# MULTILIN 735/737

## Feeder protection system

Multilin™ 735/737 is a microprocessor based relay used to perform primary circuit protection on distribution networks at any voltage level. Protection features include three phase timed overcurrent, phase instantaneous overcurrent, ground timed overcurrent, and ground instantaneous overcurrent. Each protection element can be selectively enabled by the front panel dial settings. Flexible settings and selec-table curve shapes enable accurate coordination with other devices. Installation and maintenance costs are lower when the 735/737 is used instead of the 8 separate overcurrent protection devices it has been designed to replace.

The 735/737 feeder relays are being discontinued. You may still purchase these relays until December 29, 2017. The suggested replacement device is the Multilin 8 Series. Customers can easily upgrade to the Multilin 850 feeder protection system using the Retrofit Kit . Learn more at www.gegridsolutions.com/850.

### Key Benefits

- Minimize replacement time - Draw-out construction
- Simplify testing - Built in simulation features
- Access information - via Modbus RTU

### Applications

- Primary circuit protection on distribution networks at any voltage level
- Backup protection for transformers and transmission lines

### Protection and Control

- Protection and Control
- 3 phase time overcurrent
- Ground time overcurrent
- 5 curve shapes
- 4 curve shift multipliers per curve
- 10 time multipliers per curve
- ANSI, IAC, or IEC/BS142 curves
- Phase instantaneous overcurrent
- Ground instantaneous overcurrent
- Pickup level for each overcurrent
- Outputs: trip, aux trip, service
- Aux trip: 86 lockout, ground trip
- SR737 has 8 additional output relays

### Communications

- 8 LED trip indicators
- 4 LED status indicators
- Current bar graph, % of CT
- RS485 or RS422 communications
- ModBus™ RTU protocol
- Baud rate up to 19,200 bps

### Monitoring & Metering

- Trip record of last 5 trips
- Pre-trip data includes currents
- True RMS sensing

### EnerVista Software

- EnerVista software - an industry leading suite of software tools that simplify every aspect of working with Multilin devices
- EnerVista™ Integrator provides easy integration of data from the 735/737 into new or existing monitoring and control systems

## GE VERNOVA

## Protection

The 735/737 is a digital feeder relay designed for primary circuit protection on distribution networks of any voltage. Advanced protection features include:

### Three-Phase and Ground TOC

The 735/737 provides a choice of five separate TOC curve shapes. For each curve shape 10 different time multipliers and four different curve shifts may be set. Three different curve types can be selected: ANSI, IAC, and IEC/BS142. This allows the selection of the optimum curve for coordination with equipment.

The front dials allow the user to select the curve shape, the percent of CT used for pickup value, and the time multiplier (one to 10). Option switches select the frequency, curve shift and enable the custom scheme curve type. If the pickup dial is set to OFF, the TOC is disabled.

| ANSI | IAC | IEC/BS142 |
|---|---|---|
| Moderately inv. | Short time | Short time |
| Normal inverse | Inverse | IEC A |
| Very invers | Very inv. | IEC B |
| Extremely inv. | Extr. inv. | IEC C |
| Definite time | Def. time | Definite time |

### Phase and Ground IOC

The 735/737 has a separately adjustable IOC function. No intentional delay (35 ms maximum) is added to the instantaneous trip. A front dial allows the IOC setpoint to be set or disabled.

### Functional Block Diagram
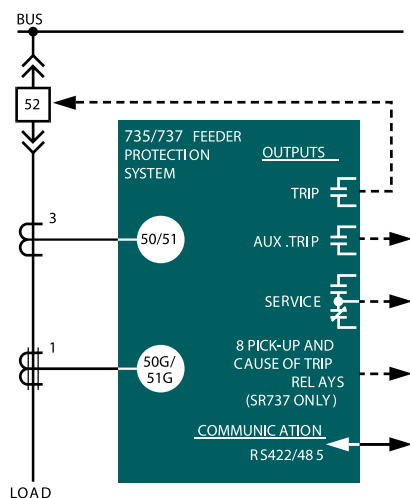


Ground level and time delay can be selected for coordination with upstream devices. The ground signal is normally derived as the residual sum of the three-phase CTs, eliminating the need for an additional ground sensor. Alternatively, for more sensitive detection, an additional core balance (zero sequence) ground sensor encircling the three-phase conductors can be used.

### Ground Trip/Phase Trip Separation

The custom scheme switch, programmed via the setup software, can be used to separate ground trips from phase trips. With this option selected, the auxiliary trip relay will only respond to ground faults and the main trip relay will only respond to phase faults.

### Block Instantaneous on Autoreclosure

The 735/737 is capable of blocking instantaneous trips after an autoreclose operation. This prevents accidental trips caused by the high inrush currents typically experienced in these situations. The custom scheme switch allows this function to be enabled. The phase and ground instantaneous trip block time can be set from 0 to 180 seconds. Instantaneous trips are disabled for the duration of the time setting, but TOC protection is still enabled.

### Lockout

The custom scheme switch can be programmed to set the auxiliary trip relay to act as an 86 Lockout relay, keeping the breaker open. To reset the lockout contacts either the front panel CLEAR key must be pressed, or a "trip reset" command must be received via the communications serial port.

### Outputs

The 735/737 has three standard outputs. The main trip output is used to activate the breaker trip coil in the event of a fault. The auxiliary trip output can follow the trip relay, act as an 86 Lockout, or trip only on ground faults while the main trip output trips only on phase faults. The relay service output is used to provide the relay status.

The 737 has eight additional output relays to provide separate dry contact outputs for each overcurrent protection element.

## Monitoring and Metering

The 735/737 features advanced user interfaces which can facilitate monitoring and metering. These features include:

### Status LEDs

The relay features LEDs that indicate normal operation, testing, and service required. When the phase or ground instantaneous or time overcurrent threshold is exceeded, a separate indicator flashes.

### Latched Trip LEDs

Eight separate latched indicator LEDs for instantaneous and time overcurrent remain set after a breaker trip. They can be reset with the front panel CLEAR push button.

### Current Indicator

To monitor load current a front panel bar graph indicator is provided. It gives an indication of 10% CT rating to 100% of CT rating in steps of 10%.

## Communications

Either an RS485 or RS422 configuration is available for relay communication. This allows remote monitoring of status, currents, settings, and values present at the time of a trip using ModBus® RTU protocol. Up to 31 relays (slaves) can be connected on a twisted pair communications link to a single master (a unique address must be assigned to each slave). Baud rates of up to 19,200 bps are available. A TEST switch allows the 735/737 to accept commands for testing and training purposes, while temporarily disabling protection features.

## EnerVista Software

The 735/737 comes with EnerVista; an industry-leading suite of software tools that simplifies every aspect of working with Multilin devices. EnerVista™ software is extremely easy to use and provides advanced features that help you maximize your investment in Multilin products.

### EnerVista Launchpad

EnerVista Launchpad is a complete set of powerful device setup and configuration tools that is included at no extra charge with the 735/737.

- Set up the 735/737 - and any other Multilin device - in minutes. Retrieve and view oscillography and event data at the click of a button.
- Build an instant archive on any PC of the latest Multilin manuals, service advisories, application notes, specifications or firmware for your 735/737.
- Automatic document and software version updates via the Internet and detailed e-mail notification of new releases.

**EnerVista Viewpoint**

EnerVista is a premium workflow-based toolset that provides engineers and technicians with everything they need to monitor, test and troubleshoot Multilin IEDs and manage settings files with ease. The 735/737 includes an evaluation version of EnerVista Viewpoint.

- The settings file changing process, automatic error checking and visual Flexlogic™ editor make creating, editing and storing setting seamless.

- Plug-and-Play monitoring automatically creates customized monitoring screens for your 735/737 - no programming required.
- Powerful testing tools help shorten your commissioning cycle
- Quickly retrieve oscillography and event data when a fault occurs

See the EnerVista Suite section for more information.

## Typical Wiring

## Technical Specifications

### PROTECTION

#### PHASE TIME OVERCURRENT (51)

| | |
|---|---|
| Pickup level: | LO: 20 – 100%/OFF<br>HI: 110 – 220%/OFF % of CT rating |
| Curve types: | ANSI, IAC, IEC/BS142 |
| Curve shapes: | Definite time, moderately inverse, inverse, very inverse, extremely inverse; see time/overcurrent curves; curves apply up to 20 x pickup or 20 x CT, whichever is less. |
| Time multiplier: | 10 curves 1 – 10 for each shape, 4 shift multipliers 0.5/0.8/1/1.1 |
| Definite time: | 100 ms to 1 sec (100 ms steps) |
| Reset: | Time reset to zero each time current level falls below pickup threshol |
| Accuracy: | |
|  Level: | ±3% of setting |
|  Time: | Greater of ±3% or ±20 ms @ >150% of pickup |

#### GROUND TIME OVERCURRENT (51G/51N)

| | |
|---|---|
| Pickup level: | |
|  LO: | 15 – 55%/OFF |
|  HI: | 60 – 100%/OFF % of CT rating in steps of 5% |
| Curve types: | ANSI, IAC, IEC/BS142 |
| Curve shapes: | Definite time, moderately inverse, inverse, very inverse, extremely inverse; see time/overcurrent curves; curves apply up to 20 x pickup or 20 x sensor (whichever is less) |
| Time multiplier: | 10 curves 1 – 10 for each shape, 4 shift multipliers 0.5/0.8/1/1.1 |
| Definite time: | 100 ms to 1 sec (100 ms steps) |
| Reset: | Time reset to zero each time current level falls below pickup |
| Accuracy: | |
|  Level: | ±3% of setting |
|  Time: | Greater of ±3% or ±20 ms @ >150% of pickup |

#### PHASE INSTANTANEOUS (50)

| | |
|---|---|
| Pickup level: | 4/5/6/8/10/12/14/16/20/OFF x CT |
| Accuracy: | |
|  Level: | ±3% of setting |
|  Time: | 35 ms max @ >150% of pickup setting |

#### GROUND INSTANTANEOUS OVERCURRENT (50G/50N)

| | |
|---|---|
| Pickup level: | 0.1/0.2/0.4/0.8/1/2/4/8/16/OFF x CT |
| Accuracy: | |
|  Level: | ±3% of setting |
|  Time: | 35 ms max @ >150% of pickup setting |

### MONITORING

#### INDICATORS

Phase time overcurrent trip A,B,C (latched)
Phase instantaneous overcurrent trip A,B,C (latched)
Ground fault time overcurrent trip (latched)
Ground fault instantaneous overcurrent trip (latched)
Relay in service
Service required
Phase pickup
Ground pickup
Current level LED bar graph: 10 – 100% of CT

### POWER SUPPLY

#### CONTROL POWER

| | |
|---|---|
| Options: | LO/HI (specified when ordering) |
| LO range: | DC = 20 to 60 V<br>AC = 20 to 48 V @ 48 – 62 Hz |
| LO DC supply: | 48 VDC nominal |
| HI range: | DC = 88 to 300 V<br>AC = 70 to 265 V @ 48 – 62 Hz |
| HI DC supply: | 125 VDC, 250 VDC nominal |
| Power: | 10 W nominal, 25 W maximum |

### OUTPUTS

#### OUTPUT RELAYS

| VOLTAGE | | SERVICE, CAUSE OF TRIP/PICKUP | | | | TRIP1, AUX TRIP | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | MAKE/CARRY CONTINUOUS | MAKE/CARRY 0.2 S | BREAK | MAX LOAD | MAKE/CARRY CONTINUOUS | MAKE/CARRY 0.2 S | BREAK | MAX LOAD |
| DC Resistive | 30 VDC | 10 | 30 | 10 | 300 W | 20 | 80 | 16 | 480 W |
| | 125 VDC | 10 | 30 | 0.5 | 62.5 W | 20 | 80 | 0.8 | 100 W |
| | 250 VDC | 10 | 30 | 0.3 | 75 W | 20 | 80 | 0.4 | 100 W |
| DC Inductive L/R=40 ms | 30 VDC | 10 | 30 | 5 | 150 W | 20 | 80 | 5 | 150 W |
| | 125 VDC | 10 | 30 | 0.25 | 31.3 W | 20 | 80 | 0.3 | 375 W |
| | 250 VDC | 10 | 30 | 0.15 | 37.5W | 20 | 80 | 0.2 | 50 W |
| AC Resistive | 120 VAC | 10 | 30 | 10 | 2,770 VA | 20 | 80 | 20 | 2,400 VA |
| | 250 VAC | 10 | 30 | 10 | 2,770 VA | 20 | 80 | 20 | 5,000 VA |
| AC Inductive PF=0.4 | 120 VAC | 10 | 30 | 4 | 480 VA | 20 | 80 | 8 | 960 VA |
| | 250 VAC | 10 | 30 | 3 | 750 VA | 20 | 80 | 7 | 1,750 VA |
| CONFIGURATION | | FORM C NO/NC | | | | FORM A NO | | | |
| CONTACT MATERIAL | | SILVER ALLOY | | | | SILVER ALLOY | | | |
| NUMBER | | SR735: 1 RELAY SR737: 9 RELAYS | | | | 2 RELAYS | | | |

## COMMUNICATIONS

RS485/RS422 port (using ModBus® protocol)

## INPUTS

### CURRENT INPUTS

Withstand phase/ground CTs:

| | |
|---|---|
| 4 times rated current: | continuous |
| 20 times rated current: | 5 sec |
| 40 times rated current: | 2 sec |
| Sensing: | True RMS; 16 samples/cycle |
| Secondary: | 1 A or 5 A (must be specified with order) |
| Accuracy: | Greater of 3% of CT primary or 3% of displayed |
| Drift: | No greater than 0.5% over 10 years |

### CT BURDEN

| | |
|---|---|
| 1 A inputs: | 0.02 VA @ 1 A, 0.2 VA @ 5 A, 10 VA @ 20 A |
| 5 A inputs: | 0.02 VA @ 5 A, 0.2 VA @ 20 A, 10 VA @ 100 A |
| Conversion range: | 0 – 20 times CT primary |
| Frequency response: | 48 – 300 Hz ±3 dB |

## ENVIRONMENTAL

**Operating Temperature Range:**     -40° C to +70° C

*Specifications subject to change without notice.*

## TYPE TESTS

| | |
|---|---|
| Insulation Resistance: | per IEC 255-5 (500 V DC, 2000 MW) |
| Dielectric Strength: | per IEC 255-5 and ANSI/IEEE C37.90 (2 kV at 60 Hz for 1 minute) |
| Impulse Voltage: | per IEC 255-5 (5 kV) |
| Surge Immunity: | per EN 61000-4-5 (common mode 4 kV, differential modes 2 kV) |
| Oscillatory Surge Withstand: | per ANSI/IEEE C37.90.1, per Ontario Hydro A-28M-82 |
| Voltage Dips per: | IEC 61000-4-11 (0%, 40%, 70%) |
| Electrostatic Discharge: | per IEC 255-22-2 (4/4 kV) |
| Damp Heat (Humidity Cyclic): | per IEC 68-2-30 (6 days) |
| Make and Carry for relays: | per IEEE C37.90 (30 A) |
| Current Withstand: | per ANSI/IEEE C37.90 (40x rated 1 A for 2 seconds; 60x rated 5 A for 1 second) |
| RFI Radiated Immunity: | per IEC 255-22-3 (160 MHz, 460 MHz), per EN 61000-4-3 (10 V/m) |
| RFI Conducted Immunity: | per EN-61000-4-6 (10 V) |
| Temperature Cycle: | −40°C, +60°C (per GE Vernova internal procedures) |
| Mechanical Stress: | 2 g (per GE Vernova internal procedures) |
| Current Calibration: | per GE Vernova internal procedures 10 A DC continuous relay current carry at 80°C per GE Vernova internal procedure |

## PACKAGING

| | |
|---|---|
| Weight: | 15 lbs (6.8 kg) |
| Shipping Dimensions: | 15" x 14" x 14" (38.1 cm x 35.6 cm x 35.6 cm) |

## APPROVALS

| | |
|---|---|
| CSA: | Approved under LR41286 |
| UL: | Recognized under E83849 |

**NOTE:** For dimensions see SR Family brochure.

# Ordering

| * | | * | * | * | * | |
|---|---|---|---|---|---|---|
| 735 737 | | | | | | Standard relay with 50/51, 50G/51G protection Relay with 8 additional outputs |
| | | 1 5 | | | | 1 A phase CT secondaries 5 A phase CT secondaries |
| | | | 1 5 | | | 1 A ground CT secondaries 5 A ground CT secondaries |
| | | | | LO HI | | 20 – 60 VDC; 20 – 48 VAC @ 50, 60 Hz control power 90 – 300 VDC; 70 – 265 VAC @ 50, 60 Hz control power |
| | | | | | 485 422 | RS485 2-wire communications (standard) RS422 4-wire communications (optional) |

**Accessories**

| | |
|---|---|
| 19-1 PANEL | Single cutout panel |
| 19-2 PANEL | Dual cutout panel |
| SCI | RS232 to RS485 convertor |
| 735/737-DEMO | 737 demo/test case |
| 1 3/8" Collar: | For shallow switchgear, reduces the depth of the relay by 1 3/8". |
| 3" Collar: | For shallow switchgear, reduces the depth of the relay by 3". |

Upgrade to the Multilin 850 for advanced feeder management, protection and control capabilities. Visit www.gridsolutions.com/850

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For more information, visit
**gevernova.com/grid-solutions**