# Multilin T35

## Cost-Effective Differential Protection for Transformers With Up To 6 Sets of CTs

The Multilin™ T35 transformer protection system is a three-phase transformer relay designed to protect power transformers with up to six windings/restraints. The T35 provides for automatic or user-definable magnitude reference winding selection for CT ratio matching.

The T35 performs automatic phase shift compensation for all types of transformer winding connections. The T35 algorithm allows the user to enable the removal of the zero-sequence current even for delta connected transformer windings, accommodating transformers with a variety of grounding configurations.

### Key Benefits

- Secure, high-speed protection for transformers, compliant with IEEE® C37.91 for maximum asset life
- Improved security for transformer energization and inrush provided through an adaptive 2nd harmonic restraint algorithm
- Application flexibility for transformers with up to 6 sets of CTs, with independent magnitude/phase angle compensation and grounding settings
- Advanced automation capabilities to enable customized protection & control solutions
- 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 IEC 61850-9-2 process bus solution ensures interoperability, device managing optimization and reduced cost of ownership
- Routable GOOSE (R-GOOSE) enables customer to send GOOSE messages beyond the substation, which enables WAPC and more cost effective communication architectures for wide area applications
- Increased network availability via failover time reduced to zero through IEC® 62439-3 "PRP" support
- Supports IEEE C37.111-1999/2013, IEC 60255-24 Ed 2.0 COMTRADE standard

### Applications

- Combined protection for transformers and small bus zone, including breaker-and-a-half and ring bus diameters
- Stand-alone or component in automated substation control systems
- Primary & backup protection of power transformers, autotransformers, reactors, split-phase and angle regulating transformers

### Protection & Control

- Percent restrained and unrestrained differential protection
- 2nd Harmonic inrush inhibit and overexcitation inhibit
- Transducer I/Os (RTD & dcmA)
- FlexElements & FlexCurves
- 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

- Support industry standard protocols with 3 independent Ethernet ports for simultaneous & dedicated connection with IEEE 1588 support
- Direct I/O for secure, high-speed exchange of data between URs for DTT & pilot-aided schemes
- IEC 61850-9-2 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 high-capacity event recorder, configurable and extended waveform capture and data logger
- Metering: current, voltage, power, energy, frequency, and harmonics

## Protection and Control

The T35 transformer protection system is a three-phase transformer relay designed to protect power transformers with up to six windings/restraints.

As part of the Universal Relay (UR) Family, the T35 provides cost-effective solutions and superior protection and control.

### Multi-CT Configurations

The T35 can be used to protect transformer differential zones with up to 6 three-phase current inputs (six restraints), making it possible to include multiple breakers or small buses in the differential zone.

### Percent Differential Protection

The percent differential element is based on a configurable dual-breakpoint/dual-slope differential restraint characteristic with inrush and overexcitation inhibits. The maximum winding current is used as a restraint signal for better through-fault stability under CT saturation conditions.

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.

### Inrush Inhibit

The 2nd harmonic inhibit function is selectable in order to cover the energization of different types of transformers, and can be set to either traditional or adaptive mode.

The adaptive mode maximizes dependability on internal faults and ensures security during inrush conditions even with weak second harmonics. It reduces the sensitivity of magnitude comparison, by biasing towards security, based on an angular relationship. Dependability is maintained by

### T35 - Protection, Metering, Monitoring and Control
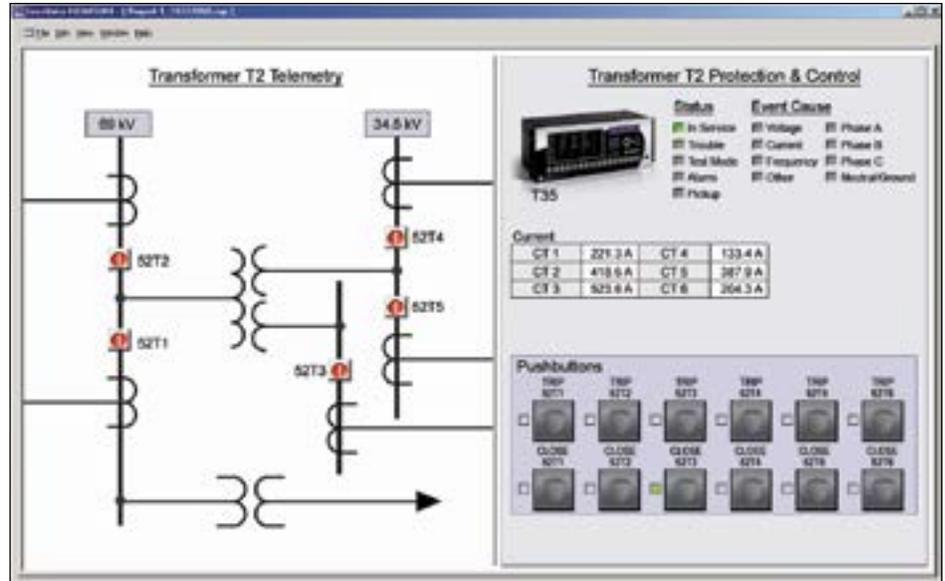


*The T35 is the single point for protection, control, metering, and monitoring in one integrated device that can easily be connected directly into DCS or SCADA monitoring and control systems like Viewpoint Monitoring as shown.*

applying the restraint signal only for a period of time, dependent on the magnitude ratio.

### Overexcitation Inhibit

An increase in transformer voltage or decrease in system frequency may result in the transformer becoming overexcited. It is often desirable to prevent differential element operation in these cases, therefore, a fifth harmonic inhibit is integrated into the percent differential element to cater to overexcitation conditions resulting from an increased V/Hz ratio.

### Unrestrained Differential

An unrestrained differential element is provided for fast tripping on heavy internal faults to limit catastrophic damage to the transformer and minimize risks to the rest of the power system.

### Differential vs. Restraint Characteristic (Id vs.Ir)
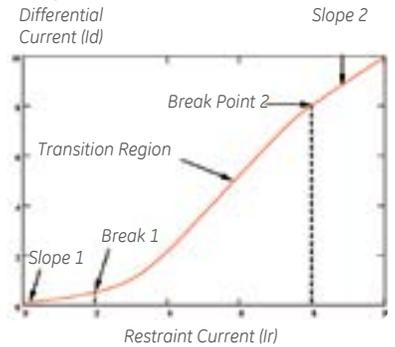


*The settings for the dual-slope, dual-breakpoint characteristic provides higher flexibility for shaping up the characteristic and achieving better sensitivity and security.*

### Multi-CT Configurations
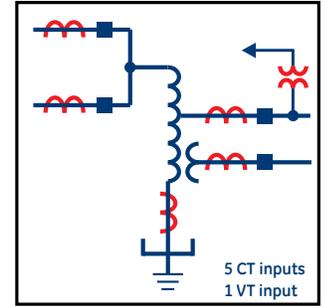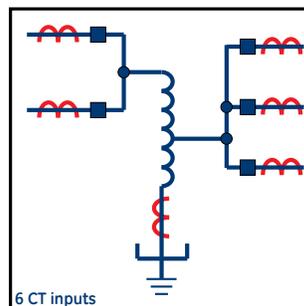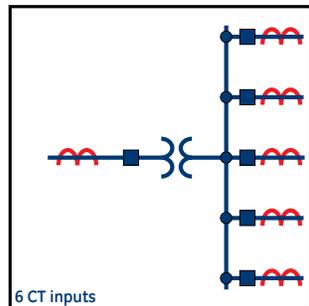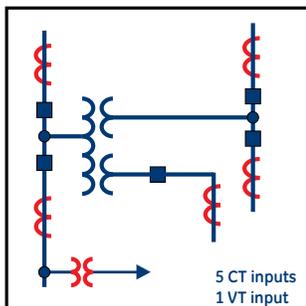


*Examples of T35 applications for transformers and autotransformers connected to more than two breakers.*

## Overcurrent Functions

T35 provides thermal overload, time overcurrent elements for phase, neutral, and ground, which can run in parallel with primary differential protection or can be programmed to provide primary protection under conditions when other protection elements are unavailable.

## User-Definable Protection Functions

Sixteen user-definable protection functions (FlexElements) can be programmed to respond to any quantity measured or computed by the relay (phase, ground and sequence currents and voltages, power, frequency, power factor, etc.). Applications could include overvoltage, overpower, low power factor, temperature differential, and more.

## 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

## FlexLogic™ Designer
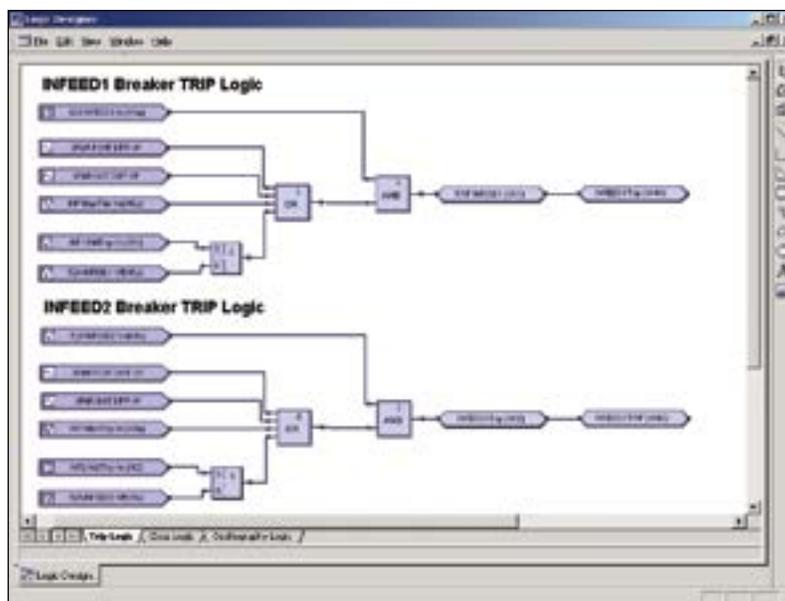


*FlexLogic allows for customizing the T35 to operate and control the breakers and other auxiliary devices needed to fit most transformer protection schemes and applications.*

- Integrates with existing T35'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 Grid Solutions web site for more details.

## Advanced Automation

The T35 incorporates advanced automation features including powerful FlexLogic programmable logic, communication, and SCADA capabilities that far surpass what is found in the average transformer relay. The T35 integrates seamlessly with other UR relays for complete system protection.

## Functional Block Diagram



T35 Transformer Protection System

**ANSI® Device Numbers & Functions**

| DEVICE NUMBER | FUNCTION |
|---|---|
| 49 | Thermal Overload |
| 50/87 | Instantaneous Differential Overcurrent |
| 51G | Ground Time Overcurrent |
| 51P | Phase Time Overcurrent |
| 87T | Transformer Differential |

### 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 T35 can be programmed to provide the required tripping logic along with custom scheme logic for transformer breaker control (including interlocking with external synchronizers), transfer tripping schemes for remote breakers and dynamic setting group changes.

### Scalable Hardware

The T35 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 multi-winding transformer 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 T35 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 T35 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
  - 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 amount of storage space available for data recording in the T35 can eliminate the need for installing costly stand-alone recording equipment.

### Advanced Device Health Diagnostics

The T35 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

## 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:

## Power System Troubleshooting

The T35 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 T35 elements and external connected devices with 1ms time-stamped accuracy to identify the Sequence of Operation of station devices during transformer faults and disturbances.*



*Visualization of differential characteristics allows for setting verification and operation troubleshooting.*



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

### 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 T35 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 T35 supports the most popular industry standard protocols enabling easy, direct integration into DCS and SCADA systems.

- IEC 61850 Ed. 1 and Ed. 2 with 61850-9-2 and 61850-90-5 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
- IEEE 1588 and redundant SNTP for time synchronization
- PRP as per IEC 62439-3
- Supports Routable GOOSE (R-GOOSE)

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

The new IEC 61850 implementation in the UR Family positions GE 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

- 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 Systems based on IEC 61850 using universal 3rd party tools
- 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.

### Cost Effective Solution
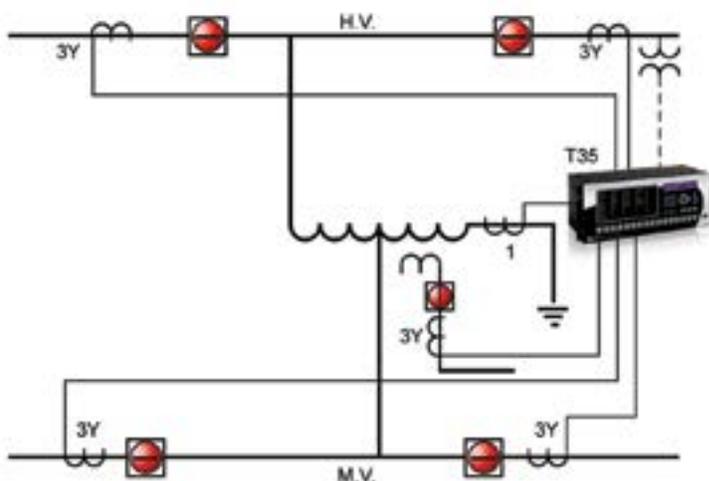


*Auto-transformer with breaker-and-a-half on both sides and loaded tertiary.*

standard file transfer services (MMS and SFTP)

## 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 T35 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 T35 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 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 & Presentations
- 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 UR Engineer

Viewpoint UR 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 UR Engineer provides the following configuration and commissioning utilities:

- Graphical Logic Designer
- Graphical System Designer
- Graphical Logic Monitor
- Graphical System Monitor
- IEC 61850 Configurator

### 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
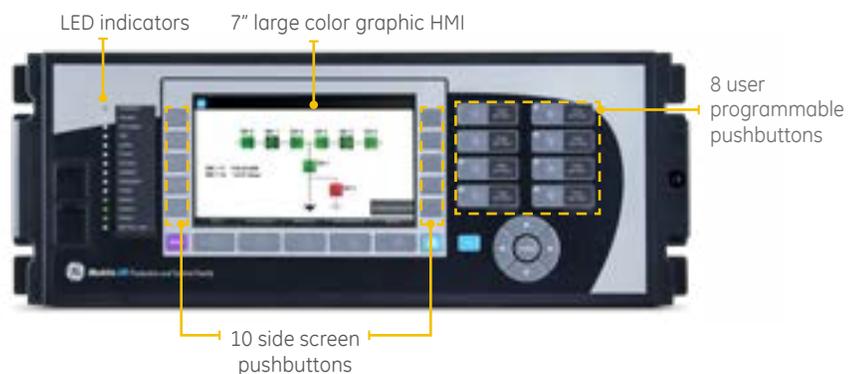- Single-Click Fault Data Retrieval

### EnerVista Integrator

EnerVista Integrator is a toolkit that allows seamless integration of 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 T35 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.



LED indicators    7" large color graphic HMI

8 user programmable pushbuttons

10 side screen pushbuttons

# Typical Wiring

GE Consumer & Industrial
Multilin

**T35** TRANSFORMER MANAGEMENT RELAY

# Ordering

| | T35 | - * | ** | - H | * | - * | - F** | - H** | - M** | - P** | - U** | - W** | For full sized horizontal mount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Base Unit** | T35 | | | | | | | | | | | | Base Unit |
| **CPU** | | E | | | | | | | | | | | RS485 & RS485 (IEC 61850 option not available) |
| | | J | | | | | | | | | | | RS485 + multimode ST 100BaseFX |
| | | K | | | | | | | | | | | RS485 + multimode ST Redundant 100BaseFX |
| | | N | | | | | | | | | | | RS485 + 10/100 100BaseT |
| | | 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 |
| | | 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 |
| | | | 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. Req UR FW 7.xx or higher |
| **Mount** | | | | 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** | | | | | E | | | | | | | | 7" Graphical display, USB front port & programmable pushbuttons - Multi-Language (FW 7.6x or higher) |
| | | | | | F | | | | | | | | 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 power supply |
| | | | | | | L | | | | | | | 24 - 48 V (DC only) |
| **CT/VT DSP** | | | | | | | 8L | | 8L | | 8L | | Standard 4CT/4VT w/ enhanced diagnostics |
| | | | | | | | 8M | | 8M | | 8M | | Sensitive Ground 4CT/4VT w/ enhanced diagnostics |
| | | | | | | | 8N | | 8N | | 8N | | Standard 8CT w/ enhanced diagnostics |
| | | | | | | | 8R | | 8R | | 8R | | Sensitive Ground 2CT/6VT w/ enhanced diagnostics |
| **IEC 61850 Process Bus** | | | | | | | 81 | | | | | | 8 Port IEC 61850 Process Bus Module |
| **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 |
| | | | | | | | 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 |
| | | | | | | | 5E | 5E | 5E | 5E | 5E | | 4 dcmA Inputs, 4 RTD Inputs |
| | | | | | | | 5F | 5F | 5F | 5F | 5F | | 8 dcmA Inputs |
| **Inter-Relay Communications** | | | | | | | | | | | | 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 |
| | | | | | | | | | | | | 7S | G.703, 2 Channels |
| | | | | | | | | | | | | 7W | RS422, 2 Channels |
| | | | | | | | | | | | | 77 | IEEE C37.94, 820 nm, multimode, LED, 2 Channel |

**Notes:**

1. To view all the options available for T35, please visit GE's On-Line Store http://store.gedigitalenergy.com/viewprod.asp?model=T35
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

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