GE
Grid Solutions

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

imagination at work

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.

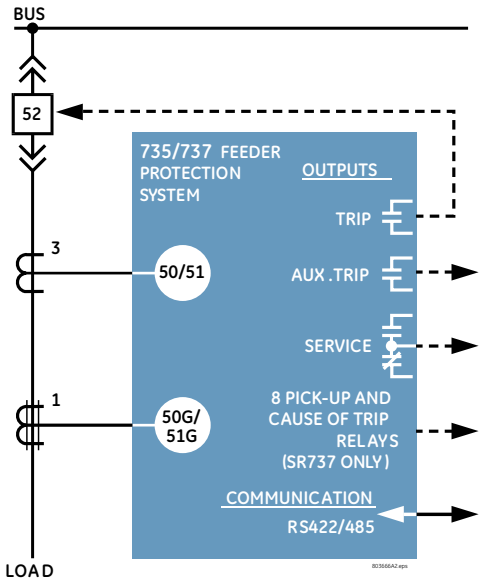
The front dials allow the user to select the curve shape, the percent of CT used for pickup value, and the time multiplier (one to 10). Option switches select the frequency, curve shift and enable the custom scheme curve type. If the pickup dial is set to OFF, the TOC is disabled.

ANSI	IAC	IEC/BS142
Moderately inv.	Short time	Short time
Normal inverse	Inverse	IEC A
Very inverse	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.

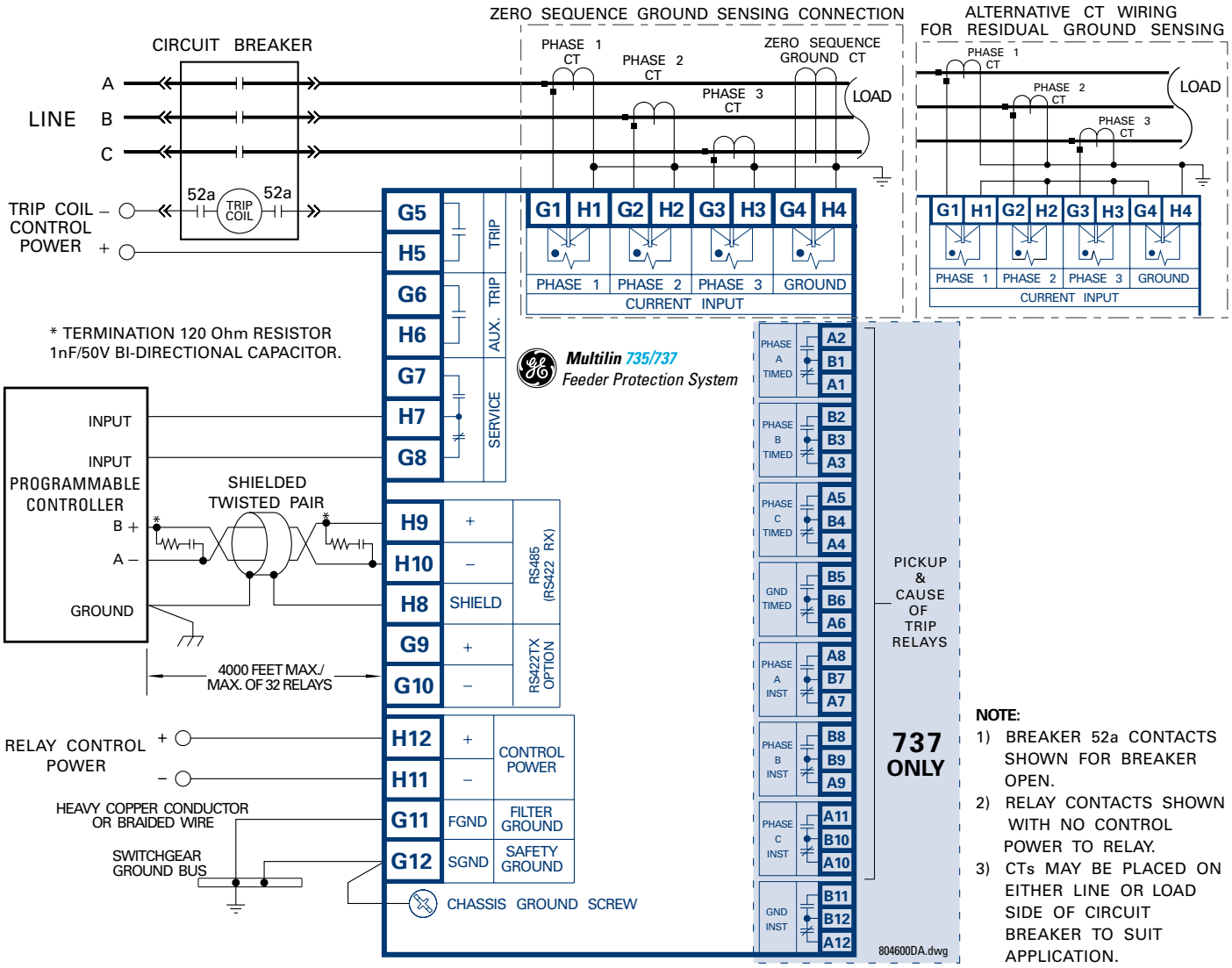
EnerVista Viewpoint

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
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 threshold

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
AC = 20 to 48 V @ 48 – 62 Hz
LO DC supply: 48 VDC nominal
HI range: DC = 88 to 300 V
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

		SERVICE, CAUSE OF TRIP/PICKUP				TRIP1, AUX TRIP			
VOLTAGE		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

*Specifications subject to change without notice.

ENVIRONMENTAL

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

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 internal procedures)
Mechanical Stress: 2 g (per GE internal procedures)
Current Calibration: per GE internal procedures
10 A DC continuous relay current carry at 80°C per GE 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					Standard relay with 50/51, 50G/51G protection
737					Relay with 8 additional outputs
	1				1 A phase CT secondaries
	5				5 A phase CT secondaries
		1			1 A ground CT secondaries
		5			5 A ground CT secondaries
			LO		20 – 60 VDC; 20 – 48 VAC @ 50, 60 Hz control power
			HI		90 – 300 VDC; 70 – 265 VAC @ 50, 60 Hz control power
				485	RS485 2-wire communications (standard)
				422	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.gegridsolutions.com/850

imagination at work

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