



## 2-WIRE PROGRAMMABLE TRANSMITTER TT518



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## **2-WIRE PROGRAMMABLE TRANSMITTER TT518**

- RTD or Ohm input
- High measurement accuracy
- 3-wire connection
- Programmable sensor error outputs
- For DIN form B sensor head mounting

### **Application**

- Linearized temperature measurement with Pt100...Pt1000 and other sensor types.
- Conversion of linear resistance variation to a standard 4-20mA current signal, for instance from valves or Ohmic level sensors.

### **Technical characteristics**

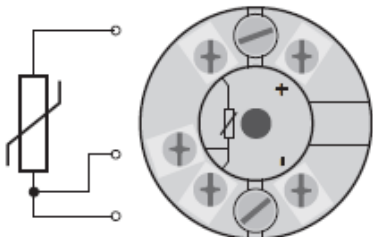
- Within a few seconds the user can program the TT518 to measure temperatures within all ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 3-wire connection.

### **Mounting / Installation**

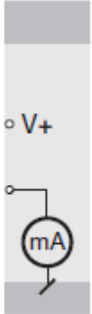
- For DIN form B sensor head mounting. In non-hazardous areas the TT518 can be mounted on a DIN rail with the AC807 Minco DIN rail adapter.

# APPLICATIONS

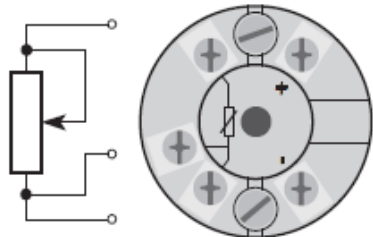
RTD to 4...20 mA



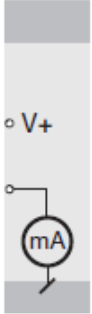
2-wire installation  
in control room



Resistance to 4...20 mA



2-wire installation  
in control room



TT518 Order Options:

<b>TT518PD(0/100)C1Z ← EXAMPLE OF MODEL NUMBER</b>	
<b>TT518</b>	SPECIFICATIONS DRAWING NUMBER.
<b>PD</b>	SENSOR INPUT TYPE: PA = 100Ω PLATINUM RTD (.00392); PB = 100Ω PLATINUM RTD (.00391); PD = 100Ω PLATINUM RTD (.00385); PE = 100Ω PLATINUM RTD (.00385); PF = 1000Ω PLATINUM RTD (.00385); PW = 1000Ω PLATINUM RTD (.00375); CA = 10Ω COPPER RTD (.00427); FA = 604Ω NICKEL-IRON; FB = 1000Ω NICKEL-IRON; FC = 2000Ω NICKEL-IRON; NA = 120Ω NICKEL.
<b>(0/100)</b>	TEMPERATURE RANGE: 4mA TEMPERATURE/20mA TEMPERATURE. RANGE SCALE:
<b>C</b>	C = CELSIUS; F = FAHRENHEIT.
<b>1</b>	CALIBRATION: 1 = NOMINAL CALIBRATION; 2 = MATCHED TO SENSOR 0.75% OF SPAN (ASSEMBLY ONLY); 3 = MATCHED TO SENSOR 0.50% OF SPAN (ASSEMBLY ONLY); 4 = MATCHED TO SENSOR 0.20% OF SPAN (ASSEMBLY ONLY).
<b>Z</b>	SENSOR LEADS: Y = 2 LEADS; Z = 3 LEADS.

**Electrical specifications**

**Specifications Range:**

-40°C to +85°C

**Common specifications:**

Supply voltage, DC .....	8...30 VDC
Internal consumption .....	25 mW...0.7 W
Voltage drop .....	8 VDC
Warm-up time .....	5 min.
Communications interface .....	Loop Link (with Minco AC205817)
Signal /noise ratio .....	Min. 60 dB
Response time (programmable) .....	0.33...60 s
Signal dynamics, input .....	19 bit
Signal dynamics, output .....	16 bit
Calibration temperature .....	20...28°C

Accuracy:

Calibration	Type	Accuracy
Nominal	Pt(.00385) and Ni RTD	Greater of: $\pm 0.54^{\circ}\text{F}/\pm 0.3^{\circ}\text{C}$ or $\pm 0.1\%$ of Span
	Non-Pt(.00385)	$\pm 0.9^{\circ}\text{F}/\pm 0.5^{\circ}\text{C}$
Matched	All	See ordering options

EMC immunity influence .....  $< \pm 0.5\%$  of span  
 Effect of supply voltage variation .....  $\leq 0.005\%$  of span/VDC  
 Vibration ..... IEC 60068-2-6:2007 Test FC  
     2...25 Hz .....  $\pm 1.6$  mm  
     25...100 Hz .....  $\pm 4$  g  
 Max. wire size .....  $1 \times 1.5$  mm<sup>2</sup> stranded wire  
 Humidity .....  $< 95\%$  RH (non-cond.)  
 Dimensions .....  $\varnothing 44 \times 20.2$  mm  
 Protection degree (enclosure / terminal) ..... IP68 / IP00  
 Weight ..... 50 g

**Electrical specification, input:**

**RTD and linear resistance input:**

RTD type	Min. value	Max. value	Min. span	Standard
Pt100	-200°C	+850°C	25°C	IEC 60751
Ni100	-60°C	+250°C	25°C	DIN 43760
Lin. R	0 $\Omega$	10000 $\Omega$	30°C	----

Max. offset ..... 50% of selec. max. value  
 Cable resistance per wire (max.) ..... 10  $\Omega$   
 Sensor current .....  $> 0.2$  mA,  $< 0.4$  mA  
 Effect of sensor cable resistance  
 (3-wire) .....  $< 0.002\Omega/\Omega$   
 Sensor error detection ..... Yes

**Output:**

**Current output:**

Signal range ..... 4...20 mA  
 Min. signal range ..... 16mA  
 Updating time ..... 135 ms  
 Load resistance .....  $\leq (V_{\text{supply}} - 8)/0.023$  [ $\Omega$ ]  
 Load stability .....  $< \pm 0.01\%$  of span/100  $\Omega$

**Sensor error detection:**

Programmable ..... 3.5...23 mA  
 Namur NE43 Upscale ..... 23 mA  
 Namur NE43 Downscale..... 3.5 mA

Of span = Of the presently selected range

**Approvals:**

EMC ..... 2014/30/EU  
CCOE ..... P337392/3  
RoHS ..... 2011/65/EU  
EAC..... TR-CU 020/2011

**Marine approval:**

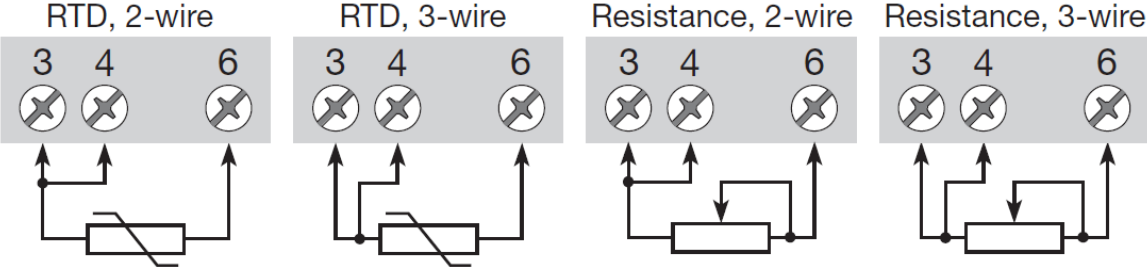
DNV-GL, Ships & Offshore..... Standard for Certification No. 2.4

**Ex / I.S.:**

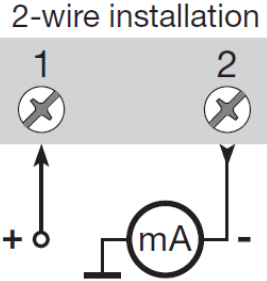
ATEX 2014/34/EU..... KEMA 03ATEX1535 X  
FM certificate ..... FM17US0013X  
CSA certificate ..... 1125003  
IECEX ..... DEK 13.0036 X  
INMETRO ..... DEKRA 16.0014 X  
CCOE ..... P337392/4  
EAC Ex TR-CU 012/2011 ..... RU C-DK.GB08.V.00410

# CONNECTIONS

## Input:



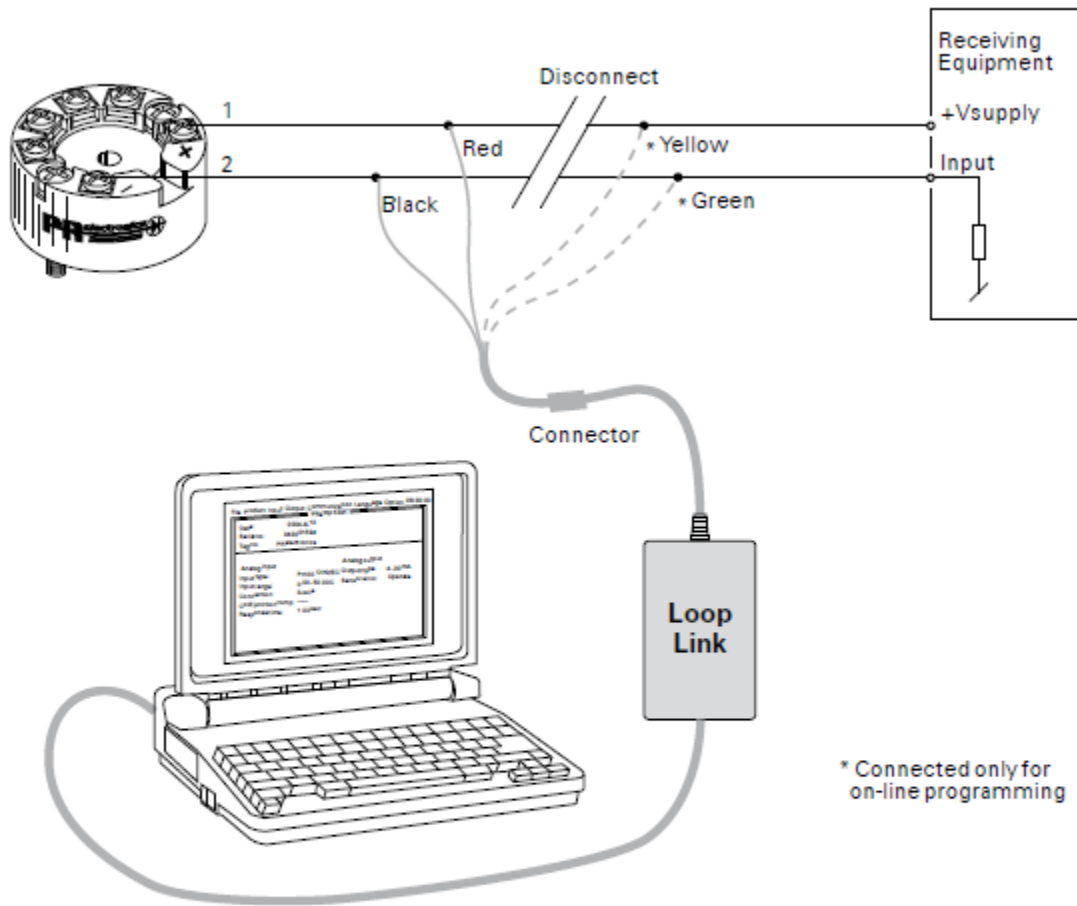
## Output:



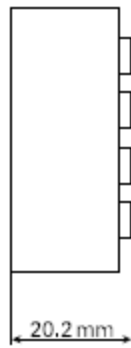
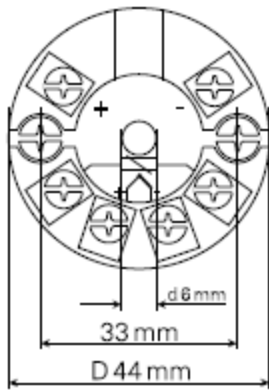


# PROGRAMMING

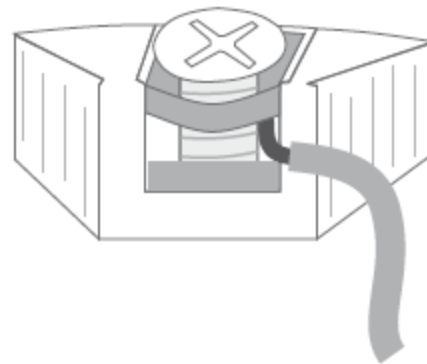
- Loop Link is a communications interface that is needed for programming the TT508, TT509, TT510, TT511, TT518, TT519, TT520 & TT521.
- Use Minco AC205817.
- For programming please refer to the drawing below.
- Loop link is not approved for communication with modules installed in hazardous (Ex) areas.



## Mechanical specifications



## Mounting of sensor wires



Wires must be mounted between the metal plates.

# APPENDIX

## ATEX Installation drawing



For safe installation of the TT518 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

ATEX Certificate            KEMA 03ATEX 1535 X

Marking



II 1 G EX ia IIC T4..T6 Ga  
II 1 D Ex ia IIIC Da  
II 1 M Ex ia I Ma

Standards

EN 60079-0 : 2012, EN 60079-11 : 2012, EN 60079-26 : 2007,  
EN 60079-15: 2010

Hazardous area

Zone 0, 1, 2, 20, 21, 22

T4:  $-40 \leq T_a \leq 85^\circ\text{C}$

T6:  $-40 \leq T_a \leq 60^\circ\text{C}$

**Terminal: 3,4,6**

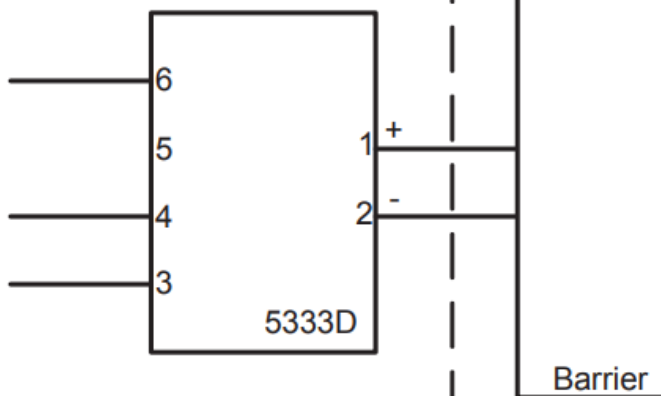
U<sub>o</sub>: 27 VDC

I<sub>o</sub>: 7 mA

P<sub>o</sub>: 45 mW

L<sub>o</sub>: 35 mH

C<sub>o</sub>: 90 nF



**Terminal: 1,2**

U<sub>i</sub>: 30 VDC

I<sub>i</sub>: 120 mA

P<sub>i</sub>: 0.84 W

L<sub>i</sub>: 10μH

C<sub>i</sub>: 1.0nF

#### Installation notes:

In a potentially explosive gas atmosphere, the transmitter shall be mounted in an enclosure in order to provide a degree of protection of at least IP20 according to EN60529.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment of category 1 G, 1 M or 2 M, and if the enclosure is made of aluminum, it must be installed such that ignition sources due to impact and friction sparks are excluded.

If the enclosure is made of non-metallic materials, electrostatic charging shall be avoided.

For installation in a potentially explosive dust atmosphere, the following instructions apply:

The transmitter shall be mounted in a metal enclosure form B that is providing a degree of protection of at least IP6X according to EN60529, that is suitable for the application and correctly installed.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

For an ambient temperature  $\geq 60^{\circ}\text{C}$ , heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

The surface temperature of the enclosure is equal to the ambient temperature plus 20 K, for a dust layer with a thickness up to 5 mm.

# IECEx Installation Drawing



For safe installation of TT518 the following must be observed. The module shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Year of manufacture can be taken from the first two digits in the serial number.

Certificate IECEx DEK 13.0036X

Marking Ex ia IIC T4...T6 Ga  
Ex ia IIIC Da  
Ex ia I Ma

Standards IEC 60079-0 : 2011, IEC 60079-11 : 2011, IEC 60079-26:2006

Hazardous area

Zone 0, 1, 2, 20, 21, 22, M1

T4:  $-40 \leq T_a \leq 85^\circ\text{C}$

T5:  $-40 \leq T_a \leq 60^\circ\text{C}$

T6:  $-40 \leq T_a \leq 45^\circ\text{C}$

Non Hazardous Area

**Terminal: 3,4,6**

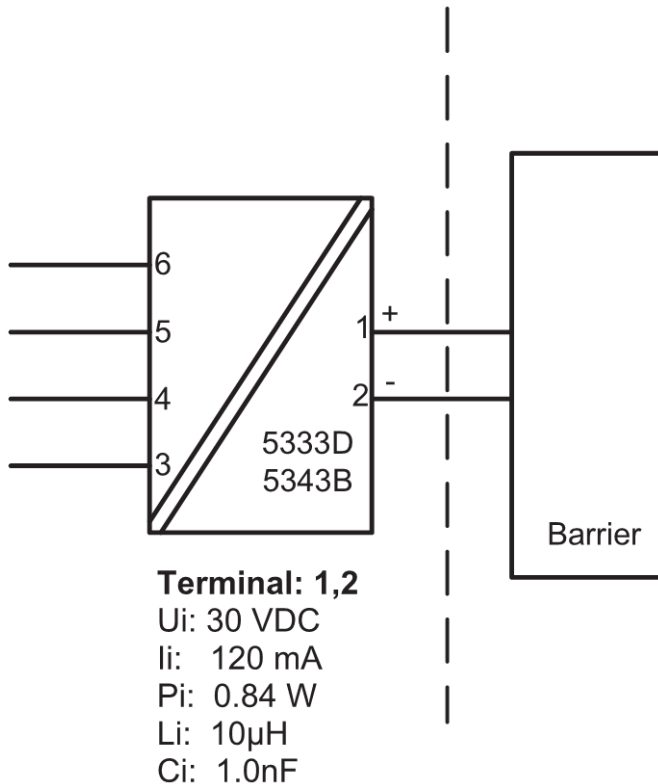
Uo: 30 VDC

Io: 8 mA

Po: 60 mW

Lo: 35 mH

Co: 66 nF



**Terminal: 1,2**

Ui: 30 VDC

li: 120 mA

Pi: 0.84 W

Li: 10µH

Ci: 1.0nF

## Installation notes:

In a potentially explosive gas atmosphere, the transmitter shall be mounted in a metal form B enclosure in order to provide a degree of protection of at least IP20 according to IEC60529. If however the environment requires a higher degree of protection, this shall be taken into account.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Ga, Ma and Mb, and if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded.

For installation in a potentially explosive dust atmosphere, the following instructions apply:

For explosive dust atmospheres, the surface temperature of the outer enclosure is 20 K above the ambient temperature.

The transmitter shall be mounted in a metal enclosure form B according to DIN43729 that is providing a degree of protection of at least IP6X according to IEC60529, that is suitable for the application and correctly installed.

Cable entries and blanking elements shall be used that are suitable for the application and correctly installed.

For an ambient temperature  $\geq 60^{\circ}\text{C}$ , heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

# FM Installation Drawing 5300Q502 Rev AH

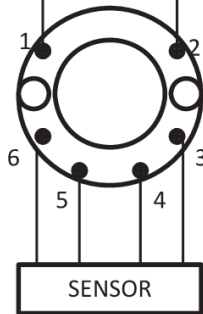
## Hazardous (Classified) Location

Class I, Division 1, Groups, A, B, C, D T4..T6  
 Class I, Zone 0, AEx ia IIC T4..T6

Ambient temperature limits  
 T4: -40 to + 85 deg. Celcius  
 T6: -40 to + 60 deg. Celcius

Terminal 1, 2  
 Vmax or Ui: 30 V  
 Imax or Ii: 120 mA  
 Pmax or Pi: 0.84 W  
 Ci: 1 nF  
 Li: 10 uH

Terminal 3, 4, 5, 6  
 Vt or Uo: 9.6 V  
 It or Io: 28 mA  
 Pt or Po: 67.2 mW  
 Ca or Co: 3.5 uF  
 La or Lo: 35 mH



## Non Hazardous Location

Associated Apparatus  
 or Barrier  
 with  
 entity Parameters:

$UM \leq 250V$   
 $Voc \text{ or } Uo \leq Vmax \text{ or } Ui$   
 $Isc \text{ or } Io \leq Imax \text{ or } Ii$   
 $Po \leq Pi$   
 $Ca \text{ or } Co \geq Ci + Ccable$   
 $La \text{ or } Lo \geq Li + Lcable$

This device must not be connected  
 to any associated apparatus which  
 uses or generates more than 250  
 VRMS

## The entity concept

The Transmitter must be installed according to National Electrical Code (ANSI-NFPA 70) and shall be installed with the enclosure, mounting, and spacing segregation requirement of the ultimate application.

Equipment that is FM-approved for intrinsic safety may be connected to barriers based on the ENTITY CONCEPT. This concept permits interconnection of approved transmitters, meters and other devices in combinations which have not been specifically examined by FM, provided that the agency's criteria are met. The combination is then intrinsically safe, if the entity concept is acceptable to the authority having jurisdiction over the installation.

The entity concept criteria are as follows:

The intrinsically safe devices, other than barriers, must not be a source of power.

The maximum voltage  $U_i(V_{MAX})$  and current  $I_i(I_{MAX})$ , and maximum power  $P_i(P_{max})$ , which the device can receive and remain intrinsically safe, must be equal to or greater than the voltage ( $U_o$  or  $V_{OC}$  or  $V_t$ ) and current ( $I_o$  or  $I_{SC}$  or  $I_t$ ) and the power  $P_o$  which can be delivered by the barrier.

The sum of the maximum unprotected capacitance ( $C_i$ ) for each intrinsically device and the interconnecting wiring must be less than the capacitance ( $C_a$ ) which can be safely connected to the barrier.

The sum of the maximum unprotected inductance ( $L_i$ ) for each intrinsically device and the interconnecting wiring must be less than the inductance ( $L_a$ ) which can be safely connected to the barrier.

The entity parameters  $U_o, V_{OC}$  or  $V_t$  and  $I_o, I_{SC}$  or  $I_t$ , and  $C_a$  and  $L_a$  for barriers are provided by the barrier manufacturer.

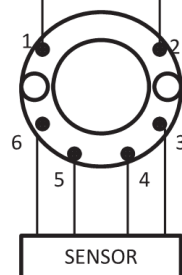
## NI Field Circuit Parameters

### Hazardous (Classified) Location

Class I, Division 2, Groups, A, B, C, D T4..T6  
Class I, Zone 2, IIC T4..T6

Ambient temperature limits  
T4: -40 to + 85 deg. Celcius  
T6: -40 to + 60 deg. Celcius

Terminal 1 , 2  
 $V_{max}$  : 35 V  
 $C_i$ : 1.0 nF  
 $L_i$ : 10 uH



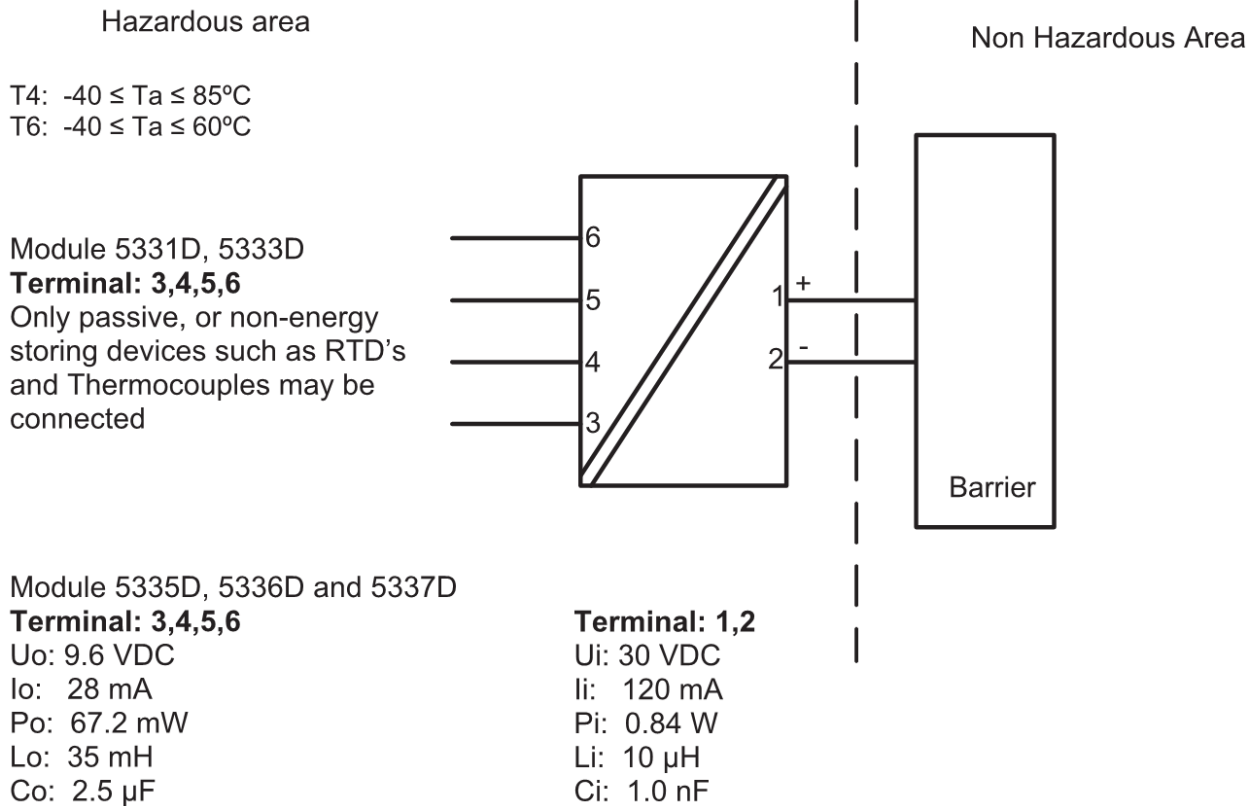
### Non Hazardous Location

Associated Apparatus  
or Barrier

This device must not be connected  
to any associated apparatus which  
uses or generates more than 250  
VRMS



# CSA Installation Drawing 533XQC03



CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations  
Class I, Division 1, Groups A, B, C and D  
Ex ia IIC, Ga

CLASS 2258 84 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations - Certified to US Standards  
Class I, Division 1, Groups A, B, C and D  
Class I, Zone 0, AEx ia IIC, Ga

**Warning:**  
Substitution of components may impair intrinsic safety.

The transmitters must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC) or for US the National Electrical Code (NEC).

## Desenho de Instalação InNMETRO



Para instalação segura do TT518 o seguinte deve ser observado. O modo deve apenas ser instalado por pessoas qualificadas que são familiarizadas com as leis nacionais e internacionais, diretrizes e padrões que se aplicam a esta área.

Ano de fabricação pode ser pego dos dois primeiros dígitos do número de série.

Certificado DEKRA 16.0014 X

Indicação Ex ia IIC T6...T4 Ga  
Ex ia IIIC Da

Padrões ABNT NBR IEC 60079-0 : 2013, ABNT NBR IEC 60079-11 : 2013,

### Áreas Risco

Zona 0, 1, 2, 20, 21, 22, M1

T4:  $-40 \leq T_a \leq 85^\circ\text{C}$

T5:  $-40 \leq T_a \leq 60^\circ\text{C}$

T6:  $-40 \leq T_a \leq 45^\circ\text{C}$

Áreas de não Risco

### Terminais:

**3,4,5,6**

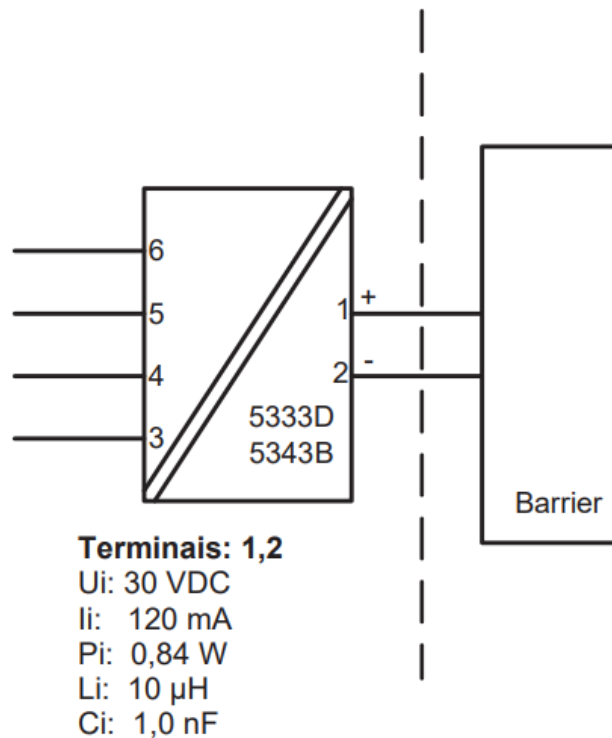
Uo: 30 VDC

Io: 8 mA

Po: 60 mW

Lo: 35 mH

Co: 66 nF



### Terminais: 1,2

Ui: 30 VDC

Ii: 120 mA

Pi: 0,84 W

Li: 10  $\mu\text{H}$

Ci: 1,0 nF

## Notas para instalação

Em uma atmosfera de gás potencialmente explosiva, o transmissor deve ser montado em um enclosure a fim de garantir um grau de proteção de no mínimo IP20 de acordo com EN60529. Se contudo o ambiente requer um nível de proteção maior, isso deve ser levado em conta

Se o transmissor é instalado em uma atmosfera explosiva exigindo o uso de equipamento de categoria Ga e se o enclosure é feito de alumínio, ele deve ser instalado de modo que, mesmo em caso de avaria rara, fontes de ignição devido a impacto e fricção, faíscas são eliminadas; se o enclosure é feito de materiais não metálicos, cargas eletrostáticas devem ser evitadas.

Para instalação em atmosfera de poeira potencialmente explosiva, as instruções a seguir:

O transmissor deve ser montado em enclosure de metal forma B de acordo com DIN43729 que está fornecendo um grau de proteção de pelo menos IP6X de acordo com EN60529. Isso é adequado para aplicação e corretamente instalado.

As entradas dos cabos e os elementos de obturação que podem ser utilizados são adequados para a aplicação e corretamente instalados.

Para temperatura ambiente  $\geq 60^{\circ}\text{C}$ , fios de resistência ao calor devem ser usados com uma faixa de pelo menos 20K acima da temperatura ambiente.

A temperatura da superfície do enclosure é igual à temperatura ambiente mais de 20 K, por uma camada de pó, com uma espessura até 5 mm.