

EN K109PT
ISOLATED CONVERTER FOR PT100 TEMPERATURE SENSORS

General Description
The K109PT converts a PT100 (EN 60 751) temperature sensor signal with a 2, 3 or 4 wire connection to a voltage or current signal. Resolution is 14 bit.

The module's main features are its compact size (6.2 mm W), attachment to a 35 mm DIN rail, bus-conductor power supply option, quick connection by spring terminals, 3-way isolation, and easy configuration in the field using DIP switches.

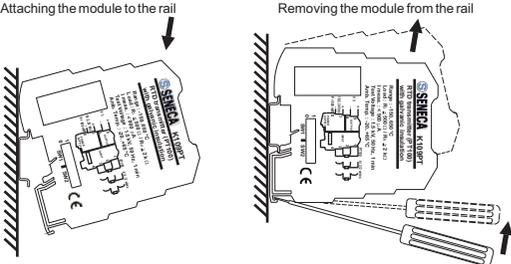
Technical Features

Power supply:	19.2 - 30 VDC
Consumption:	Max. 21 mA at 24 VDC
Input:	PT100 probe, EN 60751/A2 (ITS90) 2, 3, or 4 wires
Sensor current:	< 900 uA
Cable resistance:	Max. 20 Ω per wire
Measurement range:	-150 to 650 °C
Resistance range:	20 to 350 Ω
Minimum span:	50 °C
Voltage output:	0-5 VDC, 1-5 VDC, 0-10 VDC, 10-0 VDC
	Minimum load resistance: 2 KΩ
Current output:	0-20 mA, 4-20 mA, 20-0 mA, 20-4 mA
	Maximum load resistance: 500 Ω
Over-range output:	102.5% FS (see Table on Page 5)
Malfuction output:	105% of FS (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:	100 ppm
Response time (10-90 %):	< 50 ms (without filter) < 200 ms (with repeat filter 50 Hz)
Insulation voltage:	1.5 KV (50 Hz for 1 min)
Protection index:	IP20
Operating conditions:	Temperature: -20 to +65 °C Humidity: 30 to 90% RH at 40°C (non-condensing)
Storage temperature:	-40 to +85 °C
LED indicators:	Setting error, connection malfuction, internal malfuction
Connections:	Spring terminals
Conductor size range:	14 to 24 AWG (0.2 to 2.5 mm ²)

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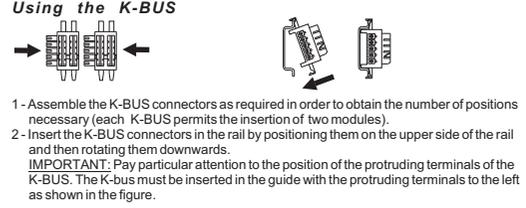
Wire Stripping:	8 mm (5/16")
Housing Material:	PBT Polybutylene terephthalate (black color)
Dimensions, Weight:	6.2 x 93.1 x 102.5 mm, 50 g.
Standards:	EN61000-6-4 (electromagnetic emission, industrial environment) EN61000-6-2 (electromagnetic immunity, industrial environment) EN61010-1 (safety).
CE	
UL LISTED SLUT	
Notes:	- Use with copper conductors. - Use in Pollution Degree 2 Environment. - Power Supply must be Class 2. - When supplied by an Isolated Limited Voltage/Limited Current power supply a fuse rated max 2.5A shall be installed in the field.

Installation
This module has been designed for attachment to a 35 mm DIN 46277 rail. Assembly in a vertical position is recommended in order to increase the module's ventilation, and no raceways or other objects that compromise air flow 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 compartment. We recommend the K-BUS power connector that eliminates the need to connect the power supply to each module.



- 1-Attach the module to the upper part of the rail.
- 2- Press the module downwards.
- 1- Apply leverage using a screwdriver (as shown in the figure).
- 2- Rotate the module upwards.

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- ⚠ 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 THE DIP SWITCHES

Factory settings
All the module DIP switches are at position 0 as the default configuration. This setting corresponds 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 (212°F) |
| Output signal in case of Malfuction | → 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 malfuction. |

This configuration is valid only with all the DIP switches at position 0. If one DIP switch is moved, it is necessary to set all the other parameters as indicated in the following tables.

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

PT100 WIRING

SW1 1	● 2 or 4 wires 3 wires
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INPUT FILTER (*)

SW1 2	● Absent Present
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(*) The input filter slows down the response time to around 200 ms.

OUTPUT SIGNAL

SW1 3	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	°F
●	0	32
●	-10	-14
●	-20	-4
●	-30	-22
●	-40	-40
●	-50	-58
●	-100	-148
●	-150	-238

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MEASUREMENT FULL SCALE: SW2 1 through 8

SW2 1	2	3	4	5	6	°C	°F	SW2 1	2	3	4	5	6	°C	°F
●	●	●	●	●	●	0	32	●	●	●	●	●	●	0	32
●	●	●	●	●	●	5	41	●	●	●	●	●	●	5	41
●	●	●	●	●	●	10	50	●	●	●	●	●	●	10	50
●	●	●	●	●	●	15	59	●	●	●	●	●	●	15	59
●	●	●	●	●	●	20	68	●	●	●	●	●	●	20	68
●	●	●	●	●	●	25	77	●	●	●	●	●	●	25	77
●	●	●	●	●	●	30	86	●	●	●	●	●	●	30	86
●	●	●	●	●	●	35	95	●	●	●	●	●	●	35	95
●	●	●	●	●	●	40	104	●	●	●	●	●	●	40	104
●	●	●	●	●	●	45	113	●	●	●	●	●	●	45	113
●	●	●	●	●	●	50	122	●	●	●	●	●	●	50	122
●	●	●	●	●	●	55	131	●	●	●	●	●	●	55	131
●	●	●	●	●	●	60	140	●	●	●	●	●	●	60	140
●	●	●	●	●	●	65	149	●	●	●	●	●	●	65	149
●	●	●	●	●	●	70	158	●	●	●	●	●	●	70	158
●	●	●	●	●	●	75	167	●	●	●	●	●	●	75	167
●	●	●	●	●	●	80	176	●	●	●	●	●	●	80	176
●	●	●	●	●	●	85	185	●	●	●	●	●	●	85	185
●	●	●	●	●	●	90	194	●	●	●	●	●	●	90	194
●	●	●	●	●	●	95	203	●	●	●	●	●	●	95	203
●	●	●	●	●	●	100	212	●	●	●	●	●	●	100	212
●	●	●	●	●	●	110	230	●	●	●	●	●	●	110	230
●	●	●	●	●	●	120	248	●	●	●	●	●	●	120	248
●	●	●	●	●	●	130	266	●	●	●	●	●	●	130	266
●	●	●	●	●	●	140	284	●	●	●	●	●	●	140	284
●	●	●	●	●	●	150	302	●	●	●	●	●	●	150	302
●	●	●	●	●	●	160	320	●	●	●	●	●	●	160	320
●	●	●	●	●	●	170	338	●	●	●	●	●	●	170	338
●	●	●	●	●	●	180	356	●	●	●	●	●	●	180	356
●	●	●	●	●	●	190	374	●	●	●	●	●	●	190	374
●	●	●	●	●	●	200	392	●	●	●	●	●	●	200	392
●	●	●	●	●	●	210	410	●	●	●	●	●	●	210	410
●	●	●	●	●	●	220	428	●	●	●	●	●	●	220	428
●	●	●	●	●	●	230	446	●	●	●	●	●	●	230	446
●	●	●	●	●	●	240	464	●	●	●	●	●	●	240	464
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●	●	●	●	●	●	260	482	●	●	●	●	●	●	260	482
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●	●	●	●	●	●	270	518	●	●	●	●	●	●	270	518
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●	●	●	●	●	●	290	554	●	●	●	●	●	●	290	554
●	●	●	●	●	●	300	572	●	●	●	●	●	●	300	572
●	●	●	●	●	●	310	590	●	●	●	●	●	●	310	590
●	●	●	●	●	●	320	608	●	●	●	●	●	●	320	608
●	●	●	●	●	●	330	626	●	●	●	●	●	●	330	626

OUTPUT SIGNAL IN CASE OF MALFUNCTION

SW2 7	● Towards the bottom of the output range (downscale burnout) Towards the top of the output range (upscale burnout)
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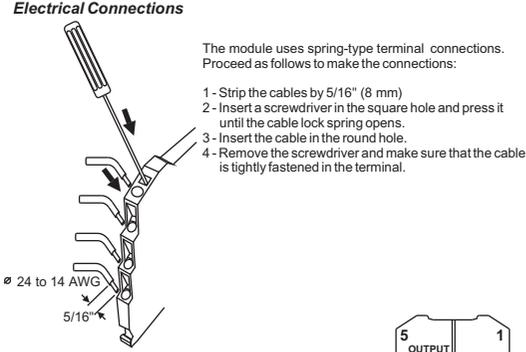
OVER-RANGE (*)

SW2 8	● NO: the malfuction 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 malfuction.
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(*) See the table below for the corresponding values.

Output signal limit	Over-range / Malfuction ± 2.5 %	Malfuction ± 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

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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 to distribute power to the modules via the DIN rail bus connector. This eliminates the need to connect power to each module. The bus can be powered from any of the modules; the total power used by the bus must be less than 400 mA. Higher values can damage the module. An appropriately sized fuse must be connected in series with the power supply.

- 3 - Using the K-BUS connector for the distribution of power to the modules via the DIN rail bus connector and the K-SUPPLY power supply. The K-SUPPLY is a regulated power supply designed to protect the modules connected to the bus from over-voltage loads. The bus connector can be provided with power using the K-SUPPLY module if the total power consumption of the bus is less than 1.5 A. Higher values can damage both the module and the bus. An appropriately sized fuse must be connected in series with the power supply.

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

The use of shielded cables is recommended for signal 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 cable resistance.

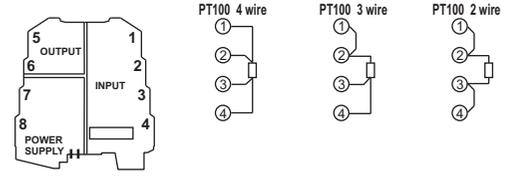
DIP-switch SW1-1 set in Position 1 (ON) (2/4 wires).
With jumpers between Terminals 1 and 2 and Terminals 3 and 4.

3-wire connection
This is the connection to be used for medium-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 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 should be used for 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 connecting cables.

DIP-switch SW1-1 set in Position 1 (ON) (2/4 wires).

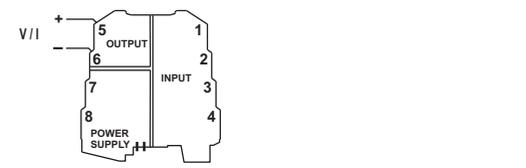


The PT100 sensor resistance is measured in short pulses to reduce the module power consumption and sensor heating effects. For this reason, some electronic calibrators are not able to generate the correct simulated signal.

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Output
Voltage connection - Current connection (applied current)

The use of shielded cables is recommended for signal connections.



Note: in order to reduce the module's heat dissipation, either use the voltage output or the current output with a load of > 250 Ω.

LED indications on the front

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

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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