

SNV047EC

Combiner Box Card

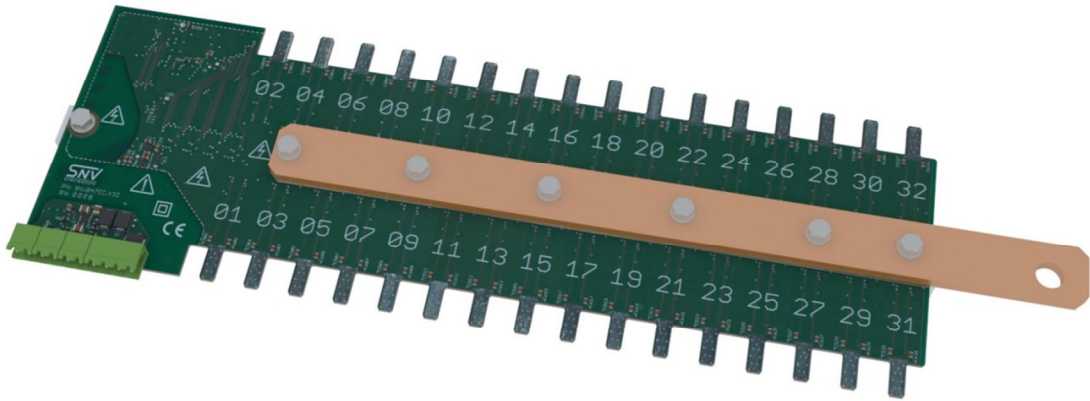


Figure 1: SNV047EC card

Features

- 16, 24, or 32 channels (any pair number up to 32 channels on request).
- board shape to collaborate with DIN rail fuse holders.
- on board positive current collector bar ready to connect to disconnection switch .
- independent DC current measurements per channel at positive side.
- 0 - 10A current measurement range (other ranges are available on demand). 16A/channel ampacity for entire operating temprature range.
- 0 – 1000V voltage measurement.
- very low sensing resistance on measurement channels: 3mΩ.
- system voltage up to 1000Vdc.
- 347Hz sampling per channel.
- 3 dry contact inputs.
- temperature measurement on board with high accuracy.
- on board long time averaging and integrations.
- communication using MODBUS over RS485.
- board low power consumption < 1W.
- Operating temperatures : -40°C to +75°C (up to +85°C on request).
- 32bit ARM CORTEX-M3 microcontroller @ 96MHz.
- CE: EMC: EN61326-1 and Safety: EN61010-1.
- ANSI/UL61010-1 (file number E464243)

Description / Typical Applications

SNV047EC is a “combiner box” card with dc current, voltage measurement and with three digital inputs. It is designed to be used in photovoltaic parks with central inverters in order to connect in parallel strings and monitor string currents and voltage.

It has specific board shape to fit in DIN rail fuse holders, avoiding extra cabling and material costs. Current collector bar is pre-mounted and designed to be directly connected to the disconnecter switch for a more clear installation and cost efficient. Negative pole collector bar can be also provided.

Current measurement is performed on the positive side. Very low thermal drift and thermal stability is achieved due to continually active correction from microcontroller. Measurements are amplified through precision amplifiers and then sampled and processed by a 32bit CORTEX-M3 microcontroller at 96MHz.

The microcontroller can deliver measurements through an isolated serial RS485 bus transceiver using Modbus protocol. It can also hold values, in order to perform simultaneous measurements through all the cards in a bus and then retrieve all the measurements. The microcontroller is also calculating the average of voltage, currents and current square values, with 347Hz sampling for each channel. The averaging period is indicated-marked by a master controller command. Averaged values of different cards are synchronized and then collected. Bandwidth consumption on the bus is limited, giving the ability for a prompt response of the rest requests.

Three contact inputs are also implemented in order to monitor other component like the condition of an SPD, disconnecter switch status, etc. Board temperature is also measured and provided.

Characteristics

Electrical Characteristics

	note	min	nom	max	Unit
Power supply	Absolute	18	24	26	V dc
Consumption:	Note 1, 2 Abs. Max	40	30	25	mA
Measurement channel resistance	each			3	mOhm
Channel maximum current		-16		16	A
Channel max working voltage	Note 3			1000	V dc
Current measurement range	Note 4, 5	0.035	-	10	A
Voltage measurement range		0	-	1000	V

Note 1: The value is for each installed board.

Note 2: The maximum number of cards to be installed in series is 127.

Note 3: Equipment pollution degree 2.

Note 4: Current values lower than 35mA are pulled down to zero.

Note 5: The provided measurement range is for the entire operating temperature range.

Physical & Environmental Characteristics

	Details
Operating Temperature	-40 °C to +75 °C (see Note 6 & 7)
Storage Temperature	-40 °C to +100 °C
Relative Humidity	up to 95% non-condensing
Operating Altitude	bellow 2000m
Board Dimensions (see also annex A)	16 Channels: LxWxH = 238 x 122 x 28 mm 24 Channels: LxWxH = 284 x 122 x 28 mm 32 Channels: LxWxH = 356 x 122 x 28 mm
EMC – Emissions	Meets: EN 61326-1, EN 61000-6-3, EN 50081-1, EN 55011(Class A ITE)
EMC – Immunity	Meets: EN 61326-1, EN 50082-1, EN61000-4-3 (Radiated EM fields immunity) EN61000-4-4 (Fast transient burst (EFT)) EN61000-4-5 (Surges) EN61000-4-6 (Conducted EM fields immunity)
Safety	Meets IEC61010-1(ed.3), IEC61010-2-030(ed.1)
Measurement Category	CAT 0
Transient Overvoltage	rated for 1,5kV
Pollution degree	2
Usage	Indoor or outdoor use installed in a metallic and/or plastic box

Note 6: Terminal blocks should not be plugged or unplugged below -30°C.

Note 7: Extended operating temperature range up to +85°C on request.

Measurement Specifications

		Details
Averaging	maximum averaging time	25 days at 347Hz sampling
Current measurement	measurement range	0.035 to 10 A (see Note 8)
	measurement accuracy	0.5% reading + 0.5%range (10A)
	ADC resolution (12bit)	2.5mA
	thermal Drift on board compensated	0.4% / °C
	calibration current	at 5.5 A
Voltage measurement	measurement range	0 to 1000 V
	measurement accuracy	better than 0.5%
	ADC resolution (12bit)	0.25 V
	calibration voltage	700 V
on board Temperature measurement	measurement range	-55°C to +125°C
	measurement accuracy	±0.5°C (typical) at +25°C
		±1°C (max) from -10°C to +80°C
		±2°C (max) from -10°C to +125°C
		±3°C (max) from -55°C to +125°C

Note 8: Other current measurement ranges are available on request.

Communications and bus Specifications

Hardware layer	RS485
Communication Protocol	Modbus RTU
Default baud rate	9600 bps (see Note 9)
Max number of nodes	128
Max suggested cable length	1200 m
Protected from Overvoltage Line Faults	yes
Bus Short-Circuit Protection	Yes

Note 9: Other baud rates up to 250 kbps are set on request.

Ordering information

SNV047EC.X## ordering configuration:

SNV047EC.X16	16 current measurement channels
SNV047EC.X24	24 current measurement channels
SNV047EC.X28	28 current measurement channels
SNV047EC.X32	32 current measurement channels
SNV047EC.X##	Custom versions (could be different measurement range, etc)

X: is the hardware version, ##: is the active channels

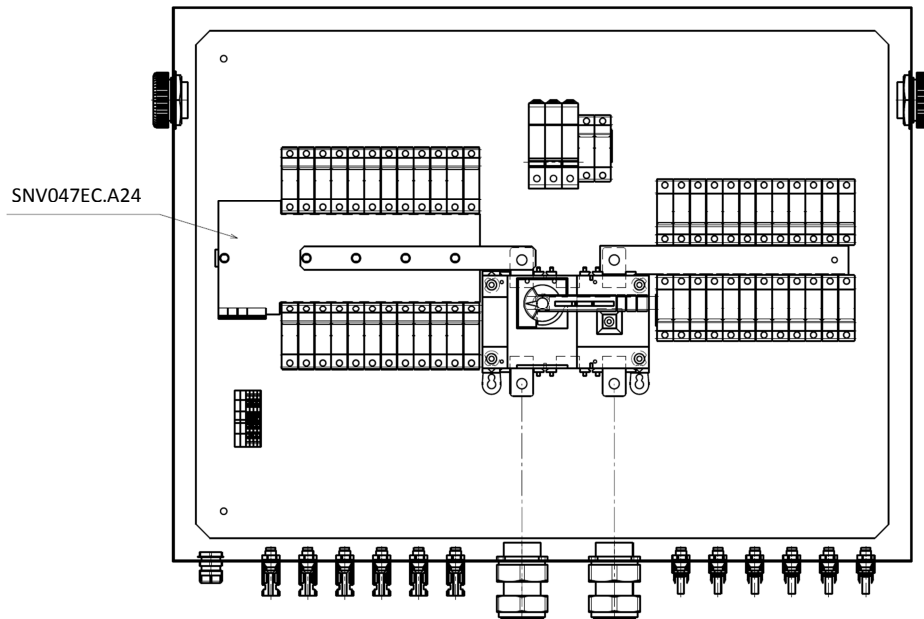
Communication & Usage

For communication, MODBUS protocol over an RS485 serial line is implemented (RTU mode @9600bps). See further “*MODBUS Application Protocol Specification v1.1b*” and “*MODBUS over Serial Line Specification and Implementation Guide v1.02*”.

Data can be read through “16bit input registers”. Commands are send by writing “Holding registers”. Three commands are implemented: “hold”, “mark” and “change address”. Hold command transfer “instant current” values to “current holded values”. Command can be send with a broadcast write, acquiring a snapshot of all the currents from all the cards in the bus.

Mark command initiates averaging and at the same time terminates previous averaging and transfers the result to the relevant registers. It is suggested to broadcast periodically the “mark” command, with the desired period (as for example 10 mins), and during each period read and store the averaged data.

Indicative CB Layout



See SNV047EC – User and Installation Manual Annex A (Drawings) for more details.

Figure 2: Card layout and dimensions

	Board Dimensions [mm]	Overall Dimensions (with collector, mounting bars and terminals) [mm]
SNV047EC.X16	238 x 122 x 28	300 x 136 x 36
SNV047EC.X24	284 x 122 x 28	346 x 136 x 36
SNV047EC.X28	320 x 122 x 28	382 x 136 x 36
SNV047EC.X32	356 x 122 x 28	418 x 136 x 36

X: is the hardware version

Technical Assistance

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