



General pedagogical program

Compact – Hybrid – Programming



Document index	Comments	Date of update	Author
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1. Introduction

Our team of expert instructors guides participants through a technical and practical training program delivered at our training center in Sophia Antipolis.

This training is designed to provide a complete and progressive view of CRE solutions, from the fundamentals to advanced functions, by combining theoretical input, demonstrations and practical exercises on simulation benches and a training center.

A large emphasis is placed on practical application in order to ensure the acquisition of operational skills directly applicable in the field, in the context of commissioning, operation and diagnosis.

Training courses are offered in French and English. Sessions in Spanish can be organized depending on availability.

2. General objective of the training

To enable participants to acquire a comprehensive and operational mastery of CRE solutions, including the configuration, commissioning, operation, diagnosis and advanced programming of conventional and hybrid energy production systems.

3. Educational objectives

Upon completion of the training, participants will be able to:

Explain the fundamental operating principles of generator sets and associated power generation systems.

Identify the architectures, application scenarios and operating modes of CRE solutions, including conventional and hybrid systems.

Configure and set up CRE controllers using dedicated software tools, while respecting operating constraints.

Commissioning single-source, multi-source and hybrid installations on simulation benches and training center.

Analyze the behavior of installations in normal operation and in degraded situations using monitoring and diagnostic tools.

Diagnose common malfunctions and propose appropriate corrective actions.

Program advanced functions using the Easy Flex® language, a programming language integrated into CRE controllers, including variables, conditions and specific functions.

Apply the knowledge acquired through practical exercises and concrete cases representative of field situations.

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 involved in the design, commissioning, operation or maintenance of installations incorporating CRE controllers (generator sets, hybrid systems and supervision).

5. Prerequisites

Basic knowledge of generator sets and electrical power generation systems.

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) is communicated to participants before the start of the training.

7. Organization of the training

The training courses are offered in the form of training packages corresponding to different learning paths.

The following packages are available:

Full Pack – 5 days

Monday + Tuesday + Wednesday + Thursday + Friday

Comprehensive training covering conventional systems, hybrid systems and programming.

Hybrid Pack – 4 days

Monday + Tuesday + Wednesday + Thursday

Training covering conventional systems and an introduction to hybrid systems.

Pack Hybrid Only – 2 jours

Wednesday + Thursday

Training dedicated to hybrid systems.

GE Pack – 2 days

Monday + Tuesday

Training dedicated to generator sets and conventional systems.

GE Pack + Programming – 3 days
Monday + Tuesday + Friday
Training covering generator sets and advanced programming.

8. Educational and technical resources

Theoretical course materials and technical documentation
CRE software tools dedicated to configuration, monitoring and programming
Simulation benches and a 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

Monday – Day 1: Fundamentals and getting started with CRE generator set control solutions

Fundamentals of generator sets

Basic principles of generator sets – Review of electricity production and energy conversion – Speed and voltage regulation – Introduction to control loops – PID concepts (parameters influencing the speed and stability of regulation) – Synchronization between two sources – Coupling conditions – Parallel connection of generator sets – Load balancing between generator sets – Load balancing between generator sets and the grid

Applications et architectures CRE

Applications and possible configurations of CRE controllers – Overview of the different controller ranges – Single-source architectures – Multi-source architectures – Backup grid operation – Generator/grid interaction – Priority and safety logic for installations

Getting to grips with the products and tools

MAN / AUTO / TEST operating modes – Front panel and control overview – Operator menu navigation – System status and information readings – Alarm and fault pages – Alarm acknowledgment and reset – History and counter viewing – Installation information pages

Software environment

Introduction to i4Gen Suite, PC software for configuring and monitoring controllers – Software installation and updates – Differences between versions – Connecting a PC to the controller – Automatic equipment detection – Communication principles (Ethernet, CAN bus (internal communication network between devices)) – Introduction to the i4Gen Box, a module enabling remote monitoring and access to installations – Connectivity and messaging functions – Secure remote access – Support and diagnostic tools

Objectives covered: Explain the fundamental principles – Identify the architectures and modes of operation

Tuesday – Day 2: Advanced configuration and commissioning (conventional solutions)

Configuration via CRE software tools

Advanced navigation in configuration menus – Organization and prioritization of parameters – Automatic controller detection – Application association – Configuration of generator set characteristics (power, voltages, frequency) – Network configuration – Communication bus configuration – Management of automatic generator start and stop thresholds based on load level – Activation and verification of functions

Regulation and synchronization

Adjusting speed and voltage parameters – Dynamic configuration of regulators – Using graphical tools for adjustment with curve visualization – Adjusting parameters influencing stability – Synchronization in voltage, frequency and phase – Active and reactive power distribution – Managing automatic start and stop according to load – Managing energy exchanges with the grid (import/export)

Inputs, outputs, and protections

Configuration of digital and analog inputs – Setting of trigger thresholds with safety margin (example: fuel level management) – Configuration of circuit breakers – Setting of electrical protections (over/under voltage, frequency, power, etc.) – Alarm and fault management – Monitoring via synchronization display – Verification of input/output states

Commissioning and diagnostics

Commissioning on simulation benches and training center – Practical exercises on network backup cabinets (AMF) – I-O-II inverter configuration – External load start-up tests – Commissioning of multi-group and network coupling – Introduction to fault diagnosis – Fault simulation – Analysis of abnormal behavior – Initial corrective actions

Objectives covered: Configure and set up CRE controllers – Commission single-source and multi-source installations

Wednesday – Day 3: Introduction to hybrid systems

Hybrid systems bases

Fundamental reminders of generator sets – Basic concepts of inverters – Differences between conventional and hybrid systems – General principles of hybrid systems – Grid-forming and grid-following modes – Impacts on regulation and stability

Hybrid architectures and scenarios

Priority source selection – Source control logic – Hybrid coupling scenarios – Generator + photovoltaic operation – Generator + photovoltaic + grid operation – Power reserve concepts – Power limitations and grid constraints

Communication and integration

Modbus and SunSpec communication protocols – Data exchange with third-party equipment – Inverter integration – Explanation of key terms and acronyms in the hybrid field and presentation of commonly used hybrid architectures – Presentation of CRE hybrid product lines – Features associated with hybrid controllers

Demonstrations and initial practical applications

Demonstrations on hybrid systems – Observation of active and reactive power flows – Analysis of the behavior of hybrid installations – Interactions between generator sets, the grid, and renewable energies – Initial tests in a training power plant

Objectives covered: Identify hybrid architectures and scenarios – Analyze the behavior of hybrid installations

Thursday – Day 4: Commissioning and operation of hybrid systems

Advanced hybrid configuration

Access to specific hybrid menus – Configuration of Master Compact 1B and Compact Prime controllers – Power export limitation – Start and stop based on renewable energy production – Inverter mode control – Active and reactive power limitation – Power factor logging modes

Inverters and storage

Configuration of hybrid inverters – Control via Modbus – Management of active and reactive setpoints – Integration of storage systems – Role of storage in system stability

Commissioning and operation

Full commissioning of hybrid scenarios in a training center – Verification of start-up and shutdown sequences – Dynamic observation of system behavior – Analysis in normal operation – Analysis in degraded operation

Diagnosis and troubleshooting

Hybrid fault simulation – Root cause analysis – Reading of states and alarms – Parameter adjustment – Appropriate corrective actions – Validation of behavior after correction

Objectives covered: Commissioning hybrid installations – Analyzing and diagnosing operating situations

Friday – Day 5: Programming and Advanced Functions

Introduction to Easy Flex® programming

Introduction to the Easy Flex® language – Programming logic applied to installations – Programming environment – Program structuring

Variables and logic

Saved and unsaved user variables – Constants – Variable types – Logical, arithmetic, and comparison operators – State and condition management

Advanced structures

Equations and assignments – Multiple conditions – Custom functions – Threshold management with safety margin – Scheduling (calendars) – Modifying parameters by variable number

Communication and specific functions

Modbus redirection – Modbus communication (server and master) – Custom frames – Circular archiving – File transfer

Debugging and implementation

Debugging mode – Program behavior analysis – Error correction – Progressive practical exercises – Real-world case studies – Summary of acquired knowledge

Objectives covered: Programming advanced functions with Easy Flex® – Applying knowledge to real-world scenarios

10. Accessibility and consideration of special situations

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

Participants are encouraged to report any special circumstances prior to the training in order to explore the possibilities of adapting the teaching and organizational methods.

11. Conclusion

This training enables participants to consolidate their technical knowledge and acquire operational autonomy on CRE solutions, thanks to a progressive, structured and highly practice-oriented approach.



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