

**General Description**  
The K109PT instrument converts a temperature signal read by a PT100 probe (EN 60 751) with connection by 2, 3 or 4 wires into a signal normalised in voltage or current. Resolution 14 bit.  
The module's main features are its compact size (6.2 mm), attachment to a 35 mm DIN rail, bus-connector power supply option, quick connection by spring terminals, 3-point insulation, and easy configuration in the field by DIP-switch.

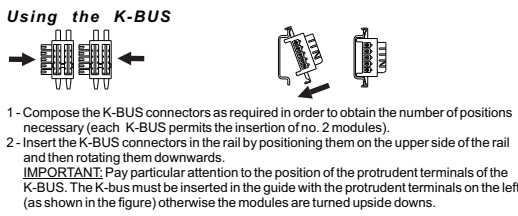
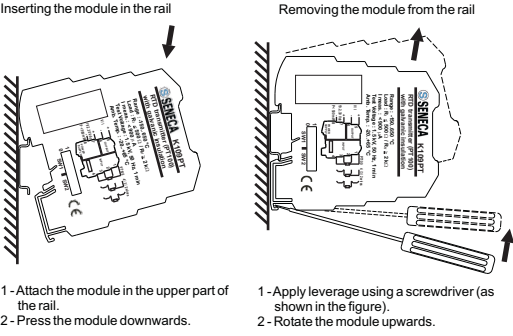
**Technical Features**

Power supply: Consumption:	19,2..30 Vdc Max 21 mA @ 24 Vdc
Input:	PT100 probe, EN 60751/A2 (ITS90) connection by 2, 3 or 4 wires
Current on sensor: Cable resistance: Measurement Range: Resistance Range: Minimum span :	< 900 uA Max. 20 Ω per wire -150..650 °C 20..350 Ω 50 °C
Voltage output:	0,5 Vdc, 1,5 Vdc, 0..10 Vdc and 10..0 Vdc Minima load resistance: 2 KΩ
Current output:	0,20 mA, 4,20 mA, 20,0 mA e 20,4 mA Maximum load resistance: 500 Ω
Output in case of over-range: Output in case of malfunction:	102,5% of full scale value (see Table on Page 5) 105% of full scale value (see Table on Page 5)
Current output protection:	approximately 25 mA
Transmission error:	0,1 % (max. range), or (40 K / Δtemp + 0,05 %) (Measurement range)
Temperature Coefficient: Response time (10..90 %):	100 ppm < 50 ms (without filter) < 200 ms (with repeat filter 50 Hz)
Insulation Voltage: Protection Index: Operating Conditions:	1,5 KV (50 Hz for 1 min) IP20 Temperature -20..+65 °C Humidity 30..90% at 40°C (non-condensing)
Storage Temperature: LED Signalling:	-40..+85 °C Setting error, connection malfunction, internal malfunction
Connections: Conductor Section:	Spring terminals 0,2..2,5 mm <sup>2</sup>

Wire stripping:	8 mm
Box:	PBT (black colour)
Dimensions, Weight:	6,2 x 93,1 x 102,5 mm, 50 g.
Standards:	EN50081-2 (electromagnetic emission, industrial surroundings) EN50082-2 (electromagnetic immunity, industrial surroundings) EN61010-1 (safety) All the circuits must be provided with double insulation from the circuits under dangerous voltage. The power supply transformer must be built to compliance with EN60742- "Insulation transformers and Safety transformers".



**Installation rules**  
This module has been designed for assembly on a DIN 46277 rail. 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. We recommend rail-type assembly using the corresponding bus connector (Code K-BUS) that eliminates the need to connect the power supply to each module.



**⚠**

- Never connect the power supply directly to the bus connector on the DIN rail.
- Never tap power supply from the bus connector either directly or by using the module's terminals.

**SETTING OF THE DIP-SWITCHES**

**Factory setting**  
All the module DIP switches are at pos. 0 as default configuration. This set correspond to the following configuration :

PT100 wiring → 3 wires  
Input Filter → present  
Output Signal → 4..20 mA  
Measurement Range Start → 0 °C  
Measurement Full-Scale → 100 °C  
Output signal in case of Malfunction → 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 malfunction.

It is understood that this configuration is valid only with all the DIP switches at position 0. If also one Dip is moved, it is necessary to set all the other parameter as indicated on the following tables.

Note: for all following tables  
The indication ● indicates that the DIP-switch is set in Position 1 (ON).  
No indication indicates when the DIP-switch is set in Position 0 (OFF).

**PT100 WIRING**

SW1	1	2	3	4	5	6
●	2 / 4 wires					
	3 wires					

**INPUT FILTER (\*)**

SW1	2
●	Absent
	Present

(\*) The input filter slows down the response time to around 200 ms and guarantees the repeating of the disturbance signal at 50 Hz overlapping the measurement signal.

**OUTPUT SIGNAL**

SW1	3	4	5
●	4..20 mA		
	0..20 mA		
●	20..4 mA		
	20..0 mA		
●	0..10 Vdc		
	10..0 Vdc		
●	0..5 Vdc		
	1..5 Vdc		

**MEASUREMENT RANGE START**

SW1	6	7	8	°C
●				0
				-10
●				-20
				-30
●				-40
				-50
●				-100
				-150

**MEASUREMENT FULL SCALE**

SW2	1	2	3	4	5	6	°C
●							120
							130
●							140
							150
●							160
							170
●							180
							190
●							200
							210
●							220
							230
●							240
							250
●							260
							270
●							280
							290
●							300
							310
●							320
							330

**OUTPUT SIGNAL IN CASE OF MALFUNCTION**

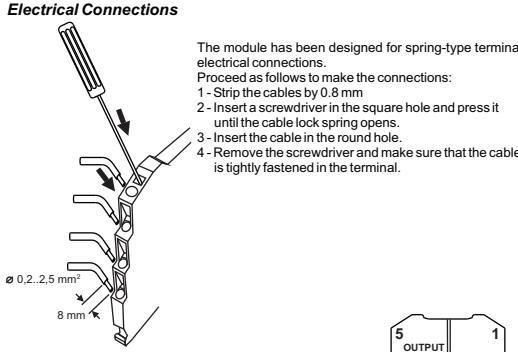
SW2	7
●	Towards the bottom of the output range
	Towards the top of the output range

**OVER-RANGE (\*)**

SW2	8
●	NO: the malfunction 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 malfunction.

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

Output signal limit	Over-range / Malfunction ± 2,5 %	Malfunction ± 5 %
20 mA	20,5 mA	21 mA
4 mA	3,5 mA	3 mA
0 mA	0 mA	0 mA
10 Vdc	10,25 Vdc	10,5 Vdc
5 Vdc	5,125 Vdc	5,25 Vdc
1 Vdc	0,875 Vdc	0,75 Vdc
0 Vdc	0 Vdc	0 Vdc



**Power supply**  
There are various ways to provide the K Series modules with power.

1 - Direct power supply to the modules by connecting 24 Vdc power supply directly to Terminals 7 (+) and 8 (-) of each module.

2 - Using the K-BUS connector accessory for the distribution of the power supply to the modules via bus connector, in this way eliminating the need to connect power supply to each module.

The bus can be supplied from any of the modules; the total absorption of the bus must be less than 400 mA. Higher absorption values can damage the module. An appropriately sized fuse must be connected in series to the power supply.

3 - Using the K-BUS connector accessory for the distribution of the power supply to the modules via bus connector and the K-SUPPLY accessory for the connection of the power supply.

The K-SUPPLY accessory is a 6.2 mm wide module that contains a set of protections designed to protect the modules connected via bus against over-voltage loads. The bus connector can be provided with power using the K-SUPPLY module if the total absorption of the bus is less than 1.5 A. Higher absorption values can damage both the module and the bus. An appropriately sized fuse must be connected in series to the power supply.

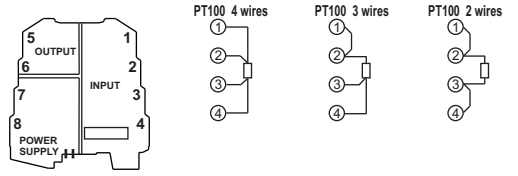
**Input**  
The module accepts input from a PT100 temperature probe (EN 60 751) with connection by 2, 3 or 4 wires.

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 equivalent to the resistance contributed by the connection cables to the measurement.  
DIP-switch SW1-1 set in Position 1 (ON) (2/4 wires).  
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 all cables be equal because in order to perform compensation the instrument measures the resistance of only one cable and assumes the resistance of the others cables to be exactly the same.  
DIP-switch SW1-1 set in Position 0 (OFF) (3 wires).  
With bridge between Terminals 3 and 4.

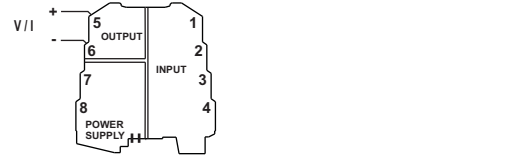
**4-wire connection**  
This connection to be used for media-long distances (> 10 m) between module and probe. Provides the maximum precision because the instrument measure the resistance of the sensor independently of the resistance of the connection cables.  
DIP-switch SW1-1 set in Position 1 (ON) (2/4 wires).



The PT100 measure is effected in impulsive way for a very short time to reduce the module consumption. For this reason, some electronic calibrators could not be able to generate the simulated signal in the right way.

**Output**  
Voltage connection - Current connection (applied current)

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



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

**LED indications on the front**

LED	Meaning
Rapid flashing 1 pulse/sec.	Internal malfunction
Slow flashing 3 pulses/sec.	DIP-switch setting error
Steady light	PT100 connection wire malfunction. 3 <sup>rd</sup> wire resistance over-range.

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**CSQ** **IQNEC**

ISO9001-2000

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