



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx QPS 23.0009X** Page 1 of 3 [Certificate history:](#)

Status: **Current** Issue No: 0

Date of Issue: 2023-07-18

Applicant: **JUMO-REGULATION SAS**
7 Rue des Drapiers
Metz 57075
France

Equipment: **Temperature assemblies series I... and TB.97-XD**

Optional accessory:

Type of Protection: **Ex i, Ex d, Ex t**

Marking: **IECEx QPS 23.0009X**

II 1 G Ex ia IIC T6...T1 Ga
II 1/2G Ex ia IIC T6...T1 Ga/Gb
II 1/2 D Ex ia IIIC T₂₀₀85°C...T₂₀₀450°C Da/ Ex ia IIIC T85°C...T135°C Db
II 2 G Ex db IIC T6...T1 Gb
II 1/2 D Ex ta IIIC T₂₀₀85°C...T₂₀₀450°C Da / Ex tb IIIC T85°C...T135°C Db
Refer to Annex of the Certificate for details

Approved for issue on behalf of the IECEx
Certification Body:

D. Adams, P.Eng.

Position:

Manager, Hazardous Location Department

Signature:
(for printed version)

Date:
(for printed version)

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Evaluation Services Inc.
81 Kelfield St
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Canada





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Certificate No.: **IECEx QPS 23.0009X**

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Date of issue: 2023-07-18

Issue No: 0

Manufacturer: **JUMO-REGULATION SAS**
7 Rue des Drapiers
Metz 57075
France

Manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

[IEC 60079-0:2017](#) Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

[IEC 60079-1:2014](#) Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

[IEC 60079-11:2023](#) Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:7.0

[IEC 60079-26:2014](#) Explosive atmospheres – Part 26: Equipment with Equipment Protection Level (EPL) Ga
Edition:3.0

[IEC 60079-31:2022](#) Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure "t"
Edition:3.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[CA/QPS/ExTR23.0006/00](#)

Quality Assessment Report:

[NL/DEK/QAR19.0019/02](#)



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

Temperature assemblies series I... and TB.97-XD, consists of a connection head, a protection sleeve and an insert.

The connection head is provided with terminals or a transmitter.

The protection sleeve is available in various lengths and with various process connections

, screwed in the connection head with or without an interchangeable measuring insert.

The insert consists of a metal sheathed mineral insulated cable, a metal protective sleeve available in various lengths, provided with one (single) or two (duplex) thermocouple or RTD or CERNOX or digital temperature sensing elements.

Temperature sensors series TB.97-XD are in type of protection Ex d and Ex t.

Temperature sensors series I... are in type of protection Ex i.

For more details, electrical data and thermal data, see Annex to this certificate.

SPECIFIC CONDITIONS OF USE: YES as shown below:

The Temperature class and maximum surface temperature, can be found in the paragraph "thermal data" of Annex 1 to this certificate.

When the process temperature range exceeds the ambient temperature range it shall be verified that the temperature at the connection of the nipple with the connection head does not exceed the specified ambient temperature range of the connection head and the transmitter.

For EPL Ga, if an aluminium connection head is used, it must installed such that ignition sources due to impact and friction sparks are excluded.

Series TB.97-XD: For information about the dimensions of the flameproof joints contact the manufacturer.

When the ambient temperature is more than 60 °C a cable and cable gland shall be suitable for the ambient temperature +20 K.

Annex:

[Annex 1_QPS23.0009X_Iss0.pdf](#)



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Description

Temperature assemblies series I... and TB.97-XD, consists of a connection head, a protection sleeve and an insert.

The connection head is provided with terminals or a transmitter.

The protection sleeve is available in various lengths and with various process connections , screwed in the connection head with or without an interchangeable measuring insert.

The insert consists of a metal sheathed mineral insulated cable, a metal protective sleeve available in various lengths, provided with one (single) or two (duplex) thermocouple or RTD or CERNOX or digital temperature sensing elements.

Temperature sensors series TB.97-XD are in type of protection Ex d and Ex t.

Temperature sensors series I... are in type of protection Ex i.

Table 1: Temperature sensors Series I...

TEMPERATURE SENSOR SERIE I... - TYPE OF PROTECTION Ex » i »				
TYPE	MEASURING ELEMENT	REFERENCE	ADDITIONAL CODE	REMARKS
I.I.R	Resistive sensor (Pt100,Pt1000, CTP, CTN..) CERNOX Digital sensor	903520/10		Terminal head
I.I.R.420	Resistive sensor (Pt100,Pt1000, CTP, CTN..)	903520/10 903520/15	/331 Ex Transmitter /332 Ex Profibus Transmitter /336 Ex HART Transmitter /868 Ex HART Trans. 2 Chan /869 Ex HART / SIL Trans. 2 Channels /... Other Ex Transmitter*	Terminal head Field mounted temperature transmitter Digital display
I.T.C	Thermocouple	903510/10		Terminal head
I.T.C.420	Thermocouple	903510/10 903510/15	/331 Ex Transmitter /332 Ex Profibus Transmitter /336 Ex HART Transmitter /868 Ex HART Trans. 2 Chan /869 Ex HART / SIL Trans. 2 Channels /... Other Ex Transmitter*	Terminal head Field mounted temperature transmitter Digital display

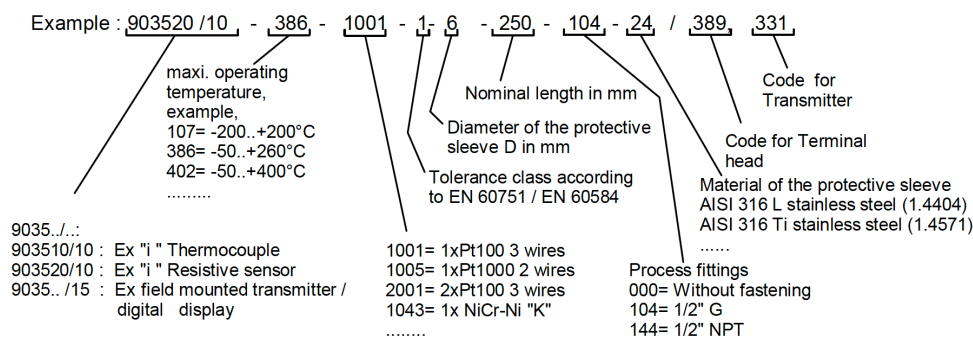
*: Other Ex transmitters can be installed as long as they present the same certification code and electrical ratings.



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Model Code example :

Ref.: 9035../... .. / ...



For Explosion Protection Ex db and Ex tb:

The assembly consists of one single flameproof enclosure. The connection head and the sensor part are threaded together on the threads provided by the connection head. As an alternative the combination of the connection head together with the sensor part forms a flameproof joint compliant with EN60079-1. The sensor part is enclosed by a mineral insulated metal sheath or metal protective sleeve available in various lengths. The insert can be single or dual (duplex) thermocouple or RTD or digital or Cernox.

Table 2: Series TB97-XD

TEMPERATURE SENSOR SERIE TB97-XD - TYPE OF PROTECTION Ex » d » and Ex « t »				
TYPE	MEASURING ELEMENT	REFERENCE	ADDITIONAL CODE	REMARKS
TB97-XD-R	Resistive sensor (Pt100,Pt1000, CTP,CTN..) – CERNOX – Digital sensor	903520/30		Terminal head
TB97-XD-R.420	Resistive sensor (Pt100,Pt1000, CTP, CTN..)	903520/30 903520/35	/331 Ex Transmitter /332 Ex Profibus Transmitter /336 Ex HART Transmitter /868 Ex HART Trans. 2 Chan /869 Ex HART / SIL Transmitter 2 Chaneles /... Other Ex Transmitter*	Terminal head Ex Field mounted HART temperature transmitter Digital display
TB97-XD-T	Thermocouple	903510/30		Terminal head
TB97-XD-T.420	Thermocouple	903510/30 903510/35	/331 Ex Transmitter /332 Ex Profibus Transmitter /336 Ex HART Transmitter	Terminal head Ex Field mounted HART temperature transmitter Digital display



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			/868 Ex HART Trans. 2 Chan /869 Ex HART / SIL Transmitter 2 Channels /... Other Ex Transmitter*	
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*: Other Ex transmitters can be installed as long as they present the same electrical ratings or below.

Table 3: connection heads series TB.97-XD:

TERMINAL HEAD USED FOR TEMPERATURE SENSOR SERIES TB97-XD			
Manufacturer	Model	Temperature range	Certification
Limatherm	XD-AD	-50..+60°C	FTZU 03 ATEX 0074U IECEX FTZU 14.0003U
Limatherm	XD-SD	-50..+60°C	FTZU 03 ATEX 0074U IECEX FTZU 14.0003U
Limatherm	XD-Addig	-50..+60°C	FTZU 03 ATEX 0074U IECEX FTZU 14.0003U
FPL	TTE200 TTE300	-55..+60°C	CESI 08 ATEX 029U IECEX CES 14.0006U

Series I...

One of the Aluminum, cast-iron, polyamide or stainless steel connection heads providing a degree of protection of minimum IP65 as listed in the table below is used. The connection head may be provided with terminals or with a separately certified Ex ia transmitter as listed in table 3 below.

Table 4: connection heads series I...

TERMINAL HEAD USED FOR TEMPERATURE SENSOR SERIES I...				
Type	Supplier reference	Temperature range	Material	IP
JFR (BUZ72)	NAA1	-40..+100°C	Alu pressure die casting	IP68
BFR (BUZ85) BFR 2 cable entries	DANA1 DAND1	-40..+100°C	Alu pressure die casting	IP68
BUSH BUSH 2 cable entries	DANAW1 DANAD1	-40..+100°C	Alu pressure die casting	IP68
DNAG	DNAG	-40..+100°C	Alu pressure die casting	IP68
CNI-3		-30..+100°C	Stainless Steel (304,316..)	IP66
		-50..+100°C		
BEGF		-50..+100°C	Stainless Steel (304,316..)	IP65



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AB7		-40..+100°C	Alu pressure die casting	
XI-DSN (1)	XI-DSN	-40..+100°C	Poyamide PA12 antistatic - Black	IP68
XI-DSNW (1)	XI-DSNW	-40..+100°C	Poyamide PA12 antistatic - Black	IP68

ATEX certification : FTZU 12 ATEX 0202U

Table 5: transmitters series I...

Transmitter Ex »i » certified						
Type	Supplier reference	Certificate	Tamb.Min	Tamb.Max	Zone	T-Class
Jumo 707015 dTrans 01 Ex	00372362	IECEX ZLM 14.0011 X ZELM 99 ATEX 0018 X	-40°C	+55°C	0	T6
			-40°C	+70°C	0	T5
			-40°C	+75°C	0	T4
Jumo 707016 dTrans 01 Ex HART	00391004	PTB 01 ATEX 2124	-20°C	+40°C	0	T6
			-20°C	+50°C	0	T5
			-20°C	+60°C	0	T4
Jumo 707085/8-06 dTrans 07 Ex HART Jumo 707086/8-06 dTrans 07 Ex HART SIL	00672697	EPS 17 ATEX 1129 X IECEX EPS 17.0075 X	-40°C	+46°C	0	T6
	00672698		-40°C	+60°C	0	T5
			-40°C	+60°C	0	T4
707085/8 and 707086/8 + Display BD07 - Jumo	00672701	EPS 18 ATEX 1113 X IECEX EPS 18.0048X	-40°C	+55°C	1	T6
			-40°C	+70°C	1	T5
			-40°C	+85°C	1	T4
ABB TTH200, TTH300	TTH200 TTH300	PTB 20 ATEX 2008 X IECEX PTB 20.0035X	-40°C	+44°C	0	T6
			-40°C	+60°C	0	T5
			-40°C	+60°C	0	T4
PR Electronics	5333D	DEKRA 20ATEX0095 X	-40°C	+60°C	0/21	T6
	5334B	DEKRA 20ATEX0105 X	-40°C	+60°C	0/21	T5
	5335D	DEKRA 20ATEX0108 X	-40°C	+60°C	0/21	T5
	5337D	IECEX DEK 20.0059 X IECEX DEK 20.0062 X IECEX DEK 20.0063 X	-40°C	+85°C	0/21	T4
Endress Hauser	iTEMP TMT182	PTB 10 ATEX 2029 IECEX BKI 05.002	-40°C	+46°C	0/21	T6
			-40°C	+60°C	0/21	T5
			-40°C	+60°C	0/21	T4
PR Electronics	7501A	DEKRA 15 ATEX 0058 X	-40°C	+45°C	0/21	T6
	7501B	IECEX DEK 15.0039 X	-40°C	+60°C	0/21	T5
			-40°C	+85°C	0/21	T4 (7501A)
			-40°C	+80°C	0/21	T4 (7501B)
YOKOGAWA	YTA610	FM16ATEX0019X	-40 °C	+ 50°C	0	T5
	YTA710	IECEX FMG 16.0014X	-40°C	+70	0	T4
			-30°C	+70°C	21	IIIC



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*: Other Ex transmitters can be installed as long as they present the same certification code and electrical ratings.

Electrical data

Series TB.97-XD

Without transmitter:

- **For RTD/Thermocouple:**
Electrical ratings per sensing element: 25 Vdc, 95mA, 140 mW.
- **For Cernox:**
Electrical ratings per sensing element: 9.0 Vdc, 95mA, 140 mW.
- **For Digital element:**
Electrical ratings per sensing element: 9.0 Vdc, 550mA, 630mW

With transmitter: The electrical data of the transmitter applies when transmitter is used with RTD or Thermocouple. In all cases, Maximum power of the transmitter is limited to 2.25W.

Series I...

Without transmitter:

- The entity parameters per sensing element are;
For RTD/Thermocouple:
Electrical ratings per sensing element: 25 Vdc, 95mA 140 mW.
- **For Cernox:**
Electrical ratings per sensing element: 9.0 Vdc, 95mA 140 mW.
- **For Digital element:**
Electrical ratings per sensing element: 9.0 Vdc, 550mA, 630mW

With transmitter: the entity parameters of the are given by the entity parameters of the transmitter:

Table 6: Electrical data of the transmitters used in series I...

Electrical value Ex built in Transmitter						
Type	Supplier reference	Ui	Ii	Pi	Ci	Li
Jumo 707015 dTrans 01 Ex	00372362	30V	100mA	750mW	négligible	négligible
Jumo 707015 dTrans 01 Ex HART	00391004	30V	100mA	750mW	négligible	négligible
Jumo 707085/8-06 dTrans 07 Ex HART	00672697	30V	130mA	800mW	négligible	négligible
Jumo 707086/8-06 dTrans 07 Ex HART SIL	00672698					
ABB TTH200, TTH300	TTH200 TTH300	30V	130mA	800mW	0,57nF	160µH
PR Electronics	5333D 5334B 5335D 5337D	30V	120mA	840mW	1nF	10µH
Endress Hauser	iTEMP TMT182	30V	100mA	750mW	négligible	négligible



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Thermal data:

Process temperature ranges are defined below for each type of sensing element:

- For resistive sensor I... and TB97-XD series:

-70°C ≤ Tp ≤ +550°C for chip temperature sensor

-200°C ≤ Tp ≤ +800°C for ceramic/glas temperature sensor (Platinum wire winding)

-270°C ≤ Tp ≤ +200°C for Cernox sensor/specific resistive sensor

-50°C ≤ Tp ≤ +120°C for digital sensor

- For thermocouple I... and TB97-XD series:

-270°C ≤ Tp ≤ +1300°C

Thermal assement of thermal devices is divided in 3 aspects:

- 1-Sensing part of the assembly, in contact with the process
- 2-Nipple / connection head, out of the process but potentially influenced by the process
- 3-Extension tube to control process temperature influence on nipple/connection head assembly

1. Sensing part of the assembly, in contact with the process

The current flowing through the sensor element/sensing part generates a heat rise of the element.

The self-heating at the sensor tip or thermowell tip depends upon the sensor type (resistance, thermometer/thermocouple), the sensor diameter and the power supplied to the sensor in the event of a failure.

This temperature rise must be deducted from the maximum surface temperature for the temperature classes T1 to T6, or process temperature when Tp is above 450°C..

The maximum admissible measurement temperature on the tip of the probe is determined using the following:

$$\Delta t = R_{th} \times P_i$$

R_{th}= Thermal resistance of the assembly, see table 7

P_i: Power of the electrical circuit

Table 7 – Empirical value for the thermal resistance of sensitive parts

EMPIRICAL VALUES FOR THE THERMAL RESISTANCE OF TEMPERATURE SENSORS			
Measuring insert	D mm	Scope of validity	Thermal resistance K/W
RTD sensor simple	3	From d=3 to d=5mm	198
RTD sensor duplex	3	From d=3 to d=5mm	370
RTD sensor simple	6	From d=6 to d=9mm	75
RTD sensor duplex	6	From d=6 to d=9mm	140
RTD sensor simple	10	≥ 10mm	50
RTD sensor duplex	10	≥ 10mm	95
Cernox	3	≥ 3mm	195
Thermocouple	3	From d=3 to d=5mm	15
Thermocouple	6	From d=6 to d=9mm	5
Digital sensor	6	≥ 6mm	60



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Example :

RTD sensor simple d=3 - Rth 198K/W and Pi:140mW

$\Delta t = R_{th} \times P_i = 198K/W \times 0,14W = 27,8 K$

In the case of a malfunction, or fault current, an increase of 27,8 K is generated

(this value must be deducted from the maximum surface temperature for the temperature classes T1 to T6)

Applying this to the different sensing parts in the scope of this certificate, gives the following table:

Table 8. Temperature class and temperature process for RTD sensor

Protectiv e sleeve diameter	Temperature class/max temperature T200	Max. allowed process temperature [°C]			
		Without built in transmitter	With Jumo built in transmitter, see table 11		
		Pi ≤ 140mW	Po ≤ 11 mW	Po ≤ 6,6mW	Po ≤ 24,7mW
Ø 3mm	T6 (85°C)	57	83	84	80
	T5 (100°C)	72	98	99	95
	T4 (135°C)	107	133	134	130
	T3 (200°C)	172	198	199	195
	T2 (300°C)	272	298	299	295
	T1 (450°C)	422	448	449	445
Ø 3mm duplex	T6 (85°C)	33	81	83	76
	T5 (100°C)	48	96	98	91
	T4 (135°C)	83	131	133	126
	T3 (200°C)	148	196	198	191
	T2 (300°C)	248	296	298	291
	T1 (450°C)	398	446	448	441
Ø 6 mm	T6 (85°C)	75	84	85	83
	T5 (100°C)	90	99	100	98
	T4 (135°C)	125	134	134	133
	T3 (200°C)	190	199	199	198
	T2 (300°C)	290	299	299	298
	T1 (450°C)	440	449	449	448
Ø 6 mm duplex	T6 (85°C)	65	83	84	82
	T5 (100°C)	80	98	99	96
	T4 (135°C)	115	133	134	132
	T3 (200°C)	180	198	199	197
	T2 (300°C)	280	298	299	297



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	T1 (450°C)	430	448	449	447
Ø 10 mm	T6 (85°C)	78	84	84	83
	T5 (100°C)	93	99	99	98
	T4 (135°C)	128	134	134	133
	T3 (200°C)	193	199	199	198
	T2 (300°C)	293	299	299	298
	T1 (450°C)	443	449	449	448
Ø 10 mm duplex	T6 (85°C)	72	84	84	83
	T5 (100°C)	87	99	99	98
	T4 (135°C)	122	134	134	133
	T3 (200°C)	187	199	199	198
	T2 (300°C)	287	299	299	298
	T1 (450°C)	437	449	449	448

Table 9. Temperature class and temperature process for Cernox sensor and digital sensor

Protective sleeve diameter	Temperature class/max temperature T200	Max. allowed process temperature [°C]	
		Without built in transmitter	
		Pi ≤ 140mW	Pi ≤ 630mW
Ø 3 mm Cernox	T6 (85°C)	58	/
	T5 (100°C)	73	/
	T4 (135°C)	108	/
	T3 (200°C)	173	/
	T2 (300°C)	273	/
	T1 (450°C)	423	/
Ø 6 mm Digital sensor	T6 (85°C)	/	47
	T5 (100°C)	/	62
	T4 (135°C)	/	97
	T3 (200°C)	/	162
	T2 (300°C)	/	262
	T1 (450°C)	/	412



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Table 10. Temperature class and temperature process for thermocouple

Protective sleeve diameter	Temperature class/max temperature T200	Max. allowed process temperature [°C]			
		Without built in transmitter	With Jumo built in transmitter, see table 11		
		Pi ≤ 140mW	Po ≤ 11 mW	Po ≤ 6,6mW	Po ≤ 24,7mW
Ø 3 mm	T6 (85°C)	83	85	85	85
	T5 (100°C)	98	100	100	100
	T4 (135°C)	133	135	135	135
	T3 (200°C)	198	200	200	200
	T2 (300°C)	298	300	300	300
	T1 (450°C)	448	450	450	450
Ø 6 mm D	T6 (85°C)	84	85	85	85
	T5 (100°C)	99	100	100	100
	T4 (135°C)	134	135	135	135
	T3 (200°C)	199	200	200	200
	T2 (300°C)	299	300	300	300
	T1 (450°C)	449	450	450	450

Table 11: Po values for Jumo transmitter

Po VALUES FOR JUMO TRANSMITTER				
	Jumo 707015 dTrans 01 Ex	Jumo 707015 dTrans 01 Ex HART	Jumo 707085/8-06 dTrans 07 Ex HART	Jumo 707086/8-06 dTrans 07 Ex HART SIL
Po	11mW	6,6mW	24,7mW	24,7mW

Category 2: in the case of temperature classes T1 and T2, a 10 °C safety deduction must be applied, and in the case of temperature classes T3 to T6, a 5 °C safety deduction must be applied.

Category 1: according to EN 1127-1:2011, point 6.4.2 (hot surfaces), the temperatures of all surfaces of devices for use in zone 0 must not exceed 80 % of the ignition temperature.

2. Nipple and connection head,
The heat from the process in a direct installation (no extension tube) is transferred through the protection fitting to the sensor connection head. This heat rise of the ambient temperature of the connection head shall be taken into account when assessing the overall temperature at the connection head level.



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2a- I... series sensors

The ambient temperature limits T_a for I... series sensors without temperature transmitter for Zone 1 applications are:

- T6 : -40..+80°C
- T5 : -40..+95°C
- T4 : -40..+100°C

Notes:

- For Zone 0 applications, the maximum ambient temperatures are decreased by 20%
- -50°C for CNI-3 and BEGF terminal heads

The ambient temperature limits for I... series sensors with temperature transmitter are:

- Minimum ambient temperature : -40°C
- Maximum ambient temperature is the maximum ambient temperature of the selected transmitter (refer to Table 5 above)

2b- TB97-XD series sensors

For sensor without transmitter

- Minimum ambient temperature : -50°C or -55°C depending of the terminal head (see table 3)
- Maximum ambient temperature: the maximum ambient temperature of the selected terminal head (refer to Table 3 above)

For sensor with transmitter :

- Minimum ambient temperature: the minimum ambient temperature of the selected connection head.
- Maximum ambient temperature: the maximum ambient temperature of the selected connection head.

3. Extension tube:

A reverse heat flow from the process shall be controlled by the use of a suitable thermal insulation or a suitable extension tube between process connection and terminal head.

Table below specifies the length of the extension tube with the temperature increase (seen at the head level)

Table 9: Temperature rise K (at connection head level) as a function of extension tube length

	Temperature rise K (at connection head level) as a function of extension tube length			
Process temperature	0mm	70mm	120mm	200mm
100 °C	20	11	4	4
200°C	29	13	5	4
300°C	39	18	12	4
400°C	64	26	15	11
550°C	80	33	20	13



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Maximum surface temperature in DUST

The maximum surface temperature $T_{20085}^{\circ}\text{C}$... $T_{200450}^{\circ}\text{C}$ rise as a function of electrical circuit power $^{\circ}\text{C}$.

Measuring insert Diametre Ø	Pi ≤ 25 mW	Pi ≤ 50 mW	Pi ≤ 75 mW	Pi ≤ 100 mW	Pi ≤ 125m W	Pi ≤ 140mW
	Temperature rise as a function of electrical circuit power $^{\circ}\text{C}$					
RTD sensor simple Ø 3	6	14	20	27	33	36
RTD sensor duplex Ø 3	13	24	34	44	54	60
RTD sensor simple Ø 6	3	8	12	16	20	23
RTD sensor duplex Ø 6	7	14	21	27	34	37
Digital sensor	3	8	12	16	20	23