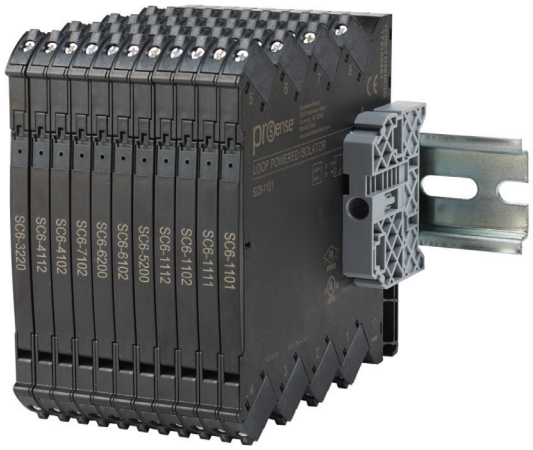
ProSense SC6 Frequency Converter and Pulse Isolator Signal Conditioners User Manual



This product manual covers the following part numbers:

SC6-2001	SC6-2502
SC6-2002	SC6-PCU1
SC6-2501	

ProSense SC6 Frequency Converter and Pulse Isolator Signal Conditioners User Manual

Please include the Manual Number and the Manual Issue, both shown below, when communicating with Technical Support regarding this publication.

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Issue: 1st Edition
Issue Date: 07/2025

Publication History		
Issue	**Date**	**Description of Changes**
1st Edition	08/2025	Original

ProSense SC6 Frequency Converter and Pulse Isolator Signal Conditioners User Manual

1 - Warnings

General

To avoid the risk of electric shock and fire, the safety instructions of this guide must be observed and the guidelines followed. The specifications must not be exceeded, and the device must only be applied as described in the following. Prior to the commissioning of the device, this installation guide must be examined carefully. Only qualified personnel (technicians) should install this device. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Until the device is installed, do not connect hazardous voltages to the device.

Caution

To avoid explosion and serious injury, modules having mechanical failures must not be used.

Modules are not repairable.

In applications where hazardous voltage is connected to in-/outputs of the device, sufficient spacing or isolation from wires, terminals and enclosure - to surroundings (incl. neighboring devices), must be ensured to maintain protection against electric shock.

Potential electrostatic charging hazard. To avoid the risk of explosion due to electrostatic charging of the enclosure, do not handle the units unless the area is known to be safe, or appropriate safety measures are taken to avoid electrostatic discharge.

2 - Symbol Identification

Triangle with an exclamation mark: Read the manual before installation and commissioning of the device in order to avoid incidents that could lead to personal injury or mechanical damage.

CE

The CE mark indicates device is in compliance with the essential requirements of the directives.

3 - Safety Instructions

3.1 - Receipt and unpacking

Unpack the device without damaging it and check whether the device type corresponds to the one ordered. The packing should always follow the device until the unit has been permanently installed.

3.2 - Environment

Avoid direct sun light, dust, high temperatures, mechanical vibrations and shock, as well as heavy moisture and rain. If necessary, heating in excess of the stated limits for ambient temperatures should be avoided by way of ventilation. The device can be used for Measurement Category II and Pollution Degree 2. The modules are designed to operate safely at an altitude of 2000m or less.

3.3 - Installing

Only technicians who are familiar with the technical terms, warnings, and instructions in the manual and who are able to follow these should connect the device.

Should there be any doubt as to the correct handling of the device, please contact AutomationDirect.com.

Installation and connection of the device should comply with national legislation for installing of electric materials, e.g. wire cross section, protective fuse, and location.

Descriptions of input / output and supply connections are shown in this installation guide and on the side label.

The device is provided with field wiring terminals and shall be supplied from a power supply having double or reinforced insulation. A power switch should be readily accessible and close to the device. The power switch shall be marked as the disconnecting unit for the device.

The SC6 Series must be installed on a DIN rail that complies with EN 60715. Note: No mounting orientation restrictions.

UL installation

Use 60°C/75°C copper conducters only.

Wire size . . . . . .AWG 26-12

UL file number E498965

The device is an Open Type Listed Process Control Equipment. To prevent injury resulting from accessability to live parts the equipment must be installed in an enclosure.

The power supply unit must comply with NEC Class 2, as described by the National Electrical Code® (ANSI / NFPA 70).

3.3 - Cleaning

When disconnected, the device may be cleaned with a cloth moistened with distilled water.

4 - Supply Voltage Options

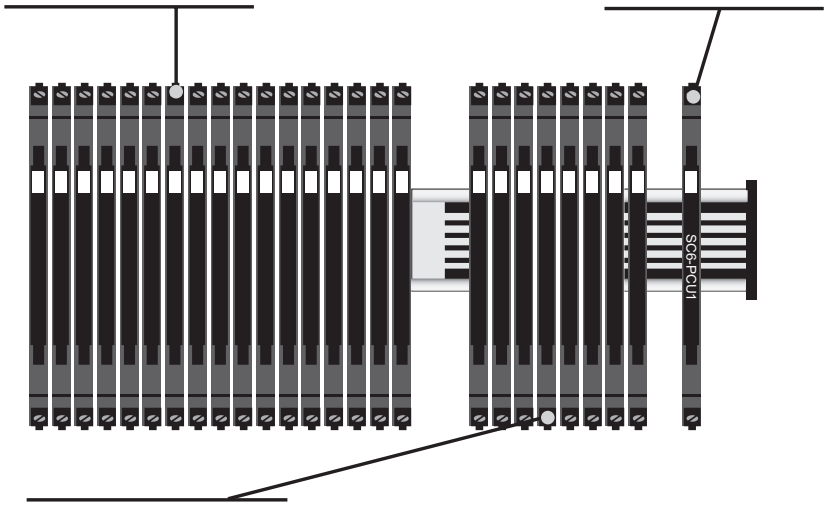
The technical specifications specify the maximum required power at nominal operating values, e.g. 24V supply voltage, 60°C ambient temperature, 600 Ω load, and 20mA output current.

DIN rail solution - device daisy chain:
The units can be supplied with 24VDC ±30% via direct wiring and a loop between the devices.

Protective fuse: 2.5 A.

Power rail solution #2:
The SC6-PCU1 power connector unit allows easy connection of a 24 VDC / 2.5 A source to the power rail.

Protective fuse: 2.5 A.

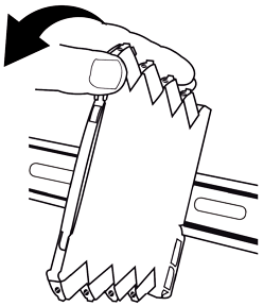


Protective fuse: 0.4 A.

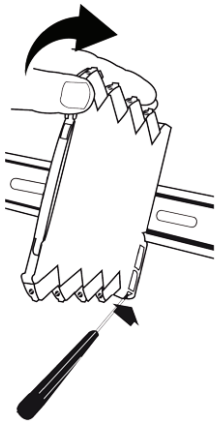
Power rail solution #1:
Alternately, you can connect 24VDC to any one SC6 Series device with power rail connector which will then energize other units on the rail. The terminals can pass a current of 400mA maximum.

External fuse characteristics:
The 2.5 A fuse must break after not more than 120 seconds at 6.4 A.

5 - Installing and Uninstalling the SC6 Series

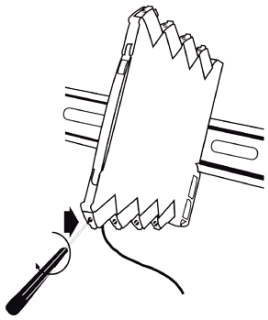


Picture 1:
Installing on DIN rail / power rail. Click the device onto the rail.



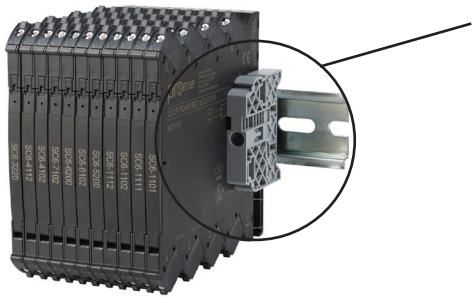
Picture 2:
Uninstalling from DIN rail / power rail.
First, remember to uninstall the connectors with hazardous voltages. Detach the device from the DIN rail by lifting the bottom lock.

Note: Always use a screwdriver to uninstall units and avoid excessive force to prevent damaging the unit.



Picture 3:
Wire size AWG 26-12 / 0.13 - 2.5 mm2 stranded wire. Screw terminal torque 0.5 N·m.

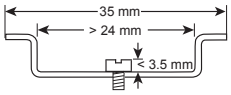
6 - Installation on DIN rail / power rail



End Bracket
(part number KN-EB7-10)

The devices in the SC6 Series can be installed on a DIN rail or on a power rail (-2001, -2002, -2501, and -2502). It is recommended that the modules be supported by end brackets (part number KN-EB7-10). Power supply units can be installed on the power rail according to customer requirements.

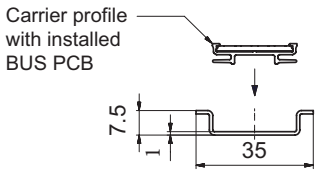
If you want to install a SC6 Series device with power rail connectors on a standard DIN rail, the head of the screws holding the 7.5 mm DIN rail shall be no more than 3.5 mm high in order to avoid short circuit between the power rail connectors on the SC6 Series device and the screws.



6.1 - In-Rail-Bus-Set Installation

Step 1

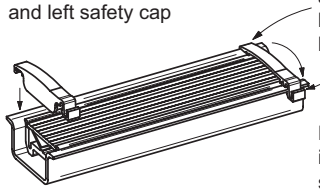
Put the BUS PCB into the carrier profile and then put the carrier profile into the DIN rail



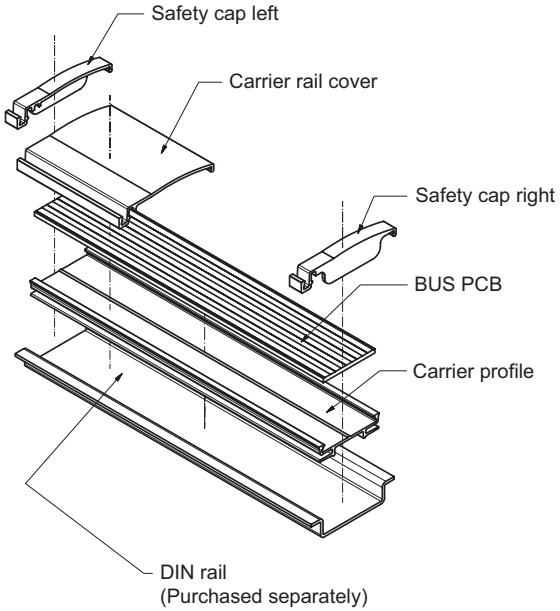
Step 2

Put on the right
and left safety cap

Pay attention to the sequence:
a) put the cap in from above
laid on the carrier profile
b) snap the cap on below

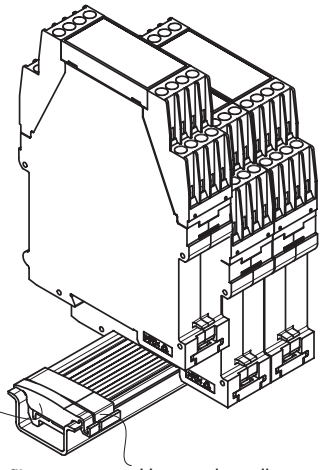


Dismantling
in reversed
sequence



Step 3

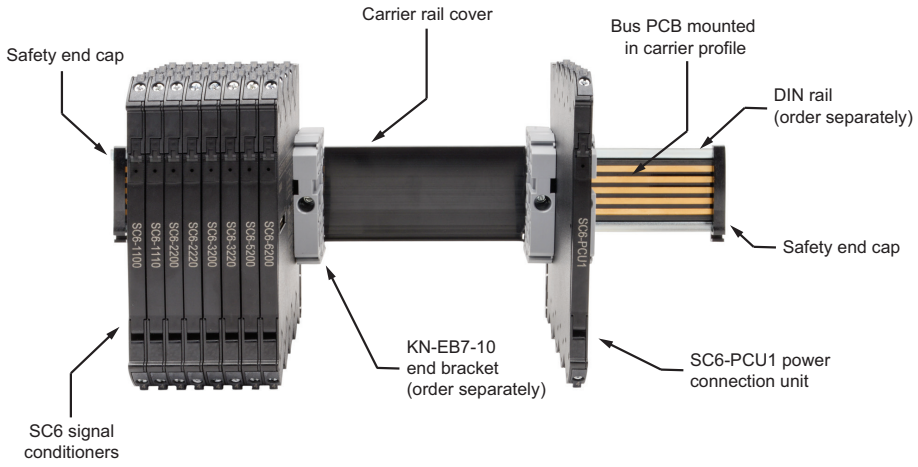
Snap the devices on
the In-Rail-Bus



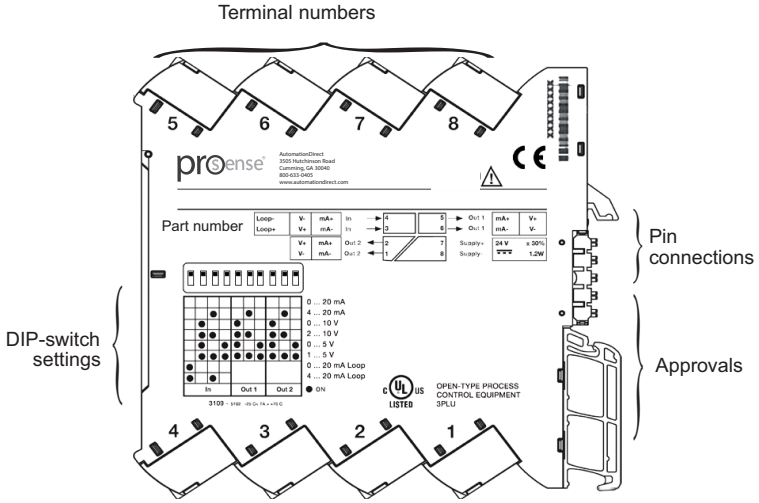
Safety cap on both
sides tight to the carrier profile
The safety cap fixes the carrier profile
in the DIN rail and protects the ends of
the BUS

Use carrier rail
cover provided to
protect exposed
sections of the BUS PCB

Part No.	***In-Rail-Bus-Set / 250mm 0068060***
Each Set Includes	BUS-PCB 250mm
	Carrier profile 250mm
	Carrier rail cover 250mm
	Safety cap right
	Safety cap left



7 - Side Label



8 - Common Technical Specifications

SC6 Series Common Technical Specifications		
Environmental Conditions		
Operating Temperature	-25°C to +70°C (-13°F to +158°F)	
Storage Temperature	-40°C to +85°C (-40°F to +185°F)	
Calibration Temperature	+20°C to +28°C (+68 to +82.4°F)	
Relative Humidity	< 95% RH (non-cond.)	
Protection Degree	IP20*	
Mechanical Specifications		
Dimensions (HxWxD)	113 x 6.1 x 115 mm (4.45 x 0.24 x 4.53 in)	
Weight Approx.	SC6-2001, SC6-2501, SC6-2502: 70g / SC6-2002: 80g	
DIN Rail Type	DIN EN 60715 - 35mm	
Wire Size	0.13...2.5 mm2 / AWG 26...12 stranded wire	
Screw Terminal Torque	0.5 N·m	
Observed Authority Requirements	EMC	2014/30/EU
	LVD	2014/35/EU
	RoHS 2	2011/65/EU
Approvals	cULus, Standard for Safety	UL 61010-1, File E498965
	Safe Isolation	EN 61140
* Installation in pollution degree 2 & overvoltage category II, No corrosive gases		

9 - Pulse Isolator Technical Specifications

Pulse Isolator Technical Specifications			
Part No.		***SC6-2001***	***SC6-2002***
DIP switch configurable		Yes	
Supply voltage		16.8 - 31.2 VDC (terminals or bus rail)	
Max. required power		≤ 1.2 W	
Max. power dissipation		0.65 W	0.95 W
Isolation voltage, test		2.5 kVAC	
Isolation voltage, working		300VAC (reinforced)	
Sensor auxiliary supply limitation		8.2 VDC, max. 8.2 mA @ 0VDC	
Input Specifications			
NAMUR Input	NAMUR according to	EN 60947-5-6	
	Max. input frequency	5kHz	
	Trig level LOW	<1.2 mA	
	Trig level HIGH	>2.1 mA	
	Input impedance SC6-2001 / -2002	1kΩ || 220pF / 1kΩ || 1.2 nF	
	Sensor supply	8.2 VDC, max. 8.2 mA @ 0VDC	
	Line Fault Detection – open loop / short circuit	Trig-level / hysteresis: 0.1 mA / 0.2 mA, 7mA / 0.5 mA	
NPN Input	Max. input frequency	5kHz	
	Trig level LOW	<1.2 mA	
	Trig level HIGH	>2.1 mA	
	Input impedance SC6-2001 / -2002	1kΩ || 220pF, 1kΩ || 1.2 nF	
	Max. input voltage	24VDC	
	Line Fault Detection – open loop / short circuit	Trig-level / hysteresis: 0.1 mA / 0.2 mA, 7mA / 0.5 mA	
Contact Input	Max. input frequency	5kHz	
	Trig level LOW	<1.2 mA	
	Trig level HIGH	>2.1 mA	
	Input impedance SC6-2001 / -2002	1 kΩ || 220pF, 1kΩ || 1.2 nF	
	Max. input voltage	24VDC	
	Line Fault Detection – open loop / short circuit	Trig-level / hysteresis: 0.1 mA / 0.2 mA, 7mA / 0.5 mA	
Output Specifications			
Relay Output	Max. voltage	250VAC / 200VDC	
	Max. current	2AAC	
	Max. AC power	100VA	
	Max. DC current, resistive load @ U_{relay} ≤ 30VDC	2ADC	
	Max. DC current resistive load @ 30 VDC < U_{relay} < 200VDC	$380 \times (U_{relay}\text{-}15)^{-2} \times 1.012^{Urelay\text{-}15}$ ADC	
	Max. switching frequency	20Hz	
	Response time	< 20 ms	
NPN Output	Max. voltage	30VDC	
	Max. switching frequency	5kHz	
	Min. pulse length	> 0.1 ms	
	Max. voltage drop	2.5 VDC @ 80mA	
	Response time	<0.1 ms	

10 - Frequency Converter Technical Specifications

Frequency Converter Technical Specifications			
Part No.		***SC6-2501***	***SC6-2502***
DIP Switch Configurable		Yes	
Supply Voltage		16.8 - 31.2 VDC (terminals or bus rail)	
Fuse		400mA SB / 250VAC	
Max. Required Power		≤ 1.2 W	
Max. Power Dissipation		0.65 W	
Isolation Voltage, Test		2.5 kVAC	
Isolation Voltage, Working		300VAC (reinforced)	
Response Time (0-90%, 100-10%)		≤ 30ms	
Auxiliary Supplies	Sensor supply limitation	23mA, 5-17 VDC	
	Signal dynamics, output	18bit	
	Long term stability, current, 1yr / 5yr @ 25°C	≤ 0.058% / ≤ 0.101%	
	Long term stability, voltage, 1yr / 5yr @ 25°C	≤ 0.032% / ≤ 0.058%	
	Accuracy	See Accuracy Table Below	
	EMC immunity influence	< ±0.5% of span	
	Extended EMC immunity: NAMUR NE21, A criterion, burst	< ±1% of span	
Input Specifications			
Frequency Input	Frequency range	0.001 Hz to 100kHz	
	Time range, time function	10µs to 999.9 s	
	Max. frequency / min. pulse width, with input filter ON	75Hz / 8ms	
Tacho Input	Trig-level LOW	≤ -50 mV	
	Trig-level HIGH	≥ +50 mV	
	Input impedance	100 kΩ || < 220 pF	
	Max. input voltage	80VAC pp	
	Sensor supply	5-17 V / 23mA	
NPN / PNP Input	Trig-level LOW	≤ 4.0 VDC	
	Trig-level HIGH	≥ 7.0 VDC	
	Input impedance	3.48 kΩ || < 220 pF	
	Trimmer edge	NPN = Neg. edge, PNP = Pos. edge.	
	Sensor supply	7.1-17 V / 23mA	
	Max. input voltage	24V	
TTL Input	Trig-level LOW	≤ 0.8 VDC	
	Trig-level HIGH	≥ 2.0 VDC	
	Input impedance	≥ 100kΩ || < 220pF	
	Sensor supply	5...17 V / 23mA	
S0 Input Acc. to DIN 43864	Trig-level LOW	≤ 2.2 mA	
	Trig-level HIGH	≥ 9.0 mA	
	Input impedance	758 Ω || < 220pF	
	Sensor supply	17V / 23mA	
	Max. input voltage	24VDC	

Frequency Converter Technical Specifications Continued			
Part No.		***SC6-2501***	***SC6-2502***
NAMUR Input	NAMUR according to	EN 60947-5-6	
	Trig-level LOW	≤ 1.2 mA	
	Trig-level HIGH	≥ 2.1 mA	
	Input impedance	1 kΩ || < 220pF	
	Breakage detection	≤ 0.1 mA	
	Short-circuit detection	≥ 6.9 mA	
	Sensor supply	8.3 V	
Output Specifications			
Current Output	Signal range, active	0-23 mA	
	Programmable signal ranges	0/4-20 mA	
	Load, max	23mA / 600Ω	
	Load stability	≤ 0.01% of span / 100Ω	
	Sensor error indication	Downscale = 3.5 mA Upscale = 23 mA	
	Current limit	≤ 28mA	
Voltage Output	Signal range	≤ 11.5 VDC	
	Programmable signal ranges	0-1, 0-5, 1-5, 0-10, 0.2-1, 2-10 VDC	
	Load, min	≥ 10kΩ	
Relay Output	Relay functions	Increasing, Decreasing	
	Hysteresis	1, 5, 10, 25%	
	Activation Delay	0, 10 sec	
	Power On delay	2, 120 sec	
	Max. voltage	250VAC / 200VDC	
	Max. AC current	2A	
	Max. AC power	100VA	
	Max. DC current, resistive load (@) Urelay ≤ 30VDC	2A DC	
	Max. DC current, resistive load (@) 30VDC < Urelay < 200VDC .	$380 \times (U_{relay}\text{-}15)^{-2} \times 1.012^{Urelay\text{-}15}$ ADC	

Accuracy				
Input Accuracy				
	Input Type	Range(s)	Absolute Accuracy	Temperature Coefficient
General Values	Frequency	0 – 100 kHz	≤ ±0.01% of input frequency	≤ ±0.0005% / °C
Basic Values			≤ 0.0002 Hz	
Output Accuracy				
	Output Type	Range(s)	Absolute Accuracy	Temperature Coefficient
General Values	Current Output	0 – 23 mA	≤ ±0.05% of span	≤ ±0.005% / °C
	Voltage Output	0 – 10 V	≤ ±0.05% of span	≤ ±0.005% / °C
Basic Values	Current Output	0 – 23 mA	8 µA	0.8 µA / °C
	Voltage Output	0 – 10 V	2 mV	200 µV / °C

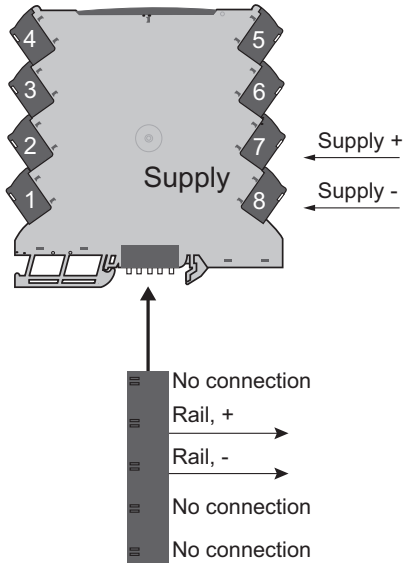
11 - Power Connector Module - Technical Specifications

Power Connection Module - Technical Specifications	
Part No.	***SC6-PCU1***
Supply voltage	16.8-31.2 VDC
Internal power dissipation	0.25 W max.
Required external fuse	2.5 A

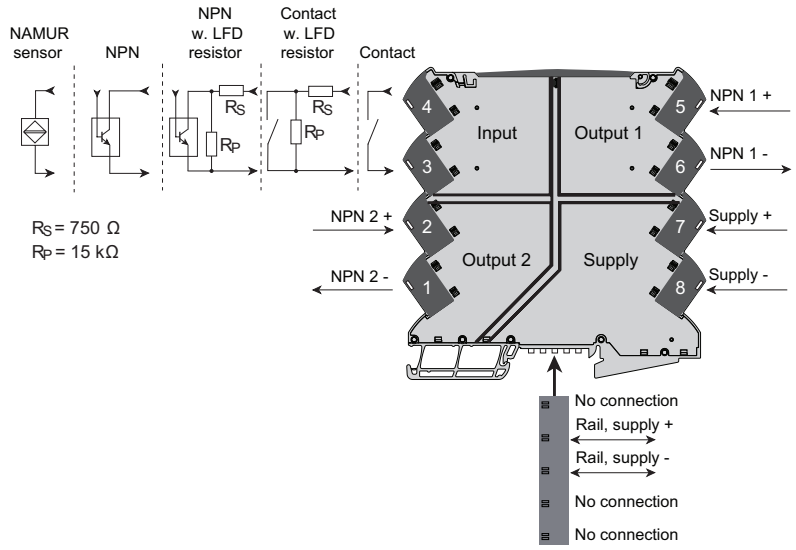
12 - Wiring Diagrams

Note: The SC6 2-wire Transmitter Input is a current input which provides an excitation voltage to the input device, otherwise known as an active or sourcing input, while the SC6 Current Input requires the input device be provided with an external excitation voltage, otherwise known as a passive or sinking input.

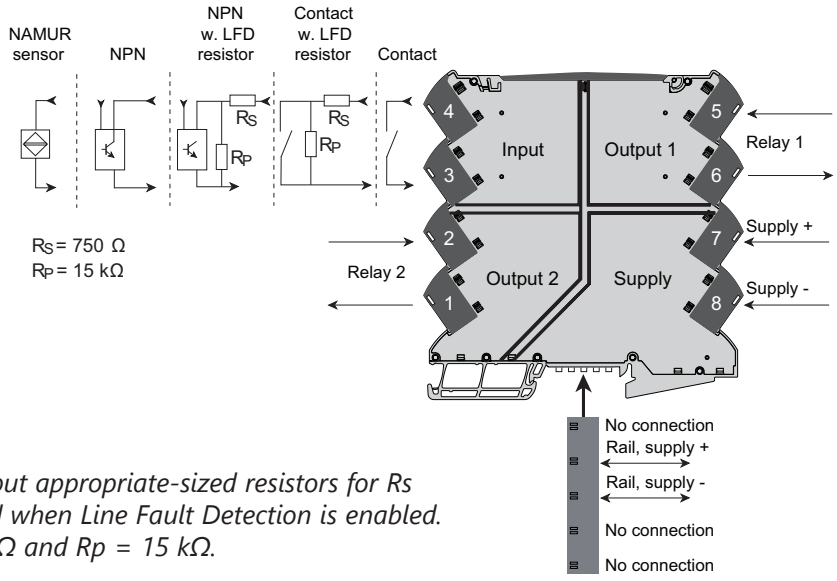
SC6-PCU1



SC6-2001

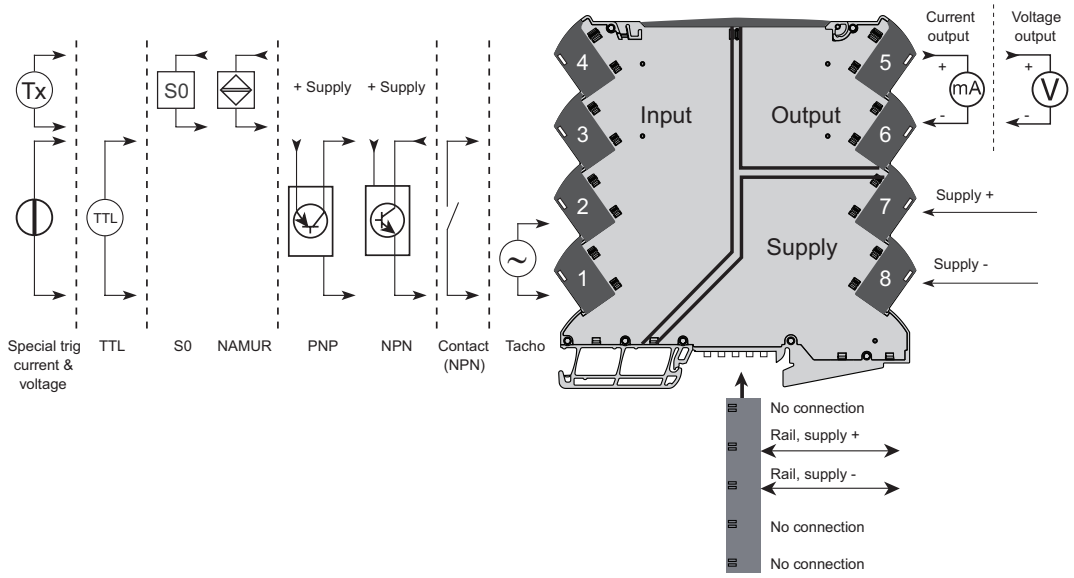


SC6-2002

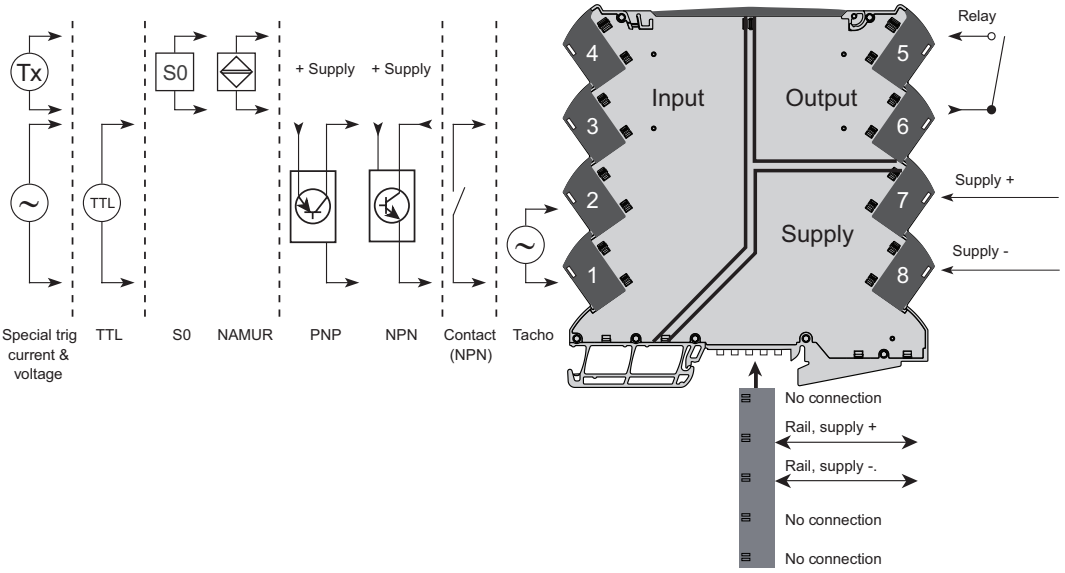


Note: For contact and NPN input appropriate-sized resistors for Rs and Rp must be installed when Line Fault Detection is enabled. Typical values Rs = 750 Ω and Rp = 15 kΩ.

SC6-2501

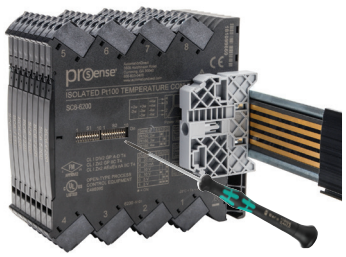


SC6-2502



13 - DIP Switch Settings

The part numbers listed below are configured with DIP switches which are located on the side of the module and can be adjusted with a small screw driver or other implement.



SC6-2001, SC6-2002

	S1	1	2	3	4
LFD enabled		●			
Out2 = Alarm indication			●		
Out1 inverted				●	
Out2 inverted					●

●= ON

SC6-2501

Input types	Sensor supply	S1	1	2	3
NAMUR without sensor error det.	8.3 V				●
NAMUR with sensor error det.	8.3V			●	
NPN	17V			●	●
PNP	17V		●		
Tacho	17V		●		●
TTL	5V		●	●	
S0	17V		●	●	●

Output types	S1	4	5	6
0...20mA				
4...20mA				●
0...1V			●	
0.2...1V			●	●
0...10V		●		
2...10V		●		●
0...5V		●	●	●
1...5V		●	●	●

Frequency input max. (f high)										
f1 [Hz]	S2	1	2	3	4	5	6	7	f2 [x factpr]	S2	8	9	10
1		●							0.001				
2			●						0.01				●
4				●					0.1			●	
8					●				1			●	●
16						●			10		●		
32							●		100		●		●
64								●	1,000		●	●	
									10,000		●	●	●

Input filter	S1	7
On		●
Off		

Output error level	S1	8
Downscale		
Upscale		●

Low cut off	S1	9
On		●
Off		

●= ON f1=S2.1+S2.2+S2.3+S2.4+S2.5+S2.6+S2.7
f high = f1xf2

Note: S1-10 must be set to off.

SC6-2502

Input types	Sensor supply	S1	1	2	3
NAMUR without sensor error det.	8.3 V				●
NAMUR with sensor error det.*	8.3V			●	
NPN	17V			●	●
PNP	17V		●		
Tacho	17V		●		●
TTL	5V		●	●	
S0	17V		●	●	●

* : Action on error is “OPEN”

Relay setpoint (f setpoint)										
f1 [Hz]	S2	1	2	3	4	5	6	7	f2 [x factor]	S2	8	9	10
1		●							0.001				
2			●						0.01				●
4				●					0.1			●	
8					●				1			●	●
16						●			10		●		
32							●		100		●		●
64								●	1,000		●	●	
									10,000		●	●	●

Relay contact	S1	4
N.O.		
N.C.		●

Activation direction	S1	5
Increasing		
Decreasing		●

Hysteresis	S1	6	7
1%			
5%			●
10%		●	
25%		●	●

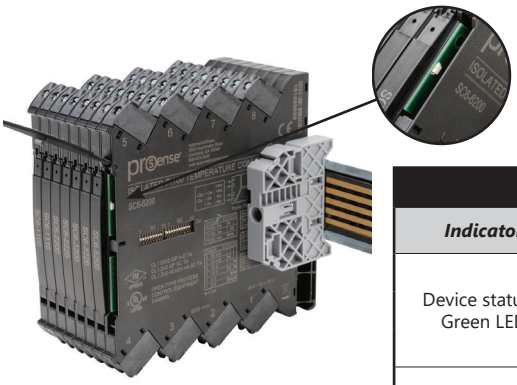
Power on delay	S1	8
2 sec.		
120 sec.		●

Relay activation delay	S1	9
0 sec.		
10 sec.		●

●= ON f1=S2.1+S2.2+S2.3+S2.4+S2.5+S2.6+S2.7
f high = f1xf2

Note: S1-10 must be set to off.

14 - LED Status Indication (SC6-2001, -2002)

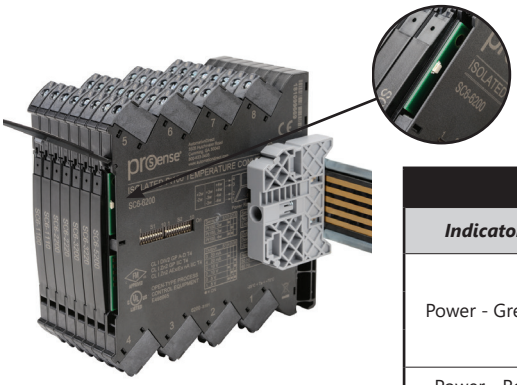


LED Indication

The device is equipped with a green power LED in the front to indicate the operation status, see the table below:

LED Indication for Analog Input Modules		
Indicator	***Indicator Pattern***	***Condition***
Device status – Green LED	Off	No power supply or internal device failure
	13Hz, 15ms	Normal operation
	1Hz, 500ms	Illegal DIP-switch settings or start / restart
LFD alarm / device failure - Red LED	Off	Normal operation
	On	Device failure
	1Hz, 15ms	LFD sensor / wire failure
Out 1 / Out 2 - Yellow LED	On/Off (f_{out} < 13Hz)	Relay energized / de-energized , transistor ON/OFF
	13Hz, 15ms (f_{out} > 13Hz)	Relay energized / de-energized , transistor ON/OFF

15 - LED Status Indication (SC6-2501, -2502)



LED Indication

The device is equipped with a green power LED in the front to indicate the operation status, see the table below:

LED Indication for Analog Input Modules		
Indicator	***Indicator Pattern***	***Condition***
Power - Green	13Hz, 250ms	Normal operation
	1Hz, 2ms	Device OK, Sensor or Input limit error
	Solid	Internal error
Power - Red	Solid	Device failure
f_{in} - Yellow	Input active or: input f > 13 Hz => 13 Hz, 250 ms	Signal > trigger level high
Relay - Yellow	0...13 Hz, 20 ms < 250 ms	Relay energized

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