


Intrinsically Safe Temperature Detectors and Feedthroughs

 II 1 G Ex ia IIC T6...T3 Ga (LCIE 05 ATEX 6038 X)

Increased Safety Temperature Detectors and Feedthroughs

 II 2 G Ex e IIC T6...T3 Gb (LCIE 05 ATEX 6039 X)

1. Description

These temperature sensors are designed to be installed in various locations.

- Operating temperature range is defined on individual specifications drawings.
- Operating temperature range -20°C to 40°C for connective part.
- S __ models are available for 2-, 3- or 4-wire measurement circuits and with single or dual resistance temperature detector (RTD) elements.
- TC __ models are available with single or dual thermocouple elements.
- Accessories:
 - Feedthrough AC717/AC718/AC958/AC961 can be used in assemblies with temperature sensors S __ models and TC __ models.
 - Operating temperature range is -20°C to 149°C
 - Pressure rating to 25 psi (1.7 bar)
 - Springs AC171/AC672 and rings AC172/AC1038 are fit to S102951/S102953/TC102961/TC102963 only.

2. Installation Instructions

A separate installation instruction is included with each shipment of bearing embedment sensors. If lost, a copy can be downloaded from the Minco website (www.minco.com). The appropriate Engineering Instruction(s) for each model is as follows:

- S102950, TC102960:
*EI 164 Installing Case Style "A" Sensors in Sleeve Bearings or
EI 167 Installing Case Style "A" Sensors in Thrust Bearings.*
- S102951, S102953, TC102961, and TC102963:
*EI 180 Installing Case Style "B" Sensors in Thrust Bearings (Babbitt) or
EI 181 Installing Case Style "B" Sensors in Thrust Bearings (Spring and Ring).*
- S102952, TC102962:
EI 184 Installing Case Style "C" Sensors in Bearing Shoes.
- Dielectric Test: Recommended after installation; 500VRMS at 50-60Hz for 1min, lead to case with 5mA maximum leakage current. Not applicable for grounded thermocouples "G".
- Feedthrough Accessory Installation: When ordered with a case style B bearing sensors, spring and ring are automatically included.
- See additional specification drawing FAS102900 for accessory assembly features.

3. Electrical Data

	S __ models	TC __ models
Maximum input voltage	30 V	30 V
Maximum input power	0.40 W	/

Cable for a length of 3 meters: $C_i = 84 \text{ pF}$ $L_i = 4\mu\text{H}$ $R_i = 0.48 \Omega$

Continued on next page

Intrinsically Safe and Increased Safety Temperature Detectors, continued

4. Special Conditions for Safe Use

The equipment is Intrinsically Safe and Increased Safety rated, and can be used in potentially explosive atmospheres.

Intrinsically Safe installations only:

The apparatus must be only connected to certified associated intrinsically safe equipment and this combination must be compatible as regards to intrinsic safety rules.

The electrical parameters of the associated intrinsically safe equipment must not exceed any of the following values: $U_o \leq 30\text{ V}$ and $P_o \leq 0.4\text{ W}$.

The connection of the cable must be effected in an enclosure with a minimum protection degree IP20 according to the paragraph 6.1 of the standard EN 60079-11.

For a temperature class T6, T5, T4 or T3 according to standard EN 60079-0:2009, the maximum ambient temperature depends on the power dissipated in the RTD per the following table:

Power dissipated in the RTD sensor	Maximum Temperature			
	Class T6	Class T5	Class T4	Class T3
0.1 W	+70°C	85°C	120°C	185°C
0.2 W	+60°C	75°C	110°C	175°C
0.4 W	+45°C	60°C	95°C	160°C

For sensors equipped with elastomer-filled cable the maximum ambient temperature is limited to 125°C.

Power dissipated in the thermocouple sensor	Maximum Temperature			
	Class T6	Class T5	Class T4	Class T3
0.1 W	+70°C	85°C	120°C	180°C

For sensors equipped with elastomer-filled cable the maximum ambient temperature is limited to 125°C.

5. Temperature Classes and Calculations

See the temperature class matching the maximum ambient temperature for electrical apparatus in the group II following EN60079-0.

Temperature Class	Maximum ambient temperature	Security Factor
T3	+200°C	5°C
T4	+135°C	5°C
T5	+100°C	5°C
T6	+85°C	5°C

Temperature class changes are function of the ambient temperature. Under no conditions may the surface temperature of the sensor exceed the temperature class. The surface temperature includes the temperature increase caused by the power dissipation plus the ambient temperature. There is also a security factor based on the ambient temperature that must be considered. The security factor is 5°C for ambient temperatures below or equal to 200°C (T6, T5, T4, T3 classes).

To determine the temperature class you must calculate the maximum surface temperature of the sensor.

Example – Calculation of sensor’s maximum surface temperature

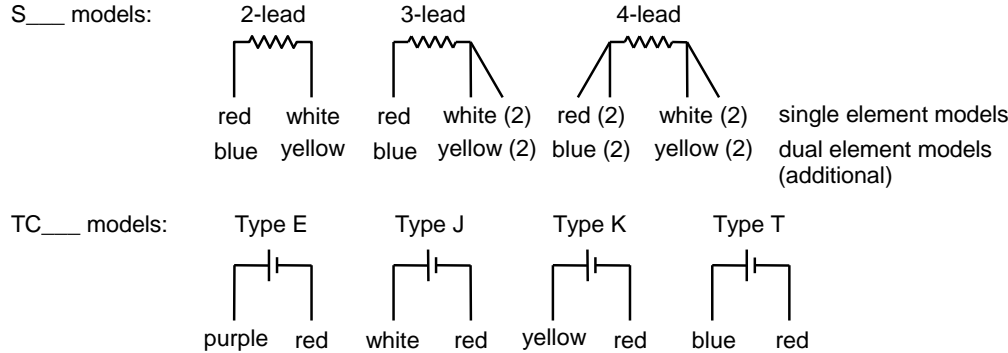
The above table can be rewritten for temperature class calculations at higher temperatures. The right column lists the surface temperature increase due to the power dissipation.

Power dissipated in the sensor	Maximum ambient temperature for a temperature class T6	Temperature increase due to power dissipation
0.1 W	+70°C	10°C (80°C - 70°C)
0.2 W	+60°C	20°C (80°C - 60°C)
0.4 W	+45°C	35°C (80°C - 45°C)

The maximum surface temperature is calculated:	$T_{\text{surface}} = T_{\text{ambient}} + T_{\text{power dissipation}}$
If the explosive atmosphere is at 110°C and the power is 0.4W the surface temperature will be:	$T_{\text{surface}} = 110^\circ\text{C} + 35^\circ\text{C} = 145^\circ\text{C}$
The temperature class must be greater than the surface temperature plus the security factor:	$T_{\text{surface}} + T_{\text{security factor}} = 145^\circ\text{C} + 5^\circ\text{C} = 150^\circ\text{C}$
The lowest temperature class that meets this requirement is T3 (200°C) according to standard EN60079-0.	

Intrinsically Safe and Increased Safety Temperature Detectors, continued

6. Electrical Connections



7. Feedthrough and Mechanical Accessories

A feedthrough is mechanical accessory assembled with temperature detectors and is a passive component. Its maximum temperature skin is 149°C. Under no conditions may the surface temperature of the feedthrough exceed the temperature class.

Temperature class	Maximum ambient temperature	Feedthrough temperature limit of utilization > Ambient temperature
T3	+200°C	NO. Feedthrough will not be assembled on T3 temperature class applications.
T4	+135°C	YES
T5	+100°C	YES
T6	+85°C	YES

8. Attestation

Attestation of Conformity

Temperature Detector Type:

S102900, S102901, S102902, S102905, S102906, S102907, TC102910, TC102911, TC102912, TC102915, TC102917, S102920, S102921, S102922, S102923, S102930, S102931, S102935, S102936, S102950, S102951, S102952, S102953, S102970, S102971, S102972, S102973, S102974, TC102960, TC102961, TC102962, TC102963

Accessories:

Feedthrough AC717, AC718, AC958, AC961. Springs AC171, AC672. Rings AC172, AC1038.

The products defined above conform to:

ATEX Directive 94/9/EC

EN 60079-0:2009 Explosive atmospheres - Part 0: Equipment - General requirements

EN 60079-7:2007 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

EN 60079-11:2007 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

EN 60079-26:2007 Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga

ГОСТ Р МЭК 60079-0-2007, ГОСТ Р МЭК 60079-11-2010

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