Universal Relay Family

Overview
The Universal Relay Family

“The engine for substation/industrial automation”

G60 - Generator Protection System
G30 - Generator Protection System (basic)
D60 - Line Distance Protection System
D30 - Line Distance Protection System (basic)
L90 - Line Differential System
L60 – Phase Comparison System
B90 - Bus Differential System (24 circuits)
B30 - Bus Differential System (6 circuits)
T60 - Transformer Protection System
T35 - Transformer Protection System
C60 - Breaker Protection System
C30 - Controller System
F60 - Feeder Protection System
F35 - Multiple Feeder Protection System
M60 - Motor Protection System
N60 - Network Protection System

One Platform . . . One Programming Package . . . Covering All Applications
Universal Relay
Design Guidelines

**Challenges**
- Part Obsolescence
- Spares Parts
- Changing Technology
- New Features
- Software Bugs
- User Training
- Ease of Use
- Serviceability

**Solutions**
- Modular Hardware
- Modular Software
- Single Platform
- Common User Interfaces
Universal Relay Architecture – ‘Modularity’

Six Module Types

[Diagram showing the six module types: Power Supply, CPU, DSP & Magnetics, Digital I/O, Analog I/O, Inter-Relay Communications.]

LED Modules

LED Modules

LED Modules

Display

Modular HMI panel

Keypad
Modularity...
Physical Realization

19” Chassis (4RU high)
High-Speed Data Bus
Modules

Modular HMI
Modularity ...

- Environmental limits
  • -40 - 130°C

- High Efficiency Switch Mode Power Supply (SMPS)
  • > 80%

- Power Supply

- CPU
  • Main Processor
  • RS232, RS485, Ethernet

- DSP + CT/VT

- DSP & Magnetics
  • DSP processor + CT/VTs

- Modular CT/VT configurations
  • up to 8 CT/VTs

- High-speed digital sampling
  • >16 Bit A/D
  • > 64 samples / power cycle

- High-speed 16-Bit DSP
  • > 32 MIPS, up to 80 MIPS

- High-speed 32-Bit Reduced Instruction Set Computer (RISC) CPU
  • >50 Million Instructions per Second (MIPS), up to 120 MIPS

- FLASH memory
- Easy firmware upgrades

- High-Speed Comms support
  • 10/100Mbps Ethernet Local Area Network (LAN)
  • Redundant Fiber
Modularity ...

- **Digital I/O**
  - Control outputs
    - Solid State
    - Electromechanical - multiple types
    - Fast activation speeds (< 4ms)
  - Status inputs
    - Dry and Wet contacts
    - 18 - 300 VDC
    - Fast detection speeds (< 4ms)

- **Analog I/O**
  - Transducer type inputs
    - ± dcmA
    - ± Voltage
    - Resistive
  - Outputs for Legacy SCADA
    - ± dcmA
  - Support multiple I/O configurations

- **Communications**
  - High-speed Serial
    - Asynchronous (9600 - 115K Baud)
    - Synchronous (56K - 256K Bps)
    - Fiber Optical (Single/Multi mode)
  - Channel Redundancy
Scalability

Minimum

Maximum
Software Architecture
‘Modularity’

Features

- Protection
- Metering
- Control
- Monitoring
- HMI
- Comms

Common Core Software

Application Software
UR Functional Architecture
Flexibility ...

Voting Logic Schematic Example
Flexibility ...

Time Overcurrent Acceleration Example
UR Communications

Internet/Intranet Ready - IP Address

Modbus RTU protocol

- Standard Front Port: RS232 (point-to-point)
- Rear Ports: RS485 up to 115kbps and 10BaseT/10BaseF Ethernet
- Available over TCP/IP

DNP 3.0 Level 2 Protocol (CERTIFIED)

- Rear Ports: RS485 up to 115kbps and 10BaseT/10BaseF Ethernet

IEC 61850

- Across Full UR Product Line

HTML View Access with Netscape Navigator® or Microsoft® Internet Explorer

- Ethernet Connections
IEC 61850

‘Perfectly Positioned to Support’

GE Multilin first to market and the only vendor with IEC 61850 across all protection and control applications.

- IEC 61850 across a full product line... the Universal Relay
- Embedded IEC 61850... no external Protocol converters
- Builds on 7 years of GE Multilin leadership in open communication standards
- Easy upgrades as new IEC 61850 features become available
Universal Relay
‘A True Global Product’

• Switch between English and additional language on the local HMI

• French, Chinese and Russian languages available
High Impedance (Hi-Z)

- High Impedance (Hi-Z)
- Fault Detection
- Advanced Algorithms
- Reliable Detection of Faults Caused by Downed Conductors
- Improved Safety ... Faster Response to Hazardous Situations
- Dependable and Secure Operation ... Uses Artificial Intelligence
- Easy Integration ... Add-On Module to the F60
- Includes Overcurrent Protection, Autoreclosing and Advanced Metering
- Over 10 Years of Field Experience

Downed But Not Out!
The Universal Relay . . .
“Delivering Customer Value”

**PROTECTION**
- **One Family** – Complete Range of Protection
- **Commonality** of look, feel, and functionality across the entire UR family
- **Proven technology** with over 7 years of field experience
- Hardware obsolescence protected through modular design

**CONTROL**
- **Remote control** of all output contacts available through SCADA – no additional wiring required
- Controls are **password protected**
- **Front-panel pushbuttons** – eliminate many traditional switches
- Ability to isolate output contacts with latching contacts to enable **remote testing**

Modularity, Scalability, Flexibility, Simplicity
The Universal Relay . . .

“Delivering Customer Value”

MONITORING

- “Best in Class” **Sequence of Events (SOE)** recording with 500μsec max.
- 3840 Samples per second **waveform capture** – Eliminates digital fault recorders
- **Data Logging** - 16-channel data recording at intervals from 1 second to 1 hour.
- Automatic Sequence of Events and **oscillography** retrieval
- Available **RTD and 4-20 ma inputs** for temperature, pressure, and other monitored quantities

COMMUNICATIONS

- “**Network Enabled**” allowing access through an Internet Protocol (IP) address over Ethernet
- **Multi-protocol** – can dynamically switch DNP and IEC61850 over Ethernet – no settings or user intervention required
- Supports **high-speed** (<4ms) Relay-to-Relay communication which can be used to minimize wiring
- Available with **redundant-media** Ethernet for high-availability communications
- **OPC server** available to interface with “other function” systems

Modularity, Scalability, Flexibility, Simplicity
The Universal Relay . . .

“Delivering Customer Value”

With Other Products

With Multilin UR

Multiple Devices/
Multiple Vendors

Convergence and
Integration

One Platform/
One Vendor

The Universal Relay . . .
“Delivering Customer Value”

*EnerVista™*

“The Most Powerful Relay Management Tool”

- Setup any GE Multilin Device from one Application
  - Intuitive Graphical Interface
  - Quick Connect Communications
  - Off-line Settings Management
  - Copy and Paste Setting Files
  - Onscreen Phasor Diagrams

- Manage your Support Documents and Software tools
  - Manuals
  - Drawings
  - Application Notes
  - Service Bulletins
  - Firmware Updates
  - FAQs
  - Guideform Specs
  - Brochures

- Receive automatic notification of any new updates.
  - E-Mail Notification
  - Automatic Downloads

Oscillography
Flexlogic
Settings
Metering

Easy to use Device Setup & Document Management Toolset
Premium Monitoring, Engineering & Maintenance Toolsets
Powerful OPC/DDE Communications Server
Energy Cost Allocation & Billing Software

GE Consumer & Industrial
MultiLin
June 2005
The Universal Relay . . .

“Globally Renowned Product”

UR Installed Base
- Released and in service for 7 years
- Protecting EHV, HV, MV Utility Stations
- Used as standalone and as systems
- Integrated into Local Area Networks (LAN) and Wide Area Networks (WAN)
- Approved & in use at AEP, PG&E, SRP, Hydro One, SCE, Hydro Quebec, PEPCO, CFE, Kepco...

More than 25,000 units in service Globally!
The Universal Relay . . .
“The Engine for Substation/Industrial Automation”

Universal Relay

19” Chassis

Hardware Modules

Protection

Metering

Control

Monitoring

HMI

Comms

Software Modules

Applications

G60 Generator
G30 Generator
T60 Transformer
T35 Transformer

D60 Distance
D30 Distance
B90 Bus (24 circuits)
B30 Bus (6 circuits)

L90 Line Differential
L60 Phase Comparison
F60 Feeder
F35 Multiple Feeder

C60 Breaker
C30 Controller
M60 Motor

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