



A SmartPower Product

SmartGate G Smart controller in a polycarbonate enclosure

Efacec, in line with its technological strategy that has been conducted since 2006, aiming to answer the new energy and environmental challenges, developed a new range of solutions for Smart Grids, designated by: **SmartPower**

In this scope of extensive provider of **SmartPower** solutions for Smart Grids, Efacec presents the **G Smart** controller, part of the **SmartGate** product family.

The **G Smart** is the Efacec solution for Distribution Transformer Controllers. This solution performs an important management role at the electric power grid serving end consumers, namely those fed by the LV network. This solution can also manage independent micro-production players, which, together with the consumers, constitute what is known today by "Prosumers". These are the new pro-active agents that may perform simultaneously the role of an intelligent consumer or independent micro-producer.

The **G Smart** is an intelligent module, based on Digital Signal Processor (DSP) technology, conceived to be used at the MV/LV Distribution Transformer Substations, aiming to supervise its own state, as well as to collect metering data coming from electric power smart meters, placed downstream along the LV network.

The **G Smart** also dynamically manages 2-way communication links with multiple smart meters, detecting their insertion into the system, recognizing and integrating them in its own internal database. The inclusion of those smart meters, as well as the related incoming metering data, is reported upwards into the Central Systems.

Besides these functions, the **G Smart** allows detecting upstream MV network faults, as well as managing a set of alarms concerning the internal operating environment, namely those related to the state of the equipment, ambient temperature, MV/LV transformer oil temperature, intrusion, among others.

The **G Smart** is also able to control the public lighting, executing previously scheduled orders, received from the network control centre. Furthermore it is able to perform public lighting metering.

Being a flexible solution, capable of managing multiple input data, for multiple applications, the **G Smart** allows the system to identify, at the distribution transformer substation level, the demand shifts, the independent production, and the power resources present in the network. Additionally, the **G Smart** sends that data to the upstream systems, either to the respective distribution network control centre, or to the utility's corporative information system.

Besides this standpoint, the **G Smart** also offers electrical interface mechanisms, providing not only alarm or metering, but also voltage, current, power and power factor values. Moreover it executes remote controls, coming from the control centre or the information system, as well as local controls, when applicable, over the MV or LV circuit breakers.

The **G Smart** may also be included in the scope of Distribution Automation, as a complementary solution for Feeder Automation. This function is executed at the primary substation level, gathering the necessary information so that their RTU (Remote Terminal Units) may perform, with the received fault data, the necessary FDIR (Fault Detection, Isolation and Restoration) algorithms.

The **G Smart** is able to communicate through several physical layers, such as PLC (via DLMS/COSEM), RF Mesh, GPRS or Ethernet network (via IEC 60870-5-104, DLMS/COSEM and Web Services).

The **G Smart** has an embedded Web server that offers a set of schematic diagrams, data lists and parameter setting tools, available for distribution transformer substation management, allowing local and remote access, through a valid username and password.

The **SmartGate** family is composed by products targeted for modularity, offering a set of configurable functions, according to the requirements of each project.

These characteristics are adequate for the implementation of phased solutions, thus, protecting the customer's initial investment.

SmartGate product family overview:

G Smart	Smart controller, with built-in Web server, communication functions, metering functions, isolated digital inputs, relay digital outputs and DC analogue inputs as well as one optional built-in power quality analysis module.
G Fault	Standalone fault detector device, with MV or LV fault detection functions, an isolated digital input, a relay digital output and AC analogue inputs. G Fault devices may also operate as external plug-and-play modules for G Smart controllers.
G Plus	External power quality analysis plug-and-play module for G Smart controllers for LV networks.
G Remote	Small RTU and distribution automation unit including optional fault detector for switches, reclosers or other applications.
Automation Studio	Engineering tool for device configuration and management (communications, database, etc.), including automation functions according to the IEC 61131-3 standard.

G Smart

- Up to 32 external plug-and-play modules
- Optional built-in power quality analysis module
- Communication with smart meter devices through PLC and GPRS, via DLMS/COSEM
- Data concentrator for the data sent by smart meters
- Management of smart meters
- Communication with control centres (via IEC 60870-5-104 protocol) or with corporative information systems (via Web Services and DLMS/COSEM), through GPRS or Ethernet
- It offers an embedded Web server, for external access through a local Ethernet network or GPRS, in order to implement sophisticated human machine interfaces (schematics diagrams, lists, graphics, etc.), for local or remote parameter setting, monitoring and control purposes
- Temperature monitoring, providing 2 DC analogue inputs
- Public lighting control, following a central systems' agenda
- 2 USB ports
- 2 Ethernet RJ 45 ports, featuring router functions for WAN access (optional Wi-Fi)
- 2 RS 232 serial ports (1 for the console) and 1 RS 485 serial port
- 1 GPRS port
- 1 PLC (CENELEC-A), three phase
- 8 Isolated digital inputs and 8 relay digital outputs
- Optional expansion board with 16 isolated digital inputs and 8 relay digital outputs
- Three phase metering of active energy (import/export) and reactive energy (4 quadrants)
- 0.5 Accuracy class
- Transformer's load diagram
- Phase unbalance detection

- 3 AC analogue voltage and 4 AC analogue current inputs for phase voltage, current and power measurement
- Remote firmware upgrade, configuration and parameter settings
- It works under LINUX operating system

G Fault

- MV or LV fault detection (ANSI 50, 50N, 51, 51N and 67)
- Fault external signalling
- Fault reset input
- Digital inputs and outputs, for circuit breaker control:
 - 8 isolated digital inputs and 8 relay digital outputs
- AC analogue inputs:
 - 4 current inputs and 3 voltage inputs

G Plus

- Voltage interruptions
- Voltage fluctuation according to the IEC 61000-4-30 standard
- Voltage flicker according to the IEC 61000-4-15 standard
- Voltage sags according to the IEC 61000-4-30 standard
- Harmonics, according to the IEC 61000-4-7 standard, with independant values up to the 50th harmonic and also Total Harmonic Distortion
- Voltage unbalance according to the IEC 61000-4-30 standard
- Frequency according to the IEC 61000-4-30 standard
- AC analogue inputs:
 - 3 voltage inputs

Automation Studio

- Automation functions according to the IEC 61131-3 standard
- Communication and hardware configuration



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