

Multilin™ B30

BUS DIFFERENTIAL SYSTEM

Cost effective low impedance biased bus differential protection for up to six feeders



KEY BENEFITS

- High speed differential protection algorithm for enhanced with Subcycle trip times of 0.75 power cycle
- Complete IEC 61850 Process Bus solution providing resource optimization and minimizing total P&C lifecycle costs
- Superior CT saturation detector capable of detecting CT saturation even with only 2 msec of saturation free current for enhanced through fault stability.
- Ambient temperature monitoring with alarming when outside temperature exceeds upper thresholds
- Cost effective alternative to high impedance schemes
- Advanced automation capabilities for providing customized protection and control solutions
- High-end fault and disturbance recording, including internal relay operating signals provided thus eliminating the need for redundant recording devices
- Application flexibility with multiple I/O options and programmable logic (FlexLogic™)
- Robust network security enabling Critical Infrastructure Protection through user command logging, and dual permission access control
- Simplified system integration with communications supporting serial and Ethernet interfaces and multiple protocols
- Embedded IEC61850 Protocol with no external communications hardware required

APPLICATIONS

- Re-configurable simple bus applications, up to 6 feeders and 2 differential zones with breaker failure
- Integrated bus protection and metering for HV and EHV substations

FEATURES

Protection and Control

- Differential protection with restrained and unrestrained function
- Fast and reliable CT saturation detection
- Breaker failure protection
- External Check-zone
- CT ratio mismatch compensation
- Dynamic Bus Replica
- Thermal overload and Back-up phase, ground and neutral time and instantaneous overcurrent protection
- Undervoltage function for supervision purposes

Communications

- Networking options - Ethernet-fiber (optional redundancy), RS422, RS485, G.703, C37.94
- Multiple protocols - IEC61850, DNP 3.0 Level 2, Modbus RTU, Modbus TCP/IP, IEC 60870-5-104
- Direct I/O - secure high-speed exchange of binary data between URs

IEC 61850 Process Bus Interface

- Robust communications with up to 8 HardFiber Bricks
- Seamless integration with existing B30 functions
- Redundant architecture for dependability and security

Monitoring and Metering

- Isolator monitoring
- CT trouble monitoring, VT supervision
- Metering - current, voltage, frequency
- Oscillography - 64 samples/cycle, up to 64 records
- Event Recorder - 1024 time tagged events, with 0.5 ms scan of digital inputs

EnerVista™ Software

- Graphical Logic Designer and Logic Monitor to simplify designing and testing procedures
- Document and software archiving toolset to ensure reference material and device utilities are up-to-date
- EnerVista™ Integrator providing easy integration of data in the B30 into new or existing monitoring and control systems

Protection and Control

The B30 Bus Differential System provides, secure, subcycle low impedance bus protection for a single busbar with up to six feeders. The B30 is ideally suited in applications where high impedance schemes were typically used. Overall system costs can be reduced with the B30, since there is no need for dedicated, or interposing, CTs. The B30 comes with advanced features, such as breaker failure, CT trouble detection, under-voltage supervision, and dynamic bus replica. With its extreme flexibility, which includes a CT ratio mismatch of up to 32:1 between terminals, the B30 is the ideal solution in a wide variety of bus differential applications.

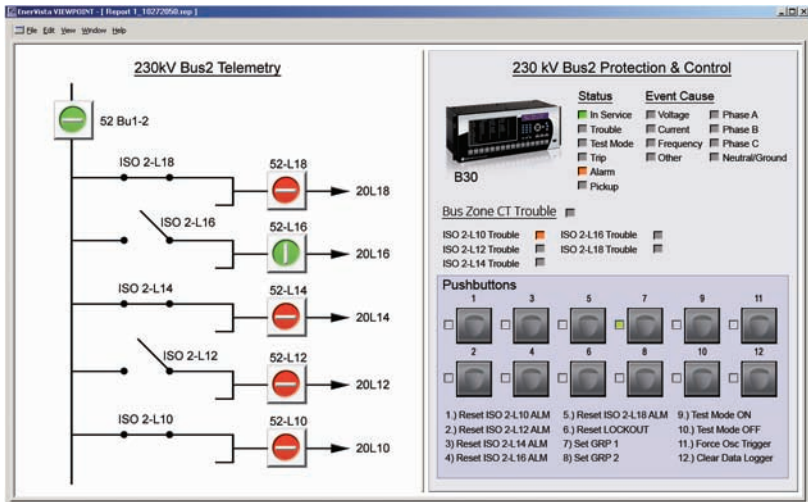
Part of the Universal Relay family, the B30 comes with a variety of versatile features truly integrating protection, monitoring, metering, communication and control in one easy-to-use device. The Universal Relay family offers higher degree of modularity in its design and functionality providing superior performance in protection and control meeting the toughest requirements of the marketplace.

Bus Differential Protection

The B30 is based on a centralized phase-segregated architecture that does not rely on extensive communications between IEDs, an approach that increases overall reliability.

The B30 provides fast and secure low impedance bus protection with sub-cycle tripping times averaging 0.75 cycles. The

B30 - Protection, Metering, Monitoring and Control



The B30 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.

primary protection is based on differential and directional protection principles, and uses a dedicated CT saturation mechanism for additional through-fault stability. This mechanism is capable of detecting saturation of CTs as quickly as two milliseconds into an external fault. The overall system costs can be reduced with the B30 since there is no need for dedicated, or interposing, external CTs. The two differential zones can handle two small buses, split bus, or single bus bar with supervision zone.

Dynamic Bus Replica

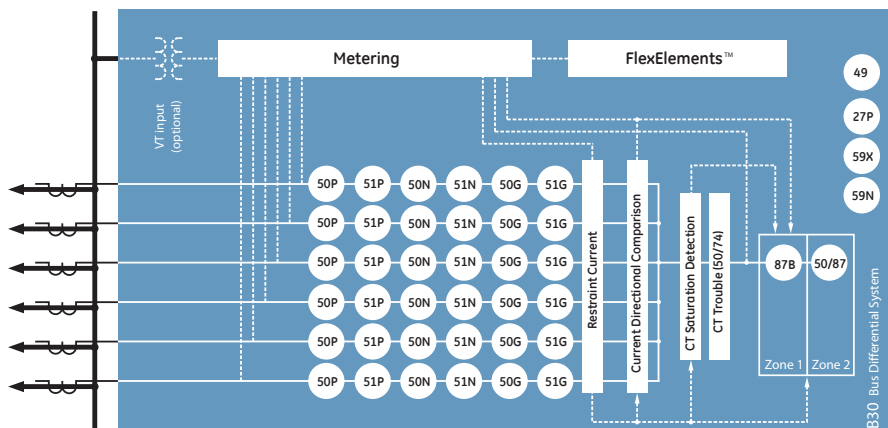
The B30 provides a dynamic bus replica for each zone of differential protection. Built-in programmable logic removes the need for external auxiliary relays, and provides the ability to include or exclude

currents dynamically from the differential zones. This allows the B30 to follow the actual busbar configuration with no external switching of CT circuits required. The B30 also avoids blind and overtripping spots in simple bus configurations. Reliability is increased and costs reduced by eliminating auxiliary relays that would otherwise be used for switching physical currents. The ability to monitor auxiliary switches and a contact discrepancy alarm also provides increased security.

Breaker Failure Protection

Three-pole breaker failure (BF) protection is available. The B30 system provides for up to 6 BF elements that can respond to currents and/or auxiliary contacts. The current supervision provides fast reset

Functional Block Diagram



ANSI Device Numbers & Functions

Device Number	Function
27P	Phase Undervoltage
49	Thermal overload
50G	Ground Instantaneous Overcurrent
50N	Neutral Instantaneous Overcurrent
50P	Phase Instantaneous Overcurrent
50/74	CT Trouble
50/87	Unrestrained Bus Differential
51G	Ground Time Overcurrent
51N	Neutral Time Overcurrent
51P	Phase Time Overcurrent
59N	Neutral Overvoltage
59X	Auxiliary Overvoltage
87B	Restrained Bus Differential

time and separate settings for low-set and hi-set are implemented. The BF can be initiated internally from the busbar protection or externally via input contacts or communications.

Backup Protection

Backup protection is available with instantaneous and time overcurrent functions for each current input of the B30 system. For supervision purposes, an undervoltage function is also provided for each voltage input of the B30 system.

- IOC Functions: Two separate IOC functions are available for trip supervision or other user-configurable applications
- TOC: One TOC function is incorporated for each CT input of the relay. Up to 6 TOCs are available for backup protection. The TOC function can use standard or user-programmable curves

- Voltage Supervision: up to two undervoltage elements are available per each VT input of the relay. This function may be used to supervise the current-based protection functions for extra security

External Check-Zone

An optional external check-zone can be used to prevent operation of the differential protection due to CT troubles. If one B30 current input is left unused and an alternative set of current signals is available from independent CTs, the currents can be combined externally and connected to the relay. Two phase overcurrent elements are available to check the level of this independently formed differential current to supervise the main differential protection.

IEC 61850 Process Bus

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

The GE 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 B30's by replacing traditional CT/VT inputs with IEC 61850 Process Bus module
- No new Cyber Security concerns

Built-in Advanced Disturbance Recording

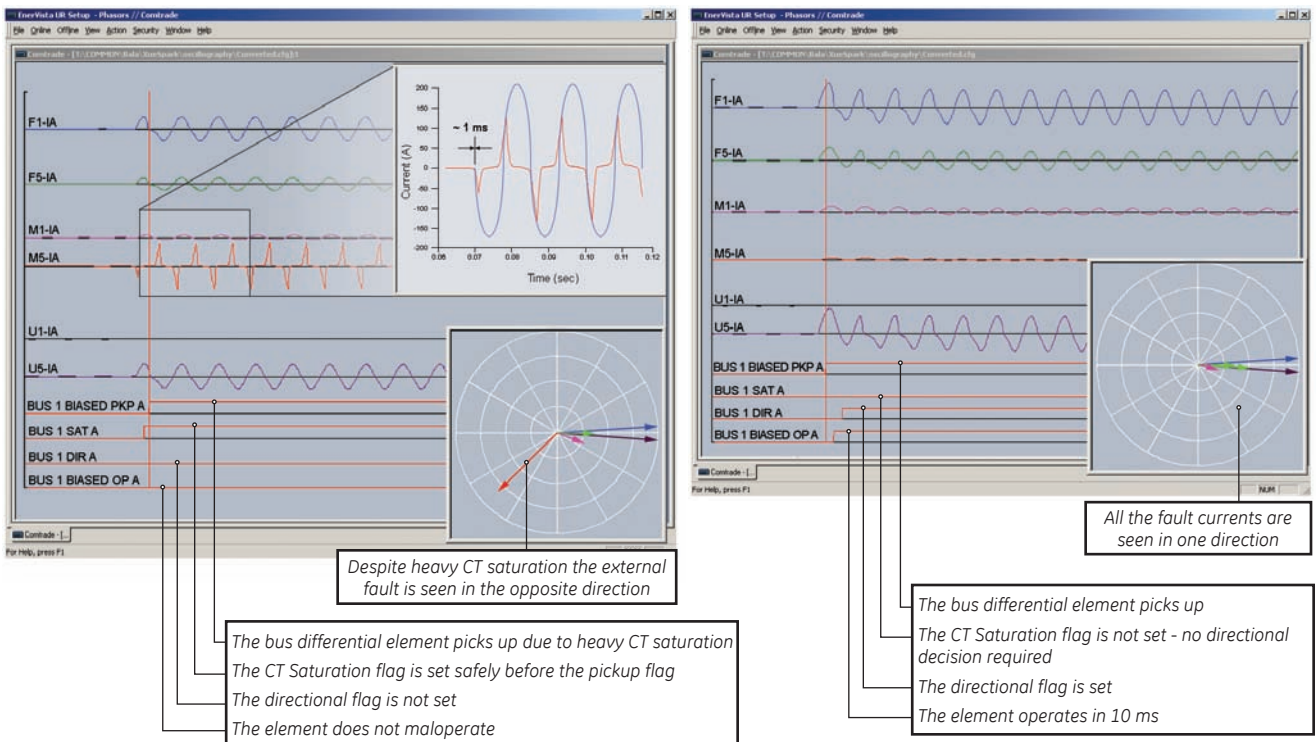
The built-in advanced disturbance recording function allows users to view the COMTRADE files and trouble shoot bus fault. The internal operation of the B30 elements, logic, and outputs can be monitored in real time to simplify commissioning and troubleshooting procedures. Two cases are shown here:

External Fault:

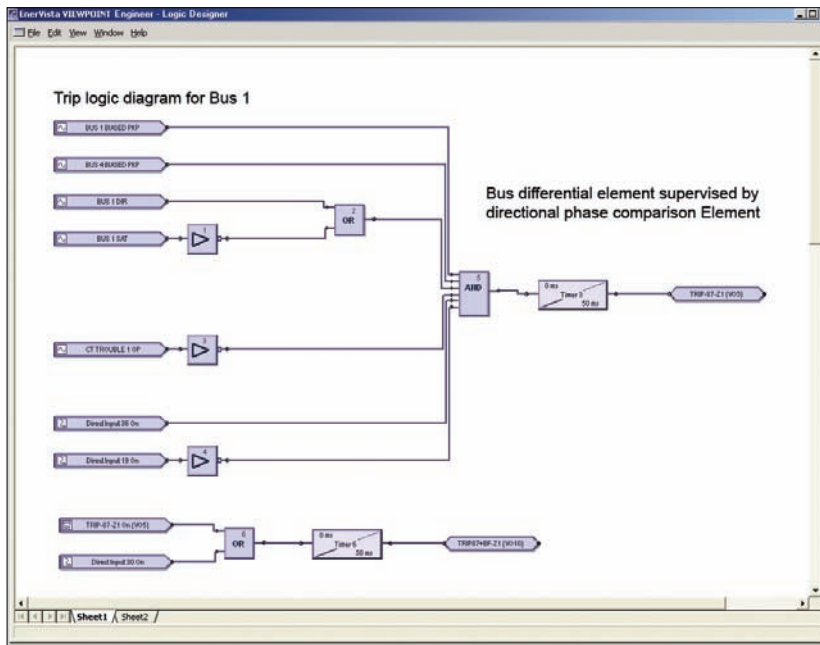
Even with heavy CT saturation and with only 1 msec of saturation free current B30 is stable for through faults. See the Directional Comparison element output, which adds additional security to the bus differential function

Internal Fault:

For internal fault the CT saturation flag is not set and the directional element output is safely ignored resulting in an operating time of less than 10 msec.



Custom Programmable Logic Designer



The internal operation of the B30 elements, logic, and outputs can be monitored in real time to simplify commissioning and troubleshooting procedures

Visit the HardFiber System product page on the GE Multilin web site for more details.

Advanced Automation

The B30 incorporates advanced automation features including powerful FlexLogic™ programmable logic, communication, and SCADA capabilities that far surpass what is found in the average bus relay. The B30 integrates seamlessly with other UR relays for complete system protection.

FlexLogic™

FlexLogic™ is the powerful UR-platform programming logic engine that provides the ability of creating customized protection and control schemes thereby minimizing the need, and the associated costs, of auxiliary components and wiring. Using FlexLogic™, the B30 can be programmed to provide required tripping logic along with custom scheme logic for breaker control, transfer tripping schemes for remote breakers and dynamic setting group changes.

Scalable Hardware

The B30 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 implementation of many different schemes
- Flexible, modular I/O covering a broad range of input signals and tripping schemes
- Types of digital outputs include tri-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 & pressure

Monitoring and Metering

The B30 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 B30 can significantly reduce the time needed for postmortem analysis of power system events and creation of regulatory reports. Recording functions include:

- Sequence of Event (SOE)
 - 1024 time stamped events
- Oscillography,
 - 64 digital & up to 40 Analog channels
- Data Logger, disturbance recording – 16 channels up to 1 sample / cycle / channel
- Fault Reports
 - Powerful summary report of pre-fault and fault values

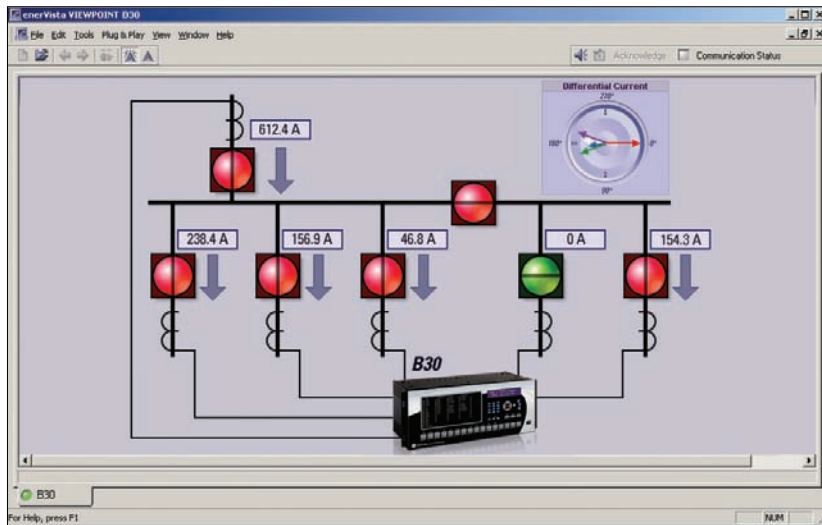
The very high sampling rate and large amount of storage space available for data recording in the B30 can eliminate the need for installing costly standalone recording equipment.

Advanced Device Health Diagnostics

The B30 performs comprehensive device health diagnostic tests during startup and continuously at runtime 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 helps improve system uptime.

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

Substation Monitoring



Monitor the status of your substation using the easy to use Viewpoint Monitoring HMI

Communications

The B30 provides for secure remote data and engineering access, making it easy and flexible to use and integrate into new and existing infrastructures. 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 redundant Ethernet option provides the means of creating fault tolerant communication architectures in an easy, cost-effective manner.

The B30 supports the most popular industry standard protocols enabling easy, direct integration into DCS and SCADA systems.

- IEC61850
- DNP 3.0
- IEC60870-5-104
- Modbus RTU, Modbus TCP/IP

Interoperability with Embedded IEC61850

The B30 with integrated IEC61850 can be used to lower costs associated with bus protection, control, and automation. GE Multilin's leadership in IEC61850 comes from thousands of installed devices and follows on Multilin's extensive development experience with UCA 2.0.

- Replace expensive copper wiring between devices with direct transfer of data using GOOSE messaging
- Configure systems based on IEC61850 and also monitor and troubleshoot them in real-time with EnerVista™ Viewpoint Engineer
- Integrate GE Multilin IEDs and generic IEC61850-compliant devices seamlessly in EnerVista™ Viewpoint Monitoring

Direct I/O Messaging

Direct I/O allows for 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

Multi-Language

The B30 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 B30 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 B30 into DCS or SCADA monitoring systems. Convenient COMTRADE and Sequence of Events viewers are an integral part of the UR Setup software included with every UR relay, to carry out postmortem event analysis to 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 GE Multilin products. The setup software within Launchpad allows configuring 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
- FAQ's
- 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 Engineer

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

EnerVista™ Integrator

EnerVista™ Integrator is a toolkit that allows seamless integration of GE Multiin

devices into new or existing automation systems. Included in EnerVista Integrator is:

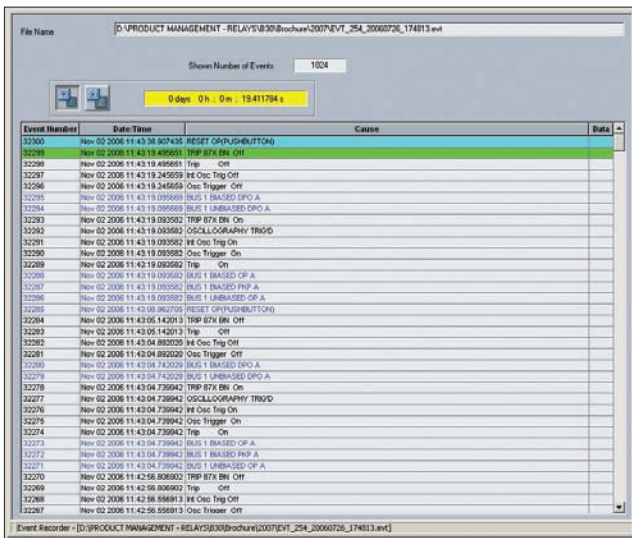
- OPC/DDE Server
- GE Multiin Drivers
- Automatic Event Retrieval
- Automatic Waveform Retrieval

User Interface

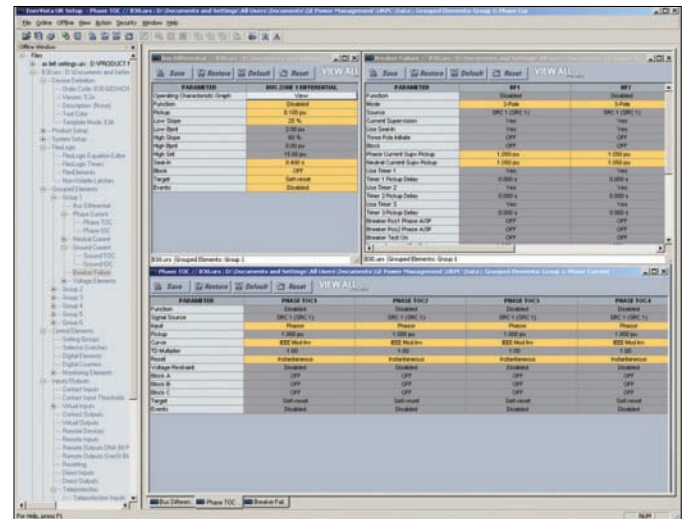
The B30 front panel provides extensive local HMI capabilities. The local display is used for monitoring, status messaging, fault diagnosis, and device configuration. User configurable messages that combine text with live data, can be displayed when user-defined conditions are met.



Simplifying Commissioning and Testing

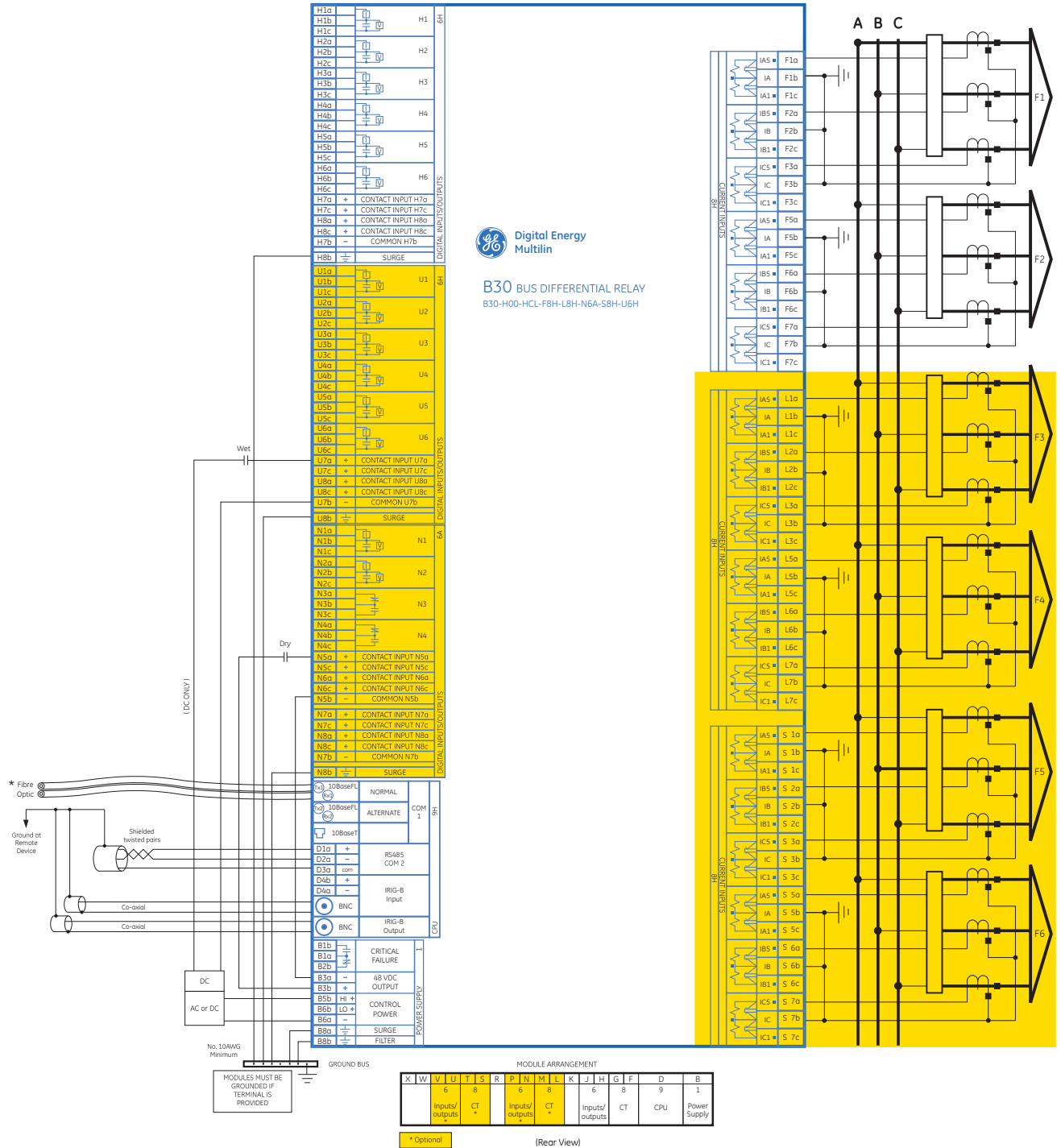


Record the operation of the internal B30 relays and external connected devices with 1ms time-stamped accuracy



Create B30 Setting File Templates to ensure critical settings are not altered

Typical Wiring



Bus Protection

Ordering

	B30	*	**	-	H	*	-	F**	H**	-	L**	N**	S**	-	U**	-	W**		
Base Unit CPU	B30	E G H J K N			H														For Full Sized Horizontal Mount Base Unit RS485 + RS485 (IEC61850 option not available) RS485 + 10BaseF RS485 + Redundant 10BaseF RS485 + Multi-mode ST 100BaseFX RS485 + Multi-mode ST Redundant 100BaseFX RS485 + 10/100 BaseT No Software Options IEC61850
Software Options			00 03																Horizontal (19" rack) Horizontal (19" rack) - Harsh Chemical Environment Option Enhanced English Front Panel Enhanced English Front Panel with User-Programmable Pushbuttons Enhanced French Front Panel Enhanced French Front Panel with User-Programmable Pushbuttons Enhanced Russian Front Panel Enhanced Russian Front Panel with User-Programmable Pushbuttons Enhanced Chinese Front Panel Enhanced Chinese Front Panel with User-Programmable Pushbuttons Basic Front Panel with English display Enhanced Turkish Front Panel Enhanced Turkish Front Panel with User-Programmable Pushbuttons
Mount/Coating					H A														
User Interface																			
Power Supply					H L												RH		125 / 250 V AC/DC 125/250 V AC/DC with redundant 125/250 V AC/DC power supply 24 - 48 V DC only)
CT/VT DSP								8L 8M 8N 8R			8L 8M 8N 8R		8L 8M 8N 8R						Standard 4CT/4VT w/ enhanced diagnostics Sensitive Ground 4CT/4VT w/ enhanced diagnostics Standard 8CT w/ enhanced diagnostics Sensitive Ground 8CT w/ enhanced diagnostics 8 Port IEC 61850 Process Bus Module
IEC 61850 Process Bus									81										No module
Digital I/O									XX 4A 4C 4D 4L 67 6C 6D 6E 6F 6K 6L 6M 6N 6P 6R 6S 6T 6U 6V		XX 4A 4C 4D 4L 67 6C 6D 6E 6F 6K 6L 6M 6N 6P 6R 6S 6T 6U 6V		XX 4A 4C 4D 4L 67 6C 6D 6E 6F 6K 6L 6M 6N 6P 6R 6S 6T 6U 6V				4 Solid State (No Monitoring) MOSFET Outputs 4 Solid State (Current w/opt Voltage) MOSFET Outputs 16 Digital Inputs with Auto-Burnish 14 Form-A (No Monitoring) Latchable Outputs 8 Form-A (No Monitoring) Outputs 8 Form-C Outputs 16 Digital Inputs 4 Form-C Outputs, 8 Digital Inputs 8 Fast Form-C Outputs 4 Form-C & 4 Fast Form-C Outputs 2 Form-A (Current w/ opt Voltage) & 2 Form-C Outputs, 8 Digital Inputs 2 Form-A (Current w/ opt Voltage) & 4 Form-C Outputs, 4 Digital Inputs 4 Form-A (Current w/ opt Voltage) Outputs, 8 Digital Inputs 6 Form-A (Current w/ opt Voltage) Outputs, 4 Digital Inputs 2 Form-A (No Monitoring) & 2 Form-C Outputs, 8 Digital Inputs 2 Form-A (No Monitoring) & 4 Form-C Outputs, 4 Digital Inputs 4 Form-A (No Monitoring) Outputs, 8 Digital Inputs 2 Form-A (No Monitoring) Outputs, 4 Digital 2 Form-A (Cur w/ opt Volt) 1 Form-C Output, 2 Latching Outputs, 8 Digital Inputs 4 dcmA Inputs, 4 dcmA Outputs 8 dcmA Inputs		
Transducer I/O								5A 5F			5A 5F		5A 5F						820 nm, multi-mode, LED, 1 Channel 1300 nm, multi-mode, LED, 1 Channel 1300 nm, single-mode, ELED, 1 Channel 820 nm, multi-mode, LED, 2 Channels 1300 nm, multi-mode, LED, 2 Channels 1300 nm, single-mode, ELED, 2 Channels G.703, 2 Channels RS422, 2 Channels IEEE C37.94, 820 nm, multimode, LED, 2 Channel
Inter-Relay Communications																	2B 7A 7B 7C 7H 7I 7J 7S 7W 77		C37.94SM, 1300nm single-mode, ELED, 2 channel single-mode 820 nm, multi-mode, LED, 1 Channel 1300 nm, multi-mode, LED, 1 Channel 1300 nm, single-mode, ELED, 1 Channel 820 nm, multi-mode, LED, 2 Channels 1300 nm, multi-mode, LED, 2 Channels 1300 nm, single-mode, ELED, 2 Channels G.703, 2 Channels RS422, 2 Channels IEEE C37.94, 820 nm, multimode, LED, 2 Channel

Ordering Note:

- 1 - For vertical mounting order codes, please visit our online store or review the B30 instruction manual
- 2 - To view the latest options available for theB30, or to order the UR Classic Front Panel, please visit our online store for more details.

Accessories for the B30

- UR Applications I Learning CD TRCD-URA1-C-S-1
- Multilink Ethernet Switch ML2400-F-HI-HI-A2-A2-A6-G1
- Viewpoint Engineer VPE-1
- Viewpoint Maintenance VPM-1
- Viewpoint Monitoring IEC61850 VP-1-61850

Visit www.GEMultilin.com/B30 to:



- View Guideform specifications
- Download the instruction manual
- Review applications notes and support documents
- Buy a B30 online
- View the UR Family brochure