

M Family Digital Ground Protection Relay



Complete numerical ground directional protection.

Features and Benefits

- Advanced 16-bit microprocessor
- Configurable logic, curves, digital I/Os and LEDs
- Flash memory for field upgrades
- Two settings groups
- Drawout case for easy maintenance
- AC/DC power supply
- Access via front panel keypad or communication links
- Compatible with M Family systems in half or full 19" racks

Applications

- Directional ground protection at any voltage level
- Backup/auxiliary protection for line schemes

- Component relay for transformers, generators and motors
- enerVista.com compatible (see page 275)

Protection and Control

- Ground directional time delayed and instantaneous overcurrent

Monitoring and Metering

- Ground current metering
- Diagnostic features – event recording (24 events), analog/digital oscillography

User Interfaces

- M+PC software for setting and monitoring
- Front RS232 and rear RS485 ports using ModBus® RTU protocol up to 19,200 bps



Protection

The MIN, a member of the M Family of protection relays, is a digital relay that provides ground directional protection for feeders of any voltage level and backup/auxiliary ground directional protection for transformers, generators and motors. The MIN offers advanced protection that includes:

Ground Time Overcurrent

Ground TOC protection can be set from 0.1 to 2.4 times I_n . Four separate ANSI or IEC TOC curves can be selected in addition to a user configurable curve. ANSI and IEC curves include: definite time, normal inverse, very inverse, and extremely inverse. For each curve, different time multipliers may be set. This allows the selection of the optimum curve for co-ordination with specific equipment.

ANSI	IEC/BS142
normal inverse	IEC A
very inverse	IEC B
extremely inv.	IEC C
definite time	definite time

Ground IOC Units

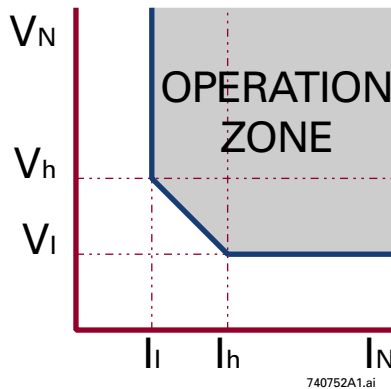
Two separately adjustable ground IOC units can be independently enabled. The pickup setpoint can be set from 0.1 to 30 times I_n and the time delay from zero to 100 seconds.

ALGORITHM 1: Neutral connected to ground solidly or through a resistor. Ground Directional Control

This unit offers directional control to the Ground IOC Units. The supervision is polarized by zero-sequence voltage and/or current, with adjustable torque angle. The directional supervision is adjustable independently for each overcurrent unit. Programmable performance logic for polarization voltage loss is included. This algorithm is used in the MIN option E model.

ALGORITHM 2: Neutral isolated from the ground. Isolated Ground Directional Control

The MIN provides directional protection for ungrounded systems. In this type of system the neutral is completely isolated from the ground. As a result, the ground fault current value is minimal and produced only by the line capacitive coupling. The algorithm is



based on the presence of this capacitive current plus the detection of an overvoltage condition. This algorithm is used in MIN option S models.

ALGORITHM 3: Neutral connected to ground through a Petersen Coil

The MIN provides directional protection for systems where the ground connection is done through a Petersen coil. This scheme is known as a ground resonant circuit or ground fault neutralizer. The algorithm is based on a real power directional protection unit, being intrinsically a ground directional function polarized by zero sequence voltage. The torque angle defines the operation zone and the three magnitudes (residual current, residual voltage and real power) define the pickup value. This algorithm is used in option S models.

Direct Comparison Scheme Logic

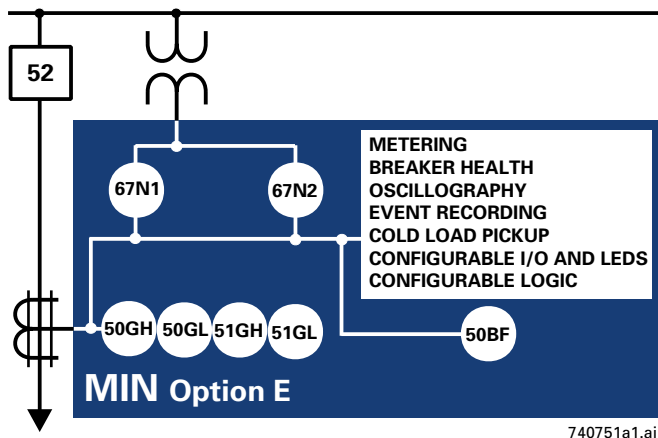
Directional comparison scheme functionality can be used as an instantaneous unit or a time-delayed device in pilot protection schemes.

The MIN will work in a number of pilot schemes in conjunction with distance relays. Note that most of these schemes will require the use of the two available digital inputs. This logic is available in MIN-L models.

Inputs and Outputs

The factory configuration of MIN inputs and outputs can be easily modified using M+PC software. Two digital inputs and six relay outputs are provided, four of them programmable. These configurable outputs can be assigned either to a set of pre-configured values, or to an OR/NOT combination of the same values.

Functional Block Diagram



Monitoring and Metering

The MIN offers advanced monitoring and metering functions which includes an event recorder that captures up to 24 events and timestamps them with one millisecond resolution. Additionally, the MIN offers analog/digital oscillography, and a breaker wear monitor to help schedule maintenance. The MIN also features ground current metering.

User Interfaces

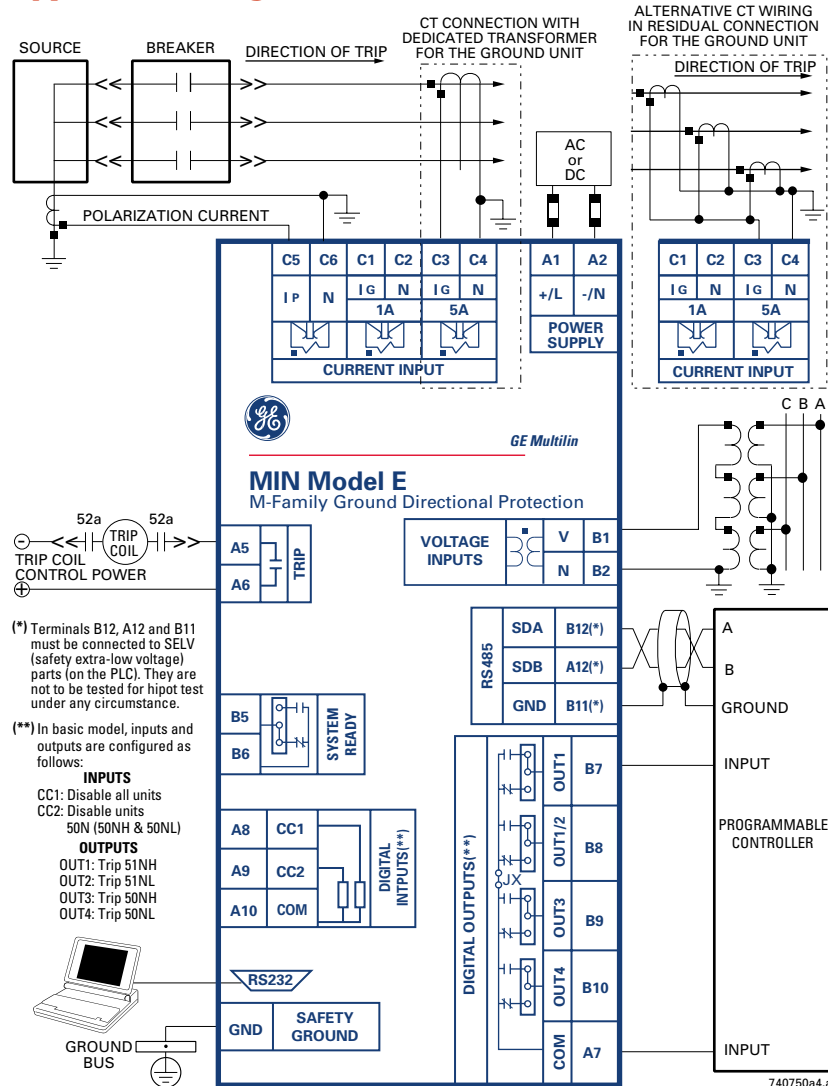
The user can use the M+PC software for setting and monitoring functions. Communication is provided through the RS232 port on the faceplate or the RS485 rear port using ModBus® RTU protocol at 19,200 bps. Local interface is provided through a keypad and display, with LED indicators.

MIN Guideform Specifications

For an electronic version of the MIN guideform specifications, please visit: www.GEindustrial.com/Multilin/specs, fax your request to 905-201-2098 or email to literature.multilin@indsys.ge.com.



Typical Wiring



Ordering

MIN * * 0 * E000 * 00 *

MIN					Digital ground protection
N					Ground directional relay
L					Ground directional relay for teleprotection schemes
A					ANSI curves
I					IEC curves
		E			$I_n = 1\text{ A or }5\text{ A}$ (pickup range: 10 – 240% CT rating)
		S			Isolated ground and Petersen coil
			F		24 – 48 VAC (range: 19 – 58 VDC) power supply
			H		110 – 250 VDC (range: 88 – 300 VDC) power supply and
				C	110 – 230 VAC (range: 88 – 264 VAC) power supply
				S	Individual relay
					Mounted in an M+ system†

† If relays are to be mounted in an M+ system, then either an M050 half 19" rack or M100 full 19" rack case must be ordered. The M050 and M100 racks are provided at no additional cost based on the number of relays ordered.

Accessories

B1315P1 Depth reducing collar: reduces the mounting depth in 63 mm