



High Impedance Bus Differential System

Numerical High Impedance Bus Differential System for LV, MV and HV Busbars

Key Benefits

- Robust numerical high impedance differential protection relay suitable for all high-impedance circulating current differential protection applications
- Alternate setting groups for sensitive setting of the differential element for changing system conditions
- Reduced troubleshooting and maintenance cost through built-in event recording, and oscillography functions
- Easy to use programming logic for scheme customization
- Application flexibility through digital I/Os and LEDs
- Wide range of auxiliary power supply supported
- Easy access to relay information through front panel keypad or through communication links
- Isolated RS232 port for easy front port communications
- Drawout construction in a 19" rack case and can be flush or 19" rack mounted

Applications

- Differential protection of single and split busbar arrangements
- High impedance differential (restricted ground fault) protection for reactors, transformers, generators and large motors

Features

Protection and Control

- High impedance differential protection
- Two 87 elements easily configurable for trip or alarm
- Open CT detection can be achieved using the second 87 element
- Lockout logic
- 6 outputs - four configurable, plus trip and alarm
- Two setting groups

Monitoring & Metering

- 24-event record
- Analog/digital oscillography
- Per phase differential current metering
- Monitoring of the last 5 trips information from the display

Communications

- 2x16 character LCD display
- 6 LED indicators, 4 configurable in function and color
- Front RS232 and rear RS485 ports using ModBus® RTU protocol up to 19,200 bps

EnerVista™ Software

- State of the art software for configuration and commissioning GE Vernova Multilin products
- Document and software archiving toolset to ensure reference material and device utilities are up-to-date



Overview

The MIB is designed for fast and selective differential protection based on the high-impedance circulating current principle. It is used for the protection of busbars, generators, transformers and reactors against phase-to-phase and phase-to-earth faults. It can be applied for protection of bus bars of different voltage levels.

The MIB can be used to provide Restricted Ground Fault (RGF) protection to machines and transformers having impedance grounded Wye windings. It is intended to provide sensitive ground fault detection for low magnitude fault currents which would not be detected by other protection functions.

Protection

Differential Unit (87)

The MIB has two differential elements freely configurable for trip or alarm. Very sensitive settings can be provided by adjusting the element pick-up from 10mA to 400mA. The MIB includes a set of 2000 Ohm stabilizing resistors for enhanced through-fault stability. In order to protect the differential unit, a set of MOVs is used to clamp the secondary voltage during faults to less than 2 kV.

The second differential element can be used to detect any current unbalance condition due to a opening of a CT phase. A built-in timer can be used to block the operation of the MIB under such situations.

Configurable Logic

Up to a maximum of 4 configurable logic schemes can be implemented into each MIB relay by means of using 4 sets of pre-configured logic gates and timers. A graphical user interface is provided for configuration of the logic. The outputs of the configurable logic can be used to configure digital outputs and LEDs.

Multiple Setting Groups

Two separate settings groups are stored in non-volatile memory, with only one group active at a given time. Switching between setting groups 1 and 2 can be done by means of a communication command or digital input activation.

Settings are divided in 2 categories, main and advanced settings. This allows users to have access to main relay functions in an extremely simple, user friendly way by entering only main settings, while having access to complete functionality for more complex use through the advanced settings.

Inputs and Outputs

Two configurable inputs and six contact outputs (four of them configurable) are provided for each MIB relay.

Metering

The MIB provides metering values for phase differential current.

Features

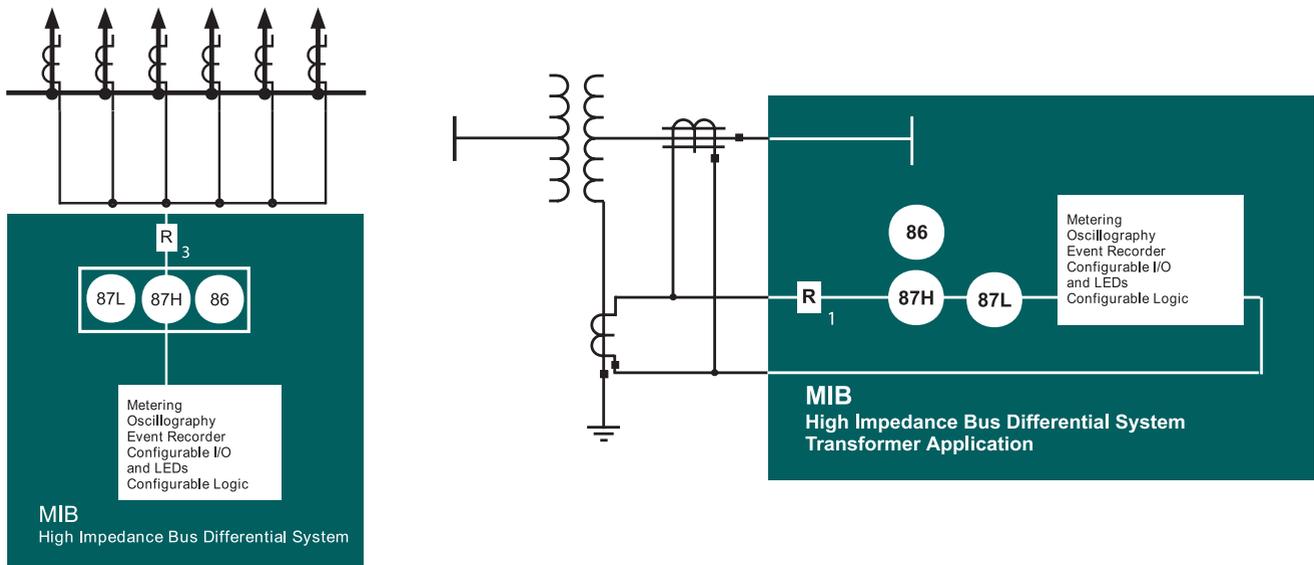
Event Recording

Events consist of a broad range of change of state occurrences, including element pickups, trips, contact operations, alarms and self test status. Each MIB relay stores up to 24 events time tagged to the nearest millisecond. This provides the information needed to determine sequence of events which facilitates diagnosis of relay operation. Each event can be individually maskable in order to avoid the generation of undesired events.

Oscillography

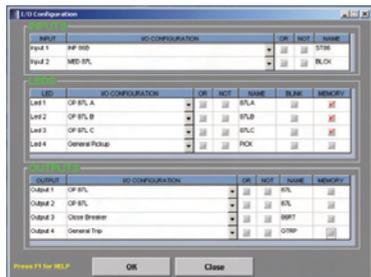
Each MIB relay captures current waveforms and digital channels at 8 samples per cycle. One oscillography record with a maximum length of 24 cycles is stored in memory. Oscillography is triggered either by internal signals or an external contact.

Functional Block Diagram



Configurable I/O and LEDs

There are two configurable digital inputs in each MIB relay. Of the six digital outputs, two have a fixed function (trip and service required), while the other four are user configurable. Those configurable outputs can be assigned either to a set of pre-configured values, or an OR/NOT combination of the same values. Each configurable output can be independently latched.



Input, output and LED configuration can be performed using EnerVista software

User Interfaces

Status LEDs

The first LED has a fixed assignment (relay in service), the second is fixed for trip, and the remaining four LEDs are user configurable in function, memory and/or blinking/fixed indication.

Keypad and Display

A three button keypad allows user access for easy relay interrogation and change of

settings. Metering data, last trip information and settings are displayed through the LED dot matrix display. Note that full access to the event and oscillography records, and unit configuration is possible only through PC communications.

Self Test Diagnostics

Comprehensive self test diagnostics occur at power up and continuously during relay operation. Any problem found by self tests causes an alarm and an event is logged.

Communication Ports

A front mounted RS232 and a rear RS485 port allow easy user interface via a PC. ModBus® RTU protocol is used for all ports. The relay supports baud rates from 300 to 19,200 bps. Up to 32 relays can be addressed on a single communications channel. A unique address must be assigned to each relay via a setting when multiple relays are connected.

GE Vernova MultiNet™ Compatible

MultiNet is a communications module that provides GE Vernova Multilin serial ModBus IEDs with ModBus TCP/IP communications over Ethernet, allowing connection to fiber optic LAN and WAN network systems.

EnerVista™ Software

The EnerVista™ Suite is an industry-leading set of software programs that simplifies every aspect of using the relay. The EnerVista™ suite provides

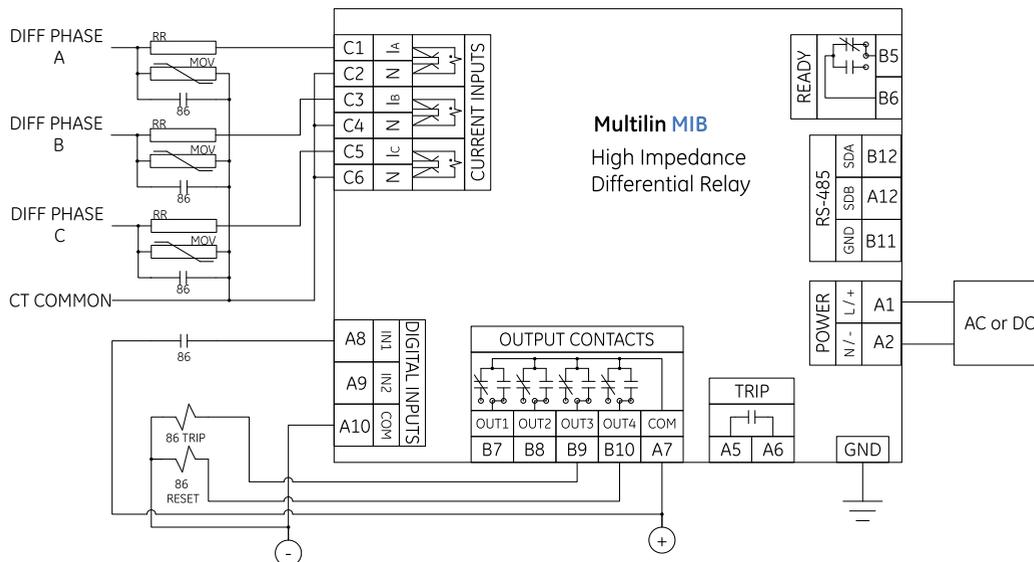
all the tools to monitor the status of the protected asset, maintain the relay, and integrate information measured into DCS or SCADA monitoring systems. Convenient COMTRADE and Sequence of Events viewers are an integral part of the UR Setup software included with every UR relay, to carry out postmortem event analysis to ensure proper protection system operation.

EnerVista™ Launchpad

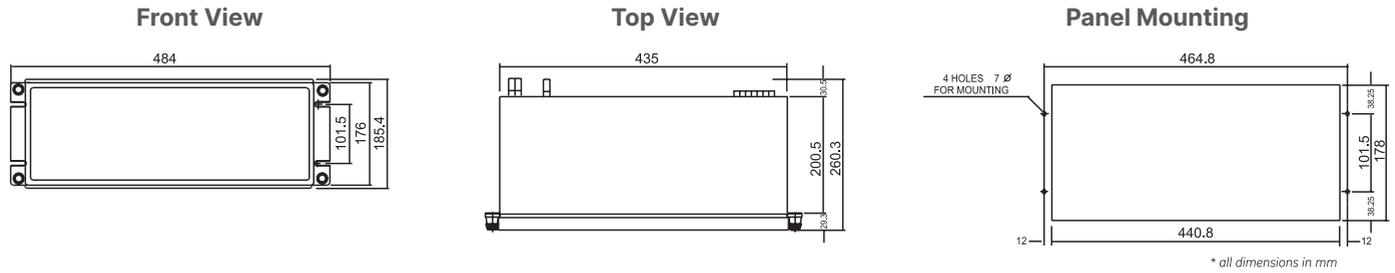
EnerVista™ Launchpad is a powerful software package that provides users with all of the setup and support tools needed for configuring and maintaining GE Vernova Multilin products. The setup software within Launchpad allows configuring devices in real-time by communicating using serial, Ethernet, or 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
- Wiring Diagrams
- FAQ's
- Service Bulletins

Typical Wiring Diagram



Dimensions



Technical Specifications

HIGH IMPEDANCE

DIFFERENTIAL UNIT (87)

Pickup Level:	5mA to 400mA
Definite Time:	Up to 600 sec (10 msec steps)
Accuracy:	
Level:	±3% in the complete range
Time:	Greater of ±3% or ±25 ms

ALARM UNIT (87AL)

Pickup Level:	10mA to 400mA
Definite Time:	Up to 600 sec (10 msec steps)
Accuracy:	
Level:	±3% in the complete range
Time:	Greater of ±3% or ±25 ms

INPUTS

BURDENS

Current Circuits:	<0.08 VA at In (1A)
DC Burden:	
During Operation:	5 W standby
Per Activated Input:	8 mA / 1 W, Vaux:125
High Impedance Module:	
Stabilizing Resistors:	2000 Ohm
Metal Oxide Varistor:	
Clamping Voltage:	1900V
Energy Rating:	5400J

OUTPUTS

OUTPUT RELAYS

Configuration:	6 Electromechanical Form C
Contact Material:	Alloy suited for inductive loads
Maximum Operating Voltage:	400Vac
Continuous Mode Current:	16 A at 250 Vac. general purpose ¾ HP, 124 Vac 1-1/2 HP, 250 Vac 10A, 250 Vac, 0.4 PF, B300 pilot duty
Make and Carry:	30 A
Breaking:	4000 VA

	Voltage	M/C cont.	M/C 0.2sec	Break	Max Load
DC Resistive	24 Vdc	16A	48A	16A	384W
	48 Vdc	16A	48A	2.6A	125W
	125 Vdc	16A	48A	0.6A	75W
	250 Vdc	16A	48A	0.5A	125W
AC Resistive	120 Vdc	16A	48A	16A	1920W
	250 Vdc	16A	48A	16A	4000W
Inductive	250 Vdc	10A	30A	10A	1000W

METERING

Current Circuits:	
Continuously:	4A
During 3 Sec:	50A
During 1 Sec:	100A

COMMUNICATIONS

Local	Alphanumeric display;
Communication:	3 button frontal keypad
Remote Communication:	(local or remote PC and communications net):
Mode:	ModBus® RTU
Baudrate:	300 to 19200 bps
DB9 connector for RS232 ports on the front (1) and RS485 on the rear	

POWER SUPPLY

Frequency:	50/60 Hz
Auxiliary Voltage:	24-48 VDC ±20%
Voltage:	110-250 VDC ±20%

RESISTOR

Value:	2000 Ohm
Max. Operating Cont. Voltage	300 V

MOVs

V Peak:	1900 V
Max. Withstand Energy:	5400 J

ENVIRONMENTAL

Temperature:	
Storage:	-40°C to +80°C
Operation:	-25°C to +70°C
Humidity:	Up to 95% without condensing

Technical Specifications (cont'd)

PACKAGING

Approximate Weight:

Net:	23.59 lb (10.7 kg)
Ship:	25 lb (11.3 kg)

TYPE TESTS

Isolation Test Voltage:	2kV, 50/60 Hz, 1 min IEC 60255-5
Surge Test Voltage:	5 kV peak, 0.5 J IEC 60255-5
Interference:	Class III according to IEC 60255-22-1
Electrostatic Discharge:	Class IV according to IEC 60255-22-2
Radio interference:	Class III according to IEC 60255-22-3

TYPE TESTS

Fast Transient:	Class IV according to IEC 60255-22-4
Sinusoidal Vibration:	Class I according to IEC 60255-21-1
Shock:	Class I according to IEC 60255-21-2
Radiofrequency Emission:	According to IEC 41B (Sec 81) and EN55022 Class B
Oscillatory/Fast Risetime Transient:	ANSI/IEEE C 37.90.1
Electromagnetic Interference Withstand Capability:	ANSI/IEEE C 37.90.2

APPROVALS

CE	Conforms to 89/336/CEE and 73/23/CEE
CNL:	C22.2 Certified
UL:	UL508 Certified
ISO:	Manufactured to an ISO 9001 registered program

**Specifications subject to change without notice*

Ordering

MIB	*	O	**	C	E	000	00	
Application	1							1 winding Transf. REF App. 1 High Imp. Differential Element
	2							2 winding Transf. REF App. 2 High Imp. Differential Elements
	3							Busbar App. 3 High Imp. Differential Elements
Auxiliary Voltage			LO					LO Power Supply: 24-28 Vdc (range: 19~58Vdc)
			HI					HI Power Supply: 110-250Vdc (range: 88~300Vdc)

For more information, visit
governova.com/grid-solutions



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