

Overview

The Universal Relay (UR) is a family of leading edge protection and control products built on a common modular platform. All UR products feature high-performance protection, expandable I/O options, integrated monitoring and metering, high-speed communications, and extensive programming and configuration capabilities. The UR forms the basis of simplified power management for the protection of critical assets, either as a stand-alone device or within an overall power automation system.

The UR is managed and programmed through EnerVista Launchpad. This powerful software package, which is included with each relay, not only allows the setpoints of the relay to be programmed, but also provides the capability to manage setpoint files, automatically access the latest versions of firmware/documentation and provide a window into the substation automation system.

The UR can be supplied in a variety of configurations and is available as a 19-inch rack horizontal mount unit or a reduced size (3/4) vertical mount unit. The UR consists of the following modules: power supply, CPU, CT/VT input, digital input/output, transducer input/output, inter-relay communications, communication switch and IEC Process Bus. All hardware modules and software options can be specified at the time of ordering.

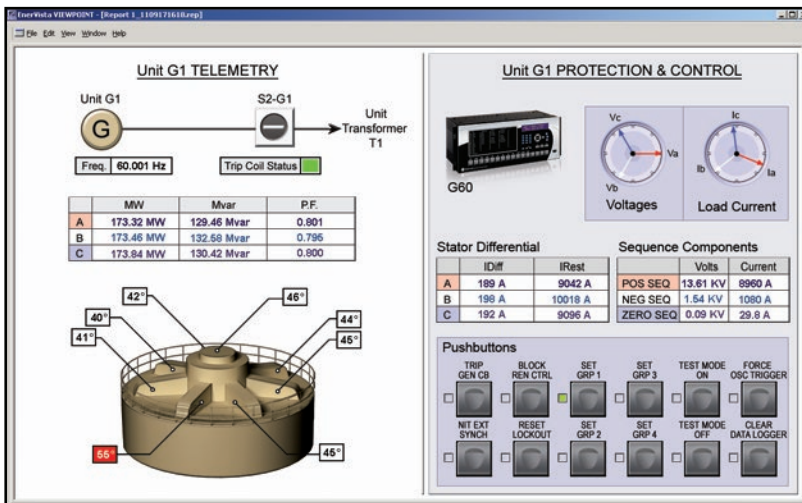
Protection and Control

The UR incorporates the most complete and unique protection algorithms to provide unparalleled security and system uptime. The UR selector guide (in the following pages) lists all the protection elements found in each relay. To support the protection and control functions of the UR, various types and forms of I/O are available (specific capabilities are model dependent). Supported I/Os include:

CTs and VTs

Up to 24 analog current transformer (CT) and voltage transformer (VT) signals can be configured to monitor AC power lines. Both 1 A and 5 A CTs are supported. Special function modules are available including: a CT module with sensitive ground input to provide ground fault protection on high-impedance grounded systems, and a high-impedance fault detection module that provides fast and reliable detection of faults caused by downed conductors.

UR – Protection, Metering, Monitoring and Control



The UR 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.

Digital I/O

Up to 96 contact inputs (with utility voltage rating up to 250V), and up to 64 contact outputs, are available and can be used to monitor and control a wide range of auxiliary equipment found within a substation or other protection application. Types of digital I/O cards include trip-rated Form-A, Form-C, Fast Form-C, latching and Solid State Relay (SSR), with or without DC voltage, current monitoring and isolated inputs (with auto burnish feature). Mechanically latching outputs can be used to develop secure interlocking applications and replace mechanical switches and lockout relays. Form-A digital outputs have activation speeds of less than 4ms and both wet and dry contacts are supported.

Solid state output modules with high current breaking capability, fast tripping and reset time are ideal for direct tripping applications.

Transducer I/O

RTDs and DCmA cards are available to monitor system parameters, such as temperature, vibration, pressure, wind speed, and flow. Analog outputs can be used for hardwired connections from the controller to a SCADA system, to a programmable logic controller (PLC), or to other user interface devices (eg. panel display).

Advanced Automation

The UR incorporates advanced automation features including powerful FlexLogic programmable logic, communication, and

SCADA capabilities that far surpass what is found in the average protection relay. Each UR can be seamlessly integrated with other UR relays for complete system protection 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 associated costs of, auxiliary components and wiring. Using FlexLogic, the UR can be programmed to provide the required tripping logic along with custom scheme logic for breaker control (including interlocking with external synchronizers), transfer tripping schemes for remote breakers and dynamic setting group changes.

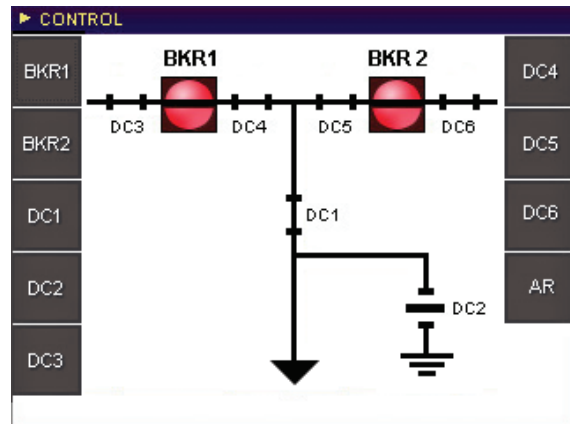
Scalable Hardware

The UR 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 I/O covering a broad range of input signals and tripping schemes with trip rated Form-A, SSR, Form-C and mechanically latched relays

DFR – SUMMARY				
	Ready to Capture	Memory Available		
Fault Report	●	●		
Transient Recorder	●	●		
Disturbance Recorder	●	●		
Records	Latest	Total		
Events	Mar 05 2009 12:23:23:637727	431		
Faults	Mar 05 2009 12:23:20:735543	1		
Transients	Mar 05 2009 12:23:20:721634	1		
Disturbances	Mar 04 2009 02:47:12:346789	3		
Summary	SOE	Fault Reports	Transient	Disturbance

Digital fault recorder summary with the latest information on the events, faults, transients and disturbances.



Control screen for the preconfigured bay with breaker & disconnect control in multiple pages using dedicated pushbuttons in the front panel.

- Inter-relay communications module that enables the sharing of digital status and analog values between UR relays for control, fast tripping or teleprotection applications
- Types of digital outputs include trip-rated Form-A and 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
- IEC 61850 Process Bus delivering advanced protection and control capabilities while providing significant savings on the total life cost of electrical substations
- RTDs and DCmA inputs are available to monitor equipment parameters such as temperature and pressure
- Sequence of Event (SOE)
 - 1024 time stamped events (UR Relays)
 - 8192 time stamped events (UR^{plus})
- Oscillography
 - 64 digital & up to 40 analog channels
 - Events with up to 45s 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 amounts of storage space available for data recording in the UR allows for the capture of complex events and can eliminate the need for installing costly stand-alone recording equipment.

Advanced Device Health Diagnostics

The UR 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
- Monitors internal DC voltage levels that allows for proactive maintenance and increased uptime

PMU - Synchrophasors

With the ability of having up to 6 PMU elements in one device, UR devices provide simultaneous data streams of up to four different clients.

UR devices exceed the IEEE C37.118 (2011) requirements for Total Vector Error (TVE) less than 1% over a range of 40Hz to 70Hz, and are able to measure and report synchrophasors over a frequency range from 30Hz to 90Hz with little effect on TVE.

A special feature of the synchrophasor implementation is the ability to apply magnitude and phase angle correction on a per-phase basis for known CT and PT magnitude and phase errors. Selected UR devices can apply a phase correction on each phase of up to $\pm 5^\circ$ in increments of 0.05° . They also provide the ability to adjust for delta-wye phase angle shifts or polarity reversal in the synchrophasor reporting of the voltage and current sequence components.

UR devices can stream PMU data through any of its three Ethernet ports using either IEEE C37.118 or IEC 61850-90-5 data formats. When streaming PMU data through a single port, a failover function can automatically switch the transmission over another Ethernet port.

Selected UR devices also support up to 16 user-definable command outputs via the command frame defined in the IEEE C37.118 standard.

PMU recording

UR devices include high accuracy metering

Monitoring and Metering

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