650 FAMILY

Advanced Protection, Control and Monitoring System

Key Benefits

- Unique built-in control features - Comprehensive protection plus programmable logic

- Flexible and cost effective control for complex systems - Use IEC compatible programmable logic to customize the functionality of your protection & control system to address unique, site specific applications

- Human machine interface (HMI) - Standard backlit LCD display with 4 × 20, optional 16 × 40 (240 × 128 pixels) graphical LCD, programmable buttons, and rotary knob for selecting setting menus, and submenus

- Minimize replacement time - Modular with card draw-out construction

- Reduce troubleshooting time and maintenance costs - IRIG-B time synchronization, event reports, waveform capture, data logger

- Cost Effective Access information - Via multiple protocols, through standard RS232, & RS485, Ethernet Ports

- Optimal integration flexibility via open standard protocols - Modbus RTU, DNP 3.0 Level 2, IEC60870-5-104, IEC61850, IEC 870-5-103

- Minimize communication down time - Reliable redundant Ethernet Communication ports with 10/100BaseTX, 100BaseFX with ST connectors, and optional double 100BaseFX, with ST connectors

- Complete asset monitoring - Full metering including demand & energy

- Follow technology evolution - Flash memory for product field upgrade

Applications

- F650: Management and primary protection of distribution feeders and bus couplers

- F650: Backup protection of busses, transformers and power lines

- G650: Packaged generator mains failure detection

- G650: Distributed generation management device

- G650: Reliable Distributed Generation interconnection protection system

- W650: Wind turbine protection, control and monitoring

- W650: Distributed generation grid interconnection device

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Features

Protection and Control

- Up to 32 Programmable digital inputs
- Up to 16 digital outputs
- Trip Circuit Supervision
- Redundant power supply option
- Configurable PLC logic according to IEC 61131-3
- Fully configurable graphic display HMI interface
- Alarms panel

Monitoring and Metering

- Energy metering
- Demand metering
- Trip circuit monitoring
- Oscillography
- Data logger
- Sequence of event
- Self diagnostic

User Interface

- Large graphic (16×40) or regular (4×20) character display
- Easy to use control via Shuttle key
- Front USB port or standard RS232
- Rear wire 10/100BaseTX Ethernet for LAN connection
- Rear wire CAN bus port (OPEN CAN protocol - W650)
- Optional fibre optic 100BaseFX Ethernet, single or redundant
- Optional rear RS485 port
- 1 ready LED and 15 programmable LED indicators
- EnerVista™ Integrator providing easy integration of data in the 650 relay into new or existing monitoring and control systems

Overview

The 650 family has been designed as a comprehensive protection, control, metering and monitoring package. The microprocessor based architecture is a complete solution for different applications that complies with the most relevant international standards.

All the elements required for each application have been integrated into a single package for a cost-effective, reliable and simple utilization. The low number of components, thanks to the use of state of the art but mature technology, deliver a very high reliability.

Hardware inputs and outputs have been designed in a modular way that allow easy migration from simple to more complex applications.

The control functions include a full-scheme virtual PLC with an optional graphical display. The combination of both elements provide total control for a bay. This means real-time monitoring of breakers and selector switches, open and close commands supervised by the programmable interlockings and metering screens.

The metering capability allows 0.5% accuracy for current and 1% from 10 V to 208 V for voltage in metering range. Monitoring functions include a 479 event recorder, and a programmable oscillography recorder.

The 650's communications capability and option make the product very unique. These units include a maximum of three independent communication ports: COM1, COM2 and COM3, with many physical choices through the use of two removable plug and play boards.

The brain of 650 units includes a powerful built-in virtual PLC. This PLC can be programmed according to the IEC 61131-3 language by functional block diagrams.

650 units come with 8 to 32 digital inputs and with 8 to 16 outputs depending on options. All digital inputs may be filtered with a separate debounce time to tailor customer requirements.

On top of that, programmable threshold allows the use of different voltage levels (0 to 255 Vdc) in the same model. This is accomplished by programming the requested thresholds using advanced "quasi analog" inputs.

EnerVista™ software allows the user to program all the interlocking and switching sequences. This is done in an easy way through the graphic interface. No special knowledge of software application is needed.

The same EnerVista™ software provides a graphic interface for the HMI. The monitoring, metering and alarm panel screens can be created just by clicking and dragging the symbols. 650 units incorporate a complete library of symbols.

Metering

The F650 provides the following metering values.

- Current: Ia, Ib, Ic, In, Ig, Isg
- Phase-to-phase and phase-to-ground voltage values for bus and line: Van, Vbn, Vcn, Vab, Vbc, Vca, Vx
- Active power (per phase and total): Wa, Wb, Wc, W
- Reactive power (per phase and total): VARa, VARb, VARc, VAR
- Power factor (per phase and total)
- Frequency

These signals are available for local display, and accessible remotely using communications.

Recording Functions

The recording functions of the F650 include:

- Event recorder capable of storing 479 time-tagged events (1 true millisecond accurate tagging)
- Up to 20 separate oscillography records can be stored in memory. The capacity of each record will depend on the type of oscillo selected (1 Mbyte/Max. No. Osc)

These records are stored in non volatile memory. Therefore, there is no need for internal battery monitoring or maintenance.

Trip circuit monitoring

650 units offer as an option two complete supervision circuits for breaker trip and closing coils and circuits. These supervision inputs monitor both the battery voltage level and the continuity of the trip and/or closing circuits, applying current through those circuits and checking that it flows properly. In order to apply this feature it is necessary to choose I/O board 1 option 2.

Communications

650 units incorporate up to three ports that operate independently. Redundant ports are available for high reliability applications:

Available protocols for rear port 1 and 2 are ModBus RTU, IEC 103, and serial DNP 3.0.

The third port is located in a removable communications card. This plug and play card can be easily changed in the future as new standards arrive to the market, thus providing a migration path to the customer.

The protocol available for the third port is DNP 3.0 over TCP/IP, UDP/IP, ModBus TCP/IP and IEC 60870-5-104.

User Interface

- Graphic 16×40 or text 4×20 LCD display
- Fluorescent backlight to improve visibility

- Multicolor programmable LEDs with label panel
- Local/Remote/Off pushbutton with LEDs

- Key control for easy navigation
- Ergonomic programmable keys

- Electrically isolated front USB communication port

Dimensions

Side View

Front View

Cutout

All Dimensions are shown in mm
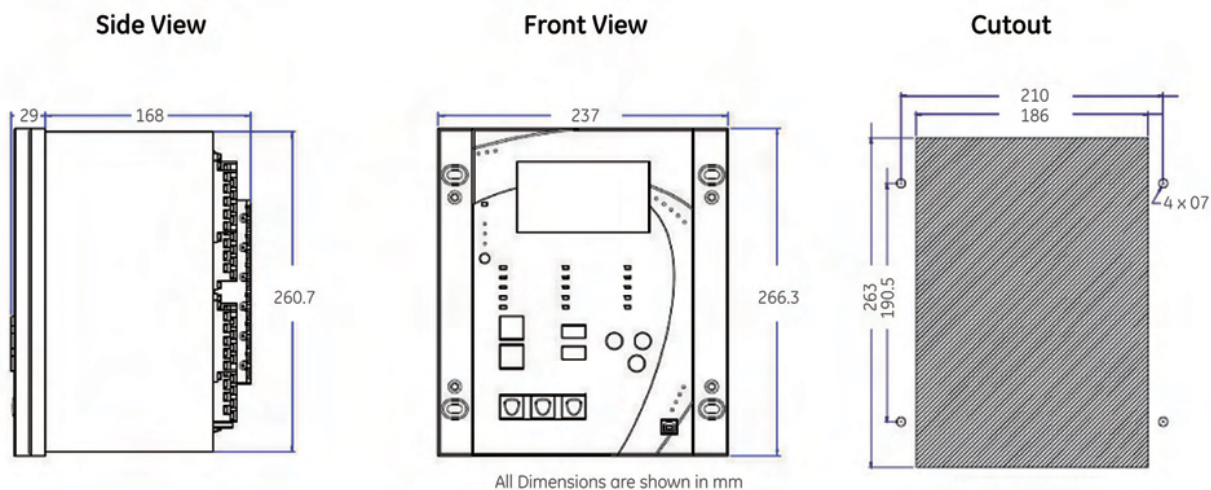
Setup Program

Windows based EnerVista™ software allows complete access to relay information as well as PLC type logic configuration.

Keypad & Display

There are versions with text display (4×20 characters) as well as large graphic display (16×40 characters) with fluorescent backlit for a better visibility under all conditions.

LED Indicators

Up to 15 programmable LEDs green, yellow and red, with tags tailored to the application allow quick and safe indicators understanding. Five additional large keys, all of them configurable, help automating frequently performed control functions (such as breaker open, close, recloser lockout).

Easy Keys

The easy keys make the 650 equipment extremely easy to use, very much like the key controls in a domestic DVD.

EnerVista™ Software

The 650 comes with EnerVista™, an industry-leading suite of software tools that simplifies every aspect of working with GE Vernova Multilin devices. EnerVista™ software is extremely easy to use and provides advanced features that help you maximize your investment in GE Vernova Multilin products. EnerVista™ 650 setup software allows complete access to relay information as well as PLC type logic configuration. PLC is programmed using standard IEC 1131-3.

EnerVista™ Launchpad

EnerVista™ Launchpad is a complete set of powerful device setup and configuration tools that is included with the 650.

- Set up the 650 - and any other GE Vernova Multilin device - in minutes. Retrieve and view oscillography and event data at the click of a button
- Build an instant archive on any PC of the latest GE Vernova Multilin manuals, service advisories, application notes, specifications or firmware for your 650
- Automatic document and software version updates via the Internet and detailed e-mail notification of new releases

EnerVista™ Viewpoint

EnerVista™ is a premium workflow-based toolset that provides engineers and technicians with everything they need to monitor, test and troubleshoot GE Vernova Multilin IEDs and manage settings files with ease. The 650 includes an evaluation version of EnerVista™ Viewpoint.

- Settings file change control and automatic error checking make creating, editing and storing settings a snap
- Plug-and-Play monitoring automatically creates customized monitoring screens for your 650 - no programming required
- Powerful testing tools help shorten your commissioning cycle
- Quickly retrieve oscillography and event data when a fault occurs

See the EnerVista™ Suite section for more information.

For more information, visit
gevernova.com/grid-solutions

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