Operating Instruction
OI/TTH300-EN

Head mounted Temperature Transmitter TTH300

HART COMMUNICATION PROTOCOL
PROFIBUS
Fieldbus Foundation

ABB

Head mounted Temperature Transmitter
TTH300

Operating Instruction

OI/TTH300-EN

02.2010
Rev. B

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1 Safety

1.1 General information and notes for the reader

Read these instructions carefully prior to installing and commissioning the device.

These instructions are an important part of the product and must be kept for later use.

These instructions are intended as an overview and do not contain detailed information on all designs for this product or every possible aspect of installation, operation and maintenance.

For additional information or in case specific problems occur that are not discussed in these instructions, contact the manufacturer.

The content of these instructions is neither part of any previous or existing agreement, promise or legal relationship nor is it intended to change the same.

This product is built based on state-of-the-art technology and is operationally safe. It has been tested and left the factory in a safe, maintenance-free state. The information in the manual must be observed and followed in order to maintain this state throughout the period of operation.

Modifications and repairs to the product may only be performed if expressly permitted by these instructions.

Only by observing all of the safety information and all safety/warning symbols in these instructions can optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device, be ensured.

Information and symbols directly on the product must be observed. They may not be removed and must be fully legible at all times.

1.2 Intended use

To measure the temperature of fluid, pulpy or pasty substances and gases or resistance/voltage values.

The device is designed for use exclusively within the stated values on the name plate and in the technical specifications (see section "Specifications").

- The maximum operating temperature must not be exceeded.
- The permitted operating temperature must not be exceeded.
- The housing degree of protection must be observed.

1.3 Target groups and qualifications

Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator to do so. The specialist personnel must have read and understood the manual and comply with its instructions.

Prior to using corrosive and abrasive materials for measurement purposes, the operator must check the level of resistance of all parts coming into contact with the materials to be measured. ABB Automation Products GmbH will gladly support you in selecting the materials, but cannot accept any liability in doing so.

The operators must strictly observe the applicable national regulations with regards to installation, function tests, repairs, and maintenance of electrical products.

1.4 Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this instruction, using underqualified personnel, or making unauthorized alterations releases the manufacturer from liability for any resulting damage. This renders the manufacturer's warranty null and void.

1.5 Plates and symbols

1.5.1 Safety-/ warning symbols, note symbols

DANGER – <Serious damage to health / risk to life>

This symbol in conjunction with the signal word "Danger" indicates an imminent danger. Failure to observe this safety information will result in death or severe injury.

DANGER – <Serious damage to health / risk to life>

This symbol in conjunction with the signal word "Danger" indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.

WARNING – <Bodily injury>

This symbol in conjunction with the signal word “Warning“ indicates a possibly dangerous situation. Failure to observe this safety information may result in death or severe injury.

WARNING – <Bodily injury>

This symbol in conjunction with the signal word "Warning" indicates a potential electrical hazard. Failure to observe this safety information may result in death or severe injury.

CAUTION – <Minor injury>

This symbol in conjunction with the signal word “Caution“ indicates a possibly dangerous situation. Failure to observe this safety information may result in minor or moderate injury. This may also be used for property damage warnings.

ATTENTION – <Property damage>!

The symbol indicates a potentially damaging situation.

Failure to observe this safety information may result in damage to or destruction of the product and/or other system components.

IMPORTANT (NOTICE)

This symbol indicates operator tips, particularly useful information, or important information about the product or its further uses. It does not indicate a dangerous or damaging situation.

1.5.2 TTH300-XXH - HART name plate

The name plate is located on the transmitter housing.

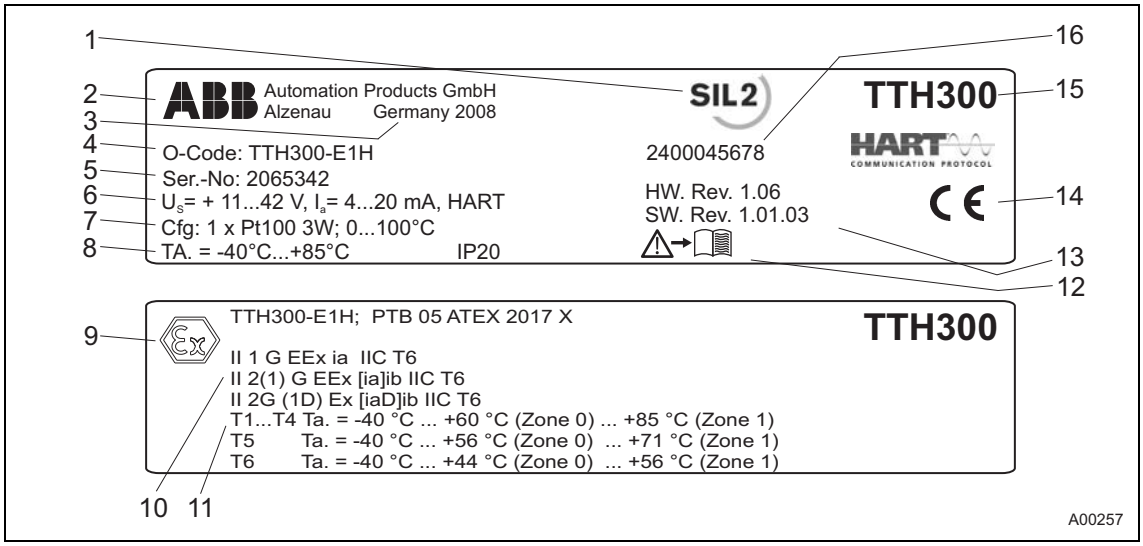


Fig. 1: Example for ATEX explosion protection

1 Safety Integrity Level (optional)
2 Manufacturer of transmitter
3 Country and year of manufacture
4 Order number
5 Serial number
6 Supply voltage range, typical current range, protocol
7 Customer configuration
8 Ambient temperature range / Housing ingress protection
9 Ex mark (optional)
10 Protection class of hazardous area design (optional)
11 Temperature class of hazardous area design (optional)
12 Refer to product documentation
13 Software revision number / Hardware revision number
14 CE mark (EC conformity)
15 Model name
16 Order number

Important

The temperature range on the name plate (7) refers only to the permissible ambient temperature range for the transmitter and not to the measuring element used in the measuring inset.

1.5.3 TTH300-XXP - PROFIBUS PA name plate

The name plate is located on the transmitter housing.

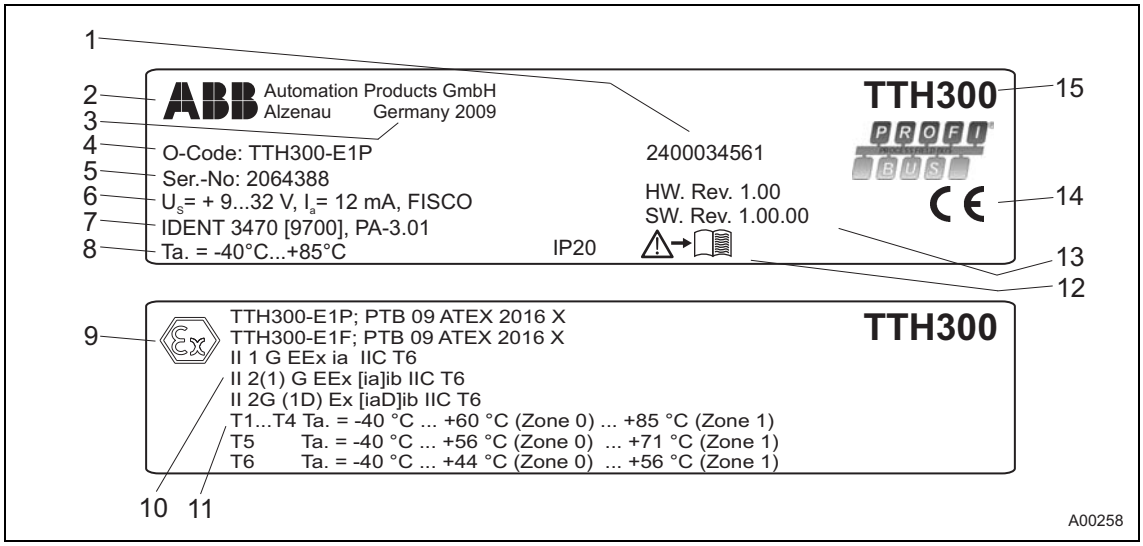


Fig. 2: Example for ATEX explosion protection

1 Order number
2 Manufacturer of transmitter
3 Country and year of manufacture
4 Order number
5 Serial number
6 Supply voltage range, typical current range, concept for intrinsically safe fieldbuses
7 PROFIBUS ID number, protocol
8 Ambient temperature range / Housing ingress protection
9 Ex mark (optional)
10 Protection class of hazardous area design (optional)
11 Temperature class of hazardous area design (optional)
12 Refer to product documentation
13 Software revision number / Hardware revision number
14 CE mark (EC conformity)
15 Model name

1.5.4 TTH300-XXF - FOUNDATION Fieldbus name plate

The name plate is located on the transmitter housing.

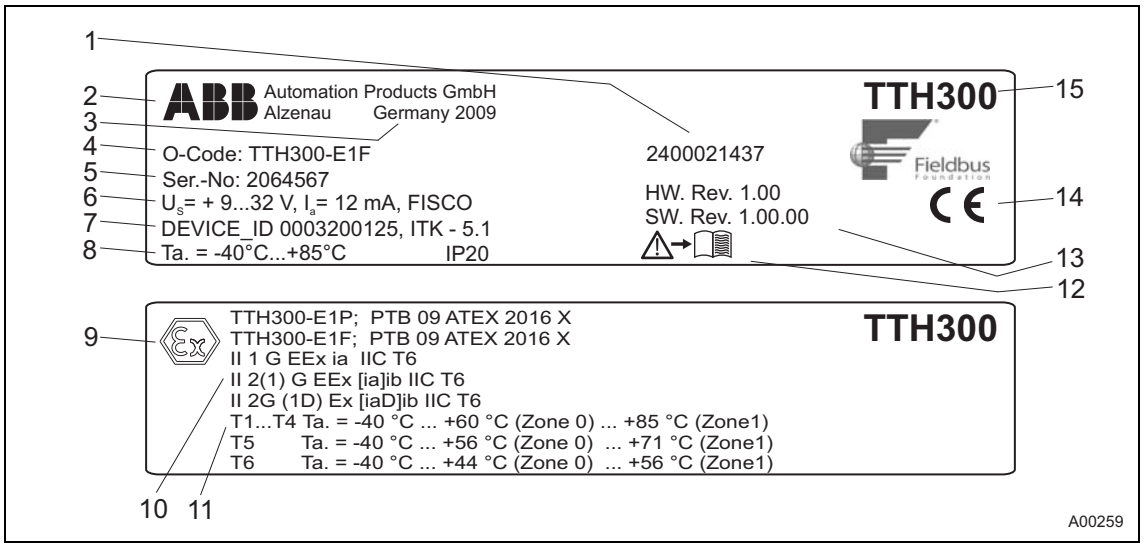


Fig. 3: Example for ATEX explosion protection

1 Order number
2 Manufacturer of transmitter
3 Country and year of manufacture
4 Order number
5 Serial number
6 Supply voltage range, typical current range, concept for intrinsically safe fieldbuses
7 FOUNDATION Fieldbus device ID number
8 Ambient temperature range / Housing ingress protection
9 Ex mark (optional)
10 Protection class of hazardous area design (optional)
11 Temperature class of hazardous area design (optional)
12 Refer to product documentation
13 Software revision number / Hardware revision number
14 CE mark (EC conformity)
15 Model name

1.6 Transport safety information

Observe the following information:

- Do not expose the device to moisture during transport. Pack the device accordingly.
- Pack the device so that it is protected from vibration during transport, e.g. through air-cushioned packaging.

1.7 Safety information for electrical installation

The electrical connections may only be performed by authorized specialist personnel according to the electrical plans.

Comply with electrical connection information in the instruction. Otherwise, the electrical protection class can be affected.

The secure separation of contact-dangerous electrical circuits is only ensured when the connected devices fulfil the requirements of the DIN EN 61140 (VDE 0140 Part 1) (basic requirements for secure separation).

For secure separation, run the supply lines separated from contact-dangerous electrical circuits or additionally insulate them.

1.8 Operating safety information

Before switching on, ensure that the specified environmental conditions in the “Technical Specifications” chapter and in the data sheet are complied with and that the power supply voltage corresponds with the voltage of the transmitter.

When there is a chance that safe operation is no longer possible, put the device out of operation and secure against unintended operation.

Check the devices for possible damage that may have occurred from improper transport. Damages in transit must be recorded on the transport documents. All claims for damages must be submitted to the shipper without delay and before installation.

1.9 Returning devices

Use the original packaging or suitably secure shipping containers if you need to return the device for repair or recalibration purposes. Fill out the return form (see the Appendix) and include this with the device.

According to EC guidelines for hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for shipping purposes:

All devices delivered to ABB Automation Products GmbH must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Please contact Customer Center Service acc. to page 2 for nearest service location.

1.10 Disposal

ABB Automation Products GmbH actively promotes environmental awareness and has an operational management system that meets the requirements of ISO 9001:2008, ISO 14001:2004, and BS OHSAS18001:2008. Our products and solutions are intended to have minimum impact on the environment and persons during manufacturing, storage, transport, use, and disposal.

This includes the environmentally-friendly use of natural resources. ABB conducts an open dialog with the public through its publications.

This product / solution is manufactured from materials that can be reused by specialist recycling companies.

1.10.1 Information on WEEE Directive 2002/96/EC (Waste Electrical and Electronic Equipment)

This product / solution is not subject to the WEEE Directive 2002/96/EC and relevant national laws (e.g., ElektroG in Germany).

The product / solution must be disposed of at a specialist recycling facility. Do not use municipal garbage collection points. According to the WEEE Directive 2002/96/EC, only products used in private applications may be disposed of at municipal garbage facilities. Proper disposal prevents negative effects on people and the environment, and supports the reuse of valuable raw materials.

If it is not possible to dispose of old equipment properly, ABB Service can accept and dispose of returns for a fee.

1.10.2 RoHS Directive 2002/95/EC

With the Electrical and Electronic Equipment Act (ElektroG) in Germany, the European Directives 2002/96/EC (WEEE) and 2002/95/EC (RoHS) are translated into national law. ElektroG defines the products that are subject to regulated collection and disposal or reuse in the event of disposal or at the end of their service life. ElektroG also prohibits the marketing of electrical and electronic equipment that contains certain amounts of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) (also known as hazardous substances with restricted uses).

The products provided to you by ABB Automation Products GmbH do not fall within the current scope of the directive on waste from electrical and electronic equipment according to ElektroG. If the necessary components are available on the market at the right time, in the future these substances will no longer be used in new product development.

2 Use in potentially explosive atmospheres

Special regulations must be observed in potentially explosive atmospheres for the power supply, signal inputs/outputs, and ground connection. The information relating specifically to explosion protection that appears within the individual sections must be observed.

Notice - Potential damage to parts!

All parts must be installed in accordance with the manufacturer's specifications, as well as relevant standards and regulations.

Commissioning and operation must comply with EN 60079-14 (Electrical apparatus for explosive gas atmospheres).

2.1 Approvals

Codes relating to the approvals for use in potentially explosive atmospheres can be found in the section titled "Ex relevant specifications" in this manual.

2.2 Housing ingress protection

The connection parts of the temperature transmitter and LC display types A and AS must be installed so that housing ingress protection of at least IP 20 as per IEC 60529:1989 is achieved.

2.3 Electrostatic charging

When using the transmitter in a potentially explosive atmosphere, please ensure that impermissible electrostatic charging of the temperature transmitter and the LC display is prevented (observe the warnings on the device).

2.4 Grounding

If, for functional reasons, the intrinsically safe circuit needs to be grounded by means of a connection to the equipotential bonding, it may only be grounded at one point.

2.5 Interconnection

If transmitters are operated in an intrinsically safe circuit, proof that the interconnection is intrinsically safe must be provided in accordance with DIN VDE 0165/Part 1 (EN 60079-25/2004 and IEC 60079-25/2003). An interconnection certificate must always be provided for intrinsically safe circuits.

2.6 Configuration

The transmitter can be configured in the potentially explosive atmosphere in compliance with the interconnection certificate, both directly in the potentially explosive atmosphere using approved handheld terminals and by coupling an Ex modem into the circuit outside the potentially explosive atmosphere.

2.7 Ex relevant specifications

See Chapter 11, "Ex relevant specifications" page 65.

3 Design and function

Digital transmitters are communication-ready devices with microprocessor-controlled electronics. They conform to the requirements of housing ingress protection type IP 20 and are suitable for integration into DIN A and DIN B sensor heads.

With HART transmitters, for bidirectional communication purposes an FSK signal is superimposed on the 4 … 20 mA output signal in accordance with the HART standard.

With PROFIBUS PA transmitters, communication takes place in accordance with PROFIBUS MBP (IEC 61158-2), PROFIBUS PA profile 3.01.

With FF transmitters, communication takes place in accordance with FOUNDATION Fieldbus H1 (IEC 611582), ITK Version 5.1.

The transmitters can be configured, polled, and tested using a DTM or an EDD.

As an option, the transmitter can be fitted with an A or AS-type LC display. Type AS is used exclusively for visualizing current process values.

Type A also supports the option of configuring the transmitter. It is recommended that you use this combination.

The electrical connection between the LC display and transmitter is provided by a 6-pin flat ribbon cable with a plug connector. The LC display can only be operated when connected to transmitters that have an LC display interface.

3.1 Input functionality

3.1.1 Sensor redundancy

To enhance system availability, the TTH300 has two sensor inputs.

The second sensor input can be used redundantly for both resistance thermometers (2x three-wire circuit or 2x two-wire circuit) and thermocouples, or for a mixture of these. Sensor redundancy (or sensor backup) always involves measuring the temperature of the two sensors and calculating the mean value on the basis of this. This value is provided at the output of the transmitter. Should a sensor fail, the temperature measurement for the sensor that remains in operation is provided at the output of the transmitter.

A relevant diagnostic message is provided via the EDD or DTM, or shown on the display. The reading continues to be available and maintenance measures can be taken at the same time.

3.1.2 Sensor drift monitoring

When two sensors are connected, sensor drift monitoring can be activated via the EDD or DTM.

It can be activated for the following two sensor types:

- 2x resistance thermometers (RTD), two-wire circuit
- 2x resistance thermometers (RTD), three-wire circuit
- 2x resistors (potentiometers), two-wire circuit
- 2x resistors (potentiometers), three-wire circuit
- 2x thermocouples
- 2x voltages
- 1x resistance thermometer (RTD), two-wire circuit and 1x thermocouple
- 1x resistance thermometer (RTD), three-wire circuit and 1x thermocouple
- 1x resistance thermometer (RTD), four-wire circuit and 1x thermocouple

To activate sensor drift monitoring, the transmitter must first be configured for the sensor types referred to above. Following this, the maximum permissible sensor deviation must be configured, e.g., max. 1 K.

Since sensor response times may be marginally different, it is then necessary to set a limit time period during which the sensor deviation must be continuously larger than the maximum sensor drift differential value defined previously (1°K, for example).

If the transmitter records a larger sensor deviation during the defined time period, a HART, EDD, and DTM diagnostic notification - "Maintenance required" - is generated according to NE 107. At the same time, diagnostic information is shown on the LC display.

If drift monitoring is used for equivalent sensors (2x Pt100 or 2x thermocouples), the mean value calculated from the two sensors is mapped to the transmitter's output signal as a process variable in redundancy mode.

If a thermocouple is used for Pt100 drift monitoring, the Pt100 sensor (see Chapter 5, "Electrical connections") must be connected to channel 1 and the thermocouple to channel 2.

The reading from channel 1 (Pt100) is mapped to the transmitter output as a process variable.

Note

Before configuring the maximum permissible sensor deviation for drift monitoring, sensor adjustment with respect to the sensor channel 1 value must be carried out with the help of the TTH300 DTM.

3.1.3 Sensor error adjustment using Callendar van Dusen coefficients

Under normal circumstances, the standard Pt100 characteristic curve is used for resistance thermometer measurement.

Recent technology has made it possible to achieve maximum measuring accuracy where necessary, by means of individual sensor error adjustment. Sensor characteristic curves are optimized through a Pt100 polynominal in accordance with ITS-90 / IEC 751 and EN 60150, and by applying A ,B, C, or Callendar van Dusen coefficients.

The DTM or EDD can be used to set and store these sensor coefficients (Callendar van Dusen) in the transmitter as a CVD characteristic curve. Up to five different CVD characteristic curves can be stored for HART and PROFIBUS PA, while up to two can be stored for FOUNDATION Fieldbus.

4 Mounting

4.1 Installation options

There are three options for installing the transmitter:

- Installation in the cover of the connection head (without springs)
- Direct installation on the measuring inset (with springs)
- Installation on a top-hat rail

4.1.1 Installation in the cover of the connection head

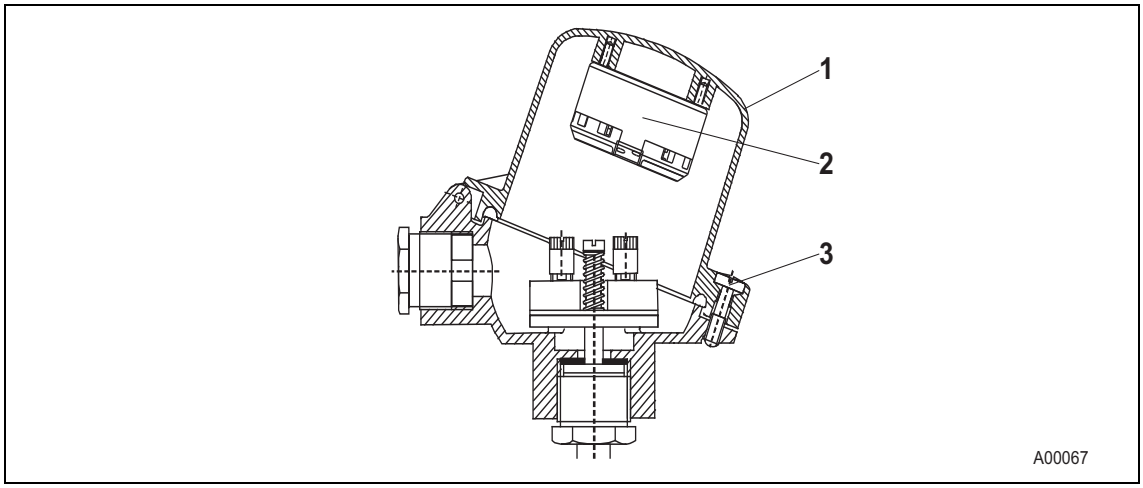


Fig. 4

1. Release the screw plug (3) for the cover of the connection head.
2. Open the cover (1).
3. Secure the transmitter (2) at the proper position on the cover, using the captive screws found in the transmitter.

4.1.2 Installation on the measuring inset

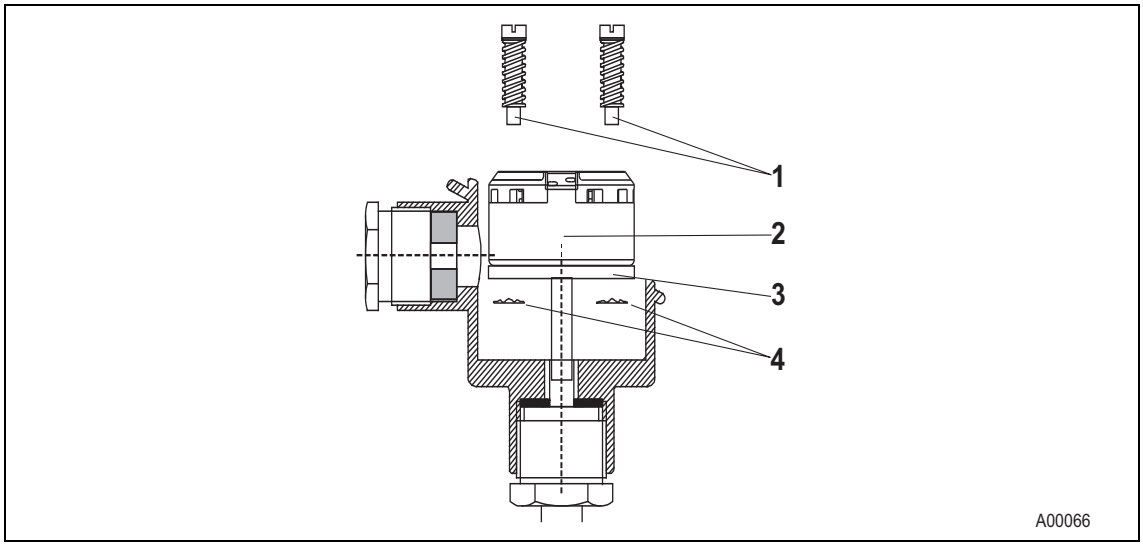


Fig. 5

Important

Before mounting the transmitter on the measuring inset, remove the ceramic block on the measuring inset and the captive screws in the transmitter.

To install the transmitter on the measuring inset, cambered toothed discs and the corresponding mounting screws are required; these must be ordered as separate accessories:

Measuring inset installation set (2 mounting screws, 2 springs, 2 toothed discs)
Order number: 237013

1. Remove the ceramic block from the measuring inset (3).
2. Remove the screws from the transmitter (2). Remove the sleeves from the screw holes and then remove the screws.
3. Insert new mounting screws (1) from above in the installation holes of the transmitter.
4. Place the cambered toothed discs (4) with curve facing upward on the downward protruding screw thread.
5. Connect the power supply cable to the transmitter according to connection diagram.
6. Place the transmitter in the housing on the measuring inset and secure it.

Important

The toothed discs between measuring inset and transmitter are straightened when the screws are tightened. This enables them to grip the mounting screws.

4.1.3 Installation on a top hat rail

When mounted on a top hat rail, the transmitter can be placed at a distance from the sensor in a housing that is suitable for the ambient conditions.

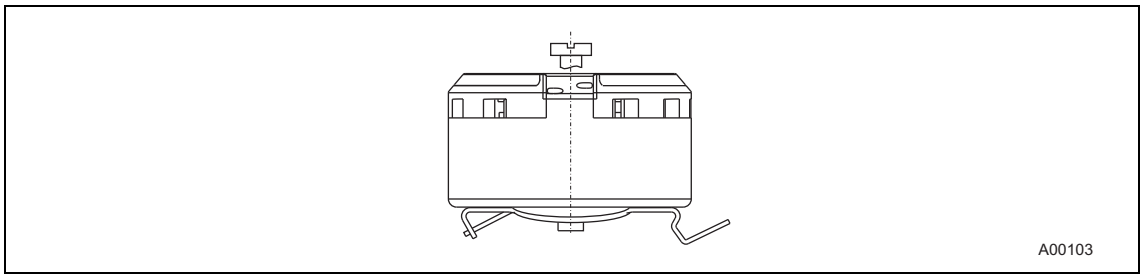


Fig. 6

4.2 Installing / Removing the optional LCD display

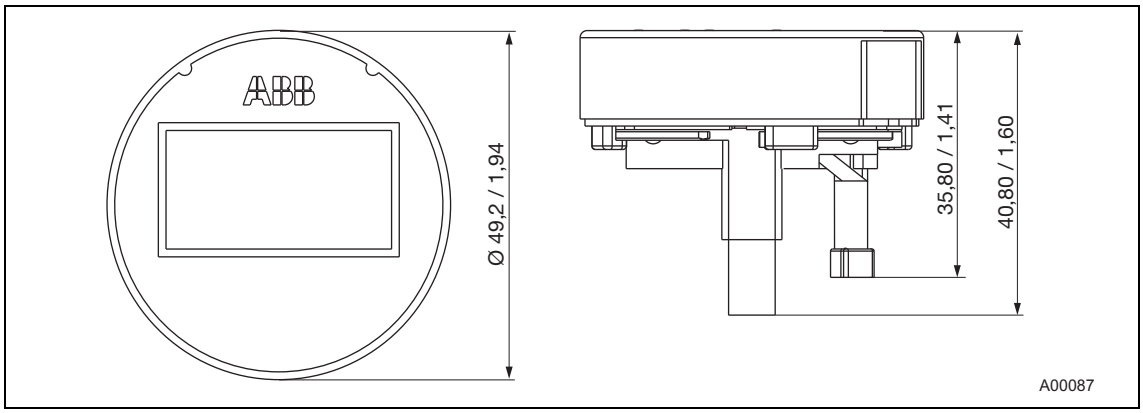


Fig. 7: Type AS LC display

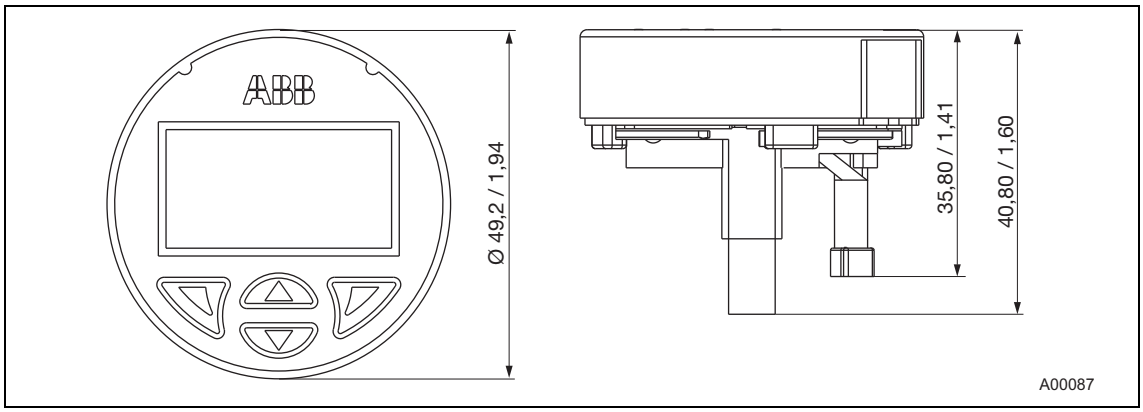


Fig. 8: Type A LC display

Thanks to the LC display interface, the TTH300 can be operated using the LC display.

The display must be removed to enable connection of the sensor line or supply line:

- Carefully remove the LC display from the transmitter inset. The LC display is held firmly in place, meaning that you may have to use the tip of a screwdriver to pry it loose. Take care to avoid any mechanical damage.

No tools are required to insert the LC display.

1. Carefully insert the guide pins for the LC display in the guide holes of the transmitter inset. Make sure the black connection socket fits into the terminal on the transmitter inset.
2. Then press the LC display in as far as it will go. Make sure that the guide pins and connection socket are fully inserted.

The position of the LC display can be adjusted to suit the installation position of the transmitter, to ensure that the display is as clearly legible as possible.

There are twelve positions at increments of 30°.

1. Carefully turn the LC display to the left to release it from its holder.
2. Carefully turn the LC display into the required position.
3. Insert the LC display into its holder again and turn it to the right into the required position until it snaps into place.

Caution - Potential damage to parts

Make sure the flat ribbon cable does not get twisted or torn when rotating the LC display.

5 Electrical connections

Warning - Dangerous electrical current

The relevant guidelines must be observed during electrical installation. Connections must only be established in a dead-voltage state.

The transmitter has no switch-off elements. Therefore, overvoltage protection devices, lightning protection, or voltage disconnection options must be provided at the plant.

The power supply and signal are routed in the same line and must be implemented as a SELV or PELV circuit in accordance with the standard (standard version). For the Ex version, the guidelines stipulated by the Ex standard must to be adhered to.

A check must be carried out as to whether the existing power supply corresponds to the specifications both on the name plate and in the technical specifications in the “Technical specifications" section or the data sheet.

Important

The signal cable wires must be provided with wire end sleeves.

The slotted screws of the connection terminals are tightened with a size 1 screwdriver (3.5 or 4 mm).

5.1 Conductor material

- Power supply cable: flexible standard conductor material
- Maximum wire cross-section: 1.5 mm^2 (16 AWG)

Notice - Potential damage to parts
Using rigid conductor material may cause line breaks.

5.2 Electrical connections configuration

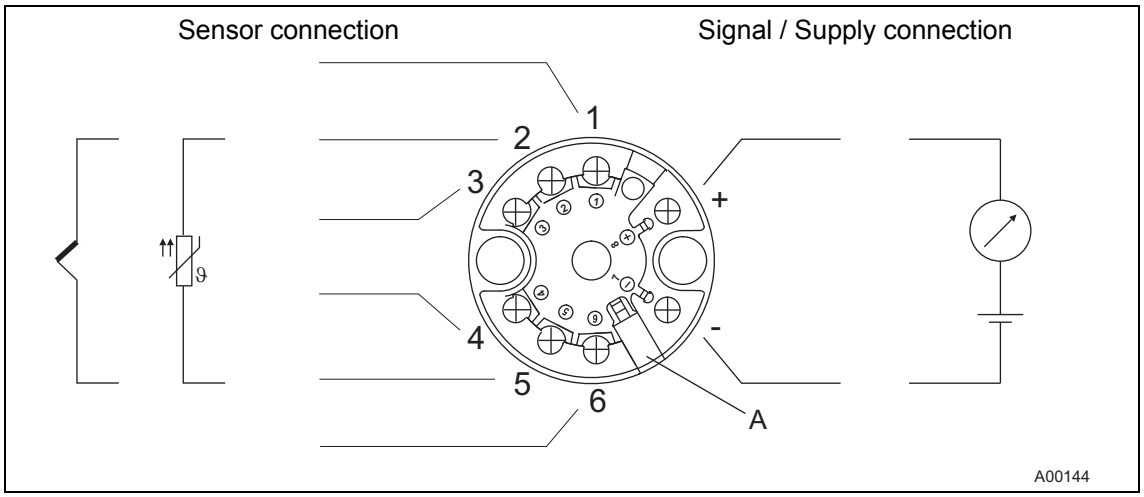


Fig. 9
A LC display interface

5.2.1 Sensor connection

Depending on the sensor model, a variety of conductor materials can be used for sensor connections. The integrated internal reference point makes it possible to directly connect thermal compensating lines.

Resistance thermometers (RTD) / resistors (potentiometers)

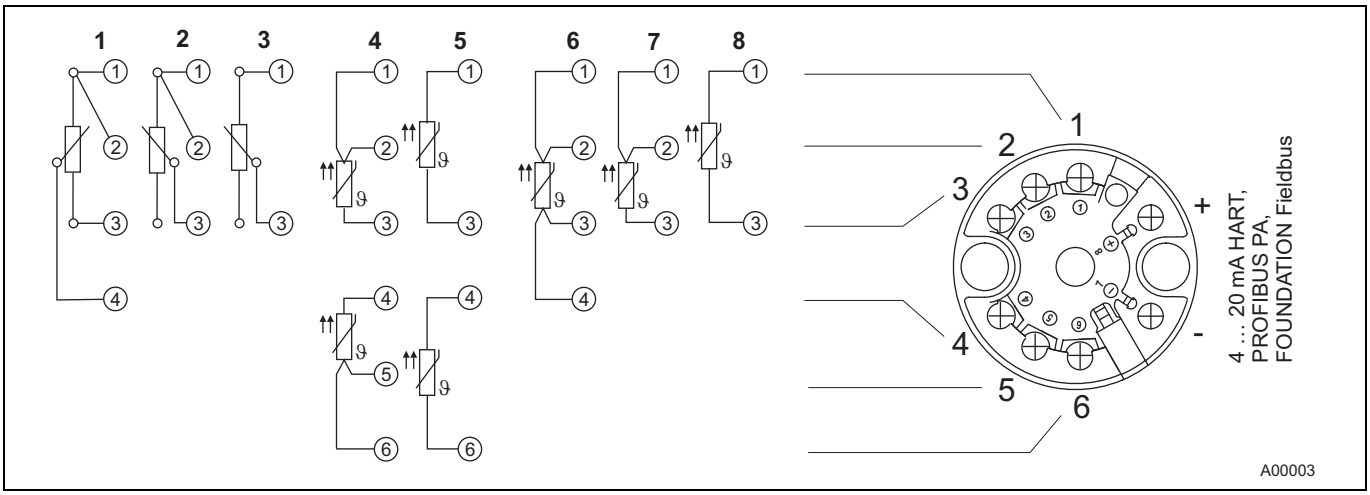


Fig. 10

1 Potentiometer, four-wire circuit
2 Potentiometer, three-wire circuit
3 Potentiometer, two-wire circuit
4 2 x RTD, three-wire circuit 1)
5 2 x RTD, two-wire circuit 1)
6 RTD, four-wire circuit
7 RTD, three-wire circuit
8 RTD, two-wire circuit

1) Sensor backup/redundancy, sensor drift monitoring, mean measurement or differential measurement

Thermocouple / voltage and resistance thermometer (RTD) / thermocouple combinations

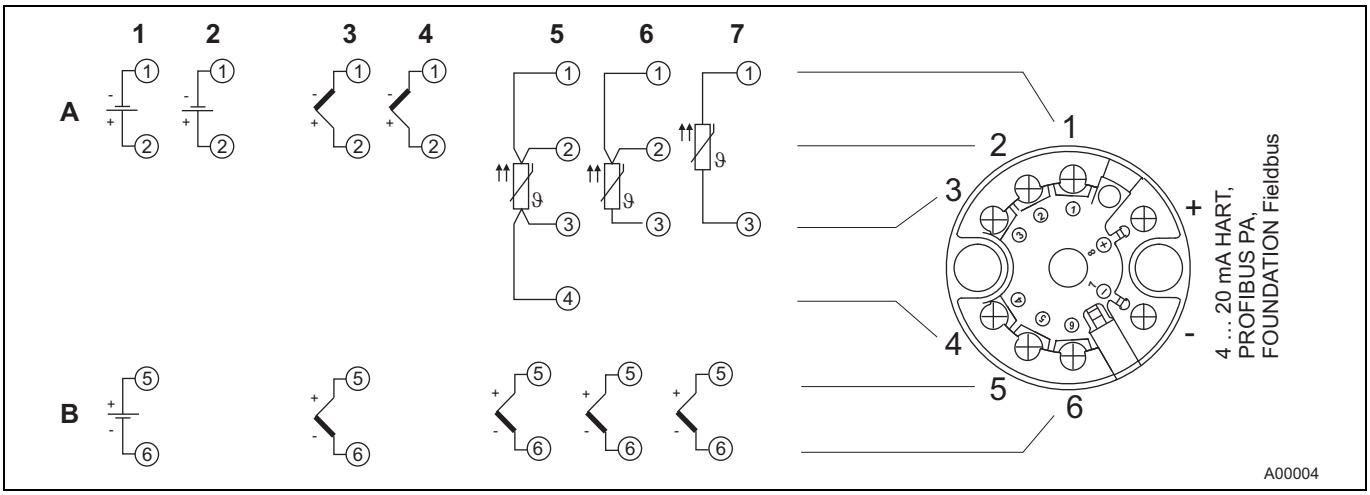


Fig. 11

A Sensor 1
B Sensor 2
1 2 x voltage measurement 1)
2 1 x voltage measurement
3 2 x thermocouple 1)
4 1 x thermocouple
5 1 x RTD, four-wire circuit and 1 x thermocouple 1)
6 1 x RTD, three-wire circuit and 1 x thermocouple 1)
7 1 x RTD, two-wire circuit and 1 x thermocouple 1)

1) Sensor backup/redundancy, sensor drift monitoring, mean measurement or differential temperature measurement

5.2.2 Standard application with 4 ... 20 mA functionality

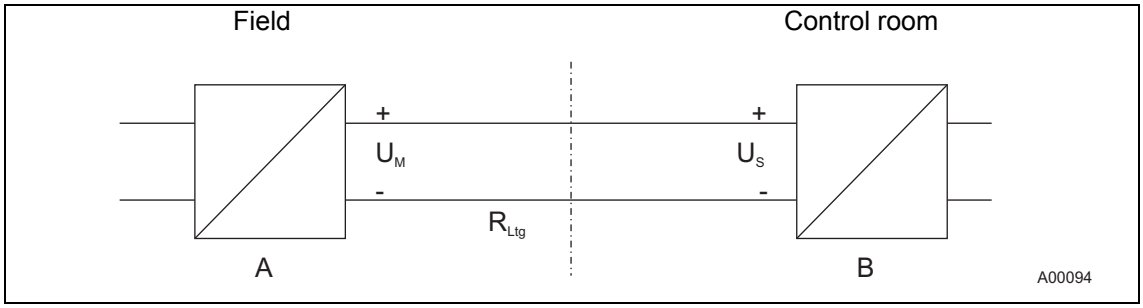


Fig. 12

A Transmitter B Supply isolator / PCS input with supply

When connecting these components, observe the following condition:

$U_{Mmin} \leq U_{Smin} + 0.022\ A \times R_{Ltg}$

Where

U_{Mmin}: Minimum operating voltage of transmitter
U_{Smin}: Minimum supply voltage of supply isolator / PCS input
R_{Ltg}: Line resistance between transmitter and supply isolator

5.2.3 Standard application with HART functionality

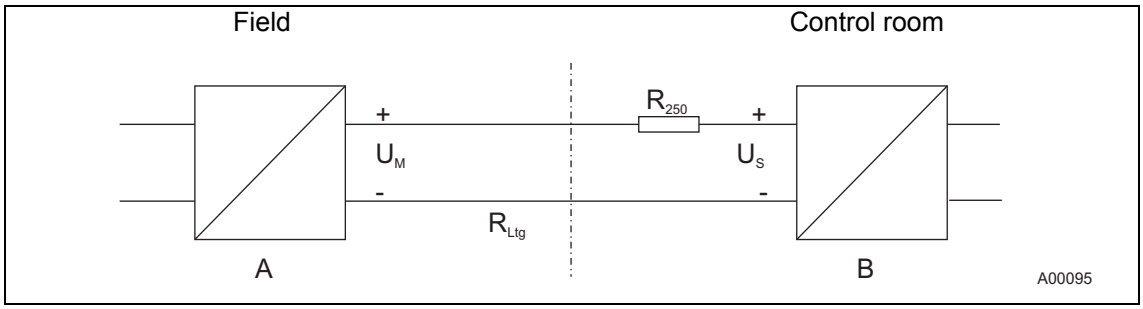


Fig. 13

A Transmitter B Supply isolator / PCS input with supply

Adding resistance R_{250} increases the minimum supply voltage:

$U_{Mmin} \leq U_{Smin} + 0{,}022\ A \times (R_{Ltg} + R_{250})$

Where

U_{Mmin}: Minimum operating voltage of transmitter
U_{Smin}: Minimum supply voltage of supply isolator / PCS input
R_{Ltg}: Line resistance between transmitter and supply isolator
R_{250}: Resistance for HART functionality

For HART functionality, use supply isolators or PCS input cards with a HART mark. If this is not possible, the interconnection must have a resistance of $\geq 250\ \Omega$ (< 1,100 Ω).

The signal line can be connected with or without grounding. When establishing a ground connection (minus side), make sure that only terminal side is connected to the equipotential bonding.

5.2.4 Standard application with PROFIBUS PA and FOUNDATION Fieldbus H1 functionality

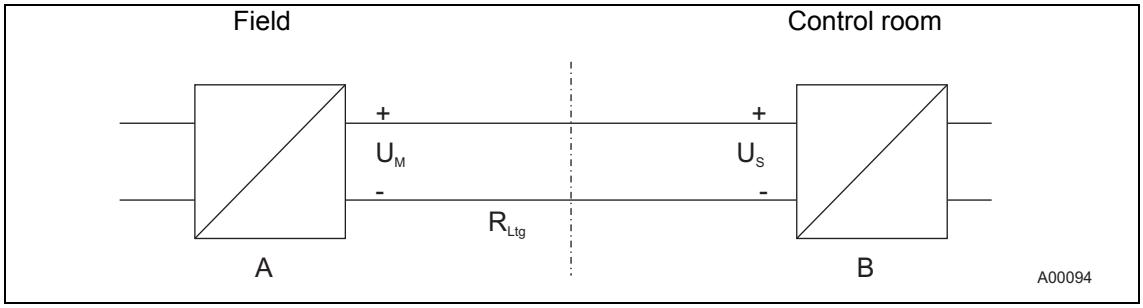


Fig. 14

A Transmitter B Segment coupler

When connecting these components, observe the following condition:

$U_{Mmin} \leq U_{Smin} + 0.012\ A \times R_{Ltg}$

Where

U_{Mmin}: Minimum operating voltage of transmitter
U_{Smin}: Minimum supply voltage of supply isolator / PCS input
R_{Ltg}: Line resistance between transmitter and supply isolator

5.3 Electrical interconnection in explosion hazardous areas

Depending on the safety requirements, special interconnections are required for use in potentially explosive atmospheres.

Important

Refer to Chapter "Ex relevant specifications".

Intrinsic safety

The supply isolators / PCS inputs must feature intrinsically safe input protection circuits in order to eliminate hazards (spark formation). The interconnection must be inspected. In order to provide proof of intrinsic safety, the electrical limit values must be used as the basis for the EC-type examination certificates for the equipment (devices); this includes the capacitance and inductance values of the cables. Proof of intrinsic safety is said to have been provided if the following conditions are fulfilled when a comparison is carried out in relation to the limit values of the equipment:

Transmitter (intrinsically safe equipment)		Supply isolator / PCS input (related equipment)
U_i	≥	U_o
I_i	≥	I_o
P_i	≥	P_o
$L_i + L_c$ (cable)	≤	L_o
$C_i + C_c$ (cable)	≤	C_o

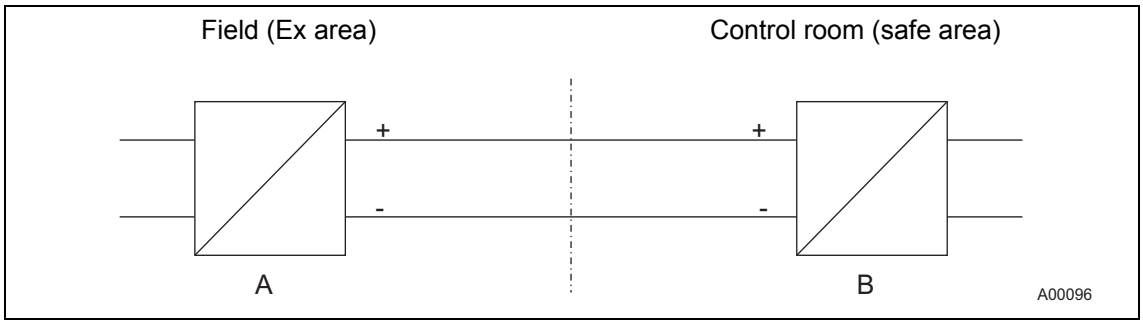


Fig. 15

A Transmitter

B Supply isolator / PCS input with supply / Segment coupler

5.3.1 Installation in a potentially explosive atmosphere

Transmitters can be installed in all kinds of industrial sectors. Potentially explosive systems are divided into zones, meaning that a wide range of different instruments are also required. Depending on the region in question, different certificates are required for these.

Important

Ex relevant specifications must be taken from the EC-type examination certificates and other relevant certificates that apply in each case.

With transmitters for PROFIBUS PA and FOUNDATION Fieldbus H1 applications, FISCO / FNICO interconnection methods can be used.

5.3.2 ATEX - Zone 0

Transmitter design: II 1 G Ex ia IIC T6

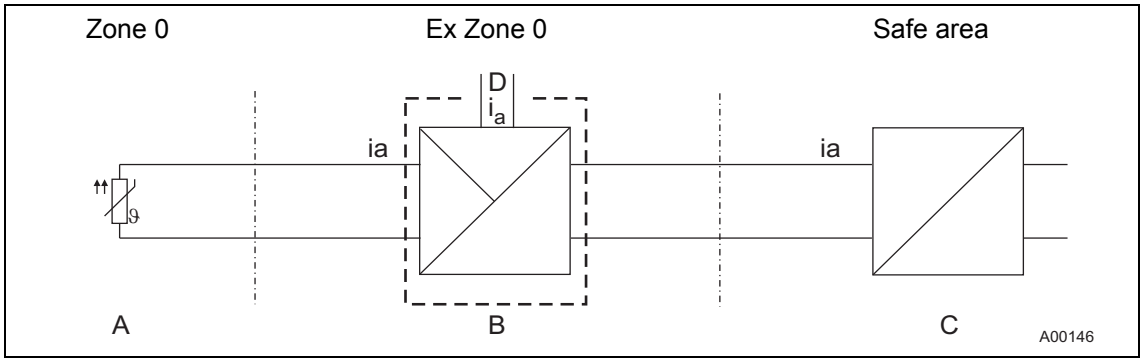


Fig. 16

A Sensor
B Transmitter in housing with IP 20 ingress protection
C Supply isolator [Ex ia]
D Interface for LC display

For instruments in Zone 0, the transmitter must be installed in a suitable housing with IP 20 ingress protection. The input for the supply isolator must have an [Ex ia] design.

When using the transmitter in Zone 0, you must ensure that impermissible electrostatic charging of the temperature transmitter is prevented (observe the warnings on the device).

The user must ensure that the sensor instrumentation meets the requirements of applicable explosion protection standards.

5.3.3 ATEX - Zone 1 (0)

Transmitter design: II 2 (1) G Ex [ia] ib IIC T6

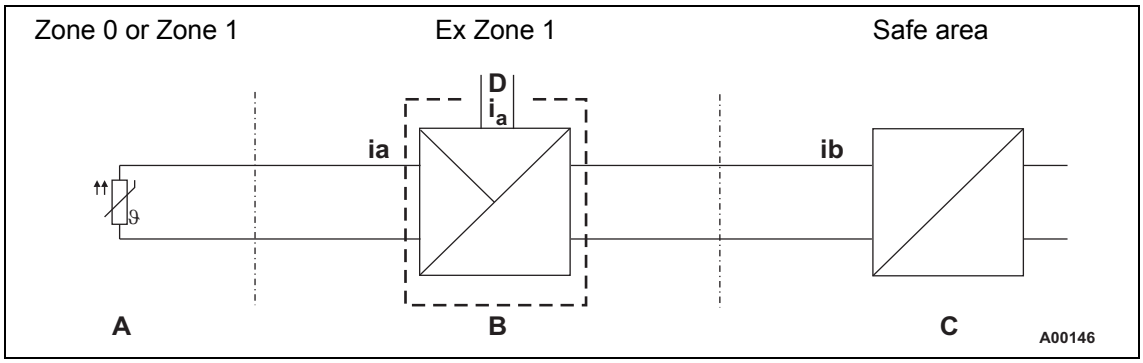


Fig. 17

A Sensor
B Transmitter in housing with IP 20 ingress protection
C Supply isolator [Ex ib]
D Interface for LC display

For instruments in Zone 1, the transmitter must be installed in a suitable housing with IP 20 ingress protection. The input for the supply isolator must have an [Ex ib] design.

The user must ensure that the sensor instrumentation meets the requirements of applicable explosion protection standards. It can be installed in Zone 1 or Zone 0.

5.3.4 ATEX - Zone 1 (20)

Transmitter design: II 2 G (1D) Ex [iaD] ib IIC T6

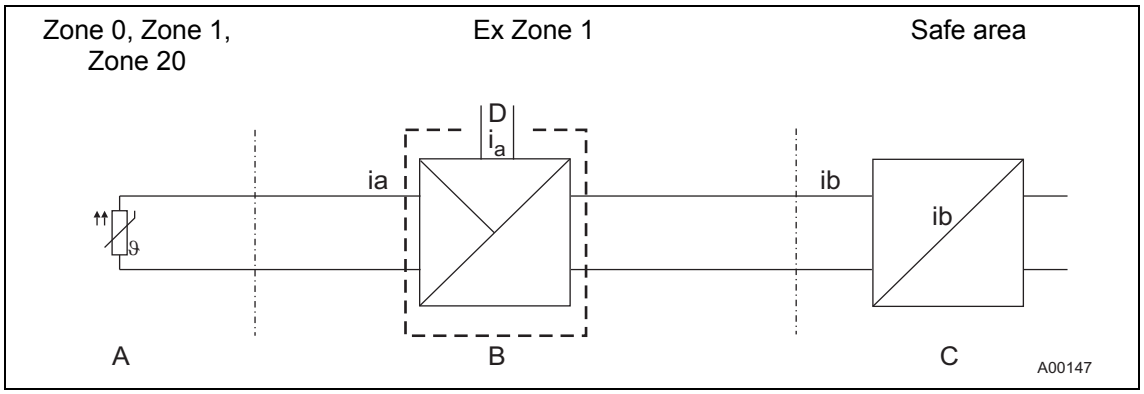


Fig. 18

A Sensor
B Transmitter in housing with IP 20 ingress protection
C Supply isolator [Ex ib]
D Interface for LC display

For instruments in Zone 1, the transmitter must be installed in a suitable housing with IP 20 ingress protection. The input for the supply isolator must have an [Ex ib] design.

The user must ensure that the sensor instrumentation meets the requirements of applicable explosion protection standards. It can be installed in Zone 0, Zone 1, or Zone 20.

5.3.5 ATEX - Zone 2

Transmitter design: II 3 G Ex nA II T6

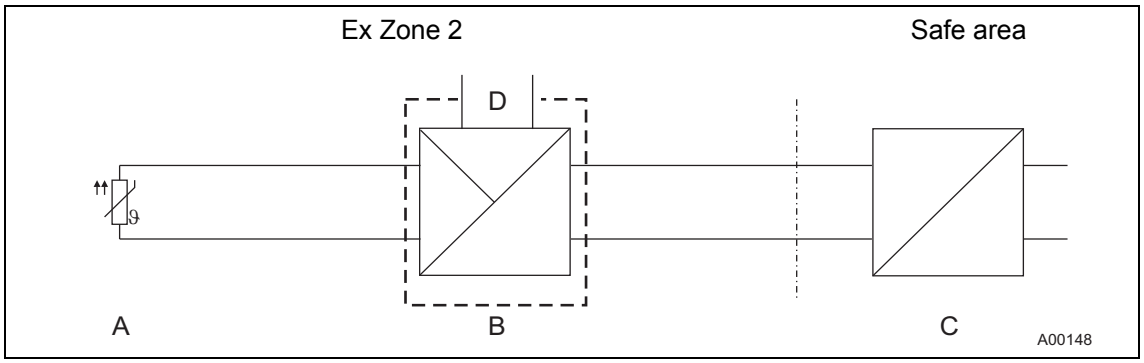


Fig. 19

A Sensor
B Transmitter in housing with IP 54 ingress protection
C Supply isolator
D Interface for LC display

For instruments in Zone 2, the transmitter must be installed in a suitable housing with ingress protection of at least IP 54.

In the event of a disturbance, it must be ensured that the supply voltage cannot exceed the normal voltage by more than 40 %.

6 Commissioning

The transmitter is immediately ready for operation after mounting and installation of the connections. The parameters are set at the factory.

The connected lines must be checked for firm seating. Only firmly seated lines ensure full functionality.

7 Communication and configuration

Important

Transmitter communication and configuration via HART, PROFIBUS PA, and FOUNDATION Fieldbus H1 are described in separate documentation ("Interface description").

The following configuration types are available for the transmitter:

- With DTM

  Configuration can be performed within an FDT frame application that is approved for use with the DTM.

- With EDD

  Configuration can be performed within an EDD frame application that is approved for use with the EDD.

- Via type A LC display with control buttons

  Configuration can be performed using the four control buttons on the front.

Important

Unlike configuration using the DTM or EDD, the functionality of the transmitter can only be changed to a limited extent if the LC display is used.

8 Configuration via the LC display with control buttons

8.1 Operation

8.1.1 Menu navigation

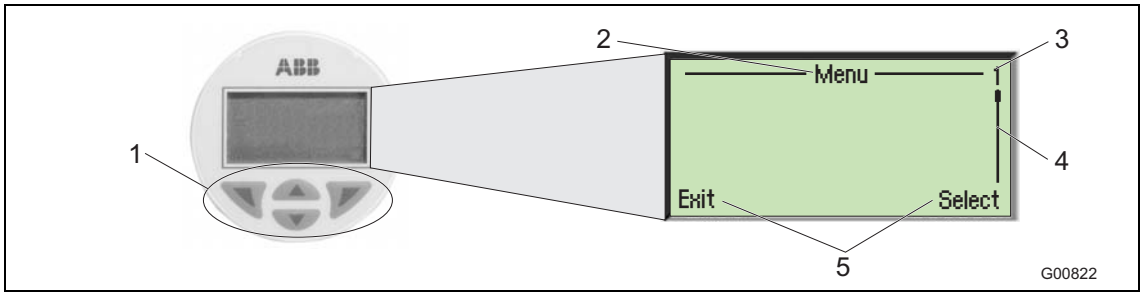


Fig. 20: Type A LC display

1 Buttons for menu navigation
2 Menu name
3 Menu number
4 Marking for indicating relative position within the menu
5 Function currently assigned to the and buttons

You can browse through the menu or select a number or character within a parameter value using the or buttons.

Different functions can be assigned to the and buttons. The function that is currently assigned to them (5) is shown on the display.

8.1.1.1 Button functions

	Meaning
Exit	Exit menu
Back	Go back one submenu
Cancel	Cancel a parameter entry
Next	Select the next position for entering numerical and alphanumeric values

	Meaning
Select	Select submenu / parameter
Edit	Edit parameter
OK	Save parameter entered

8.1.2 Process display

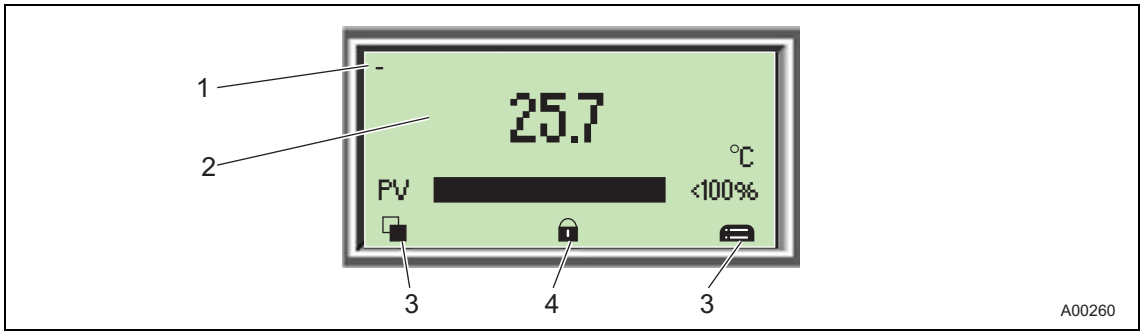


Fig. 21: Process display (example)

1 Measuring point identifier
2 Current process values
3 Symbol indicating button function
4 Symbol indicating "Parameterization protected"

The process display appears on the LC display when the device is switched on. It shows information about the device and current process values.

The way in which the current process values (2) are shown can be adjusted on the configuration level.

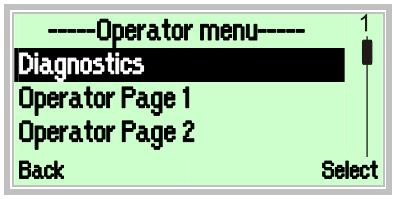
8.1.2.1 Description of symbols

Symbol	Description
	Call up information level. When Autoscroll mode is enabled, a ↻ symbol appears here and the operator pages are automatically displayed one after the other.
	Call up configuration level.
	The device is protected against changes to the parameter settings.

8.1.3 Switching to the information level (PROFIBUS PA and FOUNDATION Fieldbus only)

On the information level, the operator menu can be used to display diagnostic information and choose which operator pages to display.

1. Use  to switch to the information level.



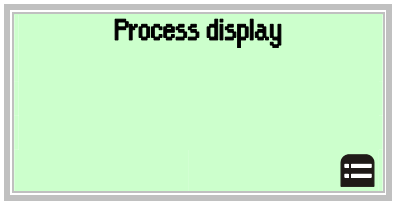
2. Use  or  to select a submenu.
3. Use  to confirm your selection.

Menu	Description

... / Operator menu	
Diagnostics	Selects the "Diagnostics" submenu; see also Chapter 8.3.4.1, "Calling up the diagnostics description"
Operator Page 1	Selects the operator page to be displayed
Operator Page 2	
Autoscroll	When Multiplex mode is enabled, this initiates automatic switching of the operator pages on the process display.
Signal View	Selects the "Signal View" submenu, in which all dynamic readings are displayed

8.1.4 Switching to the configuration level (parameterization)

The device parameters can be displayed and changed on the configuration level.

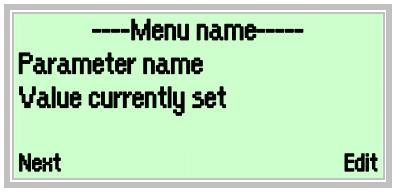


1. Use  to switch to the information level.

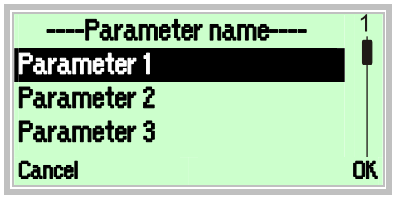
8.1.5 Selecting and changing parameters

8.1.5.1 Entry from table

When an entry is made from a table, a value is selected from a list of parameter values.



1. Select the parameters you want to set in the menu.
2. Use  to call up the list of available parameter values. The parameter value that is currently set is highlighted.

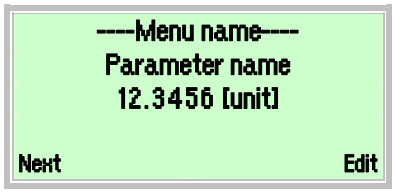


3. Use  or  to select the required value.
4. Use  to confirm your selection.

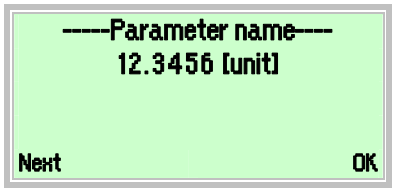
This concludes the procedure for selecting a parameter value.

8.1.5.2 Numerical entry

When a numerical entry is made, a value is set by entering the individual decimal positions.



1. Select the parameters you want to set in the menu.
2. Use  to call up the parameter for editing. The position that is currently selected is highlighted.

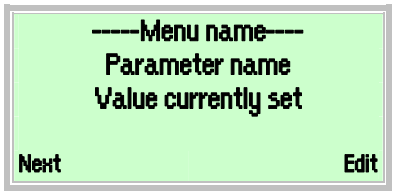


3. Use  to select the decimal position to be changed.
4. Use  or  to set the required value.
5. Use  to select the next decimal position.
6. If necessary, select and set other decimal positions using the same procedure as described in steps 3 and 4.
7. Use  to confirm your setting.

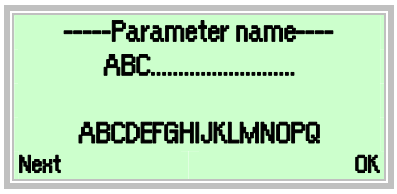
This concludes the procedure for changing a parameter value.

8.1.5.3 Alphanumeric entry

When an alphanumeric entry is made, a value is set by entering the individual decimal positions.



1. Select the parameters you want to set in the menu.
2. Use  to call up the parameter value for editing. The position that is currently selected is highlighted.



3. Use  to select the position to be changed.
4. Use  or  to select the required character.
5. Use  to select the next position.
6. If necessary, select and set other decimal positions using the same procedure as described in steps 3 and 4.
7. Use  to confirm your setting.

This concludes the procedure for changing a parameter value.

8.2 Menu structure for HART transmitters

8.2.1 Menu levels

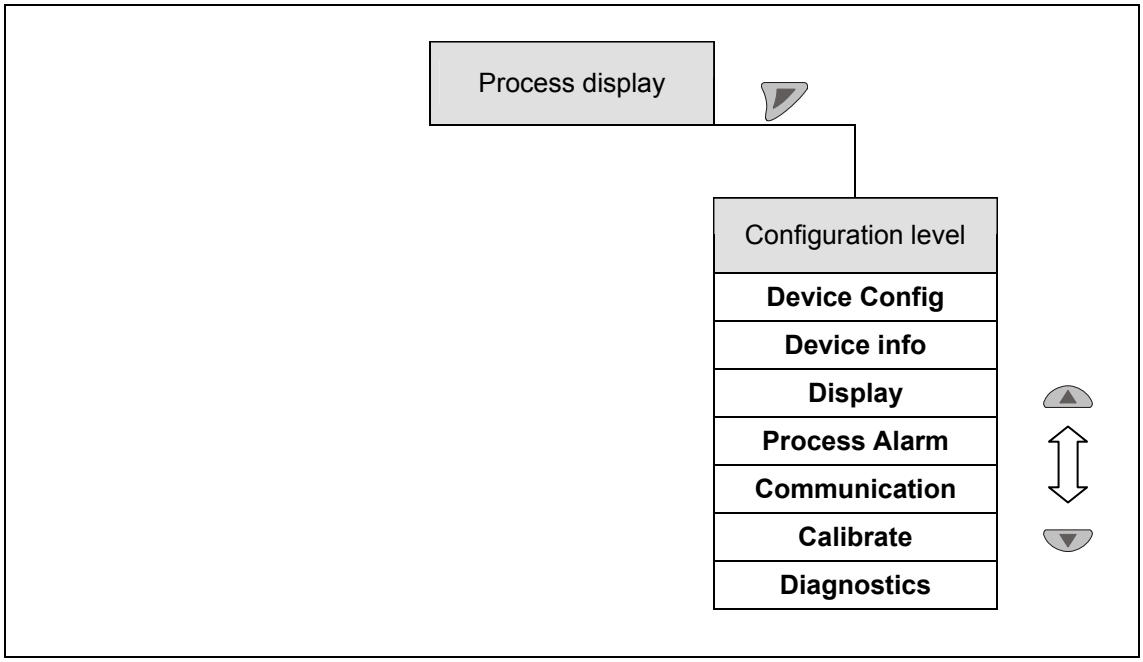
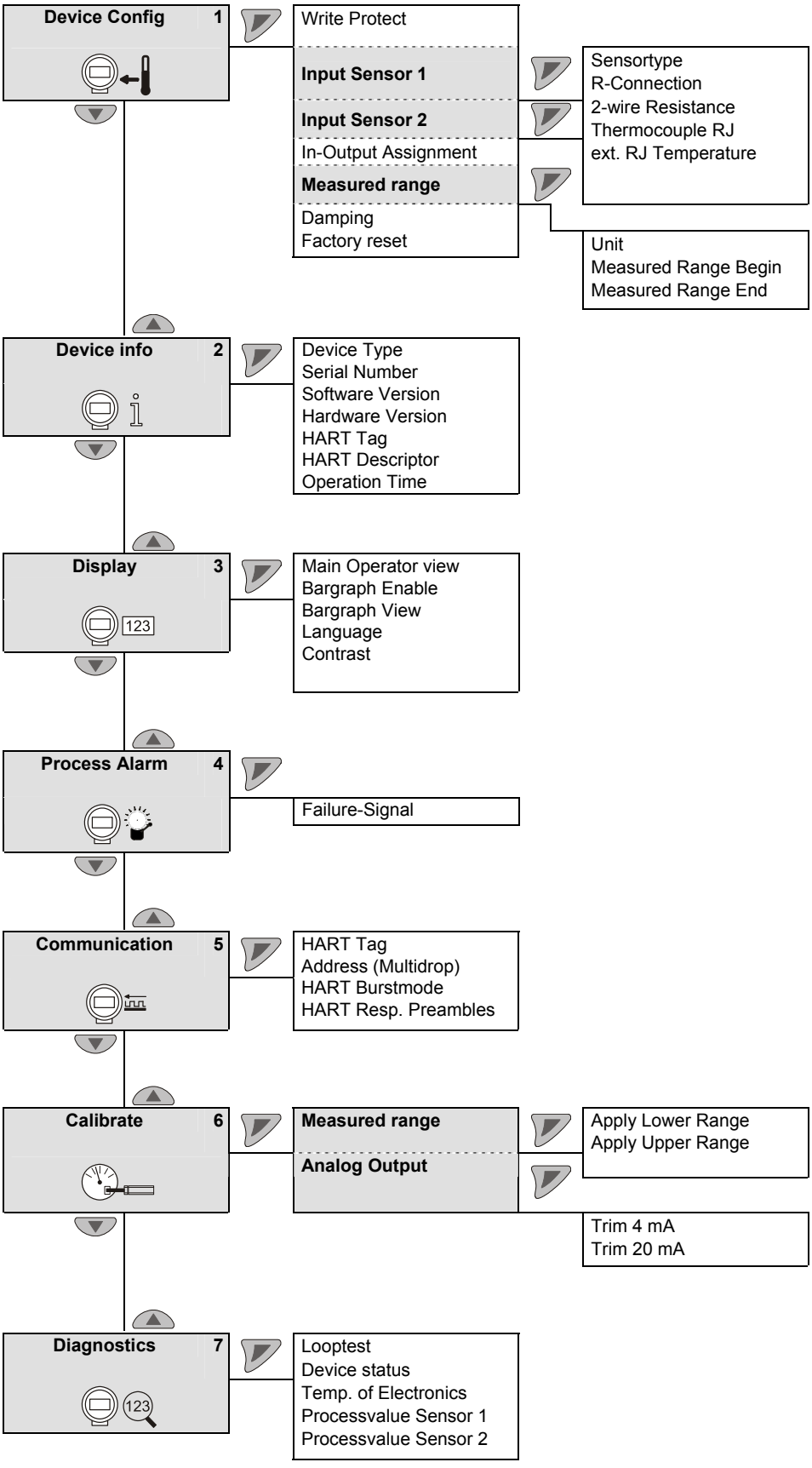


Fig. 22

Process display
The process display shows the current process values.

Configuration level
The configuration level contains all the parameters required for device commissioning and configuration. The device configuration can be changed on this level.

8.2.2 Parameter overview



8.2.3 HART parameter description

8.2.3.1 Menu: Device Setup

Menu / Parameter	Value range	Description
... / Device Setup		
Write protection	Yes: Locked Password: ≠ 0110 No: Unlocked Enter password: 0110	Activates write protection for the entire device
Input Sensor 1		Selects submenu "Input Sensor 1"
Input Sensor 2		Selects submenu "Input Sensor 2"
In-Output Assignment	Sensor 1 Sensor 2 Difference (S1-S2) Difference (S1-S2) Mean value Electr. Meas. S1 Electr. Meas. S2 Redundancy Temp. Electronics	Selects the inputs that are mapped to the current output
Measured range		Selects submenu "Measurement range"
Damping	0 ... 100 s	Configurable τ 63 % output signal damping value
Factory Reset	Yes / OK	Resets configuration data, adjustment data trim high / low and DAC adjustment values to factory settings

Menu / Parameter	Value range	Description
... / ... / Input Sensor 1 **... / ... / Input Sensor 2**		
Sensortype		Selects sensor type
	Pt100 (IEC 751)	Pt100 resistance thermometer (IEC 751)
	Pt1000 (IEC 751)	Pt1000 resistor (IEC 751)
	TC type K (IEC 584)	Thermocouple type K (IEC 584)
	TC type B (IEC 584)	Thermocouple type B (IEC 584)
	TC type C (ASTME 988)	Thermocouple type C (IEC 584)
	TC type D (ASTME 988)	Thermocouple type D (ASTME 988)
	TC type E (IEC 584)	Thermocouple type E (IEC 584)
	TC type J (IEC 584)	Thermocouple type J (IEC 584)
	TC type N (IEC 584)	Thermocouple type N (IEC 584)
	TC type R (IEC 584)	Thermocouple type R (IEC 584)
	TC type S (IEC 584)	Thermocouple type S (IEC 584)
	TC type T (IEC 584)	Thermocouple type T (IEC 584)
	TC type L (DIN 43710)	Thermocouple type L (DIN 43710)
	TC type U (DIN 43710)	Thermocouple type U (DIN 43710)
	–125 ... 125 mV	Linear voltage measurement -125 ... 125 mV
	–125 ... 1,100 mV	Linear voltage measurement -125 ... 1,100 mV
	0 ... 500 Ω	Linear resistance measurement 0 ... 500 Ω
	0 ... 5,000 Ω	Linear resistance measurement 0 ... 5,000 Ω
	Pt10 (IEC 751)	Pt10 resistance thermometer (IEC 751)
	Pt50 (IEC 751)	Pt50 resistance thermometer (IEC 751)
	Pt200 (IEC 751)	Pt200 resistance thermometer (IEC 751)
	Pt500 (IEC 751)	Pt500 resistance thermometer (IEC 751)
	Pt10 (JIS 1604)	Pt10 resistance thermometer (JIS 1604)
	Pt50 (JIS 1604)	Pt50 resistance thermometer (JIS 1604)
	Pt100 (JIS 1604)	Pt100 resistance thermometer (JIS 1604)
	Pt200 (JIS 1604)	Pt200 resistance thermometer (JIS 1604)
	Pt10 (IMIL 24388)	Pt10 resistance thermometer (MIL 24388)
	Pt50 (IMIL 24388)	Pt50 resistance thermometer (MIL 24388)
	Pt100 (MIL 24388)	Pt100 resistance thermometer (MIL 24388)

Menu / Parameter	Value range	Description
... / ... / Input Sensor 1 (continued) **... / ... / Input Sensor 2**		
		Selects sensor type
	Pt200 (MIL24388)	Pt200 resistance thermometer (MIL 24388)
	Pt1000 (MIL24388)	Pt1000 resistance thermometer (MIL 24388)
	Ni50 (DIN43760)	Ni50 resistance thermometer (DIN 43716)
	Ni100 (DIN43760)	Ni100 resistance thermometer (DIN 43716)
	Ni120 (DIN43760)	Ni120 resistance thermometer (DIN 43716)
	Ni1000 (DIN43760)	Ni1000 resistance thermometer (DIN 43716)
	Cu10 a=4270	Cu10 resistance thermometer a = 4,270
	Cu100 a=4270	Cu100 resistance thermometer a = 4,270
	Fixpoint-Tabl. 1	Customer-specific characteristic curve 1
	Fixpoint-Tabl. 2	Customer-specific characteristic curve 2
	Fixpoint-Tabl. 3	Customer-specific characteristic curve 3
	Fixpoint-Tabl. 4	Customer-specific characteristic curve 4
	Fixpoint-Tabl. 5	Customer-specific characteristic curve 5
	Cal. Van Dusen 1	Callendar Van Dusen coefficient set 1
	Cal. Van Dusen 2	Callendar Van Dusen coefficient set 2
	Cal. Van Dusen 3	Callendar Van Dusen coefficient set 3
	Cal. Van Dusen 4	Callendar Van Dusen coefficient set 4
	Cal. Van Dusen 5	Callendar Van Dusen coefficient set 5
	off	Sensor channel deactivated (sensor 2 only)
R-Connection	2-wire 3-wire 4-wire	Sensor connection type relevant for all Pt, Ni, Cu resistance thermometers
2-wire Resistance	0 ... 100 Ω	Sensor line resistance relevant for all Pt, Ni, Cu resistance thermometers with a two-wire circuit

Menu / Parameter	Value range	Description
... / ... / Input Sensor 1 (continued) **... / ... / Input Sensor 2**		
Thermocouple RJ	internal	Use of internal reference point for transmitter when using thermal compensating line
	external fixed	Use of external, fixed reference point for transmitter when using a constant thermostat temperature (can be set with ext. reference point)
	none	No reference point
	Sensor 1 Temperature	Use of sensor 1 as reference point for sensor 2
ext. RJ Temperature	-50 ... 100 °C	Relevant for external reference point, specification of constant external reference point temperature

Menu / Parameter	Value range	Description
... / ... / Measured range		
Unit	°C, °F, °R, K, user, mV, Ω, mA	Selects physical unit for sensor measuring signal
Measured Range Begin	Configurable	Defines value for 4 mA
Measured Range End	Configurable	Defines value for 20 mA

8.2.3.2 Menu: Device info

Menu / Parameter	Value range	Description
... / Device info		
Device Type		Displays device type
Serialnumber		Displays serial number
Softwareversion		Displays software version
Hardwareversion		Displays hardware version
HART Tag		Displays HART tag
HART Descriptor		Displays HART descriptor
Operation Time		Displays operating hours

8.2.3.3 Menu: Display

Menu / Parameter	Value range	Description
... / Display		
Main Operator view	Process variable Sensor 1 Sensor 2 Electr. Meas. S1 Electr. Meas. S2 Temp. Electronics Output Current Output %	Calculated process variable (PV) Reading from sensor 1 Reading from sensor 2 Reading from sensor 1 (in Ω or mV) Reading from sensor 2 (in Ω or mV) Temperature of transmitter Output current of 4 ... 20 mA signal Output value as % of measurement range
Bargraph Enable	Yes, No	Selects whether or not a bar graph is shown
Bargraph View	Output Current Output %	Output current of 4 ...20 mA signal Output value as % of measurement range
Language	German English	Selects the menu language
Contrast	0 ... 100 %	Sets the display contrast

8.2.3.4 Menu: Process Alarm

Menu / Parameter	Value range	Description
... / Process Alarm		
Failure-signal	Upscale	In the event of an error, the current (e.g., 3.6 mA) is output.
	Downscale	In the event of an error, the current (e.g., 22 mA) is output.

8.2.3.5 Menu: Communication

Menu / Parameter	Value range	Description
... / Communication		
HART Tag	8 characters	Indicates measuring points
Address (multidrop)	0 ... 15	Address range in multidrop mode (0 means that multidrop mode is not active)
HART Burstmode	Status (on / off)	Switches burst mode on or off
	Command # (1, 2, 3, 33)	Sets the HART command to be sent cyclically
HART Resp. Preambles	5 ... 20	Number of preambles to be used for sending

8.2.3.6 Menu: Calibrate

Menu / Parameter	Value range	Description
... / Calibrate		
Measured range		Selects submenu "Measured range"
Analog output		Selects submenu "Analog Output"

... / ... / Measured range		
Apply Lower Range		The current reading (PV) is used as the lower range limit (4 mA).
Apply Upper Range		The current reading (PV) is used as the upper range limit (20 mA).

... / ... / Analog Output		
Trim 4 mA	3,500 ... 4,500 mA	Adjusts the current output with a 4 mA setpoint
Trim 20 mA	19,500 ... 20,500 mA	Adjusts the current output with a 20 mA setpoint

8.2.3.7 Menu: Diagnostics

Menu / Parameter	Value range	Description
... / Diagnostics		
Looptest	0 ... 23,600 mA	Simulates the current output signal
Device Status		Diagnostic message (maintenance required, error, etc.)
Temp. of Electronics	max	Drag indicator: Maximum device temperature
	min	Drag indicator: Minimum device temperature
Processvalue Sensor 1	max	Drag indicator: Maximum temperature, sensor 1
	min	Drag indicator: Minimum temperature, sensor 1
	reset	Resets the values
Processvalue Sensor 2	max	Drag indicator: Maximum temperature, sensor 2
	min	Drag indicator: Minimum temperature, sensor 2
	reset	Resets the values

8.2.4 Activating write protection

1. Confirm "Device Config" using and select "Write Protection". The current write protection setting is displayed.
2. Use the "Edit" button to edit the current write protection setting.
3. Use the or buttons to select at least one alphanumeric character (up to 4 may be selected) and confirm via the button.

Note
Spaces and the number combination 0110 must not be entered.

4. "Write protection YES" is displayed.

Click the button 3 times to exit configuration mode and display "Reading Display Mode".

8.2.5 Deactivating write protection

Access write protection edit mode as described in the example.
In write protection edit mode, an alphanumeric string of characters is displayed.

1. Enter master password "0110".
2. Use the "OK" button to confirm.

"Write protection NO" is displayed.

Note
Master password "0110", for deactivating write protection, cannot be changed.

8.2.6 Diagnostic information on the LC display

If diagnostic information is available, a message consisting of a symbol or letter (device status) and a number (DIAG NO.) will appear at the bottom of the process display.

The diagnostic messages are divided into the following groups in accordance with the NAMUR classification scheme:

Symbol - Letter	Description	
I	OK or Information	Device is functioning or information is available
C	Check Function	Device is undergoing maintenance (e.g., simulation)
S	Off Specification	Device or measuring point is being operated outside of the specifications
M	Maintenance Required	Request service to prevent the measuring point from failing
F	Failure	Error; measuring point has failed

The error can then be read in plain-text format on the "Diagnostics" information level.

Additionally, the diagnostic messages are divided into the following areas:

Area	Description
Electronics	Diagnostics for device hardware
Sensor	Diagnostics for sensor elements and supply lines
Installation / Configuration	Diagnostics for communication interface and parameterization / configuration
Operating conditions	Diagnostics for ambient and process conditions

8.2.7 Description of diagnostic information

Area	Display, device status	Display, DIAG. NO.	Cause	Remedy
Electronics	F	1	Device defective	Replace the device
Electronics	S	2	Above / below ambient temperature	Check environment; reposition measuring point if required
Electronics	F	3	EEPROM defective	Replace the device
Electronics	M	4	Electronics overload	Factory reset
Electronics	F	5	Memory error	Factory reset
Electronics	I	7	HMI inserted	Remove display
Installation / Configuration	I	8	Device write-protected	Remove write protection
Electronics	I	9	EEPROM busy	Wait for status information to finish processing
Electronics	F	12	Sensor input defective (communication)	Replace the device
Electronics	F	13	Sensor input defective (error)	Replace the device
Electronics	F	14	Sensor input defective (ADC error)	Replace the device
Installation / Configuration	C	32	Diagnostic simulation mode	Exit simulation mode
Sensor	F	34	Measuring error, sensor 1	Check sensor connection
Sensor	F	35	Short circuit, sensor 1	Check sensor connection
Sensor	F	36	Wire break, sensor 1	Check sensor connection
Sensor	F	37	Above sensor range, sensor 1	Check measuring limits
Sensor	F	38	Below sensor range, sensor 1	Check measuring limits
Installation / Configuration	I	41	Single point calibration active, sensor 1	Terminate single-point adjustment
Installation / Configuration	I	42	Two point calibration active, sensor 1	Terminate two-point adjustment
Sensor	F	50	Measuring error, sensor 2	Check sensor connection

Area	Display, device status	Display, DIAG. NO.	Cause	Remedy
Sensor	F	51	Short circuit, sensor 2	Check sensor connection
Sensor	F	52	Wire break, sensor 2	Check sensor connection
Sensor	F	53	Above sensor range, sensor 2	Check measuring limits
Sensor	F	54	Below sensor range, sensor 2	Check measuring limits
Installation / Configuration	F	65	Configuration defective	Check configuration: A) Wrong device B) Span is too small C) Incorrect configuration data
Sensor	M	66	No sensor detected at sensor 1 in redundancy configuration	Check connection
Sensor	M	67	No sensor detected at sensor 2 in redundancy configuration	Check connection
Sensor	M	68	Sensors exceeded specified drift window	Calibrate sensors
Installation / Configuration	C	71	Reconfiguration is running	Terminate reconfiguration
Operating conditions	F	72	Incorrect application	Check configuration, connections; reset to factory settings
Installation / Configuration	I	74	Calibration of analog output active	Terminate compensation
Installation / Configuration	C	75	Analog output in simulation	Terminate simulation
Operating conditions	S	76	Above range	Check parameters: A) Sensor limits exceeded B) Span is too small
Operating conditions	S	77	Limit HIGH HIGH	Upper limit value: Alarm
Operating conditions	S	78	Limit LOW LOW	Lower limit value: Alarm
Operating conditions	S	79	Limit HIGH	Upper limit value: Warning
Operating conditions	S	80	Limit LOW	Lower limit value: Warning

Important

If the remedial measures listed for the diagnostic information do not improve the status of the device, please consult ABB Service.

8.3 Menu structure for PROFIBUS PA and FOUNDATION Fieldbus H1 transmitters

8.3.1 Menu levels

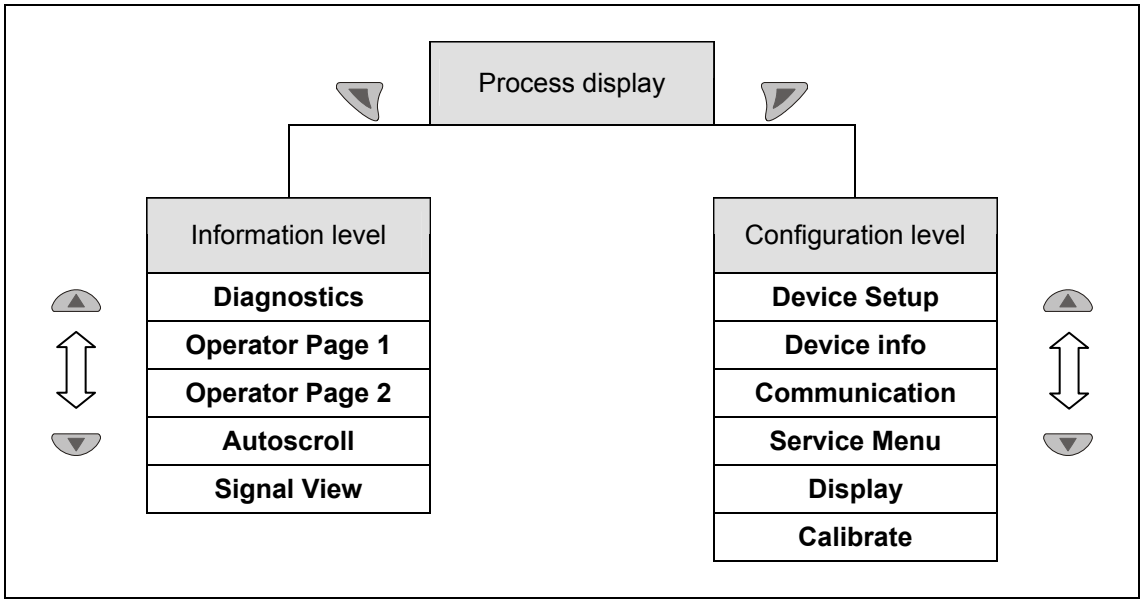


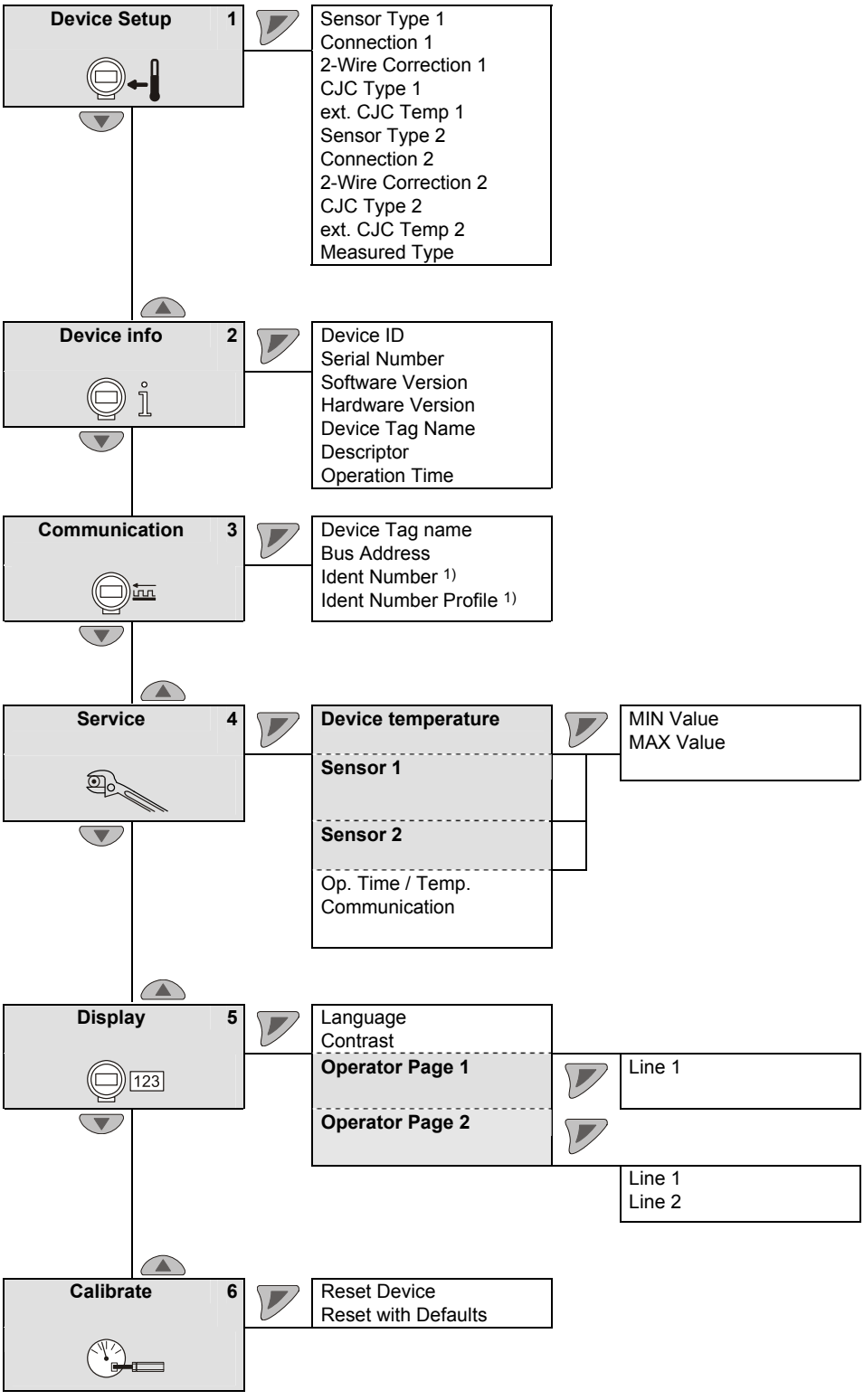
Fig. 23

Process display
The process display shows the current process values.

Information level
The information level contains the parameters and information that are relevant for the user. The device configuration cannot be changed on this level.

Configuration level
The configuration level contains all the parameters required for device commissioning and configuration. The device configuration can be changed on this level.

8.3.2 Overview of parameters on the configuration level



1) PROFIBUS PA only

8.3.3 PROFIBUS PA and FOUNDATION Fieldbus parameter description

8.3.3.1 Menu: Device Setup

Menu / Parameter	Value range	Description
... / Device Setup		
Sensor Type 1 / Sensor Type 2		Selects sensor type
	Pt100 (IEC 751)	Pt100 resistance thermometer (IEC 751)
	Pt1000 (IEC 751)	Pt1000 resistance thermometer (IEC 751)
	TC type K (IEC 584)	Thermocouple type K (IEC 584)
	TC type B (IEC 584)	Thermocouple type B (IEC 584)
	TC type C (ASTME 988)	Thermocouple type C (IEC 584)
	TC type D (ASTME 988)	Thermocouple type D (ASTME 988)
	TC type E (IEC 584)	Thermocouple type E (IEC 584)
	TC type J (IEC 584)	Thermocouple type J (IEC 584)
	TC type N (IEC 584)	Thermocouple type N (IEC 584)
	TC type R (IEC 584)	Thermocouple type R (IEC 584)
	TC type S (IEC 584)	Thermocouple type S (IEC 584)
	TC type T (IEC 584)	Thermocouple type T (IEC 584)
	TC type L (DIN 43710)	Thermocouple type L (DIN 43710)
	TC type U (DIN 43710)	Thermocouple type U (DIN 43710)
	–125 ... 125 mV	Linear voltage measurement -125 ... 125 mV
	–125 ... 1,100 mV	Linear voltage measurement -125 ... 1,100 mV
	0 ... 500 Ω	Linear resistance measurement 0 ... 500 Ω
	0 ... 5,000 Ω	Linear resistance measurement 0 ... 5,000 Ω
	Pt10 (IEC 751)	Pt10 resistance thermometer (IEC 751)
	Pt50 (IEC 751)	Pt50 resistance thermometer (IEC 751)
	Pt200 (IEC 751)	Pt200 resistance thermometer (IEC 751)
	Pt500 (IEC 751)	Pt500 resistance thermometer (IEC 751)
	Pt10 (JIS 1604)	Pt10 resistance thermometer (JIS 1604)
	Pt50 (JIS 1604)	Pt50 resistance thermometer (JIS 1604)
	Pt100 (JIS 1604)	Pt100 resistance thermometer (JIS 1604)
	Pt200 (JIS 1604)	Pt200 resistance thermometer (JIS 1604)
	Pt10 (IMIL 24388)	Pt10 resistance thermometer (MIL 24388)
	Pt50 (IMIL 24388)	Pt50 resistance thermometer (MIL 24388)
	Pt100 (MIL 24388)	Pt100 resistance thermometer (MIL 24388)

Menu / Parameter	Value range	Description
... / Device Setup (continued)		
		Selects sensor type
	Pt200 (MIL24388)	Pt200 resistance thermometer (MIL 24388)
	Pt1000 (MIL24388)	Pt1000 resistance thermometer (MIL 24388)
	Ni50 (DIN43760)	Ni50 resistance thermometer (DIN 43716)
	Ni100 (DIN43760)	Ni100 resistance thermometer (DIN 43716)
	Ni120 (DIN43760)	Ni120 resistance thermometer (DIN 43716)
	Ni1000 (DIN43760)	Ni1000 resistance thermometer (DIN 43716)
	Cu10 a=4270	Cu10 resistance thermometer a = 4,270
	Cu100 a=4270	Cu100 resistance thermometer a = 4,270
	Fixpoint-Tabl. 1	Customer-specific characteristic curve 1
	Fixpoint-Tabl. 2	Customer-specific characteristic curve 2
	Fixpoint-Tabl. 3	Customer-specific characteristic curve 3
	Fixpoint-Tabl. 4	Customer-specific characteristic curve 4
	Fixpoint-Tabl. 5	Customer-specific characteristic curve 5
	Cal. Van Dusen 1	Callendar Van Dusen coefficient set 1
	Cal. Van Dusen 2	Callendar Van Dusen coefficient set 2
	Cal. Van Dusen 3	Callendar Van Dusen coefficient set 3
	Cal. Van Dusen 4	Callendar Van Dusen coefficient set 4
	Cal. Van Dusen 5	Callendar Van Dusen coefficient set 5
	off	Sensor channel deactivated (sensor 2 only)
Connection 1 / Connection 2	2-wire 3-wire 4-wire	Sensor connection type relevant for all Pt, Ni, Cu resistance thermometers
2-Wire Correction 1 / 2-Wire Correction 2	0 ... 100 Ω	

Menu / Parameter	Value range	Description
... / Device Setup (continued)		
CJC Type 1 / CJC Type 2	intern	Use of internal reference point for transmitter when using thermal compensating line
	extern	Use of external, fixed reference point for transmitter when using a constant thermostat temperature (can be set with external reference point)
	not used	No reference point
	Sensor 1	Use of sensor 1 as reference point for sensor 2
ext. CJC Temp 1 / ext. CJC Temp 2	-50 ... 100 °C	Relevant for external reference point, specification of constant external reference point temperature

8.3.3.2 Menu: Device info

Menu / Parameter	Value range	Description
... / Device info		
Device ID		Displays device ID
Serial Number		Displays serial number
Software Version		Displays software version
Hardware Version		Displays hardware version
Device Tag Name		Displays measuring point ID
Descriptor		Displays a user-defined text
Operation Time		Displays operating hours

8.3.3.3 Menu: Communication

Menu / Parameter	Value range	Description
... / Communication		
Device Tag Name	16 characters	Indicates measuring points
Bus Address	0 ... 125	Address range during bus operation
Ident Number Select	PA profile Manufacturer-specific	Selects ID numbers that can be used (IDENT__NUMBER_SELECT); PA only
Profile Ident Select	1*AI (0x9700) 2*AI (0x9701) 3*AI (0x9702) 4*AI (0x9703)	ID number used for PA profile value range

8.3.3.4 Menu: Service Menu

Menu / Parameter	Value range	Description
... / Service Menu		
Device temperature		Selects submenu "Device temperature"
Sensor 1		Selects submenu "Sensor 1"
Sensor 2		Selects submenu "Sensor 2"
Op. Time / Temp	Total < -40 °C -40 to -20 °C -20 to 0 °C 0 to 20 °C 20 to 40 °C 40 to 60 °C 60 to 85 °C > 85 °C	Total operating hours Operating hours, < -40 °C Operating hours, – 40 °C to – 20 °C Operating hours, – 20 °C to 0 °C Operating hours, 0 to 20 °C Operating hours, 20 to 40 °C Operating hours, 40 to 60 °C Operating hours, 60 to 85 °C Operating hours, > 85 °C
Communication	excellent very good good bad none	Displays the communication quality

Menu / Parameter	Value range	Description
... / ... / Device temperature		
MIN Value		Drag indicator: Minimum device temperature
MAX Value		Drag indicator: Maximum device temperature
... / ... / Sensor 1		
MIN Value		Drag indicator: Minimum temperature, sensor 1
MAX Value		Drag indicator: Maximum temperature, sensor 1
... / ... / Sensor 2		
MIN Value		Drag indicator: Minimum temperature, sensor 2
MAX Value		Drag indicator: Maximum temperature, sensor 2

8.3.3.5 Menu: Display

Menu / Parameter	Value range	Description
... / Display		
Language	English German	Selects the menu language
Contrast	0 ... 100 %	Sets the display contrast
Operator Page 1		Selects submenu "Operator Page 1"
Operator Page 2		Selects submenu "Operator Page 2"
... / ... /Operator Page 1		
Line 1	Calculated value Sensor 1 Sensor 2 Device Temperature AO Block	Selects the value displayed
... / ... /Operator Page 2		
Line 1	Calculated value Sensor 1 Sensor 2 Device Temperature AO Block	Selects the value displayed in line 1
Line 2	Calculated value Sensor 1 Sensor 2 Device Temperature AO Block	Selects the value displayed in line 2

8.3.3.6 Menu: Calibrate

Menu / Parameter	Value range	Description
... / Calibrate		
Reset Device		Device restarts without configuration changes
Reset with Defaults		Device restarts with factory settings applied

8.3.4 Diagnostic information on the LC display

If diagnostic information is available, a message consisting of a symbol and text (e.g., Electronics) will appear at the bottom of the process display. The text displayed provides information about the area in which the error has occurred.

The diagnostic messages are divided into four groups in accordance with the NAMUR classification scheme:

Symbol	Description
	Error / Failure
	Functional check
	Out of specification
	Maintenance required

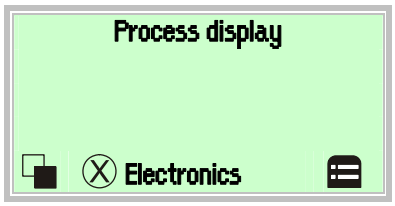
The error can then be read in plain-text format on the "Diagnostics" information level.

Additionally, the diagnostic messages are divided into the following areas:

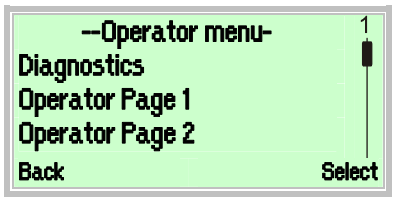
Area	Description
Electronics	Diagnostics for device hardware
Sensor	Diagnostics for sensor elements and supply lines
Installation / Configuration	Diagnostics for communication interface and parameterization / configuration
Operating conditions	Diagnostics for ambient and process conditions

8.3.4.1 Calling up the diagnostics description

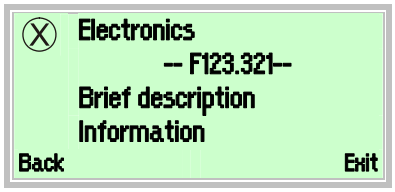
Additional details about the diagnostics information can be called up on the information level.



1. Use  to switch to the information level.



2. Use  or  to select the "Diagnostics" submenu.
3. Use  to confirm your selection.



The first line shows the area the diagnostics information comes from.

The second line shows the error number.

The next lines show a brief description of the error and information on how to remedy it.

8.3.5 Description of diagnostic information

Area	Device status message (on the display)	Cause	Remedy
Sensor	Sensor drift	Out of specification	Sensor adjustment
Sensor	S1 line resistance too high	Maintenance required	Sensor 1: Remove corrosion at the connections or reduce line length
Sensor	S1 short circuit	Error	Sensor 1: Rectify short circuit or replace sensor 1
Sensor	S1 wire break	Error	Sensor 1: Rectify wire break or replace sensor 1
Sensor	S2 line resistance too high	Maintenance required	Sensor 2: Remove corrosion at the connections or reduce line length
Sensor	S2 short circuit	Error	Sensor 2: Rectify short circuit or replace sensor 2
Sensor	S2 wire break	Error	Sensor 2: Rectify wire break or replace sensor 2
Operating conditions	S1 measurement range overflow	Out of specification	Adapt S1 measurement range to suit measuring task
Operating conditions	S1 measurement range underflow	Out of specification	Adapt S1 measurement range to suit measuring task
Operating conditions	S2 measurement range overflow	Out of specification	Adapt S2 measurement range to suit measuring task
Operating conditions	S2 measurement range underflow	Out of specification	Adapt S2 measurement range to suit measuring task
Operating conditions	Device temperature out of spec.	Out of specification	Check environment; reposition measuring point if required
Electronics	Device error	Error	Replace device
Electronics	Device not calibrated	Out of specification	Calibrate device
Electronics	Device being simulated	Functional check	Terminate simulation

Area	Device status message (on the display)	Cause	Remedy
Electronics	Configuration error	Error	Validate configuration
Sensor	Sensor 1 + 2 redundancy failure	Error	Check sensor / sensor connection
Sensor	Sensor 1 redundancy: Short circuit	Maintenance required	Rectify short circuit at sensor 1 or replace sensor 1
Sensor	Sensor 1 redundancy: Wire break	Maintenance required	Rectify break at sensor 1 or replace sensor 1
Sensor	Sensor 2 redundancy, short circuit	Maintenance required	Rectify short circuit at sensor 2 or replace sensor 2
Sensor	Sensor 2 redundancy, wire break	Maintenance required	Rectify break at sensor 2 or replace sensor 2

Important

If the remedial measures listed for the diagnostic information do not improve the status of the device, please consult ABB Service.

8.4 Acquisition of operating values

8.4.1 Monitoring of operating values

The transmitter saves the highest and lowest values for the electronic unit temperature as well as readings from sensor 1 and sensor 2 in the non-volatile memory ("Drag Indicator").

Supply voltage	Current supply voltage measured at the terminals of the transmitter in volts (± 5 %)
Max. elec. temp.	Highest detected internal temperature in °C that the transmitter was subjected to. This value cannot be reset.
Min. elec. temp.	Lowest detected internal temperature in °C that the transmitter was subjected to. This value cannot be reset.
Max. reading for sensors 1, 2	Highest reading at sensor 1 or 2. When changing the sensor type (e.g., Pt100 to thermocouple type K), the value is reset automatically.
Min. reading for sensors 1, 2	Lowest reading at sensor 1 or 2. When changing the sensor type, the value is reset automatically.
Reset	The drag indicators for the sensor readings are all reset to the current reading in each case.

8.4.2 Operating hours statistics

Operating hours	Total hours since commissioning that the supply voltage has been switched on for the transmitter
Operating hours according to electronic unit temperature	The operating hours are categorized according to the measured internal temperature of the transmitter. Due to rounding and frequently switching the device on and off, the total of the individual values may differ slightly from the value displayed by the counter for operating hours. Values in the fields on the far left and right indicate operation of the transmitter outside the specified range. In this event, acknowledged properties of the transmitter might be limited, in particular, with respect to accuracy and service life.

8.5 Factory settings

8.5.1 Firmware settings

The transmitter is configured at the factory. The table below contains the relevant parameter values.

Menu	Description	Parameter	Factory setting
Device Config	Write protection	-	No
	Input sensor 1	Sensortype	Pt100 (IEC 751)
		R-Connection	3-wire
		Measured Range Begin 1)	0
		Measured Range End 1)	100
		Unit	°C
		Damping	Off
Process Alarm		Fault signaling 1)	Overdrive 22 mA 1)
	Input sensor 2	Sensortype	Off
	Input / output assignment	Measurement type	Sensor 1
	TAG	-	-
	HART descriptor 1)	-	TIXXX-1)
Display	Main Operator View	-	Process Variable
	Bargraph Enable 1)	-	Yes, output % 1)
	Language	-	English
	Contrast	-	50 %
Communication	HART Burstmode 1)	Status 1)	Off 1)
	Bus address 2) 3)	-	126 2) 30 3)
	Simulation mode 3)	-	Off 3)

1) Only applies to HART transmitters
2) Only applies to PROFIBUS PA transmitters
3) Only applies to FOUNDATION Fieldbus H1 transmitters

8.5.2 Hardware settings

PROFIBUS PA and FOUNDATION Fieldbus H1 transmitters have two switches on their upper side, next to the LC display interface.

Switch 1 activates write protection for PROFIBUS PA and FOUNDATION Fieldbus transmitters. In the future, this option will also become available for HART transmitters.

Switch 2 supports the FOUNDATION Fieldbus request for a hardware release for ITK simulation.

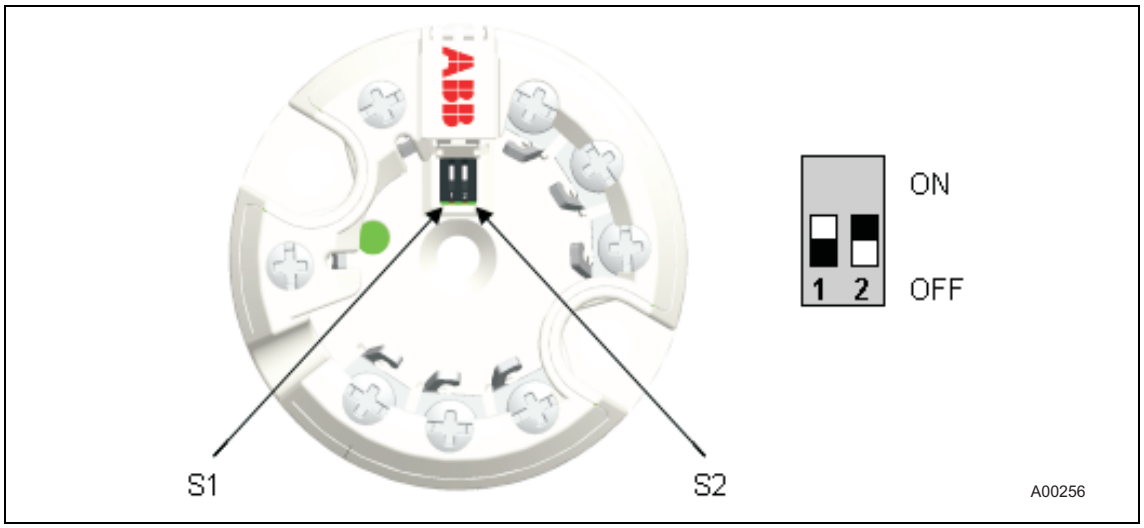


Fig. 24

Switches S1 and S1 can be accessed via hinged cover.

Switch 1 (S1)

Local write protection ("Hardware")

Setting	Function
Off	Local write access enabled
On	Local write access disabled

Switch 2 (S2)

Simulation release

Setting	Function
Off	Simulation blocked
On	Simulation enabled

Important

- Factory setting: Both switches "Off" (device not write-protected and simulation blocked)
- With PROFIBUS PA devices, switch 2 must always be in the "Off" position.

9 Maintenance / Repair

9.1 General information

For transmitters that are used as intended under normal operation, no maintenance is required.
No on-site repair or replacement of electronic parts is planned.

Warning! Risk of explosion!
Faulty transmitters may not be placed into operation by the user.
Repairs must be performed in the production plant.

9.2 Cleaning

When cleaning the exterior of meters, make sure that the cleaning agent used does not corrode the housing surface and the gaskets.

10 Specifications

10.1 Input

10.1.1 Resistance thermometers / Resistors

Resistance thermometers
Pt100 in accordance with IEC 60751, JIS C1604-81, MIL-T-24388,
Ni in accordance with DIN 43760, Cu

Resistance measurement
0 … 500 Ω
0 … 5000 Ω

Sensor connection type
Two-, three-, four-wire circuit

Connecting cable
Maximum sensor line resistance (R_W) for each line 50 Ω according to NE 89 (January 2009)
Three-wire circuit:
symmetrical sensor line resistances
Two-wire circuit:
compensation up to 100 Ω total line resistance

Measurement current
< 300 µA

Sensor short circuit
< 5 Ω (for resistance thermometer)

Sensor wire break

Measuring range: 0 ... 500 Ω	> 0.6 ... 10 kΩ
Measuring range: 0 ... 5 kΩ	> 5.3 ... 10 kΩ

Corrosion detection in accordance with NE 89

Three-wire resistance measurement	> 50 Ω
Four-wire resistance measurement	> 50 Ω

Sensor error signaling

Resistance thermometers:	Short circuit and wire break
Linear resistance measurement:	Wire break

10.1.2 Thermocouples / Voltages

Types
B, E, J, K, N, R, S, T in accordance with IEC 60584
U, L in accordance with DIN 43710
C, D in accordance with ASTM E-988

Voltages
-125 ... 125 mV
-125 ... 1,100 mV

Connecting cable
Maximum sensor line resistance (R_W) for each line: 1.5 kΩ, total: 3 kΩ

Sensor wire-break monitoring in accordance with NE 89
Pulsed with 1 µA outside measurement interval

Thermocouple measurement	5.3 ... 10 kΩ
Voltage measurement	5.3 ... 10 kΩ

Input resistance
> 10 MΩ

Internal reference point
Pt1000, IEC 60751 Cl. B
(no additional jumpers necessary)

Sensor error signaling

Thermocouple:	Wire break
Linear voltage measurement:	Wire break

10.1.3 Functionality

Freestyle characteristics and 32-point sampling table
Resistance measurement up to maximum 5 kΩ
Voltages up to maximum 1.1 V

Sensor error adjustment
Via Callendar van Dusen coefficients
Via table of 32 sampling points
Via single-point adjustment (offset adjustment)
Via two-point adjustment

Input functionality
1 sensor
2 sensors:
mean measurement,
differential measurement,
sensor redundancy,
sensor drift monitoring

10.2 Output

10.2.1 HART output

Transmission characteristics
Temperature linear
Resistance linear
Voltage linear

Output signal
Configurable 4 ... 20 mA (standard)
Configurable 20 ... 4 mA
(dynamic range: 3.8 ... 20.5 mA in accordance with NE 43)

Simulation mode
3.5 ... 23.6 mA

Induced current consumption
< 3.5 mA

Maximum output current
23.6 mA

Configurable error current signal
Override 22 mA (20.0 … 23.6 mA)
Underdrive 3.6 mA (3.5 … 4.0 mA)

10.2.2 PROFIBUS PA output

Output signal
PROFIBUS – MBP (IEC 61158-2)
baud rate 31.25 kbit/s
PA profile 3.01
FISCO-compliant in accordance with IEC 60079-27
IDENT_ NUMBER: 0x3470 [0x9700]

Error current signal
FDE (Fault Disconnection Electronic)

Block structure
Physical block
transducer block 1 – temperature
transducer block 2 – HMI (LCD)
transducer block 3 – extended diagnostics
analog input 1 – primary value (calculated value*)
analog input 2 – SECONDARY VALUE_1 (sensor 1)
analog input 3 – SECONDARY VALUE_2 (sensor 2)
analog input 4 – SECONDARY VALUE_3 (reference point temp.)
analog output – optional HMI display (transducer block 2)
discrete input 1 – extended diagnostics 1 (transducer block 3)
discrete input 2 – extended diagnostics 2 (transducer block 3)
* Sensor1, sensor2, or difference, or mean

10.2.3 FOUNDATION Fieldbus output

Output signal
FOUNDATION Fieldbus H1 in accordance with IEC 611582
Baud rate 31.25 kbit/s, ITK 5.1
FISCO-compliant in accordance with IEC 60079-27
Device ID: 0003200125

Error current signal
FDE (Fault Disconnection Electronic)

Block structure [1)]
Resource block
Transducer block 1 – temperature
Transducer block 2 – HMI (LCD)
Transducer block 3 – extended diagnostics
Analog input 1 – PRIMARY_VALUE_1 (sensor 1)
Analog input 2 – PRIMARY_VALUE_2 (sensor 2)
Analog input 3 – PRIMARY_VALUE_3 (calculated value*)
Analog input 4 – SECONDARY_VALUE (reference point temp.)
Analog output – optional HMI display (transducer block 2)
Discrete input 1 – extended diagnostics 1 (transducer block 3)
Discrete input 2 – extended diagnostics 2 (transducer block 3)
PID – PID controller
* Sensor1, sensor2, or difference, or mean

LAS (Link Active Scheduler) link master functionality

1) For the block description, block index, execution times, and block class, refer to the interface description.

10.3 Power supply (polarity safe)

Two-wire technology; power lines = signal lines

10.3.1 HART power supply

Supply voltage
Non ignition-proof application with or without LCD:
U_S = 11 ... 42 V DC
Ignition-proof applications with or without LCD:
U_S = 11 ... 30 V DC

Max. permissible residual ripple for supply voltage
During communication in accordance with HART FSK "Physical Layer" specification, version 8.1 (August 1999) Section 8.1

Undervoltage detection
$U_{Terminal-Mu}$ < 10 V results in I_a = 3.6 mA

Maximum load
R_{Load} = (supply voltage – 11 V) / 0.022 A

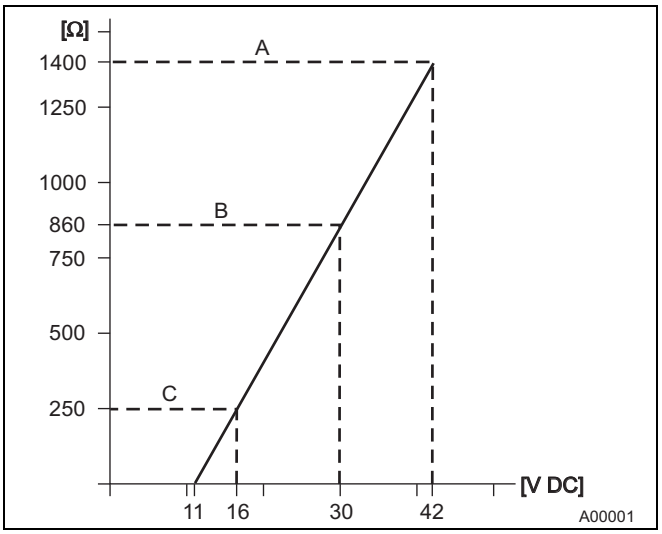


Fig. 25: Max. load depending on supply voltage
A TTH300
B TTH300 In ia hazardous area design
C HART communication resistor

Maximum power consumption
P = U_S x 0.022 A
e.g., U_S = 24 V → P_{max} = 0.528 W

10.3.2 PROFIBUS / FOUNDATION Fieldbus power supply

Supply voltage
Non ignition-proof application with or without LCD:
U_S = 9 ... 32 V DC
Ignition-proof applications with or without LCD:
U_S = 9 ... 17.5 V DC (FISCO)
U_S = 9 ... 24 V DC (Fieldbus Entity model I.S.)
Current consumption ≤ 12 mA

11 Ex relevant specifications

11.1 TTH300-E1X, intrinsic safety ATEX

Explosion protection

The TTH300 complies with the requirements of the ATEX Directive 94/9/EC
Approved for use in Zone 0, 1, and 2

Designation

II 1G Ex ia IIC T6 (Zone 0)
II 2(1)G Ex [ia] ib IIC T6 (Zone 1 [0])
II 2G(1D) Ex [iaD] ib IIC T6 (Zone 1 [20])

TTH300-E1H:
EC type-examination test certificate PTB 05 ATEX 2017 X
TTH300-E1P/E1F:
EC type-examination test certificate PTB 09 ATEX 2016 X

11.2 TTH300-H1X, intrinsic safety IECEx

Designation

Ex ia IIC T6
Ex [ia] ib IIC T6
Ex [iaD] ib IIC T6

TTH300-H1H:
IECEx certificate of conformity IECEx PTB 09.0014X
TTH300- H1P/H1F:
IECEx certificate of conformity

11.3 Safety specifications for Intrinsic Safety ATEX / IECEx

Temperature table

Temperature class	Permissible ambient temperature range	
	Device category 1 use	Device category 2 use
T6	-50 … 44 °C (-58 ... 111.2 °F)	-50 … 56 °C (-58 ... 132.8 °F)
T5	-50 … 56 °C (-58 ... 132.8 °F)	-50 … 71 °C (-58 ... 159.8 °F)
T4, T3, T2, T1	-50 … 60 °C (-58 ... 140.0 °F)	-50 … 85 °C (-58 ... 185.0 °F)

Type of protection intrinsic safety Ex ia IIC (Part 1)

	TTH300-E1H TTH300-H1H Supply circuit	TTH300-E1P/-H1P TTH300-E1F/-H1F Supply circuit 1)	
		FISCO	ENTITY
Max. voltage	U_i = 30 V	$U_i \leq$ 17.5 V	$U_i \leq$ 24.0 V
Short circuit current	I_i = 130 mA	$I_i \leq$ 183 mA 2)	$I_i \leq$ 250 mA
Max. power	P_i = 0.8 W	$P_i \leq$ 2.56 W 2)	$P_i \leq$ 1.2 W
Internal inductance	L_i = 0.5 mH	$L_i \leq$ 10 µH	$L_i \leq$ 10 µH
Internal capacitance	C_i = 5 nF	$C_i \leq$ 5 nF	$C_i \leq$ 5 nF

1) FISCO in accordance with 60079-27
2) II B FISCO: $I_i \leq$ 380 mA, $P_i \leq$ 5.32 W

Type of protection intrinsic safety Ex ia IIC (Part 2)

	Measurement current circuit: resistance thermometers, resistors	Measurement current circuit: thermocouples, voltages
Max. voltage	U_o = 6.5 V	U_O = 1.2 V
Short circuit current	I_o = 25 mA	I_O = 50 mA
Max. power	P_o = 38 mW	P_O = 60 mW
Internal inductance	L_i = 0 mH	L_i = 0 mH
Internal capacitance	C_i = 49 nF	C_i = 49 nF
Maximum permissible external inductance	L_o = 5 mH	L_O = 5 mH
Maximum permissible external capacitance	C_o = 1.55 µF	C_O = 1.05 µF

Type of protection intrinsic safety Ex ia IIC (Part 3)

	LCD interface
Max. voltage	U_o = 6.2 V
Short circuit current	I_o = 65.2 mA
Max. power	P_o = 101 mW
Internal inductance	L_i = 0 mH
Internal capacitance	C_i = 0 nF
Maximum permissible external inductance	L_o = 5 mH
Maximum permissible external capacitance	C_o = 1.4 µF

11.4 TTH300-E2X, non-sparking ATEX

Explosion protection

The TTH300 complies with the requirements of
ATEX Directive 94/9/EC
Approved for use in Zone 2

Designation

II 3 G Ex nA II T6

ABB manufacturer's declaration in accordance with ATEX Directive

Temperature table

Temperature class	Device category 3 use
T6	-50 … 56 °C (-58 ... 132.8 °F)
T5	-50 … 71 °C (-58 ... 159.8 °F)
T4	-50 … 85 °C (-58 ... 185.0 °F)

11.5 TTH300-L1X, intrinsically safe FM

Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, AEx ia IIC T6
TTH300-L1H: control drawing: SAP_214829
TTH300-L1P: control drawing: TTH300-L1P (IS)
TTH300-L1F: control drawing: TTH300-L1F (IS)

11.6 TTH300-L2X, non-incendive FM

Class I, Div. 2, Groups A, B, C, D
TTH300-L2H:
Control drawing: 214830 (non-incendive)
Control drawing: 214831 (non-incendive)
TTH300-L2P:
Control drawing: TTH300-L2P (NI_PS), TTH300-L2P (NI_AA)
TTH300-L2F:
Control drawing: TTH300-L2F (NI_PS), TTH300-L2F (NI_AA)

11.7 TTH300-R1X, intrinsically safe CSA

Class I, Div. 1 + 2, Groups A, B, C, D
Class I, Zone 0, Ex ia Group IIC T6
TTH300-R1H: control drawing: 214826
TTH300-R1P: control drawing: TTH300-R1P (IS)
TTH300-R1F: control drawing: TTH300-R2F (IS)

11.8 TTH300-R2X, non-incendive CSA

Class I, Div. 2, Groups A, B, C, D
TTH300-R2H:
Control drawing: SAP_214824 (non-incendive)
Control drawing: SAP_214896 (non-incendive)
TTH300-R2P:
Control drawing: TTH300-R2P (NI_PS), TTH300-R2P (NI_AA)
TTH300-R2F:
Control drawing: TTH300-R2F (NI_PS), TTH300-R2F (NI_AA)

12 Type A and type AS LCD indicator

The type A LCD can be used to carry out configuration functions, while the type AS LCD only has a display function. Both LCDs can only be ordered in conjunction with temperature sensors.

CE Marking

The type A and type AS LCD meets all requirements as regards the CE Marking in accordance with IEC 61326 (2006).

12.1 Features

Transmitter-controlled graphic (alphanumeric) LCD

Character height, mode-dependent
Sign, 4 digits, 2 decimal places
Bar graph display
Rotatable in 12 increments of 30°

Display options

Sensor 1 process data
Sensor 2 process data
Electronics/ambient temperature
Output value
Output %

Display diagnostic information related to transmitter and sensor status

12.2 Specifications

Temperature range

-20 … 70 °C (-4 … 158 °F)
Restricted display function (contrast, reaction time) in the temperature ranges:
-50 … -20 °C (-58 … -4 °F) [1)]
or
70 … 85 °C (158 … 185 °F)

Humidity

0 … 100 %, condensation permitted

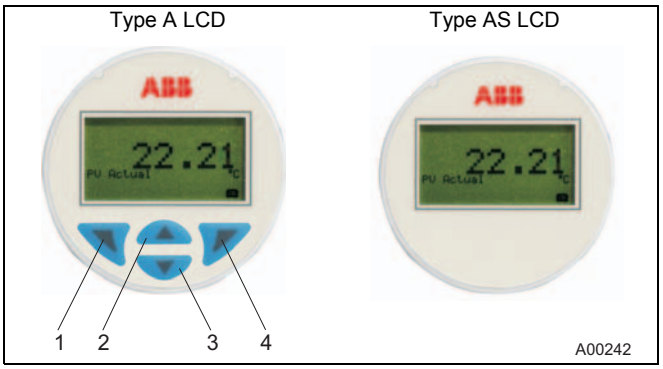


Fig. 26

1 Exit / Cancel
2 Scroll back
3 Scroll forward
4 Select

1) Additional mechanical protection is required for this range

12.3 Type A LCD configuration function

Sensor configuration for standard sensors
Measuring range
Behavior in the event of a fault (HART)
Software write protection for configuration data
Device address for HART and PROFIBUS PA

12.4 Ex relevant specifications

12.4.1 Intrinsic Safety ATEX

Explosion protection

Approved for use in Zone 0.

Designation

II 1G Ex ia IIC T6

EC type-examination certificate PTB 05 ATEX 2079 X

12.4.2 Intrinsic Safety IECEx

Explosion protection

Approved for use in Zone 0.

Designation

Ex ia IIC T6

For further information, see certificate

12.4.3 Safety specifications for Intrinsic Safety ATEX / IECEx

Temperature table

Temperature class	Permissible ambient temperature range	
	Device category 1 use	Device category 2 use
T6	-40 … 44 °C (-40 … 111.2 °F)	-40 … 56 °C (-40 … 132.8 °F)
T5	-40 … 56 °C (-40 … 132.8 °F)	-40 … 71 °C (-40 … 159.8 °F)
T4	-40 … 60 °C (-40 … 140 °F)	-40 … 85 °C (-40 … 185 °F)

Protection type intrinsic safety Ex ia IIC

	Supply circuit
Max. voltage	U_i = 9 V
Short circuit current	I_i = 65.2 mA
Max. power	P_i = 101 W
Internal inductance	L_i = 0 mH
Internal capacitance	C_i = 0.4 nF

12.4.4 Intrinsically Safe FM

I.S. Class I Div 1 and Div 2, Group: A, B, C, D or
I.S. Class I Zone 0 AEx ia IIC T*
Temp. Ident: T6 T_{amb} 56 °C, T4 T_{amb} 85 °C
U_i / V_{max} = 9V, I_i / I_{max} < 65.2 mA, P_i = 101 mW
C_i = 0.4 µF; L_i = 0
Control Drawing: SAP_214 748

12.4.5 Non-Incendive FM

N.I. Class I Div 2, Group: A, B, C, D or
Ex nL IIC T*, Class I Zone 2
Temp. Ident: T6 T_{amb} 60 °C, T4 T_{amb} 85 °C
U_i / V_{max} = 9V, I_i / I_{max} < 65.2 mA, P_i = 101 mW
C_i = 0.4 µF; L_i = 0
Control Drawing: SAP_214 751

12.4.6 Intrinsically Safe CSA

I.S. Class I Div 1 and Div 2; Group: A, B, C, D or
I.S Zone 0 Ex ia IIC T*
*Temp. Ident T6 T_{amb} 56 C, T4 T_{amb} 85 °C
U_i / V_{max} = 9V, I_i / I_{max} < 65,2 mA; P_i = 101 mW
C_i < 0,4 F_{μ}, L_i = 0
Control Drawing: SAP_214 749

12.4.7 Non-Incendive CSA

N.I. Class I Div 2, Group: A, B, C, D or
Ex nL IIC T*, Class I Zone 2
*Temp. Ident T6, T_{amb} 60 °C, T4 T_{amb} 85 °C
U_i / V_{max} = 9V, I_i / I_{max} < 65.2 mA, P_i = 101 mW
C_i < 0.4 µF, L_i = 0
Control Drawing: SAP_214 750

13 Appendix

13.1 Additional documents

- Commissioning Instruction (CI/TTH300)
- Data Sheet (DS/TTH300)

13.2 Approvals and certifications

CE mark	CE	The version of the meter in your possession meets the requirements of the following European directives: - EMC directive 2004/108/EC - ATEX directive 94/9/EC
Explosion Protection	Ex IECEx FM APPROVED CSA	Identification for intended use in potentially explosive atmospheres according to: - ATEX directive (marking in addition to CE marking) - IEC standards - FM Approvals (US) - CSA International (Canada)

Important

All documentation, declarations of conformity, and certificates are available in ABB's download area.

www.abb.com/temperature

EG-Konformitätserklärung
EC-Certificate of Compliance

ABB Automation Products GmbH
Borsigstr. 2
D-63755 Alzenau
Germany

Erklärt, dass die Produkte der Geräteart: ***Declare that the products of device type:***	**Temperatur Messumformer** **Temperature Transmitter**
Modell- / Typebezeichnung: ***Model- / type name:***	**TTH300**
Produktnummer: ***Product number:***	**TTH300-.H (HART)** **TTH300-.P (Profibus PA)** **TTH300-.F (Fieldbus Foundation)**
Konform zu EG-Richtlinien: ***Conform to EC-directives:***	**94/9/EG (ATEX)** **2004/108/EG (EMV/EMC)**
EG-Baumusterprüfbescheinigung: ***EC-Type examination certificate:***	**PTB 05 ATEX 2017 X** **PTB 09 ATEX 2016 X**
Relevante Normen: ***Related Standards:***	**EN 61326-1:2006** **EN 60079-0:2006** **EN 60079-11:2007** **EN 60079-26:2006**
Qualitätssicherung Produktion Anerkennung: ***Production Quality notification:***	**PTB 99 ATEX –Q004-...**

entspricht.
complies.

Alzenau, 29 January 2010

i.V.

i.V. Reiner Laurinat
Leiter Qualitätsmanagement
Quality Manager

i.A.

i.A. Harald Müller
Leiter Hardwareentwicklung
R&D Manager Hardware

ABB Automation Products GmbH

Statement on the contamination of devices and components

Repair and/or maintenance work will only be performed on devices and components if a statement form has been completed and submitted.

Otherwise, the device/component returned may be rejected. This statement form may only be completed and signed by authorized specialist personnel employed by the operator.

Customer details:

Company:	
Address:	
Contact person:	Telephone:
Fax:	E-mail:

Device details:

Type:	Serial no.:
Reason for the return/description of the defect:	

Was this device used in conjunction with substances which pose a threat or risk to health?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items)?

Biological	☐	Corrosive/irritating	☐	Combustible (highly/extremely combustible)	☐
Toxic	☐	Explosive	☐	Other toxic substances	☐
Radioactive	☐				

Which substances have come into contact with the device?

1.
2.
3.

We hereby state that the devices/components shipped have been cleaned and are free from any dangerous or poisonous substances.

Town/city, date	Signature and company stamp

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ABB has Sales & Customer Support expertise in over 100 countries worldwide.

www.abb.com/temperature

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

Printed in the Fed. Rep. of Germany (02.2010)

3KXT231001R4201

OI/TTH300-EN Rev. B

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