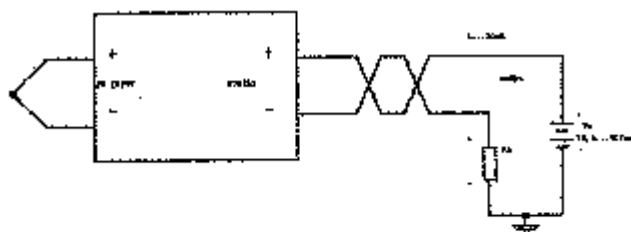


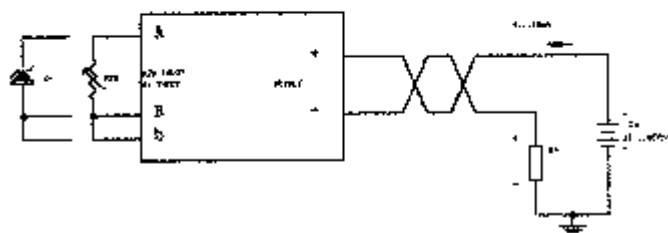
TRANSMITTERS 4...20 mA

The transmitter is a transducer type with standardized signal output and converts the physical parameters into conditioned and standardized output signal. The 4...20 mA analogical signal in d.c. also allows the deceleration for non-functioning (lack of current or below 4 mA). The current transmission for analogical and digital signals leads to an increased level of immunity to disturbances. The information for the receptor is not affected by the drop in voltage on cables or connectors, nor on the parasite thermocouples distributed in various contacts during signal track. For analogical signals, we can realize transmissions electromagnetically compatible on a distance up to 600 m, depending also on the loop's resistance. The connection to the power supply source is made through a pair of wires used also for the transmission of the measurement results, realizing also the current loop. The electrical zero value of the current is 4mA, and the scale end value is 20 mA, therefore for a variation from 0 to 100% of the measuring parameter it corresponds a 16mA current variation. The same device is also known as adapter, adapter with two-wire transmission, resistance- current converter, voltage- current converter etc.

CONNECTION TO CIRCUIT



Connection of transmitter
with thermocouple entry



Connection of transmitter
with RTD entry

PERFORMANCES

- two-wire communication with protection to inverse connection ⁴;
- output proportional with the input parameter (resistance, voltage) or with parameter which influences the input values (linearized type);
- direct output $4 \div 20\text{mA}$ or inverse output $20 \div 4\text{mA}$;
- interferences warning signalization in sensor circuit;
- mounting in various types of connection blocks, instead of terminal block;
- a widely used sensor range;
- compensation of extension cable resistance and its variation with temperature for those types with input for resistive parametric signal and input for temperature sensor - type LM135/LM235/LM335, in case of 3-wire communication, and compensation of temperature reference junction for thermocouple input types ;
- miniaturized construction in plumbaginous polyamide body, high temperature resistance.

TECHNICAL CHARACTERISTICS

- input signal:
 - parametric resistance: RTDs Pt100, with $W_{100}=1.385$ or $W_{100}=1.391$ (other types on request) potentiometer or thermistor ($R_{\text{MAX}} \leq 3.5\text{k}\Omega$ and $\Delta R_{\text{MAX}}=1\text{k}\Omega$; value of marking current through sensor: $0.8 \div 1\text{mA}$), 2 or 3 –wire connection;
 - e.m.f. from thermocouples -type J, K, T, E, R, S (or other types, on request);
 - temperature sensors - type LM135/LM235/LM335 or similar (value of marking current through sensor: 0.8mA), 2 or 3 –wire connection;
- minimum measurement range: equivalent for a 12.5Ω variation of parametric resistance, equivalent for a 2mV e.m.f. variation of thermocouples and 5°C for temperature sensor type LM135/LM235/LM335;
- output signal: analogic $4 \div 20\text{mA}$;
- operating temperature range: $-25 \div +70^\circ\text{C}$;
- transportation and storage temperature range: $-40 \div +85^\circ\text{C}$;
- limits of intrinsic error as reported to range (including the non-linearity error, hysteresis error, repeatability and reproducibility error):
 - Device type: input for resistive signal and output proportional to resistance:
 - $\pm 0.25\%$ for $12.5 \leq \Delta R_{\text{in}} \leq 62.5\Omega$;
 - $\pm 0.2\%$ for $\Delta R_{\text{in}} > 62.5\Omega$;
 - Device type: input for resistive signal and output proportional to temperature:
 - $\pm 0.4\%$ for $12.5 \leq \Delta R_{\text{in}} \leq 62.5\Omega$;
 - $\pm 0.25\%$ for $\Delta R_{\text{in}} > 62.5\Omega$;
 - Device type: input for thermocouple and output proportional to e.m.f.
 - $\pm 0.4\%$ for $2 \leq \Delta V_{\text{in}} \leq 10\text{mV}$;
 - $\pm 0.25\%$ for $10 < \Delta V_{\text{in}} \leq 50\text{mV}$;
 - $\pm 0.2\%$ for $\Delta V_{\text{in}} > 50\text{mV}$;
 - Device type: input for thermocouple and output proportional to temperature:
 - $\pm 1\%$ for $2 \leq \Delta V_{\text{in}} \leq 10\text{mV}$;
 - $\pm 0.5\%$ for $10 \leq \Delta V_{\text{in}} \leq 50\text{mV}$;
 - $\pm 0.4\%$ for $\Delta V_{\text{in}} > 50\text{mV}$;

⁴Standard type is protected with diode. On request, we can execute devices with Zenner or Transorb diode. For these types, the minimum and maximum supply voltages are reduced.

⁵We are unable to build devices with output proportional to temperature.

Device type: input for LM135/LM235/LM335 temperature sensor type: $\pm 0.2\%$.

- supply voltage range:

11... 40Vcc for transmitter with input for parametric resistive signal, output e.m.f. proportional to value that leads to the variation of the input parameter (temperature) and for transmitters with input for LM135 / LM235 / LM335 temperature sensor type, (on request, $9 \div 30Vcc$ for acquisition data systems where the available supply voltage is 12Vcc, see note 1);

13.5 \div 40Vcc for transmitter with input for thermocouple and output proportional with input e.m.f. (on request, $9 \div 30Vcc$ for acquisition data systems where the available supply voltage is 12Vcc, see note 1);

- recommended supply voltage: 24Vcc;

- resistance of current loop: 0 to $(U_a - U_{a \min}) / 0.02$;

U_a - supply voltage

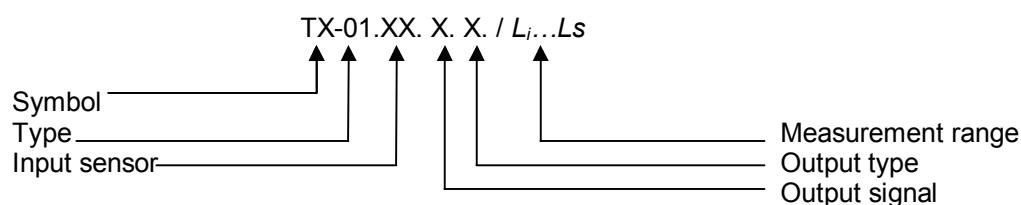
$U_{a \min}$ - minimum supply voltage for that type of transmitter;

- dimensions $\varnothing \times H$: 42.5 x 30 mm (height includes also the connection block);

- weight: approximately 35g.

CODING

The coding of TX-01 transmitters uses the product symbol followed by 5 groups of alpha-numerical characters



a. Input Sensor

Type	Code	Type	Code
Special order (to be specified)	00 ⁶	PtRh 10% - Pt Thermocouple	06
Iron- Constantan Thermocouple (J)	01	RTD Pt100 with $W_{100} = 1.385$	07
Chromel –Alumel Thermocouple (K)	02	RTD Pt100 with $W_{100} = 1.391$	08
Copper-Constantan Thermocouple (T)	03	LM 135/235/335 Solid State Circuit	09
Chromel- Constantan Thermocouple (E)	04	Potentiometer	10
PtRh13% -Pt Thermocouple (R)	05	Thermistor	11 ⁶

b. Output signal

Output signal	Code
4...20 mA	1
20...4 mA	2

c. Output type

Output type	Code
Linearized	1
Non -linearized	2

d. Measurement range -Will be clearly specified by the beneficiary, using the $L_i^7 \dots L_s^8$ code type.

CODING EXAMPLE

TX 01.08.1.1/ 0...200

This product is a TX- 01 transmitter, input sensor RTD Pt100 with $W_{100} = 1.391$, output signal 4...20 mA, linearized output (proportional to temperature), measurement range $0 \dots 200^{\circ}C$.

⁶Special orders. The sensor type will be specified in detail.

⁷ L_i is the inferior limit of the measurement range

⁸ L_s is the superior limit of the measurement range

TRANSMITTERS 20...4 mA TYPE TX- 02



PERFORMANCES

- two-wire communication with protection to inverse connection ⁹;
- output proportional with the input parameter (resistance, voltage) or with parameter which influences the input values (linearized type);
- direct output $4 \div 20\text{mA}$ or inverse output ⁵ $20 \div 4\text{mA}$;
- interferences warning signalization in sensor circuit;
- mounting on carrier bar in automation panel according to EN 50 022 or mounting on plate with a adjustment device;
- a widely used sensor range;
- possibility to make devices that measure temperature differences;
- compensation of extension cable resistance and its variation with temperature for those types with input for resistive parametric signal and input for temperature sensor - type LM135/LM235/LM335, in case of 3-wire communication, and compensation of temperature reference junction for thermocouple input types ;
- ABS parallelepiped box with one or two channels, identical or different, electrically isolated

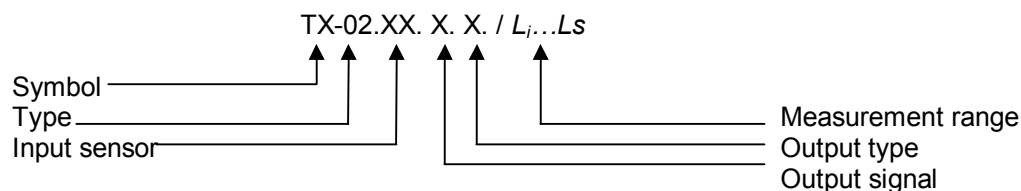
⁹ The standard type is protected with a serial diode. On request, we can execute devices with Zenner od Transorb diode protection. For these types, the minimum and maximum supply voltages are reduced.

TECHNICAL CHARACTERISTICS

- input signal:
 - parametric resistance: RTDs Pt100, with $W_{100}=1.385$ or $W_{100}=1.391$ (other types on request) potentiometer or thermistor ($R_{MAX} \leq 3.5k\Omega$ and $\Delta R_{MAX}=1k\Omega$; value of marking current through sensor: $0.8 \div 1mA$), 2 or 3 –wire connection;
 - e.m.f. from thermocouples -type J, K, T, E, R, S (or other types, on request);
 - temperature sensors - type LM135/LM235/LM335 or similar (value of marking current through sensor: $0.8mA$), 2 or 3 –wire connection;
 - minimum measurement range: equivalent for a 12.5Ω variation of parametric resistance, equivalent for a $2mV$ e.m.f. variation of thermocouples and $5^{\circ}C$ for temperature sensor type LM135/LM235/LM335;
 - output signal: analogic $4 \div 20 mA$;
 - operating temperature range: $-25 \div +70^{\circ}C$;
 - transportation and storage temperature range: $-40 \div +85^{\circ}C$;
 - limits of intrinsic error as reported to range (including the non-linearity error, hysteresis error, repeatability and reproducibility error):
 - Device type: input for resistive signal and output proportional to resistance:
 - $\pm 0.25\%$ for $12.5 \leq \Delta R_{in} \leq 62.5\Omega$;
 - $\pm 0.2\%$ for $\Delta R_{in} > 62.5\Omega$;
 - Device type: input for resistive signal and output proportional to temperature:
 - $\pm 0.4\%$ for $12.5 \leq \Delta R_{in} \leq 62.5\Omega$;
 - $\pm 0.25\%$ for $\Delta R_{in} > 62.5\Omega$;
 - Device type: input for thermocouple and output proportional to e.m.f.
 - $\pm 0.4\%$ for $2 \leq \Delta V_{in} \leq 10mV$;
 - $\pm 0.25\%$ for $10 < \Delta V_{in} \leq 50mV$;
 - $\pm 0.2\%$ for $\Delta V_{in} > 50mV$;
 - Device type: input for thermocouple and output proportional to temperature:
 - $\pm 1\%$ for $2 \leq \Delta V_{in} \leq 10mV$;
 - $\pm 0.5\%$ for $10 \leq \Delta V_{in} \leq 50mV$;
 - $\pm 0.4\%$ for $\Delta V_{in} > 50mV$;
 - Device type: input for LM135/LM235/LM335 temperature sensor type: $\pm 0.2\%$.
 - supply voltage range:
 - 11... 40Vcc for transmitter with input for parametric resistive signal, output e.m.f. proportional to value that leads to the variation of the input parameter (temperature) and for transmitters with input for LM135 / LM235 / LM335 temperature sensor type, (on request, $9 \div 30Vcc$ for acquisition data systems where the available supply voltage is 12Vcc, see note 1);
 - 13.5 \div 40Vcc for transmitter with input for thermocouple and output proportional with input e.m.f. (on request, $11.6 \div 30Vcc$ for acquisition data systems where the available supply voltage is 12Vcc, see note 1);
 - recommended supply voltage: 24Vcc;
 - resistance of current loop: 0 to $(U_a - U_{a \min}) / 0.02$;
 - U_a - supply voltage
 - $U_{a \min}$ - minimum supply voltage for that type of transmitter;
 - dimensions H x h x B: 109.5 x 75 x 45 mm;
 - weight: approximately 50g.
 - optional accessories: transparent Plexiglas cover with sealing option, adjustment device for plate attach.

CODING

The coding of TX-02 transmitters uses the product symbol followed by 5 groups of alpha-numerical characters


a. Input Sensor

Type	Code	Type	Code
Special order (to be specified)	00 ¹⁰	PtRh 10% - Pt Thermocouple	06
Iron- Constantan Thermocouple (J)	01	RTD Pt100 with W ₁₀₀ = 1.385	07
Chromel –Alumel Thermocouple (K)	02	RTD Pt100 with W ₁₀₀ = 1.391	08
Copper-Constantan Thermocouple (T)	03	LM 135/235/335 Solid State Circuit	09
Chromel- Constantan Thermocouple (E)	04	Potentiometer	10
PtRh13% -Pt Thermocouple (R)	05	Thermistor	11 ¹⁰

b. Output signal

Output signal	Code
4...20 mA	1
20...4 mA	2

c. Output type

Output type	Code
Linearized	1
Non -linearized	2

d. Measurement range -Will be clearly specified by the beneficiary, using the L_i¹¹...L_s¹² code type.

For the two- channels type , a “+” symbol shall be added after the normal one- channel codification , followed by the information regarding the input sensor, the output signal and type, the measurement range for the second channel.

¹⁰Special orders. The sensor type will be specified in detail.

¹¹L_i is the inferior limit of the measurement range

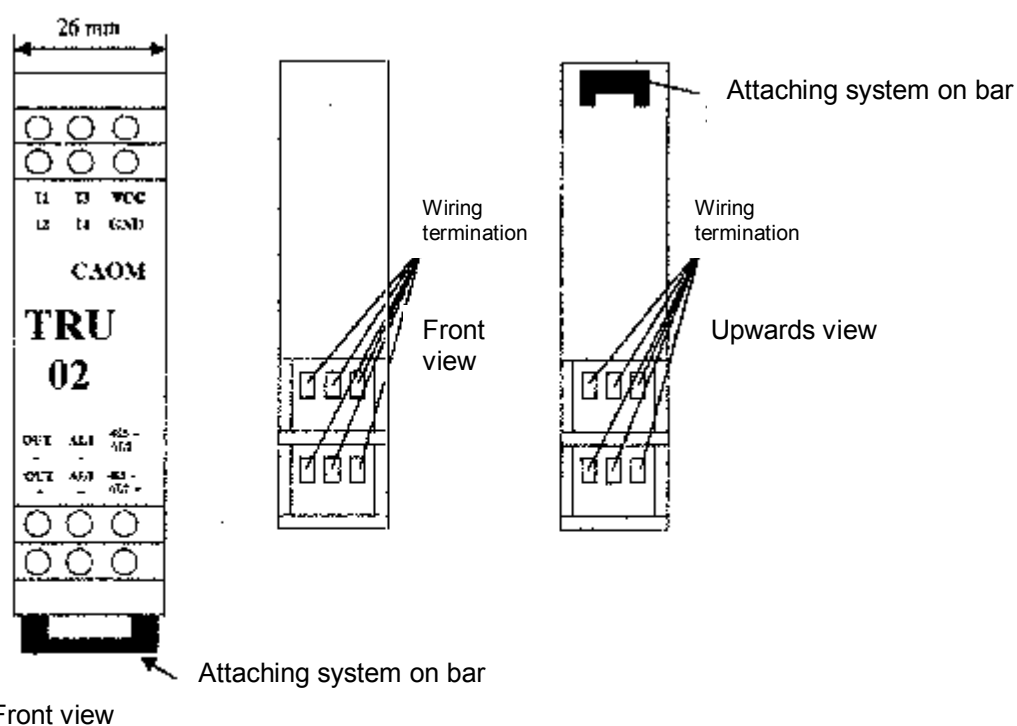
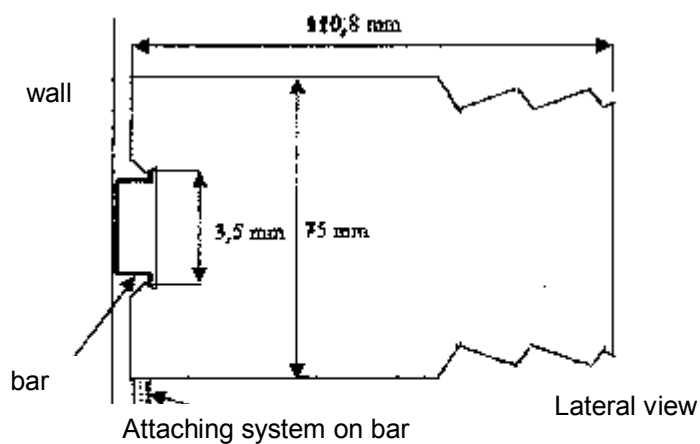
¹²L_s is the superior limit of the measurement range

INTELLIGENT UNIVERSAL TRANSMITTER WITH GALVANIC ISOLATION

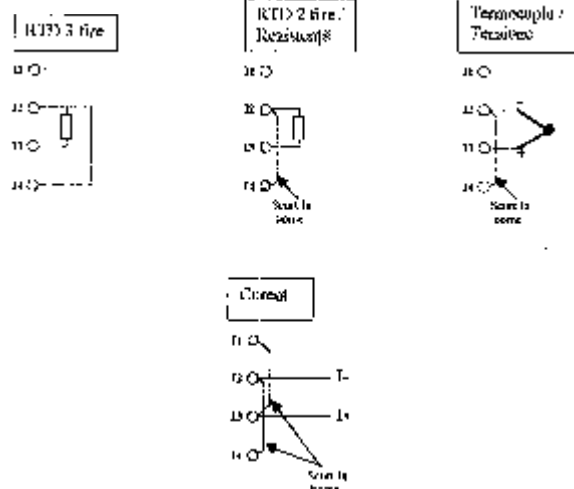
The main characteristic of TRU- 02 adaptors is the galvanic separation between input and output, in order to protect the automation devices from dangerous voltages, from ground or low insulation resistance of the component elements (transducers or execution elements).

Technical characteristics:

Supply voltage	10 V _{cc} ...30 V _{cc} ±10%
Programmable input	1. RTD s Pt50; Pt 100; Pt 1000; Cu 50; Cu 100; Ni 100; Ni 1000; 2. Thermocouple type : J, K,E, L, S, B, N, T, R; 3. Resistance 10...1000Ω; 4. Voltage = ±20 mV...±2500 mV; 5. Power 4...20 mA (2...10 mA)
Input precision	0,1% for RTD 0,1% for thermocouple 0,1% for resistance, voltage
Output	4...20mA (min. 3.5; max. 21.5 mA), alarm signal (sup, inf) 3,5 mA galvanic isolated; RS 485 network galvanically isolated with ASCII protocol; 2 open collector outputs for alarm (one for RS485 network); Open collector output characteristics: U_{max} = 35V, I_{max} = 80 mA
Galvanic separation	Min. 1,5 kV, 1 min. 50 Hz
Maximum terminating resistance	500 Ω
Temperature drift	Max 0,02%
Compensation	- environmental compensation for reference junction 0,1% - automate compensation of the connection wires for 3-wire RTDs and compensation by measurement of the wires resistance for 2-wire RTDs and for resistances
Mounting Dimensions	In electric boards or boxes on bar 26 x 75 x 110, 8 mm
Weight	Max. 0.2 kg
Normal Protection Degree	Carcass IP40 ; terminals IP20
Operating temperature	0...50° C
Storage temperature	-30...+70 °C
Humidity	Max. 85%, non- toxic and non- corrosive environment



Connection inputs



CONVERTER VOLTAGE- CURRENT WITH GALVANIC ISOLATION

Conv. U-I. IG. T24

This device realizes the conversion of the input parameter (voltage from 0 to 10 V) into output parameter (current 4...20 mA), providing also the supply power for output. The converter assures the galvanic separation between in and out in order to protect the automation devices from dangerous voltages, from ground or low insulation resistances of the elements from the field (transducers or execution elements).

Technical characteristics:

Supply voltage	220 V _{ca} ±10%
IN	Voltage 0...10 V
OUT	Current 4...20 mA
Galvanic separation IN/ OUT	Max. 5 kV rms/ 1 min
Regulation	For scale ends
Maximum terminating resistance	600 Ω
Transportation and Storage Temperature	-40...+70 °C
Humidity	Max. 85%
Protection Degree	IP40 (carcass); IP20 (terminals)
Operating temperature	0...45 °C
Casing	ABS , size 45 x 75 x 110 mm
Weight	0.250 kg
Mounting	In electric boards or boxes with M4 screws or EN35 bar

GALVANIC ISOLATOR 4...20 mA
IG.CU. T- 24

This device ensures the 4...20 mA current conversion into 4...20 mA current, with galvanic separation between IN / OUT, in order to protect the automation devices and the computer from dangerous voltages, from ground or low insulation resistances of the elements from the field. The device contains also the power supply source for OUT, therefore it is not necessary to charge it for utilization.

Technical characteristics:

Supply voltage	220 V _{ca} ±10%
IN	4...20 mA
OUT	4...20 mA
Galvanic separation IN/ OUT	Max. 5 kV rms/ 1 min
Regulation	For scale ends
Maximum terminating resistance	600 Ω
Transportation and Storage Temperature	-40...+90 °C
Humidity	Max. 85%
Protection Degree	IP40 (carcass); IP20 (terminals)
Operating temperature	0...45 °C
Casing	ABS , size 45 x 75 x 110 mm
Weight	0.250 kg
Mounting	In electric boards or boxes with M4 screws or EN35 bar

GALVANIC ISOLATOR 4...20 mA
IG.CU.

This device ensures the 4...20 mA current conversion into 4...20 mA current, with galvanic separation between IN / OUT, in order to protect the automation devices and the computer from dangerous voltages, from ground or low insulation resistances of the elements from the field. The device does not provide the power supply source for OUT, therefore a 24 Vcc source is necessary.

Technical characteristics:

Supply voltage	220 V _{ca} ±10%
IN	4...20 mA
OUT	4...20 mA
Galvanic separation IN/ OUT	Max. 5 kV rms/ 1 min
Regulation	For scale ends
Maximum terminating resistance	600 Ω
Transportation and Storage Temperature	-25...+70 °C
Humidity	Max. 85%
Protection Degree	IP40 (carcass); IP20 (terminals)
Operating temperature	0...45° C
Casing	ABS , size 35 x 86 x 58 mm
Weight	0.250 kg
Mounting	In electric boards or boxes