

General Description

The K109S instrument is a V - mA converter with 4-way isolation designed for industrial standard voltage or current signals with passive input, active output and auxiliary supply. Analog/digital conversion takes place at 14 bits in every input range. The instrument also provides the following functions:



- Auxiliary supply, completely floating, isolated from the other ports, with voltage unrelated to the input power supply.
- Current or voltage input.
- Programmable rejection for 50 or 60 Hz line frequency.
- Input stabilization filter.
- Inversion of the input and inverted output scales
- Input Out-of-Range programmable to 2.5% or 5.0%
- SQRT function.
- Linearization for horizontal cylindrical tanks.

The module also features an extremely compact size, 35 mm DIN mounting, available bus power supply, quick connect spring-type wire terminals, 3-way isolation, on-site configuration using DIP-switches.

Technical Features

Power Supply:	19.2 to 30 VDC
Power Consumption:	Max 23 mA at 24 VDC (with output at 20 mA and auxiliary supply not used) Max 45 mA at 24 VDC (with output at 21 mA and auxiliary supply at 21 mA)
Dissipation :	< 500 mW
Voltage Input :	0-10 V, 2-10 V, 0-5 V, 1-5 V, Input Impedance : 110 k Ω
Current Input:	0-20 mA, 4-20 mA, Input Impedance : 35 Ω
Permissible Max. Input Out-of-Range:	$\pm 2.5\%$ or $\pm 5\%$ depending on settings (see section on Input-Output Limits)
Voltage Output:	0-5 VDC, 1-5 VDC, 0-10 VDC, 2-10 VDC Minimum load resistance 2 K Ω
Current Output:	0-20 mA, 4-20 mA, 20-0 mA, 20-4 mA Maximum load resistance 500 Ω
Max. Output Out-of-Range:	Fixed (see section <i>Input-Output Limits</i>)
Current output protection:	Approximately 25 mA
Auxiliary Supply:	Voltage: 17-21 VDC Current: 0-25 mA
Processing :	Digital, 32 bit floating-point calculation
ADC :	14 bit for every input range

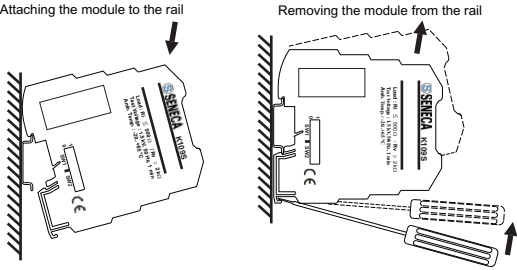
10-90% response:	50 Hz: max 41 ms without filter, 88 ms with filter 60 Hz: max 35 ms without filter, 74 ms with filter.
Transmission:	Digital Optical
Max. transmission error: (1)	0.08% of the f.s. value for mA or 5 V output 0.07% of the f.s. value for 10 V output
Resolution:	1 mV for voltage output, 2 μ A for current output
Thermal drift:	Less than 120 ppm/K
SQRT error: (2)(3)	in the range 1-100%: floating point 32 bit
Linearization error Cylindrical tank: (2)	0.05%
Isolation Voltage:	1.5 KV between each group of ports
Protection Index:	IP20
Operating Conditions:	Temperature -20 to +65 °C Humidity 10-90% at 40°C (non-condensing) Altitude 2000 sim -40 to +85 °C
Storage Temperature:	-40 to +85 °C
LED Indicator:	Input or output out-of-range limiter device triggered or input saturation. Internal fault.
Connections:	Spring terminals
Wire Sizes:	24 to 14 AWG; 0.2 to 2.5 mm ²

Box :	PBT (black color)
Dimensions, Weight :	6.2 x 93.1 x 102.5 mm, 46 g.
Standards :	EN61000-6-4/2002 (electromagnetic emission, industrial surroundings) EN61000-6-2/2005 (electromagnetic immunity, industrial surroundings) EN61010-1/2011 (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: "Isolating transformers and Safety transformers".
	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.

(1) No linearization function enabled.
(2) Linearization functions operate only in the 0-100% rated range. For under-range and over-range, the input signal is not linearized (G=1). Continuity and monotonic quality of transfer are guaranteed throughout the entire range of measurement.
(3) In the 0-1% range, the function is linear with gain G=10 in order to avoid over-amplification of noise.

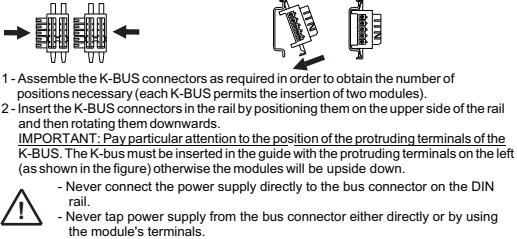
Installation

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 using 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.

Using the K-BUS connector



- 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 set to OFF as default configuration. This set correspond to the following configuration:

Input signal	→ 0-20 mA
50-60 Hz line frequency rejection	→ 50 Hz
Input filter	→ Present
Inversion	→ No
Linearization	→ None
Output signal	→ 0-20 mA
Input Out-of-range	→ $\pm 5\%$ limit

The above configuration is valid only with all the DIP switches at position 0. If one 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).

INPUT SIGNAL	
SW1 1 2 3	
<input type="checkbox"/>	0-20 mA
<input type="checkbox"/>	4-20 mA
<input type="checkbox"/>	20-0 mA ⁽⁵⁾
<input type="checkbox"/>	20-4 mA ⁽⁵⁾
<input type="checkbox"/>	0-10 VDC
<input type="checkbox"/>	0-5 VDC
<input type="checkbox"/>	1-5 VDC
<input type="checkbox"/>	0-5 VDC
<input type="checkbox"/>	Not allowed
<input type="checkbox"/>	Not allowed

50-60 Hz LINE FREQUENCY REJECTION	
SW1 4	
<input type="checkbox"/>	60 Hz
<input type="checkbox"/>	50 Hz

INPUT FILTER (*)	
SW1 5	
<input type="checkbox"/>	Present
<input type="checkbox"/>	Absent

(*) The filter increases the rejection of line frequency disturbances and stabilizes the reading, reducing the measured noise. It is advised to enable it if faster response time is not required.

INPUT INVERSION	
SW1 6	
<input type="checkbox"/>	Present
<input type="checkbox"/>	Absent

FUNCTION	
SW1 7 8	
<input type="checkbox"/>	Default
<input type="checkbox"/>	None
<input type="checkbox"/>	SQRT
<input type="checkbox"/>	Tank

OUTPUT SIGNAL	
SW2 1 2 3	
<input type="checkbox"/>	0-20 mA
<input type="checkbox"/>	4-20 mA
<input type="checkbox"/>	20-0 mA ⁽⁵⁾
<input type="checkbox"/>	20-4 mA ⁽⁵⁾
<input type="checkbox"/>	0-10 VDC
<input type="checkbox"/>	0-5 VDC
<input type="checkbox"/>	1-5 VDC
<input type="checkbox"/>	2-10 VDC

(5) These are inverse output ranges that are useful whenever the linearization applied is incompatible with the inversion of the input.

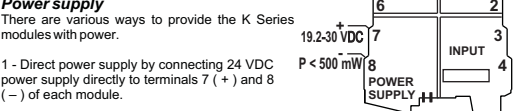
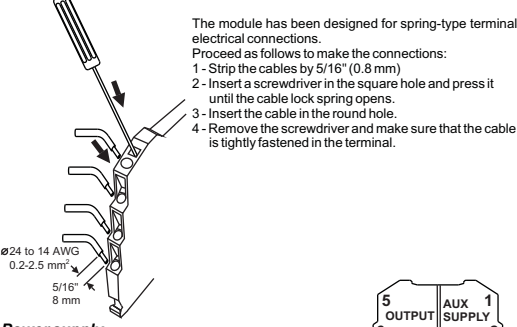
INPUT OUT-OF-RANGE	
SW2 4	
<input type="checkbox"/>	5%
<input type="checkbox"/>	2.5%

Input Output Limits

The Out-Of-Range Limits provided in the following table are applied to the input signal, whereas the fixed limits are applied to the output signal: 0-21 mA, 0-5.25 VDC, 0-10.5 VDC.

Rated value	Over Range $\pm 2.5\%$	Over-Range $\pm 5\%$
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
2 VDC	1.75 VDC	1.5 VDC
0 VDC	0 VDC	0 VDC

Electrical Connections

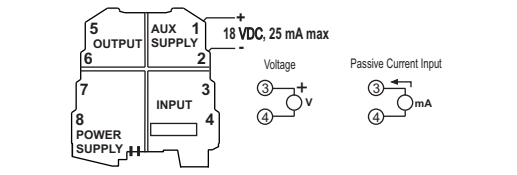


2 - Using the K-BUS connector accessory for the distribution of the power supply to the modules via bus connector, in this way eliminating the need to connect power to each module. The bus can be supplied from any of the modules; the total consumption of the bus must be less than 400 mA. Higher power consumption 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 bus connector with the K-SUPPLY for power. The K-SUPPLY is a regulated power supply module that is designed to protect the modules connected via the K-BUS against over-voltages. 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 power consumption values can damage both the module and the bus. An appropriately sized fuse must be connected in series with the power supply.

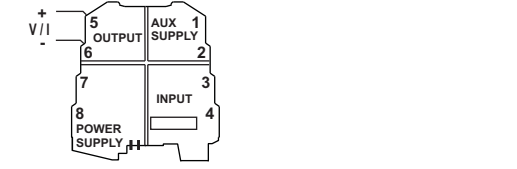
Input and Auxiliary Power Supply

Input
The module accepts a current or voltage input signal. The use of shield cables is recommended for signal wiring.
Voltage input
Terminal 3: Voltage input.
Terminal 4: Return (GND).
Current input
Terminal 3: Current input.
Terminal 4: Return (GND).
Auxiliary Power Supply
The value of the voltage is independent from the one supplied through power terminals 7 and 8.



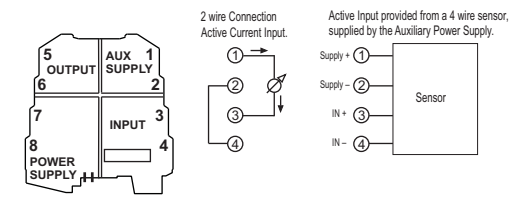
Output

Voltage connection - Current connection (applied current)
The use of shield cables is recommended for the signal wires.



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

Examples of Active Input Connections



Red LED Indicator

LED (Red)	Meaning
Fast Flashing	Internal fault
Slow Flashing	DIP-switch setting not allowed
Steady light	Input or output out-of-range limiter device triggered or input saturation.

Note: in case of internal fault, the output will stay at null value.

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 the retail store where you purchased this product.

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