



Member of the FM Global Group

FM Approvals
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CERTIFICATE OF COMPLIANCE

HAZARDOUS LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

Model TTH300-ab, Temperature Transmitter

IS/I,II,III/1/ABCDEFGH/ T* ; — SAP_214829; Entity; I/0/AEx ia IIC; T*-SAP_214829;NI/II/2/ABCD/ T*; NI/2/II T*=Ta*-SAP_214831; S/II,III/2/EFG T*.

Entity Parameters:

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$ $C_i=5nF$, $L_i=500\mu H$

Output Terminals(1,2,3,4,5 and 6)

Group AB $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=1.55\mu F$, $L_a=5mH$

Group CD $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=8.75\mu F$, $L_a=5mH$

Output Terminals (JP1)

$V_{oc}=6.2v$, $I_{sc}= 65.2mA$, $P_o= 101mW$ $C_a=1.4\mu F$, $L_a=5mH$

NonIncendive Field Wiring parameters

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$

a = Type of protection; L1 or L2.

b = Communication Protocol; H.

Special Conditions of Use:

1. The Model TTH300 must be used with an IP54 NRTL certified enclosure.

2. For Intrinsic Safety and Non Incendive Approvals the Temperature code and Ambient temperatures are as follows:

T*=Temperature Code T6 for a Maximum Ambient Temperature of 56°C.

T*=Temperature Code T5 for a Maximum Ambient Temperature of 71°C

T*=Temperature Code T4 for a Maximum Ambient Temperature of 85°C.

Model TTF300-abcd, Temperature Transmitter

IS/I,II,III/1/ABCDEFGH/ T* ; — SAP_214832; Entity; I/0/AEx ia IIC; T*-SAP_214832;NI/II/2/ABCD/ T*; NI/2/II T*=Ta*-SAP_214828; S/II,III/2/EFG T**, XP/II/ABCD/ T*; DIP/II,III/EFG/ T**, Type 4X; IP66, IP67

Entity Parameters:

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$ $C_i=5nF$, $L_i=500\mu H$

Output Terminals(1,2,3,4,5 and 6)

Group AB $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=1.55\mu F$, $L_a=5mH$

Group CD $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=8.75\mu F$, $L_a=5mH$

Output Terminals (JP1)

$V_{oc}=6.2v$, $I_{sc}= 65.2mA$, $P_o= 101mW$ $C_a=1.4\mu F$, $L_a=5mH$

NonIncendive Field Wiring parameters

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$

a = Type of protection; L1 or L2.

b = Housing/Display; A, B, C, D.

c = Cable Entry; 1,2,3.Certificates CS

d = Communication protocol; H.

Special Conditions of Use:

1. For Intrinsic Safety and Non Incendive Approvals the Temperature code and Ambient temperatures are as follows:

T*=Temperature Code T6 for a Maximum Ambient Temperature of 44°C.

T*=Temperature Code T5 for a Maximum Ambient Temperature of 56°C

T*=Temperature Code T4 for a Maximum Ambient Temperature of 84°C.

2. For Explosionproof and Dust-Ignitionproof Approvals the Temperature code and Ambient temperatures are as follows:

T**=Temperature Code T6 for a Maximum Ambient Temperature of 56°C.

T**=Temperature Code T5 for a Maximum Ambient Temperature of 71°C

T**=Temperature Code T4 for a Maximum Ambient Temperature of 85°C.

Model TTH200-ab, Temperature Transmitter

IS/I,II,III/1/ABCDEFGF/ T* ; — TTH200-L1H; Entity; I/0/AEx ia IIC; T*-TTH200-L1H;NI/II/2/ABCD/ T*; NI/2/II

T*=Ta=*-TTH200-L2H; S/II,III/2/EFG T*.

Entity Parameters:

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$ $C_i=5nF$, $L_i=500\mu H$

Output Terminals(1,2,3,4,5 and 6)

Group AB $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=1.55\mu F$, $L_a=5mH$

Group CD $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=8.75\mu F$, $L_a=5mH$

Output Terminals (JP1)

$V_{oc}=6.2v$, $I_{sc}= 65.2mA$, $P_o= 101mW$ $C_a=1.4\mu F$, $L_a=5mH$

NonIncendive Field Wiring parameters

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$

a = Type of protection; L1 or L2.

b = Communication Protocol; H.

Special Conditions of Use:

1. The Model TTH200 must be used with an IP54 NRTL certified enclosure.

2. For Intrinsic Safety and Non Incendive Approvals the Temperature code and Ambient temperatures are as follows:

T*=Temperature Code T6 for a Maximum Ambient Temperature of 56°C.

T*=Temperature Code T5 for a Maximum Ambient Temperature of 71°C

T*=Temperature Code T4 for a Maximum Ambient Temperature of 85°C.

Model TTF350-abcdef, Temperature Transmitter

IS/I,II,III/1/ABCDEFGF/ T* ; — TTF350-L4; Entity; I/0/AEx ia/IIC; T*-TTF350-L4;NI/II/2/ABCD/ T*;

NI/2/II T*=Ta=*-TTF350-L5; S/II,III/2/EFG T**, XP/II/ABCD/ T*; DIP/II,III/EFG/ T**; Type 4X; IP66

IP67.

Entity Parameters:

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$ $C_i=5nF$, $L_i=500\mu H$

Output Terminals(1,2,3,4,5 and 6)

Group AB $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=1.55\mu F$, $L_a=5mH$

Group CD $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=8.75\mu F$, $L_a=5mH$

Output Terminals (JP1)

$V_{oc}=6.2v$, $I_{sc}= 65.2mA$, $P_o= 101mW$ $C_a=1.4\mu F$, $L_a=51mH$

NonIncendive Field Wiring parameters

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$

a = Type of protection; L3 or L4 or L5.

b = Housing/Display; N, or R.

c = Cable Entry; 5,6 or 8.

d = Communication protocol; H.

Special Conditions of Use:

1. For Intrinsic Safety and Non Incendive Approvals the Temperature code and Ambient temperatures are as follows:

T*=Temperature Code T6 for a Maximum Ambient Temperature of 44°C.

T**=Temperature Code T5 for a Maximum Ambient Temperature of 56°C.

T*=Temperature Code T4 for a Maximum Ambient Temperature of 84°C.

2. For Explosionproof and Dust-Ignitionproof Approvals the Temperature code and Ambient temperatures are as follows:

T**=Temperature Code T6 for a Maximum Ambient Temperature of 56°C.

T**=Temperature Code T5 for a Maximum Ambient Temperature of 71°C.

T**=Temperature Code T4 for a Maximum Ambient Temperature of 85°C.

Model TTR200-ab, Temperature Transmitter

IS/I,II,III/1/ABCDEFGFG/ T* ; — TTR200-L6H(IS); Entity; I/O/AEx ia/IIC; T*- TTR200-L6H(IS)

;NI/II/2/ABCD/ T*; NI/2/II T*=Ta=*-TTR200-L6H(NI).

Entity Parameters:

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$ $C_i=5nF$, $L_i=500\mu H$

Sensor Terminals(1,2,3,4,5 and 6)

Group AB $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=1.55\mu F$, $L_a=5mH$

Group CD $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=8.75\mu F$, $L_a=5mH$

Display Connector

$V_{oc}=6.2v$, $I_{sc}= 65.2mA$, $P_o= 101mW$ $C_a=1.4\mu F$, $L_a=5mH$

NonIncendive Field Wiring parameters

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$

a = Type of protection; L6.

b = Communication protocol; H.

Special Conditions of Use:

1. For Intrinsic Safety and Non Incendive Approvals the Temperature code and Ambient temperatures are as follows:

T*=Temperature Code T6 for a Maximum Ambient Temperature of 56°C.

T*=Temperature Code T5 for a Maximum Ambient Temperature of 71°C.

T*=Temperature Code T4 for a Maximum Ambient Temperature of 85°C.

2. For a Class II,III rating the instrument is required to be mounted into an Class II, Class III rated enclosure that is compliant to ANSI/ISA 61010 standard.

Model TTR300-ab, Temperature Transmitter

IS/I,II,III/1/ABCDEFGFG/ T* ; — TTR300-L6H(IS); Entity; I/O/AEx ia/IIC; T*- TTR300-L6H(IS)

;NI/II/2/ABCD/ T*; NI/2/II T*=Ta=*-TTR300-L6H(NI).

Entity Parameters:

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$ $C_i=5nF$, $L_i=500\mu H$

Sensor Terminals(1,2,3,4,5 and 6)



Group AB $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=1.55\mu F$, $L_a=5mH$
Group CD $V_{oc}=6.5v$, $I_{sc}= 25.0mA$, $P_o= 38mW$ $C_a=8.75\mu F$, $L_a=5mH$

Display connector

$V_{oc}=6.2v$, $I_{sc}= 65.2mA$, $P_o= 101mW$ $C_a=1.4\mu F$, $L_a=5mH$

NonIncendive Field Wiring parameters

$V_{max}=30v$, $I_{max}= 130mA$, $P_{max}= 0.8W$

a = Type of protection; L6.

b = Communication protocol; H.

Special Conditions of Use:

1. For Intrinsic Safety and Non Incendive Approvals the Temperature code and Ambient temperatures are as follows:

T*=Temperature Code T6 for a Maximum Ambient Temperature of 56°C.

T*=Temperature Code T5 for a Maximum Ambient Temperature of 71°C

T*=Temperature Code T4 for a Maximum Ambient Temperature of 85°C.

2. For a Class II,III rating the instrument is required to be mounted into an Class II, Class III rated enclosure that is compliant to ANSI/ISA 61010 standard.

Equipment Ratings:

The TTF350, TTH300, TTH200, TTF300, TTR200 and TTR300 Series Temperature Transmitters are FM Approved for Intrinsic Safety for Class I, II, III, Division 1, Groups A, B, C, D, E, F and G; Non Incendive for Class I, Division 2, Groups A, B, C, D and Suitable for Class II, III, Division 2, Groups E, and G when connected in conjunction with Control Drawings SAP_214828, SAP_214829, SAP_214830, SAP_214831, SAP_214832, TTH200-L1H, TTH200-L2H, TTF350-L4...H(1), TTF350-L4...H(2), TTF350-L5...H(1), TTF350-L5...H(2), . TTR200-L6H(IS), TTR300-L6H(IS), TTR200-L6H(NI) and TTR300-L6H(NI).

In addition, the TTF300 and TTF350Temperature Transmitter is FM Approved for Explosionproof For Class I, Division 1, Groups A, B, C and D and Dust-Ignition Proof for Class II, III, Division 1, Groups E, F and G Hazardous(classified) Locations Indoors and Outdoors Type 4X, IP66, IP67.

FM Approved for:

ABB Automation Products GmbH
Alzenau, Germany



This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
Class 3610	1999
Class 3611	2004
Class 3615	2006
Class 3616	1989
ISAS12.00.01	2002
Class 3810	2005
Nema 250	2003
IEC60529	2004

Original Project ID: 3027610

Approval Granted: January 5, 2007

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
070801	November 2, 2007		
3028938	December 10, 2007		
3031178	October 9, 2008		

FM Approvals LLC



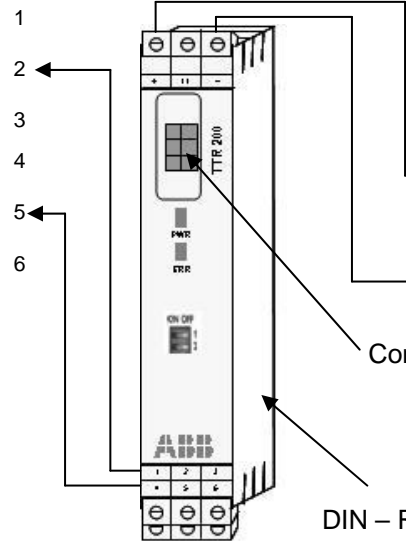
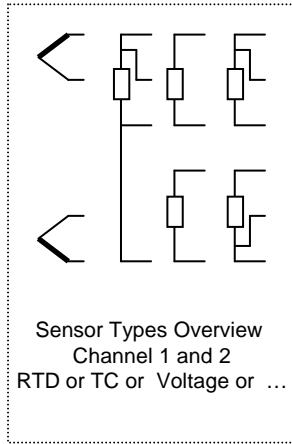
James E. Marquedant
Group Manager, Electrical

9 October 2008

Date

Hazardous Location

Sensors must be FM approved or be a simple apparatus. Simple apparatus is a device which will neither generate or store more than 1.5 V; 0.1 A; 25 mW or 20 μJ such as switches; RTD's, TC or LED's

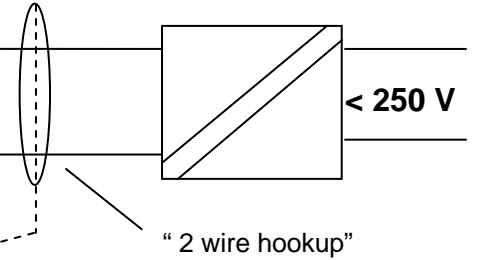


Apparatus Input Values
I. S. V max ≤ 30.0 V DC ;
I max ≤ 130 mA ; Pi ≤ 0.8W
Ci = 5nF Li = 0,5mH

Connector for HMI / Display – Interface
w/wo FM approved HMI

Non – Hazardous Location

Barrier Galvanic Isolator



- Barrier or Galvanic Isolator must be FM approved and must be installed in accordance with manufactures instructions.
- Barrier or Galvanic Isolator parameters must meet the following Requirements :
- Voc or Vt ≤ V max; Ca ≥ Ci + Ccable;
Isc or It ≤ I max; La ≥ Li + Lcable
Po or Pt ≤ P max
- Maximum non hazardous area voltage must not exceed 250V
- Install in accordance with the NEC (ANSI/NFPA 70) and ANSI/ISA RP12.6. “ Installation of intrinsically safe systems” Do not alter without FM authorization

I.S. Sensor Field Circuit Entity Parameters

Voc = 6.5 V; Isc < 25.0 mA; Po = 38 mW
Tem. Ident. for Class I Div. 1 and Div. 2; Groups A,B,C,D
T6 at Tamb = 56 °C; T5 at Tamb = 71 °C;
T4 at Tamb = 85 °C
Tem. Ident. For Class I Zone 0 AEx ia IIC
T6 at Tamb = 44 °C; T5 at Tamb = 56 °C;
T4 at Tamb = 84 °C
Terminals: 1,2,3,4,5,6
GP: A,B Ca = 1.55 μF; La = 5.0 mH
C,D Ca = 8.75 μF; La = 5.0 mH

HMI / Display Interface

Intrinsically Safe Output Parameters
Voc = 6.2 V; Isc < 65.2 mA; Po = 101 mW
Class I Div 1 and Div 2; ; Groups: A,B,C,D or
Class I Zone 0 AEx ia IIC
Terminals: 6 PIN Connector
GP A,B Ca = 1.3 μF; La = 5.0 mH
C,D Ca = 8.8 μF; La = 5.0 mH

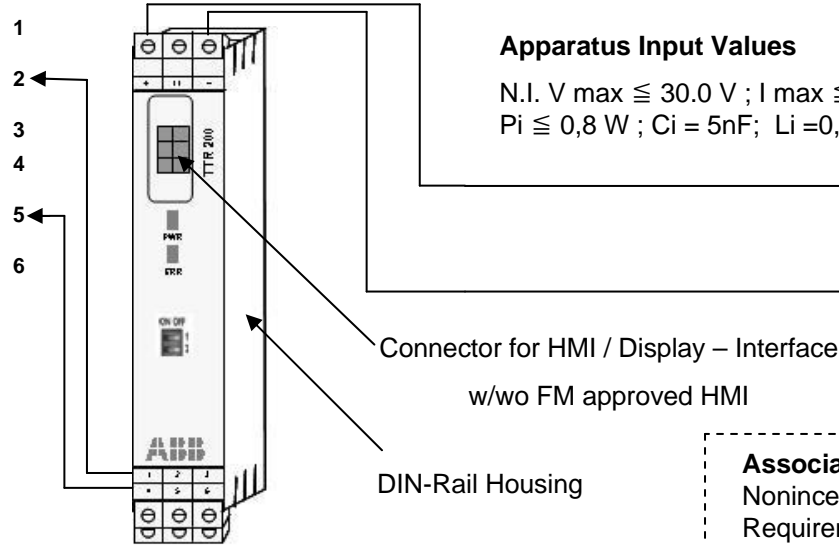
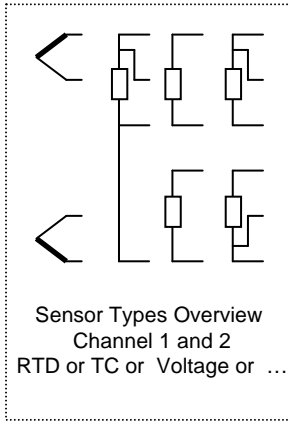
Temperature Transmitter Type “TTR200”,
Ordering Code “TTR200-L6H...” or
Temperature Transmitter Type “TTR300”,
Ordering Code “TTR300-L6H.. for
installation in Div. 1 Class II and III must be
used with an NRTL certified enclosure.

Warning: Resistance between barrier ground and earth ground must be less then 1.0 Ohm!

				Title:		Scale:	
				TTR200 and TTR300 HART I.S. Temperature Transmitter Control Drawing		-----	
				Approv.	05.07.07	Müller	
				Date		Name	
				 Automation Products		Drawing / Part No.:	
						TTR200-L6H (I.S.) TTR300-L6H (I.S.)	
1.00	Release	05.07.07	Zeiger	Replacement of: -----			
Rev.	Desc.	Date	Name				

Hazardous Location

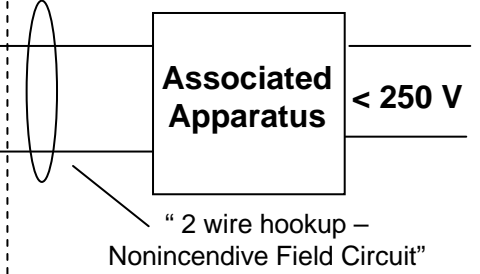
The sensor must be FM approved or be a simple apparatus. Simple apparatus is a device which will neither generate or store more than 1.5 V; 0.1 A; 25 mW or 20 μJ such as switches; RTD's, TC or LED's



Apparatus Input Values

N.I. $V_{max} \leq 30.0 V$; $I_{max} \leq 130 mA$;
 $P_i \leq 0,8 W$; $C_i = 5nF$; $L_i = 0,5mH$

Non – Hazardous Location



Associated Apparatus

Nonincendive Parameters must meet the following Requirements :

V_{oc} or $V_t \leq V_{max}$; $C_a \geq C_i + C_{cable}$;
 I_{sc} or $I_t \leq I_{max}$; $L_a \geq L_i + L_{cable}$

The temperature transmitter is FM approved for nonincendive field circuits when installed per national electrical code (NEC) article 501-4(B) exception or 502-4(B) exception with FM approved nonincendive field circuit output apparatus which meet the parameters indicated below. Article 501-4(B)/502-4(B)

Exception: Wiring in nonincendive circuits shall be permitted using any of the methods suitable for wiring in ordinary locations !

FM nonincendive field circuit approval

Temp.Ident:T6 at Tamb = 56 °C;

T5 at Tamb = 71 °C;

T4 at Tamb = 85 °C;

Cass I Div 2; Groups: A,B,C,D or

Cass 1 Zone 2 Group IIC T6

Sensor Field Circuit Entity Parameters

$V_{oc} = 6.5 V$; $I_{sc} < 25.0 mA$; $P_o = 38 mW$

Terminals: 1,2,3,4,5,6

GP: A,B = $C_a = 1.55 \mu F$; $L_a = 5.0 mH$

C,D = $C_a = 8.75 \mu F$; $L_a = 5.0 mH$

Temperature Transmitter Type “TTR200”, Ordering Code “TTR200-L6H..” or Temperature Transmitter Type “TTR300” Ordering Code “TTR300-L6H..” for installation in Div.2 Class II and III must be used with an NRTL certified enclosure.

HMI / Display Interface Output Parameters

N.I. Cass I Div 2; Group: A,B,C,D or

N.I. Class 1 Zone 2 Groups IIC T6

$V_{oc} = 6.2 V$; $I_{sc} < 65.2 mA$; $P_o = 101 mW$

Terminals: 6 PIN Connector

GP A,B $C_a = 1.3 \mu F$; $L_a = 5.0 mH$

C,D $C_a = 8.8 \mu F$; $L_a = 5.0 mH$

					Title: TTR200 and TTR300 HART N. I. Temperature Transmitter Control Drawing		Scale: -----
				Approv.	05.07.07	Müller	
				Date		Name	
						Drawing / Part No.:	Page : of
						TTR200-L6H (N.I.) TTR300-L6H (N.I.)	1 / 1
1.00	Release	05.07.07	Zeiger	Replacement of: -----			
Rev.	Desc.	Date	Name				