Grid Solutions

MULTILIN G60

Comprehensive Protection for Generators

The Multilin™ G60 generator protection system provides comprehensive protection for medium and large generators, including large steam and combustion turbines, combined-cycle generators and multicircuit hydro units.

The G60 includes advanced automation and communication capabilities, extensive I/O options, and powerful fault recording features that can simplify postmortem disturbance analysis and help minimize generator downtime.

Key Benefits

- Secure, high-speed protection elements for complete generator protection, compliant with IEEE® C37.102, extending asset life
- Available Ethernet Global Data (EGD) to ease integration with new and existing GE Vernova control systems
- Embedded Synchrophasor measurement capabilities (per IEEE® C37.118), eliminating the need for dedicated PMUs and support for synchrophasor multi-cast (per IEC® 61850-90-5) reducing bandwidth and communications infrastructure costs
- An integrated large, full color display, provides real-time visualization and control of the protected bay, via a bay mimic as well as annunciator functionality and graphical visualization of phasors
- Advanced IEC 61850 Ed. 1 and Ed. 2 certified implementation, complete settings via SCL files and comprehensive process bus support (IEC 61850-9-2LE or IEC 61869 or IEC 61850-9-2 Hardfiber) ensures interoperability, device managing optimization and reduced cost of ownership
- Routable GOOSE (R-GOOSE) enables GOOSE messages going beyond the substation, which enables wide area protection and control applications
- Increased network availability via failover time reduced to zero through IEC® 62439-3 “PRP” support
- Supports latest edition of waveform capture (COMTRADE 2013) simplifying fault records management
- Embedded multi-range signal oscillation detection (MSOD)

Applications

- Medium to large generators typically driven by steam, gas, or hydraulic turbines
- Pumped storage generators used as pumping motors for reservoir storage
- Stand-alone protection or component in automated substation control systems
- Standard protection product offering on new GE Vernova generator installations

GE VERNOVA

Protection and Control

- 100% Stator and Field Winding Ground Fault Protection (GPM-S & FPM-F Modules)
- Generator stator differential, loss of excitation, overexcitation and generator unbalance protection, and breaker failure
- Power swing blocking and out-of-step tripping
- Reverse/low forward power
- Restricted ground fault, thermal overload protection, directional, time, instantaneous, phase, neutral, negative sequence and ground overcurrent protection
- Protection and control functionality in one box, reducing the number of devices
- High density inputs/outputs to support the control of many switchyard assets – all from one powerful device
- Integrated large, full color display, for real-time visualization and control of the protected bay

Advanced Communications

- 3 independent Ethernet ports for simultaneous & dedicated network connections with IEEE 1588 support
- IEC 61850-9-2LE/IEC 61869 networked or IEC61850-9-2 Hardfiber process bus support

Cyber Security

- CyberSentry™ provides high-end cyber security aligned to industry standards and services (NERC® CIP, AAA, Radius, RBAC, Syslog)

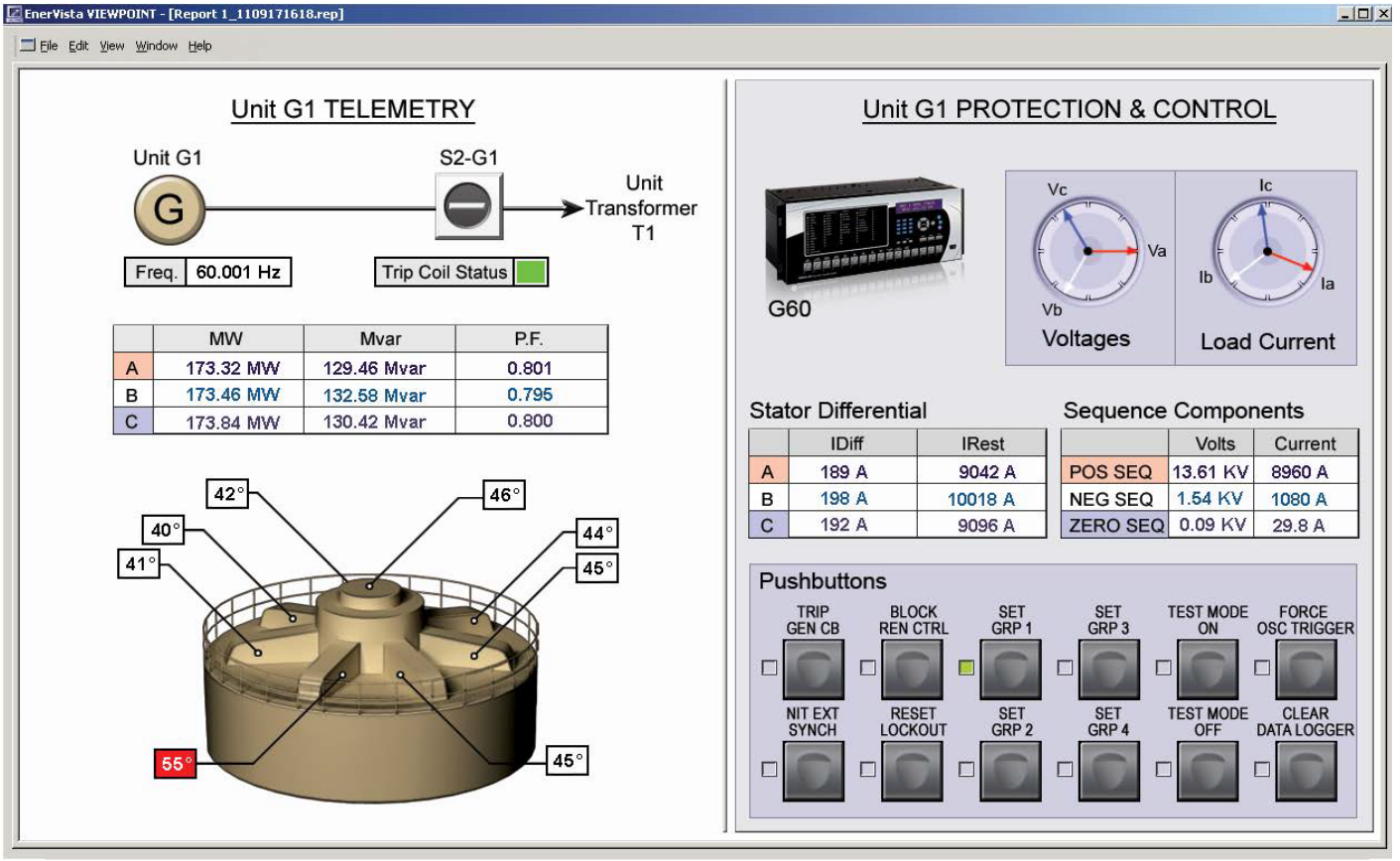
Monitoring & Metering

- Advanced recording capabilities with highcapacity event recorder, configurable and extended waveform capture and data logger
- Metering: current, voltage, power, energy, frequency, and harmonics
- Embedded multi-range signal oscillation detection (MSOD)

Protection and Control

As part of the UR family of Protection & Control devices, the G60 offers a high degree of modularity in its design and functionality, providing superior performance while meeting the toughest requirements of the marketplace. Advanced protection and control features of this relay includes:

G60 - Protection, Metering, Monitoring and Control



The G60 is the single point for protection, control, metering, and monitoring in one integrated device that can easily be connected directly into DCS or SCADA monitoring and control systems like Viewpoint Monitoring as shown.

Generator Stator Differential

High-speed stator differential protection provides sub-cycle detection and high-speed clearing of stator phase faults. Advanced CT saturation and failure detection algorithms maintain immunity to high current AC and low current DC saturation conditions that may occur due to external disturbances, such as transformer inrush or near generator faults, without sacrificing speed or sensitivity.

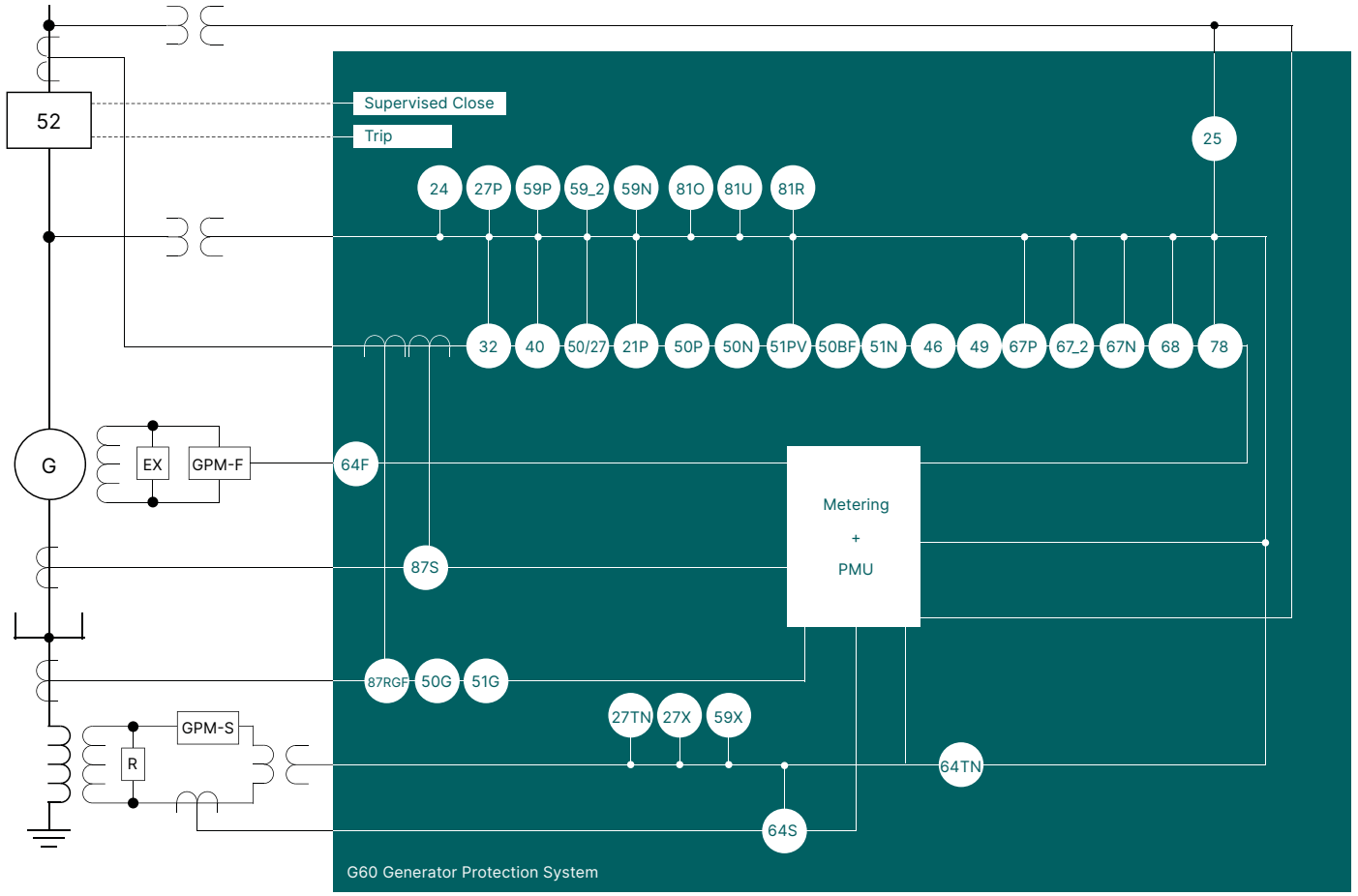
100% Stator Ground 3rd Harmonic

100% stator ground fault protection is provided through a voltage differential feature that responds to the unbalance of the third harmonic at the machine terminals and at the neutral point. This method is insensitive to the absolute value of the third harmonic and is easily set without the need for on-line measurements. For generators with delta connected PTs, a third harmonic undervoltage element is also offered for detecting a loss of the third harmonic voltage at the generator neutral.

Breaker Failure Protection

The breaker failure protection element monitors for timely operation of the connected breaker. If a trip command is not successful in operating the breaker and clearing the fault, the breaker failure element can be used to send trip signals to upstream breakers to clear the fault.

Functional Block Diagram



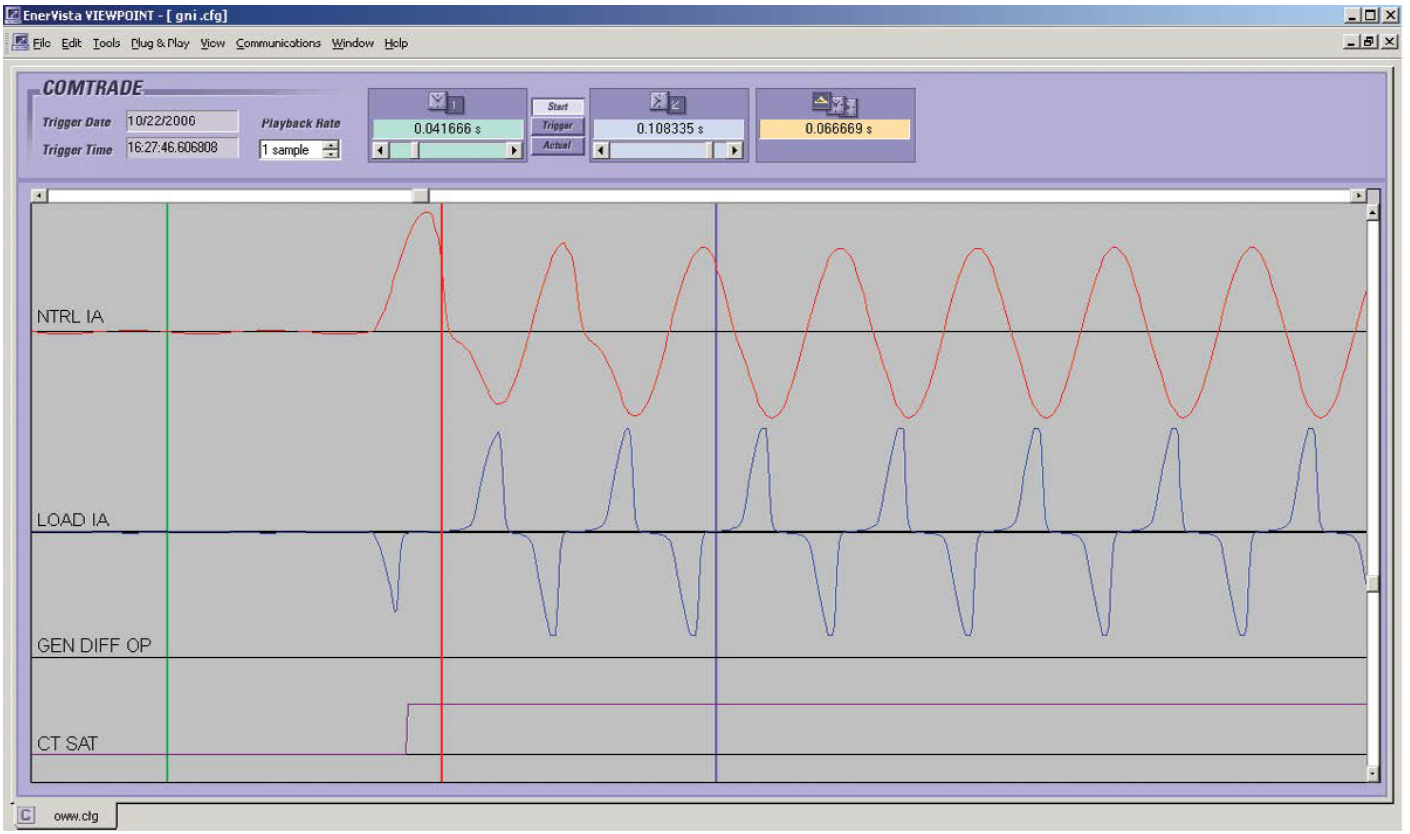
ANSI® Device Numbers & Functions

DEVICE NUMBER	FUNCTION
21P	Phase distance backup
24	Volts per hertz
25	Synchrocheck
27P	Phase undervoltage
27TN	Third harmonic neutral undervoltage
27X	Auxiliary undervoltage
32	Sensitive directional power
40	Loss of excitation
46	Generator unbalance
49	Thermal overload protection (RTD)
50BF	Breaker failure
50G	Ground instantaneous overcurrent
50N	Neutral instantaneous overcurrent

DEVICE NUMBER	FUNCTION
50P	Phase instantaneous overcurrent
50SP	Split phase protection
50/27	Accidental energization
51G	Ground time overcurrent
51PV	Phase time overcurrent with voltage restraint
51N	Neutral time overcurrent
59N	Neutral overvoltage
59P	Phase overvoltage
59X	Auxiliary overvoltage
59_2	Negative-sequence overvoltage
64F	Field ground protection
64S	Sub-harmonic stator ground protection
64TN	1 stator ground

DEVICE NUMBER	FUNCTION
67_2	Negative-sequence directional overcurrent
67N	Neutral directional overcurrent
67P	Phase directional overcurrent
68	Power swing blocking
78	Out-of-step protection
81O	Overfrequency
81R	Rate of change of frequency
81U	Underfrequency
87RGF	Restricted ground fault
87S	Stator differential
	Harmonic/Inrush detection

G60 Percent Differential Element



The G60 percent differential element has enhanced saturation detection algorithms to provide additional security against AC and DC saturation that can occur during faults near the generator.

Field Ground Protection

Field ground protection identifies the occurrence of a ground fault in a generator field winding and helps to prevent serious damage to the, maximizing operational lifespan. The field ground protection module (GPM-F) works in combination with the G60 to detect ground faults in the field winding of the generator. The solution includes: two-stage field ground detection, injected voltage and current supervision, brush lift-off detection, field over and undercurrent elements and field ground fault location.

100% Stator Ground Fault Protection Using Sub-Harmonic Injection

Protecting the generator from internal faultsis critical to maintaining the overall life of the generator. Using the 100% stator ground fault protection based on sub-harmonic injection, a 20Hz voltage is injected to detect ground faults at any point across 100% of the winding. The stator ground module (GPM-S) works in combination with the G60 to provide 100% stator ground fault protection that is operational during generator start-up, running and stopped conditions. The solution includes: two-stage stator ground detection, injected voltage and current supervision and ground overcurrent element.

Loss of Excitation

Generator loss of excitation protection is provided via two negative offset mho characteristics as per IEEE C37.102. Inadvertent pickup time delay settings and blocking input provide security for blown VT fuses and power swing conditions.

Power Swing/Out-of-Step

The power swing blocking element provides blocking of the backup distance element and other protections under power swing conditions. Negative sequence current supervisors provide extended selectivity for detecting evolving faults that may appear as a power swing event (faults with slow moving impedance locus). Additionally, the out-of-step tripping element can be used for tripping the generator when an unstable power swing is detected.

Backup Phase Distance

Three separate phase distance elements provide time-delayed backup protection for generator faults that have not otherwise been cleared by the primary system and generator protection Each zone can independently compensate for power transformers, so compensation can be applied for zones reaching out into the system through the unit transformer, while zones looking into the stator can remain uncompensated.

Sensitive Directional Power

Two separate directional power elements are provided to detect generator motoring to protect the prime mover from damage. Each element responds to either reverse or low forward power flow and can be used to provide independent alarm and trip settings.

Restricted Ground Fault (87G)

RGF protection (also known as zero-sequence differential) extends protection coverage to the neutral point of the stator winding, where fault currents may be below the pickup of the stator differential element. The low-impedance (87G) protection provided by the G60 uses an optimized adaptive restraint signal that provides security for external fault conditions that may cause CT saturation while still maintaining sensitivity for internal faults.

Pumped Storage Generator

The G60 can be used for protecting generators that are also run as pumped storage motors, without the need for switching the CT secondary circuitry. The G60 is able to automatically compensate for the phase reversal that occurs when the generator is being run as a motor.

Synchronism Check

The G60 provides six elements to monitor differences in voltage magnitudes, phase angles, and frequencies taking the CB closing time intoaccount to perform synchronism checks across breakers. The G60 can be used in conjunction with an external synchronizer as an independent check of the synchronizer prior to closing the generator breaker.

Harmonic/Inrush detection

The Harmonic detection element monitors the selected 2nd to 5th harmonic or Total Harmonics Distortion (THD), which is present in the phase currents. The relay provides six identical Harmonic Detection elements.

During transformer energization or motor starts, the inrush current present in phase currents can impact some sensitive elements, such as negative sequence overcurrent. Therefore, the ratio of the second harmonic to the fundamental magnitude per phase is monitored, while exceeding the settable pickup level, an operand is asserted, which can be used to block sensitive elements.

Temperature Protection (RTD Module Option 5C)

The G60 RTD option provides 8 programmable RTD inputs per module that are used for temperature monitoring. Each RTD input has 2 operational levels: alarm and trip. The G60 supports RTD trip voting and provides open RTD failure alarming. Alternatively, a remote RTD module, "RRTD", which supports 12 RTD inputs, can also be used with the G60 for temperature monitoring. The RRTD provides cost savings compared with standard RTD wiring.

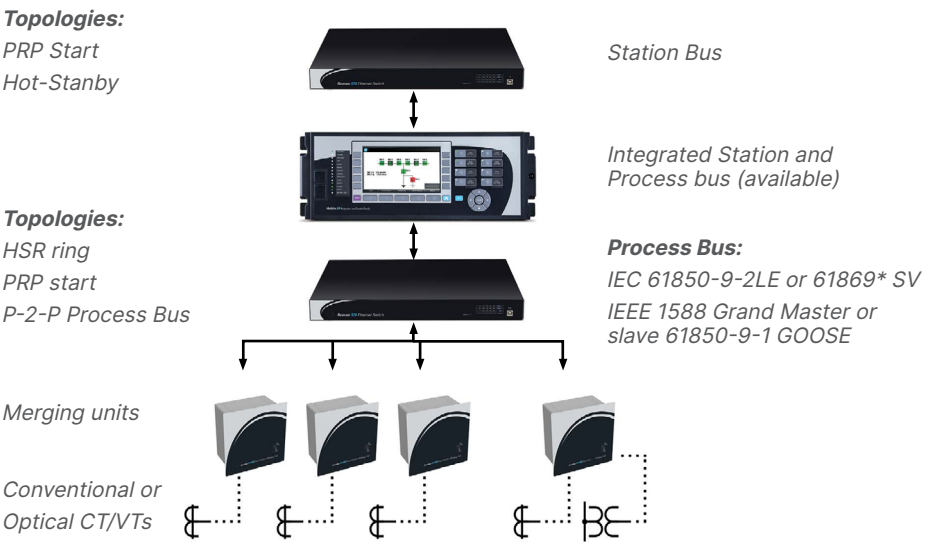
IEC 61869 and 61850-9-2LE Process Bus

Three UR process bus modules enable communicating to Merging Units "MU" that comply to either IEC 61869 standard or IEC 61850-9-2LE technical report. MUs connect to the primary asset and translate analog signals and digital status/commands to standard sample values "SV" data and GOOSE messages.

Flexibility for connecting to different network size and topology is granted through 100Mbps and/or 1Gbps Ethernet port support, plus IEC 62439 PRP or HSR standard redundancy, plus Star, Ring and Point-to-point network support.

For time synchronization purposes, this Process bus module can become an IEEE 1588 slave clock (61850-9-3 profile) or a 1588 Grand Master clock which removes the need of external time sources connected to the process bus network.

Customers who may not be using GE Vernova MU devices, could use MU from other vendors. Interoperability with MU from other vendors is expected when they comply to the mentioned standards



IEC 61850-9-2 HardFiber Process Bus

The IEC 61850 Process Bus module is designed to interface with the Multilin HardFiber System, allowing bi-directional IEC 61850 fiber optic communications. The HardFiber System is designed to integrate seamlessly with existing UR applications, including protection functions, FlexLogic™, metering and communications.

The Multilin HardFiber System offers the following benefits:

- Communicates using open standard IEC 61850 messaging
- Drastically reduces P&C design, installation and testing labor by eliminating individual copper terminations
- Integrates with existing G60's by replacing traditional CT/VT inputs with the IEC 61850 Process Bus module
- Does not introduce new cyber security concerns

Visit the HardFiber System product page on the Grid Solution web site for more details.

Advanced Automation

The G60 incorporates advanced automation features including powerful FlexLogic programmable logic, communication, and SCADA capabilities that far surpass what is found in the average generator relay. The G60 integrates seamlessly with other UR relays for complete system protection, including unit and auxiliary transformers, and balance of plant protection.

FlexLogic

FlexLogic is the powerful UR-platform programming logic engine that provides the ability to create customized protection and control schemes, minimizing the need and associated costs of auxiliary components and wiring. With 1024 lines of FlexLogic, the G60 can be programmed to provide the required tripping logic along with custom scheme logic for generator breaker control (including interlocking with external synchronizers), transfer tripping schemes for remote breakers and dynamic setting group changes.

Scalable Hardware

The G60 is available with a multitude of I/O configurations to suit the most demanding application needs. The expandable modular design allows for easy configuration and future upgrades.

- Multiple CT/VT configurations allow for the implementation of many different schemes, including concurrent split-phase and differential protection
- Flexible, modular high density I/O covering a broad range of input signals and tripping schemes
- Types of digital outputs include trip-rated Form-A and Solid State Relay (SSR) mechanically latching, and Form-C outputs
- Form-A and SSR outputs available with optional circuit continuity monitoring and current detection to verify continuity and health of the associated circuitry
- Mechanically latching outputs can be used to develop secure interlocking applications and replace electromechanical lockout relays
- RTDs and DCmA inputs are available to monitor equipment parameters such as temperature and pressure

Monitoring and Metering

The G60 includes high accuracy metering and recording for all AC signals. Voltage, current, and power metering are built into the relay as a standard feature. Current and voltage parameters are available as total RMS magnitude, and as fundamental frequency magnitude and angle.

Fault and Disturbance Recording

The advanced disturbance and event recording features within the G60 can significantly reduce the time needed for postmortem analysis of power system events and the creation of regulatory reports. Recording functions include:

- Sequence of Event (SOE)
  - 1024 time stamped events
- Oscillography
  - Supports IEEE C37.111-1999/2013, IEC 60255-24 Ed 2.0 COMTRADE standard
  - 128 digital & up to 56 analog channels
  - Events up to 45s in length
- Data Logger and Disturbance Recording
  - 16 channels up to 1 sample/cycle/channel
- Fault Reports
  - Powerful summary report of pre-fault and fault values

The very high sampling rate and large amount of storage space available for data recording in the G60 can eliminate the need for installing costly stand-alone recording equipment.

Advanced Device Health Diagnostics

The G60 performs comprehensive device health diagnostic tests at startup and continuously during run-time to test its own major functions and critical hardware. These diagnostic tests monitor for conditions that could impact security and availability of protection, and present device status via SCADA communications and front panel display. Providing continuous monitoring and early detection of possible issues help improve system uptime.

- Comprehensive device health diagnostic performed at startup
- Monitors the CT/VT input circuitry to validate the integrity of all signals

Multi-range Signal Oscillation Detection (MSOD)

A general purpose multi-range signal oscillation detector (MSOD) meets a broad-range of application needs for detecting power system oscillation. Oscillations are always present in power systems due to the electromechanical nature of the electric grid. However, some oscillations may become poorly or negatively damped, and could lead to system instabilities, equipment damages or system blackout if such oscillations are not detected and proper remedy actions are not taken in time.

Cyber Security – CyberSentry UR

CyberSentryTM is a software option that delivers wide range of cyber security features that help customers to comply with NERC CIP, NIST® IR 7628, IEC 62351 and IEC 62443 cyber security requirements and standards. Additionally secure FW upgrade is granted through UR Setup's digital signature validation capabilities. This software option delivers the following core features:

AAA Server Support (Radius/LDAP)

Enables integration with centrally managed authentication and accounting of all user activities and uses modern industry best practices and standards that meet and exceed NERC CIP requirements for authentication and password management.

Role Based Access Control (RBAC)

Efficiently administrate users and roles within UR devices. The new and advanced access functions allow users to configure up to five roles for up to eight configurable users with independent passwords. The standard "Remote Authentication Dial In User Service" (Radius) is used for authentication.

Event Recorder (Syslog for SEM)

Capture all cyber security related events within a SOE element (login, logout, invalid password attempts, remote/local access, user in session, settings change, FW update, etc), and then serve and classify data by security level using standard Syslog data format. This will enable integration with established SEM (Security Event Management) systems.

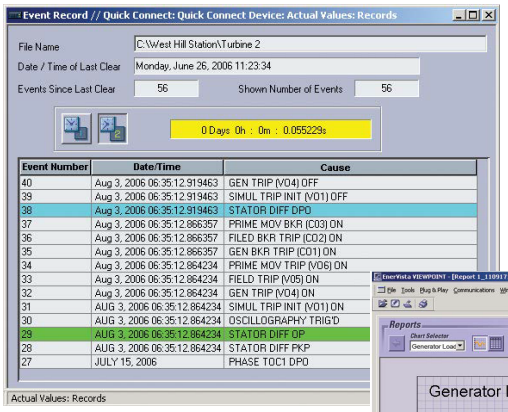
Communications

The G60 provides advanced communications technologies for remote data and engineering access, making it easy and flexible to use and integrate into new and existing infrastructures. Direct support for fiber optic Ethernet provides high-bandwidth communications allowing for low-latency controls and high-speed file transfers of relay fault and event record information. The available three independent Ethernet ports, redundant Ethernet option and the embedded managed Ethernet switch provide the means to create fault tolerant communication architectures in an easy, cost-effective manner without the need for intermediary communication hardware. The G60 supports the most popular industry standard protocols enabling easy, direct integration into DCS and SCADA systems.

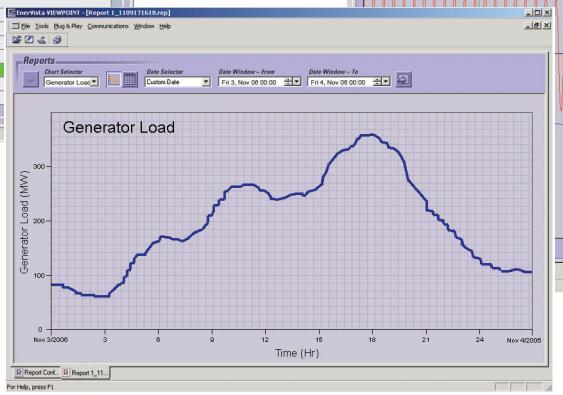
- IEC 61850 Ed. 1 and Ed. 2 Station Bus, IEC 61850-2-2LE / IEC 61869 networked or IEC 61850-9-2 HardFiber Process Bus, and IEC 61850-90-5 PMU over GOOSE support
- DNP 3.0 (serial & TCP/IP)
- Ethernet Global Data (EGD)
- IEC 60870-5-103 and IEC 60870-5-104
- Modbus RTU, Modbus TCP/IP
- HTTP, TFTP, SFTP and MMS file transfer
- IEEE1588 and redundant SNTP for time synchronization
- PRP as per IEC 62439-3
- IEC61850 GOOSE, Routable GOOSE and legacy UCA fixed GOOSE

Power System Troubleshooting

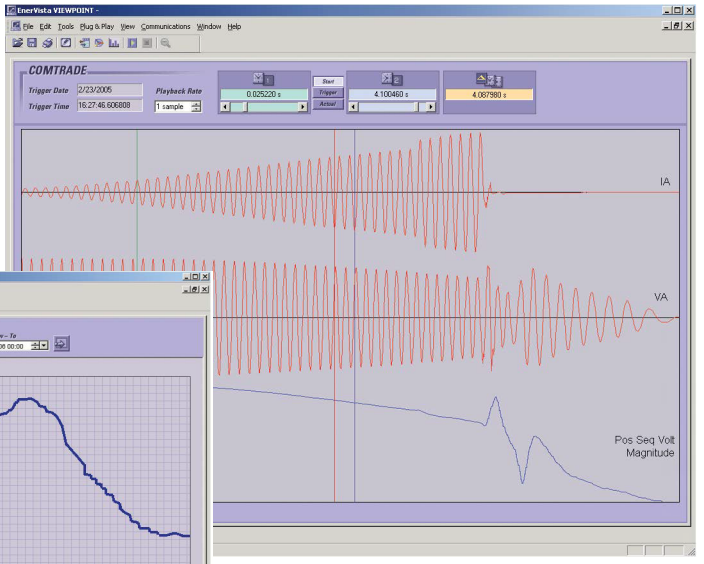
The G60 contains many tools and reports that simplify and reduce the amount of time required for troubleshooting power system events.



Record the operation of the internal G60 elements and external connected devices with 1ms time-stamped accuracy to identify the Sequence of Operation of station devices during generator faults and disturbances.



Log generator operating parameters to allow for analyzing generator loading and performance over weeks and months.



Analyze generator faults using both analog and digital power system quantities that are measured and recorded up to a rate of 64 samples per cycle.

Interoperability with Embedded IEC 61850 Ed. 1 and Ed. 2

The new IEC 61850 implementation in the UR Family positions GE Vernova as an industry leader in this standard.

- Implements, user selectable, Ed. 1 and Ed. 2 of the standard across the entire UR Family
- Provides full relay setting management via standard SCL files (ICD, CID and IID)
- Enables automated relay setting management using 3rd party tools through standard file transfer services (MMS and SFTP)
- Increases the number of Logical Devices and data mapped to them, GOOSE messages from up to 64 remote devices, and reports to support different organizational needs for data transfer and reduce dependency on generic logical nodes
- Configures GE Vernova Systems based on IEC 61850 using universal 3rd party tools
- Multicast IEEE C37.118 synchrophasor data between PMU and PDC devices using IEC 91850-90-5
- R-GOOSE enable customer to send GOOSE messages beyond the substation, which enables WAPC and more cost effective communication architectures for wide area applications

Direct I/O Messaging

Direct I/O allows for the sharing of high-speed digital information between multiple UR relays via direct back-to-back connections or multiplexed through a standard DS0 multiplexer channel bank.

Regardless of the connection method, direct I/O provides continuous real-time channel monitoring that supplies diagnostics information on channel health.

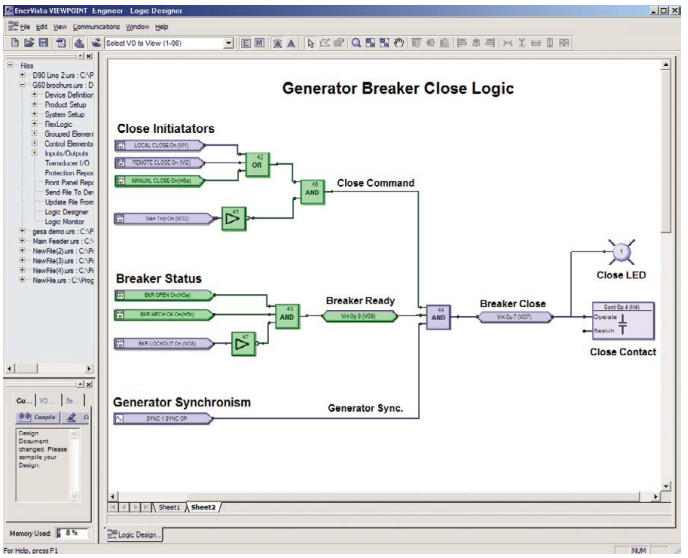
Direct I/O provides superior relay-to-relay communications that can be used in advanced interlocking, generation rejection and other special protection schemes.

- Communication with up to 16 UR relays in single or redundant rings rather than strictly limited to simplistic point-to-point configurations between two devices
- Connect to standard DS0 channel banks through standard RS422, G.703 or IEEE C37.94 interfaces or via direct fiber optic connections
- No external or handheld tester required to provide channel diagnostic information

LAN Redundancy

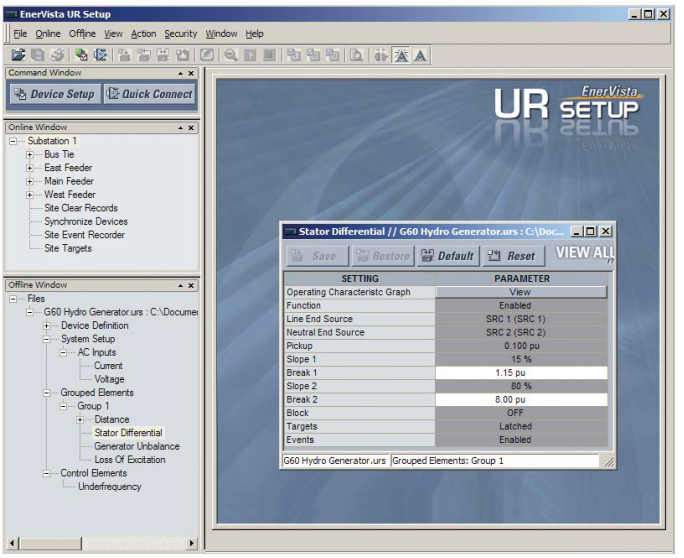
Substation LAN redundancy has been traditionally accomplished by reconfiguring the active network topology in case of failure. Regardless of the type of LAN architecture (tree, mesh, etc), reconfiguring the active LAN requires time to switchover, during which the LAN is unavailable. UR devices deliver redundancy as specified by PRP-IEC 62439-3, which eliminates the dependency on LAN reconfiguration and the associated switchover time. The UR becomes a dual attached node that transmits data packets over both main and redundant networks simultaneously, so in case of failure, one of the data packets will reach the receiving device with no time delay.

Simplifying Commissioning and Testing



The internal operation of the G60 elements, logic, and outputs can be monitored in real-time to simplify commissioning and troubleshooting procedures.

Simplifying G60 Configuration



Create G60 setting file templates to ensure critical settings are not altered.

Multi-Language

UR devices support multiple languages: English, French, Russian, Chinese, Turkish, German, Polish and Japanese. These language options are available on the front panel, in the EnerVista setup software, and in the product manuals. Easily switch between English and an additional language on the local displays without uploading new firmware.

EnerVista Software

The EnerVista suite is an industry-leading set of software programs that simplifies every aspect of using the G60 relay. The EnerVista suite provides all the tools to monitor the status of the protected asset, maintain the relay, and integrate information measured by the G60 into DCS or SCADA monitoring systems. Convenient COMTRADE and SOE viewers are an integral part of the UR setup software included with every UR relay, to carry out postmortem event analysis and ensure proper protection system operation. UR Setup also provides an export/import setting file tool which allows customer to transfer specific settings from one file to another. This tool also provides comprehensive setting file comparison. These features, together with UR single setting file, help users to simplify their setting file management experience.

EnerVista Launchpad

EnerVista Launchpad is a powerful software package that provides users with all of the setup and support tools needed for configuring and maintaining Multilin products. The setup software within Launchpad allows for the configuration of devices in real-time by communicating using serial, Ethernet, or modem connections, or offline by creating setting files to be sent to devices at a later time. Included in Launchpad is a document archiving and management system that ensures critical documentation is up-to-date and available when needed. Documents made available include:

- Manuals
- Application Notes
- Guideform Specifications
- Brochures
- Wiring Diagrams
- FAQs
- Service Bulletins

Viewpoint Monitoring

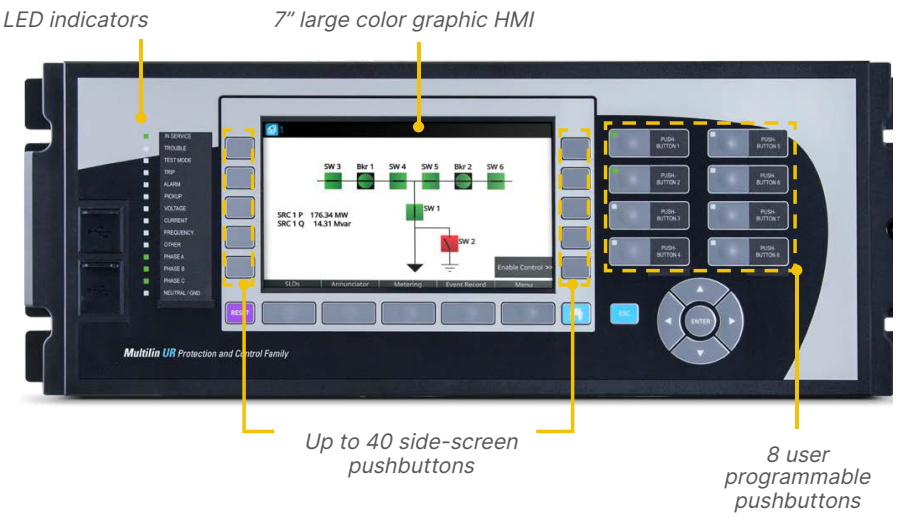
Viewpoint Monitoring is a simple-to-use and full-featured monitoring and data recording software package for small systems. Viewpoint Monitoring provides a complete HMI package with the following functionality:

- Plug & Play Device Monitoring
- System Single-Line Monitoring & Control
- Annunciator Alarm Screens
- Trending Reports
- Automatic Event Retrieval
- Automatic Waveform Retrieval

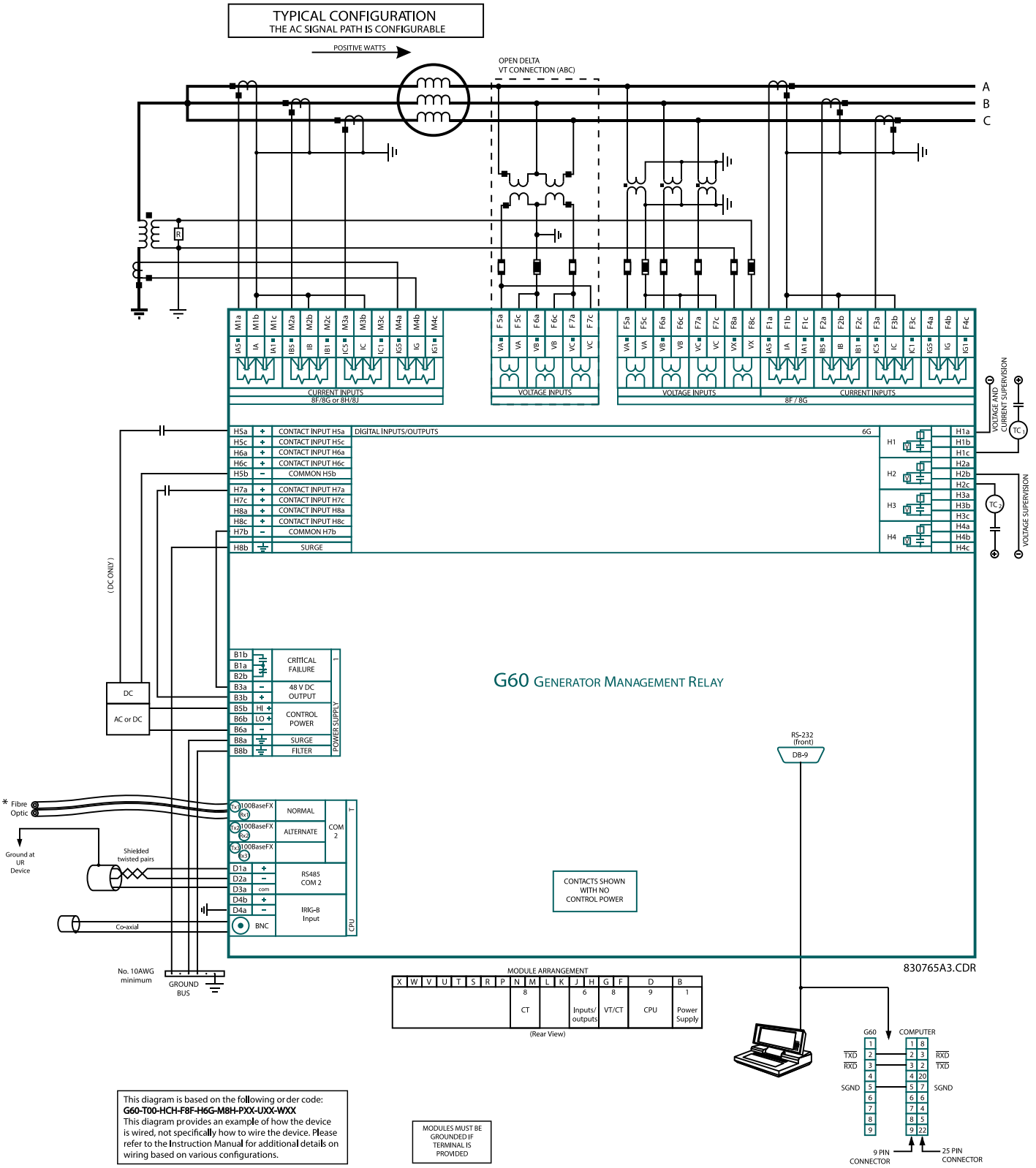
User Interface

The G60 front panel provides extensive local HMI capabilities. The local display is used for monitoring, status messaging, fault diagnosis, and device configuration. User-configurable messages that combine text with live data can be displayed when user-defined conditions are met.

A 7” color, graphic HMI is optionally available that allows users to have customizable bay diagrams with local monitoring of status, values and control functionality. The alarm annunciator panel provides the configuration of up to 96 signals (alarms and status) with full text description.



Typical Wiring



This diagram is based on the following order code:
G60-T00-HCH-F8F-H6G-M8H-PXX-UXX-WXX
This diagram provides an example of how the device is wired, not specifically how to wire the device. Please refer to the Instruction Manual for additional details on wiring based on various configurations.

Ordering

	G60	- *	00	- H	*	*	- F **	- H **	- M **	- P **	- U **	- W/X**	For full sized horizontal mount
Base Unit	G60												Base Unit
CPU		T											RS485 + three multimode SFP LC 100BaseFX
		U											RS485 + two multimode SFP LC 100BaseFX + one SFP RJ45 100BaseT
		V											RS485 + three SFP RJ45 100BaseT
		W											RS485 + two 100BaseFx Eth, Multimode ST + one 10/100BaseT Eth, RJ-45[3]
Software Options[1]			00										No Software Options
			01										Ethernet Global Data (EGD)
			03										IEC 61850
			04										Ethernet Global Data (EGD) + IEC 61850
			05										Phasor Measurement Unit (PMU)
			06										IEC 61850 + Phasor Measurement Unit (PMU)
			A0										CyberSentry UR Lvl 1
			B0										IEEE 1588
			C0										PRP
			D0										IEEE 1588 + CyberSentry UR
			M0										IEC 61850 + PMU + 61850-90-5
			SA										IEC60870-5-103 + IEEE1588 + PRP + IEC61850 + CyberSentry UR Lvl 1 + MSOD
Mount / Coating				H									Horizontal (19" rack) - Standard
				A									Horizontal (19" rack) - Harsh Environment Coating
				V									Vertical (3/4 size) - Standard
				B									Vertical (3/4 size) - Harsh Environment Coating
User Interface					E								7" Graphical display, USB front port & programmable pushbuttons - Multi-
					F								Language (FW 7.6x or higher) Vertical Front Panel with English Display
					I								Enhanced German Front Panel
					J								Enhanced German Front Panel with User-Programmable Pushbuttons
					K								Enhanced English Front Panel
					L								Enhanced English Front Panel with User-Programmable Pushbuttons
					M								Enhanced French Front Panel
					N								Enhanced French Front Panel with User-Programmable Pushbuttons
					Q								Enhanced Russian Front Panel
					T								Enhanced Russian Front Panel with User-Programmable Pushbuttons
					U								Enhanced Chinese Front Panel
					V								Enhanced Chinese Front Panel with User-Programmable Pushbuttons
					W								Enhanced Turkish Front Panel
					Y								Enhanced Turkish Front Panel with User-Programmable Pushbuttons
					H								Enhanced Polish Front Panel[3]
					O								Enhanced Polish Front Panel with User-Programmable Pushbuttons[3]
					Z								Enhanced Japanese Front Panel[3]
					X								Enhanced Japanese Front Panel with User-Programmable Pushbuttons[3]
Power Supply[2]						H							125 / 250 V AC/DC
						H						RH	125/250 V AC/DC with redundant 125/250 V AC/DC
						L							24 - 48 V (DC only)
CT/VT DSP							8L		8L				Standard 4CT/4VT w/ enhanced diagnostics
							8M		8M				Sensitive Ground 4CT/4VT w/ enhanced diagnostics
							8N		8N				Standard 8CT w/ enhanced diagnostics
							8R		8R				Sensitive Ground 8CT w/ enhanced diagnostics
IEC 61850 Process Bus[4, 5]								81					8 Port IEC 61850 Process Bus Module
								85					-9-2LE & 61869 Process Bus, 2 × 1000BaseF
								86					-9-2LE & 61869 Process Bus, 4 × 1000BaseF + 4 × 100BaseFx
								87					-9-2LE & 61869 Process Bus, 4 × 100BaseFx
Digital I/O								XX	XX	XX	XX	XX	No module
								4A	4A	4A	4A	4A	4 Solid State (No Monitoring) MOSFET Outputs
								4C	4C	4C	4C	4C	4 Solid State (Current w/opt Voltage) MOSFET Outputs
								4D	4D	4D	4D	4D	16 Digital Inputs with Auto-Burnish
								4L	4L	4L	4L	4L	14 Form-A (No Monitoring) Latchable Outputs
								67	67	67	67	67	8 Form-A (No Monitoring) Outputs
								6C	6C	6C	6C	6C	8 Form-C Outputs
								6D	6D	6D	6D	6D	16 Digital Inputs
								6E	6E	6E	6E	6E	4 Form-C Outputs, 8 Digital Inputs
								6F	6F	6F	6F	6F	8 Fast Form-C Outputs
								6K	6K	6K	6K	6K	4 Form-C & 4 Fast Form-C Outputs
								6L	6L	6L	6L	6L	2 Form-A (Current w/ opt Voltage) & 2 Form-C Outputs, 8 Digital Inputs
								6M	6M	6M	6M	6M	2 Form-A (Current w/ opt Voltage) & 4 Form-C Outputs, 4 Digital Inputs
								6N	6N	6N	6N	6N	4 Form-A (Current w/ opt Voltage) Outputs, 8 Digital Inputs
								6P	6P	6P	6P	6P	6 Form-A (Current w/ opt Voltage) Outputs, 4 Digital Inputs
								6R	6R	6R	6R	6R	2 Form-A (No Monitoring) & 2 Form-C Outputs, 8 Digital Inputs
								6S	6S	6S	6S	6S	2 Form-A (No Monitoring) & 4 Form-C Outputs, 4 Digital Inputs
								6T	6T	6T	6T	6T	4 Form-A (No Monitoring) Outputs, 8 Digital Inputs
								6U	6U	6U	6U	6U	6 Form-A (No Monitoring) Outputs, 4 Digital Inputs
								6V	6V	6V	6V	6V	2 Form-A (Cur w/ opt Volt) 1 Form-C Output, 2 Latching Outputs, 8 Digital Inputs
								6W	6W	6W	6W	6W	30 Contact Inputs - Pin Terminals[3]
								6X	6X	6X	6X	6X	18 Form-A (No Monitoring) Outputs - Pin Terminals[3]
Transducer I/O								5A	5A	5A	5A	5A	4 dcmA Inputs, 4 dcmA Outputs
								5C	5C	5C	5C	5C	8 RTD Inputs
								5D	5D	5D	5D	5D	4 RTD Inputs, 4 dcmA Outputs
								5E	5E	5E	5E	5E	4 dcmA Inputs, 4 RTD Inputs
								5F	5F	5F	5F	5F	8 dcmA Inputs
Inter-Relay Communications												7B	1300 nm, multimode, LED, 1 Channel
												7C	1300 nm, singlemode, ELED, 1 Channel
												7H	820 nm, multimode, LED, 2 Channels
												7I	1300 nm, multimode, LED, 2 Channels
												7J	1300 nm, singlemode, ELED, 2 Channels
												7S	G.703, 2 Channels
												7W	RS422, 2 Channels
												76	IEEE C37.94, 820 nm, multimode, LED, 1 Channel
												77	IEEE C37.94, 820 nm, multimode, LED, 2 Channel

Ordering Notes:

1. To view all available model order codes, options for G60 or to order the UR Classic Front Panel, please visit GE Vernova's On-Line Store at https://store.gegridsolutions.com/viewproduct.aspx?Model=g60
2. Redundant power supply only available in horizontal unit. If redundant is chosen, must be same type. Maximum 2 per chassis
3. Option available soon
4. Process bus module requires empty slots next to it
5. Conventional DSP and Process Bus modules cannot run simultaneously

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

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