TTH300

Head-mount temperature transmitter

Temperature transmitter for all communications protocols. Redundancy thanks to two inputs.

Measurement made easy

Introduction

The TTH300 is available with the HART, PROFIBUS PA and FOUNDATION Fieldbus communications protocols.

The transmitter has global approvals for explosion protection up to zone 0.

The TTH300 implements various NAMUR recommendations, including NE 89 and NE 107.

Safety-relevant applications up to SIL 3 (redundant) are supported in accordance with IEC 61508.

Additional Information

Additional documentation on TTH300 is available for download free of charge at www.abb.com/temperature.
Alternatively simply scan this code:

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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 corresponding 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.

Cyber security disclaimer

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 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.

Software downloads

By visiting the web pages indicated below, you will find notifications about newly found software vulnerabilities and options to download the latest software. It is recommended that you visit this web pages regularly:
www.abb.com/cybersecurity

ABB Library – TTH300 – Software downloads

Manufacturer's address

ABB AG
Measurement & Analytics
Schillerstr. 72
32425 Minden
Germany
Tel: +49 571 830-0
Fax: +49 571 830-1806

Service address

Customer service center
Tel: +49 180 5 222 580
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.
- A list of standards, including the output data to which the device conforms, can be found in the examination certificate or manufacturer's declaration supplied with the device.

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 TTH300-E1H	
To HW-Rev.: 01.07:	
Type Examination Test Certificate	PTB 05 ATEX 2017 X
From HW-Rev.: 02.00.00:	
Type Examination Test Certificate	PTB 20 ATEX 2008 X
Model TTH300-E1P and TTH300-E1F	
Type Examination Test Certificate	PTB 09 ATEX 2016 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 TTH300-E2H	
To HW-Rev.: 01.07:	
Manufacturer's Declaration	
II 3 G Ex nA IIC T6...T1 Gc	
From HW-Rev.: 02.00.00:	
Type Examination Test Certificate	PTB 20 ATEX 2008 X
II 3 G Ex ec IIC T6...T1 Gc	
TTH300-E1P and TTH300-E1F	
Manufacturer's Declaration	
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 TTH300-H1H	
To HW-Rev.: 01.07:	
IECEx certificate of conformity	IECEx PTB 09.0014X
From HW-Rev.: 02.00.00:	
IECEx certificate of conformity	IECEx PTB 20.0035X
Model TTH300-H1P and TTH300-H1F	
IECEx certificate of conformity	IECEx PTB 11.0108X
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	

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	-50 to 56 °C (-58 to 132.8 °F)
T4-T1	-50 to 85 °C (-58 to 185.0 °F)

LCD indicator

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

Temperature class	Permissible ambient temperature range
T6	−50 to 56 °C (−58 to 132.8 °F)
T4-T1	−50 to 85 °C (−58 to 185 °F)

Electrical data

Transmitter

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

Supply circuit [1]			
	TTH300-E1H TTH300-H1H	**TTH300-E1P/-H1P TTH300-E1F/-H1F**	
		FISCO [1]	**ENTITY**
Max. voltage	U_i = 30 V	U_i ≤ 17.5 V	U_i ≤ 24.0 V
Short-circuit current	I_i = 130 mA	I_i ≤ 183 mA [2]	I_i ≤ 250 mA
Max. power	P_i = 0.8 W	P_i ≤ 2.56 W [2]	P_i ≤ 1.2 W
Internal inductance	L_i = 160 µH [3]	L_i ≤ 10 µH	L_i ≤ 10 µH
Internal capacitance	C_i = 0.57 nF [4]	C_i ≤ 5 nF	C_i ≤ 5 nF

1) FISCO in accordance with EN 60079-27
2) II B FISCO:Ii ≤ 380 mA, Pi ≤ 5.32 W
3) Only applies to HART variants.
   From HW-Rev.: 02.00.00, previously 0.5 mH
4) Only applies to HART variants. From HW-Rev.: 1.07, previously 5 nF

Intrinsic safety type of protection Ex ia IIC (Part 2) TTH300-E1H, TTH300-H1H

Measurement current circuit		
	Resistance thermometers, resistors	**Thermocouples, voltages**
Max. voltage	U_o = 6.5 V	U_o = 1.2 V
Short-circuit current	I_o = 17.8 mA [1]	I_o = 50 mA
Max. power	P_o = 29 mW [2]	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 = 1.65 µF [3]	C_o = 1.15 µF [4]

1) From HW-Rev.: 02.00.00, previously 25 mA
2) From HW-Rev.: 02.00.00, previously 38 mW
3) From HW-Rev.: 02.00.00, previously 1.55 µF
4) From HW-Rev.: 02.00.00, previously 1.05 µF

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

… Electrical data

Intrinsic safety type of protection Ex ia IIC (Part 2)
TTH300-E1P, TTH300-H1P, TTH300-E1F, TTH300-H1F

Measurement current circuit		
	Resistance thermometers, resistors	**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 (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

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

Type of protection non-sparking and increased safety
TTH300-E2H from HW-Rev.: 02.00.00

Supply circuit	
Max. voltage	U_S = 30 V
Rated fuse current	I_i = 32 mA
Measurement current circuit	
Max. voltage	U_b = 6.5 V
Max. output current	I_b = 17.8 mA
Max. output power	P_b = 29 mW
LCD indicator interface	Use not permitted

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 type A or type AS LCD indicator must be installed according to type of protection 'intrinsic safety' (Ex i) such that an IP rating of at least IP 20 is achieved in accordance with IEC 60529.

Perform installation according to type of protection 'non-sparking' (Ex nA) or type of protection 'increased safety' (Ex ec) such that an IP rating of at least IP 54 and a degree of contamination of 2 or better is achieved in accordance with IEC 60664-1.

Electrical connections

Grounding

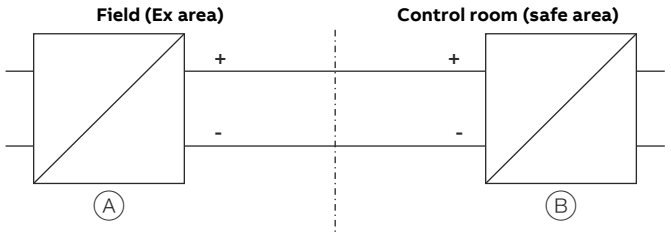
If, for functional reasons, the intrinsically safe circuit needs to be grounded by means of a connection to the potential equalization, it may only be grounded at one point.

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



Ⓐ Transmitter

Ⓑ Supply isolator / DCS input with supply / segment coupler

Figure 1: Intrinsic safety proof

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

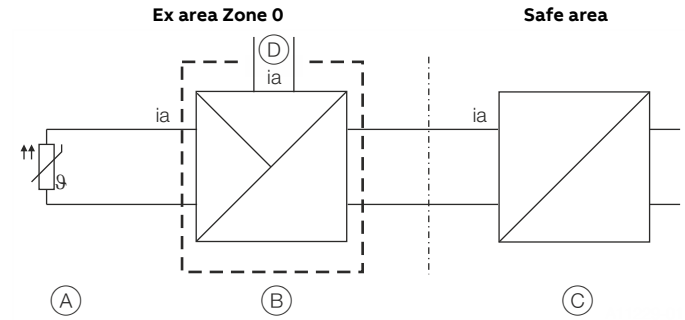
… Electrical data

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.

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

ATEX – Zone 0
Marking:II 1 G Ex ia IIC T6...T1 Ga



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

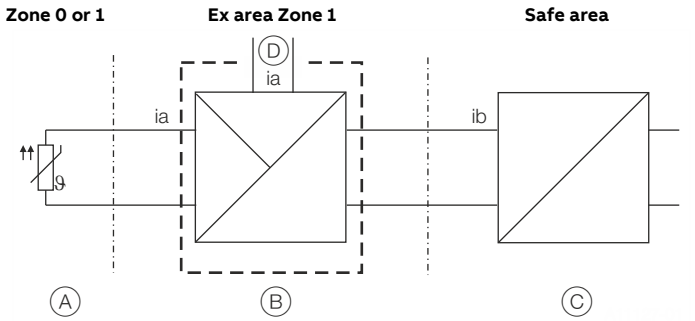
Figure 2: Hookup in ATEX – Zone 0

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 ensured.

Encapsulation material used for the transmitter:
Polyurethane (PUR)

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



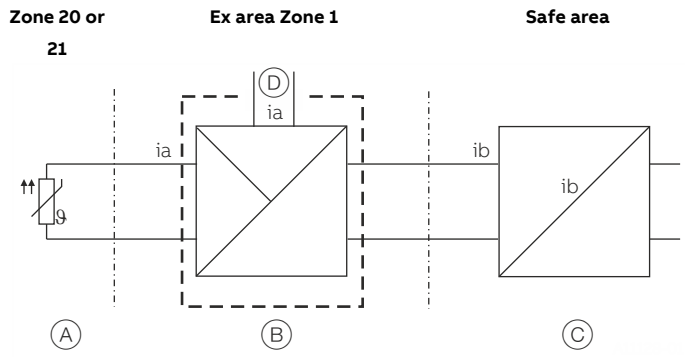
(A) Sensor
(B) Transmitter in housing with IP rating IP 20
(C) Supply isolator [Ex ib]
(D) Interface for LCD indicator

Figure 3: Hookup in ATEX – Zone 1 (0)

When using the transmitter in Zone 1, it must be installed in a suitable 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, you must ensure that impermissible electrostatic charging of the temperature transmitter is prevented (observe the warnings on the device).

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



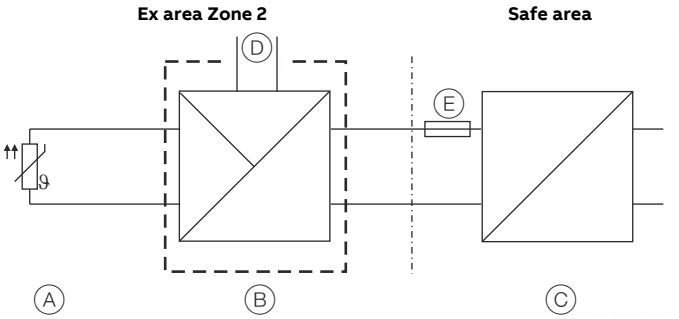
Ⓐ Sensor
Ⓑ Transmitter in housing with IP rating IP 20
Ⓒ Supply isolator [Ex ib]
Ⓓ Interface for LCD indicator

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).

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



Ⓐ Sensor
Ⓑ Transmitter in housing with IP rating IP 54
Ⓒ Supply isolator with voltage limit (max. 30 V)
Ⓓ Interface for LCD indicator
Ⓔ Fuse 32 mA (from HW-Rev.: 02.00.00)

Figure 5: Hookup in ATEX – Zone 2

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

- The temperature transmitter must be installed in a suitable housing that reaches at least IP rating IP 54 in accordance with IEC 60529 and a degree of contamination of 2 or better in accordance with IEC 60664-1.
- In addition to the housing, suitable cable glands must be used.
- The other requirements specified for potentially explosive atmospheres must be met.
- 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).
- The connection leads must be permanently installed and secured against tensile load.

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

… Electrical data

Note
In addition, the following points for TTH300 HART (TTH300-E2H) from HW-Rev.: 02.00.00 must be observed:

- The power supply circuit of the transmitter must be limited by an upstream fuse with a fuse current rating of 32 mA and a fuse rated voltage of ≥ 30 V.The fuse can be located in the associated supply isolator or must be separately installed upstream.The breaking capacity of the fuse must be the same or greater than the maximum assumed short-circuit current at the installation site (usually 1,500 A).
- The display / service interface must not be used in type of protection ‘Ex nA’ and ‘Ex ec’.

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 cFMus, 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, CSA or cFMus applies.

Transmitter Ex marking cFMus

cFMus Intrinsically Safe

Model TTH300-L1H for USA or TTH300-R1H for Canada	
From HW-Rev.: 02.00	
Control Drawing	TTH300-L1H
IS Class I, Div. 1,2 Group ABCD T6, T4	
Zone 0 AEx/Ex ia IIC T6…T1 Ga	
Zone 1 AEx/Ex [ia Ga] ib IIC T6…T1 Gb	
Zone 1 AEx/Ex ib IIC T6…T1 Gb / [AEx/Ex ia Da] IIIC	

cFMus Non-Incendive

Model TTH300-L2H for USA or TTH300-R2H for Canada	
From HW-Rev.: 02.00	
Control Drawing	TTH300-L2H
NI Class I, Div. 2 Group ABCD T6, T4	
Zone 2 AEx/Ex nA IIC T6…T1 Gc	
Zone 2 AEx/Ex ec IIC T6…T1 Gc	

Transmitter Ex marking FM / CSA

FM Intrinsically Safe

Model TTH300-L1H	
Up to HW-Rev.: 01.07:	
Control Drawing	SAP_214829
Model TTH300-L1P	
Control Drawing	TTH300-L1P (IS)
Model TTH300-L1F	
Control Drawing	TTH300-L1F (IS)
Class I, Div. 1 + 2, Groups A, B, C, D	
Class I, Zone 0, AEx ia IIC T6	

FM Non-Incendive

Model TTH300-L2H	
Up to HW-Rev.: 01.07:	
Control Drawing	214831 (Non-Incendive)
Model TTH300-L2P	
Control Drawing	TTH300-L2P (NI_PS)
	TTH300-L2P (NI_AA)
Model TTH300-L2F	
Control Drawing	TTH300-L2F (NI_PS)
	TTH300-L2F (NI_AA)
Class I, Div. 2, Groups A, B, C, D	

… 2 Use in potentially explosive atmospheres in accordance with cFMus, FM and CSA

… Transmitter Ex marking FM / CSA

CSA Intrinsically Safe

Model TTH300-R1H	
Up to HW-Rev.: 01.07:	
Control Drawing	214826
Model TTH300-R1P	
Control Drawing	TTH300-R1P (IS)
Model TTH300-R1F	
Control Drawing	TTH300-R1F (IS)
Class I, Div. 1 + 2, Groups A, B, C, D	
Class I, Zone 0, Ex ia IIC T6	

CSA Non-Incendive

Model TTH300-R2H	
Up to HW-Rev.: 01.07:	SAP_214824 (Non-Incendive)
Control Drawing	SAP_214896 (Non-Incendive)
Model TTH300-R2P	
Control Drawing	TTH300-R2P (NI_PS)
	TTH300-R2P (NI_AA)
Model TTH300-R2F	
Control Drawing	TTH300-R2F (NI_PS)
	TTH300-R2F (NI_AA)
Class I, Div. 2, Groups A, B, C, D	

LCD indicator Ex marking

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 or 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 or 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

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).

Warnings and instructions should be followed as per notes on the associated control drawing for installation in the associated hazardous area.

The control drawings are available for download under the following link. Just scan or click on the QR code:

ABB Library – TTH300 – control drawings

IP protection rating of housing

The temperature transmitter and LCD indicator Type A and Type AS must be installed such that an IP rating of at least IP 20 is achieved in accordance with IEC 60529.

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.

Note

When operating the transmitter in Zone 0, the compatibility of the device materials with the surrounding atmosphere must be guaranteed.
Encapsulation material used for the transmitter:
Polyurethane (PUR)

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!

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

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.

With HART® transmitters, an FSK signal is superimposed on the 4 to 20 mA output signal in accordance with the HART standard to facilitate bidirectional communication.

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

With FOUNDATION Fieldbus® transmitters, communication takes place in accordance with the FOUNDATION Fieldbus H1 (IEC 61158-2), ITK Version 5.x.

The transmitters can be configured using various tools / drivers.Status and measured values can also be queried. These include DTM, EDD and FDI Packages of the Field Information Manager (FIM).
These tools provide an event monitor and a configuration monitor for HART devices from SW-Rev.: 03.00.This allows critical events such as exceeding or falling below specified limit values and configuration changes to be output and logged. See the HART® “COM/TTX300/HART” interface description.

As an option, the transmitter can be fitted with a type A or a type AS LCD indicator.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 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.

Input functionality

Sensor redundancy
To enhance system availability, the TTH300 has two sensor inputs.
The second sensor input can be used redundantly for both resistance thermometers (2 × three-wire circuit or 2 × two-wire circuit) and thermocouples or a combination of both. If a combination of both is used, the resistance sensor must be connected to channel 1 and the thermocouple to channel 2, see **Electrical connections** on page 22.

In the case of HART devices, the failure of a sensor can be signaled with a configurable analog alarm pulse, see the HART® “COM/TTX300/HART” interface description.

Devices with PROFIBUS PA®, FOUNDATION Fieldbus®, and HART® to SW-Rev.: 01.03
Sensor redundancy / sensor backup for enhanced availability

With sensor redundancy (sensor backup), the temperature is always measured between both sensors, and the mean is derived from that with the same sensors.This value is provided at the output of the transmitter.If the sensors are not identical, the measured value of channel 1 (resistance thermometer) is output.If one sensor fails, the temperature measurement of the remaining sensor is transmitted seamlessly to the output of the transmitter.
A relevant diagnosis message is available via DTM, EDD, FDI Package (FIM) or on the LCD indicator.The measured value remains available and maintenance measures can be taken at the same time.

Devices with HART® from SW-Rev. 03.00
Extended configuration options are available for redundant operation.
Redundancy behavior can be configured for:
- increased availability (standard factory setting with redundancy),
- increased safety and
- increased accuracy (output of the average value).

Redundancy behavior	Output behavior (behavior of the current output)	Current output assignment to be set (Tools: “HART Mapping”)	Redundancy configuration to be set (Tools: “Parameter setting”)	Diagnostic message to be set according to NAMUR NE 107
Increased availability (Switchover for defective sensor)	Normal operation: Output signal follows sensor 1 Sensor 1 defective: Switching seamlessly (with smooth transition) to sensor 2. Output signal remains valid. Sensor 1 and sensor 2 defective: output of set alarm current	“Redundancy”	“Availability”	Redundancy, S1 not available: “Maintenance Required” Redundancy, S2 not available: “Maintenance Required” Sensor drift detected: “Maintenance Required”
Increased safety (use of drift detection)	Normal operation: Output signal follows sensor 1 Sensor 1 or sensor 2 defective: output of set alarm current Sensor drift detected: output of set alarm current	“Redundancy”	“Safety”	Redundancy, S1 not available: “Failure” Redundancy, S2 not available: “Failure” Sensor drift detected: “Failure”
Increased accuracy (through averaging)	Output signal follows the arithmetic mean value of sensor 1 and sensor 2 Sensor 1 or sensor 2 defective: output of set alarm current	“Mean value”	not relevant	Redundancy, S1 not available: “Failure” Redundancy, S2 not available: “Failure” Sensor drift detected: “Maintenance Required”

Corresponding diagnostic messages are available via DTM, EDD, FDI package (FIM) or on the LCD display.
For the meaning of the diagnostic messages according to NAMUR 107, see **Error messages in the HART® LCD display** on page 37. The error messages and options for error correction are listed in **Possible error messages – HART® devices from SW-Rev.: 03.00** on page 74.

Note
Only the current output behavior and redundancy configuration can be set for the three redundancy behaviors via the HMI LCD display with configuration function. The diagnostic messages according to NAMUR NE 107 can only be changed over in the tools and remain in the default setting ex works (“Maintenance Required”).

… 4 Design and function

… Input functionality

Sensor drift monitoring
If two sensors are connected, sensor drift monitoring can be FDI Package (FIM) enabled via DTM, EDD or

The sensor drift monitoring can be activated for the following sensor types:

- 2 × resistance thermometer (RTD), two-wire circuit
- 2 × resistance thermometer (RTD), three-wire circuit
- 2 × resistors (potentiometer), two-wire circuit
- 2 × resistors (potentiometer), three-wire circuit
- 2 × thermocouple
- 2 × voltages
- 1 × resistance thermometer (RTD), two-wire circuit, and 1 × thermocouple
- 1 × resistance thermometer (RTD), three-wire circuit, and 1 × thermocouple
- 1 × resistance thermometer (RTD), four-wire circuit, and 1 × 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., 1 K.

Since sensor response times may differ slightly, it is then necessary to configure a limit time period during which the sensor deviation has to constantly exceed the maximum set.

If the transmitter registers a larger sensor deviation over the defined period of time, the diagnostic response configured in accordance with NE 107 will be carried out (tools and LCD indicator).

Sensor drift monitoring with redundancy operation (devices with PROFIBUS PA®, FOUNDATION Fieldbus®, and HART® to SW-Rev.: 01.03)
If drift monitoring is used for the same sensor types (2 × resistance thermometer or 2 × thermocouple), the average value calculated from the two sensors will be mapped to the transmitter output signal as a process variable in redundancy mode.

If a thermocouple is used for resistance thermometer drift monitoring, the resistance thermometer should be connected to Channel 1 and the thermocouple to Channel 2 (see **Electrical connections** on page 22). The measured value of channel 1 (resistance thermometer) is mapped as a process variable at the transmitter output.

Sensor drift monitoring with redundancy operation (devices with HART® from SW-Rev.: 03.00)
If a thermocouple is used for resistance thermometer drift monitoring, the resistance thermometer should be connected to Channel 1 and the thermocouple to Channel 2 (see **Electrical connections** on page 22).
The transmitter output signal always corresponds to the configured redundancy behavior, see **Sensor redundancy** on page 16.

Note
Before configuring the maximum permissible sensor deviation with regard to drift monitoring, sensor calibration should be carried out with reference to the sensor channel 1 value using the TTH300 device drivers (FDIX/DTM/EDD), for example.

Sensor error adjustment in accordance with Callendar-Van Dusen
Under normal circumstances, the standard Pt100 characteristic curve is used for resistance thermometer measurement. However, recent advances in technology now mean that maximum measuring accuracy can be achieved where necessary by carrying out individual sensor error adjustment.

Sensor characteristic curves are optimized by using a Pt100 polynomial in accordance with IST-90 / IEC 751, and EN 60150, and by applying A ,B, C, or Callendar-Van Dusen coefficients.

The device drivers (FDIX/DTM/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 CVD characteristic curves can be stored for FOUNDATION Fieldbus.

5 Product identification

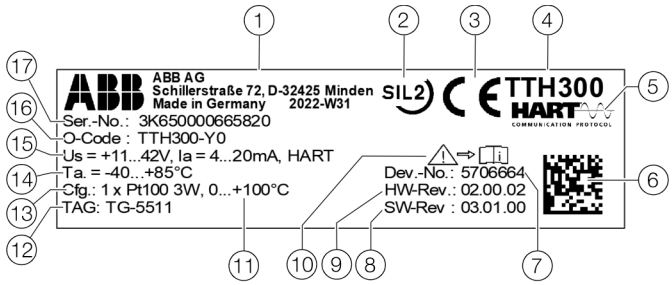
Name plate

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.
For devices with PROFIBUS PA or FOUNDATION Fieldbus, the device-ID is also specified.



(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, FF, PA)
(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)(12)(13) **HART transmitter:**
(11) Set measuring range of the transmitter
(12) Measuring point tag (TAG) in accordance with order (optional)
(13) Set sensor type and circuit type
(12)(13) **Transmitter FOUNDATION Fieldbus or PROFIBUS PA:**
(12) Measuring point tag (TAG) in accordance with order (optional)
(13) DEVICE_ID or Ident_Number
(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 6: HART name plate (example)

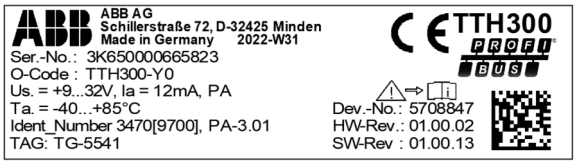


Figure 7: PROFIBUS PA name plate (example)

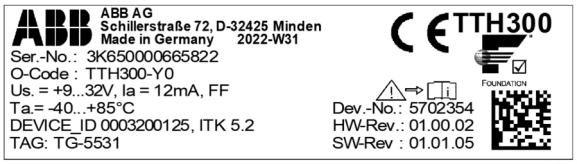
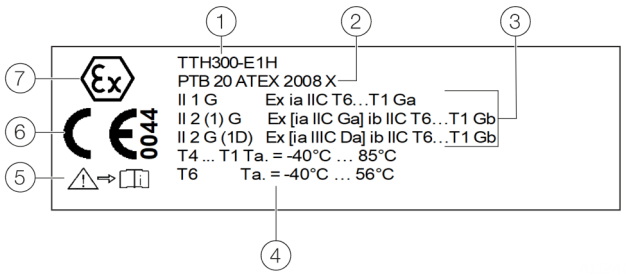


Figure 8: FOUNDATION Fieldbus name plate (example)

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



(1) Type designation in accordance with approval
(2) Approval number
(3) Protection class of the explosion-proof design (explosion protection marking)
(4) Temperature class of the explosion-proof design
(5) 'Follow product documentation' symbol
(6) CE mark (EU conformity) and notified body for quality assurance
(7) Ex marking

Figure 9: Additional data plate for explosion-protected devices (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 76.

7 Installation

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 cFMus, FM and CSA** on page 13!

Ambient conditions

Ambient temperature

- Standard:−40 to 85 °C (−40 to 185 °F)
- Optional:-50 to 85 °C (-58 to 185 °F)
- Limited temperature range for explosion-proof design: see relevant certificate

Transport- / Storage temperature

-50 to 85 °C (-58 to 185 °F)

Climate class in accordance with DIN EN 60654-1

Cx −40 to 85 °C (−40 to 185 °F) at 5 to 95 % relative air humidity

Temperature and humidity limits

In accordance with IEC 60068-2-30

Vibration resistance in accordance with IEC 60068-2-6

10 to 2000 Hz at 5 g, during operation and transport

Shock resistance in accordance with IEC 60068-2-27

gn = 30, during operation and transport

IP rating

- Power supply circuit:IP 20
- Measurement current circuit:IP 00 or IP-rating of installation housing

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 on the measuring inset

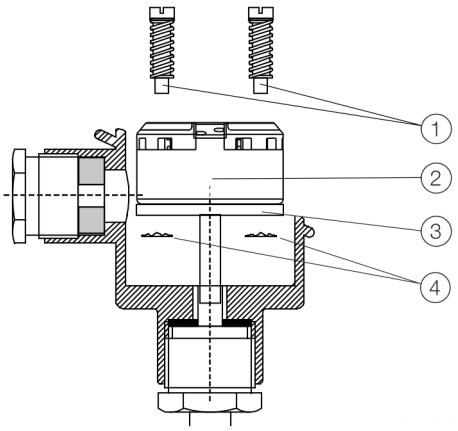


Figure 10: Mounting examples

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 in the cover of the connection head

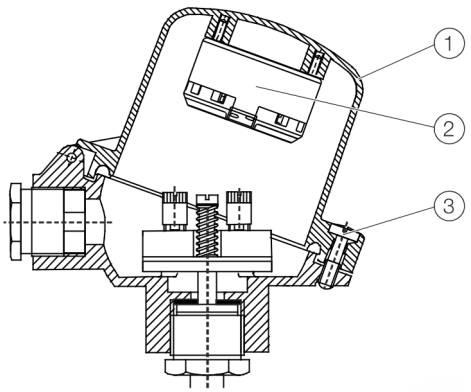


Figure 11: Mounting examples

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 top-hat rail

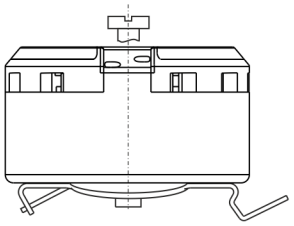


Figure 12: Mounting examples

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 cFMus, FM and CSA** on page 13!

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

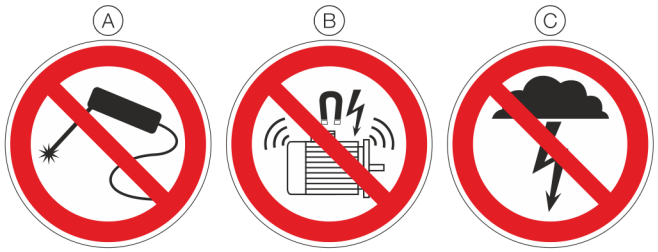
The signal cable wires must be provided with wire end sleeves. The slotted screws of the connection terminals are tightened with a size 1 screwdriver (3.5 or 4 mm).

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 24.

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.



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

Figure 13: 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)!

Suitable 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

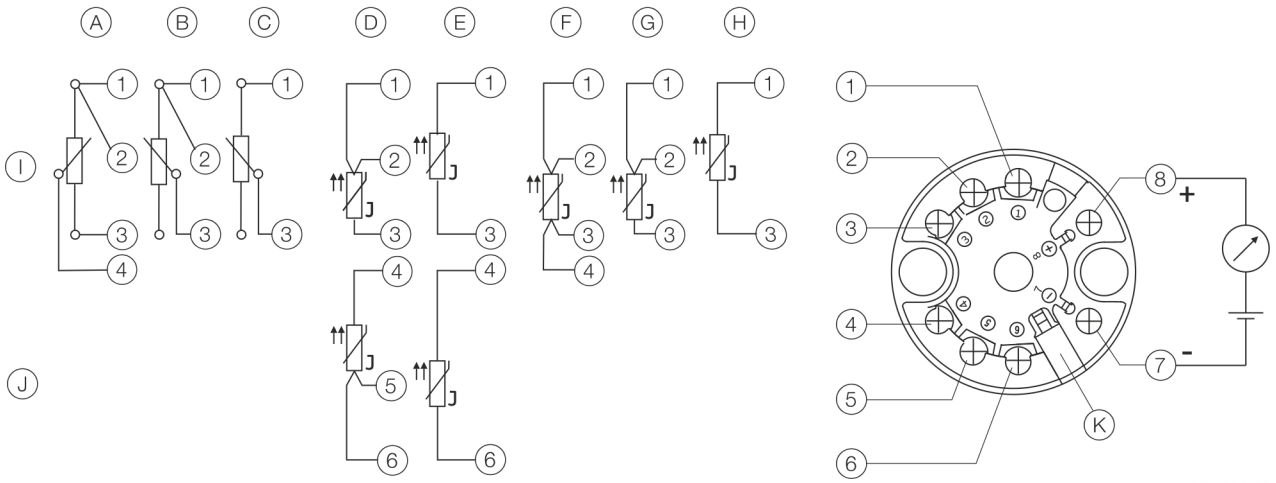
Maximum wire cross section:
1.5 mm^2 (AWG 16)

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

Resistance thermometers (RTD) / resistors (potentiometer)

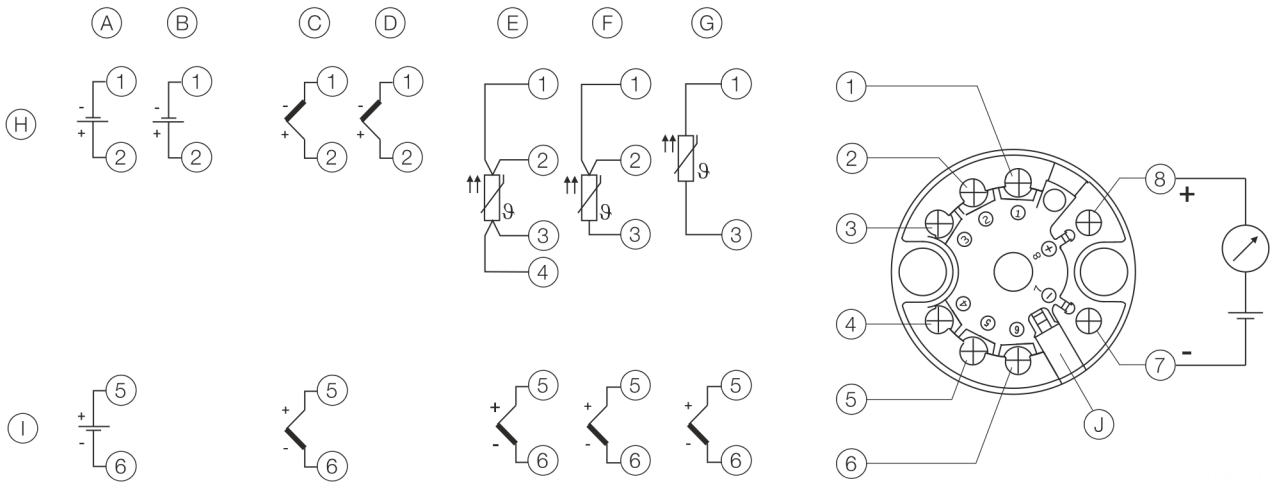


(A) Potentiometer, four-wire circuit
(B) Potentiometer, three-wire circuit
(C) Potentiometer, two-wire circuit
(D) 2 × RTD, three-wire circuit*
(E) 2 × RTD, two-wire circuit*
(F) RTD, four-wire circuit
(G) RTD, three-wire circuit
(H) RTD, two-wire circuit
(I) Sensor 1
(J) Sensor 2*
(K) Interface for LCD indicators and service
(1) – (6) Sensor connection (of measuring inset)
(7) – (8) 4 to 20 mA HART®, PROFIBUS PA®, FOUNDATION Fieldbus®

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

Figure 14: Terminal assignment for resistance thermometers (RTD) / resistors (potentiometers)

Thermocouples / voltages and resistance thermometers (RTD) / thermocouple combinations



(A) 2 × voltage measurement*
(B) 1 × voltage measurement
(C) 2 × thermocouple*
(D) 1 × thermocouple
(E) 1 × RTD, four-wire circuit and 1 x thermocouple*
(F) 1 × RTD, three-wire circuit and 1 x thermocouple*
(G) 1 × RTD, two-wire circuit and 1 x thermocouple*
(H) Sensor 1
(I) Sensor 2*)
(J) Interface for LCD indicators and service
(1) – (6) Sensor connection (of measuring inset)
(7) – (8) 4 to 20 mA HART®, PROFIBUS PA®, FOUNDATION Fieldbus®

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

Figure 15: Terminal assignment for thermocouples / voltages and resistance thermometers (RTD) / thermocouple combinations

… 8 Electrical 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

Functionality input

Freestyle characteristic / 32-points-sampling point table

- Resistance measurement up to a maximum of 5 kΩ
- Voltages up to maximum 1.1 V

Sensor error adjustment

- Through Callendar-Van Dusen coefficients
- Through value table, 32 support points
- Through single-point adjustment (offset adjustment)
- Through two-point adjustment

Input functionality

- 1 Sensor
- 2 Sensors: mean measurement, differential measurement, sensor redundancy, Sensor drift monitoring

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 behavior

- 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). Detailed information about this can be found in the SIL-Safety Manual.

Notice – Before SW-Rev.: 03.00

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)

Notice – From SW-Rev.: 03.00

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)

Output – PROFIBUS PA®

Note

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

Output signal

- PROFIBUS – MBP (IEC 61158-2)
- Baud rate 31.25 kBit/s
- PA-Profile 3.01
- FISCO compliant (IEC 60079-27)
- ID-Number: 0x3470 [0x9700]

Error current signal

- FDE (Fault Disconnection Electronic)

Block structure

- Physical Block
- Transducer Block 1 – Temperature
- Transducer Block 2 – HMI (LCD indicator)
- Transducer Block 3 – enhanced diagnosis
- 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 junction temperature)
- Analog Output – optional HMI display (Transducer Block 2)
- Discrete Input 1 – extended diagnosis 1 (Transducer Block 3)
- Discrete Input 2 – extended diagnosis 2 (Transducer Block 3)

* Sensor 1, Sensor 2 or difference or mean

For detailed information see the PROFIBUS PA® interface description (COM/TTX300/PB).

… 8 Electrical connections

… Electrical data for inputs and outputs

Output – FOUNDATION Fieldbus®

Note

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

Output signal

- FOUNDATION Fieldbus H1 (IEC 611582-2)
- Baud rate 31.25 kBit/s, ITK 5.x
- FISCO compliant (IEC 60079-27)
- Device ID:000320001F…

Error current signal

- FDE (Fault Disconnection Electronic)

Block structure*

- Resource Block
- Transducer Block 1 – Temperature
- Transducer Block 2 – HMI (LCD indicator)
- Transducer Block 3 – enhanced diagnosis
- 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 junction temperature)
- Analog Output – optional HMI display (Transducer Block 2)
- Discrete Input 1 – extended diagnosis 1 (Transducer Block 3)
- Discrete Input 2 – extended diagnosis 2 (Transducer Block 3)
- PID – PID controller

LAS (Link Active Scheduler) link master functionality

* For the block description, block index, execution times, and block class, refer to the interface description

** Sensor 1, Sensor 2 or difference or mean

For detailed information, see the COM/TTX300/FF FOUNDATION Fieldbus® interface description.

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.

Power supply – HART®

Supply 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 supply voltage

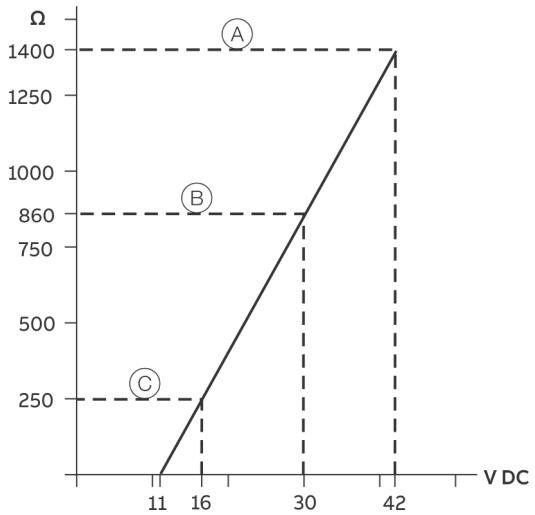
During communication this is in accordance with the HART FSK 'Physical Layer' specification.

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 = (supply voltage−11 V) / 0.022 A



Ⓐ TTH300

Ⓑ TTH300 in Ex-applications

Ⓒ HART communication resistance

Figure 16: Maximum load depending on supply voltage

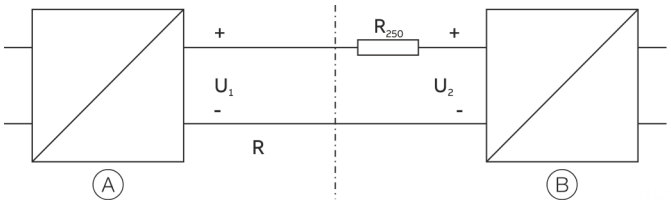
Maximum power consumption

$P = U_s \times 0.022$ A

E.G. U_s = 24 V → 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.



Ⓐ Transmitter

Ⓑ Supply isolator / DCS input with supply / segment coupler

Figure 17: 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 x R

Standard application with HART functionality

Adding resistance R_{250} increases the minimum supply voltage U_{2min}: $U_{1min} \leq U_{2min}$ - 22 mA x (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 **HART® Communication** on page 30 and **Hardware settings** on page 33..

Power supply – PROFIBUS / FOUNDATION Fieldbus

Supply voltage

Non-Ex application:

U_S = 9 to 32 V DC

Ex-applications with:

U_S = 9 to 17 V DC (FISCO)

U_S = 9 to 24 V DC (Fieldbus Entity model I.S.)

Current consumption:

≤ 12 mA

Standard application with PROFIBUS PA and FOUNDATION Fieldbus H1 functionality

During hookup, the following condition should be complied with:

$U_{1min} \leq U_{2min}$ – 12 mA x R

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 22.
- The ambient conditions must correspond to the information given on the name plate and in the data sheet.

Communication

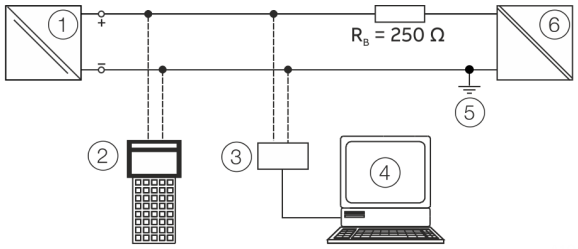
HART® Communication

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.

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 18: Example of HART® interface connection

Manufacturer ID	0x1A
Device-ID*	HART 5: 0x004B (0x000B), HART 7: 0x1A4B (0x1A0B)
Profile	From SW-Rev.: 03.00 (corresponds to HW-Rev.: 02.00 and higher): HART 5.9 and HART 7.6, can be switched via • LCD indicator with configuration function • Tools • HART commands Default, if nothing else ordered: HART 7.6. To SW-Rev.: 01.03: HART 5.1 and HART 7, switchable via DIP switch. Default, if nothing else ordered: HART 5.1. SW-Rev.: 01.01: HART 5.1, previously HART 5.
Configuration	On device using LCD indicator DTM, EDD, FDI (FIM)
Transmission signal	BELL Standard 202

* From SW-Rev.: 03.01.00, previously see brackets

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
Driver-independent:
- HMI LCD indicator with configuration function

Driver-dependent:
- Device management / Asset management tools
- FDT technology – via TTX300-DTM driver (Asset Vision Basic / DAT200)
- EDD – via TTX300 EDD driver (Handheld terminal, Field Information Manager / FIM)
- FDI technology – via TTX300 FDI Device Package (Field Information Manager / FIM)

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

Extended from SW-Rev.: 03.00:
- Device status signaling according to NE 107
- Freely configurable diagnostic categorization with diagnostic history in accordance with NE 107

Tracking of events and configuration changes, from SW-Rev.: 03.00
The HART® device stores information on critical events and configuration changes.

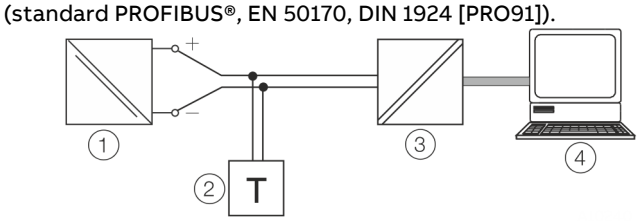
The information can be output via tools:
- Event monitor for the logging of critical events
- Configuration monitor for configuration changes

For detailed information, see HART® COM/TTX300/HART interface description.

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

The interface conforms to Profile 3.01

(standard PROFIBUS®, EN 50170, DIN 1924 [PRO91]).



1 Transmitter
2 Bus termination
3 Segment coupler
4 PC / DCS

Figure 19: Example of PROFIBUS PA® interface connection

Manufacturer ID	0x1A
ID number	0x3470 [0x9700]
Profile	PA 3.01 (see PROFIBUS PA® interface description (COM/TTX300/PB))
Configuration	On device using LCD indicator DTM EDD GSD
Transmission signal	IEC 61158-2

Voltage / current consumption
- Average current consumption:12 mA.
  In the event of an error, the FDE function (= Fault Disconnection Electronic) integrated in the device makes sure that the current consumption cannot exceed a maximum of 20 mA.

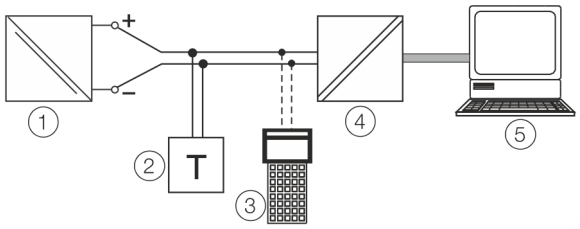
… 9 Commissioning

… Communication

FOUNDATION Fieldbus® Communication

Note

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



① Transmitter
② Bus termination
③ Handheld terminal
④ Linking Device
⑤ PC / DCS

Figure 20: Example of FOUNDATION Fieldbus® interface connection

Device ID	000320001F…
ITK	5.x (see FOUNDATION Fieldbus® interface description (COM/TTX300/FF)
Configuration	On device using LCD indicator EDD
Transmission signal	IEC 61158-2

Voltage / current consumption

- Average current consumption:12 mA.
  In the event of an error, the FDE function (= Fault Disconnection Electronic) integrated in the device makes sure that the current consumption cannot exceed a maximum of 20 mA.

Basic Setup

Note

The communication and configuration of the transmitter via HART®, PROFIBUS PA®, and FOUNDATION Fieldbus H1® are described in the separate documentation “Interface Description” for the relevant protocol (COM/TTX300/…).

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.
- With FDI-Package (FIM):
  Configuration is possible within an FDI frame applications (Field Information Manager / FIM) for which the FDI packages are released.
- With LCD indicator Type A with operating buttons
  Commissioning via the LCD indicator does not require any tools to be connected to the device and is therefore the simplest way of configuring the TTH300.
  The general operation and menus of the LCD indicator are described in **Menu navigation** on page 34.

Note

Unlike configuration using the DTM, EDD or FDI-Package (FIM) the functionality of the transmitter can only be changed to a limited extent with the LCD indicator.

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.

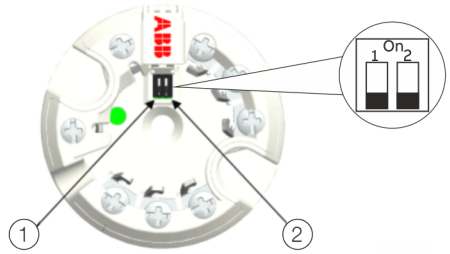
Hardware settings

Devices with HART® from HW-Rev.: 02.00 (corresponds to Software from SW-Rev.: 03.00 and higher)
HART devices from HW-Rev.: 02.00 do not have DIP switches.The desired HART profile (HART 7 or HART 5) the write protection are set via the operating buttons of the LCD display (optional), tools or HART commands.

Note
Factory setting, unless explicitly ordered otherwise:

- HART 7
- Write protection OFF

Devices with PROFIBUS PA®, FOUNDATION Fieldbus®, and HART® to HW-Rev.: 01.07



① DIP switch 1 ② DIP switch 2

Figure 21: DIP switch on the transmitter (not for HART devices from HW rev. 02.00)

The transmitter has two DIP switches that can be accessed via a hinged cover.

- Switch 1 activates the hardware write protection.
- Switch 2 supports the FOUNDATION Fieldbus requirement for a hardware enable for simulation in accordance with ITK.

For transmitters that support HART 7, switch 2 allows the desired HART version to be set (HART 5 or HART 7).

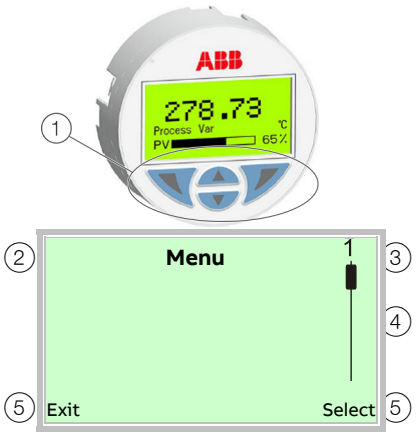
DIP switch	Function
①	**Local write protection** Off: Local write protection deactivated On: Local write protection activated
②	**Enabling the simulation (only with FOUNDATION Fieldbus)** Off: Simulation blocked On: Simulation enabled
	Selecting the HART version (only with HART protocol) Off: HART 5 On: HART 7

Note (not for HART devices from HW-Rev.: 02.00)

- Factory settings: Both switches ‘OFF’. Local write protection deactivated and HART 5, unless explicitly ordered HART 7 (HART version) or simulation locked (FOUNDATION Fieldbus).
- With PROFIBUS PA devices, Switch 2 must always be in the ‘OFF’ position.

… 10 Operation

Menu navigation



1. Operating buttons for menu navigation
2. Indication of menu designation
3. Indication of menu number
4. Marking to indicate relative position within the menu
5. Indication of the current function assigned to the operating buttons and

Figure 22: LCD display (example)

You can use the or operating buttons to browse through the menu or select a number or character within a parameter value.
Different functions can be assigned to the and operating buttons. The function (5) that is currently assigned to them is shown on the LCD display.

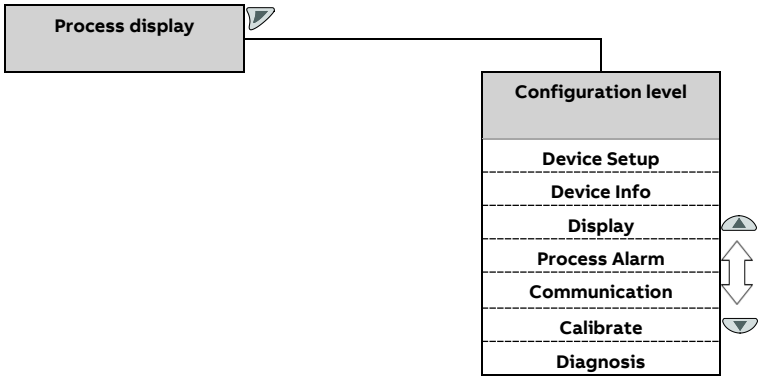
Control button functions

	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

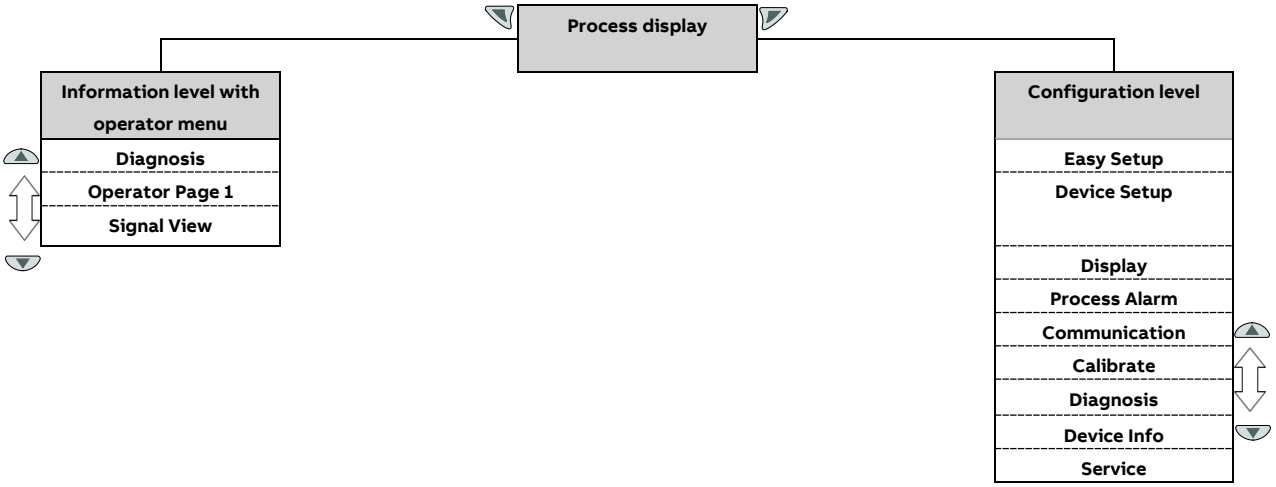
	Meaning
Select	Select submenu / parameter
Edit	Edit parameter
OK	Save parameter entered

HART® menu levels

To SW-Rev.: 01.03



From SW-Rev.: 03.00



Process display
The process display shows the current process values.

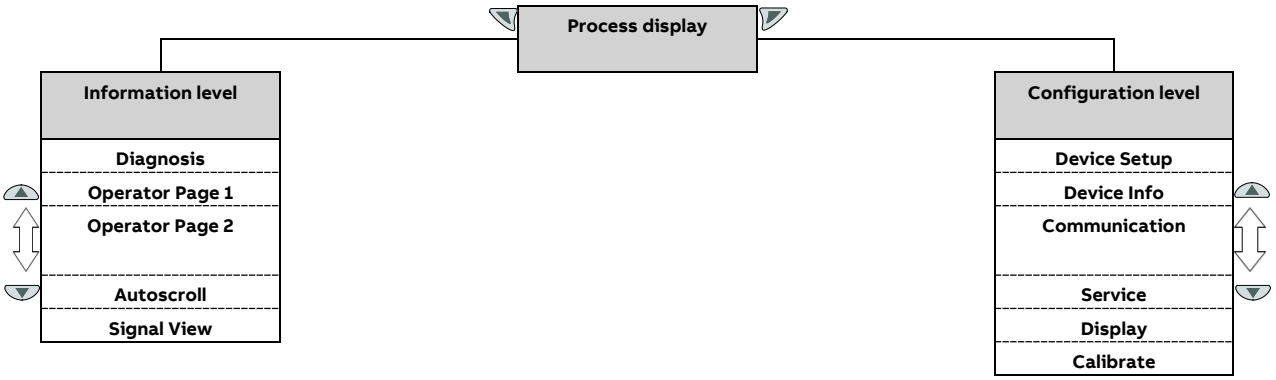
Operator menu
On the information level, the operator menu can be used to display diagnostic information and choose which operator pages to display.

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

Commissioning
The menu item “Easy Setup” from SW-Rev.: 03.00 enables a simplified configuration of the device.

… 10 Operation

PROFIBUS PA® and FOUNDATION Fieldbus® H1 menu levels

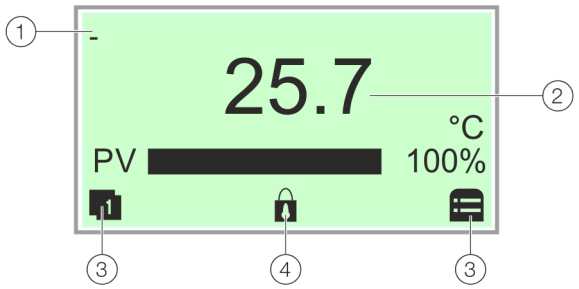


Process display
The process display shows the current process values.

Information level
The information level contains the parameters and information that are relevant for the operator.
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.

Process display



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

Figure 23: 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.
The way in which the current process values are shown can be adjusted on the configuration level.
The symbols at the bottom of the process display are used to indicate the functions of the operating buttons and , in addition to other information.

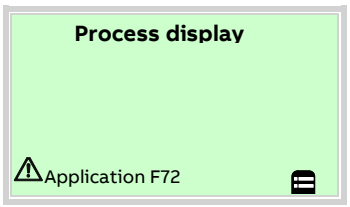
From SW-Rev.: 03.00, two process variables can also be optionally displayed: one is displayed above the other.

Symbol	Description
	Call up information level.
	Call up configuration level.
	The device is protected against changes in the parametrization.

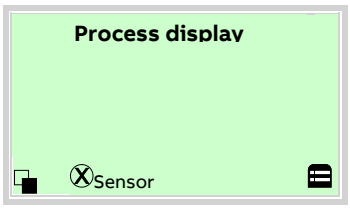
Error messages in the HART® LCD display

In the event of an error, different information appears depending on the revision:

- To SW-Rev.: 01.03: A symbol or letter (device status) and a number (DIAG.NO.)
- From SW-Rev.: 03.00: The relevant device status symbol and the associated diagnosis group.



To SW-Rev.: 01.03



From SW-Rev.: 03.00

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.: 01.03

** From SW-Rev.: 03.00

… 10 Operation

… Error messages in the HART® LCD display

The error can then be read in plain text via the “Diagnosis” information level (from SW-Rev.: 03.00).

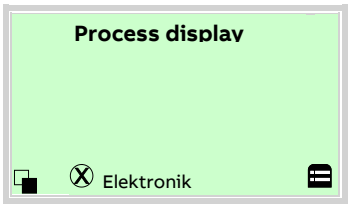
Additionally, the diagnostic messages are divided into the following areas:

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.: 03.00)	Notes and warnings when leaving the sensor or process temperature range.

Note
For a detailed description of the errors and notices on troubleshooting, see **Diagnosis / error messages** on page 70.

Error messages in the PROFIBUS PA® and FOUNDATION Fieldbus® LCD display

In the event of an error, a message consisting of a symbol and text appears at the bottom of the process screen (e. g. electronics)The text displayed provides information about the area in which the error has occurred.



The error messages are divided into four groups in accordance with the NAMUR classification scheme.The group assignment can only be changed using a DTM or EDD:

Symbol	Description
	Error / failure
	Check function
	Outside of the specification
	Maintenance required

The error can then be read in plain-text format on the ‘Diagnosis’ information level.

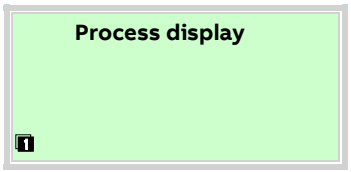
The error messages are also divided into the following areas:

Range	Description
Electronics	Diagnosis for device hardware.
Sensor	Diagnosis for sensor elements and connection lines.
Installation / Configuration	Diagnosis for communication interface and parameterization / configuration
Operating conditions	Diagnosis for ambient and process conditions.

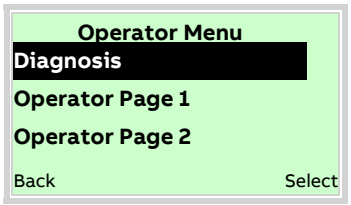
Note
For a detailed description of the errors and notices on troubleshooting, see **Diagnosis / error messages** on page 70.

Switching to the information level

(only for PROFIBUS PA®, FOUNDATION Fieldbus®, and HART® from SW-Rev.: 03.00)
On the information level, the operator menu can be used to display diagnostic information and choose which operator pages to display.



1. Open the using Operator Menu.



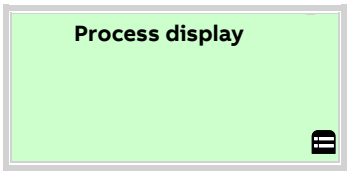
2. Select the desired submenu using / .
3. Confirm the selection with .

Menu	Description
... / Operator Menu	
Diagnosis	Selection of the “Diagnosis” submenu, see also **Error messages in the HART® LCD display** on page 37 und **Error messages in the PROFIBUS PA® and FOUNDATION Fieldbus® LCD display** on page 38.
Operator Page 1	Selection of operator page to be displayed.
Operator Page 2*	
Autoscroll*	When ‘Multiplex mode‘ is activated, automatic switching of the operator pages is initiated on the process screen.
Signal View	Selects the ‘Signal View’ submenu, in which all dynamic measured values are displayed.

* Only for PROFIBUS PA® and FOUNDATION Fieldbus®

Switching to the configuration level (parameterization)

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



1. Switch to the configuration level using .

The LCD display now indicates the first menu item on the configuration level.

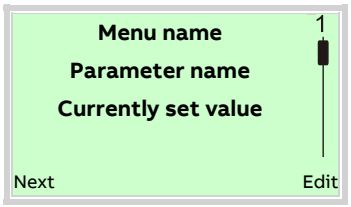
2. Select a menu using / .
3. Confirm the selection with .

… 10 Operation

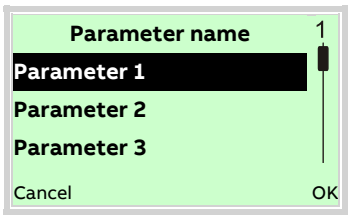
Selecting and changing parameters

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.

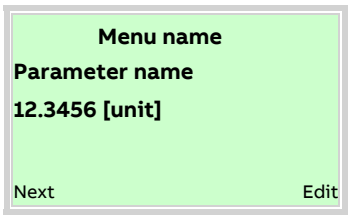


3. Select the desired value using / .
4. Confirm the selection with .

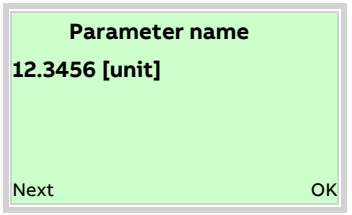
This concludes the procedure for selecting a parameter value.

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 decimal place that is currently selected is highlighted.

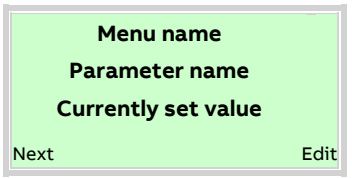


3. Use to select the decimal place to change.
4. Use / to set the desired value.
5. Use to select the next decimal place.
6. If necessary select and set additional decimal places in accordance with steps 3 to 4.
7. Use to confirm your setting.

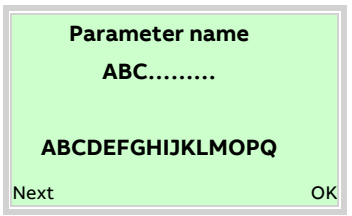
This concludes the procedure for changing a parameter value.

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 for editing. The decimal place that is currently selected is highlighted.



3. Use to select the decimal place to change.
4. Use / to set the desired value.
5. Use to select the next decimal place.
6. If necessary select and set additional decimal places in accordance with steps 3 to 4.
7. Use to confirm your setting.

This concludes the procedure for changing a parameter value.

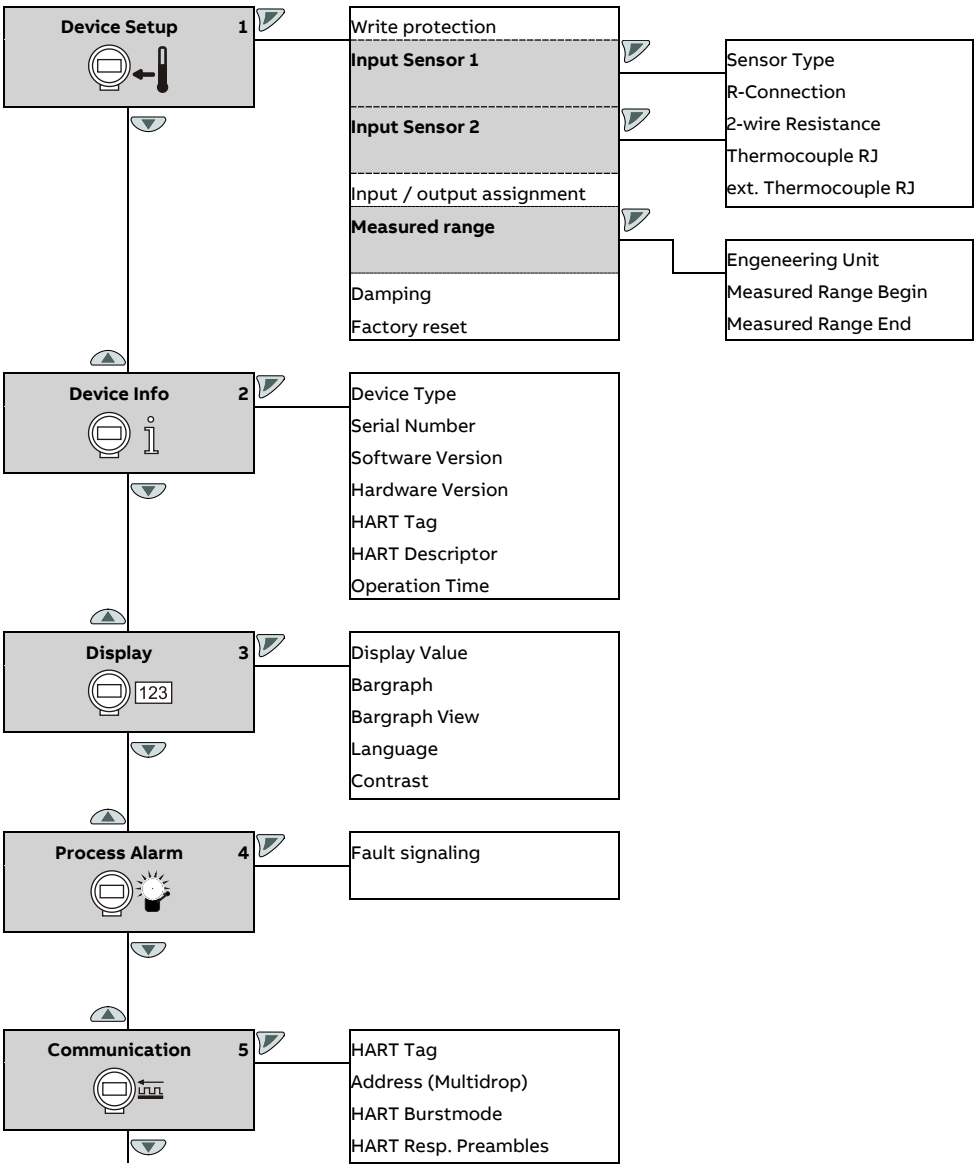
Parameter overview HART® (for devices to SW-Rev.: 01.03)

Note

This overview of parameters shows all the menus and parameters available on the device.Depending on the version and configuration of the device, not all of the menus and parameters may be visible in it.

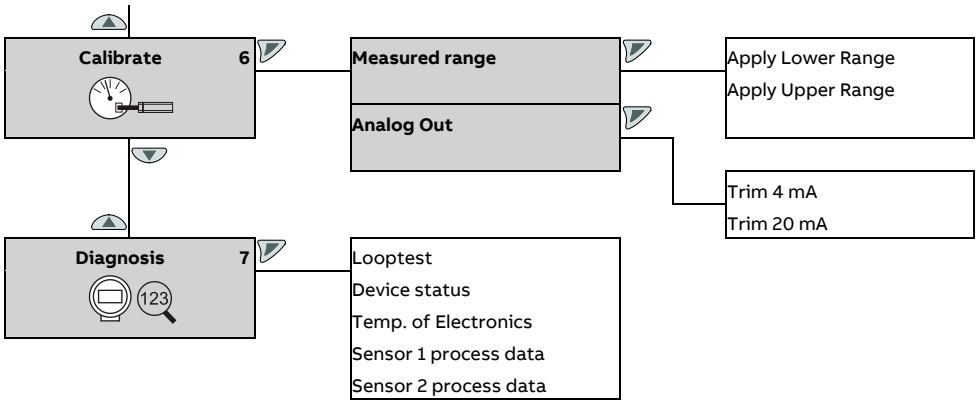
Devices to SW-Rev.: 01.03 and from SW-Rev.: 03.00 have partly different menus and parameters.The options for showing process variables are increased from SW-Rev.: 03.00. Additional device and diagnostic information is provided.The setting and canceling of write protection has changed.

In addition, for devices from SW-Rev.: 03.00, additional information (event and configuration monitor, see HART interface description, COM/TTX300/HART) and detailed diagnostics can be displayed and configured in Tools / Drivers, such as FIM and DTM.



… 10 Operation

… Parameter overview HART® (for devices to SW-Rev.: 01.03)



Parameter description HART® (for HART®-devices to SW-Rev.: 01.03)

Menu: Device Setup

Menu / parameter	Description
... / Device Setup	
Write protection	Activates write protection for the entire device • Yes: locked Input combination:≠ 0110 • No: unlocked Input combination:0110
Input Sensor 1	Select the '**Input Sensor 1**' submenu.
Input Sensor 2	Select the '**Input Sensor 2**' submenu.
Input / output assignment	Input / output assignment selects the inputs that are mapped to the current output • Sensor 1 • Sensor 2 • Difference (S1-S2) • Difference (S2-S1) • Meanvalue • Electr. Meas. S1 • Electr. Meas. S2 • Redundancy • Temp. Electronics
Measured range	Select the '**Measured range**' submenu.
Damping	Configurable τ 63% output signal damping value Value range:0 to 100 s
Factory reset	Resets configuration data, adjustment data trim high / low and DAC adjustment values to factory settings. • Yes / OK

... / Device Setup / Input Sensor 1	
... / Device Setup / Input Sensor 2	
Sensor Type	Selects sensor type: • Pt100 (IEC751):Pt100 resistance thermometer (IEC 751) • Pt1000 (IEC751):Pt1000 resistance thermometer (IEC 751) • Type K TC (IEC584):Thermocouple type K (IEC 584) • Type B TC (IEC584):Thermocouple type B (IEC 584) • Type C TC (ASTME988):Type C thermocouple (IEC584) • Type D TC (ASTME988):Thermocouple type D (ASTME 988) • Type E TC (IEC584):Thermocouple type E (IEC 584) • Type J TC (IEC584):Type J thermocouple (IEC584) • Type N TC (IEC584):Thermocouple type N (IEC 584) • Type R TC (IEC584):Type R thermocouple (IEC584) • Type S TC (IEC584):Type S thermocouple (IEC584) • Type T TC (IEC584):Type T thermocouple (IEC584) • Type L TC (DIN43710):Type L thermocouple (DIN43710) • Type U TC (DIN43710):Type U thermocouple (DIN43710)

… 10 Operation

… Parameter description HART® (for HART®-devices to SW-Rev.: 01.03)

Menu / parameter	Description
… / Device Setup / Input Sensor 1	
… / Device Setup / Input Sensor 2	
Sensor Type	Selection of the sensor type (continued): • –125 … 125 mV:Linear voltage measurement -125 to 125 mV • –125 … 1100 mV:Linear voltage measurement -125 to 1100 mV • 0 … 500Ω:Linear resistance measurement 0 to 500 Ω • 0 … 5000 Ω:Linear resistance measurement 0 to 5000 Ω • Pt10 (IEC751):Pt10 resistance thermometer (IEC 751) • Pt50 (IEC751):Pt50 resistance thermometer (IEC 751) • Pt200 (IEC751):Pt200 resistance thermometer (IEC 751) • Pt500 (IEC751):Pt500 resistance thermometer (IEC 751) • Pt10 (JIS1604):Pt10 resistance thermometer (JIS 1604) • Pt50 (JIS1604):Pt50 resistance thermometer (JIS 1604) • Pt100 (JIS1604):Pt100 resistance thermometer (JIS 1604) • Pt200 (JIS1604):Pt200 resistance thermometer (JIS 1604) • Pt10 (IMIL24388):Pt10 resistance thermometer (MIL 24388) • Pt50 (IMIL24388):Pt50 resistance thermometer (MIL 24388) • Pt100 (MIL24388):Pt100 resistance thermometer (MIL 24388) • 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 = 4270 • Cu100 a=4270:Cu100 resistance thermometer a = 4270 • 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 • 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)

Menu / parameter	Description
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
Thermocouple RJ	• Internal: Use of internal reference junction for transmitter when using thermal compensating cable. • External - fixed:Use of external fixed reference junction of the transmitter when constant thermostat temperature is used (can be set with ext. Thermocouple RJ). • None: Without Thermocouple RJ • Sensor 1: Use of sensor 1 as reference junction for sensor 2
ext. Thermocouple RJ	Relevant for external reference junction, specification of constant external reference junction temperature. Value range: −50 to 100 °C

... / Device Setup / Measured range	
Engeneering Unit	Selects the physical unit for the sensor measuring signal Units: °C, °F, °R, K, user, mV, Ω, mA
Measured Range Begin	Defines the value for 4 mA (adjustable)
Measured Range End	Defines the value for 20 mA (adjustable)

… 10 Operation

… Parameter description HART® (for HART®-devices to SW-Rev.: 01.03)

Menu: Device Info

Menu / parameter	Description
… /Device Info	
Device Type	Displays device type.
Serial Number	Displays device serial number.
Software Version	Displays device software version.
Hardware Version	Displays device hardware version.
HART Tag	Displays the HART Tag.
HART Descriptor	Displays the HART Descriptor.
Operation Time	Displays the operation hours of the device.

Menu: Display

Menu / parameter	Description
… /Display	
Display Value	Selects the process value shown in Bargraph view of process display • Process Variable: Calculated process variable (PV) • Sensor 1: Measured value from Sensor 1 • Sensor 2: Measured value from Sensor 2 • Electr. Meas. S1: Measured value from Sensor 1 (in Ω or mV) • Electr. Meas. S2: Measured value from Sensor 2 (in Ω or mV) • Temp. Electronics: Temperature of the transmitter • Output Current: Output current of 4 to 20 mA signal • Output %: Output value as % of measuring range
Bargraph	Selects whether or not a Bargraph is shown
Bargraph View	• Output Current: Output current of the 4 to 20 mA signal • Output %: Output value as % of measuring range
Language	Selects the menu language • German • English
Contrast	Sets the display contrast Value range:0 to 100%

Menu: Process Alarm

Menu / parameter	Description
... /Process Alarm	
Fault signaling	• Underrange:In the event of an error, the current (e.g. 3.6 mA) is output. • Overrange:In the event of an error, the current (e.g. 22 mA) is output.

Menu: Communication

Menu / parameter	Description
... /Communication	
HART Tag	Measuring point tagging • 8 characters
Address (Multidrop)	Address range in multidrop mode Value range:0 to15 (0 means no multidrop mode)
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	Number of preambles to be used for sending Value range:5 to 20

Menu: Calibrate

Menu / parameter	Description
... /Calibrate	
Measured range	Select the '**Measured range**' submenu.
Analog Out	Select the '**Analog Out**' submenu.

... / Calibrate / 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).

... / Calibrate / Analog Out	
Trim 4 mA	Adjusts the current output with a 4 mA setpoint Value range:3.500 to 4.500 mA
Trim 20 mA	Adjusts the current output with a 20 mA setpoint Value range:19.500 to 20.500 mA

… 10 Operation

… Parameter description HART® (for HART®-devices to SW-Rev.: 01.03)

Menu: Diagnosis

Menu / parameter	Description
… /Diagnosis	
Looptest	Simulates the current output signal Value range:0 to 23.600 mA
Device status	Diagnosis notice (maintenance required, error, etc.)
Temp. of Electronics	Drag indicator: maximum or minimum device temperature
Sensor 1 process data	Drag indicator: maximum or minimum sensor temperature for sensor 1 Reset: Resets the values
Sensor 2 process data	Drag indicator: maximum or minimum sensor temperature for sensor 2 Reset: Resets the values

Activating write protection

1. Confirm ‘Device Setup’ with and select the sub item ‘Write protection’. Displays the current write protection setting.
2. Use the ‘Edit’ button to edit the current write protection configuration.
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’.

Deactivating write protection

Access the write protection edit mode according to the example. In write protection edit mode, an alphanumeric string of characters is displayed.

1. Enter the entry combination ‘0110’.
2. Confirm with the ‘OK’ button.

‘Write protection NO’ is displayed.

Note

Entry combination ‘0110’, used to deactivate write protection, cannot be changed.

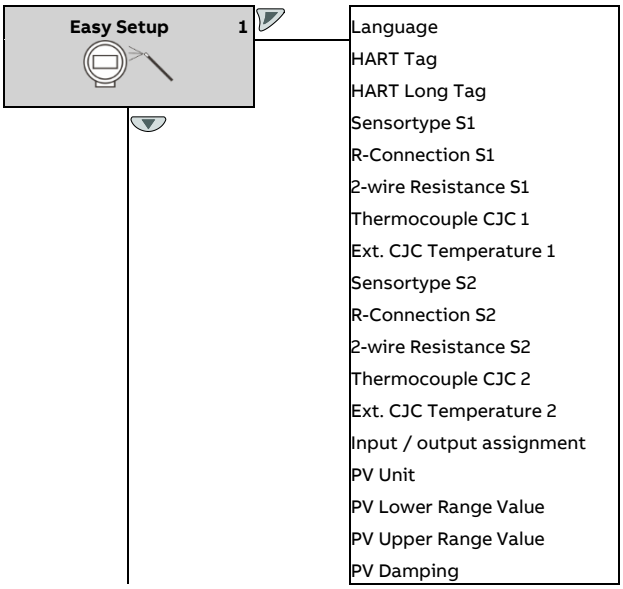
Parameter overview HART® (for HART-devices from SW-Rev.: 03.00)

Note

This overview of parameters shows all the menus and parameters available on the device. Depending on the version and configuration of the device, not all of the menus and parameters may be visible in it.

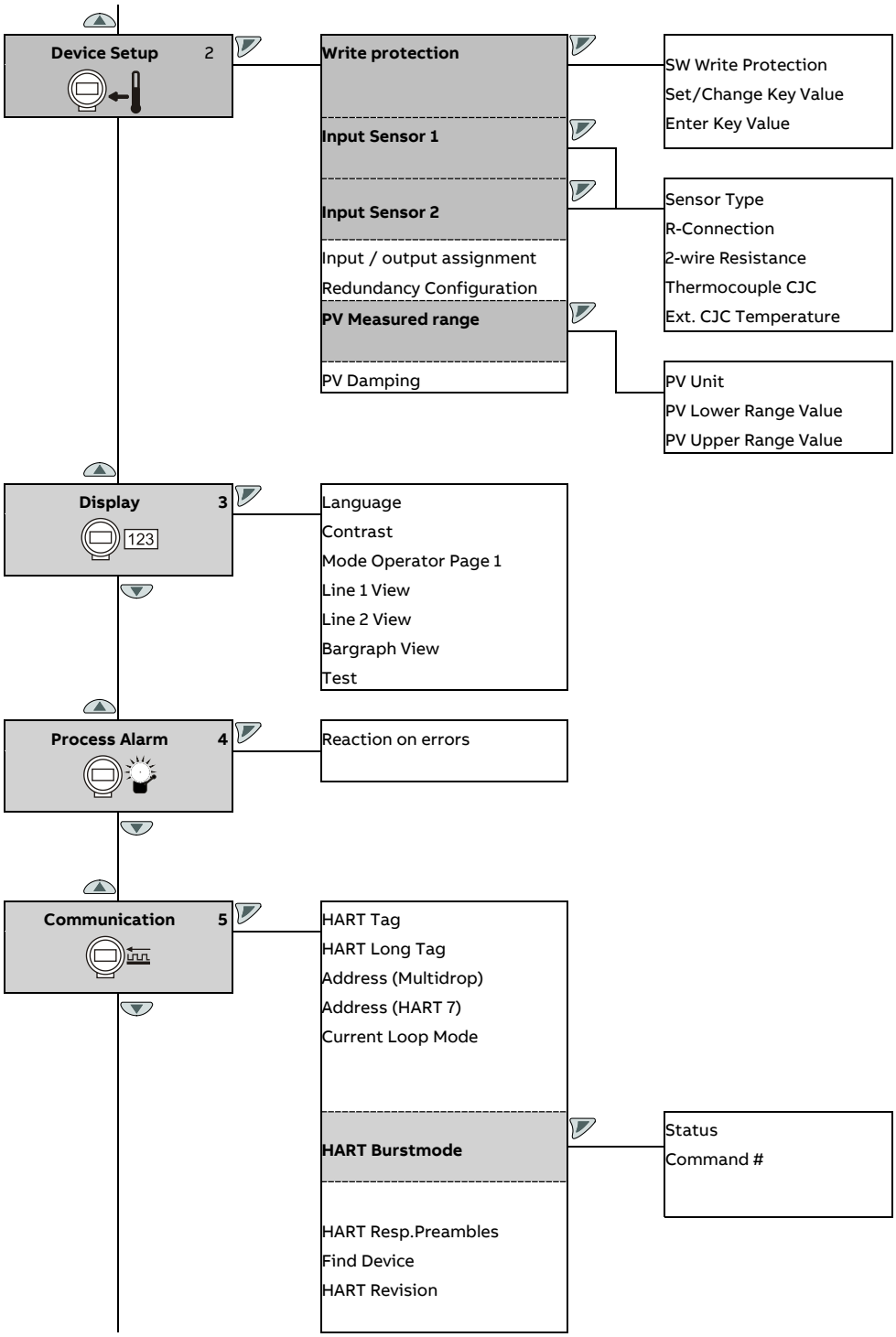
Devices to SW-Rev.: 01.03 and from SW-Rev.: 03.00 have partly different menus and parameters. The options for showing process variables are increased from SW-Rev.: 03.00. Additional device and diagnostic information is provided. The setting and canceling of write protection has changed.

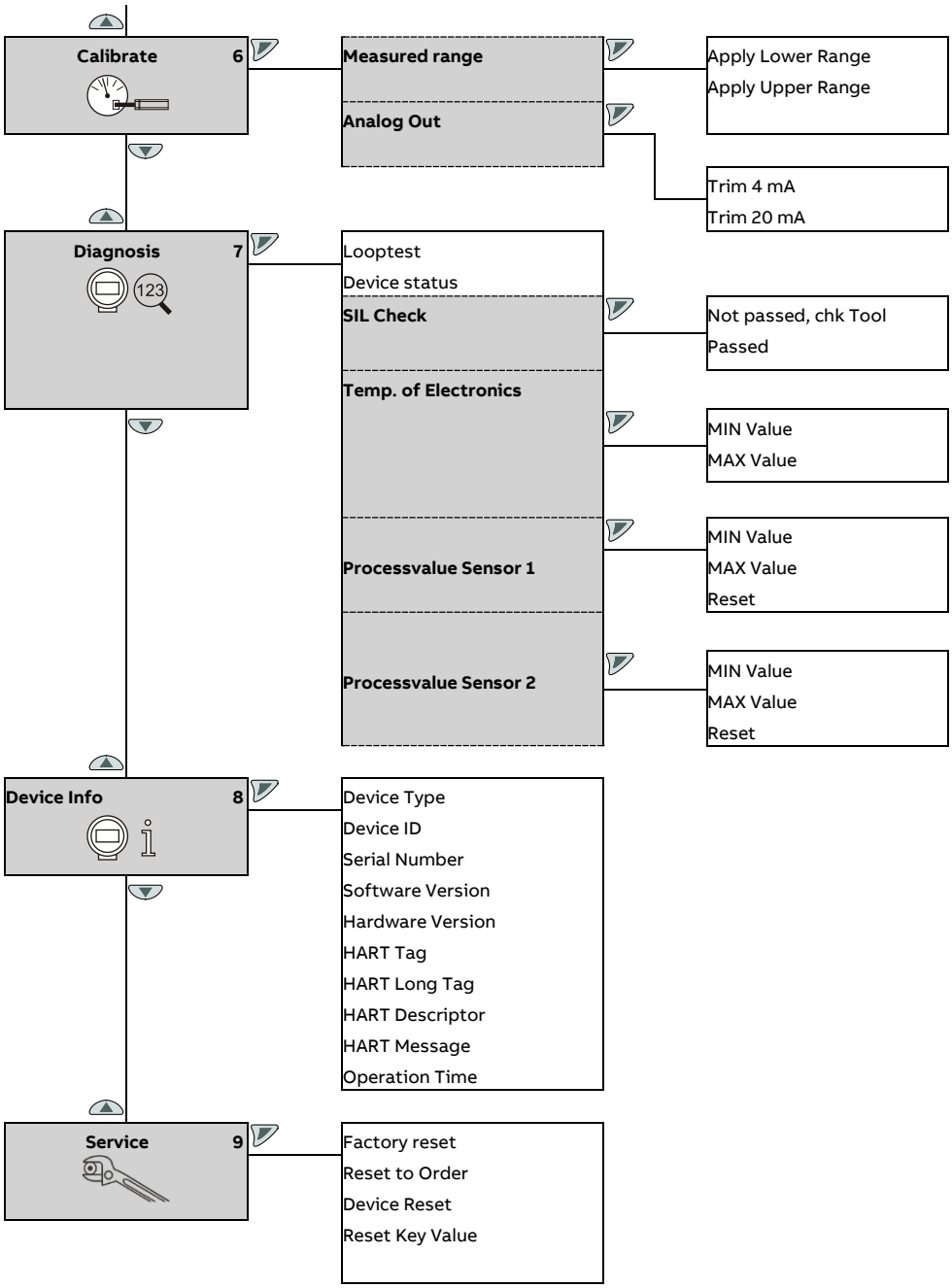
In addition, for devices from SW-Rev.: 03.00, additional information (event and configuration monitor, see HART interface description, COM/TTX300/HART) and detailed diagnostics can be displayed and configured in Tools / Drivers, such as FIM and DTM.



… 10 Operation

… Parameter overview HART® (for HART-devices from SW-Rev.: 03.00)




Calibrate 6
Measured range
Apply Lower Range
Apply Upper Range
Analog Out
Trim 4 mA
Trim 20 mA
Diagnosis 7
Looptest
Device status
SIL Check
Not passed, chk Tool
Passed
Temp. of Electronics
MIN Value
MAX Value
Processvalue Sensor 1
MIN Value
MAX Value
Reset
Processvalue Sensor 2
MIN Value
MAX Value
Reset
Device Info 8
Device Type
Device ID
Serial Number
Software Version
Hardware Version
HART Tag
HART Long Tag
HART Descriptor
HART Message
Operation Time
Service 9
Factory reset
Reset to Order
Device Reset
Reset Key Value

... 10 Operation

Parameter description HART® (for HART®-devices from SW-Rev.: 03.00)

Menu: Easy Setup

Menu / parameter	Description
... / Easy Setup	
Language	Language selects the menu language. • German • English
HART Tag	Measuring point tagging • 8 characters
HART Long Tag	Long tag:Unique device label in the plant (from HART 7) • 32 characters
Sensortype S1 (Sensortype S2)	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):Pt50 resistance thermometer (IEC 751) • Pt100 (IEC751):Pt100 resistance thermometer (IEC 751) • Pt200 (IEC751):Pt200 resistance thermometer (IEC 751) • Pt500 (IEC751):Pt500 resistance thermometer (IEC 751) • Pt1000 (IEC751):Pt1000 resistance thermometer (IEC 751) • Pt50 (JIS1604):Pt50 resistance thermometer (JIS 1604) • Pt100 (JIS1604):Pt100 resistance thermometer (JIS 1604) • Pt50 (IMIL24388):Pt50 resistance thermometer (MIL 24388) • Pt100 (MIL24388):Pt100 resistance thermometer (MIL 24388) • 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=4260:Cu10 resistance thermometer a = 4260 • Cu100 a=4260:Cu100 resistance thermometer a = 4260 • Pt10 (IEC751):Pt10 resistance thermometer (IEC 751) • Pt10 (JIS1604):Pt10 resistance thermometer (JIS 1604) • Pt10 (IMIL24388):Pt10 resistance thermometer (MIL 24388)

Menu / parameter	Description
... / Easy Setup	
	Selection of the sensor type (continued): • –125 to 125 mV:Linear voltage measurement -125 to 125 mV • –125 to 1100 mV:Linear voltage measurement -125 to 1100 mV • Type B TC (IEC584): Thermocouple type B (IEC 584) • Type C TC (ASTME988): Type C thermocouple (IEC584) • Type D TC (ASTME988): Thermocouple type D (ASTME 988) • Type E TC (IEC584): Thermocouple type E (IEC 584) • Type J TC (IEC584): Type J thermocouple (IEC584) • Type K TC (IEC584): Thermocouple type K (IEC 584) • Type N TC (IEC584): Thermocouple type N (IEC 584) • Type R TC (IEC584): Type R thermocouple (IEC584) • Type S TC (IEC584): Type S thermocouple (IEC584) • Type T TC (IEC584): Type T thermocouple (IEC584) • Type L TC (DIN43710): Type L thermocouple (DIN43710) • Type U TC (DIN43710): Type U thermocouple (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 • Freestyle characteristic 1: Customer-specific characteristic curve 1 • Freestyle characteristic 2: Customer-specific characteristic curve 2 • Freestyle characteristic 3: Customer-specific characteristic curve 3 • Freestyle characteristic 4: Customer-specific characteristic curve 4 • Freestyle characteristic 5: Customer-specific characteristic curve 5 • off:Sensor channel deactivated (sensor 2 only)
R-Connection S1	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 S1	Sensor line resistance relevant for all Pt, Ni, Cu resistance thermometers with a two-wire circuit Value range:0 to 100 Ω
Thermocouple CJC 1	Cold junction compensation for thermocouples: • Internal: Use of internal reference junction temperature of the transmitter when using thermal compensating cable. • External - fixed: Use of external fixed reference junction temperature of the transmitter when constant thermostat temperature is used (can be set with external reference junction temperature 1). • None: no reference junction compensation (CJC)
Ext. CJC Temperature 1	Relevant for external cold junction compensation , specification of constant external cold junction temperature Value range: -50 to 100 °C
Sensortype S2	Selects sensor type: see table of sensortypes ... / Easy Setup / sensortype S1

… 10 Operation

… Parameter description HART® (for HART®-devices from SW-Rev.: 03.00)

Menu / parameter	Description
… / Easy Setup	
R-Connection S2	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 S2	Sensor line resistance relevant for all Pt, Ni, Cu resistance thermometers with a two-wire circuit Value range:0 to 100 Ω
Thermocouple CJC 2	Cold junction compensation for thermocouples: • Internal: Use of internal reference junction temperature of the transmitter when using thermal compensating cable. • External - fixed: Use of external fixed reference junction temperature of the transmitter when constant thermostat temperature is used (can be set with external reference junction temperature 2). • None: no reference junction compensation (CJC) • Sensor 1 Temperature: Use of Sensor 1 as reference junction temperature for Sensor 2
Ext. CJC Temperature 2	Relevant for external reference junction compensation, specification of constant external reference junction temperature. Value range: -50 to 100 °C
In-output Assignment	Input / output assignment selects the inputs that are mapped to the current output • Sensor 1 • Electr. Meas. S1 • Temp. of Electronics • Difference (S1-S2) • Meanvalue • Sensor 2 • Electr. Meas. S2 • Redundancy • Difference (S2-S1)
PV Unit	Selects the physical unit for the sensor measuring signal Units: °C, °F, °R, K, mV, Ω, V, kΩ
PV Lower Range Value	Defines 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

Menu: Device Setup

Menu / parameter	Description
... / Device Setup	
Write protection	Select the '**Write protection**' submenu.
Input Sensor 1	Select the '**Input Sensor 1**' submenu.
Input Sensor 2	Select the '**Input Sensor 2**' submenu.
Input / output assignment	Input / output assignment Selects the inputs that are mapped to the current. see table of input / output assignment … / Easy Setup / In-output assignment
Redundancy Configuration	Configures the type of redundancy • Availability:If one of two sensors fails, the measurement will continue with the functioning sensor.Also diagnostics informs about the defective sensor. • Safety:If one of two sensors fails, current output will signal alarm current.Also diagnostics informs about the defective sensor.
PV Measured range	Select the '**PV Measured range**' submenu.
PV Damping	Configurable τ 63% output signal damping value Value range:0 to 100 s

... / Device Setup / Write protection	
SW Write Protection	Activates write protection for the entire device • Enabled: Write protection active, device locked • Disabled: Write protection deactivated, device unlocked
Set/Change Key Value	Configures the key value for the advanced write protection • Enabled: Input combination ≠ "0000" • Disabled: Input combination = "0000"
Enter Key Value	Temporary deactivation of the advanced write protection after input of the correct key value

… 10 Operation

… Parameter description HART® (for HART®-devices from SW-Rev.: 03.00)

Menu / parameter	Description
… / Device Setup / Input Sensor 1	
… / Device Setup / Input Sensor 2	
Sensor Type	Selects sensor type: Table of all sensor types: see "… / Easy Setup / Sensortype S1 "
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
Thermocouple CJC	Cold junction compensation for thermocouples: • Internal:Use of internal reference junction temperature of the transmitter when using thermal compensating cable. • External - fixed:Use of external fixed reference junction temperature of the transmitter when constant thermostat temperature is used (can be set with external reference junction temperature 2). • None: no thermocouple cold junction compensation (CJC) • Temperature sensor 1: Use of Sensor 1 as reference junction temperature for Sensor 2
Ext. CJC Temperature	Relevant for external cold junction compensation , specification of constant external cold junction temperature Value range: -50 to 100 °C

… / Device Setup / PV Measured range	
PV Unit	Selects the physical unit for the sensor measuring signal Units: °C, °F, °R, K, mV, Ω, V, kΩ
PV Lower Range Value	Defines the value for 4 mA (adjustable)
PV Upper Range Value	Defines the value for 20 mA (can be configured)

Menu: Display

Menu / parameter	Description
... /Display	
Language	Language selects the menu language. • German • English
Contrast	Sets the display contrast Value range:0 to 100%
Mode Operator Page 1	Selects the mode for the operator page (main view) of the display • One Line:Show one measured value (default PV = process variable) • One Line + Bargraph:In addition to line 1, display bar graph (default:output current %) • Two Lines:Second line for an additional measured value (such as Sensor 2) • Two Lines + Bargraph:Display 2 lines and a bar graph
Line 1 View	Selects the process value shown in Bargraph view of process display • Process Variable:Calculated process variable (PV) • Sensor 1:Reading from sensor 1 • Sensor 2:Reading from sensor 2 • Difference (S1-S2):Calculate difference Sensor 1 – Sensor 2 • Difference (S2-S1):Calculate difference Sensor 2 – Sensor 1 • Average S1 S2:Calculate average Sensor 1 / Sensor 2 • Redundancy S1 S2:Redundancy Sensor 1 and Sensor 2 • Electr. Meas. S1:Reading from sensor 1 (in Ω or mV) • Electr. Meas. S2:Reading from sensor 2 (in Ω or mV) • Temp. Electronics:Temperature of transmitter • Output Current:Output current of 4 to 20 mA signal • Output %:Output value as % of measurement range
Line 2 View	Selects the process value shown in line 2 of process display (only 2 lines) Table of selectable measured values: see "… / Display /Line 1 View"
Bargraph View	Selects the process value shown in Bargraph view of process display Table of selectable measured values: see "… / Display /Line 1 View"
Test	Display test - different patterns and letter sets are shown

Menu: Process Alarm

Menu / parameter	Description
... /Process Alarm	
Reaction on errors	• Low Alarm:In the event of an error, the current (e.g. 3.5 mA) is output. • High Alarm:In the event of an error, the current (e.g. 22 mA) is output.

… 10 Operation

… Parameter description HART® (for HART®-devices from SW-Rev.: 03.00)

Menu: Communication

Menu / parameter	Description
… /Communication	
HART Tag	Measuring point tagging • 8 characters
HART Long Tag	Long tag:Unique device label in the plant (from HART 7) • 32 characters
Address (Multidrop)	Address range in multidrop mode (HART 5) Value range:0 to 15 (0 means no multidrop mode)
Address (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)
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>)
HART Burstmode	Select the '**HART Burstmode**' submenu.
HART Resp.Preambles	Number of preambles to be used for sending Value range:5 to 20
Find Device	This option helps with finding a device The HART master sends HART command #73 to search for the device. Device answeres with HART initialize Command #0 (long address) - if found Options: • Disabled: no reaction HART command #0 • Once:One-time reaction to HART command #0 • Continuous:Always switch to HART command #0
HART Revision	Switch the device from HART 5 to HART 7 or from HART 7 to HART 5. After the change of HART Revision a device restart is recommended. Warning:Different drivers for tools for HART 5 and HART 7 required.

… / Communication / HART Burstmode		
Status	• Off:HART burst operating mode inactive • On:HART burst operating mode active	
Command #	Sets the HART command to be sent cyclically	
	• 1 Process value:	Process value PV
	• 2 current+%:	Output current and percentage range
	• 3 Current+Dyn.Vars:	Current output and dynamic variables PV, SV, QV, TV
	• 9 Dev.Variables (H7):	Device variables - only HART 7
	• 33 Dev.Variables (H5):	Device variables - only HART 5
	• 48 Add.Dev.Status:	Additional device status

Menu: Calibrate

Menu / parameter	Description
... /Calibrate	
Measured range	Select the '**Measured range**' submenu.
Analog Out	Select the '**Analog Out**' submenu.

... / Calibrate / 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).

... / Calibrate / Analog Out	
Trim 4 mA	Adjusts the current output with a 4 mA setpoint Value range:3.500 to 4.500 mA
Trim 20 mA	Adjusts the current output with a 20 mA setpoint Value range:19.500 to 20.500 mA

Menu: Diagnosis

Menu / parameter	Description
... /Diagnosis	
Looptest	Simulates the current output signal Value range:3.500 to 23.600 mA 0.000 mA:Ends loop test
Device status	Diagnostic notice (maintenance required, failure, etc.)
SIL Check	Select the '**SIL Check**' submenu. • Not passed, chk Tool:Use tool for a detailed check of the current device configuration. • Passed:SIL Configuration Check successful.The device configuration is valid for SIL Safety applications.
Temp. of Electronics	Select the '**Temp. of Electronics**' submenu. Drag indicator: maximum or minimum device temperature
Processvalue Sensor 1	Select the '**Sensor 1 process data**' submenu. Drag indicator: maximum or minimum sensor temperature for sensor 1 • Reset: Resets the values
Processvalue Sensor 2	Select the '**Sensor 2 process data**' submenu. Drag indicator: maximum or minimum sensor temperature for sensor 2 • Reset: Resets the values

… 10 Operation

… Parameter description HART® (for HART®-devices from SW-Rev.: 03.00)

Menu: Device Info

Menu / parameter	Description
… /Device Info	
Device Type	Displays device type.
Device ID	7 or 8-digit serial number of the device electronic unit.
Serial Number	Serial number of the device (serial number in accordance with order)
Software Version	Displays device software version.
Hardware Version	Displays device hardware version.
HART Tag	Displays the HART Tag.
HART Long Tag	Display the HART long tag.
HART Descriptor	Displays the HART Descriptor.
HART Message	Display the HART message.
Operation Time	Displays device operating hours.

Menu: Service

Menu / parameter	Description
… /Service	
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.
Reset Key Value	Key value of the advanced write protection is reset to factory setting.

Software write protection

In addition to regular software write protection, devices from SW-Rev.: 03.00 feature advanced software write protection.It can be configured on the device both via the LCD indicator and via the device drivers (FDIX/DTM/EDD).

If write protection has been activated, a padlock symbol will appear in the LCD indicator or the device drivers.

If the configured key value for the advanced software write protection is entered incorrectly more than five times, the device will be permanently locked.This locking function can only be deactivated on the device via the "„Reset Key Value" function.

Enable or disable regular write protection

1. "Device Setup" can be confirmed via , then select the "Write protection" submenu.
   - The "Write protection" submenu will be displayed.
2. Select the "SW Write Protection" entry and confirm with .
   - The current write protection configuration will be displayed.
3. Use "Edit" to edit the current write protection configuration (enabled/disabled), and confirm with .
   - If the "Edit" menu item is not available, the advanced write protection has been activated.
4. The current write protection setting is displayed.

Enable advanced software write protection

1. "Device Setup" can be confirmed via , then select the "Write protection" submenu.
   - The "Write protection" submenu will be displayed.
2. Select the "Set/Change Key Value" entry and confirm with .
3. Use "Edit" to edit the current key value configuration.
4. Using / , select four alphanumeric characters, and confirm with .The key value must differ from "0000".
5. The advanced write protection has been activated, the device is write-protected.

Temporarily disable software write protection

1. "Device Setup" can be confirmed via , then select the "Write protection" submenu.
   - The "Write protection" submenu will be displayed.
2. Select the "Enter Key Value" entry and confirm with .
3. Use "Edit" to edit the current key value configuration.If the "Edit" menu item is not available, the device will be locked permanently.
4. Using / , select four alphanumeric characters, and confirm with .
5. When the correct key value has been entered, write protection will be temporarily disabled, the "Write protection" subitem shows "Disabled".
6. By activating the write protection or entering a new key value, the advanced write protection will be reactivated and the device will be write-protected.

Disable advanced software write protection

1. "Device Setup" can be confirmed via , then select the "Write protection" submenu.
   - The "Write protection" submenu will be displayed.
2. Select the "Enter Key Value" entry and confirm with .
3. Use "Edit" to edit the current key value configuration.If the "Edit" menu item is not available, the device will be locked permanently.
4. Using / , select four alphanumeric characters, and confirm with .
5. Using / , select the "„Set/Change Key Value" menu item, and confirm with .
6. Using / , select the "0000" input combination, and confirm with .
7. The advanced write protection has been disabled, the device is no longer write-protected.

Reset key value

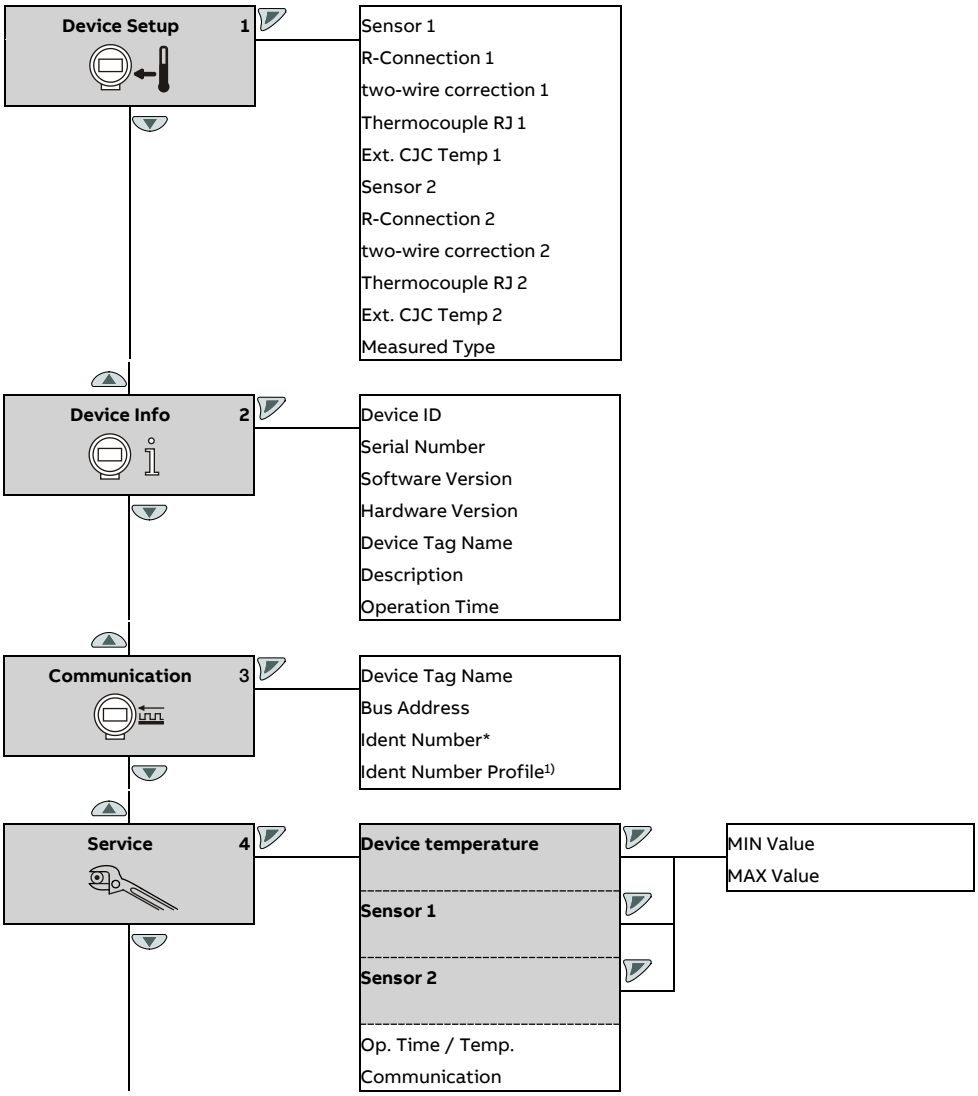
1. Confirm "Service" with and select the "Reset Key Value" item.The submenu will be displayed.
2. Confirm reset of the key value using "OK".
3. The advanced write protection has been disabled, the device is no longer write-protected.

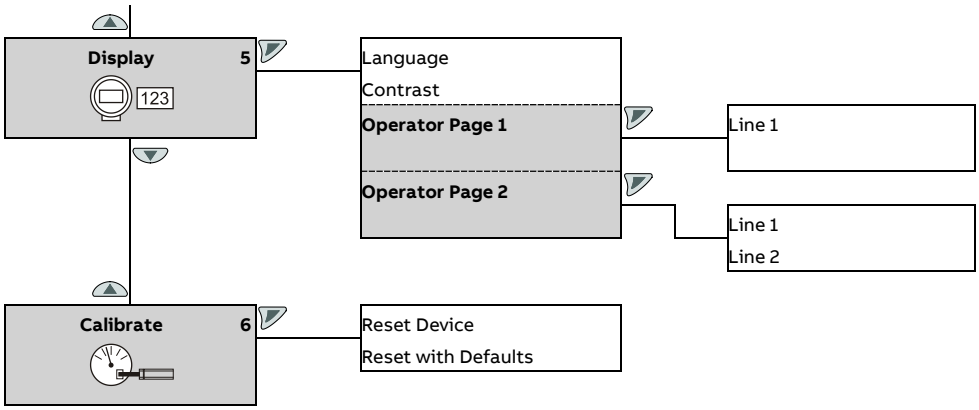
… 10 Operation

PROFIBUS PA® und FOUNDATION Fieldbus® Parameter overview

Note

This overview of parameters shows all the menus and parameters available on the device. Depending on the version and configuration of the device, not all of the menus and parameters may be visible in it.





* PROFIBUS PA only

… 10 Operation

Parameter description PROFIBUS PA® and FOUNDATION Fieldbus®

Menu: Device Setup

Menu / parameter	Description
… /Device Setup	
Sensor 1 / Sensor 2	Selects sensor type: • Pt100 (IEC751):Pt100 resistance thermometer (IEC 751) • Pt1000 (IEC751):Pt1000 resistance thermometer (IEC 751) • Type K TC (IEC584):Thermocouple type K (IEC 584) • Type B TC (IEC584):Thermocouple type B (IEC 584) • Type C TC (ASTME988):Type C thermocouple (IEC584) • Type D TC (ASTME988):Thermocouple type D (ASTME 988) • Type E TC (IEC584):Thermocouple type E (IEC 584) • Type J TC (IEC584):Type J thermocouple (IEC584) • Type N TC (IEC584):Thermocouple type N (IEC 584) • Type R TC (IEC584):Type R thermocouple (IEC584) • Type S TC (IEC584):Type S thermocouple (IEC584) • Type T TC (IEC584):Thermocouple type T (IEC 584) • Type L TC (DIN43710):Type L thermocouple (DIN43710) • Type U TC (DIN43710):Type U thermocouple (DIN43710) • –125 …125 mV:Linear voltage measurement -125 to 125 mV • –125 …1100 mV:Linear voltage measurement -125 to 1100 mV • 0 …500 Ω:Linear resistance measurement 0 to 500 Ω • 0 …5000 Ω:Linear resistance measurement 0 to 5000 Ω • Pt10 (IEC751):Pt10 resistance thermometer (IEC 751) • Pt50 (IEC751):Pt50 resistance thermometer (IEC 751) • Pt200 (IEC751):Pt200 resistance thermometer (IEC 751) • Pt500 (IEC751):Pt500 resistance thermometer (IEC 751) • Pt10 (JIS1604):Pt10 resistance thermometer (JIS 1604) • Pt50 (JIS1604):Pt50 resistance thermometer (JIS 1604) • Pt100 (JIS1604):Pt100 resistance thermometer (JIS 1604) • Pt200 (JIS1604):Pt200 resistance thermometer (JIS 1604) • Pt10 (IMIL24388):Pt10 resistance thermometer (MIL 24388) • Pt50 (IMIL24388):Pt50 resistance thermometer (MIL 24388) • Pt100 (MIL24388):Pt100 resistance thermometer (MIL 24388) • Pt200 (MIL24388):Pt200 resistance thermometer (MIL 24388) • Pt1000 (MIL24388):Pt1000 resistance thermometer (MIL 24388)

Menu / parameter	Description (continuation)
... / Device Setup	
Sensor 1 / Sensor 2	Selection of the sensor type (continued): • 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 = 4270 • Cu100 a=4270:Cu100 resistance thermometer a = 4270 • 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 • 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) * only for communication protocol PROFIBUS PA
R-Connection 1 / R-Connection 2	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
two-wire correction 1 / two-wire correction 2	Resistance correction of the connection lead for the connection type two-wire Value range:0 to 100 Ω
Thermocouple RJ 1 / Thermocouple RJ 2	• Internal:Use of internal reference point for transmitter when using thermal compensating cable. • External - fixed:External fixed reference junction used for transmitter when there is a constant thermostat temperature (can be set with ext. Thermocouple RJ). • None: No reference junction • Sensor 1:Use of Sensor 1 as reference junction for Sensor 2
ext. Thermocouple RJ 1 / ext. Thermocouple RJ 2	• Relevant for external reference junction, specification of constant external reference junction temperature Value range:-50 to 100 °C

… 10 Operation

… Parameter description PROFIBUS PA® and FOUNDATION Fieldbus®

Menu: Device Info

Menu / parameter	Description
… /Device Info	
Device ID	Displays device ID
Serial Number	Displays serial number
Software Version	Displays software version
Hardware Version	Displays hardware version
TAG	Displays measuring point tagging
Description	Displays a user-defined text
Operation Time	Displays operating hours

Menu: Communication

Menu / parameter	Description
… /Communication	
TAG	Measuring point tagging • 16 characters
Bus Address	Address range during bus operation Value range:0 to 125
Ident Number	PROFIBUS PA profile:Selects ID numbers that can be used Manufacturer-specific:(IDENT__NUMBER_SELECT) Only with PROFIBUS PA
Ident Number Profile	ID numbers used for profile with PROFIBUS PA • 1*AI (0x9700) • 2*AI (0x9701) • 3*AI (0x9702) • 4*AI (0x9703)

Menu: Service Menu

Menu / parameter	Description
... /Service Menu	
Device temperature	Select the '**Device temperature**' submenu.
Sensor 1	Select the '**Sensor 1**' submenu.
Sensor 2	Select the '**Sensor 2**' submenu.
Op. Time / Temp.	Displays total operating hours and the operating hours within specific ranges of the device temperature. • Total:Total operating hours • < −40 °C:Operating hours at < -40 °C • −40 to −20 °C:Operating hours at -40 °C to -20 °C • −20 to 0 °C:Operating hours at -20 °C to 0 °C • 0 to 20 °C:Operating hours at 0 to 20 °C • 20 to 40 °C:Operating hours at 20 to 40 °C • 40 to 60 °C:Operating hours at 40 to 60 °C • 60 to 85 °C:Operating hours at 60 to 85 °C • > 85 °C:Operating hours at > 85 °C
Communication	Displays the communication quality • Excellent • Very good • Good • Poor • None

... / Service Menu / Device temperature	
min	Drag indicator: minimum device temperature
max	Drag indicator: maximum device temperature

... / Service Menu / Sensor 1	
min	Drag indicator: minimum sensor temperature, sensor 1
max	Drag indicator: maximum sensor temperature, sensor 1

... / Service Menu / Sensor 2	
min	Drag indicator: minimum sensor temperature, sensor 2
max	Drag indicator: maximum sensor temperature, sensor 2

… 10 Operation

… Parameter description PROFIBUS PA® and FOUNDATION Fieldbus®

Menu: Display

Menu / parameter	Description
… /Display	
Language	Selects the menu language • German • English
Contrast	Sets the display contrast Value range:0 to 100%
Operator Page 1	Select the '**Operator Page 1**' submenu.
Operator Page 2	Select the '**Operator Page 2**' submenu.

… / Display / Operator Page 1	
Line 1	Selects the value displayed • Calculated value • Sensor 1 • Sensor 2 • Device temperature • AO Block

… / Display / Operator Page 2	
Line 1	Selects the value displayed in Line 1 • Calculated value • Sensor 1 • Sensor 2 • Device temperature • AO Block
Line 2	Selects the value displayed in Line 2 • Calculated value • Sensor 1 • Sensor 2 • Device temperature • AO Block

Menu: Calibrate

Menu / parameter	Description
… /Calibrate	
Reset Device	Device restarts without configuration changes
Reset with Defaults	Device restarts with factory settings applied

Factory settings

Firmware settings

The transmitter is configured ex works.

HART® devices from SW-Rev.: 03.00

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 service menu, the settings are reset to the factory settings in accordance with the following table (corresponds to default configuration BS).
- The menu item “Reset to Order” in the service menu is used to reset the settings 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 “Factory reset” and “Reset to Order”.

Devices with PROFIBUS PA®, FOUNDATION Fieldbus®, and HART® (all SW revisions)

The following table with the corresponding parameter values applies:

Menu	Designation	Parameter	Factory setting
Device Setup	Write protection	–	No
	Input Sensor 1	Sensor Type	Pt100 (IEC60751)
		R-Connection	Three-wire
		Measured Range Begin[1)]	0
		Measured Range End[1)]	100
		Engeneering Unit	Degrees °C
		Damping	Off
Process Alarm		Fault signaling[1)]	To SW-Rev.: 01.03: Overrange / high alarm 22 mA[1)] From SW-Rev.: 03.00: Underrange / low alarm 3.5 mA[1)]
	Input Sensor 2	Sensor Type	Off
	Input / output assignment	Measurement type	Sensor 1
	TAG	–	–
	HART Descriptor[1)]	–	To SW-Rev.: 01.03: TIXXX-[1)]
Display	Display Value	–	Process Variable
	Bargraph[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)]
	HART Protocol	–	HART 5 / 7[4)]

1) Only applies to HART transmitters

2 Only applies to PROFIBUS PA transmitters

3) Only applies to FOUNDATION Fieldbus transmitters

4) The currently set HART protocol remains unchanged during all types of reset (all SW revisions).

11 Diagnosis / error messages

Diagnostic information

Monitoring of operating data

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

Value	Description
Supply voltage (HART devices to SW-Rev. 01.03)	Current supply voltage measured at the terminals of the transmitter in volts (± 5 %).
Loop current (HART-devices from SW-Rev.: 03.00)	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 1 / 2	Largest measured value on 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	Smallest measured value on 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 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.

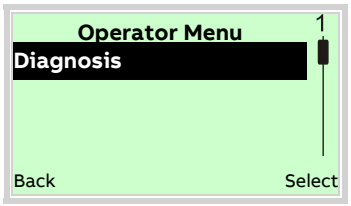
* For HART devices in tools such as FIM and DTM

Calling up the error description

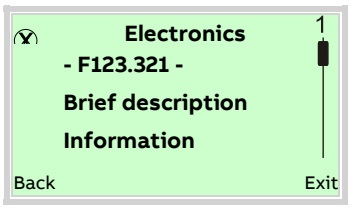
For devices with PROFIBUS PA, FOUNDATION Fieldbus and HART® from SW-Rev.:3.00

Additional details about the error that has occurred can be called up on the information level.

1. Use to switch to the information level (Operator Menu).



2. Use / to select the submenu ‘Diagnosis’.
3. Confirm the selection with .



The error message is shown on the display according to priority.
The first line shows the area in which the error has occurred.
The second line shows the unique error number. It is made up of the priority (Fxxx) and the error position (.xxx)
The next lines show a brief description of the error and information on how to remedy it.
You absolutely need to scroll the display further to read the error message in more detail.

Note
For a detailed description of the error messages and information on troubleshooting, see the following pages.

… 11 Diagnosis / error messages

Possible error messages – HART® devices to SW-Rev.: 01.03

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 display connected	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	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	Range exceeded, sensor 1	Check measuring limits
Sensor	F	38	Range undershot, sensor 1	Check measuring limits
Installation / Configuration	I	41	Single-point adjustment active, sensor 1	Terminate single-point adjustment
Installation / Configuration	I	42	Two-point adjustment active, sensor 1	Terminate two-point adjustment
Sensor	F	50	Measuring error, sensor 2	Check sensor connection
Sensor	F	51	Short-circuit, sensor 2	Check sensor connection
Sensor	F	52	Wire break, sensor 2	Check sensor connection
Sensor	F	53	Range exceeded, sensor 2	Check measuring limits
Sensor	F	54	Range undershot, sensor 2	Check measuring limits
Installation / Configuration	F	65	Configuration defective	Check configuration: A Wrong device B Measuring span is too small C Incorrect configuration data

Range	Displays the device status	Displays the DIAG.NO.	Cause	Remedy
Sensor	M	66	No sensor 1 detected during redundancy configuration	Check connection
Sensor	M	67	No sensor 2 detected during 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	Error in the application	Check configuration, connections; reset to factory settings
Installation / Configuration	I	74	Analog output adjustment active	Terminate compensation
Installation / Configuration	C	75	Analog output in simulation	Terminate simulation
Operating conditions	S	76	Values overshot	Check parameters: A) Sensor limits overshot 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

Note

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

… 11 Diagnosis / error messages

Possible error messages – HART® devices from SW-Rev.: 03.00

Note
The listed causes for a device status message correspond to the delivery status.They can be configured freely in Tools in the "Diagnosis/NAMUR configuration" menu, see COM/TTX300/HART interface description.

Range	Device status message (on the display)	Cause	Remedy
Sensor	Line resistance S1 too high	Maintenance required	Check sensor or replace / repair sensor
Sensor	S1 short-circuit	Maintenance required	Check sensor or replace / repair sensor
Sensor	S1 Wire break / sensor break	Maintenance required	Check sensor or replace / repair sensor
Sensor	S1 Single-point trim is active	Check function	
Sensor	S1 Two-point trim is active	Check function	
Sensor	Line resistance S2 too high	Maintenance required	Check sensor or replace / repair sensor
Sensor	S2 short-circuit	Maintenance required	Check sensor or replace / repair sensor
Sensor	S2 Wire break / sensor break	Maintenance required	Check sensor or replace / repair sensor
Sensor	S2 Single-point trim active	Check function	
Sensor	S2 Two-point trim active	Check function	
Sensor	Redundancy:S1 not available	Maintenance Required	Check sensor or replace / repairsensor S1
Sensor	Redundancy:S2 not available	Maintenance Required	Check sensor or replace / repairsensor S2
Sensor	Sensor drift detected	Maintenance required	Check Sensor/ connection / trim / drift parameter
Sensor	Error in the application	Failure	Check sensor connection / check HART variable mapping
Operation	Diagnostics is simulated	Check function	Terminate / come out of simulation
Operation	Analog output fixed / simulated	Check function	Terminate / come out of simulation
Operation	Application warning	Check function	Load valid parameter restart (reset) check S1 / S2
Electronics	Electronics temp. measurement failure	Failure	Restart (RESET) or replace transmitter
Electronics	Electronics temp. out of spec.	Out of specification	Observe spec. ambient temp. range
Electronics	Non-volatile data defect	Failure	Restart (RESET) or replace transmitter
Electronics	Non-vol. 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
Electronics	Device locked	No Alarm	Reset key value
Process	S1 over sensor range	Maintenance required	Check sensortype use diff. sensor if required
Process	S1 under sensor range	Maintenance required	Check sensortype use diff. sensor if required
Process	S2 over sensor range	Maintenance required	Check sensortype use diff. sensor if required
Process	S2 under sensor range	Maintenance required	Check sensortype use diff. sensor if required
Process	High limit: Alarm	Out of specification	Verify process or change limit value
Process	Low limit: value 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	Parameterization / config. failure	Failure	Load valid param restart (RESET), reset to factory

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 – PROFIBUS PA® and FOUNDATION Fieldbus®

Range	Device status message (on the display)	Cause	Remedy
Sensor	Sensordrift	Outside of the 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 measuring range overflow	Outside of the specification	Adapt S1 measuring range to suit measuring task
Operating conditions	S1 measuring range underflow	Outside of the specification	Adapt S1 measuring range to suit measuring task
Operating conditions	S2 measuring range overflow	Outside of the specification	Adapt S2 measuring range to suit measuring task
Operating conditions	S2 measuring range underflow	Outside of the specification	Adapt S2 measuring range to suit measuring task
Operating conditions	Device temperature out of spec.	Outside of the specification	Check environment; reposition measuring point if required
Electronics	Device error	Error	Replace device
Electronics	Device not calibrated	Outside of the specification	Calibrate device
Electronics	Device being simulated	Function check	Terminate simulation
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

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

12 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 12.

13 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 78) 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.).

Address for return shipment:
Please contact Customer Center Service acc. to page 5 for nearest service location.

14 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.

15 Specification

Note

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

16 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

PROFIBUS and PROFIBUS PA are registered trademarks of PROFIBUS & PROFINET International (PI)

FOUNDATION Fieldbus is a registered trademark of FieldComm Group, Austin, Texas, USA.

17 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

3KXT231001R4201

OI/TTH300-EN Rev. I 03.2023