SENECA

K Line

EN

K121

Universal isolated transmitter with 2 wire - loop powered

Installation Manual

Contents:

- General specifications
- Technical features
- Diagram: Load resistance vs minimum functioning voltage.
- Installation / Connections rules
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- Factory settings and advanced settings.

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GENERAL SPECIFICATIONS

- Conversion and transmission of the input read into a normalized signal current in the output for the loop 4 ..20 mA that is connected with 2 wire connection.
- Thermocouple input J, K, R, S, T, B, E, N,L (EN 60584).
- RTD input (PT100/500/1000, Ni100/120/1000, Cu50/100) with 2, 3 o 4 wire connections.
- Voltage input ± 30 V.
- Voltage input ± 150 mV
- Current input ± 24 mA.
- Potentiometer input with resistance between 500 Ω and 10 KΩ.
- Resistance input up to 1760 Ω.
- Reduced response time (Voltage and Current input): 140 ms
- Reduced response time (Other inputs): < 620 ms
- High precision: 0,1%.
- 16-bit measurement conversion.
- 1500 Vac output isolation.
- Compact size 93 x 102,5 x 6,2 mm.

TECHNICAL FEATURES

Output / Power supply

Power supply	7 ..30 V_{DC}
Power consumption	< 660 mW
Current output	4 ..20 mA
Load resistance	1 kΩ @ 28 Vdc, 21 mA (see the diagram Load resistance vs minimum functioning voltage).
Resolution	2 µA (> 13 bit)
Temperature Coefficient	< 100 ppm, typical 30 ppm
Output in case of over-range	+ 2,5% of end scale, - 2,5% of start scale
Output in case of fault	+ 5% of end scale, - 5% of start scale
Current output protection	~ 30 mA

Potentiometer input

Value of potentiometer	From 500 Ω to 10 kΩ
Input impedance	10 MΩ

Thermocouple input

Input impedance	10 MΩ
Cold junction compensation	-40 ..65 ± 1,5°C; Settable
Sensor fault detection	Yes; Settable

RTD input / Resistance

Exitation current	375 µA
Maximum cable resistance	25 Ω
Influence cable resistancei	0,003 Ω/Ω

Voltage (mV) input

Input impedance	10 MΩ
Input range	-150 ..150 mV

Voltage (V) input

Input impedance	200 kΩ
Input range	-30 ..30 Vdc

Current input

Input impedance	40 Ω
Input range	-24 ..24 mA

Environmental condition

Operating temperature	-20 ..+65°C
Humidity	30 ..90% a 40°C non condensing
Storage temperature	-20 ..+85°C
degree protection	IP20

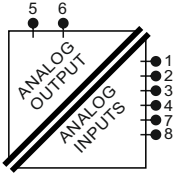
Connections

Connections	8 Spring terminals

Dimensions / Box

Dimensions	L: 93 mm; H: 102,5 mm; W: 6,2 mm
Box	PBT, Black

Isolation 1500 V



Standards

The module is conforming to the following regulations:

EN61000-6-4/2002 (Electromagnetic emission, industrial environment).
EN61000-6-2/2006 (Electromagnetic immunity, industrial environment).
EN61010-1/2001 (safety).

It designed and built in accordance with the requirements of Directive ATEX 2014/34/UE according to European standards:
EN IEC 60079-0.2018
EN IEC 60079-7:2015+A1:2018
EN 60079-31:2014

SUPPLEMENTARY NOTE FOR USE:
Use in environment with 2 or less pollution degree - EN60664-1..

DIAGRAM: LOAD RESISTANCE VS MINIMUM FUNCTIONING VOLTAGE

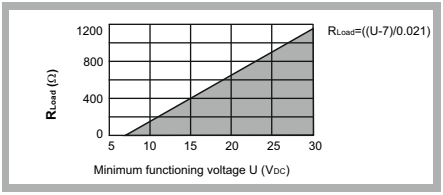


Fig. 1

INSTALLATION / CONNECTIONS RULES

Installation on DIN46277 rail

The module is designed to be installed, in vertical position, on DIN 46277 rail. For the best module performance and duration, avoid to place cables raceways and other objects that could obstruct the ventilation.
Never install the modules near heat sources. The module installation is advised in the bottom of the control panel.

Inserting the module in the rail

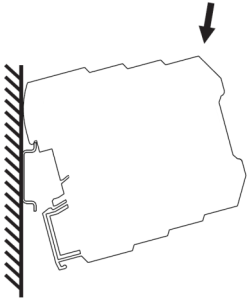


Fig.2a

1) Attach the module in the upper part of the rail (as shown in the picture 2a).

2) Press the module downwards.

Removing the module from the rail

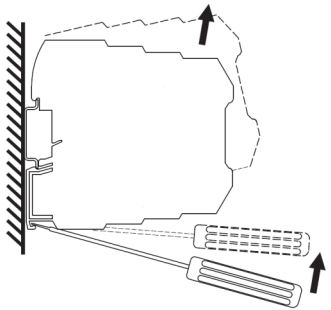
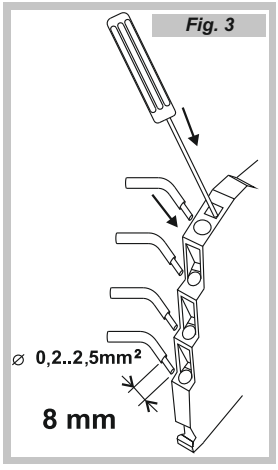


Fig. 2b

1) Apply leverage using a screwdriver (as shown in the picture 2b)

2) Rotate the module upwards.

Connections with spring terminals



The module has been designed for spring-type terminal electrical connections:
Proceed as follows to make the connections:

1) Strip the cables by 0.8 mm.

2) Insert a screwdriver in the square hole and press it until the cable lock spring opens..

3) Insert the cable in the round hole.

4) Remove the screwdriver and make sure that the cable is tightly fastened in the terminal.

ELECTRICAL CONNECTIONS

Input

Description

The signal input may come from thermocouple J, K, R, S, T, B, E, N, L (EN 60584) sensors or RTD (thermoresistance) like PT100/500/1000, Ni100/120/1000, Cu50/100.
K121 besides can read voltages in V and mV, current in mA , and resistances.

For the maximum performance it's recommended to use a shielded cable.

See Fig. 4 below for input connections.

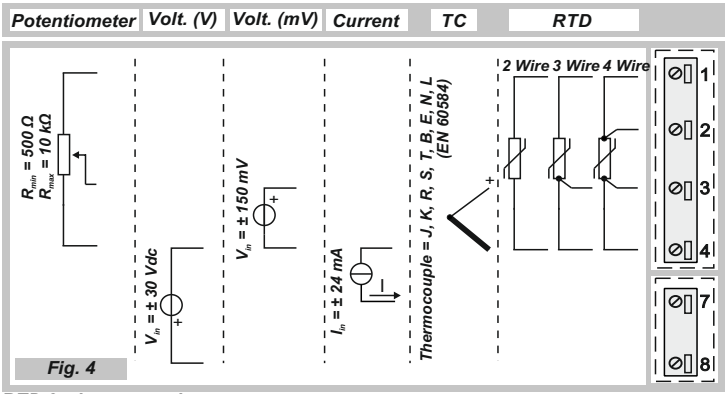


Fig. 4

RTD 2 wire connection

This connection can be used for short distances (< 10 m) between module and probe, you should note that it adds an error (which may be removed by sofware programming) equivalent to the resistance contributed by the connection cables to the measurement.
The module must be programmed by PC for 2 wire connection

RTD 3 wire connection

This connection can be used for medium-long distances (> 10 m) between module and probe. The instrument performs a compensation for the resistance of the connection cables. For a correct compensation the resistance value of each conductor must be the same.
The module must be programmed by PC for 3 wire connection.

RTD 4 wire connection

This connection can be used for medium-long distances (> 10 m) between module and probe. Provides the maximum precision because the instrument measures the resistance of the sensor independently of the resistance of the connection cables.
The module must be programmed by PC for 4 wire connection.

Output and power supply from loop 4 ..20 mA

Current Loop connection (regulated current).
The use of shielded cables is recommended for the electric connections.

Note: in order to reduce the instrument's dissipation, we recommend guaranteeing a load of > 250 Ω to the current output.

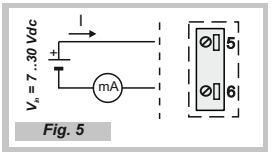


Fig. 5

Table: Output signal limit / fault or over-range

Output signal limit	Over-range / ± 2,5 %	Fault ± 5 %
20 mA	20,4 mA	21 mA
4 mA	3,6 mA	< 3,4 mA

TABLE: INPUT RANGE AND ACCURACY OF MEASURE

	Input	Range	Calibration error	EMI	Minimum Span	Resolution	Standard
Thermocouple	J	-210..1200 °C	0,1 %	< 0,5 %	50 °C	5 µV	EN 60584
	K	-200..1372 °C	0,1 %	< 0,5 %	50 °C	5 µV	EN 60584
	R	-50..1768 °C	0,1 %	< 0,5 %	100 °C	5 µV	EN 60584
	S	-50..1768 °C	0,1 %	< 0,5 %	100 °C	5 µV	EN 60584
	T	-200..400 °C	0,1 %	< 0,5 %	50 °C	5 µV	EN 60584
	B (*)	0..1820 °C	0,1 %	< 0,5 %	100 °C	5 µV	EN 60584
	E	-200..1000 °C	0,1 %	< 0,5 %	50 °C	5 µV	EN 60584
	N	-200..1300 °C	0,1 %	< 0,5 %	50 °C	5 µV	EN 60584
	L	-200..800 °C	0,1 %	< 0,5 %	50 °C	5 µV	GOST 8.585
RTD	Ni100	-60..250 °C	0,1 %	< 0,5 %	20 °C	6 mΩ	DIN 43760
	Ni120	-80..260 °C	0,1 %	< 0,5 %	20 °C	6 mΩ	DIN 43760
	Ni1000	-60..120 °C	0,1 %	< 0,5 %	20 °C	28 mΩ	DIN 43760
	Pt100	-200..650 °C	0,1 %	< 0,5 %	20 °C	6 mΩ	EN 60751/A2
	Pt500	-200..650 °C	0,1 %	< 0,5 %	20 °C	28 mΩ	
	Pt1000	-200..200 °C	0,1 %	< 0,5 %	20 °C	28 mΩ	
	Cu50	-180..200 °C	0,1 %	< 0,5 %	20 °C	6 mΩ	GOST 6651
	Cu100	-180..200 °C	0,1 %	< 0,5 %	20 °C	6 mΩ	GOST 6651
Voltage	mV	-150..150 mV	0,1 %	< 0,5 %	2,5 mV	5 µV	
Potent.	Ω	500.. 10000Ω	0,1 %	< 0,5 %	10 %	0.0015 %	
Resist.	Ω	0..400 Ω	0,1 %	< 0,5 %	10 Ω	6 mΩ	
Resist.	Ω	0..1760 Ω	0,1 %	< 0,5 %	10 %	28 mΩ	
Voltage	V	-30 ..30 Vdc	0,1 %	< 0,5 %	0,5 V	~ 1 mV	
Current	mA	-24 ..24 mA	0,1 %	< 0,5 %	0,5 mA	~ 1 µA	

(*) Termocouple type B: From 0 °C to 250 °C the measurement is zero.

Table of accuracy measure: The greater of the sum of (A+B) and C

Input type	A : % of measure	B : % of span	C : Minimum
Thermocouple J,K,T,N,E, L	0.05 %	0.05 %	0.5 °C
Thermocouple B, R, S	0.05 %	0.05 %	1 °C
RTD	0.05 %	0.05 %	0.1 °C
Resistance F.S. = 400 Ω	0.05 %	0.05 %	40 mΩ
Resistance F.S. = 1760 Ω	0.05 %	0.05 %	200 mΩ
Voltage mV	0.05 %	0.05 %	15 µV
Potentiometer	0.05 %	0.05 %	3 mV
Voltage V	0.05 %	0.05 %	3 mV
Current	0.05 %	0.05 %	2 µA

FACTORY SETTINGS AND ADVANCED SETTINGS

Factory settings

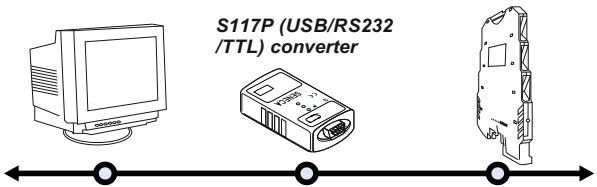
- Cold junction compensation: YES.
- Input filter: DISABLE.
- Reversed output: NO.
- TC Type: K.
- Measurement range start: 0°C.
- Measurement full-scale: 1000 °C.
- Output signal in case of fault: Towards the top of the output range.
- Over-range: YES, at 2,5% over-range values is accepted, at 5% over-range value is considered a fault.

Advanced setting

- Setting of the start scale and full scale value.
- RTD: 2 wire, 3 wire, 4 wire connections.
- Measure filter: Enable / Disable
- Output: Normal (4 ..20 mA) or reversed (20 ..4 mA).
- Selection of input type.
- Cable resistance compensation for 2 wires measurement.
- Output signal in case of fault: towards the bottom or towards the top of the output range
- Over-range: NO (the fault alone causes at 2,5% over range value) or YES (at 2,5 over-range value is accepted, at 5 % over range value is considered a fault).
- Cold junction compensation:YES / NO.

Software configuration

Configuration of the module via PC and dedicated Easy Setup software is possible using the following accessories and the following configuration (see drawing below).



Variations of standard parameters are possible by using configuration softwares. See www.seneca.it to consult the download section.

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