EN

K120RTD

2 WIRE - LOOP POWERED TRANSMITTER FOR PT100 AND NI100 PROBES

General Description

The K120RTD instrument converts a temperature signal read by a PT100 (EN 60 751) or NI100 probe with connection by 2, 3 or 4 wires into a signal normalised in current for 4 - 20 mA loop (2 wires technology).
The module's main features are:

- High precision.
- 16 bit resolution.
- Extremely compact size (6.2 mm).
- Attachment to a 35 mm DIN rail.
- Configurabilty by PC with xxxxx dedicated software.
- Configurability by DIP-switch.

Technical Features

PT100 Input- EN 60751/A2 (ITS-90)

Measurement Range :	-200 - +650 °C
Resistance Range :	18,5 Ω - 330 Ω
Minimum span :	20 °C
Current on sensor :	750 μA rated
Cable resistance :	Max 25 Ω per wire
Connection :	2, 3 or 4 wires
Resolution :	~ 6 mΩ

NI100 Input

Measurement Range :	-60 - +250 °C
Resistance Range :	69 Ω - 290 Ω
Minimum span :	20 °C
Current on sensor :	750 μA rated
Cable resistance :	Max 25 Ω per wire
Connection :	2, 3 or 4 wires
Resolution :	~ 6 mΩ

Output/Power Supply

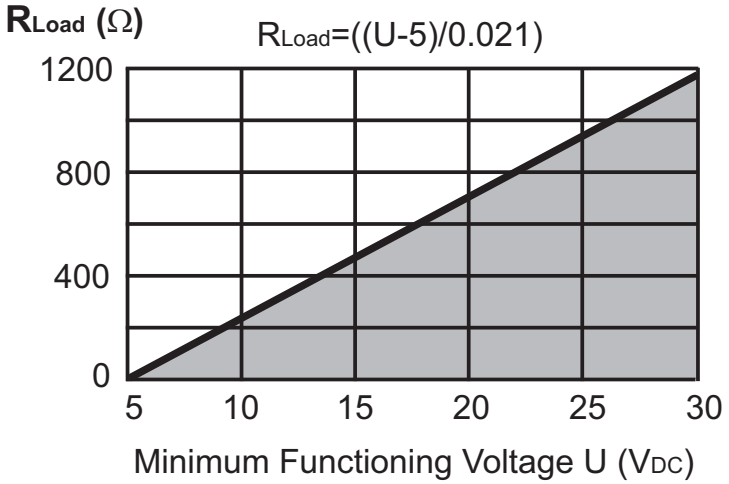
Functioning Voltage :	5-30 V_{DC}
Current output :	4 - 20 mA, 20 - 4 mA (2 wires technology)
Load resistance :	1 kΩ @ 26 V_{DC}, 21 mA (see on page 2, **Load Resistance vs Minimum Functioning Voltage** diagram)
Resolution :	1 μA (>14 bits)
Output in case of over-range :	102,5% of full scale value (see Table on Page 5)
Output in case of fault :	105% of full scale value (see Table on Page 5)
Current output protection :	approximately 30 mA

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Other Features

Network Freq. Rejection :	50 Hz and 60 Hz (settable)
Transmission error :	Max of 0,1% (of measurement range) or 0,1 °C
Error caused by EMI (*)	< 0,5 %
Influence of cable resistance :	0,005 Ω / Ω
Temperature Coefficient :	< 100 ppm, Typical : 30 ppm
Sampling Time:	100 ms (without 50/60 Hz rejection) 300 ms (with 50/60 Hz rejection enabled)
Response time (10 - 90 %) :	< 220 ms (without 50/60 Hz rejection) < 620 ms (with 50/60 Hz rejection enabled)
Protection Index :	IP20
Operating Conditions :	Temperature -20 - +65 °C Humidity 30 - 90 % at 40°C (non-condensing) Altitude: up to 2000 m.a.s.l
Storage Temperature:	-40 - +85 °C
LED Signalling :	Setting error, connection fault, internal fault
Connections :	Spring terminals
Conductor Section :	0,2 - 2,5 mm^2
Wire stripping :	8 mm
Box:	PBT (black colour)
Dimensions, Weight :	6,2 x 93,1 x 102,5 mm, 45 g
Standards : CE	EN61000-6-4/2002-10 (electromagnetic emission, industrial surroundings) EN61000-6-2/2006-10 (electromagnetic immunity, industrial surroundings)

Diagram: Load Resistance vs Minimum Functioning Voltage



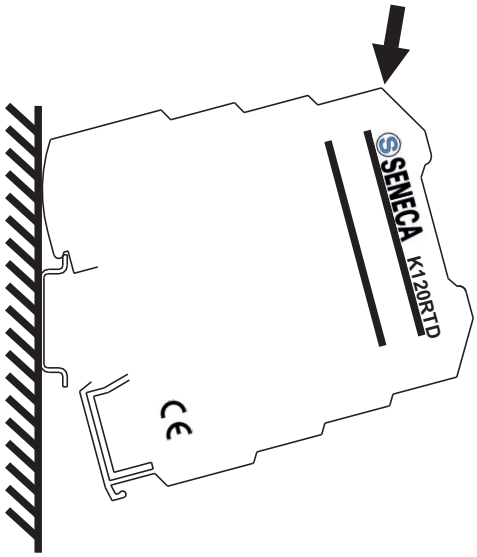
(*) EMI: electromagnetic interferences.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Installation rules

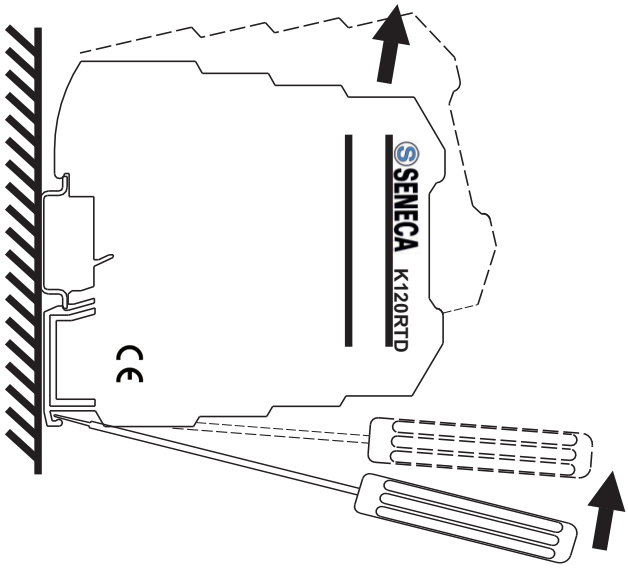
This module has been designed for assembly on a DIN 46277 rail.

Inserting the module in the rail



1 - Attach the module in the upper part of the rail.
2 - Press the module downwards.

Removing the module from the rail



1 - Apply leverage using a screwdriver (as shown in the figure).
2 - Rotate the module upwards.

Assembly in vertical position is recommended in order to increase the module's ventilation, and no raceways or other objects that compromise aeration must be positioned in the vicinity.

Do not position the module above equipment that generates heat; we recommend positioning the module in the lower part of the control panel or container compartment.

MODULE CONFIGURATION

The module may be configured both by DIP-switches and by PC.

SETTING BY DIP-SWITCHES

Configuration from memory

The module leaves the factory with all the DIP-switches in OFF position.

In this position the module uses the configuration saved in memory. This configuration may be modified by PC (see *Setting by PC* section).

The default configuration is the following (if no other indications are present on the instrument):

RTD wiring	→	3 wires
50 / 60 Hz Rejection filter	→	present
Reversed Output	→	NO
RTD Type	→	PT100
Measurement Range Start	→	0 °C
Measurement Full- Scale	→	100 °C
Output signal in case of Fault	→	Towards the top of the output range
Over-Range	→	YES: a 2.5% over-range value is acceptable; a 5% over-range value is considered a fault.

If only a DIP-switch is not in OFF position, the configuration saved in memory is not used (it

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

is not modified and will be used again with all the DIP-switches in OFF position) and so it is necessary to program all the parameters as it is indicated on the tables of the following section.

Custumized Setting

For a customized setting of the module, the positions of the DIP-switch are illustrated on the following tables.
Note: for all following tables:
The indication ● indicates that the DIP-switch is set in ON Position.
No indication is provided when the DIP-switch is set in OFF Position.

RTD WIRING		
SW1	1	
	●	2 / 4 wires connection
		3 wires connections

50 / 60 Hz REJECTION FILTER (*)		
SW1	2	
	●	Absent
		Present

(*) The filter slows down the response time to around 620 ms and guarantees the repeating of the disturbance signal at 50 / 60 Hz overlapping the measurement signal.

REVERSED OUTPUT		
SW1	3	
	●	Reversed: 20 - 4 mA
		Normal: 4 - 20 mA

RTD TYPE		
SW1	4	
	●	NI100
		PT100

NOT USED		
SW1	5	Not used

MEASUREMENT RANGE START				
SW1	6	7	8	°C
				0
	●			-10
		●		-20
	●	●		-40
			●	-50
	●		●	-100
		●	●	-150
	●	●	●	-200

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

MEASUREMENT FULL SCALE																															
SW2	1	2	3	4	5	6	°C		SW2	1	2	3	4	5	6	°C		SW2	1	2	3	4	5	6	°C
							0				●	●		●		120					●	●		●	340
	●						5			●	●	●		●		130			●		●	●		●	350
		●					10						●	●		140				●	●	●		●	360
	●	●					15			●			●	●		150			●	●	●	●		●	370
			●				20				●		●	●		160							●	●	380
	●		●				25			●	●		●	●		170			●				●	●	390
		●	●				30					●	●	●		180				●			●	●	400
	●	●	●				35			●		●	●	●		190			●	●			●	●	410
				●			40				●	●	●	●		200					●		●	●	420
	●			●			45			●	●	●	●	●		210			●		●		●	●	430
		●		●			50								●	220				●	●		●	●	440
	●	●		●			55			●					●	230			●	●	●		●	●	450
			●	●			60				●				●	240						●	●	●	480
	●		●	●			65			●	●				●	250			●			●	●	●	500
		●	●	●			70					●			●	260				●		●	●	●	520
	●	●	●	●			75			●		●			●	270			●	●		●	●	●	550
					●		80				●	●			●	280					●	●	●	●	580
	●				●		85			●	●	●			●	290			●		●	●	●	●	600
		●			●		90						●		●	300				●	●	●	●	●	620
	●	●			●		95			●			●		●	310			●	●	●	●	●	●	650
			●		●		100				●		●		●	320									
	●		●		●		110			●	●		●		●	330									

OUTPUT SIGNAL IN CASE OF FAULT		
SW2	7	
	●	Towards the bottom of the output range
		Towards the top of the output range

OVER-RANGE (*)		
SW2	8	
	●	NO: the fault alone causes a 2.5% over-range value.
		YES: a 2.5% over-range value is acceptable; a 5% over-range value is considered a fault.

(*) See the table below for the corresponding values.

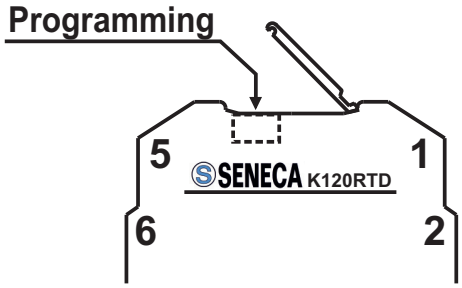
Output signal limit	Over-range / Fault ± 2,5 %	Fault ± 5 %
20 mA	20,4 mA	21 mA
4 mA	3,6 mA	< 3,4 mA

Configuration by PC

The configuration by PC use is possible with the following accessories:
S117P: USB to RS232 / TTL
PM002411: connection cable between S117 and K120RTD
Z120: Dedicated programming software.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

The module may be programmed even if it is not supplied by the 4 - 20 mA loop, since the power supply is provided through the programming connector.
The interface to program the module is available under the the frontal cover:

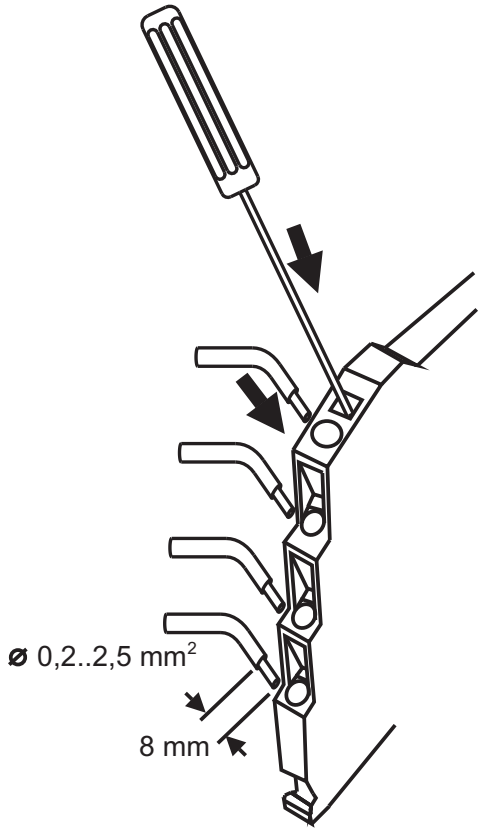


Once the user has at his disposal the above listed accessories, the following parameters may be set:

- Start and Full scale values.
- RTD Connection: 2 wires, 3 wires or 4 wires.
- 50 / 60 Hz Rejection: Absent or Present.
- Measurement filter: Absent or Present (1, 2 , 5 , 10, 30, 60 seconds).
- Output: Normal (4 - 20 mA) o Reversed (20 - 4 mA).
- RTD Type: PT100 or NI100.
- Cable Resistance Compensation for 2 wires measurement.
- Output signal in case of fault: towards the bottom of the output range or towards the top of the output range.

The configuration may be written to memory with the DIP-switches in any position, but the saved parameters are used only with all the DIP-switches in OFF position.
It is besides possible the calibration of the output scale.

Electrical Connections



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.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Input

The module accepts input from a PT100 (EN 60 751) or NI100 temperature probe with connection by 2, 3 or 4 wires.

The use of shield cables is recommended for the electronic connections.

2-wire connection

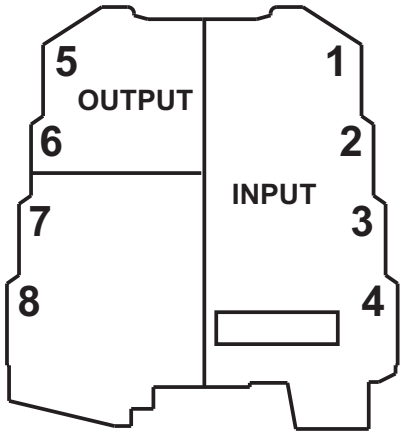
This is the connection to be used for short distances (< 10 m) between module and probe, bearing in mind that it adds an error (which may be removed by sofware programming) equivalent to the resistance contributed by the connection cables to the measurement.
DIP-switch SW1-1 set in ON Position (2 / 4 wires) or all DIP-switches in OFF position (configuration from memory: module programmed by PC for 2 wires connection).
With bridges between Terminals 1 and 2 and Terminals 3 and 4.

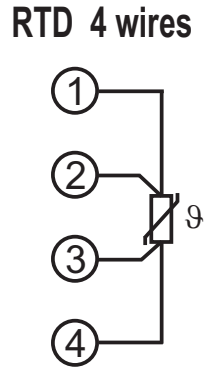
3-wire connection

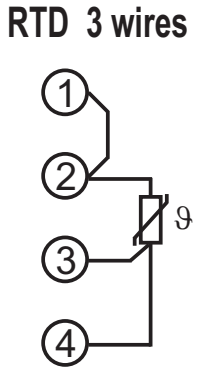
This is the connection to be used for media-long distances (> 10 m) between module and probe. The instrument performs compensation for the resistance of the connection cables. In order for compensation to be correct, it is necessary that the resistance values of each conductors be the same because in order to perform compensation the instrument measures the resistance of only one conductor and assumes the resistance of the others conductors to be exactly the same.
DIP-switch SW1-1 set in OFF Position (3 wires) or all DIP-switches in OFF position (configuration from memory: module programmed by PC for 3 wires connection).
With bridge between Terminals 3 and 4.

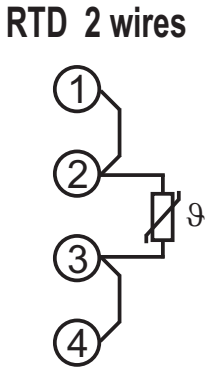
4-wire connection

This connection to be used for media-long distances (> 10 m) between module and probe. Provides the maximum precision because the instrument measure the resistance of the sensor independently of the resistance of the connection cables.
DIP-switch SW1-1 set in ON Position (2 / 4 wires) or all DIP-switches in OFF position (configuration from memory: module programmed by PC for 2 wires connection).







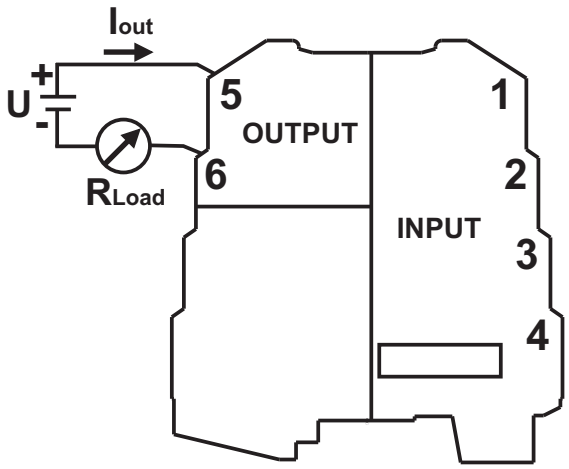


LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Output

Current loop connection (regolated current).

The use of shield cables is recommended for the electronic connections.



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

LED indications on the frontal panel

LED	Meaning
Rapid flashing 3 pulses/sec.	Internal fault
Slow flashing 1 pulse/sec.	DIP-switch setting error (full scale and start range limits)
Steady light	RTD connection wire fault. Measurement out of range, 3rd wire resistance out of range.

Disposal of Electrical & Electronic Equipment (Applicable throughout the European Union and other European countries with separate collection programs)
This symbol, found on your product or on its packaging, indicates that this product should not be treated as household waste when you wish to dispose of it. Instead, it should be handed over to an applicable collection point for the recycling of electrical and electronic equipment. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences to the environment and human health, which could otherwise be caused by inappropriate disposal of this product. The recycling of materials will help to conserve natural resources. For more detailed information about the recycling of this product, please contact your local city office, waste disposal service or thè retail store where you purchased this product.

This document is property of SENECA srl. Duplication and reprodution are forbidden, if not authorized. Contents of the present documentation refers to products and technologies described in it. All technical data contained in the document may be modified without prior notice Content of this documentation is subject to periodical revision.

CERTIFICATE N. 9115.SENE - REGISTRATION NUMBER IT-827
azienda con sistema di gestione per la qualità certificato
ISO 9001:2008

SENECA s.r.l.
Via Austria, 26 - 35127 - PADOVA - ITALY
Tel. +39.049.8705355 - 8705359 - Fax +39.049.8706287
e-mail: info@seneca.it - www.seneca.it

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000