Multilin™ C30

CONTROLLER SYSTEM

Substation Hardened Programmable Logic Controller

KEY BENEFITS

- Powerful and deterministic programmable logic suitable for creating most customized automated substation control solutions
- Modular hardware architecture allowing for flexibility in the I/O configuration to support most bay management applications
- Three independent fiber or copper Ethernet ports for simultaneous/dedicated network connections with advanced 1 microsecond time synchronization via LAN with IEEE® 1588 support
- Reduced bay or station wiring through the use of high-speed peer-to-peer communication for sending and accepting control commands from other relays
- Simplified system integration and access to information through the use of multiple communication options and protocols not found in industrial grade PLCs
- Embedded IEC® 61850 protocol
- Increase network availability by reducing failover time to zero through IEC 62439-3 "PRP" support
- CyberSentry™ provides high-end cyber security aligned to industry standards and services (NERC® CIP, AAA, Radius, RBAC, Syslog)
- Robust network security enabling Critical Infrastructure Protection through user command logging, and dual permission access control
- Complete IEC 61850 Process Bus solution provides resource optimization and minimizes total P&C life cycle costs

APPLICATIONS

- Bay control and substation automation
- Programmable logic control
- UR I/O expansion
- Sequence of Events (SOE) recorder replacement

FEATURES

Protection and Control

- Programmable logic, timers, counters
- Distributed logic, remote I/O expansion
- User-definable protection elements
- Up to 96 digital inputs and 64 digital outputs
- Transducer I/Os (RTD, DCmA)

Communication

- Networking interfaces: up to three Ethernet ports 100Mb fiber or copper, RS485, RS232, RS422, G.703, C37.94
- Multiple protocols: IEC 61850, DNP 3.0 and Modbus® serial/TCP, IEEE 1588, IEC 60870-5-104, EGD, PRP
- Direct I/O: secure, high-speed exchange of data between URs for direct transfer trip and I/O extension applications
- Embedded managed Ethernet switch with four 100 Mbit fiber optic ports and 2 copper ports

IEC 61850 Process Bus Interface

- Robust communications with up to 8 HardFiber Bricks
- Redundant architecture for dependability and security

Monitoring and Metering

- Advanced recording capabilities deliver a 1024 event recorder, configurable and extended waveform capture and data logger
- Setting for security audit trails for tracking changes to the C30 configuration

EnerVista™ Software

- Graphical Logic Designer and Logic Monitor to simplify designing and testing procedures via EnerVista UR Engineer
- Service and update notification toolset ensures device documents and software are up-to-date via EnerVista Launchpad
- EnerVista Integrator providing easy integration of data in the C30 into new or existing monitoring and control systems

Protection and Control

The C30 controller system is a substation hardened device designed to perform substation control logic that can also expand the I/O capability of protection devices and replace existing SOE recorders. The C30 provides fast and deterministic execution of programmable logic with I/O capabilities far above an average protection relay. Graphical programming tools, supported by a library of logic operators, make the C30 simple to use and configure. Using high-speed peer-to-peer communications for inter-device messaging, the C30 can also accept signals and commands from other protection and control devices at a fraction of the cost of hard-wiring these signals. Control, automation, I/O expansion and data gathering are ideally suited for the C30 in the following applications:

- Bay control
- Substation automation
- Remote I/O

Advanced Automation

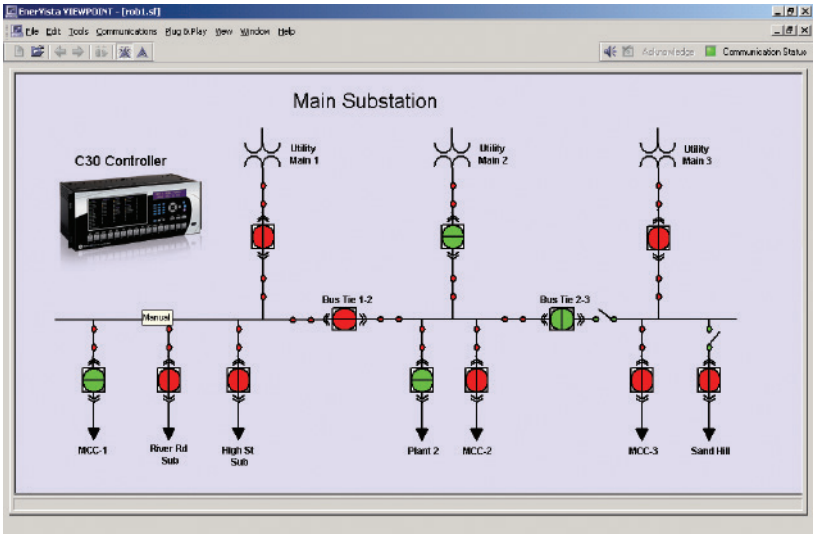
The C30 incorporates advanced automation features including powerful FlexLogic™ programmable logic, peer-to-peer communications and SCADA capabilities that far surpass what is found in the average PLC or controller. The C30 integrates seamlessly with other UR relays to extend the I/O capabilities and perform complete bay management and control.

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 the associated costs of auxiliary components and wiring. The execution of all logic is performed every 2ms regardless of the complexity or amount of logic used, providing the determinist operation required for utility power system control schemes.

Scalable Hardware

The C30 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.



The C30 is a complete solution for controlling and monitoring substation devices and can easily be connected directly into DCS or SCADA monitoring and control systems like Viewpoint Monitoring as shown.

- Flexible, modular I/O covering a broad range of input signals and tripping schemes
- RTDs and DCmA inputs are available to monitor equipment parameters such as temperature and pressure

IEC 61850 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 C30'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 GE Digital Energy web site for more details.

Monitoring and Metering

The C30 provides high resolution measuring of the status of external devices wired to its contact inputs. The changing of a contact input status can be measured and time-stamped with a 0.5ms resolution, making the C30 ideal for bay or substation SOE recording.

Fault and Disturbance Recording

The advanced disturbance and event recording features within the C30 can significantly reduce the time needed for postmortem analysis of power system events and the creation of regulatory reports.

Advanced Device Health Diagnostics

The C30 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.

Cyber Security – CyberSentry UR

CyberSentry UR enabled UR devices deliver full cyber security features that help customers to comply with NERC CIP and NIST® IR 7628 cyber security requirements. 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 C30 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 C30 supports the most popular industry standard protocols enabling easy, direct integration into DCS and SCADA systems.

- IEC 61850 with 61850-90-5 support
- DNP 3.0
- Ethernet Global Data (EGD)
- IEC 60870-5-104
- Modbus RTU, Modbus TCP/IP
- PRP as per IEC 62439-3
- IEEE 1588 for time synchronization

Interoperability with Embedded IEC 61850

Use the C30 with integrated IEC 61850 to lower costs associated with breaker protection, control and automation. GE Digital Energy's leadership in IEC 61850 comes from thousands of installed devices and follows on seven years of development experience with UCA 2.0.

- Replace expensive copper wiring between devices with direct transfer of data using GOOSE messaging
- Configure GE systems based on IEC 61850 and also monitor and troubleshoot them in real-time with EnerVista Viewpoint Engineer
- Multicast IEEE C37.118 synchrophasor data between PMU and PDC devices using IEC 61850-90-5

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.

Multi-Language

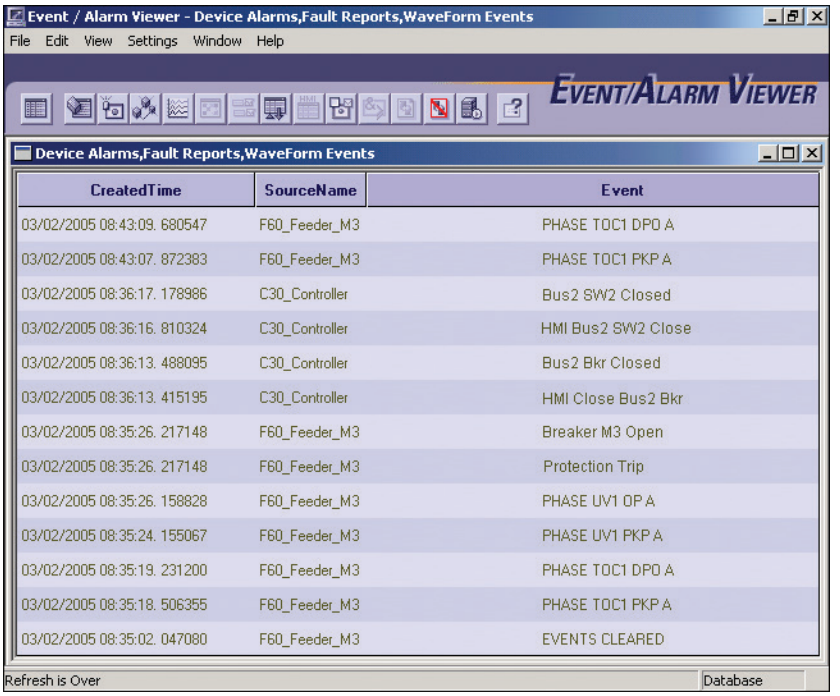
The C30 supports English, French, Russian, Chinese and Turkish languages on the front panel, EnerVista setup software, and product manual. Easily switch between English and an additional language on the local displays without uploading new firmware.

EnerVista Software

The EnerVista suite is an industry-leading set of software programs that simplifies every aspect of using the C30 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 C30 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.

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



The Viewpoint Monitoring software can merge the events logged by the C30 with those logged in other Multilin relays to create a station-wide SOE record.

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

Viewpoint UR Engineer

Viewpoint UR Engineer is a set of powerful tools that will allow the configuration and testing of GE relays at a system level in an easy-to-use graphical drag-and-drop environment. Viewpoint UR Engineer provides the following configuration and commissioning utilities:

- Graphical Logic Designer
- Graphical System Designer
- Graphical Logic Monitor
- Graphical System Monitor

Viewpoint Maintenance

Viewpoint Maintenance provides tools that will create reports on the operating status of the relay, simplify the steps to download fault and event data, and reduce the work required for cyber security compliance audits. Tools available in Viewpoint Maintenance include:

- Settings Security Audit Report
- Device Health Report
- Single-Click Fault Data Retreival

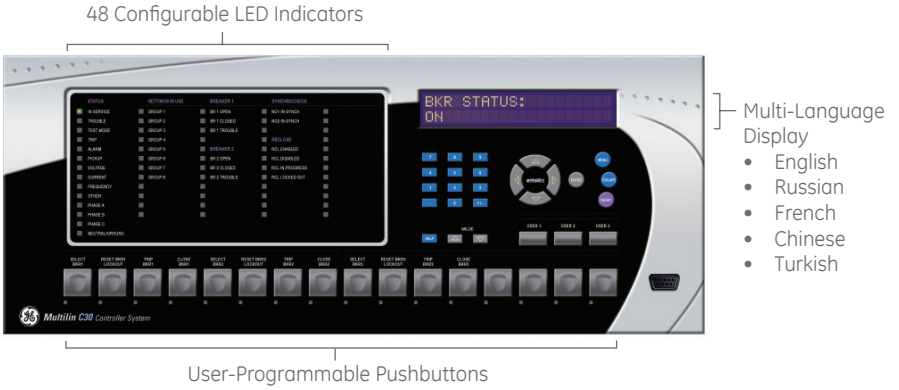
EnerVista Integrator

EnerVista Integrator is a toolkit that allows seamless integration of Multilin devices into new or existing automation systems. Included in EnerVista Integrator is:

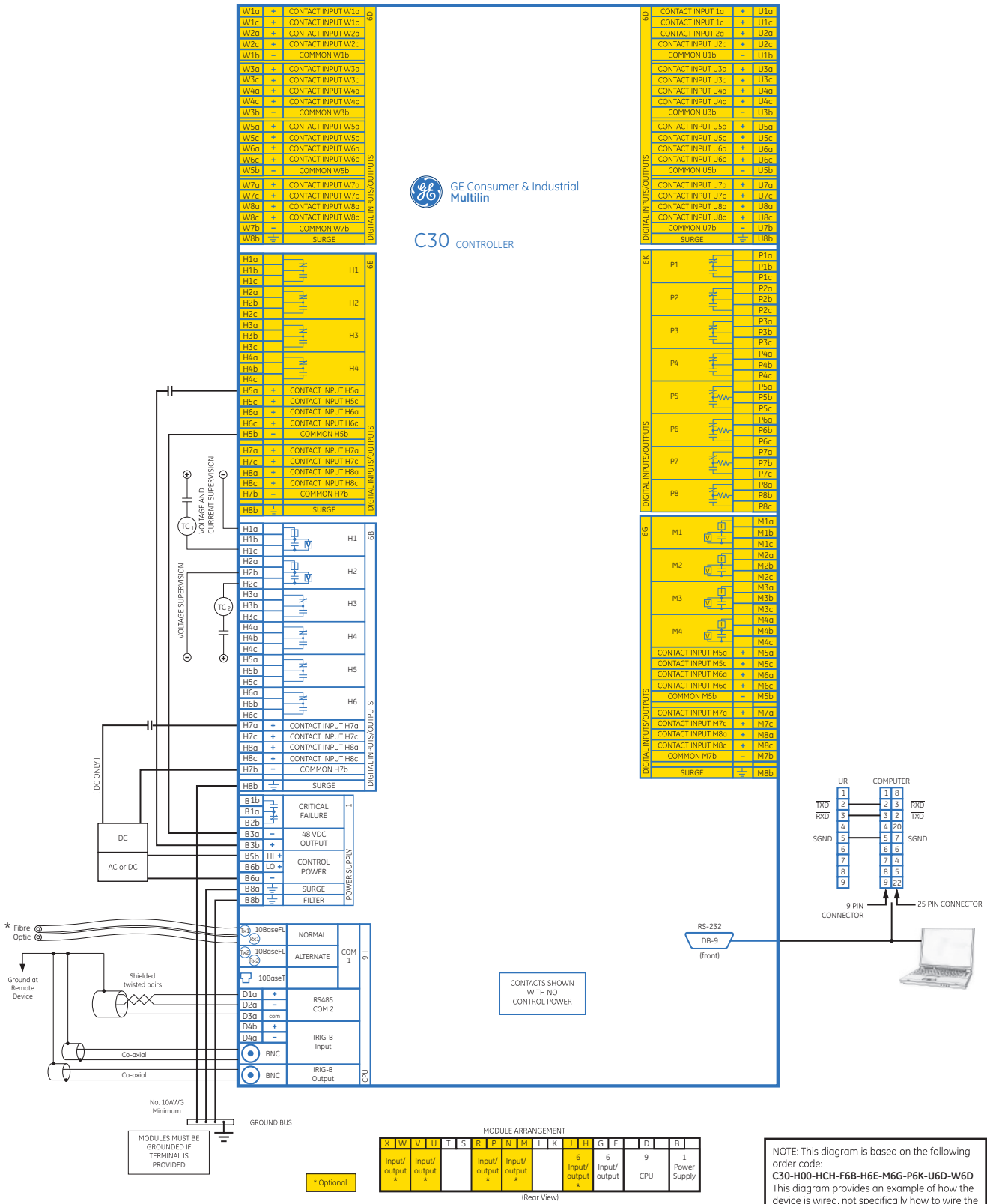
- OPC/DDE Server
- Multilin Drivers
- Automatic Event Retrieval
- Automatic Waveform Retrieval

User Interface

The C30 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.



Typical Wiring



NOTE: This diagram is based on the following order code:
C30-H00-HCH-F6B-H6E-M6G-P6K-U6D-W6D
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

C30 - *	** - H	*	*	- F** -	H** -	M**	- P** -	U** -	W**	For Full Sized Horizontal Mount
C30										Base Unit
CPU	E									RS485 + RS485
	G									RS485 + Multimode ST 10BaseF
	H									RS485 + Mutlimode ST Redundant 10BaseF
	J									RS485 + Multimode ST 100BaseFX
	K									RS485 + Multimode ST Redundant 100BaseFX
	N									RS485 + 10/100 BaseT
	T									RS485 + three Multimode SFP LC 100BaseFX. Req FW v7xx or higher
	U									RS485 + two Multimode SFP LC 100BaseFX + one SFP RJ45 100BaseT. Req FW v7xx or higher
	V									RS485 + three SFP RJ45 100BaseT. Req FW v7xx or higher
Software Options (see note 1 below)	00									No Software Options
	01									Ethernet Global Data
	03									IEC 61850
	04									Ethernet Global Data (EGD) + IEC 61850
	A0									CyberSentry UR Lvl 1. Req UR FW 7.xx or higher
	B0									IEEE 1588. Req UR FW 7.xx or higher
	C0									PRP
	D0									IEEE 1588 + CyberSentry UR. Req UR FW 7.xx or higher
Mount/Coating		H								Horizontal (19" rack) - Standard
		A								Horizontal (19" rack) - Harsh Chemical Environment Option
		V								Vertical (3/4 size) - Standard
		B								Vertical (3/4 size) - Harsh Chemical Environment Option
User Interface			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
			F							Vertical Front Panel with English display
			W							Enhanced Turkish Front Panel
			Y							Enhanced Turkish Front Panel with User-Programmable Pushbuttons
Power Supply (see note 2 below)				H						125 / 250 V AC/DC
				H					RH	125/250 V AC/DC with redundant 125/250 V AC/DC power supply
				L						24 - 48 V (DC only)
IEC 61850 Process Bus					81					8 Port IEC 61850 Process Bus Module
Digital I/O					XX	XX	XX	XX	XX	XX	No module
					4A	4A	4A	4A	4A	4A	4 Solid State (No Monitoring) MOSFET Outputs
					4B	4B	4B	4B	4B	4B	4 Solid State (Voltage w/opt Current) MOSFET Outputs
					4C	4C	4C	4C	4C	4C	4 Solid State (Current w/opt Voltage) MOSFET Outputs
					4D	4D	4D	4D	4D	4D	16 Digital Inputs with Auto-Burnish
					4L	4L	4L	4L	4L	4L	14 Form-A (No Monitoring) Latchable Outputs
					67	67	67	67	67	67	8 Form-A (No Monitoring) Outputs
					6A	6A	6A	6A	6A	6A	2 Form-A (Voltage w/ opt Current) & 2 Form-C Outputs, 8 Digital Inputs
					6B	6B	6B	6B	6B	6B	2 Form-A (Voltage w/ opt Current) & 4 Form-C Outputs, 4 Digital Inputs
					6C	6C	6C	6C	6C	6C	8 Form-C Outputs
					6D	6D	6D	6D	6D	6D	16 Digital Inputs
					6E	6E	6E	6E	6E	6E	4 Form-C Outputs, 8 Digital Inputs
					6F	6F	6F	6F	6F	6F	8 Fast Form-C Outputs
					6G	6G	6G	6G	6G	6G	4 Form-A (Voltage w/ opt Current) Outputs, 8 Digital Inputs
					6H	6H	6H	6H	6H	6H	6 Form-A (Voltage w/ opt Current) Outputs, 4 Digital Inputs
					6K	6K	6K	6K	6K	6K	4 Form-C & 4 Fast Form-C Outputs
					6L	6L	6L	6L	6L	6L	2 Form-A (Current w/ opt Voltage) & 2 Form-C Outputs, 8 Digital Inputs
					6M	6M	6M	6M	6M	6M	2 Form-A (Current w/ opt Voltage) & 4 Form-C Outputs, 4 Digital Inputs
					6N	6N	6N	6N	6N	6N	4 Form-A (Current w/ opt Voltage) Outputs, 8 Digital Inputs
					6P	6P	6P	6P	6P	6P	6 Form-A (Current w/ opt Voltage) Outputs, 4 Digital Inputs
					6R	6R	6R	6R	6R	6R	2 Form-A (No Monitoring) & 2 Form-C Outputs, 8 Digital Inputs
					6S	6S	6S	6S	6S	6S	2 Form-A (No Monitoring) & 4 Form-C Outputs, 4 Digital Inputs
					6T	6T	6T	6T	6T	6T	4 Form-A (No Monitoring) Outputs, 8 Digital Inputs
					6U	6U	6U	6U	6U	6U	6 Form-A (No Monitoring) Outputs, 4 Digital Inputs
					6V	6V	6V	6V	6V	6V	2 Form-A (Cur w/ opt Volt) 1 Form-C Output, 2 Latching Outputs, 8 Digital Inputs
Transducer I/O					5A	5A	5A	5A	5A	5A	4 dcmA Inputs, 4 dcmA Outputs
					5C	5C	5C	5C	5C	5C	8 RTD Inputs
					5D	5D	5D	5D	5D	5D	4 RTD Inputs, 4 dcmA Outputs
					5E	5E	5E	5E	5E	5E	4 dcmA Inputs, 4 RTD Inputs
					5F	5F	5F	5F	5F	5F	8 dcmA Inputs
Inter-Relay Communications										2A	C37.94SM, 1300nm singlemode, ELED, 1 channel singlemode
										2B	C37.94SM, 1300nm singlemode, ELED, 2 channel singlemode
										7A	820 nm, multimode, LED, 1 Channel
										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
										7R	G.703, 1 Channel
										7S	G.703, 2 Channels
										7T	RS422, 1 Channel
										7W	RS422, 2 Channels
										76	IEEE C37.94, 820 nm, multimode, LED, 1 Channel
										77	IEEE C37.94, 820 nm, multimode, LED, 2 Channels

Ordering Note:
1. To view all the options available for C30, please visit GE's On-Line Store at http://store.gedigitalenergy.com/viewprod.asp?model=C30
2. Redundant power supply only available in horizontal unit. If redundant is chosen, must be same type. Maximum 2 per chassis

Accessories for the C30

- UR Applications I Learning CD — TRCD-URA1-C-S-1
- Multilink Ethernet Switch — ML2400-F-HI-HI-A2-A2-A6-F1
- Viewpoint Engineer — VPE-1
- Viewpoint Maintenance — VPM-1
- Viewpoint Monitoring IEC 61850 — VP-1-61850

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