SWITCHERGEAR
GEAR TO CONTROL YOUR POWER SWITCHES

Accessory SNI005

Current sensor 25 ARMS
Current measurement for power systems

REFERENCE MANUAL

Features

Standard accessory for SwitcherGear

- *Connects directly to Module AIN004*

Measurement range ±50 A

Continuous current 25 ARMS

Closed-loop Hall-effect current sensor

- *Gain accuracy 0.5%*
- *Frequency response DC to 300 kHz*
- *Galvanic isolation*

4 mm shrouded safety connectors

Applications

Current measurement for

- *PWM power converters*
- *DC link*
- *Motors*
- *1-phase and 3-phase grid*
- *Renewable energy and storage*

Ideal for use with

- *Converters with 1200 V IGBTs*
- *Semikron® Semiteach® IGBT*

General Description

The SNI005 Accessory is an enclosed current sensor for power converter systems. It provides a simple and safe way to connect current sensors into your power system. The sensors can be connected directly to a SwitcherGear AIN004 Module.

Ordering Information

Order Code	***Description***
SNI005	*SwitcherGear accessory, current sensor 25 ARMS*
SNV005	*SwitcherGear accessory, voltage sensor ±1000 V, enclosed*
SNV006	*SwitcherGear accessory, voltage sensor ±1000 V, open*
AIN004	*SwitcherGear module, 4-channel analogue input for sensors, uni/bipolar current 20 to 200 mA*
CBL003/2m0	*SwitcherGear accessory, 3-wire cable for sensors, length 2.0 metres*

Standard Interfaces

Input Connectors (Front Panel)

The 4 mm shrouded safety connectors allow the current sensor to be connected into the power system. The markings on the front panel show the measurement polarity.

Use only patch cables that have a suitable current rating to make the connections.

Output Connector (Rear Panel)

A 3-way pluggable screw terminal connector allows for connection of power and the measurement output signal. Table 1 and the markings on the rear panel show the pin-out of the connector.

The connection can be keyed by inserting a coding section (Phoenix Contact part number 1734401) into the recess in the header, and coding profiles (Phoenix Contact part number 1734634) are inserted into the slot on the plug.

Functional Description

The SNI005 unit uses a Hall-effect sensor to accurately measure the current in power converter systems. Figure 1 shows the function and connections of the current sensor.

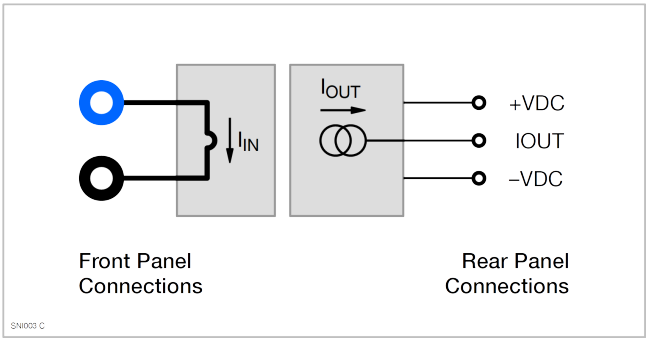

Figure 1: Functional diagram of current sensor.

Table 1: Sensor output connector

Pin	Signal	Description
1	+VDC	Sensor positive supply voltage input.
2	IOUT	Sensor measurement current output.
3	-VDC	Sensor negative supply voltage input.

Figure 2: View of front panel.

Figure 3: View of rear panel.

The measurement input is connected in **series** with the circuit of interest. The output from the sensor is a current, I_{OUT}, that is a scaled replica of the input current, I_{IN}.

A suitable signal conditioning circuit must be used to connect sensor output current to the control system, e.g. SwitcherGear Module AIN004, 4-channel analogue inputs for sensors.

The polarity convention for the sensors is that current flows out from the IOUT terminal when the conventional current of the input signal flows into the blue input connector and out of the black input connector.

Shielding

It is recommended to separate the wires of the input circuit from the wires of the output circuit to prevent external coupling of switching interference to the output signal. This should be applied throughout the system, so that the power system is adequately separated from the controller system.

Electrical Safety

Hall-effect sensing is a non-contact method for accurately measuring current. This means that there is no electrical connection between the measurement input connections on the front panel and the cabled output connections.

The input connectors and the enclosure of the SNI005 Accessory provide protection against direct contact with the power system voltages.

The design of the SNI005 Accessory provides protection in case of direct contact with the sensor outputs. The protection is provided by means of protective separation between the input and output sides of the sensor, which is comprised of reinforced insulation.

Applications Information

Please read the following information to avoid damage to sensors.

The sensor input impedance between the blue and black connectors is a short-circuit. This minimises the effect of the current sensor on the circuit into which it is inserted, but allows very large and potentially damaging current to flow if the following instructions are not followed.

The sensor must be connected in **series** with the circuit of interest. The circuit must contain a means to control the steady state and transient current that flows in the circuit. This may be a series impedance (e.g. resistor, inductor, capacitor) that limits the current, or a control loop that regulates the current.

You must ensure that the sensor is not connected in **parallel** with voltage sources or other low impedance energy sources, for example:

- AC mains supplies (single-phase or three-phase)
- laboratory power supplies
- voltage source outputs of power converters
- DC link capacitors
- batteries
- etc.

Doing so will cause very high currents to flow, which may damage the SNI005 Accessory and the connected system.

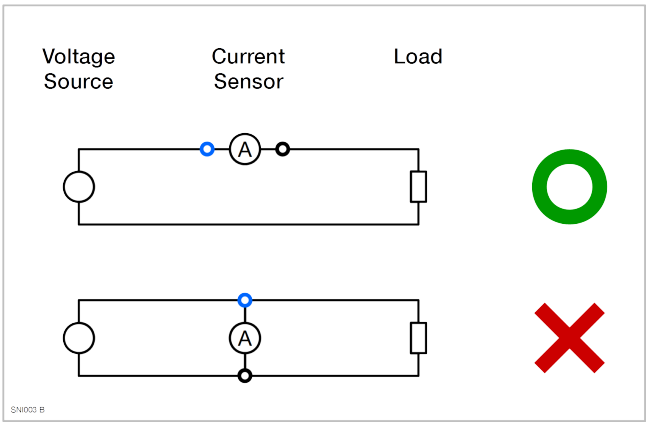

Figure 4: Connecting the current sensor into a circuit.

The SNI005 Accessory does not include fuse protection against over-current faults. You must add your own protection devices (e.g. fuse) if such protection is required.

Denkinetic cannot be responsible for damage cause by over-current to sensors and related equipment (e.g. connecting cables).

Warnings

Use only suitably rated shrouded 4 mm plugs and cables to connect to the inputs of the sensor.

Do NOT connect the current sensor inputs across voltage sources or other low impedance energy sources.

Add over-current protection (e.g. fuse) in series with the current sensor if there is a risk of over-current faults.

Absolute Maximum Ratings

Stresses above these ratings may cause permanent damage. These are stress ratings only – functional operation is not implied. Exposure to absolute maximum conditions for extended periods may affect reliability.

Parameter	Conditions		Max	Unit
Total Supply Voltage			34	V
Supply Current			70	mA
Input Current, RMS			25	A

Electrical Characteristics

The following specifications apply for V_{DC} = ±12 to ±15 V, T_A = 25 °C, unless otherwise noted.

Parameter	Conditions	Min	Typ	Max	Unit
SENSOR INPUT					
Measurement Range		–50		50	A
Input Current, RMS				25	A
Insertion Impedance					
Resistance, series			2.4		mΩ
Inductance, series			60		nH
SENSOR OUTPUT					
Gain, I_{OUT} / I_{IN}			1		mA/A
Gain Error				±0.5	%
Offset Error, Referred To Input	I_{IN} = 0 A			±0.2	A
	I_{IN} = 0 A, 0 °C ≤ T_A ≤ 70 °C			±0.2	A
Linearity			±0.1	±0.3	%
Overall Accuracy				±1.0	%
Burden Resistance	V_{DC} = ±12 V	0		75	Ω
	V_{DC} = ±15 V	35		130	Ω
High Frequency Response Limit	-3 dB		300		kHz
SUPPLY					
Bipolar Supply Voltage, V_{DC}		±11.4		±15.7	V
Current Consumption			10 + I_{OUT}	12 + I_{OUT}	mA

Electrical Safety

Reinforced Insulation	OV Cat III, PD 2			480	V

Mechanical Characteristics

Parameter	Conditions			Unit
Enclosure Width			66	mm
Enclosure Height	Excluding feet		29	mm
Enclosure Depth	Excluding connectors		108	mm
Mass	Including output connector		100	g

Revision History

Revision	Date	Changes From Previous Release
1	23 May 2018	▪ Original release.
2	21 Feb 2019	▪ Fixed functional description.