factory settings

3.59 mA

13-3. "Expert" menu

Note: The parameter groups for the Expert setup contain all the parameters of the "Setup" and "Diagnostics" operating menus, as well as other parameters that are solely reserved for experts. Descriptions of the additional parameters can be found in this section. All the fundamental parameter settings for transmitter commissioning and diagnostic evaluation are described in the 'Setup menu' (Refer to page 57) and 'Diagnostics menu' sections (Refer to page 82).

13-3-1. "System" submenu

Damping

Navigation

Expert → System → Damping

Description

Use this function to set the time constant for current output damping.

User input

0 to 120 s

Factory settings

0.00 s

Additional information

The current output reacts with an exponential delay to fluctuations in the measured value. The time constant of this delay is specified by this parameter. If a low time constant is entered, the current output reacts quickly to the measured value. On the other hand, if a high time constant is entered, the current output reaction is delayed.

Alarm delay

Navigation

Expert → System → Alarm delay

Description

Use this function to set the delay time during which a diagnostics signal is suppressed before it is output.

User input

0 to 5 s

Factory settings

2 s

Mains filter

Navigation

Expert → System → Mains filter

Description

Use this function to select the mains filter for A/D conversion.

Options:

- 50Hz
- 60Hz

Factory setting

50Hz

Device temperature alarm (Refer to page 64)

Navigation

Expert → System → Device temperature alarm (parameter)

"Display" submenu

(Refer to page 72)

"Administration" submenu

(Refer to page 81)

13-3-2. "Sensor" submenu

"Sensor 1/2" submenu

Note: n = Stands for the number of sensor inputs (1 and 2)

Sensor n lower limit

Navigation

Expert → Sensor → Sensor n → Sensor n lower limit

Description

Displays the minimum physical full scale value.

Sensor n upper limit

Navigation

Expert → Sensor → Sensor n → Sensor n upper limit

Description

Displays the maximum physical full scale value.

Serial no. sensor

Navigation

Expert → Sensor → Sensor n → Serial no. sensor

Description

Use this function to enter the serial number of the connected sensor.

User input

String with up to 12 characters consisting of numbers and/or text

Factory settings

" " (no text)

"Sensor trimming" submenu

Sensor error adjustment (sensor trimming)

Sensor trimming is used to adapt the actual sensor signal to the linearization of the selected sensor type stored in the transmitter. Compared to sensor transmitter matching, sensor trimming only takes place at the start and end value and does not achieve the same level of accuracy.

Note: Sensor trimming does not adapt the measuring range. It is used to adapt the sensor signal to the linearization stored in the transmitter.

Procedure

1. Start
⇓
2. Set the Sensor trimming parameter to the User trim settings setting.
⇓
3. Using a water/oil bath or a furnace, bring the sensor connected to the transmitter to a known and stable temperature. A temperature which is close to the set start of the measuring range is recommended.
⇓
4. Enter the reference temperature for the value at the start of the measuring range for the Sensor trimming lower value parameter. Based on the difference between the predefined reference temperature and the temperature actually measured at the input, the transmitter internally calculates a correction factor which is now used to linearize the input signal.
⇓
5. Using a water/oil bath or furnace, bring the sensor connected to the transmitter to a known and stable temperature close to the set end of the measuring range.
⇓
6. Enter the reference temperature for the value at the end of the measuring range for the Sensor trimming upper value parameter.
⇓
7. End

Sensor trimming

Navigation

Expert → Sensor → Sensor n → Sensor trimming → Sensor trimming

Description

Use this function to select the linearization method to be used for the connected sensor.
The original linearization can be restored by resetting this parameter to the Factory trim settings option.

Options:

- Factory trim settings
- User trim settings

Factory settings

Factory settings

Sensor trimming lower value

Navigation

Expert → Sensor → Sensor n → Sensor trimming → Sensor trimming lower value

Prerequisite

The customer-specific option is enabled in the Sensor trimming parameter (Refer to page 93).

Description

Lower point for linear characteristic calibration (this affects offset and slope).

User input

Depends on the selected sensor type and the assignment of the current output (PV).

Factory settings

-200 °C

Sensor trimming upper value

Navigation

Expert → Sensor → Sensor n → Sensor trimming → Sensor trimming upper value

Prerequisite

The customer-specific option is enabled in the Sensor trimming parameter.

Description

Upper point for linear characteristic calibration (this affects offset and slope).

User input

Depends on the selected sensor type and the assignment of the current output (PV).

Factory settings

850 °C

Sensor trimming min span

Navigation

Expert → Sensor → Sensor n → Sensor trimming → Sensor trimming min span

Prerequisite

The customer-specific option is enabled in the Sensor trimming parameter.

Description

Use this function to view the minimum possible span between the sensor trimming upper and lower value.

"Linearization" submenu

Procedure for configuring a linearization using Callendar/Van Dusen coefficients from a calibration certificate.

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

Sensor n lower limit

Navigation

Expert → Sensor → Sensor n → Linearization → Sensor n lower limit

Prerequisite

The RTD platinum, RTD poly nickel or RTD polynomial copper option is enabled in the Sensor type parameter.

Description

Use this function to set the lower calculation limit for special sensor linearization.

User inpu

Depends on the sensor type selected.

Factory settings

-200 °C

Sensor n upper limit

Navigation

Expert → Sensor → Sensor n → Linearization → Sensor n upper limit

Prerequisite

The RTD platinum, RTD poly nickel or RTD polynomial copper option is enabled in the Sensor type parameter.

Description

Use this function to set the upper calculation limit for special sensor linearization.

User input

Depends on the sensor type selected.

Factory settings

850 °C

Call./v. Dusen coeff. R0

Navigation

Expert → Sensor → Sensor n → Linearization → Call./v. Dusen coeff. R0

Prerequisite

The RTD platinum (Callendar/Van Dusen) option is enabled in the Sensor type parameter.

Description

Use this function to set the R0 value for linearization with the Callendar/Van Dusen polynomial.

User input

40.000 to 1 050.000

Factory settings

100.000 Ohm

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

Navigation

Expert → Sensor → Sensor n → Linearization → Call./v. Dusen coeff. A, B, C

Prerequisite

The RTD platinum (Callendar/Van Dusen) option is enabled in the Sensor type parameter.

Description

Use this function to set the coefficients for sensor linearization based on the Callendar/Van Dusen method.

Factory settings

- A: 3.910000e-003
- B: -5.780000e-007
- C: -4.180000e-012

Procedure to configuration by CommStaff:
"X.XXXXXE-YYY" is displayed. However, you can input numbers in the order of "XXXXXXE-ZZZ".

Example:
1. Initial setting: 3.90830E-03
2. Deletion of decimal point: 3.90830E-03 to 390830E-003
3. Change of exponent part: 390830E-003 to 390830E-008
4. Change of numbers : 390830E-008 to 388220E-008
5. Display after setting: 3.88220E-008

Polynomial coeff. R0

Navigation

Expert → Sensor → Sensor n → Linearization → Polynomial coeff. R0

Prerequisite

The RTD poly nickel or RTD polynomial copper option is enabled in the Sensor type parameter.

Description

Use this function to set the R0 value for linearization of nickel/copper sensors.

User input

40.000 to 1 050.000 Ohm

Factory settings

100.00 Ohm

Polynomial coeff. A, B

Navigation

Expert → Sensor → Sensor n → Linearization → Polynomial coeff. A, B

Prerequisite

The RTD poly nickel or RTD copper polynomial option is enabled in the Sensor type parameter.

Description

Use this function to set the coefficients for sensor linearization of copper/nickel resistance thermometers.

Factory settings

Polynom coeff. A = 5.49630e-003
Polynom coeff. B = 6.75560e-006

Procedure to configuration by CommStaff:
"X.XXXXXE-YYY" is displayed. However, you can input numbers in the order of "XXXXXXE-ZZZ".

Example:
1. Initial setting: 3.90830E-03
2. Deletion of decimal point: 3.90830E-03 to 390830E-003
3. Change of exponent part: 390830E-003 to 390830E-008
4. Change of numbers : 390830E-008 to 388220E-008
5. Display after setting: 3.88220E-008

"Diagnostic settings" submenu

Calibration counter start

Navigation

Expert → Sensor → Diagnostic settings → Calibration counter start

Description

Option to control the calibration counter.

Note:
- The countdown duration (in days) is specified with the Calibration counter start value parameter.
- The status signal issued when the limit value is reached is defined with the Calibration alarm category parameter.

Options:

- Off: Stops the calibration counter
- On: Starts the calibration counter
- Reset + run: Resets to the set start value and starts the calibration counter

Factory settings

Off

Calibration alarm category

Navigation

Expert → Sensor → Diagnostic settings → Calibration alarm category

Description

Use this function to select the category (status signal) as to how the device reacts to the set calibration countdown.

Options:

- Maintenance required (M)
- Failure (F)

Factory settings

Maintenance required (M)

Calibration counter start value

Navigation

Expert → Sensor → Diagnostic settings → Calibration counter start value

Description

Use this function to set the start value for the calibration counter.

User input

0 to 365 d (days)

Factory settings

365

Calibration countdown

Navigation

Expert → Sensor → Diagnostic settings → Calibration countdown

Description

Use this function to view the time remaining until the next calibration.

Note: The countdown of the calibration counter is only running if the device is switched on.
Example: The calibration counter is set to 365 days on January 1st, 2011. If the device will be switched off for 100 days, the calibration alarm category is displayed on April 10th, 2012.

13-3-3. "Output" submenu

Measuring mode

Navigation Expert → Output → Measuring mode

Description

Enables the inversion of the output signal.

Additional information

- Standard
  The output current increases with increasing temperatures
- Inverse
  The output current decreases with increasing temperatures

Options:

- Standard
- Inverse

Factory settings

Standard

13-3-4. "Communication" submenu

"HART configuration" submenu

Device tag (Refer to page 58)

Navigation

Diagnostics → Device information → Device tag
Expert → Communication → HART configuration → Device tag

HART short tag

Navigation

Expert → Communication → HART configuration → HART short tag

Description

Use this function to define a short tag for the measuring point.

User input

Up to 8 alphanumeric characters (letters, numbers and special characters)

Factory settings

SHORTTAG

HART address

Navigation

Expert → Communication → HART configuration → HART address

Description

Use this function to define the HART address of the device.

User entry

0 to 63

Factory settings

0

Additional information

The measured value can only be transmitted via the current value is the address is set to "0". The current is fixed at 4.0 mA for all other addresses (Multidrop mode).

No. of preambles

Navigation

Expert → Communication → HART configuration → No. of preambles

Description

Use this function to define the number of preambles in the HART telegram.

User input

2 ... 20

Factory settings

5

Configuration changed

Navigation

Expert → Communication → HART configuration → Configuration changed

Description

Indicates the change of configuration via a primary or a secondary master.

Reset Configuration Changed Flag

Navigation

Expert → Communication → HART configuration → Reset Configuration Changed Flag

Description

The Configuration changed information is reset by a master (primary or secondary).

"HART info" submenu

Device type

Navigation

Expert → Communication → HART info → Device type

Description

Use this function to view the device type with which the device is registered with the HART Communication Foundation. The device type is specified by the manufacturer. It is needed to assign the appropriate device description file (DD) to the device.

Display

2-digit hexadecimal number

Factory settings

0xcc

Device revision

Navigation

Expert → Communication → HART info → Device revision

Description

Use this function to view the device revision with which the device is registered with the HART® Communication Foundation. It is needed to assign the appropriate device description file (DD) to the device.

Factory setting

2

HART revision

Navigation

Expert → Communication → HART info → HART revision

Description

Use this function to display the HART revision of the device.

HART descriptor

Navigation

Expert → Communication → HART info → HART descriptor

Description

Use this function to define a description for the measuring point.

User input

Up to 32 alphanumeric characters (letters, numbers and special characters)

Factory settings

The device name

HART message

Navigation

Expert → Communication → HART info → HART message

Description

Use this function to define a HART message which is sent via the HART protocol when requested by the master.

User input

Up to 32 alphanumeric characters (letters, numbers and special characters)

Factory settings

The device name

Hardware revision

Navigation

Expert → Diagnostics → Device information → Hardware revision
Expert → Communication → HART info → Hardware revision

Description

Use this function to display the hardware revision of the device.

Software revision

Navigation

Expert → Communication → HART info → Software revision

Description

Use this function to display the software revision of the device.

HART date code

Navigation

Expert → Communication → HART info → HART date code

Description

Use this function to define date information for individual use.

User input

Date in the format year-month-day (YYYY-MM-DD)

Factory settings

2010-01-01

"HART output" submenu

Assign current output (PV)

Navigation

Expert → Communication → HART output → Assign current output (PV)

Description

Use this function to assign a measured variable to the primary HART value (PV).

Options:

- Sensor 1 (measured value)
- Sensor 2 (measured value)
- Device temperature
- Average of the two measured values: 0.5 x (SV1+SV2)
- Difference between sensor 1 and sensor 2: SV1-SV2
- Sensor 1 (backup sensor 2): If sensor 1 fails, the value of sensor 2 automatically becomes the primary HART® value (PV): sensor 1 (OR sensor 2)
- Sensor switching: If the value exceeds the configured threshold value T for sensor 1, the measured value of sensor 2 becomes the primary HART® value (PV). The system switches back to sensor 1 when the measured value of sensor 1 is at least 2 K below T: sensor 1 (sensor 2, if sensor 1 > T)
- Average: 0.5 x (SV1+SV2) with backup (measured value of sensor 1 or sensor 2 in the event of a sensor error in the other sensor)

Note: The threshold value can be set with the Sensor switch set point parameter. With temperature-dependent switching, it is possible to combine 2 sensors that offer advantages in different temperature ranges.

Factory settings

Sensor 1

PV

Navigation

Expert → Communication → HART output → PV

Description

Use this function to display the primary HART value.

Assign SV

Navigation

Expert → Communication → HART output → Assign SV

Description

Use this function to assign a measured variable to the secondary HART value (SV).

Options:

See Assign current output (PV) parameter, (Refer to page 106)

Factory settings

Device temperature

SV

Navigation

Expert → Communication → HART output → SV

Description

Use this function to display the secondary HART value.

Assign TV

Navigation

Expert → Communication → HART output → Assign TV

Description

Use this function to assign a measured variable to the tertiary HART value (TV).

Options:

See Assign current output (PV) parameter, (Refer to page 106)

Factory settings

Sensor 1

TV

Navigation

Expert → Communication → HART output → TV

Description

Use this function to display the tertiary HART value.

Assign QV

Navigation

Expert → Communication → HART output → Assign QV

Description

Use this function to assign a measured variable to the quaternary (fourth) HART value (QV).

Options:

See Assign current output (PV) parameter, (Refer to page 106)

Factory settings

Sensor 1

QV

Navigation

Expert → Communication → HART output → QV

Description

Use this function to display the quaternary (fourth) HART value.

"Burst configuration" submenu

Note: Up to 3 burst modes can be configured.

Burst mode

Navigation

Expert → Communication → Burst configuration → Burst mode

Description

Activation of the HART burst mode for burst message X. Message 1 has the highest priority, message 2 the second-highest priority, etc.

Options

- Off
  The device only sends data to the bus at the request of a HART master
- On
  The device regularly sends data to the bus without being requested to do so.

Factory setting

Off

Burst command

Navigation

Expert → Communication → Burst configuration → Burst command

Prerequisite

This parameter can only be selected if the Burst mode option is enabled.

Description

Use this function to select the command whose answer is sent to the HART master in the activated burst mode.

Options

- Command 1
  Read out the primary variable
- Command 2
  Read out the current and the main measured value as a percentage
- Command 3
  Read out the dynamic HART variables and the current
- Command 9
  Read out the dynamic HART variables including the related status
- Command 33
  Read out the dynamic HART variables including the related unit

Factory setting

Command 2

Additional information

Commands 1, 2, 3 and 9 are universal HART commands.
Command 33 is a "Common-Practice" HART command.
More details on this are provided in the HART specifications.

Burst variable n

Note: n = Number of burst variables (0 to 3)

Navigation

Expert → Communication → Burst configuration → Burst variable n

Prerequisite

This parameter can only be selected if the Burst mode option is enabled.

Description

Use this function to assign a measured variable to slots 0 to 3.

Note: This assignment is only relevant for the burst mode. The measured variables are assigned to the 4 HART variables (PV, SV, TV, QV) in the HART output (Refer to page 99) menu.

Options

- Sensor 1 (measured value)
- Sensor 2 (measured value)
- Device temperature
- Average of the two measured values: 0.5 x (SV1+SV2)
- Difference between sensor 1 and sensor 2: SV1-SV2
- Sensor 1 (backup sensor 2): If sensor 1 fails, the value of sensor 2 automatically becomes the primary HART® value (PV): sensor 1 (OR sensor 2)
- Sensor switching: If the value exceeds the configured threshold value T for sensor 1, the measured value of sensor 2 becomes the primary HART® value (PV). The system switches back to sensor 1 if the measured value of sensor 1 is at least 2 K below T: sensor 1 (sensor 2, if sensor 1 > T)

Note: The threshold value can be set with the Sensor switching limit value parameter.
With temperature-dependent switching, it is possible to combine 2 sensors that offer advantages in different temperature ranges.

Average: 0.5 x (SV1+SV2) with backup (measured value of sensor 1 or sensor 2 in the event of a sensor error in the other sensor)

Factory setting

- Burst variable slot 0: sensor 1
- Burst variable slot 1: device temperature
- Burst variable slot 2: sensor 1
- Burst variable slot 3: sensor 1

Burst trigger mode

Navigation

Expert → Communication → Burst configuration → Burst trigger mode

Prerequisite

This parameter can only be selected if the Burst mode option is enabled.

Description

Use this function to select the event that triggers burst message X.

Note:
- Continuous:
  The message is triggered in a time-controlled manner, at least observing the time interval defined in the "min. update period X" parameter.
- Window:
  The message is triggered if the specified measured value has changed by the value defined in the "Burst trigger level X" parameter.
- Rising:
  The message is triggered if the specified measured value exceeds the value in the "Burst trigger level X" parameter.
- Falling:
  The message is triggered if the specified measured value falls below the value in the "Burst trigger level X" parameter.
- On change:
  The message is triggered if a measured value of the message changes.

Options

- Continuous
- Window
- Rising
- Falling
- On change

Factory setting

Continuous

Burst trigger level

Navigation

Expert → Communication → Burst configuration → Burst trigger level

Prerequisite

This parameter can only be selected if the Burst mode option is enabled.

Description

Use this function to enter the value which, together with the trigger mode, determines the time of burst message 1. This value determines the time of the message.

User entry

$-1.0e^{+20}$ to $+1.0e^{+20}$

Factory setting

$-1.0e^{+20}$

Min. update period

Navigation

Expert → Communication → Burst configuration → min. update period

Prerequisite

This parameter can only be selected if the Burst mode option is enabled.

Description

Use this function to enter the minimum time span between two burst commands of burst message X. The value is entered in the unit 1/32 milliseconds.

User entry

500 to [value entered for the maximum interval in the max. update period parameter] in whole numbers

Factory setting

1000

Max. update period

Navigation

Expert → Communication → Burst configuration → Max. update period

Prerequisite

This parameter can only be selected if the Burst mode option is enabled.

Description

Use this function to enter the maximum time span between two burst commands of burst message X. The value is entered in the unit 1/32 milliseconds.

User entry

[Value entered for the minimum interval in the min. update period parameter] to 3600000 in

whole numbers

Factory setting

2000

13-3-5. "Diagnostics" submenu

"Diagnose list" submenu

Detailed description (Refer to page 84)

"Event logbook" submenu

Detailed description (Refer to page 85)

"Device information" submenu

Extended order code 1-3

Navigation

Expert → Diagnostics → Device information → Extended order code 1-3

Description

Use this function to display the first, second and/or third part of the extended order code. On account of length restrictions, the extended order code is split into a maximum of 3 parameters.
The extended order code indicates the version of all the features of the product structure for the device and thus uniquely identifies the device. It can also be found on the nameplate.

Note: Uses of the extended order code
- TTo order an identical spare device.
- To check the ordered device features against the shipping note.

ENP-version

Navigation

Expert → Diagnostics → Device information → ENP version

Description

Use this function to display the version of the electronic nameplate (ENP).

Display

6-digit number in the format xx.yy.zz

Device revision

Navigation

Expert → Diagnostics → Device information → Device revision
Expert → Communication → HART info → Device revision

Description

Use this function to view the device revision with which the device is registered with the HART Communication Foundation. It is needed to assign the appropriate device description file (DD) to the device.

Display

2-digit hexadecimal number

Manufacturer ID

Navigation

Expert → Diagnostics → Device information → Manufacturer ID

Description

Use this function to view the manufacturer ID with which the device is registered with the HART Communication Foundation.

Display

2-digit hexadecimal number

Factory settings

17

Manufacturer

Navigation

Expert → Diagnostics → Device information → Manufacturer

Description

Use this function to display the name of the manufacturer.

Hardware revision

Navigation

Expert → Diagnostics → Device information → Hardware revision
Expert → Communication → HART info → Hardware revision

Description

Use this function to display the hardware revision of the device.

"Measured values" submenu

Sensor n raw value

Note: n = Stands for the number of sensor inputs (1 and 2)

Navigation

Expert → Diagnostics → Measured values → Sensor n raw value

Description

Use this function to display the non-linearized mV/Ohm value at the specific sensor input.

"Min/max values" submenu

Detailed description (Refer to page 88)

"Simulation" submenu

Detailed description (Refer to page 90)

Document Number:	CM2-ATT082-2001
Document Name:	ATT082 Temperature transmitter User's Manual
Date:	1st Edition: Oct. 2014
Issued/Edited by:	Azbil Corporation

Azbil Corporation