Pedagogical Program

Pack Hybrid Only

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1. Introduction

The Hybrid Only pack is a short, focused learning path dedicated exclusively to hybrid power plants integrating photovoltaics and battery storage.

It is aimed at professionals who are already comfortable with conventional generator-based installations and who want to upskill specifically on the hybrid dimension: architectures, HYBRID Compact and BAT Compact controllers, communication with inverters and power flow management.

The training takes place at our center in Sophia Antipolis and combines theory, demonstrations and direct hands-on exercises on the training power plant with real sources (generator sets, PV, battery, grid).

Sessions are delivered in French and English. Spanish sessions can be organized depending on availability.

2. General objective of the training

The Hybrid Only pack (2 days) allows you to quickly upskill on CRE hybrid power plants: choosing the right architecture (grid-forming / grid-following), getting started with HYBRID Compact and BAT Compact controllers, Modbus communication with inverters, commissioning PV + generator + storage scenarios, and diagnosing the degraded situations specific to hybrid systems.

3. Educational objectives

At the end of this pack, you will know how to:

1. Identify the specifics of a hybrid power plant compared to a conventional installation: role of the inverter, grid-forming / grid-following operation, inertia and stability constraints
2. Select the grid-forming source based on the installation context: priority rules (the grid is always grid-forming when present, GE and batteries can never be grid-forming simultaneously), and implications for plant stability
3. Identify the controllers and protocols of the CRE hybrid range: Master Compact 1B as the mains arrival controller (which also coordinates the power limitation sent to PV inverters in a hybrid context), HYBRID Compact to drive PV inverters, BAT Compact to drive battery inverters, Modbus TCP / SunSpec communication
4. Design a hybrid architecture by choosing the priority sources and the control logic among the typical scenarios: gen + PV, gen + PV + grid, gen + PV + grid + battery
5. Configure a Master Compact 1B and adjust the GENSYS Compact Prime parameters in a hybrid context: active power limits (export [2162], import [2160]), peak shaving / base load setpoints, power factor setpoint modes
6. Commission an export limitation and an automatic generator start/stop logic based on renewable production

7. Set up a PV inverter or a battery inverter via Modbus: active and reactive setpoints, status reading, communication fault handling
8. Integrate a battery storage system into the plant: role of storage in stability, state-of-charge, charge/discharge sequences
9. Read and interpret active and reactive power flows between sources (generator sets, PV, battery, grid) on the training power plant
10. Diagnose degraded situations specific to hybrid systems: loss of PV, grid outage, empty battery, inverter communication fault — and apply the appropriate corrective actions

These objectives are assessed by means of multiple-choice questions at the beginning and end of the training, as well as by observation of the practical exercises carried out during the training.

4. Target audience

Technicians, engineers and technical managers already familiar with conventional CRE generator-based installations, who specifically want to acquire the skills related to PV + battery hybrid architectures.

5. Prerequisites

- Mastery of generator set fundamentals: electricity production (engine + alternator), speed and voltage regulation, PID notions (P, I, D), synchronization conditions (voltage, frequency, phase, phase rotation).
- Hands-on knowledge of generator coupling: dynamic vs dead-bus coupling, droop, parallel CT (T.I. droop), active and reactive load sharing between machines.
- Familiarity with a conventional CRE installation: MAN / AUTO / TEST modes, grid backup (AMF), permanent grid coupling, mains-loss and mains-return sequences.
- Prior experience with a Compact range controller (AMF Compact, GENSYS Compact Prime or Mains) and with the i4Gen Suite 2 software: Ethernet connection, menu navigation, reading measurements and alarms.
- Notions of electrical protections (under-voltage, over-voltage, under-frequency, over-frequency — ANSI codes 27/59/81) and of automatic start/stop threshold parameter setting based on load.
- Familiarity with a Windows environment and basic IP networking (configuring a network card, IP address, subnet mask).
- If these basics are not in place, the 4-day Hybrid pack — which includes two days dedicated to generator set fundamentals and conventional commissioning — is a better fit. The Hybrid Only pack only briefly recaps these notions on Wednesday morning before moving on to hybrid topics.

6. Access requirements for training

Registration for the training course is done via the CRE Technology website.

Practical information regarding the sessions (dates, duration, location and content) will be provided to you before the start of the training.

7. Organization of the training

The Hybrid Only pack runs over 2 consecutive days (Wednesday and Thursday), as a complement or in parallel with other learning paths. Wednesday is dedicated to the theoretical and practical discovery of hybrid power plants; Thursday to their complete commissioning and to the diagnosis of degraded situations (loss of PV, grid outage, empty battery).

8. Educational and technical resources

Theoretical course materials and technical documentation.
CRE software tools dedicated to configuration, monitoring and programming.
Simulation benches and training center representative of field installations.
Practical exercises and case studies based on real-life situations.
Training provided by expert trainers on CRE solutions.

9. Detailed educational program

Wednesday – Discovering hybrid power plants

Theory: What changes when you integrate photovoltaics and battery storage into your power plant. The role of the inverter, the difference between grid-forming (the inverter creates the grid) and grid-following (the inverter follows the grid). Common hybrid architectures and the stability constraints to be aware of.

Practical: Introduction to hybrid controllers – HYBRID Compact for photovoltaics, BAT Compact for batteries. Communication with inverters via Modbus. On the training power station: live observation of power flows between generators, PV, battery and grid.

You will leave knowing how to:

- Explain the specific characteristics of a hybrid power plant compared to a conventional one
- Identify the controllers and protocols required for a hybrid architecture
- Read and interpret the power flows between your different sources

Thursday – Commissioning and operation of a hybrid power plant

Theory: Advanced configuration of hybrid controllers: limitation of injected power, battery storage management, starting and stopping of groups according to renewable production.

Practical: Commissioning of complete hybrid scenarios on the training power plant: generator + photovoltaic system in an off-grid location, addition of grid connection with export limitations, integration of battery storage. Then simulation of degraded situations – loss of PV, grid outage, empty battery – to learn how to react.

You will leave knowing how to:

- Configure and commission a hybrid power plant
- Analyze the system's behavior in normal and degraded operating conditions
- Diagnose and resolve faults specific to hybrid systems

10. Accessibility and consideration of special situations

CRE Technology strives to facilitate access to training for people with disabilities or specific needs.

You are invited to report any particular situation prior to the training in order to study the possibilities of adapting the teaching and organizational methods.

11. Conclusion

At the end of the Hybrid Only pack, you are autonomous on the configuration, commissioning and diagnosis of a CRE hybrid power plant combining generator sets, photovoltaics and battery storage.

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