



2-WIRE PROGRAMMABLE TRANSMITTER TT520



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2-WIRE PROGRAMMABLE TRANSMITTER TT520

- RTD, TC, Ohm or mV input
- Extremely high measurement accuracy
- 1.5 kVAC galvanic isolation
- Programmable sensor error value
- For DIN form B sensor head mounting

Application

- Linearized temperature measurement with various input types.
- Conversion of linear resistance variation to standard analogue current signal, for instance from valves or Ohmic level sensors.
- Amplification of a bipolar mV signal to a standard 4...20mA current signal.

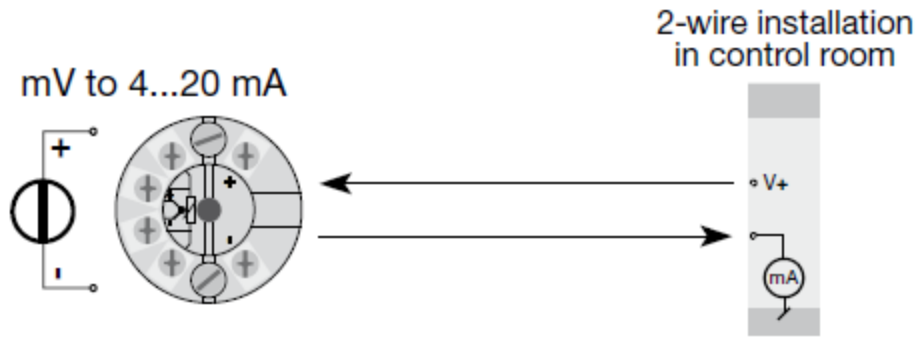
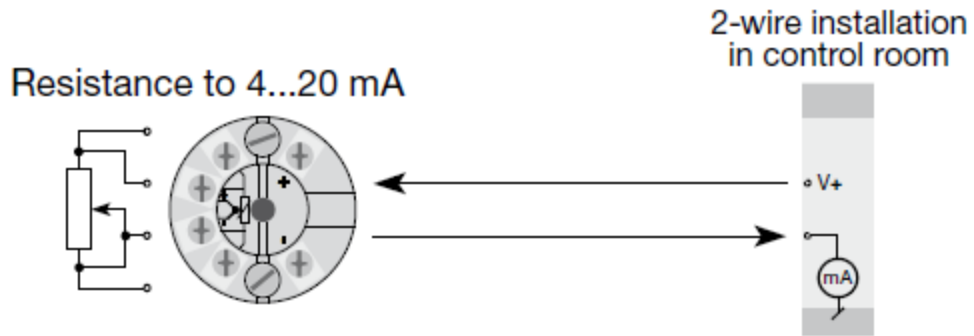
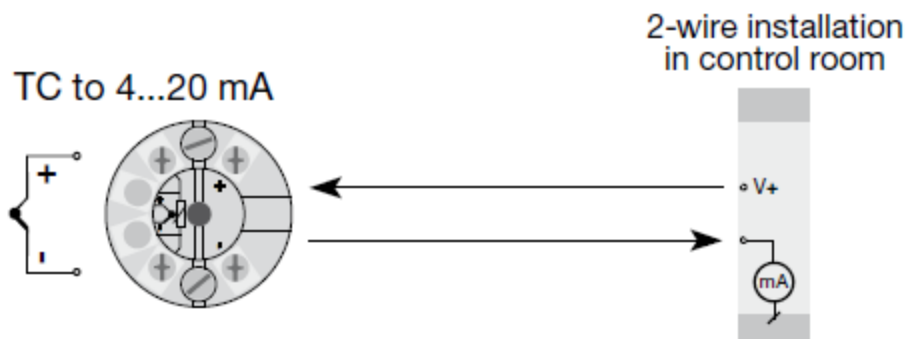
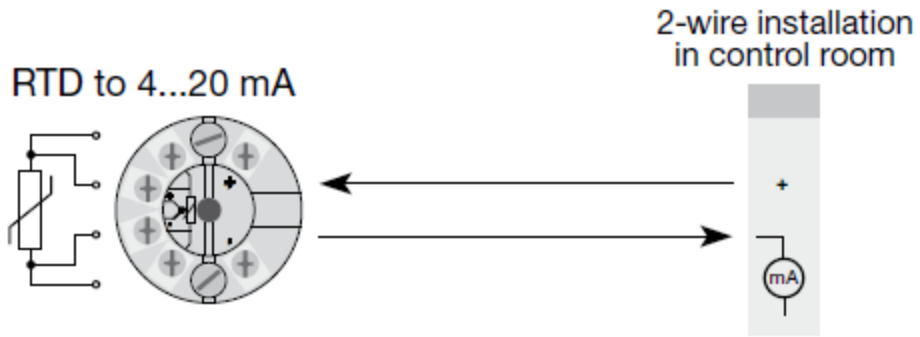
Technical characteristics

- Within a few seconds the user can program the TT520 to measure temperatures within all ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 2-, 3- and 4-wire connection.
- Continuous check of vital stored data for safety reasons.

Mounting/installation

- For DIN form B sensor head mounting. In non-hazardous areas, the TT520 can be mounted on a DIN rail with the AC807 Minco DIN rail adapter.

APPLICATIONS



Order TT520:

TT520	Model Number: TT520	
PD	PA = 100 Ω Platinum RTD (.00392) PB = 100 Ω Platinum RTD (.00391) PD = 100 Ω Platinum RTD (.00385) PE = 100 Ω Platinum RTD (.00385) PF = 1000 Ω Platinum RTD (.00385) PW = 1000 Ω Platinum RTD (.00375) CA = 10 Ω Copper RTD (.00427) FA = 604 Ω Nickel-iron FB = 1000 Ω Nickel-iron FC = 2000 Ω Nickel-iron	NA = 120 Ω Nickel E = Type E Thermocouple J = Type J Thermocouple K = Type K Thermocouple T = Type T Thermocouple B = Type B Thermocouple N = Type N Thermocouple R = Type R Thermocouple S = Type S Thermocouple V = Voltage Input
(0/100)	Temperature Range: 4 mA temperature/20 mA temperature or voltage	
C	Range Scale: C = Celsius F = Fahrenheit	
1	Calibration: 1 = Nominal Calibration Nominal calibration option 1 may be ordered for a stand-alone transmitter or for a sensor/transmitter assembly. Matched calibration options 2, 3, and 4 may only be ordered as part of an assembly. 2 = Matched to sensor 0.75% of span (RTD Assembly only) 3 = Matched to sensor 0.50% of span (RTD Assembly only) 4 = Matched to sensor 0.20% of span (RTD Assembly only)	
Y	Sensor Leads: Y = 2 lead RTD, T/C, or V Z = 3 lead RTD X = 4 lead RTD	
TT520PD(0/100)C1Y ← Sample Part Number		

Electrical specifications

Specifications Range:

-40°C to +85°C

Common specifications:

Supply voltage, DC	7.2...30 VDC
Internal consumption	25 mW...0.7 W
Voltage drop	7.2 VDC
Isolation voltage, test / operation	1.5 kVAC / 50VAC
Warm-up time	5 min.
Communications interface	Loop Link with Minco AC205817
Signal /noise ratio	Min. 60 dB
Response time (programmable)	1...60 s
EEProm error check	< 3.5 s
Signal dynamics, input	20 bit
Signal dynamics, output	16 bit
Calibration temperature	20...28°C

Accuracy:

Calibration	Type	Accuracy
Nominal	Pt(.00385) and Ni RTD	Greater of $\pm 0.36^{\circ}\text{F}/\pm 0.2^{\circ}\text{C}$ or $\pm 0.1\%$ of span
	Non-Pt(.0385) and Ni RTD with Span >30 Ohms	$\pm 0.45^{\circ}\text{F}/\pm 0.25^{\circ}\text{C}$
	Non-Pt(.00385) and Ni RTD with Span <30 Ohms	$\pm 0.9^{\circ}\text{F}/0.5^{\circ}\text{C}$
	Thermocouple	Greater of $\pm 1.8^{\circ}\text{F}/\pm 1.0^{\circ}\text{C}$ or $\pm 0.1\%$ of span
	Voltage	$\pm 10\mu\text{V}$
Matched	RTD	See ordering options

EMC immunity influence < $\pm 0.5\%$ of span

Extended EMC immunity:

NAMUR NE 21, A criterion, burst < $\pm 1\%$ of span

Effect of supply voltage variation < 0.005% of span/VDC

Vibration IEC 60068-2-6 Test : 2007

2...25 Hz..... ± 1.6 mm

25...100 Hz..... ± 4 g

Max. wire size 1x1.5 mm² stranded wire

Screw terminal torque 0.4 Nm

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 or Other RTD	0 Ω	5000 Ω	30°C	----

Max. offset 50% of selec. max. value

Cable resistance per wire (max) 5 Ω

Sensor current Nom. 0.2 mA

Effect of sensor cable resistance

(3- / 4-wire) < 0.002 Ω/Ω

Sensor error detection Yes

TC input:

Type	Min temperature	Max temperature	Min span	Standard
B	+400°C	+1820°C	100°C	IEC584
E	-100°C	+1000°C	50°C	IEC584
J	-100°C	+1200°C	50°C	IEC584
K	-180°C	+1372°C	50°C	IEC584
L	-100°C	+900°C	50°C	DIN 43710
N	-180°C	+1300°C	50°C	IEC584
R	-50°C	+1760°C	100°C	IEC584
S	-50°C	+1760°C	100°C	IEC584
T	-200°C	+400°C	50°C	IEC584
U	-200°C	+600°C	50°C	DIN 43710
W3	0°C	+2300°C	100°C	ASTM E988-90
W5	0°C	+2300°C	100°C	ASTM E988-90
LR	-200°C	+800°C	50°C	GOST 3044-84

Max. offset 50% of selec. max. value

Cold junction compensation < ±1.0°C

Sensor error detection Yes

Sensor error current:

 When detecting Nom. 33 µA

 Else 0 µA

Voltage input:

Measurement range -12...800mV

Min. span 5 mV

Max. offset 50% of selec. max. value

Input resistance 10 MΩ

Output:**Current output:**

Signal range 4...20 mA

Min. signal range 16mA

Updating time 440 ms

Output signal at EEprom error ≤ 3.5 mA

Load resistance ≤ (Vsupply – 7.2) / 0.023 [Ω]

Load stability < ±0.01% of span/100 Ω

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..... P337392/1
RoHS..... 2011/65/EU
EAC TR-CU 020/2011

Marine approval:

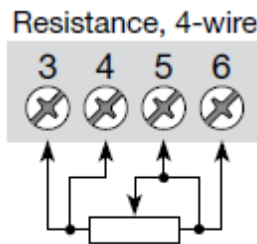
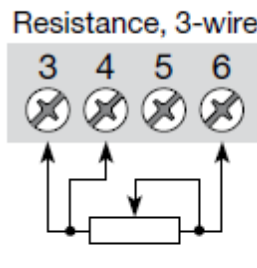
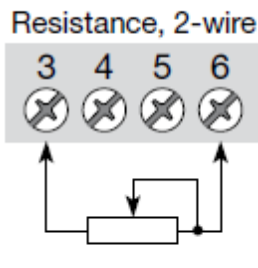
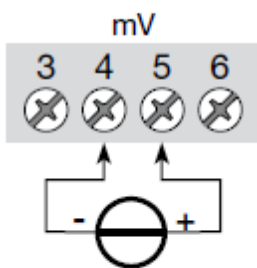
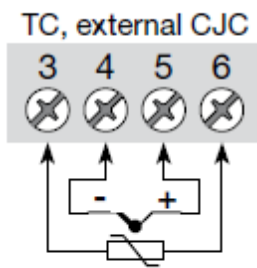
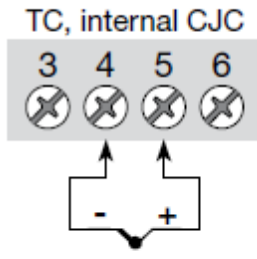
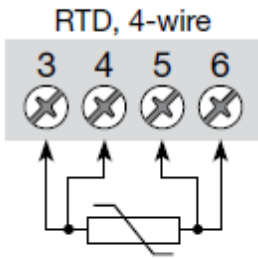
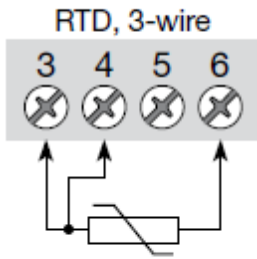
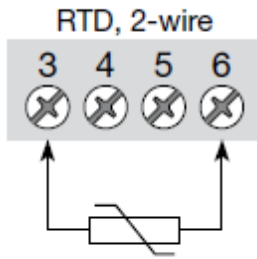
DNV-GL, Ships & Offshore Standard for Certification No. 2.4

Ex / I.S.:

ATEX 2014/34/EU..... KEMA 06ATEX0062 X
FM Certificate..... FM17US0013X
CSA Certificate..... 1125003
IECEX..... DEK 13.0035X
INMETRO..... DEKRA 16.0013 X
CCOE..... P337392/2
EAC Ex TR-CU 012/2011..... RU C-DK.GB08.V.00410

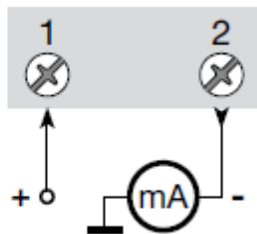
CONNECTIONS

Input:



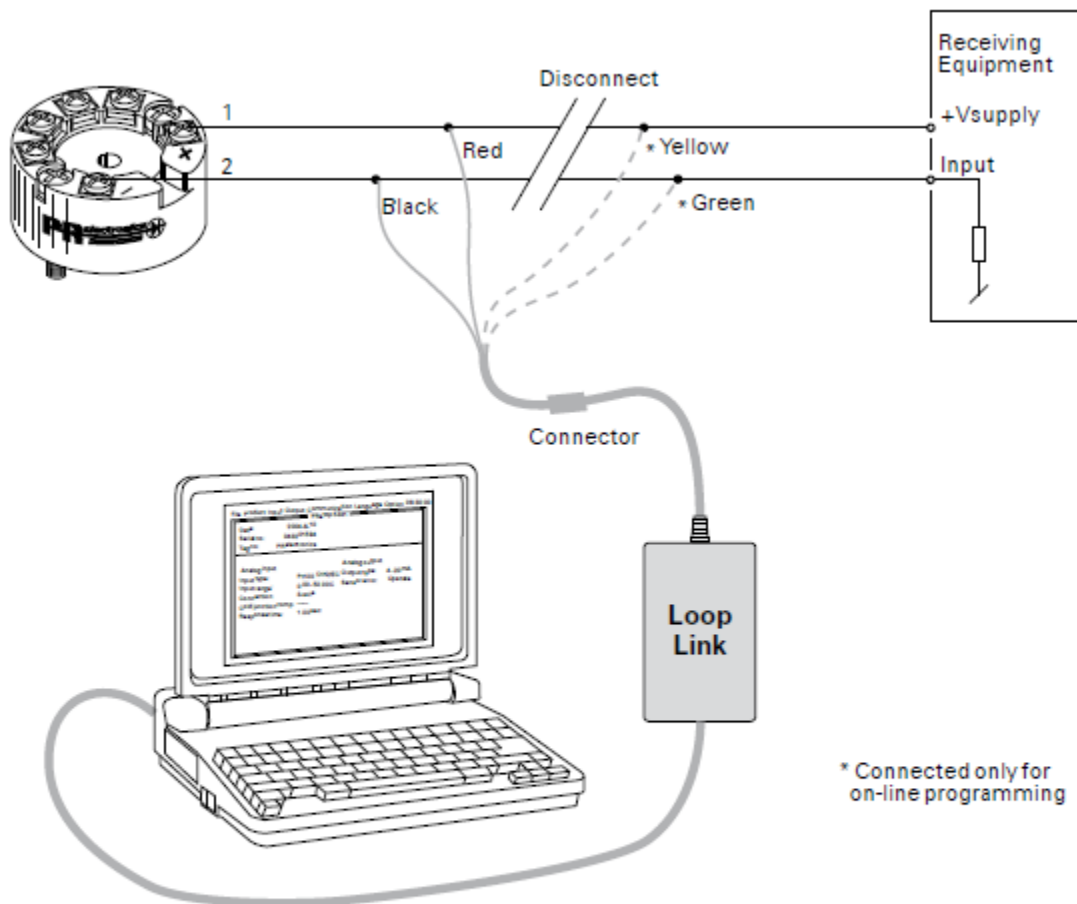
Output:

2-wire installation

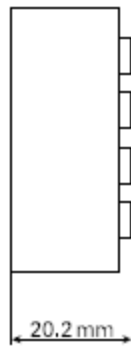
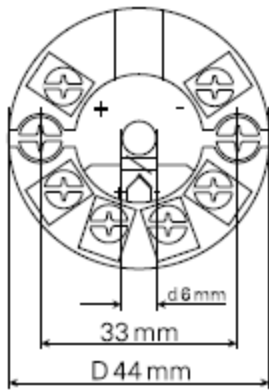


Programming

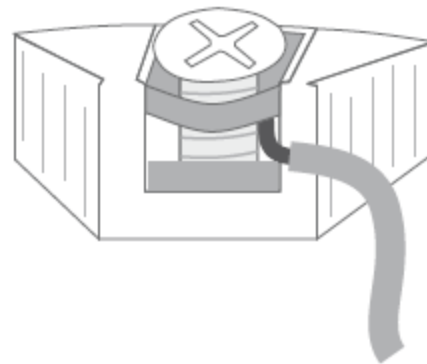
- Loop Link is a communication interface that is needed for programming the TT508, TT509, TT510, TT511, TT518, TT519, TT520 & TT521.
- Use Minco AC205817.
- For programming please refer to the drawing below.
- Loop link is not approved for communication with modules installed in hazardous (Ex) areas.



Mechanical specifications



Mounting of sensor wires



Wires must be mounted between the metal plates.

Appendix

ATEX Installation Drawing



For safe installation of TT520 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 on the serial number.

ATEX Certificate KEMA 06ATEX 0062 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: 3,4,5,6

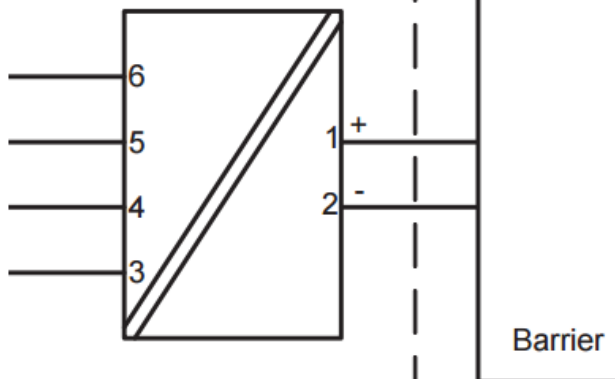
U_o: 9.6 VDC

I_o: 25 mA

P_o: 60 mW

L_o: 33 mH

C_o: 2.4 μF



Terminal: 1,2

U_i: 30 VDC

I_i: 120 mA

P_i: 0.84 W

L_i: 10 μH

C_i: 1.0 nF

Installation notes

The sensor circuit is not infallibly galvanic isolated from the input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500Vac during 1 minute.

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 according to DIN43729 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 the TT520 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 IECEx DEK 13.0035X

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

Terminal: 3,4,5,6

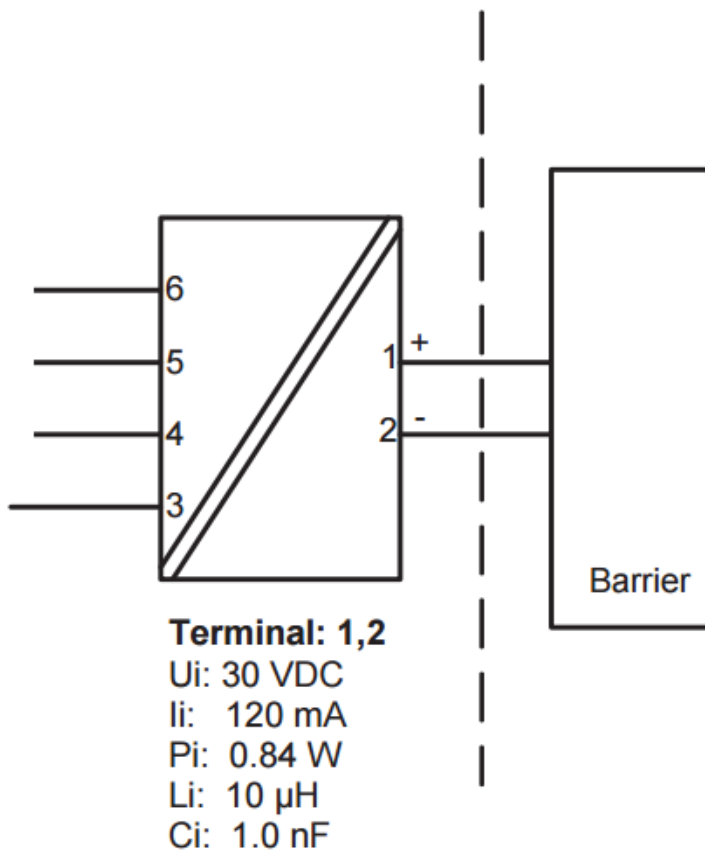
U_o: 9.6 VDC

I_o: 25 mA

P_o: 60 mW

L_o: 33 mH

C_o: 2.4 μF



Terminal: 1,2

U_i: 30 VDC

I_i: 120 mA

P_i: 0.84 W

L_i: 10 μH

C_i: 1.0 nF

Installation Notes

The sensor circuit is not infallibly galvanic isolated from the input circuit. However, the galvanic isolation between the circuits is capable of withstanding a test voltage of 500Vac during 1 minute.

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

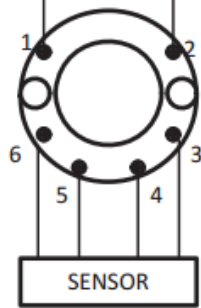
Hazardous (Classified) Location

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
 V_{max} or U_i : 30 V
 I_{max} or I_i : 120 mA
 P_{max} or P_i : 0.84 W
 C_i : 1 nF
 L_i : 10 uH

Terminal 3,4,5,6
 V_t or U_o : 9.6 V
 I_t or I_o : 28 mA
 P_t or P_o : 67.2 mW
 C_a or C_o : 3.5 uF
 L_a or L_o : 35 mH



Non Hazardous Location

Associated Apparatus
 or Barrier
 with
 entity Parameters:

$U_M \leq 250V$
 V_{oc} or $U_o \leq V_{max}$ or U_i
 I_{sc} or $I_o \leq I_{max}$ or I_i
 $P_o \leq P_i$
 C_a or $C_o \geq C_i + C_{cable}$
 L_a or $L_o \geq L_i + L_{cable}$

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 the National Electric 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 agencies 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 area as follows:

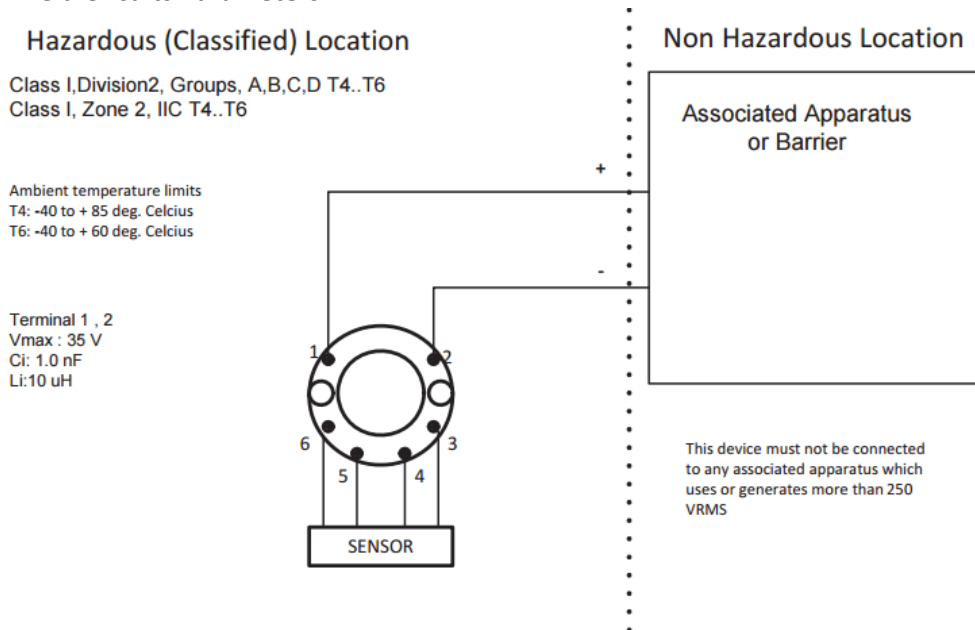
The intrinsically safe divides, other than barriers, must not be a source of power. The maximum voltage $U_i(V_{max})$ and current $I_i(I_{max})$, and maximum power $P_i(P_{max})$, which the device can receive and remain intrinsically safe, must be equal to or greater than the voltage (U_o or V_{oc} or V_t) and the current (I_o or I_{sc} or I_t) and the power P_o which can be delivered to the barrier.

The sum of the maximum unprotected capacitance (C_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 sum of the maximum unprotected inductance (L_i) for each intrinsically safe 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 the I_o , I_{sc} or I_t , and C_a and L_a for barriers are provided by the barrier manufacturer.

Ni Field Circuits Parameters



CSA Installation Drawing 533XQC03

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

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

Terminal: 3, 4, 5, 6

Only passive, or non-energy
Storing devices such as RTD's
And Thermocouples may be
Connected

Terminal: 1, 2

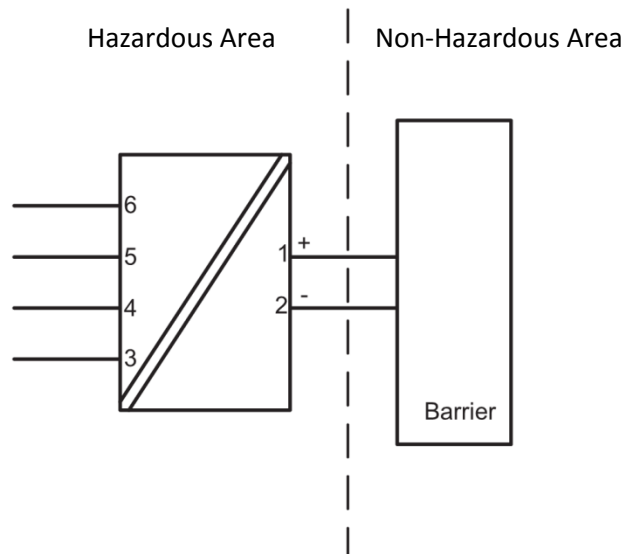
Ui: 30 VDC

Ii: 120 mA

Pi: 0.84 W

Li: 10 μH

Ci: 1.0 nF



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 INMETRO



Para instalação segura do TT520 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 16.0013 X

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

Normas ABNT NBR IEC 60079-0 : 2013 ABNT NBR IEC 60079-11 : 2013

Áreas classificadas

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

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

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

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

Terminais 3,4,5,6

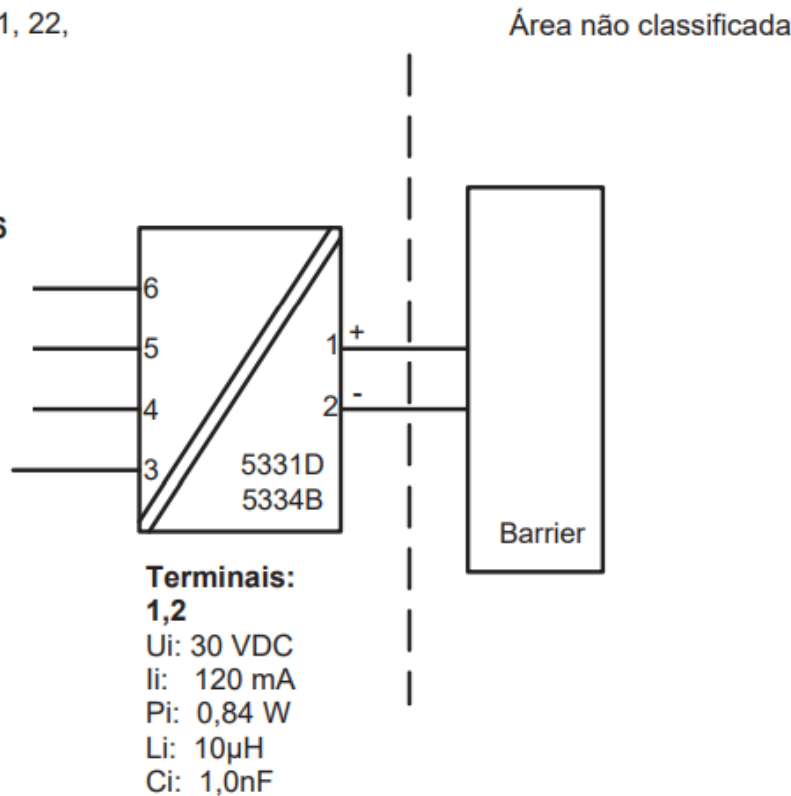
Uo: 9,6 VDC

Io: 25 mA

Po: 60 mW

Lo: 33 mH

Co: 2,4 μ F



Notas de instalação

O circuito do sensor não é isolado galvanicamente infalível do circuito de entrada. Contudo, a isolação galvânica entre os circuitos é capaz de resistir a um teste de tensão de 500Vac durante 1 minuto.

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 eletroestáticas 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.