HYBRID COMPACT

All-in-one PV/wind inverters control

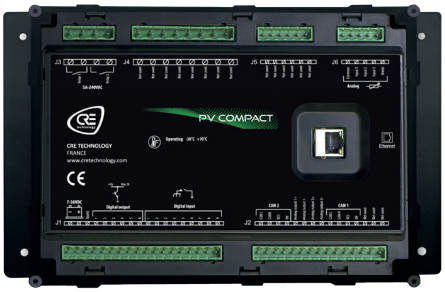
HYBRID COMPACT is one controller of a complete range for energy sources and power plant management: generators, mains, PV/wind, batteries storage, tie breakers. It controls PV/wind inverters in applications paralleled with one or several generators and one or several batteries inverters. This type of power plant can operate on-grid or off-grid. HYBRID COMPACT offers flexibility and time saving thanks to its simple wiring and easy programming.

Hardware display

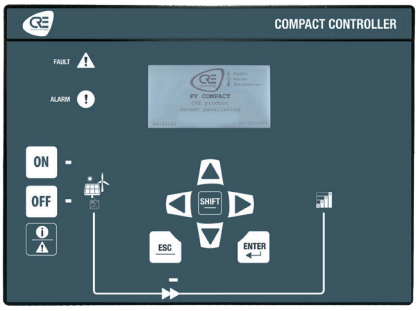
The controller is available in both switchboard panel mounted version with display, or core base mounted version and compatible with i4Gen touchscreen color display range.

Software

The controller is configurable from its front panel display, from i4Gen HMI, or through the free i4Gen Suite software.



CORE BASE DIN RAIL MOUNTED VERSION



SWITCHBOARD MOUNTED VERSION WITH DISPLAY

Part numbers:

A56-PV-00 Switchboard mounted version with display

A56-PV-10 Core base mounted version

KEY FEATURES

Single line power plant overview
An interactive and adaptative single-line diagram is generated automatically from the configuration. It provides a global view of the power plant and the possibility to switch between controllers in one click.

Easy connection to controllers
Automatic detection of controllers on the Ethernet network for fast and easy connection.

Compatibility with generator and grid controllers
Compability with PRIME, BAT, MASTER 1B and BTB controllers of the COMPACT range to manage complete hybrid power plants.

Compatibility with all inverters on the market
Modbus TCP or RTU (with adapter) communication with all inverters on the market:
- Plug and play connection with Sunspec inverters
- Compatibility with non Sunspec thanks to custom Modbus TCP mapping.

Control of the PV/wind KVAR reactive power
either by imposing a configurable fixed power factor, or by sharing the kVAR between the PV/wind energy and the other sources.

PV/Wind power limitation
So as to keep a minimum power on the generator(s).

Immediate stop of the PV/wind production in case of reverse power on the generator(s)
So as to keep the installation energy supplied.

Voltage and current measurement inputs
For redundant acquisition of electrical measurements and faster than communication with the inverter.

Enchanced graphical display
Important information are displayed on easy-to-read graphical widgets: numerical values, bar graphs, gauges, curves, animated synchroscope….

User friendly equations programming
Easily program your own equations using the drag & drop Easyflex feature.

Remote access (optional)
- Supervise, configure and control your power plant from anywhere through a reliable and secured remote communication provided by Zoho Assist
- Receive E-mails from i4Gen when an event, an alarm or a fault is triggered.

On-board modbus TCP client and server for integration with other devices
- Client (master): create custom frames in reception or transmission to read or write datas
- Server (slave): allow other devices to read/write the controller registers (with 300 registers available for custom mapping).

Automatic versions update
Automatic update of controller firmware and PC software versions.

OTHER FEATURES

Power control and management

- Datas shared between the controllers through CANbus for optimised control of the power plant: load sharing, clock synchronization, generator start/stop, sharing of electrical measures…
- Management of complex power plants with multiple generators, grids, BESS, PV/wind systems, tie breakers (up to 40 of them in one power plant).
- Allow to control a single PV/wind inverter, or several inverters through the proprietary inverter centralizing device.
- PV/Wind electrical protections.
- PV/Wind & Inverter temperatures (through PT100 analog input) display and protections.
- Manual control (CLOSE/OPEN) of the PV/Wind production relay.
- On loss of communication with the inverter, either:
  - Opening the PV/wind production relay
  - Switching the generators in droop mode to ensure operation despite the lack of communication between HYBRID COMPACT & the inverter. As soon as communication returns, the droop is disactivated to return to isochronous mode
- Two operating modes available:
  - ECO: possibility to stop all the generators and charge/discharge the batteries according to the sun
  - STORAGE: one generator, at least, always started and the batteries always fully charged

Displayed information

- Alarms and events logging: Detailed history log with timestamps of the 500 last events, alarms and faults for easy and fast troubleshooting.
- Acquisition and display of the inverter's electrical measures.
- Inputs/Outputs status.

Programming

- Scheduler: Periodic or one-off execution of specific functions and modes can be scheduled.
- Alternative parameters values configurable and switchable using digital inputs or through modbus TCP.

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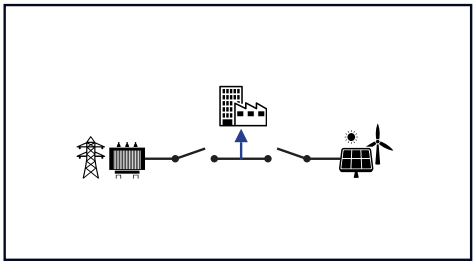
APPLICATION EXAMPLES

ON GRID PV/WIND APPLICATION



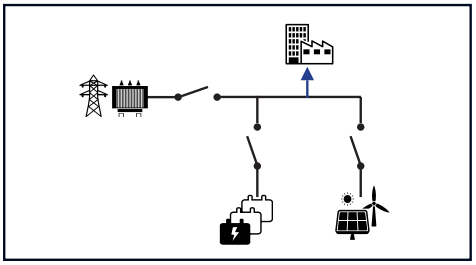
FEATURES

- Mains kW export/import control
- Mains kW cost reduction

PRODUCTS REQUIRED

- **1 HYBRID COMPACT**
- **1 MASTER COMPACT 1B**

ON GRID RENEWABLE APPLICATION



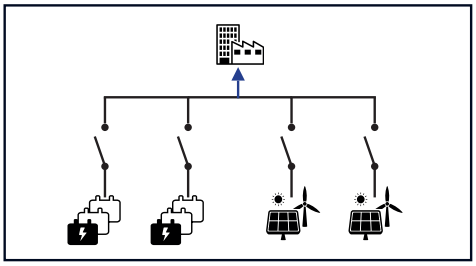
FEATURES

- Mains kW export/import control
- Mains kW cost reduction
- Backup energy in case of mains failure

PRODUCTS REQUIRED

- **1 HYBRID COMPACT + 1 BAT COMPACT**
- **1 MASTER COMPACT 1B**

OFFGRID RENEWABLE APPLICATION



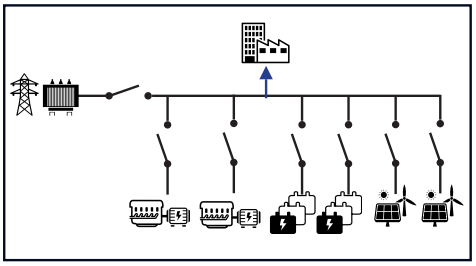
FEATURES

- Batteries as grid forming
- Photovoltaic as grid forming
- Isochronous mode
- PV/Wind limitation to respect batteries charge current

PRODUCTS REQUIRED

- **2 HYBRID COMPACT + 2 BAT COMPACT**

HYBRID APPLICATION WITH GENSETS, PV/WIND SYSTEMS AND BESS



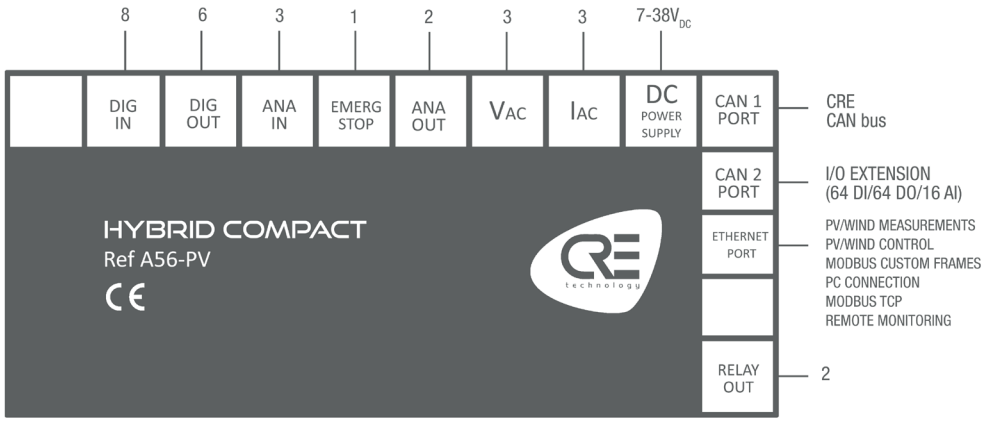
FEATURES

- Start/Stop control
- Genset mechanical & electrical protections
- Breakers management
- Synchronization
- Generator load sharing
- Mains power management
- Load shedding
- Mains paralleling
- Communication ModBus & Spec
- Control PV/wind & battery inverter
- Control of the reactive power kVAR batteries & PV

PRODUCTS REQUIRED

- **2 GENSYS COMPACT PRIME**
- **1 MASTER COMPACT 1B**
- **2 HYBRID COMPACT + 2 BAT COMPACT**

WIRING DIAGRAM



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SPECIFICATIONS

ELECTRICAL SYSTEM	
Electrical system	Compatible with 3 or 4 wires three-phase, or two-phase or single phase systems
DC POWER SUPPLY	
Power supply range	7...38 VDC
Maximum voltage	45 VDC during 15mn
Current consumption (at 24 VDC)	130 mA + the sum of maximum consumption of each digital ouput
AC VOLTAGE MEASUREMENT	
Inverter measurement inputs	3ph + N (Neutral optional)
Generators measurement inputs	3ph + N (Neutral optional)
Measurement range	80...500VAC
Current consumption	100 mA max
Accuracy	1%
Frequency range	35...75 Hz, 15VAC minimum between phase and neutral
AC CURRENT MEASUREMENT	
Inverter measurement inputs	4 wires (3ph)
Measurement range	0...5A; 1VA
Overload	Overload 15A during 10s
Accuracy	0.5%
INPUTS	
Digital inputs	9 : NO or NC to ground. Adjustable timer On and Off
Digital inputs expansion	64 : via CANopen
Analog inputs	3 : Resistive (0...500Ω) or 0...20mA (with external resistor). Could be used as digital input. Library of sensors available. Configuration curve with up to 31 points
Analog inputs expansion	16 : via CANopen (0-20mA, 0-10VDC, PT100, Thermocouple, …)
OUTPUTS	
Digital outputs	6 : NE or ND. 1.8A, over-current protected. Adjustable timer.
Digital outputs expansion	64 : via CANopen
Relay outputs (breaker control)	2 : 5A, 240VAC
Analog outputs	2 : +/-10VDC: isolated output with adjustable gain and offset
COMMUNICATION PORTS	
CAN	2 isolated port: - CAN 1: CRE protocol for communication between all COMPACT controllers - CAN 2: I/O extensions
Ethernet	Isolated port: PC communication/ModBus TCP
ENVIRONMENT	
Operating temperature	-30...70°C (-22...158°F)
Storage temperature	-40...70°C (-40...158°F)
Humidity	95% non-condensing
Altitude	Up to 4000m for 480VAC. Up to 5000m for 400VAC
IP Front	IP65/NEMA rating 4 for HMI version IP20/NEMA rating 1 for core version
IP Rear	IP20/NEMA rating 1
DIRECTIVES	
EMC Directive 2014/30/UE - EMC General Requirements EN 61326-1	Immunity according with EN 61000-6-2 and Emission according with EN 61000-6-4
Electrical Safety Directive 2014/35/UE	According with EN 60950-1
Vibrations and shocks	According with EN(IEC) 60068-2-6 and IEC 60068-2-27
Temperature	EN (IEC) 60068-2-30; EN (IEC) 60068-2-1; EN (IEC) 60068-2-2; EN 60068-2-78
DIMENSIONS - SWITCHBOARD MOUNTED VERSION WITH DISPLAY	
Overall (W x H x D)	245 x 182 x 40mm (9.64 x 7.16 x 1.57in)
Panel cut out (W x H)	220 x 160mm (8.7 x 6.3in)
DIMENSIONS - CORE BASED MOUNTED VERSION	
Overall (W x H x D)	260 x 157 x 44mm (10.24 x 6.18 x 1.73in) (depth with connectors)
Fixing dimensions (W x H)	238 x 129mm (9.37 x 5.08in) (4 screws)
Fixing hole	Ø5.24mm (0.21in)
Mounting	DIN rail
WEIGHT	
Controller	0.7kg (1.54lb)
LCD DISPLAY CHARACTERISTICS	
Size	40x70mm (1.50x2.75in)
Pixels	1024x512. Back light: 50cd/m² typical, configurable
Contrast	Configurable
LANGUAGES	
Supported languages	English, French, Spanish in standard. Italian, Portuguese, Russian, German and other custom languages are available on request

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PROTECTIONS

INVERTER ELECTRICAL PROTECTIONS

DESCRIPTION	ANSI CODE
Under frequency	81L
Over frequency	81H
Under voltage	27
Over voltage	59
Unbalance voltage	47
Over current	50
Over current IDMTL (Inverse Definite Minimum Time Lag)	51
Unbalance current	46
Minimum active power	37P
Maximum active power	32P
Minimum reactive power	37Q
Maximum reactive power	32Q

GENERATORS ELECTRICAL PROTECTIONS

DESCRIPTION	ANSI CODE
Reverse active power	32RP
Reverse reactive power	32RQ

RELATED PRODUCTS

CONTROLLERS	
A56-PRIME	GENSYS COMPACT PRIME
A56-MAS1B	MASTER COMPACT 1B
A56-BTB	BTB COMPACT
A56-BAT	BAT COMPACT
ADDITIONAL INPUTS/OUTPUTS	
BK5150	CANopen bus coupler
KL9010	End connection terminal
KL1488	8 digital inputs - 0 VDC
KL1889	16 digital inputs - 0 VDC
KL2408	8 digital outputs - 24VDC 0.5A
KL2809	16 digital outputs - 24VDC 0.5A
KL3044	4 analog inputs (0-20mA)
REMOTE DISPLAYS	
A60P0	RDM 1.0 alarm reporting module
A56VXX	i4Gen Touchscreen color display range
BATTERY CHARGERS	
BPXX	3A, 5A, 10A, 20A, 40A. 12VDC, 24VDC

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