ABB MEASUREMENT & ANALYTICS | OPERATING INSTRUCTION | OI/TTH200-EN REV. D

TTH200

Head-mount temperature transmitter

Temperature transmitter for HART protocol.
Suitable for all standard requirements

Measurement made easy

TTH200

Introduction

The TTH200 with the 4 to 20 mA output and HART communications protocol has global approvals for explosion protection up to Zone 0. Safety-relevant applications up to SIL 3 (redundant) are supported in accordance with IEC 61508.
The TTH200 implements various NAMUR recommendations, including NE 89 and NE 107.
The TTH200 features a universal sensor input for resistance thermometer, thermocouples, resistance and voltage measurement.

Additional Information

Additional documentation on TTH200 is available for download free of charge at www.abb.com/temperature.
Alternatively simply scan this code:

Table of contents

1 Safety

General information and instructions

These instructions are an important part of the product and must be retained for future reference.
Installation, commissioning, and maintenance of the product may only be performed by trained specialist personnel who have been authorized by the plant operator accordingly. The specialist personnel must have read and understood the manual and must comply with its instructions.
For additional information or if specific problems occur that are not discussed in these instructions, contact the manufacturer.
The content of these instructions is neither part of nor an amendment to any previous or existing agreement, promise or legal relationship.
Modifications and repairs to the product may only be performed if expressly permitted by these instructions.
Information and symbols on the product must be observed. These may not be removed and must be fully legible at all times.
The operating company must strictly observe the applicable national regulations relating to the installation, function testing, repair and maintenance of electrical products.

Warnings

The warnings in these instructions are structured as follows:

⚠ DANGER

The signal word '**DANGER**' indicates an imminent danger. Failure to observe this information will result in death or severe injury.

⚠ WARNING

The signal word '**WARNING**' indicates an imminent danger. Failure to observe this information may result in death or severe injury.

⚠ CAUTION

The signal word '**CAUTION**' indicates an imminent danger. Failure to observe this information may result in minor or moderate injury.

NOTICE

The signal word '***NOTICE***' indicates possible material damage.

Note
'**Note**' indicates useful or important information about the product.

Intended use

This device is intended for the following uses:

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

The device has been designed for use exclusively within the technical limit values indicated on the name plate and in the data sheets.

- The maximum ambient temperature must not be exceeded.
- The IP rating of the housing must be observed during operation.
- For use in potentially explosive atmospheres, follow the associated guidelines.
- When using as a SIL-device in safety-relevant applications, the SIL Safety Manual should be observed.

Improper use

The following are considered to be instances of especially improper use of the device:

- Material application, for example by painting over the housing, name plate or welding/soldering on parts.
- Material removal, for example by spot drilling the housing.

Warranty provisions

Using the device in a manner that does not fall within the scope of its intended use, disregarding this manual, 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.

Notes on data safety

This product is designed to be connected to and to communicate information and data via a network interface.
It is operator's sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be).
Operator shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and / or theft of data or information.
ABB Automation Products GmbH and its affiliates are not liable for damages and / or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and / or theft of data or information.

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Email: automation.service@de.abb.com

2 Use in potentially explosive atmospheres in accordance with ATEX and IECEx

Note

- Further information on the approval of devices for use in potentially explosive atmospheres can be found in the explosion protection test certificates (at www.abb.com/temperature).
- Depending on the design, a specific marking in accordance with ATEX or IECEx applies.

Ex marking

Transmitter

ATEX intrinsic safety

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 0, 1 and 2.

Model TTH200-E1	
To HW-Rev. 1.15:	
Type Examination Test Certificate	PTB 05 ATEX 2017 X
From HW Rev. 02.00.00:	
Type Examination Test Certificate	PTB 20 ATEX 2008 X
II 1 G	Ex ia IIC T6...T1 Ga
II 2 (1) G	Ex [ia IIC Ga] ib IIC T6...T1 Gb
II 2 G (1D)	Ex [ia IIIC Da] ib IIC T6...T1 Gb

ATEX non-sparking and increased safety

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 2.

Model TTH200-E2
Declaration of conformity
II 3 G Ex nA IIC T6...T1 Gc
II 3 G Ex ec IIC T6...T1 Gc

IECEx intrinsic safety

Approved for use in Zone 0, 1, and 2.

Model TTH200-H1	
To HW-Rev. 1.15:	
IECEx certificate of conformity	IECEx PTB 09.0014X
From HW Rev. 02.00.00:	
IECEx certificate of conformity	IECEx PTB 20.0035X
Ex ia IIC T6...T1 Ga	
Ex [ia IIC Ga] ib IIC T6...T1 Gb	
Ex [ia IIIC Da] ib IIC T6...T1 Gb	

LCD indicator

ATEX intrinsic safety

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 0, 1 and 2.

Type Examination Test Certificate	PTB 05 ATEX 2079 X
II 1G Ex ia IIC T6…T1 Ga	

ATEX non-sparking and increased safety

The device fulfills the requirements of Directive 2014/34/EU in case of corresponding purchase orders and is approved for use in Zone 2.

Declaration of conformity
II 3 G Ex nA IIC T6...T1 Gc
II 3 G Ex ec IIC T6...T1 Gc

IECEx intrinsic safety

Approved for use in Zone 0, 1, and 2.

IECEx certificate of conformity	IECEx PTB 12.0028X
Ex ia IIC T6…T1 Ga	

Temperature data

Transmitter

ATEX / IECEx intrinsic safety, ATEX non-sparking and increased safety

Temperature class	Permissible ambient temperature range
T6	−40 to 56 °C (−40 to 132.8 °F)
T4-T1	−40 to 85 °C (−40 to 185.0 °F)

LCD indicator

ATEX / IECEx intrinsic safety, ATEX non-sparking and increased safety

Temperature class	Permissible ambient temperature range
T6	−40 to 56 °C (−40 to 132.8 °F)
T4-T1	-40 to 85 °C (-40 to 185 °F)

Electrical data

Transmitter

Intrinsic safety type of protection Ex ia IIC (part 1)

	Supply circuit
Max. voltage	U_i = 30 V
Short-circuit current	I_i = 130 mA
Max. power	P_i = 0.8 W
Internal inductance	L_i = 160 µH*
Internal capacitance	C_i = 0.57 nF**

* From HW-Rev. 1.12, previously L_i = 0.5 mH.

** From HW-Rev. 1.07, previously C_i = 5 nF.

Intrinsic safety type of protection Ex ia IIC (part 2)

	Measurement circuit: resistance thermometer, resistances	Measurement circuit: thermocouples, voltages
Max. voltage	U_o = 6.5 V	U_o = 1.2 V
Short-circuit current	I_o = 17.8 mA*	I_o = 50 mA
Max. power	P_o = 29 mW**	P_o = 60 mW
Internal inductance	L_i ≈ 0 mH (negligible)	L_i ≈ 0 mH (negligible)
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

* From HW-Rev. 1.12, previously I_o = 25 mA.

** From HW-Rev. 1.12, previously P_o = 38 mW.

*** HW-Rev. 1.12 to 1.15: C_i = 118 nF.

Intrinsic safety type of protection Ex ia IIC (part 3)

	LCD indicator 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 (negligible)
Internal capacitance	C_i ≈ 0 nF (negligible)
Maximum permissible external inductance	L_o = 5 mH
Maximum permissible external capacitance	C_o = 1.4 µF

LCD indicator

Intrinsic safety type of protection Ex ia IIC

Supply circuit	
Max. voltage	U_i = 9 V
Short-circuit current	I_i = 65.2 mA
Max. power	P_i = 101 mW
Internal inductance	L_i ≈ 0 mH (negligible)
Internal capacitance	C_i ≈ 0 nF (negligible)

Installation instructions

ATEX / IECEx

The installation, commissioning, maintenance and repair of devices in potentially explosive atmospheres must only be carried out by appropriately trained personnel. Works may be carried out only by persons, whose training has included instructions on different types of protection and installation techniques, concerned rules and regulations as well as general principles of zoning. The person must possess the appropriate competences for the type of work to be conducted.
When operating with combustible dusts, comply with EN 60079-31.
The safety instructions for electrical apparatus in potentially explosive areas must be in accordance with Directive 2014/34/EU (ATEX) and IEC 60079-14 (Installation of electrical equipment in potentially explosive areas).
Comply with the applicable regulations for the protection of employees to ensure safe operation.

IP protection rating of housing

The temperature transmitter and LCD indicator Type AS must be installed according to the ‘intrinsic safety’ IP rating such that an IP rating of at least IP 20 is achieved in accordance with IEC 60529.
Perform installation according to the ‘non-sparking’ (nA) IP rating or the ‘increased safety’ (ec) IP rating such that an IP rating of at least IP 54 is achieved in accordance with IEC 60529.

… 2 Use in potentially explosive atmospheres in accordance with ATEX and IECEx

… Installation instructions

Electrical connections

Grounding

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

Intrinsic safety installation check

If transmitters are operated in an intrinsically safe circuit, proof that the interconnection is intrinsically safe must be provided in accordance with IEC/EN 60079-14 as well as IEC/EN 60079-25. The supply isolators / DCS inputs must feature intrinsically safe input protection circuits in order to eliminate hazards (spark formation).
In order to provide proof of intrinsic safety, the electrical limit value 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 / DCS 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

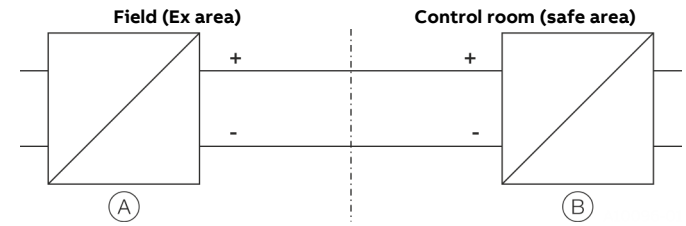


Figure 1: Intrinsic safety installation check

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. For this, pay attention to the country-specific guidelines and certificates!

Note

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

ATEX - Zone 0

Marking: II 1 G Ex ia IIC T6…T1 Ga

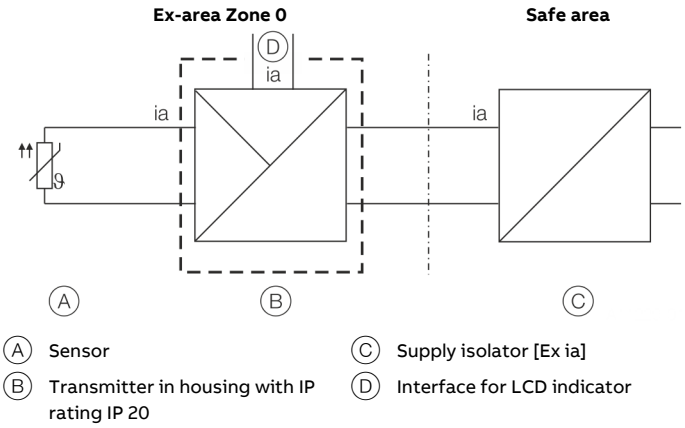


Figure 2: Hookup in ATEX - Zone 0

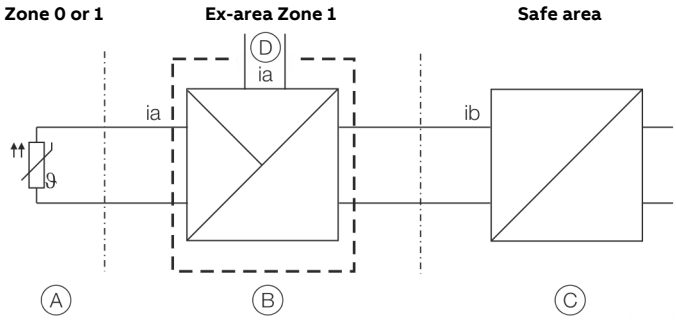
When using the transmitter in Zone 0, it must be installed in a suitable housing with IP -rating IP 20.
The input for the supply isolator must be designed with ‘Ex ia’ type of protection.
When using the transmitter in Zone 0, make sure that impermissible electrostatic charging of the transmitter is avoided (observe the warnings on the device).
As the user, it is your responsibility to ensure that the sensor instrumentation meets the requirements of applicable explosion protection standards.

Note

When operating the transmitter in Zone 0 (EPL ‘Ga’), the compatibility of the device materials with the surrounding atmosphere must be guaranteed.

Encapsulation material used for the transmitter:
Polyurethane (PUR), WEVO PU-417

ATEX - Zone 1 (0)
Marking: II 2 (1) G Ex [ia IIC Ga] ib IIC T6...T1 Gb



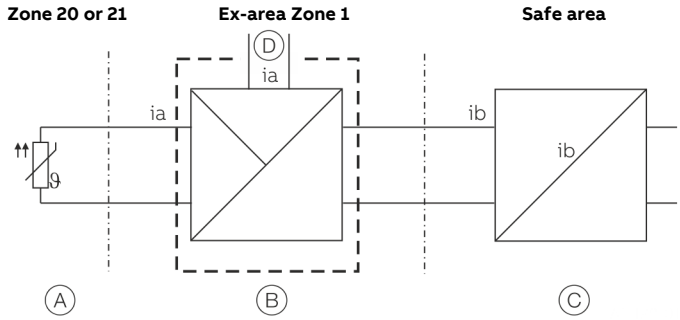
Ⓐ Sensor
Ⓑ Transmitter in housing with IP-rating IP 20
Ⓒ Supply isolator [Ex ib]
Ⓓ Interface for LCD indicator

Figure 3: Hookup in ATEX - Zone 1 (0)

When using the transmitter in Zone 1, it must be installed in a suited housing with IP-rating IP 20.
The input of the supply isolator must be designed with 'Ex ib' type of protection.
As the user, it is your responsibility to ensure that the sensor instrumentation meets the requirements of applicable explosion protection standards. The sensor can be installed in Zone 1 or Zone 0.

When using the transmitter in Zone 1, make sure that impermissible electrostatic charging of the temperature transmitter is avoided (observe the warnings on the device).

ATEX - Zone 1 (20)
Marking: II 2 G (1D) Ex [ia IIIC Da] ib IIC T6...T1 Gb



Ⓐ Sensor
Ⓑ Transmitter in housing with IP rating IP 20
Ⓒ Supply isolator [Ex ib]
Ⓓ Interface for LCD indicator

Figure 4: Hookup in ATEX - Zone 1 (20)

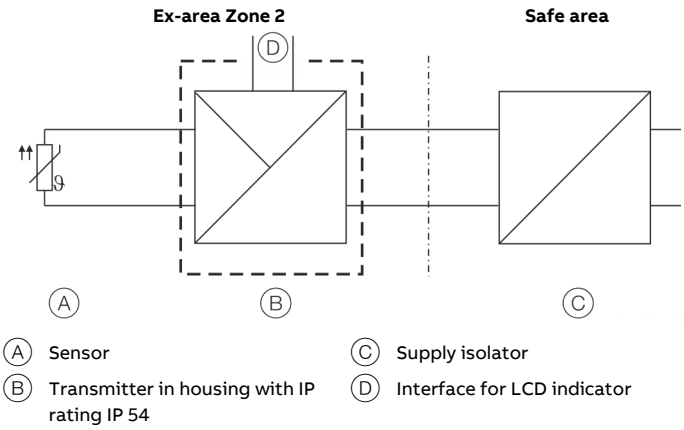
When using the transmitter in Zone 1, it must be installed in a suitable housing with IP -rating IP 20.
The input for the supply isolator must be designed with 'Ex ib' type of protection.
As the user, it is your responsibility to ensure that the sensor instrumentation meets the requirements of applicable explosion protection standards. The sensor can be installed in Zone 20 or Zone 21.

When using the transmitter in Zone 1, make sure that impermissible electrostatic charging of the temperature transmitter is avoided (observe the warnings on the device).

… 2 Use in potentially explosive atmospheres in accordance with ATEX and IECEx

… Installation instructions

ATEX - Zone 2
Marking:
II 3 G Ex nA IIC T6...T1 Gc
II 3 G Ex ec IIC T6...T1 Gc



A Sensor
B Transmitter in housing with IP rating IP 54
C Supply isolator
D Interface for LCD indicator

Figure 5: Hookup in ATEX - Zone 2

When using the transmitter in Zone 2, observe the following:

- The temperature transmitter must be installed in its own housing. This housing must at least meet IP rating IP 54 (in accordance with EN 60529) and other requirements for potentially explosive atmosphere (e.g. a certified housing). Suitable cable glands must be used for this purpose.
- External measures must be made for the power supply circuit in order to prevent the rated voltage from being up-scaled by more than 40 % in the event of transient disturbances.
- The electrical connections must only be opened or closed when there is no hazardous atmosphere.
- When using the transmitter in Zone 2, make sure that impermissible electrostatic charging of the temperature transmitter is prevented (observe the warnings on the device).

Commissioning

The commissioning and parameterization of the device may also be carried out in potentially explosive atmospheres using a handheld terminal that has been approved accordingly under consideration of an intrinsic safety installation check. Alternatively, an Ex modem can be connected to the circuit outside the potentially explosive atmosphere.

Operating instructions

Protection against electrostatic discharges
The plastic parts inside the device can store electrostatic charges.
Make sure that no electrostatic charges can accumulate when handling the device.

3 Use in potentially explosive atmospheres in accordance with FM and CSA

Note

- Further information on the approval of devices for use in potentially explosive atmospheres can be found in the explosion protection test certificates (at www.abb.com/temperature).
- Depending on the design, a specific marking in accordance with FM or CSA applies.

Ex marking

Transmitter

FM Intrinsically Safe

Model TTH200-L1	
To HW-Rev. 1.15:	
Control Drawing	TTH200-L1H (I.S.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 1 + 2, Groups A, B, C, D	
Class I, Zone 0, AEx ia IIC T6	

FM Non-Incendive

Model TTH200-L2	
To HW-Rev. 1.15:	
Control Drawing	TTH200-L2H (N.I.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 2, Groups A, B, C, D	

CSA Intrinsically Safe

Model TTH200-R1	
To HW-Rev. 1.15:	
Control Drawing	TTH200-R1H (I.S.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 1 + 2, Groups A, B, C, D	
Class I, Zone 0, Ex ia IIC T6	

CSA Non-Incendive

Model TTH200-R2	
To HW-Rev. 1.15:	TTH200-R2H (1) (N.I.)
Control Drawing	TTH200-R2H (2, no conduit) (N.I.)
As of HW-Rev 02.00.00:	
Control Drawing	See attached information
Class I, Div. 2, Groups A, B, C, D	

LCD indicator

FM Intrinsically Safe

Control Drawing	SAP_214 748
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*	
U_i / V_{max} = 9 V, I_i / I_{max} < 65.2 mA, P_i = 101 mW, C_i = 0.4 µF, L_i = 0	

FM Non-Incendive

Control Drawing	SAP_214 751
N.I. Class I Div 2, Group: A, B, C, D oder Ex nL IIC T**, Class I Zone 2	
U_i / V_{max} = 9 V, I_i / I_{max} < 65.2 mA, P_i = 101 mW, C_i = 0.4 µF, L_i = 0	

CSA Intrinsically Safe

Control Drawing	SAP_214 749
I.S. Class I Div 1 and Div 2; Group: A, B, C, D or	
I.S Zone 0 Ex ia IIC T*	
U_i / V_{max} = 9 V, I_i / I_{max} < 65.2 mA, P_i = 101 mW, C_i < 0.4 µF, L_i = 0	

CSA Non-Incendive

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

* Temp. Ident: T6 T_{amb} 56 °C, T4 T_{amb} 85 °C

** Temp. Ident: T6 T_{amb} 60 °C, T4 T_{amb} 85 °C

Installation instructions

FM / CSA

The installation, commissioning, maintenance and repair of devices in areas with explosion hazard must only be carried out by appropriately trained personnel.
The operator must strictly observe the applicable national regulations with regard to installation, function tests, repairs, and maintenance of electrical devices. (e. g. NEC, CEC).

IP protection rating of housing

The temperature transmitter and LCD display type AS must be installed such that the IP rating of at least IP20 is achieved in accordance with IEC 60529.

… 3 Use in potentially explosive atmospheres in accordance with FM and CSA

… Installation instructions

Electrical connections

Grounding

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

Intrinsic safety installation check

If transmitters are operated in an intrinsically safe circuit, proof that the interconnection is intrinsically safe must be provided in accordance with IEC/EN 60079-14 as well as IEC/EN 60079-25.
The supply isolators / DCS inputs must feature intrinsically safe input protection circuits in order to eliminate hazards (spark formation).
In order to provide proof of intrinsic safety, the electrical limit value 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 / DCS 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

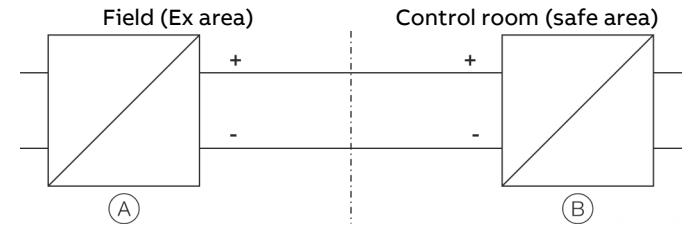


Figure 6: Intrinsic safety installation check

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. For this, pay attention to the country-specific guidelines and certificates!

Note

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

Commissioning

The commissioning and parameterization of the device may also be carried out in potentially explosive atmospheres using a handheld terminal that has been approved accordingly under consideration of an intrinsic safety installation check. Alternatively, an Ex modem can be connected to the circuit outside the potentially explosive atmosphere.

Operating instructions

Protection against electrostatic discharges

The plastic parts inside the device can store electrostatic charges.
Make sure that no electrostatic charges can accumulate when handling the device.

4 Design and function

General

Digital transmitters are communication-ready devices with microprocessor-controlled electronics. They conform to the requirements of IP rating IP 20 and are suited for integration into DIN A and DIN B sensor heads.
In the HART® transmitter, an FSK signal is superimposed on the 4 to 20 mA output signal in accordance with the HART standard to facilitate bidirectional communication.
The transmitters can be configured, polled, and tested using a DTM, an EDD or using the Field Information Manager (FIM). Handheld terminals can also be used for communication purposes.
As an option, the transmitter can be fitted with a type AS LCD display. The LCD display is used exclusively for visualizing current process values. The electrical connection between the LCD display and transmitter is provided by a 6-pin flat ribbon cable with a plug connector. The LCD display can only be operated when connected to transmitters that have an LCD display interface.

Note
The HMI type A LCD indicator with configuration function optionally used with the TTH300 is not compatible with the TTH200.

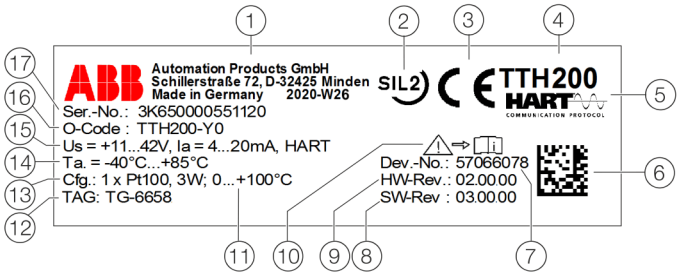
5 Product identification

Name plate

Note

Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).
They should be disposed of through separate collection of electric and electronic devices.

Note
The ambient temperature range (14) provided on the name plate refers only to the transmitter itself and not to the sensor element used in the measuring inset.



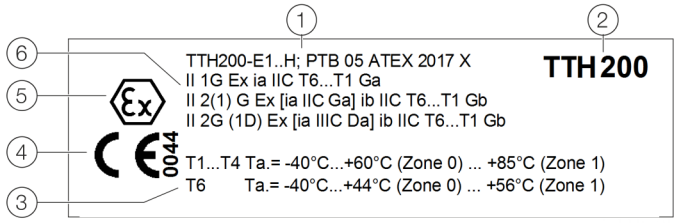
(1) Manufacturer, manufacturer address, manufacturing year - week
(2) Safety integrity level, SIL logo (optional with HART transmitter)
(3) CE mark (EU conformity), if not on additional plate
(4) Type designation / model
(5) Transmitter communications protocol (HART)
(6) 2D barcode for serial number in accordance with order
(7) Serial number of the device electronics (7 or 8 digits)
(8) Software revision
(9) Hardware version
(10) 'Follow product documentation' symbol
(11) Set measuring range of the transmitter
(12) Measuring point tag (TAG) in accordance with order (optional)
(13) Set sensor type and circuit type
(14) Ambient temperature range, on additional plate for Ex versions
(15) Transmitter specification (supply voltage range, output current range, communications protocol)
(16) Coding of the type of protection of the device (in accordance with ordering information)
(17) Serial number of the device (serial number in accordance with order)

Figure 7: Name plate (example)

… 5 Product identification

… Name plate

Devices with an explosion-proof design are marked with the following special data plate.



1. Type designation in accordance with approval
2. Type designation
3. Temperature class of the explosion-proof design
4. CE mark (EU conformity) and notified body for quality assurance
5. Ex marking
6. IP rating explosion-proof design

Figure 8: Additional plate for explosion-protected apparatus (example)

Note
The name plates displayed are examples. The device identification plates affixed to the device can differ from this representation.

6 Transport and storage

Inspection

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

Transporting the device

Observe the following instructions:

- Do not expose the device to humidity during transport. Pack the device accordingly.
- Pack the device so that it is protected against vibrations during transport, for example, by using air-cushioned packing.

Storing the device

Bear the following points in mind when storing devices:

- Store the device in its original packaging in a dry and dust-free location.
- Observe the permitted ambient conditions for transport and storage.
- Avoid storing the device in direct sunlight.
- In principle, the devices may be stored for an unlimited period. However, the warranty conditions stipulated in the order confirmation of the supplier apply.

Ambient conditions
The ambient conditions for the transport and storage of the device correspond to the ambient conditions for operation of the device.
Adhere to the device data sheet!

Returning devices

For the return of devices, follow the instructions in **Repair** on page 40.

7 Installation

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

Installation in the cover of the connection head

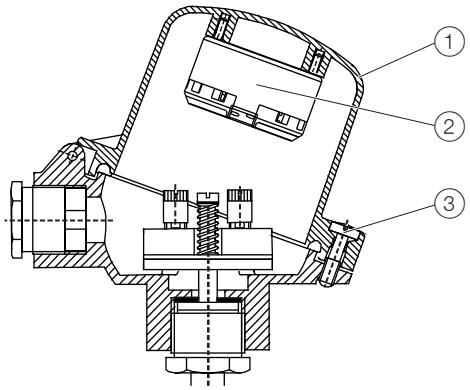


Figure 9: Installation example

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.

Installation on the measuring inset

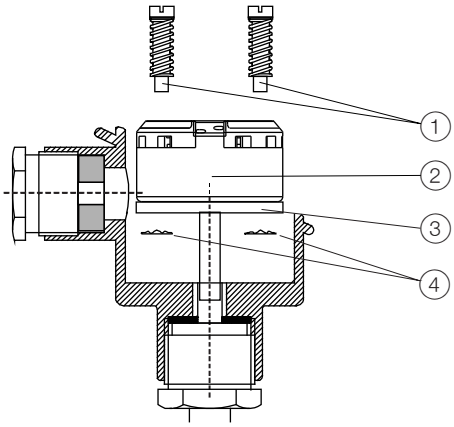


Figure 10: Installation example

Note

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 fixing screws, 2 springs, 2 toothed discs) order number: 263750

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 fixing screws (1) from above in the fixing 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.

Note

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

Installation on the top-hat rail

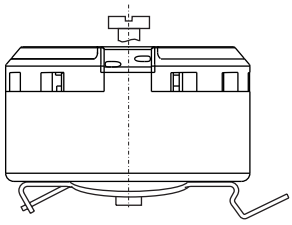


Figure 11: Installation example

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.

… 7 Installation

Installing / removing the optional LCD indicator

The transmitter can be optionally equipped with an LCD indicator.

NOTICE

Damage to the LCD indicator caused by incorrect installation / disassembly

The flat ribbon cable of the LCD indicator can become damaged due to incorrect installation / disassembly.

- Make sure the flat ribbon cable does not get twisted or torn when installing / disassembling or rotating the LCD indicator.

Disassembling the LCD indicator

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

Carefully remove the LCD indicator from the transmitter inset. The LCD indicator 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.

Installing the LCD indicator

No tools are required to install the LCD indicator.

1. Carefully insert the guide pins for the LCD indicator 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 LCD indicator in as far as it will go. Make sure that the guide pins and connection socket are fully inserted.

Rotating the LCD indicator

The position of the LCD indicator can be adjusted to suit the mounting 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 LCD indicator to the left to release it from its holder.
2. Carefully turn the LCD indicator until the required position is reached.
3. Insert the LCD indicator into its holder again and turn it to the right into the required position until it snaps into place.

8 Electrical connections

Safety instructions

⚠ DANGER

Improper installation and commissioning of the device carries a risk of explosion.

For use in potentially explosive atmospheres, observe the information in **Use in potentially explosive atmospheres in accordance with ATEX and IECEx** on page 6 and **Use in potentially explosive atmospheres in accordance with FM and CSA** on page 11!

Observe the following instructions:

- The electrical connection may only be established by authorized specialist personnel and in accordance with the connection diagrams.
- The relevant regulations must be observed during electric installation.
- The electrical connection information in the instruction must be observed; otherwise, the electric IP rating may be adversely affected.
- Safe isolation of electric circuits which are dangerous if touched is ensured only if the connected devices satisfy the requirements of DIN EN 61140 (VDE 0140 Part 1) (basic requirements for safe isolation).
- To ensure safe isolation, install connection leads separate from electric circuits which are dangerous if touched, or implement additional insulation measures.
- Connections must only be established in a dead-voltage state!
- The transmitter has no switch-off elements. Therefore, overcurrent protective devices, lightning protection, or voltage disconnection options must be provided with the installation.
- The power supply and signal are routed in the same conductor and should be implemented as a SELV or PELV circuit in accordance with the relevant standard (standard version). For the explosion-proof design, the guidelines in accordance with the Ex standard must be adhered to.
- You need to check that the available power supply corresponds to the information on the name plate.

Note

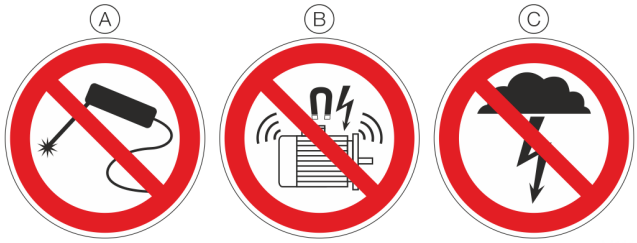
The signal cable wires must be provided with wire end sleeves. The slotted screws of the connection terminals are tightened with a size 1 screwdriver (3.5 or 4 mm).

Protection of the transmitter from damage caused by highly energetic electric interferences

The transmitter has no switch-off elements. Therefore, overcurrent protective devices, lightning protection, or voltage disconnection options must be provided at the plant.
For the shielding and grounding of the device and the connection cable, observe **Terminal assignment** on page 18.

NOTICE

Temperature transmitter damage!
Overvoltage, overcurrent and high-frequency interference signals on the supply connection as well as sensor connection side of the device can damage the temperature transmitter.



Ⓐ Do not weld
Ⓑ No high-frequency interference signals / switching operations of large consumers
Ⓒ No overvoltage due to lightning

Figure 12: Warning signs

Overcurrent and overvoltage can occur through for example welding operations, switching operations of large electric consumers, or lightning in the vicinity of the transmitter, sensor, as well as connector cables.
Temperature transmitters are sensitive devices on the sensor side as well. Long connector cables to the sensor can encourage damaging interference. This can already happen if temperature sensors are connected to the transmitter during installation, but are not yet integrated into the system (no connection to the supply isolator / DCS)!

Suited protective measures
The following items should be observed to protect the transmitter from sensor-side damage:

- In the vicinity of the transmitter, sensor and sensor connector cable in case of a connected sensor, high-energy overvoltage, overcurrent and high-frequency interference signals due to welding operations, lightning, circuit breakers or large consumers of electricity among others should be absolutely avoided.
- The connection cable of the sensor on the transmitter should be disconnected when performing welding work in the vicinity of the installed transmitter, sensor, as well as supply lines from the sensor to the transmitter.
- This correspondingly also applies to the supply side, if there is a connection there.

Conductor material

NOTICE

Danger of wire break!
The use of stiff cable material can lead to wire breaks in the cables.

- Only use cable material with stranded wires.

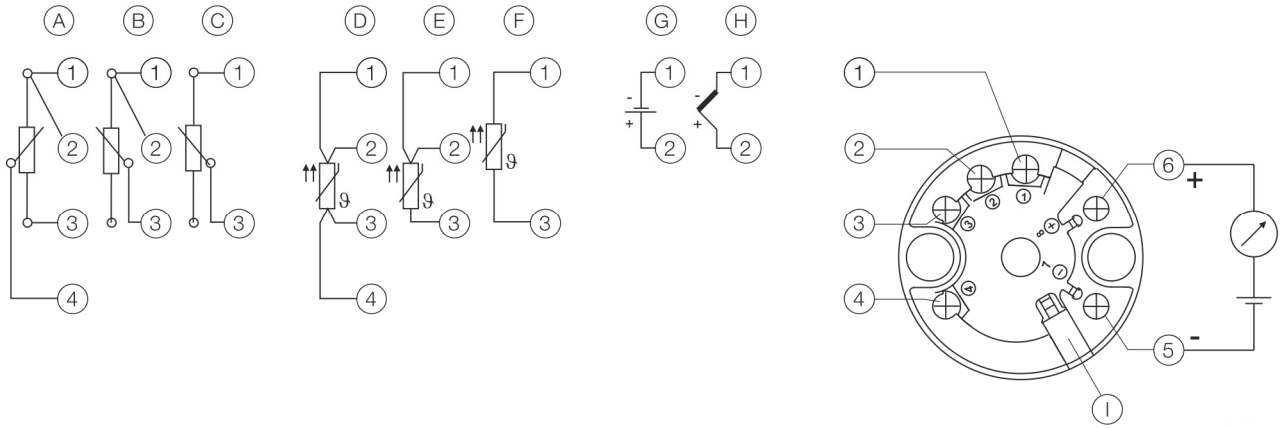
Supply voltage
Power supply cable:
Flexible standard cable material

Maximum wire cross section:
1.5 mm^2 (AWG 16)

Sensor connection
Depending on the type of sensor, a variety of cable materials can be used for connections.
The integrated internal reference junction makes it possible to directly connect thermal compensating cables.

… 8 Electrical connections

Terminal assignment



(A) Potentiometer, four-wire circuit
(B) Potentiometer, three-wire circuit
(C) Potentiometer, two-wire circuit
(D) RTD, four-wire circuit
(E) RTD, three-wire circuit
(F) RTD, two-wire circuit
(G) Voltage measurement
(H) Thermocouple
(I) Interface for type AS LCD indicator
(1) to (4) Sensor connection (of measuring inset)
(5) to (6) 4 to 20 mA HART

Figure 13: TTH200 connections

Electrical data for inputs and outputs

Input - resistance thermometer / resistances

Resistance thermometer
- Pt100 in accordance with IEC 60751, JIS C1604, MIL-T-24388
- Ni in accordance with DIN 43760
- Cu in accordance with recommendation OIML R 84

Resistance measurement
- 0 to 500 Ω
- 0 to 5000 Ω

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

Connection lead
- Maximum sensor line resistance per line 50 Ω in accordance with NE 89
- Three-wire circuit: Symmetrical sensor line resistances
- Two-wire circuit: Compensation up to 100 Ω total lead resistance

Measurement current
< 300 µA

Sensor short circuit
< 5 Ω (for resistance thermometer)

Sensor wire break
- Measuring range: 0 to 500 Ω > 0.6 to 10 kΩ
- Measuring range: 0 to 5 Ω > 5.3 to 10 kΩ

Detection of sensor wire break in accordance with NE 89 in all lines

Sensor error signaling
- Resistance thermometer: Sensor short circuit and sensor wire break
- Linear resistance measurement: Sensor wire break

Input - thermocouples / voltages

Types
- B, E, J, K, N, R, S, T in accordance with IEC 60584
- U, L in accordance with DIN 43710
- C in accordance with IEC 60584 / ASTM E988
- D in accordance with ASTM E988

Voltages
- −125 to 125 mV
- −125 to 1100 mV

Connection lead
- Maximum sensor line resistance: per line 1.5 kΩ, total 3 kΩ

Detection of sensor wire break in accordance with NE 89 in all lines

Input resistance
> 10 MΩ

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

Sensor error signaling
- Thermocouple: Sensor wire break
- Linear voltage measurement: Sensor wire break

… 8 Electrical connections

… Electrical data for inputs and outputs

Output – HART®

Note
The HART® protocol is an unsecured protocol, as such the intended application should be assessed to ensure that these protocols are suitable before implementation.

Transmission characteristics
- Temperature linear
- Resistance linear
- Voltage linear

Output signal
- Configurable 4 to 20 mA (standard)
- Configurable 20 to 4 mA
  (Dynamic range: 3.8 to 20.5 mA in accordance with NE 43)

Simulation mode
3.5 to 23.6 mA

Induced current consumption
< 3,5 mA

Maximum output current
23.6 mA

Configurable error current signal
Note
Regardless of the alarm setting (underrange or overrange), a high alarm or low alarm is always generated for some internal device errors (e.g. hardware errors). More detailed information can be found in the SIL Safety Manual.

Before SW-Rev. 3.00
Note
The default factory setting for the error current signal is high alarm 22 mA.

- Overrange / high alarm 22 mA (20.0 to 23.6 mA)
- Underrange / low alarm 3.6 mA (3.5 to 4.0 mA)

From SW-Rev. 3.00
Note
The default factory setting for the error current signal is low alarm 3.5 mA, in accordance with NAMUR recommendations NE 93, NE 107 and NE 131.

- Overrange / high alarm 22 mA (20.0 to 23.6 mA)
- Underrange / low alarm 3.5 mA (3.5 to 4.0 mA)

Power supply

Two-wire technology, polarity safe; power supply lines = signal lines

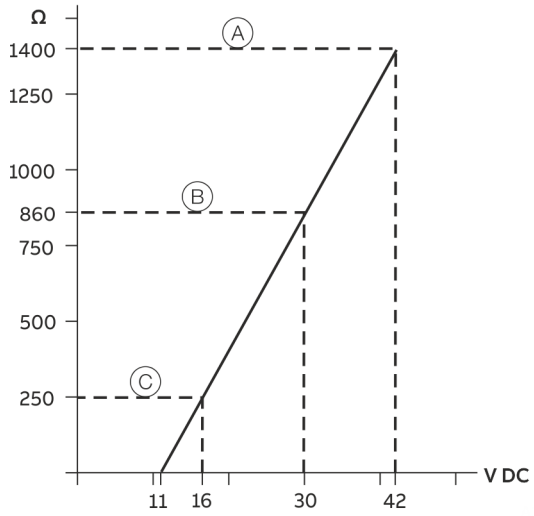
Note
Following calculations apply for standard applications. This should be taken into consideration when working with a higher maximum current.

Input terminal voltage
Non-Ex application:
U_S = 11 to 42 V DC
Ex applications:
U_S = 11 to 30 V DC

Maximum permissible residual ripple for input terminal voltage
During communication, this is in accordance with the HART® FSK 'Physical Layer' specification.

Undervoltage detection on the transmitter
If the terminal voltage on the transmitter down-scales a value of 10 V, this may lead to an output current of $I_a \leq 3.6$ mA.

Maximum load
$R_B = (U_S - 11\ V) / 0.022\ A$



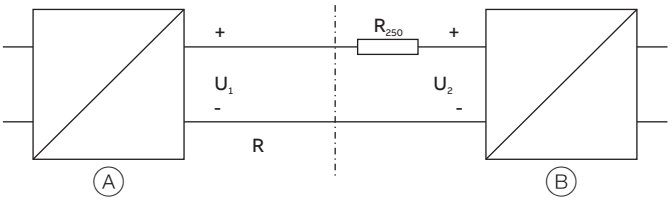
Ⓐ **TTH200**
Ⓑ **TTH200** in Ex-applications
Ⓒ HART® communication resistance (R_B)

Figure 14: Maximum load depending on input terminal voltage

Maximum power
- $P = U_s \times 0.022\ A$
- Example: $U_s = 24\ V \rightarrow P_{max} = 0.528\ W$

Voltage drop on the signal line

When connecting the devices, note the voltage drop on the signal line. The minimum supply voltage on the transmitter must not be undershot.



(A) Transmitter

(B) Supply isolator / DCS input with supply / segment coupler

Figure 15: HART load resistance

U_{1min}: Minimum supply voltage on the transmitter
U_{2min}: Minimum supply voltage of the supply isolator / DCS input
R: Line resistance between transmitter and supply isolator
R_{250}: Resistance (250 Ω) for HART functionality

Standard application with 4 to 20 mA functionality

When connecting these components, observe the following condition:
$U_{1min} \leq U_{2min}$ - 22 mA × R

Standard application with HART functionality

Adding resistance R_{250} increases the minimum supply voltage U_{2min}: $U_{1min} \leq U_{2min}$ - 22 mA × (R + R_{250})

For HART functionality, use supply isolators or DCS input cards with a HART mark. If this is not possible, a resistance of ≥ 250 Ω (< 1100 Ω) must be added to the interconnection.
The signal line can be operated with / without grounding. When establishing a ground connection (minus side), make sure that only one side of the terminal is connected to the equipotential bonding.

For further information on the revision of the standard HART® protocol and on switching options, see **Communication** on page 22.

9 Commissioning

General

In case of corresponding order the transmitter is 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.

Checks prior to commissioning

The following points must be checked before commissioning the device:

- Correct wiring in accordance with **Electrical connections** on page 16.
- The ambient conditions must correspond to the information given on the name plate and in the data sheet.

Communication

Note
The HART® protocol is an unsecured protocol, as such the intended application should be assessed to ensure that these protocols are suitable before implementation.

Communication with the transmitter takes place using the HART protocol. The communication signal is modulated onto both wires of the signal line in accordance with the HART FSK 'Physical Layer' specification.
The HART modem is connected at the signal line of the current output via which power is also supplied via the power supply unit.

Configuration parameters

Measurement type

- Sensor type, connection type
- Error signaling
- Measuring range
- General information, e.g. TAG number
- Damping
- Output signal simulation

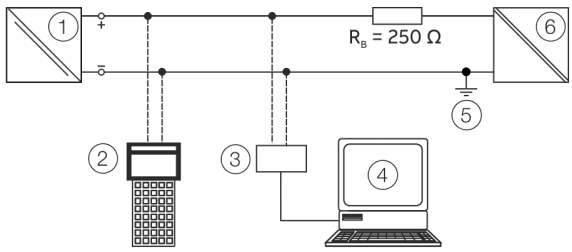
See Order form configuration in the data sheet for details.

Write protection
Software write protection

Diagnostic information in accordance with NE 107

- Sensor error signalling (wire break or short-circuit)
- Device error
- Limit value up- / down-scaled
- Upper range up- / down-scaled
- Simulation active

The device is listed with the FieldComm Group.



1 Transmitter
2 Handheld terminal
3 HART® modem
4 PC with Asset Management Tool
5 Grounding (optional)
6 Power supply unit (process interface)
R_B load resistance (if necessary)

Figure 16: Example for HART connection

Manufacturer-ID	0x1A
Device Type ID	HART 5: 0x000D HART 7: 0x1A0D
Profile	From SW-Rev. 3.00 (corresponds to HW-Rev. 2.00 and higher): HART 5.9 and HART 7.6, switchable via • Tools • HART commands Default, if nothing else ordered: HART 7.6. SW-Rev. 1.00.06 to 2.01: HART 5.1, previously HART 5
Configuration	DTM, EDD, FDI (FIM)
Transmission signal	BELL Standard 202

Operating modes
- Point-to-point communication mode – standard (general address 0)
- HART 5: Multidrop mode (addressing 1 to 15)
- HART 7: Addressing 0 to 63, independent of current loop mode
- Burst Mode

Configuration options / Tools
- Device management / Asset management tools
- FDT Technology – via TTX200-DTM driver (Asset Vision Basic / DAT200)
- EDD – via TTX200 EDD driver (handheld terminal, Field Information Manager / FIM)
- FDI Technology – via TTX200 Package (Field Information Manager / FIM)

Diagnosis notice
- Overrange / underrange in accordance with NE 43
- HART® diagnosis

Extended from SW-Rev. 3.00
- Device status signaling according to NE 107
- Freely configurable diagnostic categorization with diagnosis history according to NE 107

Tracking of events and configuration changes, from SW-Rev. 3.00

The HART® device stores information on critical events and configuration changes.
The information can be output via tools:
- Event monitor for logging critical events
- Configuration monitor for configuration changes

Parameterization of the device

Note

The device does not have operating elements for parameterization on site.
Parameterization takes place via the HART interface.

Parameterization of the device takes place via standard HART® tools. These include:
- ABB Handheld HART® Communicator DHH805 (TTX200 EDD)
- ABB Asset Vision Basic (TTX200 DTM)
- ABB 800xA Control system (TTX200 DTM)
- ABB Field Information Manager / FIM (TTX200 EDD, TTX200 Package)
- Other tools supporting standard HART® EDDs or DTMs (FDT1.2)

Note
- Depending on the revision of the device, various DTMs, EDDs and packages are available, including for HART 5 and HART 7.
- Not all tools and frame applications support DTMs or EDDs at the same level. In particular, optional or advanced EDD / DTM functions may potentially not be available on all tools.
- ABB provides frame applications supporting the full range of functions and performance.

… 9 Commissioning

… Parameterization of the device

Parameter description for devices up to SW-Rev. 2.01

Note

Devices to SW-Rev. 2.01 and from SW-Rev. 3.00 have partly different menus and parameters. The options for process variable representation are increased from SW-Rev. 3.00. Additional device and diagnostic information is provided. The setting and canceling of write protection has changed.

In addition, for devices from SW-Rev. 3.00, additional information (event and configuration monitor) and detailed diagnostics can be displayed and configured in tools / drivers such as FIM and DTM.

Note

Depending on the tool used, the menus and parameters may differ from the following selection.

DTM menu path, parameters	Description
Device / Extras	
Write protection	Activates write protection for the entire device • Yes: locked, entry combination: ≠ 0110 • No: unlocked, entry combination: 0110
Device reset	Configuration data is reset to factory settings (see **Factory settings** on page 31).
Factory Reset	Configuration data is reset to factory settings (see **Factory settings** on page 31). In addition, the adjustment data and DAC adjustment values are also reset to factory settings. • Yes / OK
Device / Configuration	
<Sensor / Sensor Type	Selects sensor type: • Pt100 (IEC751) • Pt1000 (IEC751) • Thermocouple type K (IEC584) • Thermocouple type B (IEC584) • Thermocouple type C (ASTME988) • Thermocouple type D (ASTME988) • Thermocouple type E (IEC584) • Thermocouple type J (IEC584) • Thermocouple type N (IEC584) • Thermocouple type R (IEC584) • Thermocouple type S (IEC584) • Thermocouple type T (IEC584) • Thermocouple type L (DIN43710) • Thermocouple type U (DIN43710) • Thermal voltage -125 to 125 mV • Thermal voltage -125 to 1100 mV • Resistance 0 to 500 Ω • Resistance 0 to 5000 Ω • Pt10 (IEC751) • Pt50 (IEC751) • Pt200 (IEC751) • Pt500 (IEC751) • Pt10 (JIS1604) • Pt50 (JIS1604) • Pt100 (JIS1604) • Pt200 (JIS1604) • Pt10 (IMIL24388) • Pt50 (IMIL24388) • Pt100 (MIL24388) • Pt200 (MIL24388) • Pt1000 (MIL24388) • Ni50 (DIN43760) • Ni100 (DIN43760) • Ni120 (DIN43760) • Ni1000 (DIN43760) • Cu10 (OIML R 84), a=4270 • Cu100 (OIML R 84), a=4270
Sensor / Connection	Sensor connection type relevant for all Pt, Ni, Cu resistance thermometers • Two-wire: sensor connection type in two-wire technology • Three-wire: sensor connection type in three-wire technology • Four-wire: sensor connection type in four-wire technology
Sensor / Line resistance	Sensor line resistance relevant for all Pt, Ni, Cu resistance thermometers with a two-wire circuit Value range: 0 to 100 Ω

DTM menu path, parameters	Description
Device / Configuration	
Sensor / Reference junction	• Internal: use of the internal reference junction of the transmitter when using a thermocouple / compensating cable (relevant for all thermocouples except for type B) • External - fixed: transfer of thermal cable / compensating cable via copper material at constant thermostat temperature • Without: no reference junction
Sensor / Reference junction temperature	— Relevant for external reference junction, specification of constant external reference junction temperature Value range: -50 to 100 °C
Device / Parameterize	
Measuring range of PV / Unit>	Selects the physical unit for the sensor measuring signal Units: °C, °F, °R, K, mV, Ω, mA
Measuring range of PV / Lower range value	Establishment of the value for 4 mA (adjustable)
Measuring range of PV / Upper range value	Defines the value for 20 mA (adjustable)
Current Output / Damping	Configurable τ 63% output signal damping value Value range: 0 to 100 s
Current Output / Output uppon error (overrange)>	Generates a high alarm signal in the event of a sensor or device error; can be configured 20 to 23.6 mA • Standard 22 mA
Current Output / Output uppon error (underrange)>	Generates a low alarm signal in the event of a sensor or device error; can be configured 3.5 to 4 mA
Device / Maintenance	
Poll address / TAG (HART TAG)	Defines the HART TAG name. • 8 characters, alphanumeric
Poll address / TAG (Adress (Multidrop))	Specifies the communication type • Address = 0 conforms to HART operating mode: point-to-point communication, 4 to 20 mA output signal • Address = 1 to 15 conforms to HART multidrop operating mode output signal 3.6 mA, only the digital HART measured values are available
Adjustment (Set lower range value)	Temperature correction for specified / simulated sensor lower range value to target lower range temperature value • Set Trim low or lower range value > OK
Adjustment / DAC adjustment fixed for zero at 4 mA	Output signal correction for specified / simulated sensor LRV value to 4.000 mA set point • Analog current measurement value input 3.5 to 4.5 mA
Adjustment / DAC adjustment fixed for amplification at 20 mA	Output signal correction for specified / simulated sensor URV value to 20.000 mA set point • Analog current measurement value input 19.5 to 20.5 mA
Device / Simulation	Output signal simulation corresponding to the value specified • Value range: 3.5 to 23.6 mA

… 9 Commissioning

… Parameterization of the device

Parameter description for devices from SW-Rev. 3.00

Note

Devices to SW-Rev. 2.01 and from SW-Rev. 3.00 have partly different menus and parameters. The options for process variable representation are increased from SW-Rev. 3.00. Additional device and diagnostic information is provided. The setting and canceling of write protection has changed.

In addition, for devices from SW-Rev. 3.00, additional information (event and configuration monitor) and detailed diagnostics can be displayed and configured in tools / drivers such as FIM and DTM.

Note

Depending on the tool used, the menus and parameters may differ from the following selection.

Menu: Easy Setup

Menu / parameter	Description
… / Device settings / Easy Setup	
HART TAG	Measuring point tagging • 8 characters
Sensor Type	Selects sensor type: • 0 to 500 Ω: Linear resistance measurement 0 to 500 Ω • 0 to 5000 Ω: Linear resistance measurement 0 to 5000 Ω • Cal. Van Dusen 1: Callendar-Van Dusen coefficient set 1 • Pt50 (IEC751): Resistance thermometer Pt50 (IEC751) • Pt100 (IEC751): Resistance thermometer Pt100 (IEC751) • Pt200 (IEC751): Resistance thermometer Pt200 (IEC751) • Pt500 (IEC751): Resistance thermometer Pt500 (IEC751) • Pt1000 (IEC751): Resistance thermometer Pt1000 (IEC751) • Pt50 (JIS1604): Resistance thermometer Pt50 (JIS1604) • Pt100 (JIS1604): Resistance thermometer Pt100 (JIS1604) • Pt50 (IMIL24388): Resistance thermometer Pt50 (MIL24388) • Pt100 (MIL24388): Resistance thermometer Pt100 (MIL24388) • Pt200 (MIL24388): Resistance thermometer Pt200 (MIL24388) • Pt1000 (MIL24388): Resistance thermometer Pt1000 (MIL24388) • Ni50 (DIN43760): Resistance thermometer Ni50 (DIN43716) • Ni100 (DIN43760): Resistance thermometer Ni100 (DIN43716) • Ni120 (DIN43760): Resistance thermometer Ni120 (DIN43716) • Ni1000 (DIN43760): Resistance thermometer Ni1000 (DIN43716) • Cu10 a=4260: Resistance thermometer Cu10 a=4260 • Cu100 a=4260: Resistance thermometer Cu100 a=4260 • Pt10 (IEC751): Resistance thermometer Pt10 (IEC751) • Pt10 (JIS1604): Resistance thermometer Pt10 (JIS1604) • Pt10 (IMIL24388): Resistance thermometer Pt10 (MIL24388) • −125 to 125 mV: Linear voltage measurement −125 to 125 mV • −125 to 1100 mV: Linear voltage measurement −125 to 1100 mV • TC type B (IEC584): Thermocouple type B (IEC584) • TC type C (ASTME988): Thermocouple type C (IEC584) • TC type D (ASTME988): Thermocouple type D (ASTME988) • TC type E (IEC584): Thermocouple type E (IEC584) • TC type J (IEC584): Thermocouple type J (IEC584) • TC type K (IEC584): Thermocouple type K (IEC584)

Menu / parameter	Description
... / Device settings / Easy Setup	
	Selection of the sensor type (continued): • TC type N (IEC584): Thermocouple type N (IEC584) • TC type R (IEC584): Thermocouple type R (IEC584) • TC type S (IEC584): Thermocouple type S (IEC584) • TC type T (IEC584): Thermocouple type T (IEC584) • TC type L (DIN43710): Thermocouple type L (DIN43710) • TC type U (DIN43710): Thermocouple type U (DIN43710) • 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 • Fixpoint table 1: Customer-specific characteristic curve 1 • Fixpoint table 2: Customer-specific characteristic curve 2 • Fixpoint table 3: Customer-specific characteristic curve 3 • Fixpoint table 4: Customer-specific characteristic curve 4 • Fixpoint table 5: Customer-specific characteristic curve 5
R-Connection	Sensor connection type relevant for all Pt, Ni, Cu resistance thermometers • Two-wire: sensor connection type in two-wire technology • Three-wire: sensor connection type in three-wire technology • Four-wire: sensor connection type in four-wire technology
2-wire Resistance	Sensor line resistance relevant for all Pt, Ni, Cu resistance thermometers with a two-wire circuit Value range: 0 to 100 Ω
Cold junction compensation thermocouple	Cold junction compensation for thermocouples: • Internal: Use of internal cold junction temperature of the transmitter when using thermal compensating cable. • External - fixed: Use of external fixed cold junction temperature of the transmitter when constant thermostat temperature is used (can be set with external cold junction temperature). • None: no Thermocouple cold junction compensation (CJC)
External cold junction temperature	Relevant for external cold junction compensation, specification of constant external cold junction temperature Value range: −50 to 100 °C
Process Variable PV	Input / output assignment selects the inputs that are mapped to the current output • Sensor 1 • Electr. meas. S1 • Temp. electronics
PV Unit	Selects the physical unit for the sensor measuring signal Units: °C, °F, °R, K, mV, Ω, V, kΩ
PV Lower Range Value	Establishment of the value for 4 mA (adjustable)
PV Upper Range Value	Defines the value for 20 mA (adjustable)
PV Damping	Configurable τ 63% output signal damping value Value range: 0 to 100 s
Looptest	Simulates the current output signal Value range: 3.500 to 23.600 mA 0.000 mA: ends looptest

… 9 Commissioning

… Parameterization of the device

Menu: Configuration

Menu / parameter	Description
… Device settings / Detailed setup / Configuration	
Sensor Type	Selects sensor type: Table of all sensor types: see … /Easy Setup / Sensor Type
R-Connection	Sensor connection type relevant for all Pt, Ni, Cu resistance thermometers • Two-wire: sensor connection type in two-wire technology • Three-wire: sensor connection type in three-wire technology • Four-wire: sensor connection type in four-wire technology
2-wire Resistance	Sensor line resistance relevant for all Pt, Ni, Cu resistance thermometers with a two-wire circuit Value range: 0 to 100 Ω
Cold junction compensation thermocouple	Cold junction compensation for thermocouples: • Internal: Use of internal cold junction temperature of the transmitter when using thermal compensating cable. • External - fixed: Use of external fixed cold junction temperature of the transmitter when constant thermostat temperature is used (can be set with external cold junction temperature) . • None: no Thermocouple cold junction compensation (CJC)
External cold junction temperature	Relevant for external cold junction compensation, specification of constant external cold junction temperature Value range: −50 to 100 °C

Menu: Display

Menu / parameter	Description
… / Device settings / Detailed setup/ Display / Display settings	
Language	Language selects the menu language. • German • English
Contrast	Sets the display contrast Value range: 0 to 100 %
… / Device settings / Detailed setup/ Display / Operator Page 1	
Display Mode	Selects the mode for the operator page (main view) of the display One line: Show line 1: one measurement value (default PV = process variable) One line + Bargraph: Show line 1 and Bargraph Two lines: Show second line with additional measurement value (example electronics temperature) Two Lines + Bargraph: Show 2 lines and Bargraph
Line 1 View	Selects the process value shown in Bargraph view of process display • Process Variable: Calculated process variable (PV) • Sensor 1: Measured value of sensor 1 • Electr. meas. S1: Measured value from sensor 1 (in Ω or mV) • Electronics temp.: Temperature of the transmitter • Output current: Output current of 4 to 20 mA signal • Output %: Output value as % of the measuring range
Line 2 View	Selects the process value shown in line 2 of process display (only 2 lines) see table of process variables … / Display / Line 1 View
Bargraph View	Selects the process value shown in Bargraph view of process display see table of process variables … / Display / Line 1 View

Menu: Parameter setup

Menu / parameter	Description
... / Device settings / Detailed setup / Parameter setup / Parameter Current Output	
Reaction on errors	• Low alarm: in the event of an error, the current, for example 3.5 mA, is output • High alarm: in the event of an error, the current, for example 22 mA, is output

Menu: HART-Mapping

Menu / parameter	Description
... / Device settings / Detailed setup / Parameter setup / HART-Mapping	
Process Variable PV	Input / output assignment selects the inputs that are mapped to the current output • Sensor 1 • Electr. meas. S1 • Temp. electronics
PV Unit	Selects the physical unit for the sensor measuring signal Units: °C, °F, °R, K, mV, Ω, V, kΩ

Menu: Calibration

Menu / parameter	Description
... / Device settings / Detailed setup / Calibration / Sensor 1 Calibration	
Sensor calibration (trimming) is used for fine correction (including to compensate for the tolerance of the sensor). Resetting the calibration is recommended when changing single-point calibration or two-point calibration. The “Reset to order” option in the Tools menu is used to reset to factory calibration (if this has been performed).	
One point trim	Lower value of calibration for sensor 1 (zero point). Parallel shift of all temperature values. Finally, a stable reference temperature is required. For example, it can also be the current stable measured temperature.
Two point trim	Lower and upper value of calibration for sensor 1 (zero point and amplification). Two exact temperature references are required. For example ice water (0 °C) and boiling water (100 °C)
Reset trim	Reset to the basic calibration for sensor 1 (delete calibration - like factory reset in the Extras menu)
... / Device settings / Detailed setup / Calibration / Current Output	
D/A trim	Adjustment of current output: allows adjustment of the start point (4 mA) and end point (20 mA) with an existing reference (precision ammeter).

Menu: Diagnostics

Menu / parameter	Description
... / Diagnostics / Overview	
Device status	Diagnostic notice (maintenance required, failure, etc.)
... / Diagnostics / Extended Diagnostics / Supervising Information	
Electronics Temp.	Select the ‘Electronics Temp.’ submenu. Drag indicator: maximum or minimum device temperature
Processvalue Sensor 1	Select the ‘Processvalue Sensor 1’ submenu. Drag indicator: maximum or minimum sensor temperature for sensor 1 Reset: Resets the values
... / Diagnostics / Extended Diagnostics / Operation Time Statistics	
Operation Time	Displays device the operation time.

… 9 Commissioning

… Parameterization of the device

Menu: Identification

Menu / parameter	Description
… / Device settings / Identification / Device	
Model	Displays device type.
Serial Number Device / HART serial no.	7 or 8-digit serial number of the device electronic unit.
Current Loop Mode	Only HART 7: • Independent of the address • Enabled = normal operation (output current depends on process variable (PV)) • Disabled = Constant output current (like Multidrop HART 5 address >0)
… / Device Info / Identification / Additional Device Revision	
Software Version	Displays device software version.
Hardware Version	Displays device hardware version.
… / Device Info / Identification / Measurement point	
Address (Multidrop)	Address range in multidrop mode (HART 5) Value range: 0 to 15 (0 means no multidrop mode)
Adress (HART 7)	Address range (HART 7) Value range: 0 to 63 (independent of Current Loop Mode) Information HART 5: • Address = 0 (Current Loop Mode enabled – Multidrop disabled) • Address = 1 to 15 (Current Loop Mode disabled – Multidrop enabled)
HART Descriptor / Description	Displays the HART Descriptor.
HART Message / Message	Display the HART message.
Tag	Displays the HART Tag.
Long Tag	Display the HART long tag.

Menu: Extras

Menu / parameter	Description
… / Device settings / Detailed setup / Extras	
SIL Check	SIL Check (for SIL devices only) Checks whether the device configuration is valid for SIL Safety applications.
Factory Reset	Device restarts with factory settings applied.
Reset to Order	Device restarts with settings according to the customer order.
Device Reset	Device restarts without configuration changes.
Set / Reset Write protection	Activates write protection for the entire device • On: locked • Off: unlocked
Software Switch HART 5 / HART 7	Switch the device from HART 5 to HART 7 or from HART 7 to HART 5. A device restart (reset) is recommended after changing the HART version. Caution: Different driver for tools for HART 5 and HART 7 required.

Factory settings

The transmitter is configured ex works.

Devices from SW-Rev. 3.00
These devices can be reset to the factory setting, as well as to the setting according to the customer order.

With the menu item “Factory reset” in the “Extras” menu, the factory settings are reset to the factory settings according to the following table (corresponds to standard configuration BS).

The menu item “Reset to order” in the “Extras” menu is used to reset to the configuration ordered by the customer (default configuration BS, customer-specific configuration without special user characteristic BF or customer-specific configuration with special user characteristic BG).
The currently set HART protocol remains unchanged during a factory reset and a reset to order.

All devices
The following table contains the corresponding parameter values when resetting to factory settings.

Menu	Designation	Parameter	Factory setting
Device Setup	Write protection	—	No
	Input	Sensor Type	Pt100 (IEC60751)
		R-Connection	Three-wire circuit
		Lower range value	0
		Upper range value	100
		Unit	Degrees C
		Damping	Off
Process Alarm		Fault signaling	To SW rev. 2.01: Overrange / high alarm 22 mA[1] From SW-Rev. 3:00: Underrange / low alarm 3.5 mA[1]
Display	Display Bargraph	—	Process value
	Bargraph	—	Yes, output %
	Language	—	English
	Contrast	—	50 %
Communication	HART-Protocol	—	HART 5 / 7*

* The currently set HART protocol remains unchanged during any type of reset (all SW revisions).

… 9 Commissioning

Basic Setup

Sensor error adjustment (adjustment function via tools)
The sensor error adjustment can be performed in the Tools via the menu path Device settings / Detailed setup / Calibration.

For sensor error adjustment, the sensor connected to the transmitter must be brought to the lower range value temperature / Trim low using a water quench or oven. It is important to make sure the temperature is balanced and stable. Tools for devices from SW rev. 3.00 additionally support a two-point adjustment with “Trim high”.

Check that the proper adjustment temperature for the sensor has been entered in the Tools before adjusting it. Based on the comparison of the adjustment temperature entered (setpoints) with the digital temperature measured by the transmitter, which is available after linearization in the form of HART temperature information, the transmitter calculates the temperature deviation resulting from the sensor error.

During sensor adjustment (single-point adjustment), the temperature deviation calculated results in an offset shift of the linear characteristic output by the linearization module; the values of this characteristic correspond to the HART signal or are sent to the current output.

A pure sensor offset error can be corrected via the calibration function ‘Set lower range value’ or the adjustment function ‘Trim low’.
By contrast, if the error is not a pure sensor offset error, it can only be corrected using two-point adjustment or two-point calibration (“Trim high”).

D / A analog output adjustment (4 mA- and 20 mA-Trim)
D/A analog output adjustment is used to compensate for errors in the current input of the higher-level system. D/A analog output adjustment for the transmitter can be used to modify the loop current so that the desired value is displayed in the higher-level system.
Error compensation for the higher-level system is possible at the lower range value with 4 mA and / or 20 mA (single-point error correction: offset or two-point error correction: offset + linear gradient).

The D / A sensor error adjustment can be performed in the Tools via the menu path Device settings / Detailed setup / Calibration. Prior to analog adjustment, it is necessary to determine the loop current values based on iterative entry of current values in simulation mode; the higher-level I/O system displays exactly 4.000 mA or the lower range limit temperature, and 20.000 mA or the upper range limit temperature. The current loop values must be measured using an ammeter and recorded.

The lower range limit value or 4.000 mA should then be simulated in D / A analog output compensation mode using sensor simulation. Following this, the iteratively calculated current value at which the higher-level system displays exactly 4.000 mA or the lower range limit value must be entered as an adjustment value. Proceed in a similar manner for the upper range value or 20.000 mA.

After this correction, the AD converter error of the higher-level system is corrected by the DA converter of the transmitter For the higher-level system, the value of the analog 4 to 20 mA output signal and the digital HART signal now match.

The adjustment should be repeated when connecting the transmitter to another input of a higher-level system.

HART variables
The transmitter provides three HART variables. The HART variables are assigned the following values:

- Primary HART variable: process value
  The primary HART variable is assigned permanently to the analog output and is accordingly mapped to the 4 to 20 mA signal.
- Secondary HART variable: electronic unit temperature
- Third-level HART variable: electric input

Communication / HART TAG / device addressing
For ease of identification, each HART device features a configurable 8-digit HART TAG. When storing HART TAG measuring point tags with more than 8 digits in the device, use the 'Message' parameter, which supports up to 32 characters. The HART LONG TAG with 32 characters can also be used for devices in HART 7 mode.

In addition to the HART TAG, each device has a HART address. This address is set to 0 by default, which means that the device operates in HART standard communication mode (point-to-point operation).

The following applies for devices in HART 5 mode:
When an address in the range 1 to 15 is used, the device switches to HART multidrop mode with constant current output. This operating mode enables users to connect up to 15 devices to a power supply unit in parallel.

The following applies for devices in HART 7 mode:
HART 7 mode supports an address range from 0 to 63. The address can be selected independently of the activated current loop mode (loop current 4 to 20 mA) or constant output current. The current loop mode is activated/deactivated and the address is selected via the Tools. The operating mode with constant output current enables the connection of up to 64 devices to a power supply unit in parallel.

In HART multidrop mode (HART 5) as well as with constant output current (current loop mode deactivated, HART 7), there is no analog output signal available with a value corresponding to the process temperature. The output signal then remains constant at 4.0 mA (from SW rev. 3.00, previously 3.6 mA) and is used exclusively for supplying power to the device. The sensor or process data information is available only as a HART signal.

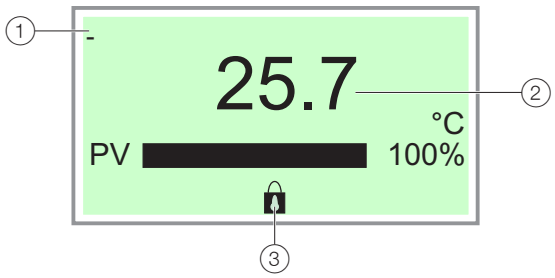
10 Operation

Safety instructions

If there is a chance that safe operation is no longer possible, take the device out of operation and secure it against unintended startup.

Process display

Note
The device does not have operating elements for parameterization on site.
Parameterization takes place via the HART interface.



1 Measuring point tagging (Device TAG)
2 Current process values
3 'Parameterization protected' symbol

Figure 17: Process display (example)

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

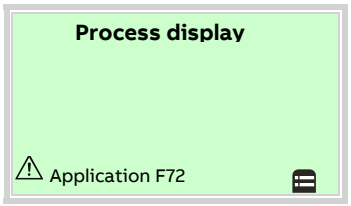
From SW-Rev. 3.00, two process variables can also be optionally displayed: one is displayed on top of the other.

… 10 Operation

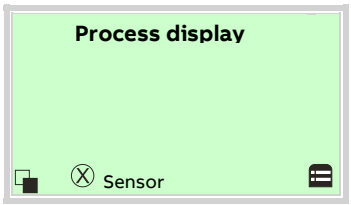
… Process display

Error messages on the LCD display
In the event of an error, different information appears depending on the revision:

- To SW-Rev. 2.01: A symbol or letter (Device Status) and a number (DIAG.NO.)
- As of SW-Rev. 3.00: Corresponding device status symbol and associated diagnostics group.



To SW-Rev. 2.01



From SW-Rev. 3.00

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

Symbol letter*	Status symbols according to NAMUR NE 107**	Description	
I	not applicable	OK or Information	Device is functioning or information is available
C		Check Function	Device is undergoing maintenance (for example 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

* To SW-Rev. 2.01

** From SW-Rev. 3.00

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

Range	Description
Electronics	Diagnosis for device hardware.
Sensor	Diagnosis for sensor elements and connection lines.
Configuration	Diagnosis of the communication interface and parameterization / configuration.
Operating conditions	Diagnosis for ambient and process conditions.
Process (from SW-Rev. 3.00)	Notes and warnings when leaving the sensor or process temperature range.

11 Diagnosis / error messages

The transmitter signals messages and errors in different ways.

Messages via the HART interface
The transmitter signals changed configuration or parameter setting by setting the HART flag ‘Configuration-changed’ (Configuration-changed).
The message can be acknowledged via the tools.

Error message on the LCD display
To SW-Rev. 2.01
If the event of an error, a message consisting of a symbol or letter (device status) and a number (DIAG NO.) will appear at the bottom of the process display.

From SW-Rev. 3.00
If the event of an error, a message consisting of a status symbol according to NAMUR NE 107 (device status) and specification of the diagnosis range appear at the bottom of the process display. Detailed information can be read through the tools.

Error message on the current output
Sensor or device errors can be indicated by underranging or overranging of the current output.
Configuration takes place via the tools, menu path “Device settings / Detailed setup / Parameter setup / Parameter Current Output / Reaction on errors”.

Diagnostic information, from SW-Rev. 3.00

Monitoring of operating data

The transmitter saves the highest and lowest values for the electronic unit temperature as well as measured values from the sensor in the non-volatile memory (‘Drag Indicator’).

Value	Description
Monitoring of the 4 to 20 mA loop current.	
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	Largest measured sensor value. When changing the sensor type (e.g., Pt100 to thermocouple type K), the value is reset automatically.
Min. reading for sensors	Smallest measured sensor value. When changing the sensor type the value is reset automatically.
Reset	The drag indicators for the sensor readings are all reset to the current measured value in each case.

Operating hours statistics

Value	Description
Operation Time	Total hours since commissioning that the supply voltage has been switched on for the transmitter.
Operation Time (according to 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.

* In tools such as FIM and DTM

… 11 Diagnosis / error messages

Possible error messages – HART® devices to SW-Rev. 2.01

Range	Displays the device status	Displays the DIAG. NO.	Cause	Remedy
Electronics	F	1	Device defective	Replace the device
Electronics	S	2	Ambient temperature overshot / undershot	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	LCD indicator connected	Status info; not an error
Installation / configuration	I	8	Device write-protected	Status info; not an error
Electronics	I	9	EEPROM busy	Status info; not an error
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	Diagnostics simulation mode	Not an error, diagnostic info, measurement OK
Sensor	F	34	Measuring error, sensor	Check sensor connection
Sensor	F	35	Short-circuit, sensor	Check sensor connection
Sensor	F	36	Wire break, sensor	Check sensor connection
Sensor	F	37	Range overshot, sensor	Check measuring limits
Sensor	F	38	Range undershot, sensor	Check measuring limits
Installation / configuration	I	41	Single-point adjustment active, sensor	Status info; not an error
Installation / configuration	I	42	Two-point adjustment active, sensor	Status info; not an error
Installation / configuration	F	65	Configuration defective	Check configuration: • Incorrect device • Measuring span is too small • Incorrect configuration data
Installation / configuration	C	71	Reconfiguration is running	Status info; not an error
Operating conditions	F	72	Error in the application	Check configuration, connections; reset to factory settings
Installation / configuration	I	74	Analog output adjustment active	Status info; not an error
Installation / configuration	C	75	Analog output in simulation	Status info; not an error
Operating conditions	S	76	Values overshot	Check parameters: • Sensor limits up-scaled • Measuring span is too small

Note
If the remedial measures listed for the error message do not improve the status of the device, please consult ABB Service.

Possible error messages – HART® devices from SW-Rev. 3.00

Range	Device status message (in the display)	Cause	Remedy
Sensor	Sensor 1: line resistance too high	Maintenance required	Check sensor or replace / repair sensor
Sensor	Sensor 1: short circuit	Maintenance required	Check sensor or replace / repair sensor
Sensor	Sensor 1: wire break / sensor break	Maintenance required	Check sensor or replace / repair sensor
Sensor	Sensor 1: single-point trim active	Check function	
Sensor	Sensor 1: two-point trim active	Check function	
Sensor	Application failure	Failure	Check sensor connection / Check HART variable mapping
Operation	Diagnostics is simulated	Check function	Terminate / come out of simulation
Operation	The analog output is fixed or simulated	Check function	Terminate / come out of simulation
Operation	Application warning	Check function	Load valid parameter / restart (reset) / check sensor 1
Electronics	Electronics temperature measurement failure	Failure	Restart (RESET) or replace transmitter
Electronics	Electronics temperature out of specification	Out of specification	Observe spec. ambient temp. range
Electronics	Non-volatile data defect	Failure	Restart (RESET) or replace transmitter
Electronics	Non-volatile memory write cycles exceeded	Maintenance required	Restart (RESET) or replace transmitter
Electronics	Device not calibrated	Failure	Restart (RESET) or replace transmitter
Electronics	Electronics failure	Failure	Restart (RESET) or replace transmitter
Process	Sensor 1: above the sensor range	Maintenance required	Check sensor type, replace / change if necessary
Process	Sensor 1: below the sensor range	Maintenance required	Check sensor type, replace / change if necessary
Process	High limit: Alarm	Out of specification	Verify process or change limit value
Process	Low limit: Alarm	Out of specification	Verify process or change limit value
Process	High limit: Warning	Out of specification	Verify process or change limit value
Process	Low limit: Warning	Out of specification	Verify process or change limit value
Configuration	Configuration / Parameterization failure	Failure	

Note

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

12 Special functions (from SW-Rev. 3.00)

The tools can be used to execute the following functions on devices from SW-Rev. 3.00 onwards. The exact designations in the various tools can differ from the following description.

SIL Check

(From SW-Rev. 3.00 only when device with SIL2 conformity is ordered.
The SIL Check function supports the operator in checking important functional safety parameters for the intended device utilization. It therefore facilitates the implementation of the required described in the SIL Safety Manual.
A check of the current configuration and set device parameters for SIL conformity is performed. The areas checked include the following:

- correct configuration in accordance with NAMUR
- correct operation with
  - HART 5: deactivated HART Multidrop mode
  - HART 7: activated Current Loop mode (loop current 4 to 20 mA)
- correct setting of the alarm current and allocation of HART variables
- correct temperature configuration
- The simulation mode must be switched off

The SIL check function can be executed via the tools or via HART commands. Tools: menu path
'Device settings / Detailed setup / Extras'.

Switching the HART version

Devices from SW-Rev. 3.00 support both HART 7 and HART 5.
Tools: menu path 'Device settings / Detailed setup / Extras'.

Switch the device from HART 5 to HART 7 and the other way around. A device restart is recommended after changing the HART version.

Note
Different drivers (DTMs, EDDs, FDI packages) will be required in the Tools for HART 5 and HART 7!

Configurable diagnosis categorization in accordance with NAMUR NE 107

Configuration of all diagnoses in accordance with NE 107 can be made via Tools as of SW-Rev. 3.00. The following categories can be assigned:

- Failure
- Maintenance Required
- Check Function
- Out of Specification

Active diagnosis of the 'Failure' category results in a configured alarm current (high alarm, low alarm).

13 Follow-up / Monitoring

As of SW-Rev. 3.00, the TTX200 transmitter supports the logging of critical events and follow-up of changes in device configuration. Both these monitors can be accessed via Tools:

- Event monitor for the logging of critical events
- Configuration monitor for the logging of configuration changes

The time of the event / change is recorded in all log entries (shown in operating hours of the device, two decimal points).

Event monitor

When the device is reset (reset, restart) or the supply voltage is powered-down and powered-up, the event monitor is emptied and is then available for storing 48 entries. New entries are cyclically written over the oldest entries.

The Event monitor stores the following events:
Setting and resetting of the signalization of:

- Upper limit value PV Alarm (Limit HIGH HIGH), the process temperature is higher than the set alarm value.
- Lower limit value PV Alarm (Limit LOW LOW), the process temperature is lower than the set alarm value.
- Upper limit value PV Warning (Limit HIGH), the process temperature is higher than the set warning value.
- Lower limit value PV Warning (Limit LOW), the process temperature is lower than the set warning value.
- Electronics temperature outside the specified range
- Electronics temperature too high (above the specified value).
- Electronics temperature too low (below the specified value).

Configuration monitor

Changes to the configuration of the device are saved in non-volatile memory. This information is therefore once again available after device reset (reset, restart) or when the supply voltage is powered-down and powered-up. 50 entries can be saved. New entries are cyclically written over the oldest entries. In addition, the value of the current HART Configuration Change Counters is entered.

The following configuration changes can be recorded:

- Sensor configuration change
- Change of the set sensor measuring range
- Change of the NAMUR configuration
- Change of the PV alarm and warning limit values (such as Limit HIGH HIGH)
- Change of the assignment of HART variables (PV, SV, TV and QV)

By default, the listed configuration changes are NOT logged. They can however be released for logging individually in the Tools

14 Maintenance

Safety instructions

⚠ CAUTION

Risk of burns due to hot measuring media

The device surface temperature may exceed 70 °C (158 °F), depending on the measuring medium temperature!

- Before starting work on the device, make sure that it has cooled sufficiently.

If transmitters are used as intended under normal operating conditions, no maintenance is required.

Cleaning

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

When using the device in potentially explosive atmospheres, observe the notice on cleaning in **Protection against electrostatic discharges** on page 10.

15 Repair

Safety instructions

⚠ DANGER

Explosion hazard

Explosion hazard due to improper repair of the device.

- Faulty devices may not be repaired by the operator.
- The device may only be repaired by the ABB Service Department.

On-site repair of the transmitter or exchange of electronic components is not permissible.

Returning devices

Use the original packaging or a secure transport container of an appropriate type if you need to return the device for repair or recalibration purposes.
Fill out the return form (see **Return form** on page 42) and include this with the device.
In accordance with the EU Directive governing 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 must be free from any hazardous materials (acids, alkalis, solvents, etc.).

Please contact Customer Center Service acc. to page 5 for nearest service location.

16 Recycling and disposal

Note

Products that are marked with the adjacent symbol may **not** be disposed of as unsorted municipal waste (domestic waste).
They should be disposed of through separate collection of electric and electronic devices.

This product and its packaging are manufactured from materials that can be recycled by specialist recycling companies.

Bear the following points in mind when disposing of them:

- As of 8/15/2018, this product will be under the open scope of the WEEE Directive 2012/19/EU and relevant national laws (for example, ElektroG - Electrical Equipment Act - in Germany).
- The product must be supplied to a specialist recycling company. Do not use municipal waste collection points. These may be used for privately used products only in accordance with WEEE Directive 2012/19/EU.
- If there is no possibility to dispose of the old equipment properly, our Service can take care of its pick-up and disposal for a fee.

17 Specification

Note

The device data sheet is available in the ABB download area at www.abb.com/temperature.

18 Additional documents

Note

Declarations of conformity of the device are available in the download area of ABB at www.abb.com/temperature. In addition, these are also included with the device in case of ATEX-certified devices.

Trademarks

HART is a registered trademark of FieldComm Group, Austin, Texas, USA

19 Appendix

Return form

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:	Email:

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

Notes

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/temperature

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3KXT231002R4201

OI/TTH200-EN Rev. D 12.2020