

1 YEAR
WARRANTY



Ω OMEGA™

User's Guide



TXUN-ST/FM 2 Wire Programmable Transmitter

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Section 1 - 2 Wire Programmable Transmitter TXUN-ST/FM

- 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
- TXUN-FM is the FM approval version of TXUN-ST

Application

- Linearised temperature measurement with Pt100...Pt1000, Ni100...Ni1000, or TC sensor.
- Conversion of linear resistance variation to a standard analogue current signal, for instance from valves or Ohmic level sensors.
- Amplification of a bipolar mV signal to a standard 4...20 mA current signal.

Technical characteristics

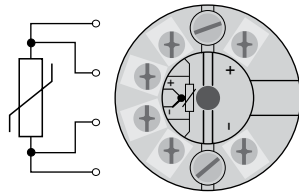
- Within a few seconds the user can program TXUN-ST to measure temperatures within all ranges defined by the norms.
- The RTD and resistance inputs have cable compensation for 2-, 3- and 4-wire connection.
- Continuous check of vital stored data for safety reasons.

Mounting/installation

For DIN form B sensor head mounting. In non-hazardous areas the TXUN-ST can be mounted on a DIN rail.

Section - Applications

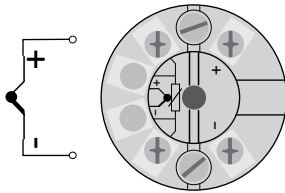
RTD to 4...20 mA



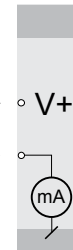
2-wire installation
in control room



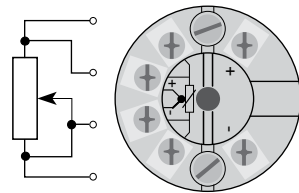
TC to 4...20 mA



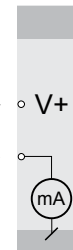
2-wire installation
in control room



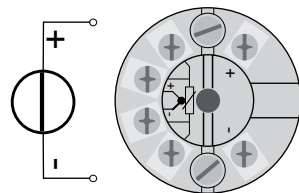
Resistance to 4...20 mA



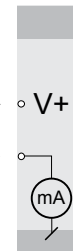
2-wire installation
in control room



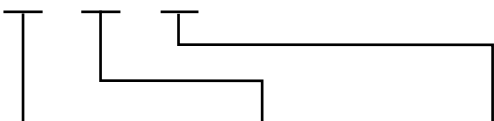
mV to 4...20 mA



2-wire installation
in control room



Order: TXUN-ST



Type	Version	Ambient temperature	Galvanic isolation
TXUN-ST	Standard : A CSA, FM, ATEX, IECEX & INMETRO: D	-40°C...+85°C : 3	1500 VAC : B

Electrical specifications

Specifications range:

-40°C to +85°C

Common specifications:

Supply voltage, DC

Standard 7.2...35 VDC

CSA, FM, ATEX, IECEX & INMETRO..... 7.2...30 VDC

Internal power dissipation

Standard 25 mW...0.8 W

CSA, FM, ATEX, IECEX & INMETRO..... 25 mW...0.7 W

Voltage drop..... 7.2 VDC

Isolation voltage, test / operation 1.5 kVAC / 50 VAC

Warm-up time..... 5 min.

Communications interface..... Loop Link

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, the greater of general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
All	$\leq \pm 0.05\%$ of span	$\leq \pm 0.01\%$ of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
RTD	$\leq \pm 0.2^\circ\text{C}$	$\leq \pm 0.01^\circ\text{C} / ^\circ\text{C}$
Lin. R	$\leq \pm 0.1 \Omega$	$\leq \pm 10 \text{ m}\Omega / ^\circ\text{C}$
Volt	$\leq \pm 10 \mu\text{V}$	$\leq \pm 1 \mu\text{V} / ^\circ\text{C}$
TC type: E, J, K, L, N, T, U	$\leq \pm 1^\circ\text{C}$	$\leq \pm 0.05^\circ\text{C} / ^\circ\text{C}$
TC type: B, R, S, W3, W5, LR	$\leq \pm 2^\circ\text{C}$	$\leq \pm 0.2^\circ\text{C} / ^\circ\text{C}$

Inputs and Specs

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 : 2007
 2...25 Hz ± 1.6 mm
 25...100 Hz ± 4 g
 Max. wire size..... 1 x 1.5 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 specifications, input:

RTD and linear resistance input:

RTD type	Min. value	Max. value	Min. span	Standard
Pt100 Ni100 Lin. R	-200°C -60°C 0 Ω	+850°C +250°C 5000 Ω	25°C 25°C 30 Ω	IEC 60751 DIN 43760 -----

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

Section 3.1 - TC Input

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 $< \pm 1.0^{\circ}\text{C}$

Sensor error detection Yes

Sensor error current:

When detecting Nom. 33 μA

Else 0 μA

Voltage input:

Measurement range -12...800 mV

Min. span 5 mV

Max. offset 50% of selec. max. value

Input resistance 10 M Ω

Output:

Current output:

Signal range 4...20 mA

Min. signal range 16 mA

Updating time 440 ms

Output signal at EEPROM error ≤ 3.5 mA

Load resistance $\leq (V_{\text{supply}} - 7.2) / 0.023 [\Omega]$

Load stability $< \pm 0.01\%$ of span / 100 Ω

Sensor error detection:

Programmable 3.5...23 mA

Namur NE43 Upscale 23 mA

Namur NE43 Downscale 3.5 mA

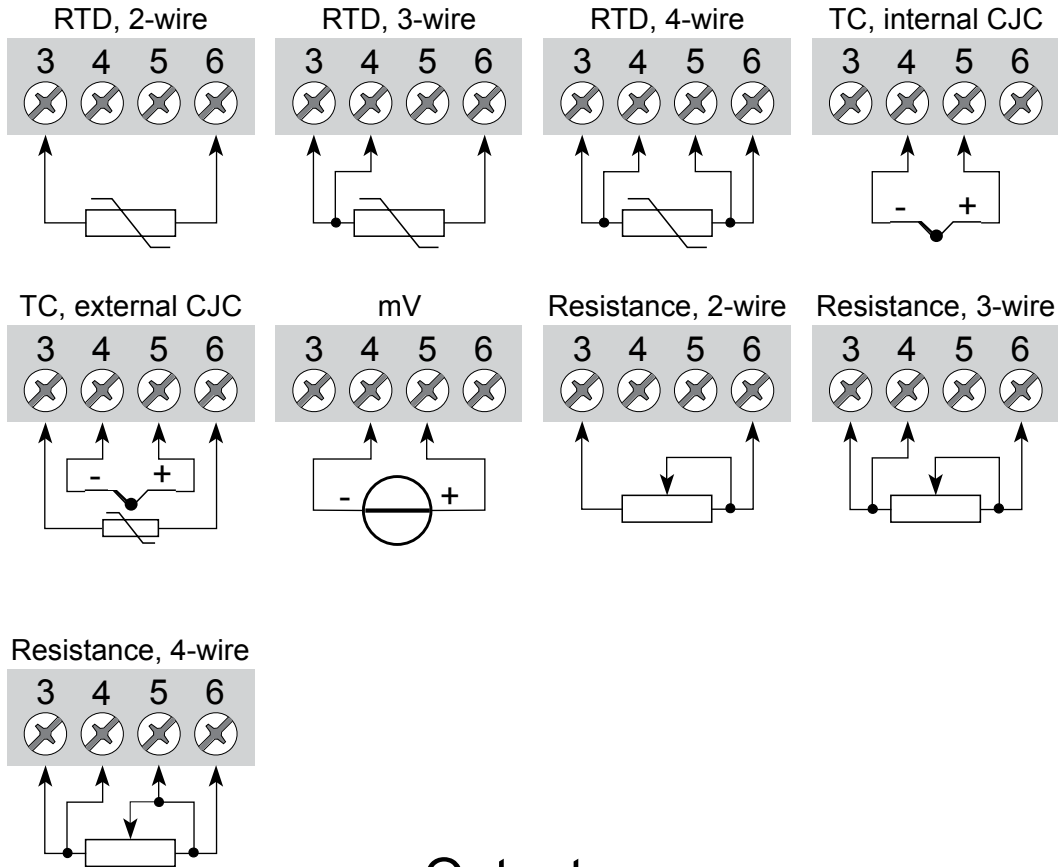
Of span = Of the presently selected range

Approvals:

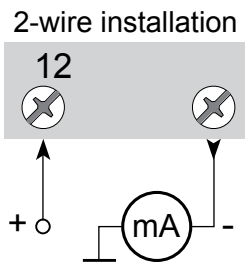
EMC 2014/30/EU
CCOE P337392/1
RoHS 2011/65/EU
EAC TR-CU 020/2011
FM certificate FM17US0013X

Section 4 - Connections

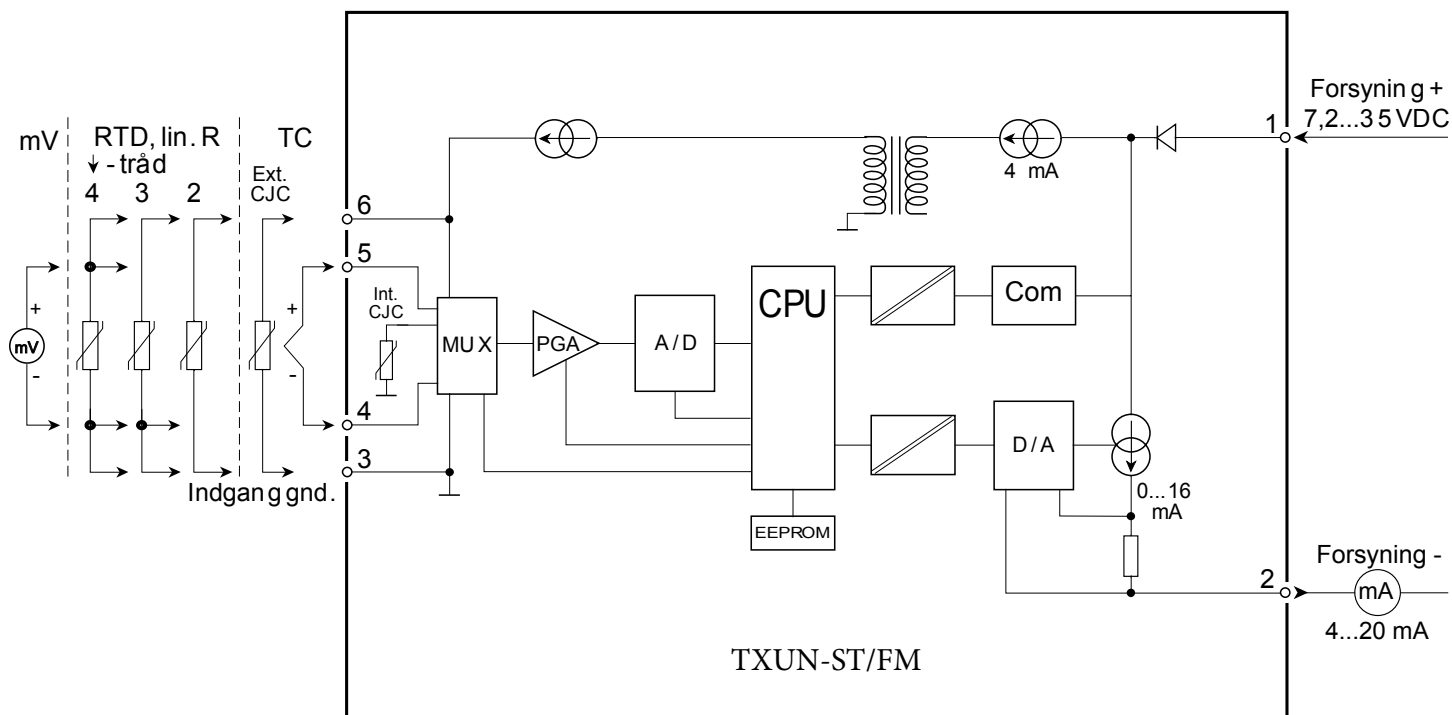
Input:



Output:

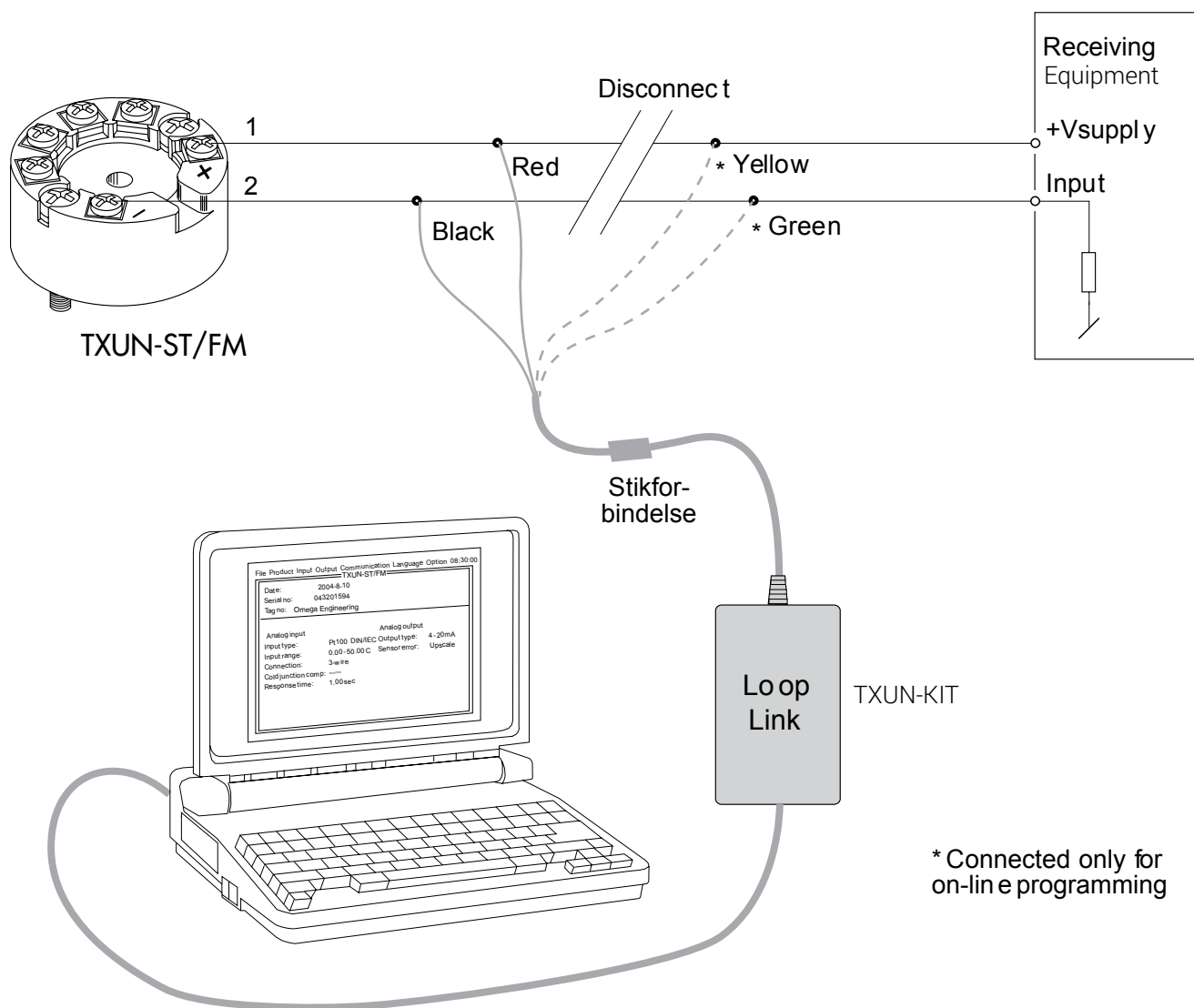


Section 5 - Block Diagram



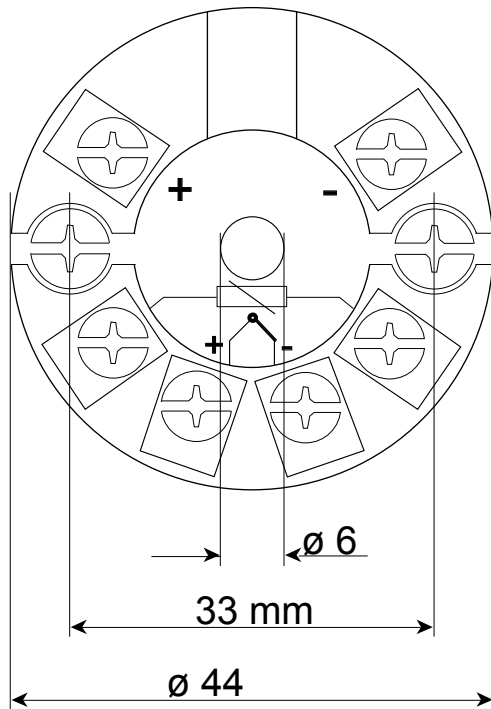
Section 6 - Programming

- Loop Link is a communications interface that is needed for programming TXUN-ST/FM.
- For programming please refer to the drawing below and the help functions in OMset.
- Loop link is not approved for communication with modules installed in hazardous (Ex) areas.

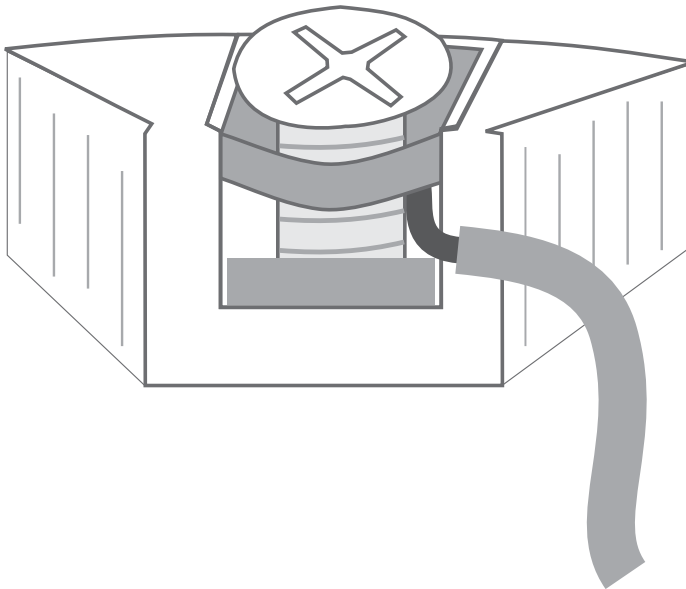
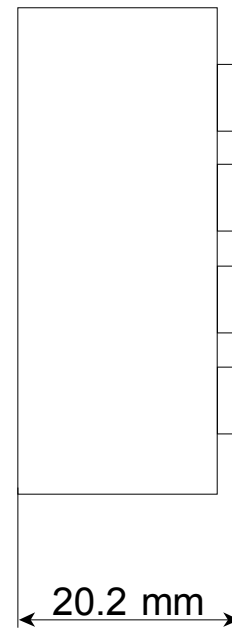


Section 7 - Mechanical Specifications

Mechanical specifications



Mounting of sensor wires



Wires must be mounted between the metal plates.

APPENDIX

FM INSTALLATION DRAWING - TXUN-FM

INMETRO INSTRUÇÕES DE SEGURANÇA - TXUN-ST

INMETRO INSTRUÇÕES DE SEGURANÇA - TXUN-FM

Section 9 - FM Installation Drawing TXUN-FM

FM Installation Drawing

Model TXUN-FM

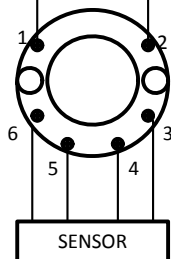
Hazardous (Classified) Location

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



Hazardous Location

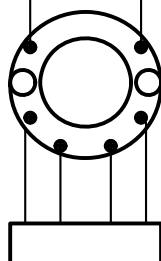
Associated Apparatus
or Barrier
with
entity Parameters:

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

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

Hazardous

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



Location

uses or generates more than 250
VRMS

Section 9 - Q502

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.

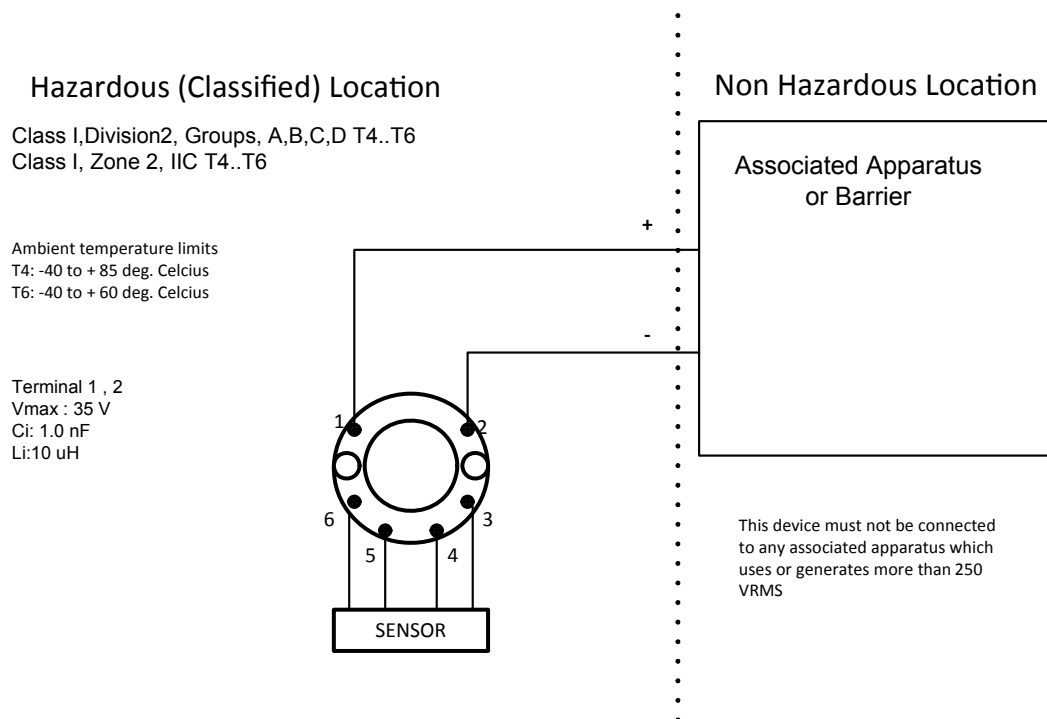
The sum of the maximum unprotected capacitance (C_i) for each intrinsically device and the interconnecting wiring must be less than the capacitance (C_a) which can be safely connected to the barrier.

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

Model TXUN-FM



Section 10 - INMETRO

Desenho de Instalação INMETRO



Para instalação segura do TXUN-ST/FM o seguinte deve ser observado. O modelo 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.
O ano de fabricação pode ser pego dos dois primeiros dígitos do número de série.

CertificadoDEKRA 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

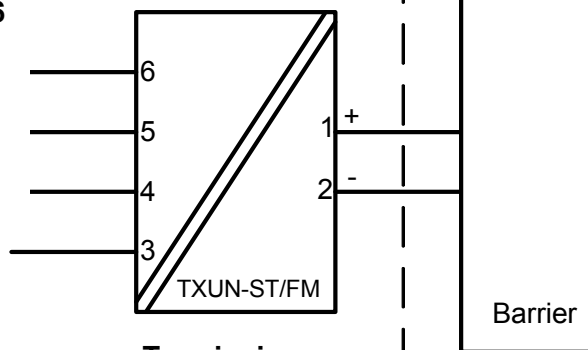
Uo: 9,6 VDC

Io: 25 mA

Po: 60 mW

Lo: 33 mH

Co: 2,4µF



Terminais:

1,2

Ui: 30 VDC

Ii: 120 mA

Pi: 0,84 W

Li: 10µH

Ci: 1,0nF

Section 10 - TXUN-FM

Notas de instalação

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

Em uma atmosfera de gás potencialmente explosiva, o transmissor deve ser montado em um invólucro a fim de garantir um grau de proteção de no mínimo IP20 de acordo com a ABNT NBR IEC60529. Se contudo, o ambiente necessitar de um nível de proteção maior, isso deve ser levado em consideração.

Se o transmissor é instalado em uma atmosfera explosiva exigindo o uso de equipamento de proteção de nível Ga e se o invólucro é feito de alumínio, ele deve ser instalado de modo que, mesmo em caso remoto de avaria, fontes de ignição devido ao impacto e fricção, faíscas são eliminadas.

Se o invólucro é feito de materiais não metálicos, cargas eletroestáticas devem ser evitadas.

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

O transmissor deve ser montado em invólucro de metal forma B de acordo com DIN43729 que está fornecendo um grau de proteção de pelo menos IP6X de acordo com ABNT NBR IEC60529. O invólucro deve ser adequado para aplicação pretendida e instalado corretamente.

As entradas dos cabos e os elementos de obturação que podem ser utilizados devem ser adequados à aplicação pretendida 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 invólucro é igual à temperatura ambiente mais 20 K, por uma camada de pó, com espessura de até 5 mm.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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- ☑ pH, Conductivity & Dissolved Oxygen Instruments

M5694/1118