

Free Software Configuration for your Application



Smart Isolated
Temperature Transmitter

TxIsoRail



Introduction

TxIsoRail is fully programmable isolated temperature transmitters dedicated to Pt100 and thermocouple industrial sensors. **TxIsoRail** is a DIN rail mount unit. Both units can be easily user configured for input type and working range by means of an interface cable connected to a PC USB port.

Why use isolated transmitters?

Isolated transmitters protect the electrical instruments by eliminating ground loop effects and reduce substantially the undesirable interferences and instabilities in sensor measurements.

Features

TxIsoRail is two-wire signal conditioning devices that deliver 1000 Vac isolation between input and output. These devices can be fully programmed by the end user for different industrial applications. One single model can be configured to accept several thermocouple types and Pt100 RTDs. TxIsoRail can also accept 0 to 50 mV, 0-20 mA and 4-20 mA field signals. The flexibility of in-the-field configuration translates into a one model fits all signal conditioning and isolator module.

Specifications

- Programmable input: thermocouples type J, K, T, E, N, R, S, B, Pt100 RTD, 0-50 mV, 0-20 mA, 4-20 mA and 0-10 V
- User programmable working range
- 2-wire loop powered 4-20 mA or 20-4 mA output
- 2 or 3-wire Pt100 input with linearized output
- Cold junction compensation for thermocouples
- Option: 0 to 10Vdc
- TxConfig Windows® configurator software
- Configuration with a PC via TxConfig interface
- Manual zero (offset) adjustment can be done by means with 1 front key in the TxIsoRail
- Power supply: 12 to 35 Vdc
- Accuracy: Pt100, 0-50 mV (tension) and 0-20 mA (current) $\pm 0.20\%$ of full scale. Thermocouples $\pm 0.25\%$ of full scale $\pm 1^\circ\text{C}$
- Temperature effect: 0.003% of maximum SPAN/ $^\circ\text{C}$
- Working temperature: -40 to +85 $^\circ\text{C}$ (-40 to 185 $^\circ\text{F}$)
- Sensor failure protection: programmable burnout upscale or downscale
- Dimensions: 72 mm (H) x 78 mm (D) x 19 mm (W)
- Isolation: 1000 Vac between sensor input and 4-20 mA output loop
- Selectable mains filter: 60 Hz or 50 Hz

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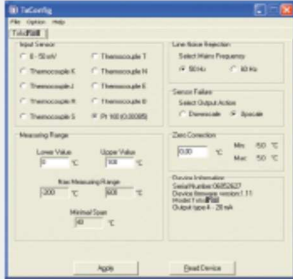
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Configuration

Configuration is achieved by means of an interface cable connected to a RS232 PC port along with the convenient configurator software TxConfig. Through this convenient software, the end user can easily configure the input type, the desired working range and the necessary upscale or downscale protections. Minor sensor error corrections can also be made whenever necessary.

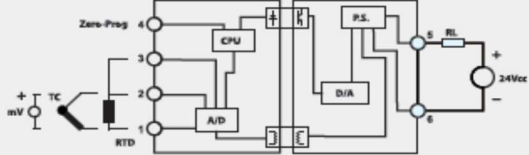


Input Types and Ranges

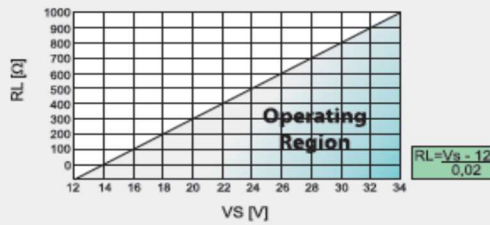
Users can easily program input type and temperature range as below:

INPUT	MAX. RANGE	MIN. SPAN
Thermocouple K	-150 to 1370 °C / -238 to 2500 °F	100 °C
Thermocouple J	-100 to 760 °C / -148 to 1400 °F	100 °C
Thermocouple R	-50 to 1760 °C / -58 to 3200 °F	400 °C
Thermocouple S	-50 to 1760 °C / -58 to 3200 °F	400 °C
Thermocouple T	-160 to 400 °C / -256 to 752 °F	100 °C
Thermocouple N	-270 to 1300 °C / 454 to 2372 °F	100 °C
Thermocouple E	-90 to 720 °C / -130 to 1328 °F	100 °C
Thermocouple B	500 to 1820 °C / 932 to 3308 °F	400 °C
Pt100	-200 to 600 °C / -328 to 1112 °F	40 °C
Voltage	0 to 50 mV	5 mV
Voltage	0 to 10 V	1V
Current	0 to 20 mA	2 mA
Current	4 to 20 mA	2 mA

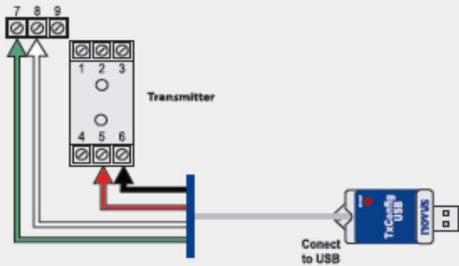
Block Diagram



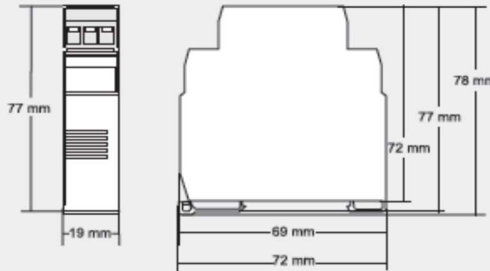
Load & Power Supply



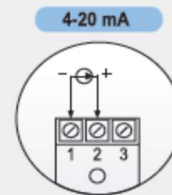
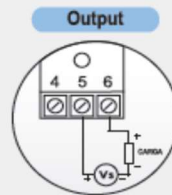
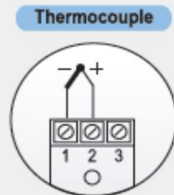
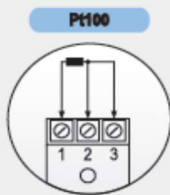
TxConfig Connections



Dimensions



Electrical Connections



TxIsoRail 4-20 mA

ISOLATED TEMPERATURE TRANSMITTER – OPERATION MANUAL V1.0x H



SPECIFICATIONS

Sensor input: User defined. The supported sensors are listed in Table 1, along with their maximum ranges.

- Thermocouples:** Types J, K, R, S, T, N, E and B to IEC 60584 (ITS-90). Impedance >> 1 M Ω
- Pt100:** Excitation: 180 μ A, 2 or 3-wire connection (for 2-wire sensors, tie terminals 2 and 3 together). $\alpha = 0.00385$, according to IEC 60751 (ITS-90).
- Voltage:** 0 to 50 mVdc, 0 to 10 Vdc. Impedance >> 1 M Ω .
* **Note:** 0-10 Vdc input type requires an internal jumper switching.
0 to 20 mA, 4 to 20 mA. Impedance 15.0 Ω (+ 1.9 Vdc).

Sensor Type	Range	Minimum measurement span
Thermocouple K	-150 to 1370 °C / -238 to 2498 °F	100 °C
Thermocouple J	-100 to 760 °C / -148 to 1400 °F	100 °C
Thermocouple R	-50 to 1760 °C / -58 to 3200 °F	400 °C
Thermocouple S	-50 to 1760 °C / -58 to 3200 °F	400 °C
Thermocouple T	-160 to 400 °C / -256 to 752 °F	100 °C
Thermocouple N	-270 to 1300 °C / -454 to 2372 °F	100 °C
Thermocouple E	-90 to 720 °C / -130 to 1328 °F	100 °C
Thermocouple B	500 to 1820 °C / 932 to 3308 °F	400 °C
Pt100	-200 to 600 °C / -328 to 1112 °F	40 °C
Voltage	0 to 50 mV	5 mV
	* 0 to 10 V	1 V
Current	0 to 20 mA	2 mA
	4 to 20 mA	2 mA

Table 1 – Transmitter input sensors

Output: 2-wire 4-20 mA, linear with respect to the measured signal.

Resolution: 0.001 mA (14 bits)

Total Accuracy: Better than 0.3 % of the maximum span for thermocouples and 0.2 % for Pt100 and voltage;

Response Time: < 500 ms

Isolation: Between the sensor and the 4-20 mA loop (1000 V / 1 min).

Power Supply: 12 to 35 Vdc, across the transmitter;

Maximum Load (RL): $RL (max.) = (Vdc - 12) / 0.02 [\Omega]$

Were: Vdc= Power supply voltage

Operating Temperature: -40 to 85 °C

Humidity: 0 to 90 % UR

Electromagnetic Compatibility: EN 50081-2, EN 50082-2

Internal protection against polarity inversion.

Cold junction compensation for thermocouples.

CONFIGURATION

If the transmitter is already configured as required by the application (sensor type, range, etc), it may be installed and used right away. However, if a distinct configuration is required, this can be done through the TxConfig software and the TxConfig Interface.

The TxConfig interface and software can be purchased from the manufacturer or at its authorized distributors and representatives. Updates for the software are available at our website. To install the TxConfig software, run the Tx_setup.exe file and follow the instructions.

The TxConfig interface connects the transmitter to the PC, as shown in Fig. 1.

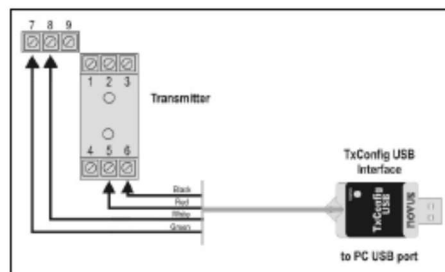


Fig. 1 – TxConfig Interface USB connections

Once the connection is accomplished, the software shows the configuration options of the transmitter model attached. Access the Help for usage instructions.

The TxConfig screen is shown in Fig. 2.



Fig. 2 – TxConfig main screen

The fields in the screen mean:

- Input Sensor:** Choose the desired temperature sensor among the available options. See Table 1.

- Measuring Range:** Defines the beginning and the end of the range.

When the Low Scale Limit is configured with a value higher than the Full Scale Limit, the current output will have a decrescent behavior (20~4 mA).

The values configured in these fields can not be beyond the sensor measuring range. The minimum span value has to be observed as well (see Table 01).

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3. **Line Noise Rejection:** The transmitter incorporates a digital filter to cancel the induced noise from the 50 or 60 Hz systems. For better performance, select the line frequency used in your country.
4. **Sensor Failure:** establishes the transmitter output behavior (upscale or down-scale) in the presence of a sensor fail.
5. **Zero Correction:** Allows for small sensor corrections.
6. **Device Information:** The *Device Information* box contains relevant data concerning a particular transmitter. Please pass along this information when contacting the technical assistance department.
7. **Apply:** Sends a new configuration to the transmitter.
8. **Read Device:** Brings to the screen the current transmitter parameters configuration.

Note: The factory default configuration is (unless otherwise specified or ordered):

- Pt100 input, 0 to 100 °C
- 60 Hz filtering and upscale (20 mA) output for sensor fail.

During the configuration, the transmitter requires to be powered. Depending on the PC used, the power can be supplied by the TxConfig interface. To assure proper communication, it is recommended to apply external power to the transmitter.

An alternative is to configure the transmitter while it is in operation; this way, the needed energy is supplied by the current loop, as in Fig. 3.

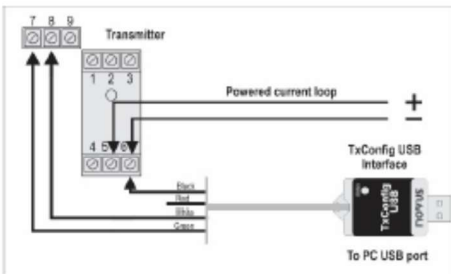


Fig. 3 – TxConfig Interface USB connections – Loop powered



The TxConfig interface has a complex electronic circuit. Do not use any other interface or cable connection to USB; the product will be damaged and this damage is not covered under warranty.

MECHANICAL INSTALLATION

The transmitter is intended for DIN rail mounting. Its drawing is presented in Fig. 4.

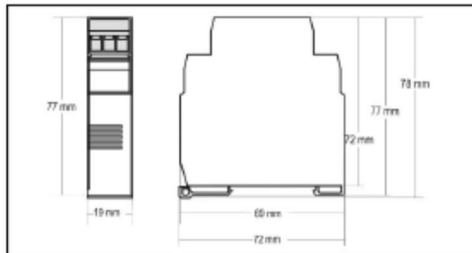


Fig. 4 – Transmitter dimensions

ELECTRICAL CONNECTIONS

Figure below shows the transmitter connections to the sensor and power supply. Terminals 1, 2 e 3 are used for sensor input. For 2-wire Pt100, terminals 2 and 3 shall be connected together.

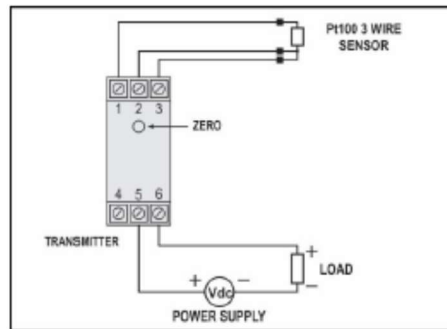


Fig. 5 – Transmitter wiring (Pt100)

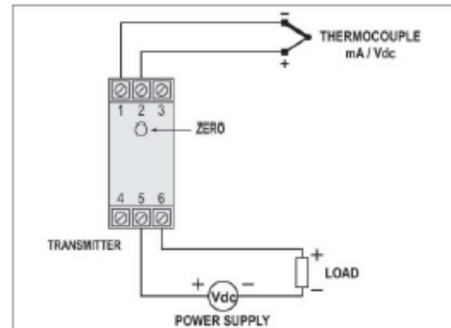


Fig. 6 – Transmitter wiring (Thermocouple, mA / Vdc)

The **LOAD** represents the input shunt of an instrument measuring the 4-20 current loop.

Electrical Connections – 0-10 Vdc Input

For 0-10 Vdc input, the transmitter requires an internal hardware configuration change. Please open the instrument case and change the jumper shown in Fig. 7.

- Position 1-2: 0-10 Vdc input
- Position 2-3: all other input types

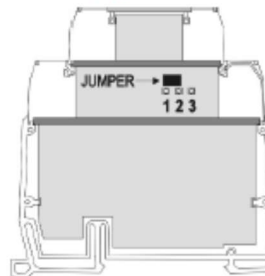


Fig. 7 – Jumper position for 0-10 Vdc input

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OPERATION

All input types and the 4-20 mA output current are factory calibrated.

However, if desired by the user, a manual offset trim is implemented to provide fine adjustments to the signal in the field. This is accomplished by the front key ZERO, located under the frontal label in order to avoid accidental adjustments. Using a small tool (2 mm diameter), press and hold the desired key for at least 2 seconds to increase or decrease the output current. When the output current is reached, the key must be released.

The offset correction can also be accomplished by the TxConfig software. See in Figure 2 the Zero Correction field for this purpose. The serial adaptor can be connected to the transmitter while it is operating in the process.

The user must choose the sensor and configure the sensor span which best suit the application. The sensor span must not exceed the maximum range supported by the transmitter for a particular sensor, neither be lower than the minimum span.

It is important to note that the transmitter accuracy is related to the total sensor span of a sensor, regardless of the output scale (span) configured. Example:

- Pt100; maximum input span of -200 to +650 °C, 0.2 % accuracy.
- Maximum error: 1.2 °C (0.2 % of 800 °C)
- This error is the same no matter if total span is used (-200 to 650 °C) or a narrower user-defined span is used, like 0 to 100 °C.

Note: When using a Pt100 simulator, make sure the transmitter Pt100 excitation current (0.18 mA) is compatible with the simulator specification.

WARRANTY

Warranty conditions are available on our website www.ncvusautomation.com/warranty.

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