TTD300

Dual compartment temperature transmitter

Safety instructions for use in harzadous areas in accordance with cFMus

Measurement made easy

TTD300

Introduction

Safety Instruction for dual compartment temperature transmitter.

This document must be considered in conjunction with related operating instructions.

Additional Information

Additional documentation on TTD300 is available for download free of charge at www.abb.com/temperature.

Alternatively simply scan this code:

Search for or click on:

Data Sheet TTD300	DS/TTD300-EN
Operating Instruction TTD300	OI/TTD300-EN
Commissioning instruction TTD300	CI/TTD300-EN

3KXT221305R4801

Table of Contents

1 Safety

1.1 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.

1.2 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.

1.3 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.

1.4 Improper use

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

- For use as a climbing aid, for example for mounting purposes.
- For use as a bracket for external loads, for example as a support for piping, etc.
- 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.

1.5 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.

1.6 Manufacturer’s address

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

ABB Limited
Measurement & Analytics
Peenya Industrial Area
Bangalore-560058
India
Tel: 1800 420 0707 – Toll free
Tel: +91 80 67143000 – International
Email: contact.center@in.abb.com

1.7 Service address

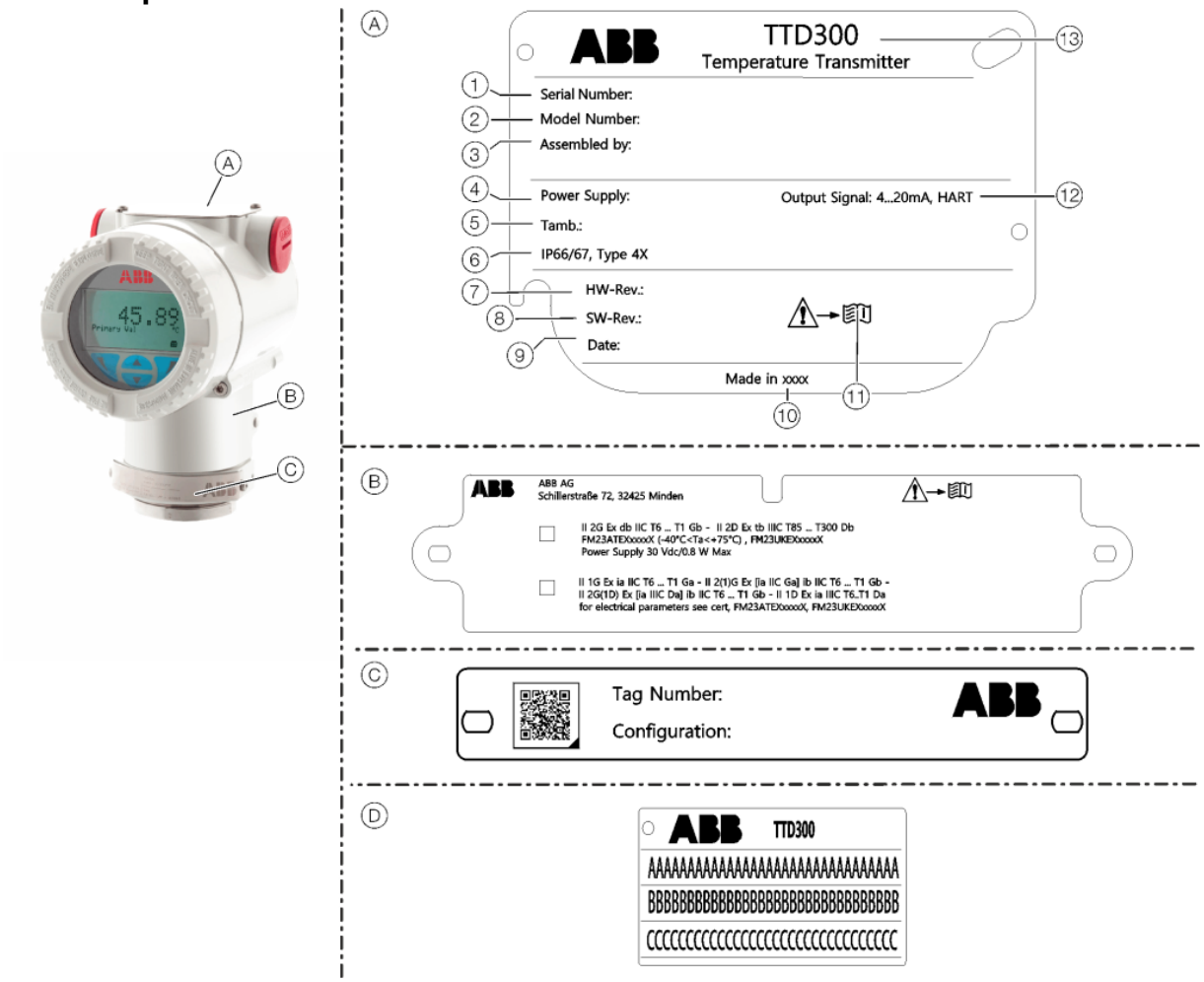
Customer service center
Tel: +49 180 5 222 580
Email: automation.service@de.abb.com

To find your local ABB contact visit
www.abb.com/contacts

For more information visit:
www.abb.com/measurement

2 Product identification

2.1 Name plate



(A) Name plate
(B) Certification plate
(C) Tag plate (tag number)
(D) Optional wired-on stainless steel plate
(1) Serial number
(2) Model number
(3) Manufacturer adress
(4) Power supply
(5) Ambient temperature range, on additional plate for Ex versions
(6) IP rating of housing
(7) Hardware version
(8) Software revision
(9) Manufacturing year - week
(10) Country of manufacture
(11) 'Follow product documentation' symbol
(12) Output signal and communication protocol of the transmitter
(13) Type designation / model

Figure 1: Name and tag plates

The instrument is identified by the device identification plates shown in **Figure 1**.

The name plate Ⓐ, always made of stainless steel, AISI 316L (1.4404) provides information concerning the model code, maximum working temperature, power supply, serial number.

The certification plate Ⓑ contains the certification related parameters for use in hazardous areas. Please refer to the appropriate Safety Instruction for the corresponding information.

Note
Unmarked devices must NOT be commissioned.

The tag plate Ⓒ provides customer tag number and calibrated range.

Both certification and tag plates are supplied as self-adhesive labels as standard. Optional these plates are available in stainless steel, AISI 316L (1.4404).

Note

- The ambient temperature range specified on the name plate refers only to the transmitter itself and not to the measuring element used in the measuring inset.
- For all information related to explosion protection, please refer to the corresponding Safety Instructions.
- The device identification plates displayed are examples. The device identification plates affixed to the device can differ from this representation.

2.2 Additional identification plate

The device can be supplied with a wired-on stainless steel plate Ⓓ which is permanently laser printed with a custom text specified in phase of order.

The available space consists in 3 lines with 30 characters per line.

2.3 Certification plate for devices with one or more types of protection

Devices with an explosion-protected design are marked with the following additional plates:

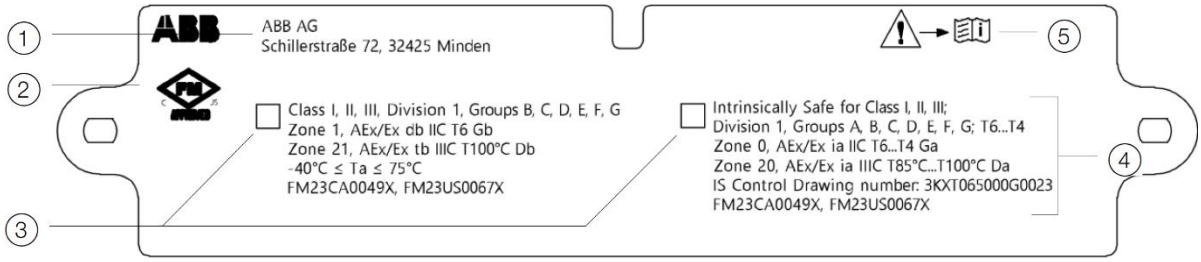


Figure 2: Certification plate for explosion-protected devices (example)

1. Certificate owner
2. Ex marking
3. Checkboxes for marking the type of protection used
4. Certification details with:
   - Protection class of the explosion-proof design (explosion protection marking)
   - Temperature class of the explosion-proof design
   - Approval number
5. 'Follow product documentation' symbol

⚠ WARNING

In the case of combined approvals, the user must

- decide on the type of protection during installation and
- read and observe the information in the relevant chapter.

NOTICE

Note for temperature transmitters with multiple types of protection

- Before the transmitter is installed, the selected type of protection must be indelibly marked on the explosion protection certification plate.
- The transmitter can then only be operated with this type of protection throughout its entire service life.
- If two protection types are indelibly marked on the explosion protection certification plate, the transmitter must not be used in areas categorized as hazardous.

3 Overview of explosion protection approvals

Type of protection "Intrinsic Safety (Ex ia / Ex ib)"

Approval	Model Code
ATEX	E1
IECEx	H1
FM (USA and Canada)	L1

Type of protection "Flameproof enclosures (Ex db)" & "Protection by enclosure (Ex tb)"

Approval	Model Code
ATEX	E3
IECEx	H5
FM (USA and Canada)	L3

Type of protection "Increased Safety (Ex ec)" & "Protection by enclosure (Ex tc)"

Approval	Model Code
ATEX	E5
IECEx	H2
FM (USA and Canada)	L2

Combined approval

Approval	Model Code
ATEX	E4 = E1 or E3
IECEX	H9 = H1 + H5
FM (USA and Canada)	L7 = L1 or L3

4 General information applicable for all types of protection

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).Special regulations must be observed in potentially explosive atmospheres as regards the power supply, signal inputs / outputs and ground connections. The information relating specifically to explosion protection that appears within the individual chapters must be observed.

All parts must be installed in accordance with the manufacturer's specifications, as well as relevant standards and regulations. For commissioning and operation, the respectively applicable regulations, especially for the protection of employees, should be complied with.

4.1 Specific Conditions of Use

- The service temperature inside the enclosure of the TTD300 and TTD300-N temperature transmitter represents the specified permissible ambient temperature. With the installation it shall be ensured that this service temperature cannot be exceeded.
- If the temperature is greater than 60°C (140°F) on the cable entries or at the cable branching point, cables with an appropriately specified temperature rating shall be used and an appropriately specified cable gland shall be installed.
- When the manufacturer of the equipment has not identified the type of protection on the label, the user shall, on installation, mark the label with the type of protection used. Once the type of protection has been marked it shall not be changed.

4.2 Ex marking

- Further information on the approval of devices for use in potentially explosive atmospheres can be found in the corresponding certificates (at www.abb.com/temperature).
- Depending on the design, a specific marking in accordance with cFMus 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.
- Devices with several types of protection may only be operated in one of the possible types of protection.

4.3 Installation instructionsNote

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 -TTD300 – Control drawings

4.4 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.

4.5 Operating instructions

Protection against electrostatic discharges
The painted surface of the housing and the plastic parts inside the device can store electrostatic charges.

The temperature transmitter must be installed, operated and maintained in such a way as to avoid the occurrence of electrostatic charging.

⚠ WARNING

Risk of explosion!
- The device must not be used in areas in which process-related electrostatic charging of the housing may occur.
- The device must be installed, maintained and cleaned such that any dangerous electrostatic charge is avoided.

4.6 Repair

⚠ DANGER

Explosion hazard
- Explosion hazard due to improper repair of the device. Faulty devices must not be repaired by the operator.
- The device may only be repaired by the ABB Service Department.

5 Specific information for “Intrinsic safety”

5.1 Ex marking

Approved for

Class I, II, & III, Division 1
Class I, Zone 0, Zone 20

Model TTD300(-N)-L1	
Certificate of conformity	FM23US0067X
	FM23CA0049X
Control drawing	IS 3XT065000G0023
IS Class I, II, III; Division 1, Groups A, B, C, D, E, F, G; T6...T4	
Zone 0, AEx/ Ex ia IIC T6...T4 Ga	
Zone 20, AEx/Ex ia IIIC T85°C...T100°C Da	
Entity – 3KXT065000G0023	
-40°C ≤ Ta ≤ 85°C (-50°C for option “SE”)	

5.2 Specific Conditions of use

- For Intrinsic Safety the temperature code and ambient temperatures are as follows:
  - T* = Temperature Code T6 or T5 for a Maximum Ambient Temperature of 56°C
  - T* = Temperature Code T4 for a Maximum Ambient Temperature of 85°C
  - T* = Temperature Code T85°C for a Maximum Ambient Temperature of 70°C
  - T* = Temperature Code T100°C for a Maximum Ambient Temperature of 85°C
- The apparatus enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.
- With integral surge / transient protector (Option n = P1) the TTD300 and TTD300-N do not provide 500 V rms isolation between circuitry and earth. Care shall be taken to ensure that ignition-capable earth currents, resulting from dissimilar earth potentials, do not occur between the intrinsically safe apparatus and the associated apparatus.

Inadmissible electrostatic charge of the plastic housing of the LCD indicator shall be prevented.

5.3 Temperature data

Transmitter

Temperature class	**Permissible ambient temperature range**
T6, T5	−50 to 56 °C (−58 to 132.8 °F)
T4 to T1	−50 to 85 °C (−58 to 185.0 °F)
T85°C	−50 to 70 °C (−58 to 158 °F)
T100°C	−50 to 85 °C (−58 to 185.0 °F)

5.4 Electrical data

Supply circuit	**TTD300**(-N)**-E1** **TTD300**(-N)**-H1**
Max. voltage	U_i = 30 V
Short-circuit current	I_i = 130 mA
Max. power	P_i = 0.8 W
Internal inductance	L_i = 160 µH
Internal capacitance	C_i = 3.5 nF

Measurement current circuit		
	Resistance thermometers, resistors (passive sensors)	**Thermocouples, voltages (active sensors)**
Max. voltage	U_o = 6.5 V	U_o = 1.2 V
Short-circuit current	I_o = 17.8 mA	I_o = 50 mA
Max. power	P_o = 29 mW	P_o = 60 mW
Internal inductance	L_i ≈ 0 mH (negligible)	L_i ≈ 0 mH (negligible)
Internal capacitance	C_i = 55 nF	C_i = 55 nF
Maximum permissible external inductance	L_o = 5 mH	L_o = 5 mH
Maximum permissible external capacitance	IIC: C_o = 1.65 µF IIB / IIIC: C_o = 8.85 µF	IIC: C_o = 1.15 µF IIB / IIIC: C_o =6.35 µF

5.5 Installation instructions

5.5.1 Grounding

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

5.5.2 Material compatibility

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).

6 Specific information for “Explosionproof / Flameproof enclosures” and “Dust-ignition proof / Protection by enclosure”

6.1 Ex marking

Approved for

Class I, II, & III, Division 1
Class I, Zone 1, Zone 21

Model TTD300(-N)-L3	
Certificate of conformity	FM23US0067X
	FM23CA0049X
Control drawing	XP / IS Outout 3XT065000G0023
XP Class I, Division 1, Groups B, C, D; T6	
DIP Class II, III; Division 1, Groups E, F, G; T6	
Zone 1, AEx/ Ex db IIC T6 Gb	
Zone 21, AEx/Ex tb IIIC T85°C...T100°C Db	
-40°C ≤ Ta ≤ 85°C (-50°C for option “SE”)	

6.2 Specific Conditions of Use

- Contact the manufacturer for specific flamepath joint details during repair of flameproof Ex db apparatus.

6.3 Temperature data

Temperature class	**Permissible ambient temperature range on the connection head**
T6	−50 to 75 °C (−58 to 167 °F)
T100°C	−50 to 75 °C (−58 to 167 °F)

6.4 Electrical data

Supply circuit	
Maximum voltage	U_S = 30 V
Maximum current	I_s = 32 mA, limited by the upstream fuse (rated fuse current 32 mA)

Measurement current circuit	
Maximum voltage	U_O = 6.5 V
Maximum current	I_O = 17.8 mA
Maximum power	P_O = 29 mW

6.5 Operating Instruction

⚠ DANGER

Risk of explosion due to hot parts

Hot parts inside the device pose an explosion hazard.

- Never open the device immediately after switch-off.
- A waiting time of at least four minutes should be observed before opening the device.

⚠ DANGER

Explosion hazard when opening the device

Explosion hazard when opening the device with activated power supply.

- Before opening the device, switch off the power supply.

⚠ DANGER

Explosion hazard when damaging the flameproof thread

The cover thread is used as a flameproof joint for the ‘Flameproof (enclosure) – Ex d’ type of protection.

- During assembly / disassembly of the device, make sure that the cover thread does not get damaged.• Devices with damaged threads must no longer be used in potentially explosive atmospheres.

6.6 Repair

⚠ DANGER

Explosion hazard when damaging the flameproof thread

Repairs on flameproof joints are not permitted.

7 Specific information for “Increased safety” and “Protection by enclosure”

7.1 Ex marking

Approved for

Class I, II, & III, Division 2
Class I, Zone 2, Zone 22

Model TTD300(-N)-L2	
Certificate of conformity	FM23US0067X
	FM23CA0049X
Control drawing	NI Outout 3XT065000G0023
NI Class I Division 2, Groups A, B, C, D T6, T5, T4	
NI Class II, III, Division 2, Groups E, F, G, T6, T5, T4	
Zone 2, AEx / Ex ec IIC T6...T4 Gc	
Zone 22, AEx / Ex tc IIIC T85°C...T100°C Dc	
-40°C ≤ Ta ≤ 85°C (-50°C for option “SE”)	

7.2 Temperature data

Temperature class	**Permissible ambient temperature range on the connection head**
T6 to T41	−50 to 85 °C (−58 to 185 °F)
T85°C ...T100°C	−50 to 85 °C (−58 to 185 °F)

7.3 Electrical data

Supply circuit	
Maximum voltage	U_S = 30 V
Maximum current	I_s = 32 mA, limited by the up-stream fuse (rated fuse current 32 mA)
Measurement current circuit	
Maximum voltage	U_O = 6.5 V
Maximum current	I_O = 17.8 mA
Maximum power	P_O = 29 mW

Notes

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ABB Measurement & Analytics

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

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

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