

CPA family

Contactless power analyzers



Description

CPA is a family of power analyzers and current transducers for AC 1-phase or DC installation monitoring, thanks to Hall effect sensing. Current is measured with no contact with the copper wire. The comprehensive set of measured variables allow this device to be used to monitor photovoltaic installations, industrial processes, battery charging systems.

Benefits

- **Flexible solution.** The instrument allows users to monitor both AC and DC system with the same device.
- **Fast connection.** AC or DC current sensing with no need to cut and join the cable.
- **Reliability.** The instrument is equipped with a Modbus/RTU communication port by RS485 connection.
- **Complete monitoring.** Depending on the model, the instrument provides a comprehensive range of monitored variables (V, A, W, var, VA, kWh, PF, HZ, THD) or limited to current variables (A, Amin, Amax, Ah).
- **Wide range of device mounting types.** The instrument can be mounted in four different ways (either DIN rail or panel mounting, vertical or horizontal) to match different installation constraints.
- **Easy programming.** Plug'n play set-up by means of CARLO GAVAZZI UCS (Universal Configuration Software).
- **Integrated solution.** The instrument is compatible with both UWP 3.0 and UWP 4.0 solutions for energy monitoring.

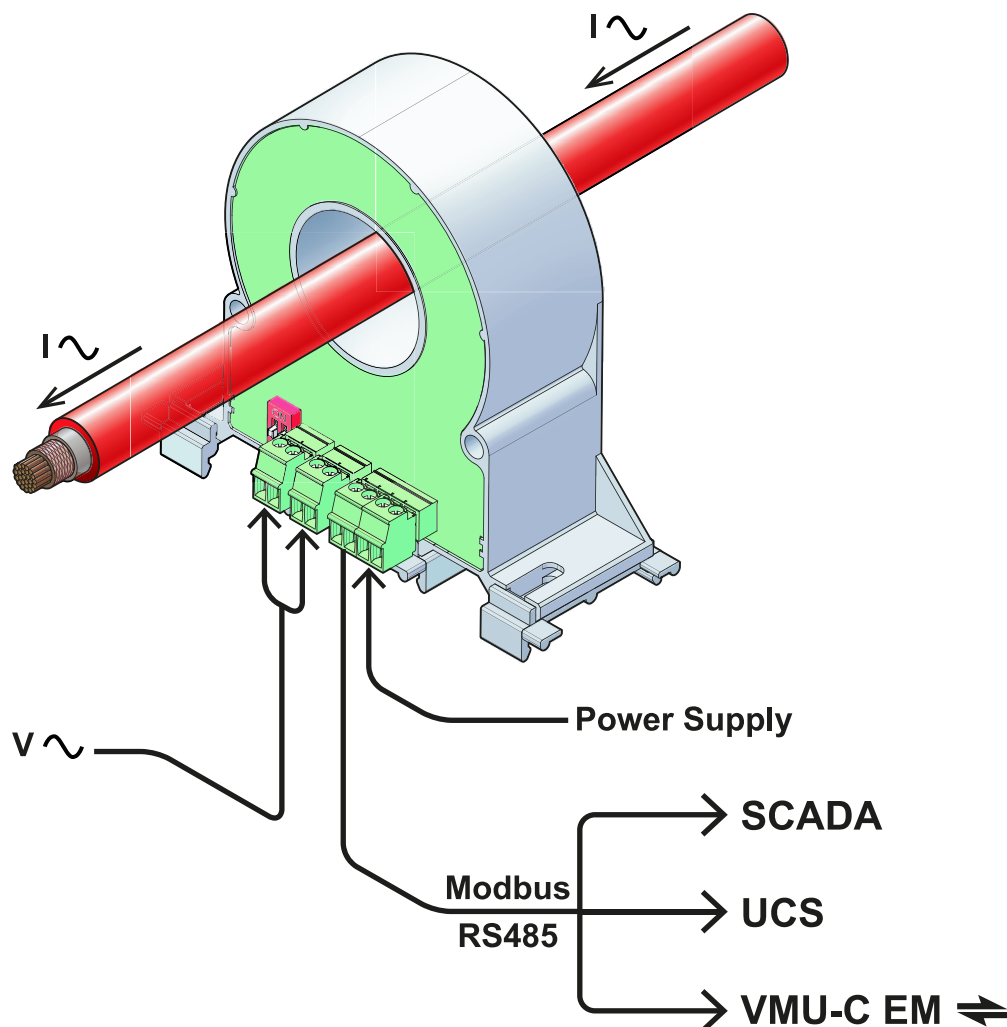
Applications

CPA power analyzers are the ideal solution for those applications which are beyond standard AC monitoring. Given their capability of working both at different frequency ranges, they match the needs of DC applications (battery charging, photovoltaic monitoring), of AC applications with high crest factor (UPS, variable frequency drives) and standard 1-phase AC installations.

Main functions

- Compatible with UWP 3.0 and UWP 4.0
- Configurable by means of UCS (Universal Configuration Software) solution
- Hall effect sensing

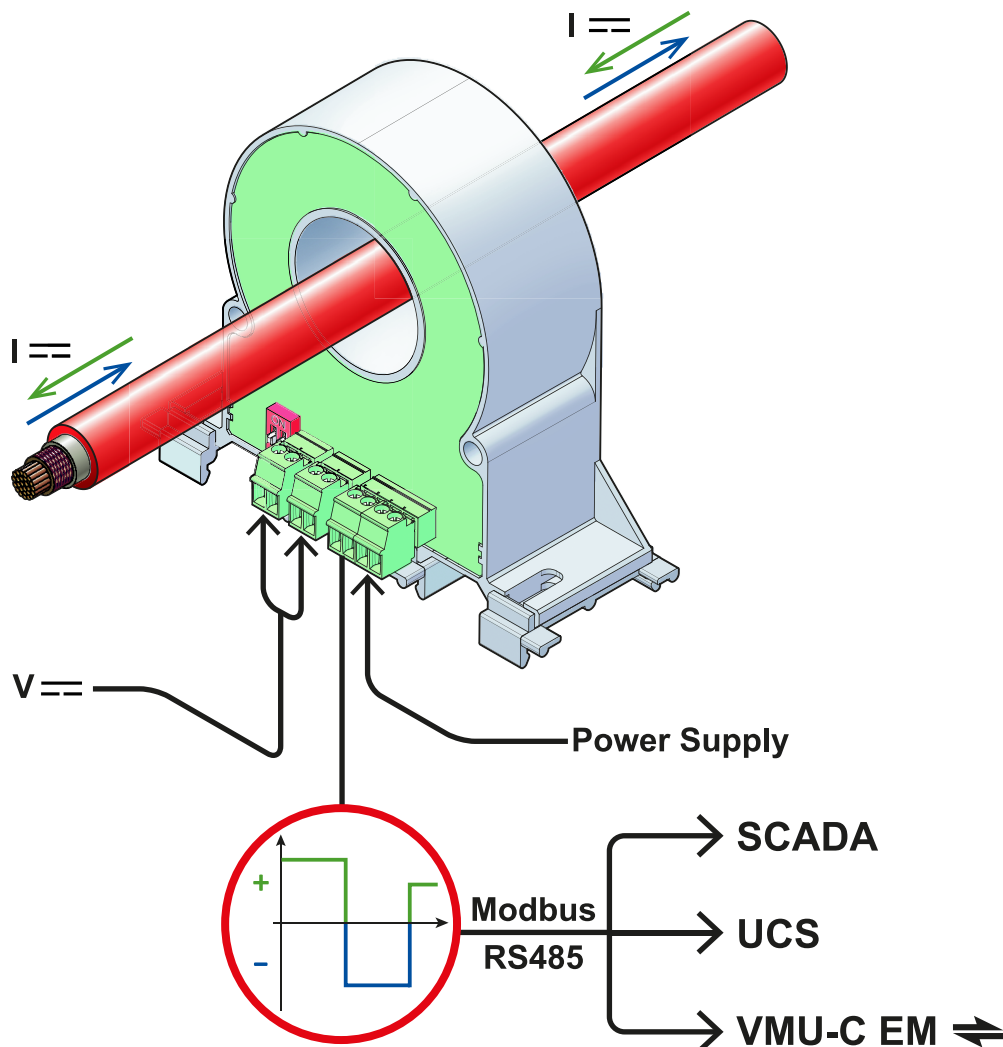
CPA system architecture for AC system



CPA operating principles for AC systems

CPA is a power analyzer, measuring current with contactless Hall effect sensing and voltage with shunt based technology. Power, power factor, energy, frequency and harmonic distortion (up to the 40th harmonic) are also measured by CPA with true RMS up to 400 Hz. The measured variables are available to the monitoring system connected through RS485, via Modbus/RTU communication. UCS (universal configuration software) installed onto a PC connected to CPA via RS485, allows to configure CPA (i.e. RS485 parameters) with ease and display measured variables in real time; configuration parameters are saved in both CPA's memory and UCS's database. UCS allows to create, edit and exchange configurations of both single CPA meters and complete networks of CPA units.

CPA system architecture for DC system



CPA operating principles for DC systems

CPA is a power analyzer, measuring DC current in both directions with contactless Hall effect sensing and DC voltage with shunt based technology. Power and energy are also measured by CPA. The measured variables are available to the monitoring system connected through RS485, via Modbus/RTU communication. UCS (universal configuration software) installed onto a PC connected to CPA via RS485, allows to configure CPA (i.e. RS485 parameters) with ease and display measured variables in real time; configuration parameters are saved in both CPA's memory and UCS's database. UCS allows to create, edit and exchange configurations of both single CPA meters and complete networks of CPA units.



Description

CPA050 is a power analyzer for DC or AC 1-phase applications.

With a maximum current of 50 A AC/A DC and maximum voltage range of 800 V AC/1000 V DC, it is the ideal solution for monitoring small photovoltaic installations, industrial processes, battery charging systems.

Main features

- True RMS AC (from 1 to 400 HZ) and DC monitoring
- Current sensing by Hall effect; range: 50 A AC/A DC
- Voltage range: 800 V AC/1000 V DC
- RS485 Modbus output variables: A, V, W, var, VA, kW, HZ, PF, THD
- 15 mm hole diameter
- DIN rail or panel, vertical or horizontal mounting

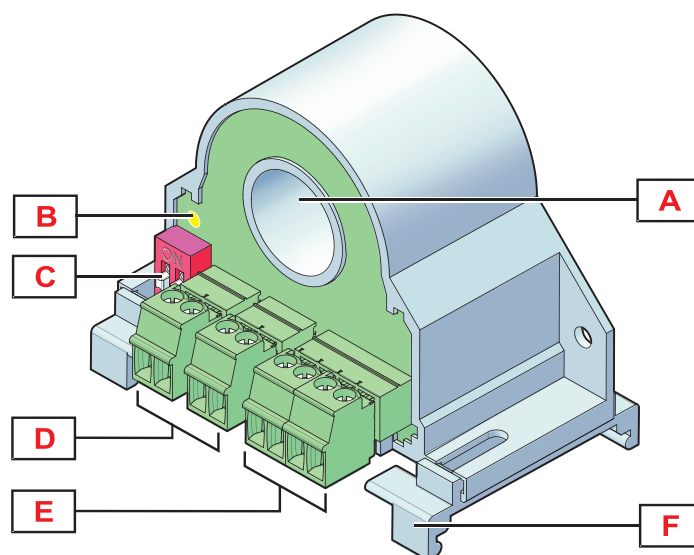
Main functions

- Compatible with UWP 3.0 and UWP 4.0
- Configurable by means of UCS (Universal Configuration Software) solution
- Hall effect sensing

Applications

CPA power analyzers are the ideal solution for those applications which are beyond standard AC monitoring. Given their capability of working both at different frequency ranges, they match the needs of DC applications (battery charging, photovoltaic monitoring), of AC applications with high crest factor (UPS, variable frequency drives) and standard 1-phase AC installations.

Structure

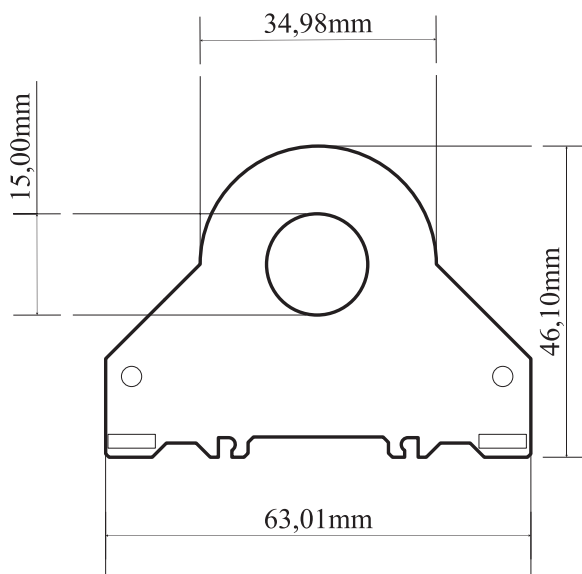


Area	Description
A	Hall sensor hole for current sensing
B	LED. Hidden: power off steady: power on blinking: data communication on
C	DIP switch for RS485 parameters set-up
D	Screw terminals for voltage input connection
E	Screw terminals for serial communication and power supply
F	Hooks for DIN rail mounting

Features

General

Material	PBT (Filling epoxy resin)
Assembly	Screw grooves for vertical or horizontal panel mounting. Clips included for vertical or horizontal DIN rail mounting.
Protection degree	IP20
Weight	80 g
Terminals	Detachable screw terminals. Section: 1.5mm ² max. (flexible). Torque: 0.2 Nm max.
Overvoltage category	Up to 600 V Cat. III Up to 1000 V Cat. II
Rejection (CMRR)	100 dB, 48 to 62 Hz



Environmental

Operating temperature	-15° to +65 °C (5° to 149 °F)
Storage temperature	-40° to +85 °C (-40° to +185 °F)
Relative humidity	< 90% non-condensing @ 40 °C (104 °F)



Power Supply

Power Supply	9-30 V DC
Consumption	< 1.3 W

Compatibility and conformity

Electromagnetic compatibility (EMC) - immunity	EN61000-6-2
Electromagnetic compatibility (EMC) - emissions	EN61000-6-4
Safety	EN61010-1
Approvals	 

Inputs

Current input	
System type	1-phase AC/DC
Rated current (I_n)	50 A AC/DC
Start-up current	0.5 A
Crest factor	1.8
Coupling type	Built-in Hall effect current sensor
Cable max. diameter	14 mm
Transformer ratio	1.0 default (customizable)

Voltage input	
System type	1-phase AC/DC
Rated current (U_n)	800 V AC 1000 V DC
Rated frequency	1-400 Hz or DC

Impedance	$\geq 1 \text{ M}\Omega \pm 1\%$
Transformer ratio	1.0 default (customizable)

Measurements

Variables	Available via RS485 Modbus: A, A max, A min, A peak, V, V max, V min, V peak, W, W min, W max, var, var min, var max, VA, VA min, VA max, Hz, PF, PF min, PF max, +/- kWh, THD A, THD A min, THD A max
Method	Selectable (TRMS or average value)
Sampling rate	11000 samples/s
Measurement refresh	Programmable via UCS Default: every 50 cycles (AC) or 1 second (DC)
Harmonic analysis	Up to the 40 th harmonic

Accuracy

Current	$< 0.5\% \text{ F.S.}$
Phase-neutral voltage	$< 0.5\% \text{ F.S.}$
Frequency	$\pm 0.1 \text{ Hz}$
Active power	$< 0.5\% \text{ F.S.}$
Reactive power	$< 1.5\% \text{ F.S.}$
Apparent power	From 0.1 I _n to I _n : $\pm 1\% \text{ rdg}$ From 0.05 I _n to 0.1 I _n : $\pm 2\% \text{ rdg}$
THD A	$\pm 1\%$

RS485

Communication type	Multidrop, bidirectional (static and dynamic variables)
Protocol	Modbus RTU
Address	1-247
Data	Dynamic: phase variables (only reading) Static: all configuration parameters (reading and writing)
Data format	1 start bit, 8 data bits, Parity (None/ Odd/ Even), 1 stop bit
Baud-rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Response delay	$\leq 1000 \text{ ms}$

 Insulation

Type	Voltage input	Current input (bare wire)	Power supply	RS485
Voltage input	-	3 kV	4 kV	4 kV
Current input (bare wire)	3 kV	-	3 kV	3 kV
Power supply	4 kV	3 kV	-	0 V
RS485	4 kV	3 kV	0 V	-

Connection diagrams

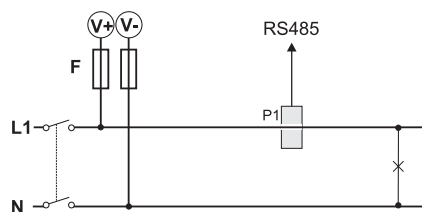


Fig. 1 AC input connection

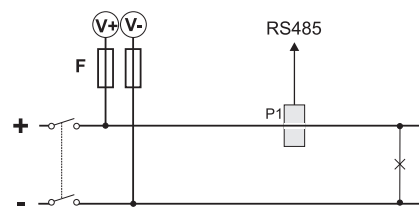


Fig. 2 DC input connection

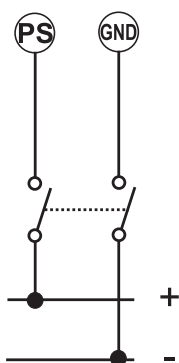


Fig. 3 Power supply

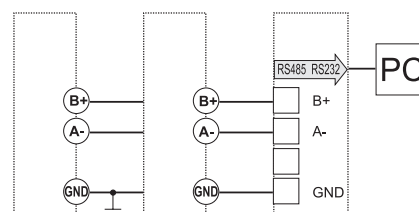


Fig. 4 RS485

Note for RS485:

the serial output must be terminated on the last network device by means of a terminating unit according to Modbus standard; check grounding arrangements specification on the official Modbus documentation for proper grounding connections.

Please check Multipoint System requirements at section 3.4 of the Modbus over serial line specification and implementation guide available at: <http://www.modbus.org/specs.php>

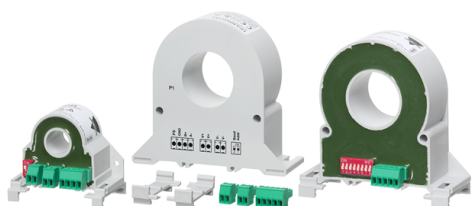
References

How to order

**CPA 050 1L S1 X**

Compatible devices

Purpose	Component	Documents
Monitoring gateway and controller	UWP 3.0	DATASHEET/ENG/UWP_3.0_DS_ENG.pdf
	UWP 4.0	DATASHEET/ENG/UWP_4.0_DS_ENG.pdf



Description

CPA300 is a power analyzer for DC or AC 1-phase applications. With a maximum current of 300 A AC/400 A DC and maximum installation voltage of 800 V AC/1000 V DC, it is the ideal solution for monitoring medium/ large PV installations, industrial processes, battery charging systems.

Main features

- True RMS AC (from 1 to 400 Hz) and DC monitoring
- Current sensing by Hall effect; range: 300 A AC/400 A DC
- Voltage range: 800 V AC/1000 V DC
- RS485 Modbus output; variables: A, V, W, var, VA, kW, Hz, PF, THD
- 33 mm hole diameter
- DIN rail or panel, vertical or horizontal mounting

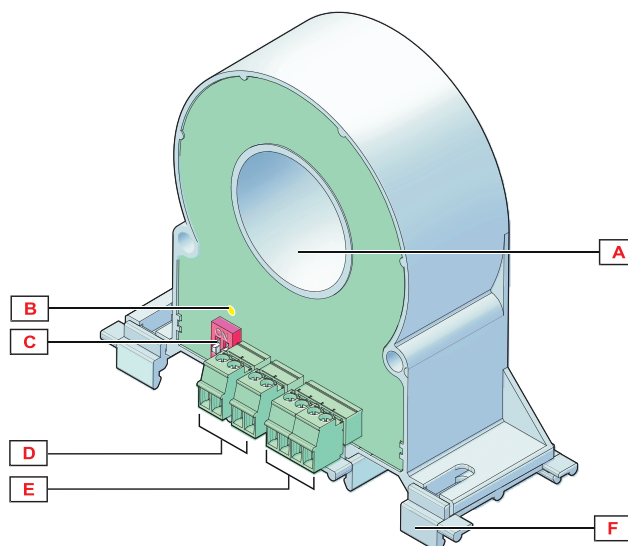
Main functions

- Compatible with UWP 3.0 and UWP 4.0
- Configurable by means of UCS (Universal Configuration Software) solution
- Hall effect sensing

Applications

CPA power analyzers are the ideal solution for those applications which are beyond standard AC monitoring. Given their capability of working both at different frequency ranges, they match the needs of DC applications (battery charging, photovoltaic monitoring), of AC applications with high crest factor (UPS, variable frequency drives) and standard 1-phase AC installations.

Structure

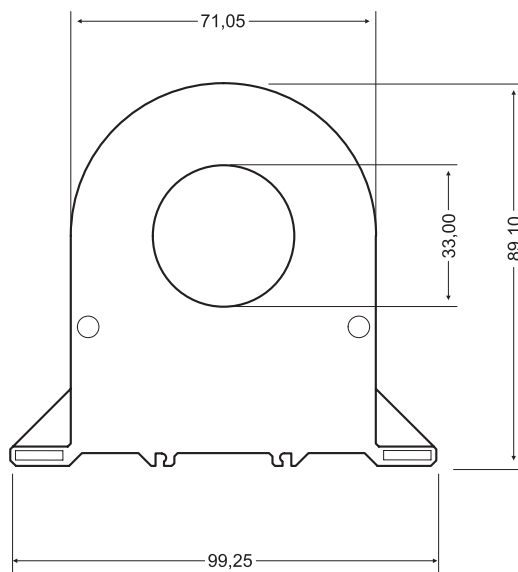


Area	Description
A	Hall sensor hole for current sensing
B	LED. Hidden: power off steady: power on blinking: data communication on
C	DIP switch for RS485 parameters set-up
D	Screw terminals for voltage input connection
E	Screw terminals for serial communication and power supply
F	Hooks for DIN rail mounting

Features

General

Material	PBT (Filling epoxy resin)
Assembly	Screw grooves for vertical or horizontal panel mounting. Clips included for vertical or horizontal DIN rail mounting.
Protection degree	IP20
Weight	370 g
Terminals	Detachable screw terminals. Section: 1.5mm ² max. (flexible). Torque: 0.2 Nm max.
Overvoltage category	Up to 600 V Cat. III Up to 1000 V Cat. II
Rejection (CMRR)	100 dB, 48 to 62 Hz



Environmental

Operating temperature	-15° to +65 °C (5° to 149 °F)
Storage temperature	-40° to +85 °C (-40° to +185 °F)
Relative humidity	< 90% non-condensing @ 40 °C (104 °F)



Power Supply

Power Supply	9-30 V DC
Consumption	≤ 1.3 W

Compatibility and conformity

Electromagnetic compatibility (EMC) - immunity	EN61000-6-2
Electromagnetic compatibility (EMC) - emissions	EN61000-6-4
Safety	EN61010-1
Approvals	 

Inputs

Current input	
System type	1-phase AC/DC
Rated current (I _n)	300 A AC/400 A DC
Start-up current	3 A
Crest factor	1.4
Coupling type	Built-in Hall effect current sensor
Cable max diameter	32 mm
Transformer ratio	1.0 default (customizable)

Voltage input	
System type	1-phase AC/DC
Rated current (U _n)	800 V AC 1000 V DC
Rated frequency	1-400 Hz or DC
Impedance	≥ 1 MΩ ±1%
Transformer ratio	1.0 default (customizable)

Measurements

Variables	Available via RS485 Modbus: A, A max, A min, A peak, V, V max, V min, V peak, W, W min, W max, var, var min, var max, VA, VA min, VA max, Hz, PF, PF min, PF max, +/- kWh, THD A, THD A min, THD A max
Method	Selectable (True RMS or DC measurements)
Sampling rate	11000 samples/s
Measurement refresh	Programmable via UCS Default: every 50 cycles (AC) or 1 second (DC)
Harmonic analysis	Up to the 40 th harmonic

Accuracy

Current	< 0.5% F.S.
Phase-neutral voltage	< 0.5% F.S.
Frequency	+/- 0.1 Hz
Active power	< 0.5% F.S.
Reactive power	< 1.5% F.S.
Apparent power	From 0.1 I _n to I _n : +/- 1% rdg From 0.05 I _n to 0.1 I _n : +/- 2% rdg
THD A	+/- 1%

RS485

Communication type	Multidrop, bidirectional (static and dynamic variables)
Protocol	Modbus RTU
Address	1-247
Data	Dynamic: System and phase variables (only reading) Static: all configuration parameters (reading and writing)
Data format	1 start bit, 8 data bits, Parity (None/ Odd/ Even), 1 stop bit
Baud-rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Response delay	≤ 1000 ms

 Insulation

Type	Voltage input	Current input (bare wire)	Power supply	RS485
Voltage input	-	3 kV	4 kV	4 kV
Current input (bare wire)	3 kV	-	3 kV	3 kV
Power supply	4 kV	3 kV	-	0 V
RS485	4 kV	3 kV	0 V	-

Connection diagrams

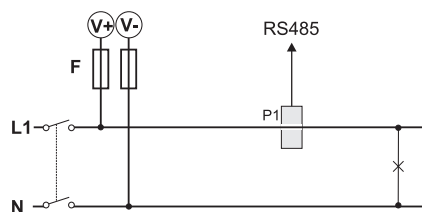


Fig. 5 AC input connection

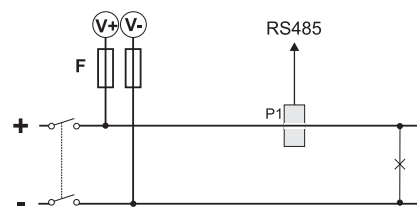


Fig. 6 DC input connection

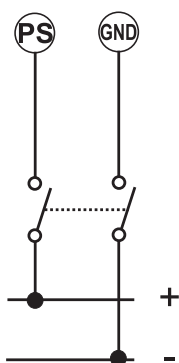


Fig. 7 Power supply

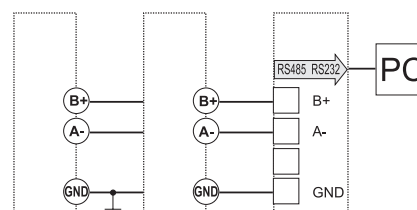


Fig. 8 RS485

Note for RS485:

the serial output must be terminated on the last network device by means of a terminating unit according to Modbus standard; check grounding arrangements specification on the official Modbus documentation for proper grounding connections.

Please check Multipoint System requirements at section 3.4 of the Modbus over serial line specification and implementation guide available at: <http://www.modbus.org/specs.php>

References

How to order

**CPA 300 1L S1 X**

Compatible devices

Purpose	Component	Documents
Monitoring gateway and controller	UWP 3.0	DATASHEET/ENG/UWP_3.0_DS_ENG.pdf
	UWP 4.0	DATASHEET/ENG/UWP_4.0_DS_ENG.pdf



Description

CPA300V is a current transducer for DC or AC 1-phase applications.

With a maximum current of 300 A AC/400 A DC and maximum installation voltage of 800 V AC/1500 V DC, it is the ideal solution for monitoring medium/large PV installations, industrial processes, battery charging systems.

Applications

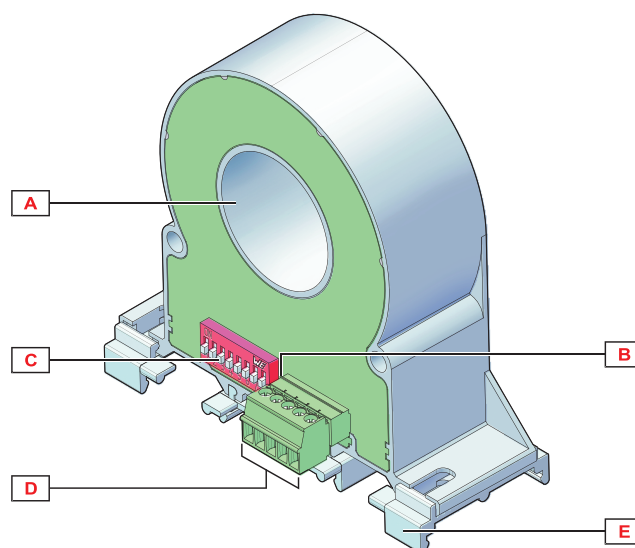
CPA-300V is the ideal solution for those applications in which current only monitoring is required. Thanks to its high current range, its contactless Hall effect sensing and the maximum system voltage of 1500 V DC, it fits perfectly the needs of medium to large size photovoltaic plant monitoring, where ease of installation and operation are mandatory requirements.

Main features

- True RMS AC (from 1 to 400 Hz) and DC monitoring
- Current sensing by Hall effect; range: 300 A AC/400 A DC
- Maximum installation voltage: 800 V AC/1500 V DC
- 0 - 10 V DC analogue output
- RS485 Modbus output; variables: Amax, Amin, Ah
- 33 mm hole diameter
- DIN rail or panel, vertical or horizontal mounting

Main functions

- Compatible with UWP 3.0 and UWP 4.0
- Configurable by means of UCS (Universal Configuration Software) solution
- Hall effect sensing

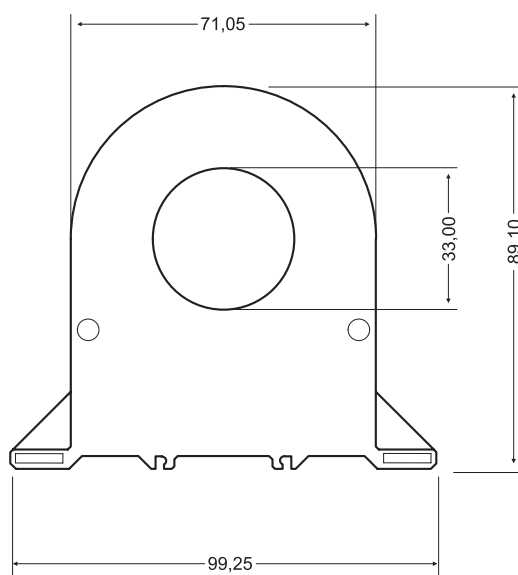
Structure

Area	Description
A	Hall sensor hole for current sensing
B	LED. Hidden: power off steady: power on blinking: data communication on
C	DIP switch for RS485 parameters set-up
D	Screw terminals for serial communication, analogue output and power supply
E	Hooks for DIN rail mounting

Features

General

Material	PBT (Filling epoxy resin)
Assembly	Screw grooves for vertical or horizontal panel mounting. Clips included for vertical or horizontal DIN rail mounting.
Protection degree	IP20
Weight	370 g
Terminals	Detachable screw terminals. Section: 1.5mm ² max. (flexible). Torque: 0.2 Nm max.
Rejection (CMRR)	100 dB, 48 to 62 Hz



Environmental

Operating temperature	-15° to +65 °C (5° to 149 °F)
Storage temperature	-40° to +85 °C (-40° to +185 °F)
Relative humidity	< 90% non-condensing @ 40 °C (104 °F)

Power Supply

Power Supply	12-30 V DC
Consumption	< 22 mA

Compatibility and conformity

Electromagnetic compatibility (EMC) - immunity	Reference: EN61000-6-2 Electrostatic discharges: EN61000-4-2: 8kV air discharge, 4 kV contact Immunity to irradiated electromagnetic fields EN61000-4-3: 10 V/m from 80 to 10000 MHz Immunity to Burst EN61000-4-4: 2 kV on power main supply Immunity to conducted disturbances: EN61000-4-6: 10 V from 150 KHZ to 80 MHZ Surge: EN61000-4-5: 500 V DC on main supply.
Electromagnetic compatibility (EMC) - emissions	Radio frequency suppression: EN 61000-6-3 (07) + A1(11)
Standard compliance	EN61000-6-4/2006+A1 2011 EN64000-6-2/2005; EN61010-1/2010
Approvals	 

Inputs

Current input	
System type	1-phase AC/DC
Rated current (In)	Selectable by DIP switch: 300 A AC/400 A DC or 150 A AC/ A DC
Start-up current	3 A
Crest factor	1.4
Coupling type	Built-in Hall effect current sensor
Cable max diameter	32 mm
Transformer ratio	1.0 default (NON-modifiable value)

Outputs

Analogue output	
Number of outputs	1
Type	0-10 V DC
Scaling factor	Programmable via serial communication
Load	$\geq 1 \text{ k}\Omega$
Response delay	Filter +200 ms

Measurements

Variables	Available via RS485 Modbus: A, A max, A min, Ah
Method	Selectable (True RMS or DC measurements)
Sampling rate	11000 samples/s
Measurement refresh	0.1 s

Accuracy

Current	< 0.5% F.S.
----------------	-------------

RS485

Communication type	Multidrop, bidirectional (static and dynamic variables)
Protocol	Modbus RTU
Address	1-247
Data	Dynamic: System and phase variables (only reading) Static: all configuration parameters (reading and writing)
Data format	1 start bit, 8 data bits, Parity (None/ Odd/ Even), 1 stop bit
Baud-rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Response delay	1-1000 ms

Insulation

Type	Current input (bare wire)	Power supply	RS485	Analogue output
Current input (bare wire)	-	3 kV	3 kV	3 kV
Power supply	3 kV	-	0 V	0 V
RS485	3 kV	0 V	-	0 V
Analogue output	3 kV	0 V	0 V	-



Connection diagrams

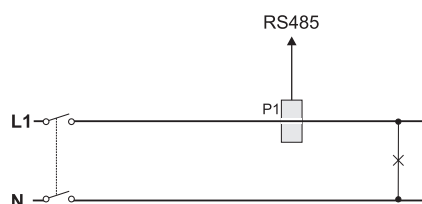


Fig. 9 AC input connection

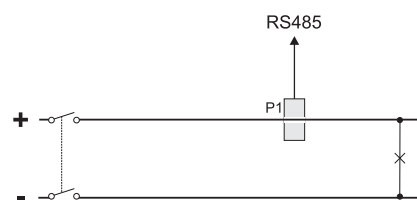


Fig. 10 DC input connection

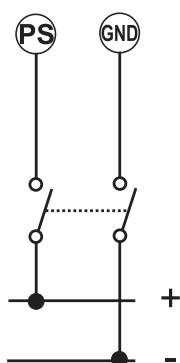


Fig. 11 Power supply

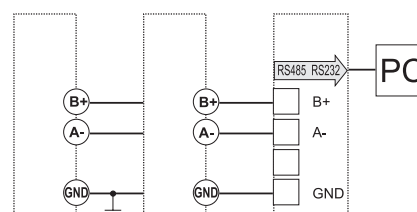


Fig. 12 RS485

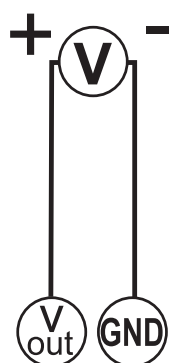


Fig. 13 Analogue output

Note for RS485:

Please check Multipoint System requirements at section 3.4 of the Modbus over serial line specification and implementation guide available at: <http://www.modbus.org/specs.php>

References

How to order

**CPA 300 1L S1 V**

Compatible devices

Purpose	Component	Documents
Monitoring gateway and controller	UWP 3.0	DATASHEET/ENG/UWP_3.0_DS_ENG.pdf
	UWP 4.0	DATASHEET/ENG/UWP_4.0_DS_ENG.pdf



COPYRIGHT ©2024

Content subject to change. Download the PDF: www.gavazziautomation.com