Technical Data **TD02602014E**

Effective March 2017
Supersedes May 2016

EMR-3000
Motor Protection Relay

Contents

Powering Business Worldwide

Key Features, Functions and Benefits

- Microprocessor-based protection with monitoring, and control for medium voltage motors.
- Integral test function reduces maintenance time and expense.
- Zone selective interlocking improves coordination and tripping time, and saves money compared to a traditional bus differential scheme.
- Reduce trouble shooting time and maintenance costs- Trip and event recording in non-volatile memory provides detailed information for analysis and system restoration. 6000 cycles of waveform capture aids in post fault analysis (viewable using Powerport-E software)
- Minimum replacement time- Removable terminal blocks ideal in industrial environments
- Front USB port and Powerport-E software provides local computer access and user-friendly windows based interface for relay settings, configuration, and data retrieval.
- Breaker open/close from relay faceplate or remotely via communications.
- Fast an easy troubleshooting, improved maintenance procedures and increased device security. Provides detailed traceability for system configuration changes
- Relays self-diagnostics and reporting improves uptime and troubleshooting.
- Breaker trip circuit monitoring improves the reliability of the breaker operation.

.

General Description

Eaton's EMR-3000 motor protection relay is a multifunctional microprocessor-based protective relay for the protection of any size motor at all voltage levels. It is most commonly applied on medium voltage or larger motors. The MP-3000 relay is a current only device that provides complete and reliable motor protection, monitoring, and starting control functions.

The EMR-3000 motor protection relay has removable terminal blocks, and multiple communications options.

The EMR-3000 motor protection relay has three-phase and one ground current inputs. It can be used with either a 5A or 1A CTs. The ground protection can be used with either a zero sequence ground CT or from the residual connection of the phase CTs. The zero sequence ground CT provides greater ground fault sensitivity than the residual connection. The unit is user programmable for 60 Hz or 50 Hz operation.

The maintenance mode password protected soft key, can be used for arc flash mitigation to change to an alternate settings group, set to have instantaneous elements only. The multiple setting groups can also be changed, via communications or a digital input. Flash memory is used for the programming and all settings are stored in nonvolatile memory.

An integral keypad and display is provided for direct user programming and retrieval of data without the need of a computer. 14 programmable LEDs provide quick indication of relay status.

A front USB port is provided for direct computer connection. An RS-485 communication port on the back is standard for local area networking using Modbus-RTU or DNP3. An optional Ethernet port and various protocols are available.

The EMR-3000 motor protection relay has mass memory for data storage and a real-time clock with 1 ms time resolution. The relay will log 300 sequence of event records, 20 detailed trip logs, minimum/maximum values, load profiles, the 5 latest start profiles, motor trending, breaker wear information and oscillography data.

The EMR-3000 motor protection relay has four discrete inputs and 1 fiber optic input, 1 Form C, and 2 NO programmable contacts, 1 Form C healthy contact. It also has an optional 4-20 mA analog output or zone interlocking card. The relay provides maximum user flexibility to configure the I/O. All inputs and outputs (except the healthy output) are user-programmable. The unit also counts with a test mode to force outputs and simulate currents, to facilitate the commissioning of the unit. It can be powered from 19 Vdc to 300 Vdc or 40 Vac to 250 Vac auxiliary power.

Features

Protection Features

- Thermal protection (49/51)
  - Locked rotor protection (49S/51)
- Phase overcurrent elements:
  - Two instantaneous elements with timers (50P[1], 50P[2], and 50P[3])
  - Three inverse time overcurrent elements (51P[1], 51P[2], and 51P[3])
  - 11 standard curves
  - Instantaneous or time delay reset
- Ground overcurrent elements:
  - Two instantaneous measured elements with timers (50X[1], and 50X[2])
  - Two instantaneous calculated elements with timers (50R[1], and 50R[2])
  - Two inverse time overcurrent measured elements (51X[1], and 51X[2])
  - Two inverse time overcurrent calculated elements (51R[1], and 51R[2])
  - 11 standard curves
  - Instantaneous or time delay reset
- Jam or Stall protection (50J[1], 50J[2])
- Phase unbalance negative sequence overcurrent (46[1], 46[2])).
- Underload protection (37[1], 37[2], 37[3])
- Temperature protection with optional URTD (49/38).
- Stars per hour (66)
- Lockout protection (86).
- Breaker failure (50BF).
- Zone interlocking for bus protection (87B).

Metering Features

- Amperes: Positive, negative and zero sequence.
- Ampere demand.
- % THD I.
- Magnitude THD I.
- Minimum/maximum recording
- Temperature with remote URTD module

Monitoring Features

- Trip coil monitor
- Breaker wear primary and secondary (accumulated interrupted current).
- Oscillography (6000 cycles total).
- Fault data logs (up to 20 events).
- Sequence of events report (up to 300 events).
- Trending (load profile over time)
- Motor History
- Records the last 5 motor start profiles.
- Motor Start Trending.
- CT supervision
- Clock (1 ms time stamping).

Control Functions

- Transition for reduced voltage starts
- Incomplete sequence delay
- Permits numbers of cold starts
- Limits numbers of starts per hour
- Anti-backspin time delay
- Mechanical load shedding
- Zero speed switch for long acceleration motors
- Motor stop inputs
- Remote trip input
- Differential trip input
- Emergency override
- Breaker/Contactor open-close/stop-start
- Remote open-close (stop-start)
- Programmable I/O
- Programmable LEDs
- Multiple setting groups.

Communication Features

- Local HMI.
- Password protected.
- Addressable.
- IRIG-B
- Local communication port.
  - USB
- Remote communication port:
  - RS-485 Terminals
  - Ethernet RJ45
  - Fiber Optic ST
  - RS-485 D-SUB
  - LC Duplex Fiber Optic
- Protocols:
  - Modbus-RTU
  - Modbus-TCP
  - IEC-61850
  - DNP3-RTU
  - DNP3-TCP/UDP
  - Profibus-DP
- Configuration software
  - Powerport-E

Protection and Control Functions

The Eaton's EMR-3000 motor protection relay has been designed for maximum motor operation and protection. It permits running the motor close to its design limits while protecting it against excessive heating and damaging overload conditions. The EMR-3000 field proven protection algorithms were developed based on motor designs and operating parameters for optimum operation and protection while minimizing nuisance tripping. The EMR-3000 motor protection relay utilizes a patented protection algorithm and measurement technique based on proven positive and negative (unbalance) sequence current sampling and true RMS calculations.

Intel-I-Trip (I2t) overload protection

The EMR-3000 motor relay features the exclusive Eaton *Intel-I-Trip* intelligent overload protection system. *Intel-I-Trip* develops custom overload curves simply from motor nameplate data. Intel-I-Trip protects motors from potentially damaging overload and abnormal operating conditions. The *Intel-I-Trip* intelligent overload protection feature utilizes field proven measurement techniques and a patented motor thermal protection model. The EMR-3000 motor relay's unique measurement technique samples the current waveforms 36 times per cycle, providing accurate measurements of the positive and negative sequence currents. The negative sequence current causes a greater heating effect on the rotor and has a greater impact on the thermal model in the relay. *Intel-I-Trip* utilizes these measurements in its motor model to safely protect the motor against the heating effects of these currents.

The motor thermal model is analogous to a bucket that is being filled and drained at the same time. The fill rate is dependent on the motor currents and the drain is based on motor design principles. The size of the bucket is equivalent to the thermal capacity associated with the mass of the motor. *Intel-I-Trip* integrates these rates and will issue a trip when the thermal capacity is filled.

Intel-I-Trip features adaptive trip characteristics that adjust the trip times based on measured motor temperature when RTDs are used.

Instantaneous overcurrent

The EMR-3000 motor protection relay provides an instantaneous phase overcurrent function to trip the motor for high fault current levels and save the fuses. This function can be disabled and has an adjustable time delay on starting to avoid nuisance tripping on inrush.

Phase Unbalance Protection

Motor supply circuits are often fed through fuses and can be run with a single-phase fuse blown, referred to as single phasing the motor. The EMR-3000 motor protection relay measures the current unbalance and can be used to alarm or trip the motor before damage occurs. Pickup, start, and run timers and a second element for alarm purposes are provided.

Ground Fault Protection

A separate measuring circuit is used to measure ground current. A ground CT is recommended for more sensitive protection against winding insulation breakdown to ground. The relay ground circuit can be connected residually from the three-phase CTs. The ground fault protection has pickup and time delay set points or can be disabled.

Jam protection

The user-selectable Jam function protects motors that are running against a sudden mechanical jam or stall condition. The common application is on motors used on crushers, chippers, or conveyors. It detects an increase of motor current to a level above full load. Pickup, start, and run timers and a second element for alarm purposes are provided.

Underload Protection

The user selectable underload function is used to detect the loss of load on the motor. Coupling failure is a common cause for loss of load. Pickup, start, and run timers and a second element for alarm purposes are provided.

Reduced voltage starting

The EMR-3000 motor protection relay provides a transition and incomplete sequence function for reduced voltage starting. The user can select to transition based on the current level and/or on time.

Antibackspin

The stop function is programmable from 2–20%. For certain applications, such as pumping a fluid up a pipe, the motor may be driven backward for a period of time after it stops. The EMR-3000 relay provides an antibackspin timer to prevent starting the motor while it is spinning in the reverse direction. The timer begins counting from the moment a stop is declared by the relay.

Start control timers

Motors typically have limits to the number of cold starts, starts per hour period, or time between starts that are permitted without damage. The EMR-3000 motor protection relay incorporates these timers to prevent starting the motor beyond its capabilities.

Load shedding

The EMR-3000 motor protection relay provides a mechanical load shedding feature that can be used to control an upstream process. The load-shedding function closes a contact on an overload condition to control an upstream process from adding more load until the overload condition is gone.

Emergency override

The EMR-3000 motor protection relay has a user-programmable feature that will let the operator reset the start inhibitor timers and thermal overload bucket. This function is intended for use in emergency conditions only, and it may result in motor damage or failure.

Long acceleration motors

Large motors with a high inertia may experience starting currents that exceed the locked rotor current and time. The EMR-3000 motor protection relay has logic and provisions for a zero speed switch input to differentiate between a stall and start condition. If the motor is spinning, then the relay will not trip on the normal locked rotor-time allowing the motor to start.

Remote/differential trip

The digital inputs can be programmed to accept a contact input from a separate differential relay or other device to trip the motor. This provides local and remote target information and utilizes the trip contacts of the EMR-3000 motor protection relay. It will also record and log the motor information at the time of the trip.

Breaker Failure or Stuck Contactor

The EMR-3000 motor protection relay includes a breaker failure (50BF, 62BF) function that can be initiated from either an internal or external trip signal. This is an independent element that can be used to operate a lockout relay or trip an upstream breaker. The timer must be longer than the breaker operating time and the protective function reset times.

Flexible Phase Rotation

The EMR-3000 motor protection relay can be applied on either an A-B-C or A-C-B phase rotation. A user setting permits correct operation and indication of the actual system configuration.

Maintenance Mode

The Maintenance Mode can improve safety by providing a simple and reliable method to reduce fault clearing time and lower incident energy levels at energized panels. The Maintenance Mode allows the user to switch to more sensitive settings via a password protected soft key, communication or via a digital Input while maintenance work is being performed at an energized panel or device. The more sensitive settings provide greater security for maintenance personnel and helps reduce the possibility of injury.

Monitoring and Metering

Sequence of Events Records

The EMR-3000 protection relay records a maximum of 300 events associated with the relay. An event is classified as a change of state as detected by the relay. These include relay pickups, dropouts, trips, contact closure, alarms, setting changes and self-diagnostic failures. Each event is date and time stamped to a 1 ms resolution. The events are stored in a FIFO in chronological order.

Trip Log

The EMR-3000 protection relay will store a maximum of 20 trip records in a FIFO trip log. Each trip record will be date and time stamped to a 1 ms resolution. The trip log record will include information on the type of fault, protection elements that operated, fault location and currents and voltages at the time of the fault.

Waveform Capture

The EMR-3000 motor protection relay provides oscillography-recording capabilities. The relay will record all measured signals along with the binary signals of pickup, trip, logic and contact closures. The EMR-3000 relay can record up to 6000 cycles of data. The number of records is proportional to the size of each record; the maximum size per record is 600 cycles. The waveform capture is initiated by up to 8 different triggers; it can also be generated manually through the display or via communications.

Integral User Interface

The front panel user interface has a 128 x 64 pixel LCD display with background illumination for wide angle viewing in all light conditions. 7 programmable LEDs provide quick and easy visual display of power on, mode of operation, alarm and trip indication. Soft keys are provided for operation mode selection, scrolling through data and settings. In addition, the relay settings and test functions are password protected.

Starting Profiles

The EMR-3000 records the average current versus time for the last five starting cycles. This information is available via the communications port through Powerport-E.

Motor Statistics

For each motor start, the EMR-300 stores a motor start report and add this data to the motor statistics buffer. With the motor statistics you can track motor start data for the past eighteen 30-day periods. For each 30-day interval, the relay records the following information:

- The date the interval began
- The total number of starts in the interval
- The averages of the following quantities:
- Motor Start Time
- Start % Rotor Thermal Capacity Used
- Maximum Start Current

Load Profiling/Trending

The EMR-3000 relay automatically records selected quantities into non-volatile memory every 5, 10, 15, 30, or 60 minutes, depending on the trending report setting.

Programmable I/O

The EMR-3000 motor protection relay provides heavy-duty, trip-rated, 2 normally open and 1 Form C contacts. One isolated inputs can be used for monitoring the trip circuit. One Form C contact is dedicated to the relay failure alarm function and is operated in a normally energized (failsafe) mode. There are 4 eight user-configurable discrete inputs that accept a wet contact and can operate through a wide range of power. Each input and output is user-programmable for maximum application flexibility.

Drilling

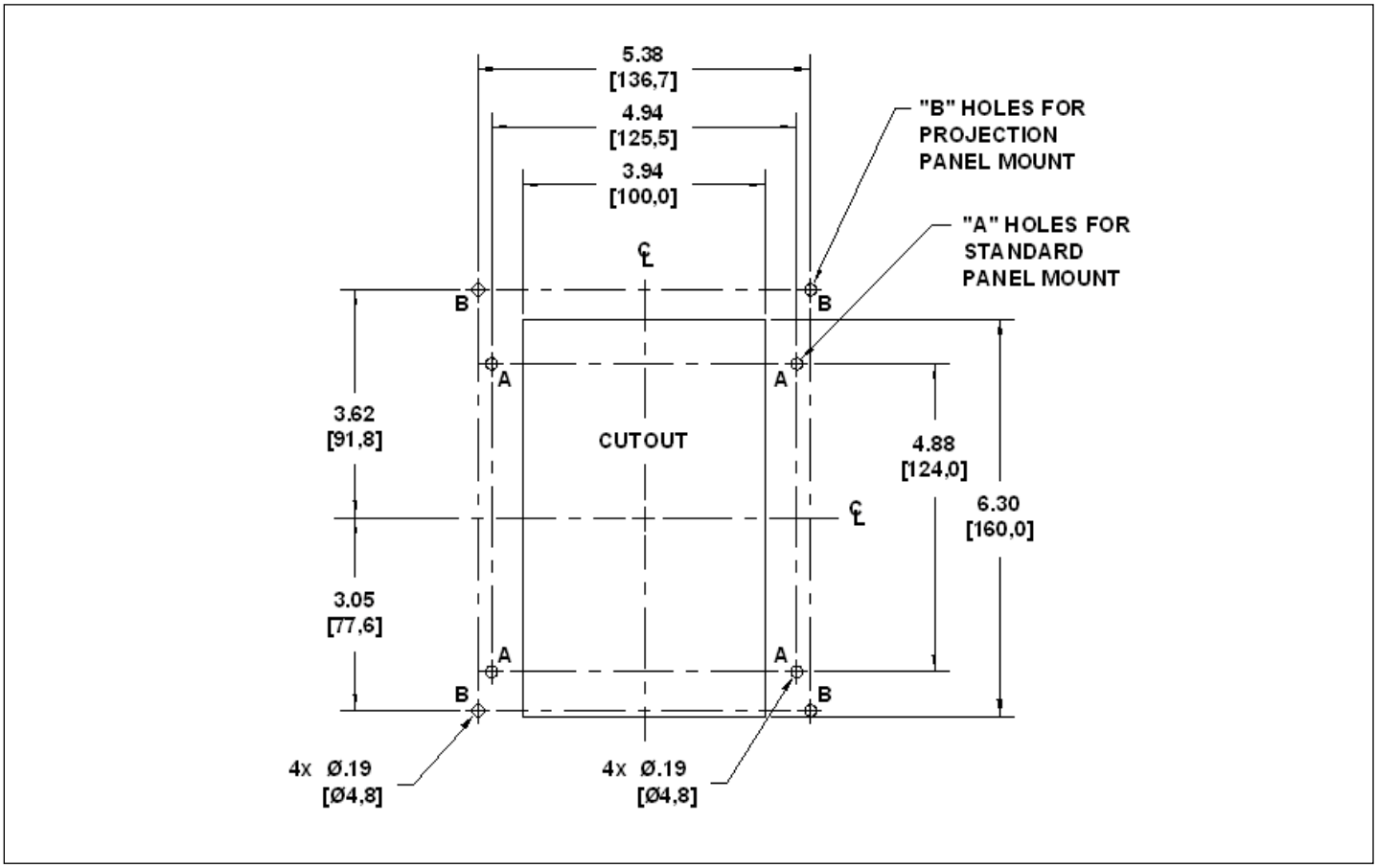

Figure 1. Drilling Plan.

Projection Mount Front and Side Views

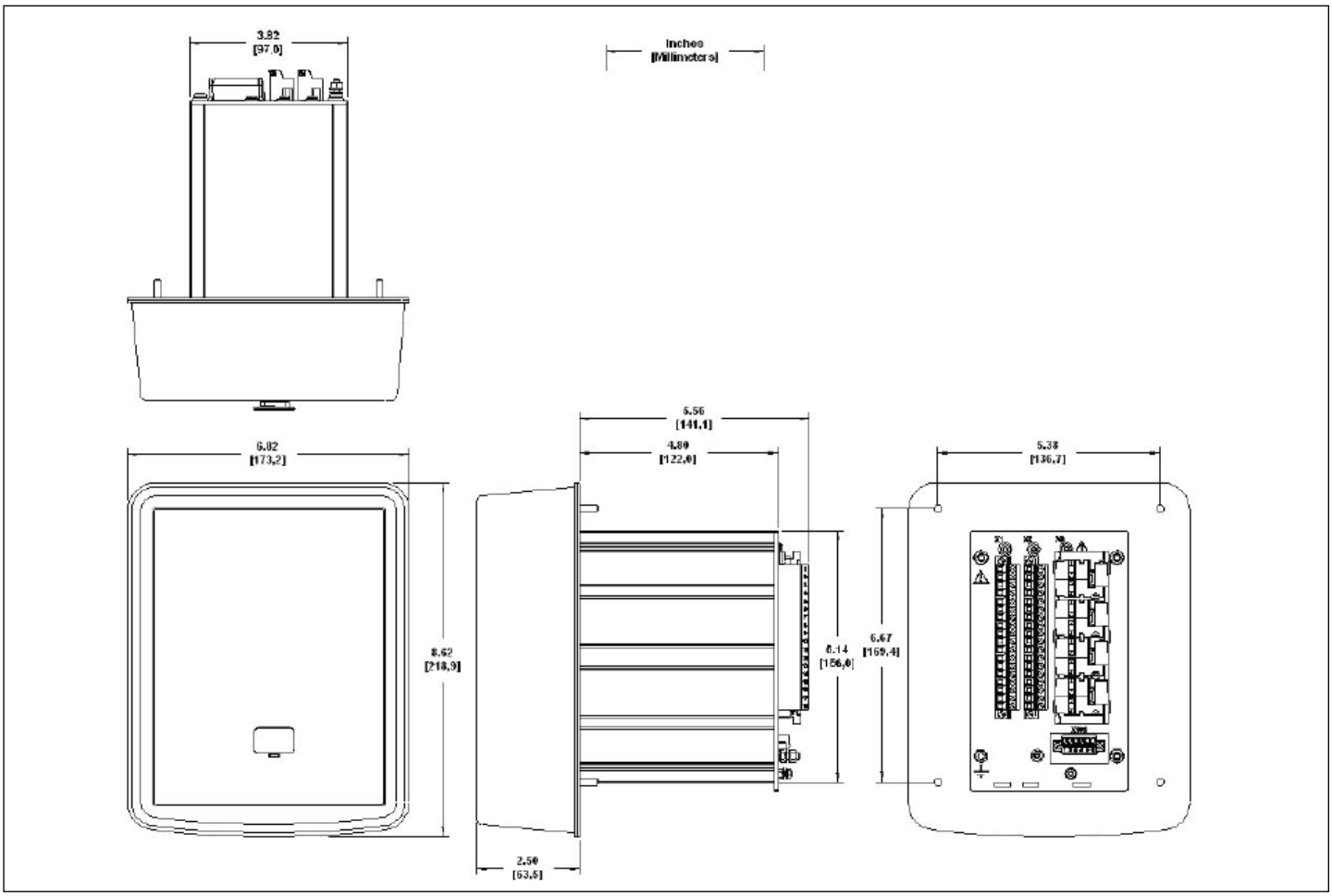

Figure 2. Projection Mount Front and Side Views.

Standard Mount Front and Side Views

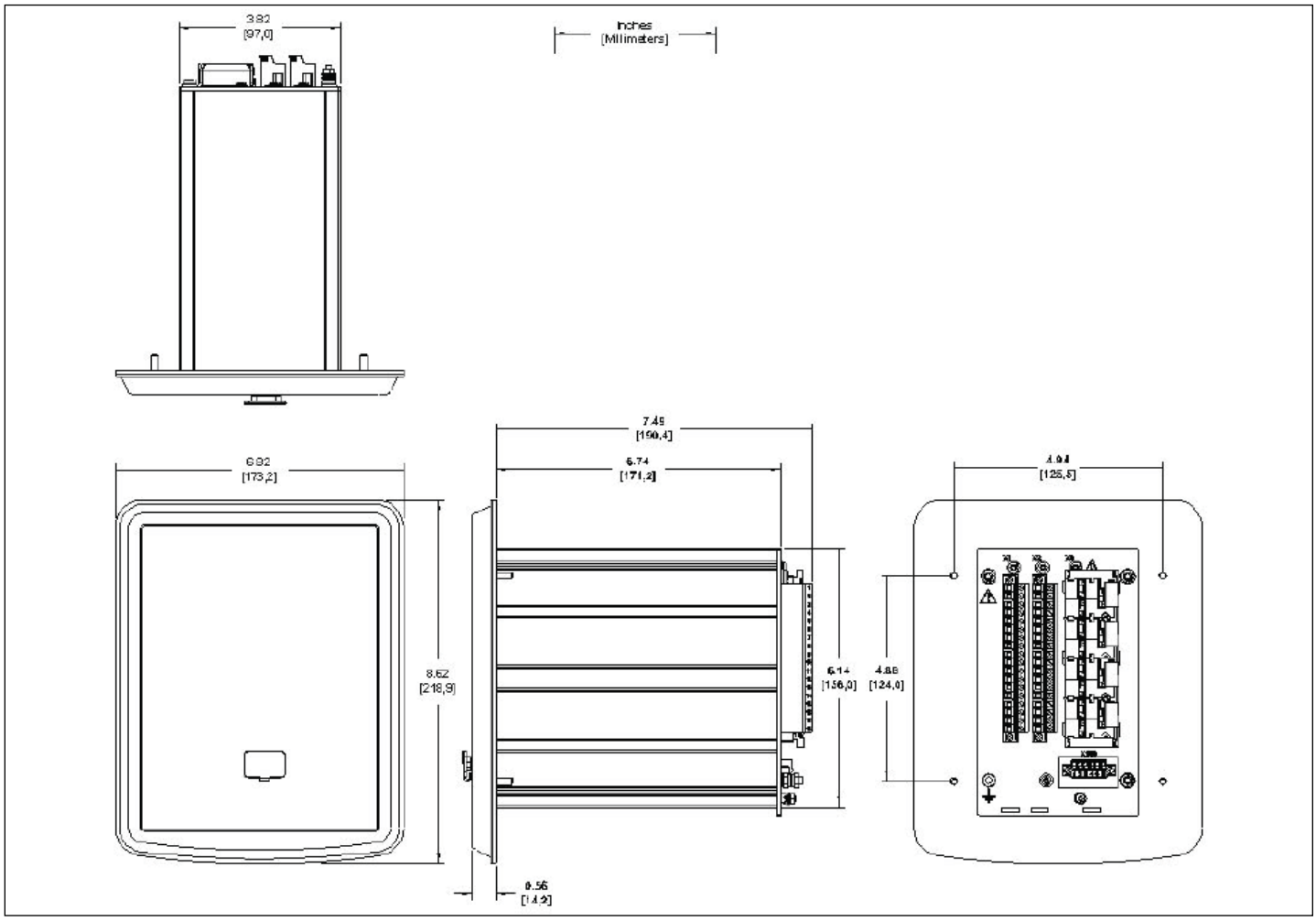

Figure 3. Standard Mount Front and Side Views.

Typical AC Connections. 1A Cts, and ground current measured by Zero Sequence CT.

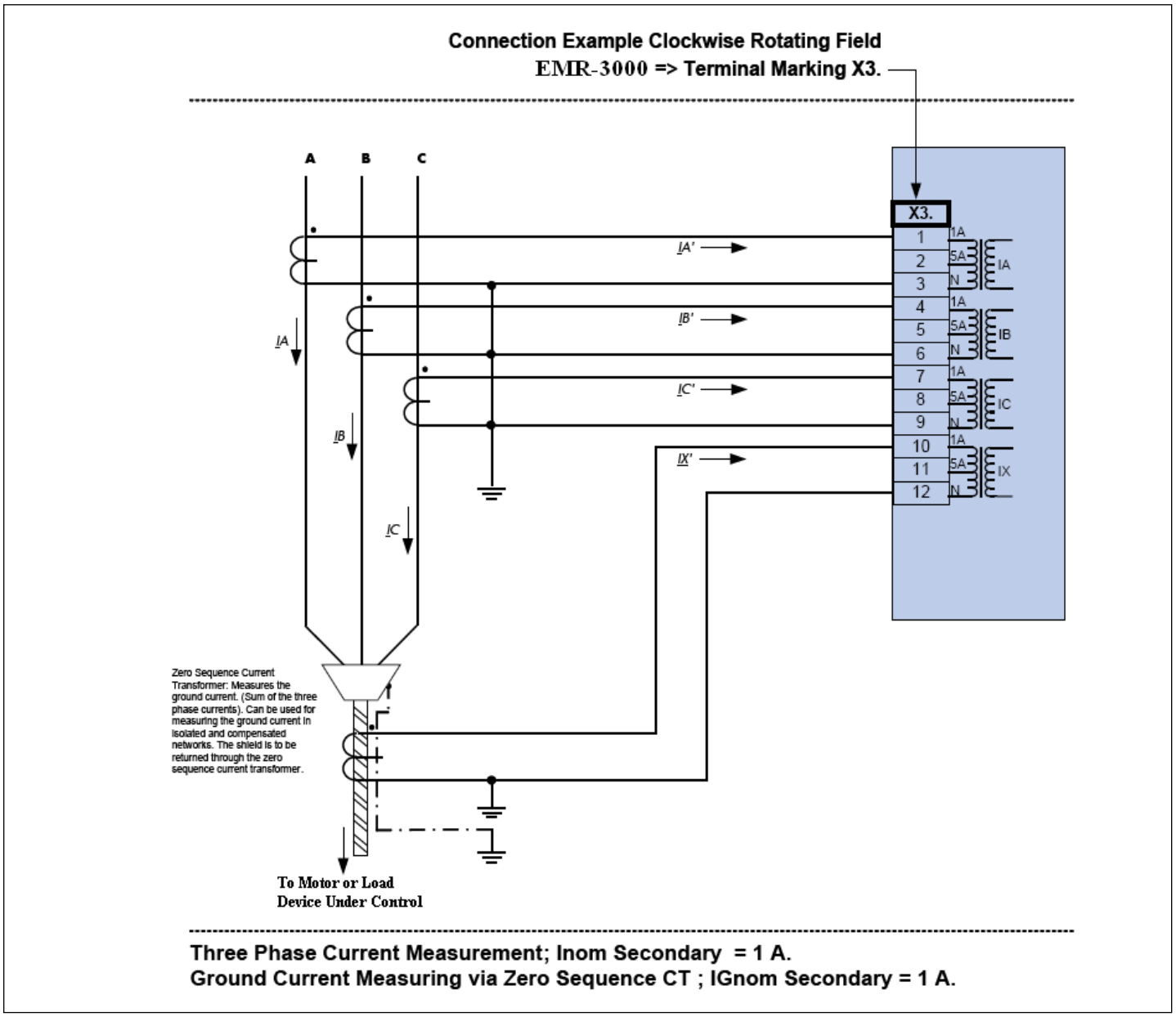

Figure 4. Typical AC Connections. 1A Cts, and ground current measured by Zero Sequence CT.

Functional Overview

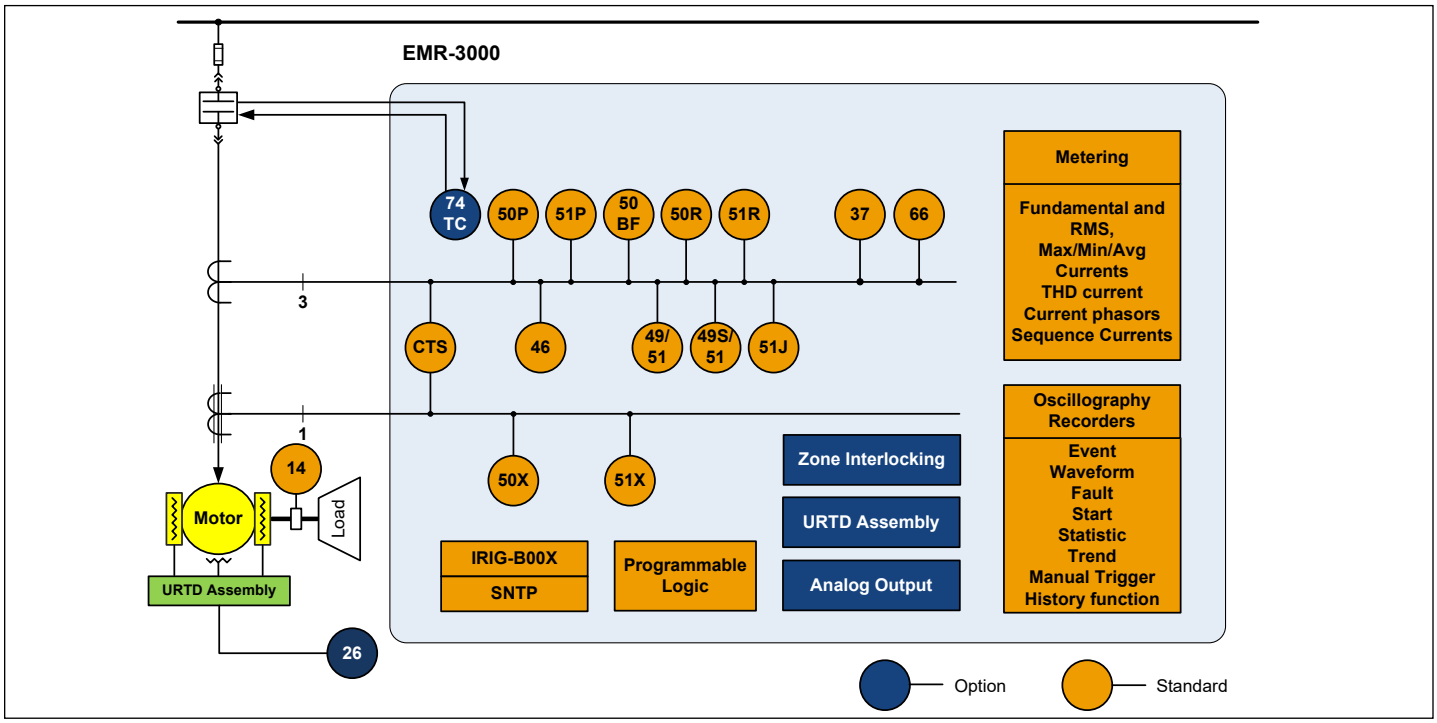

Figure 5. Functional Overview.

Typical Control Diagram

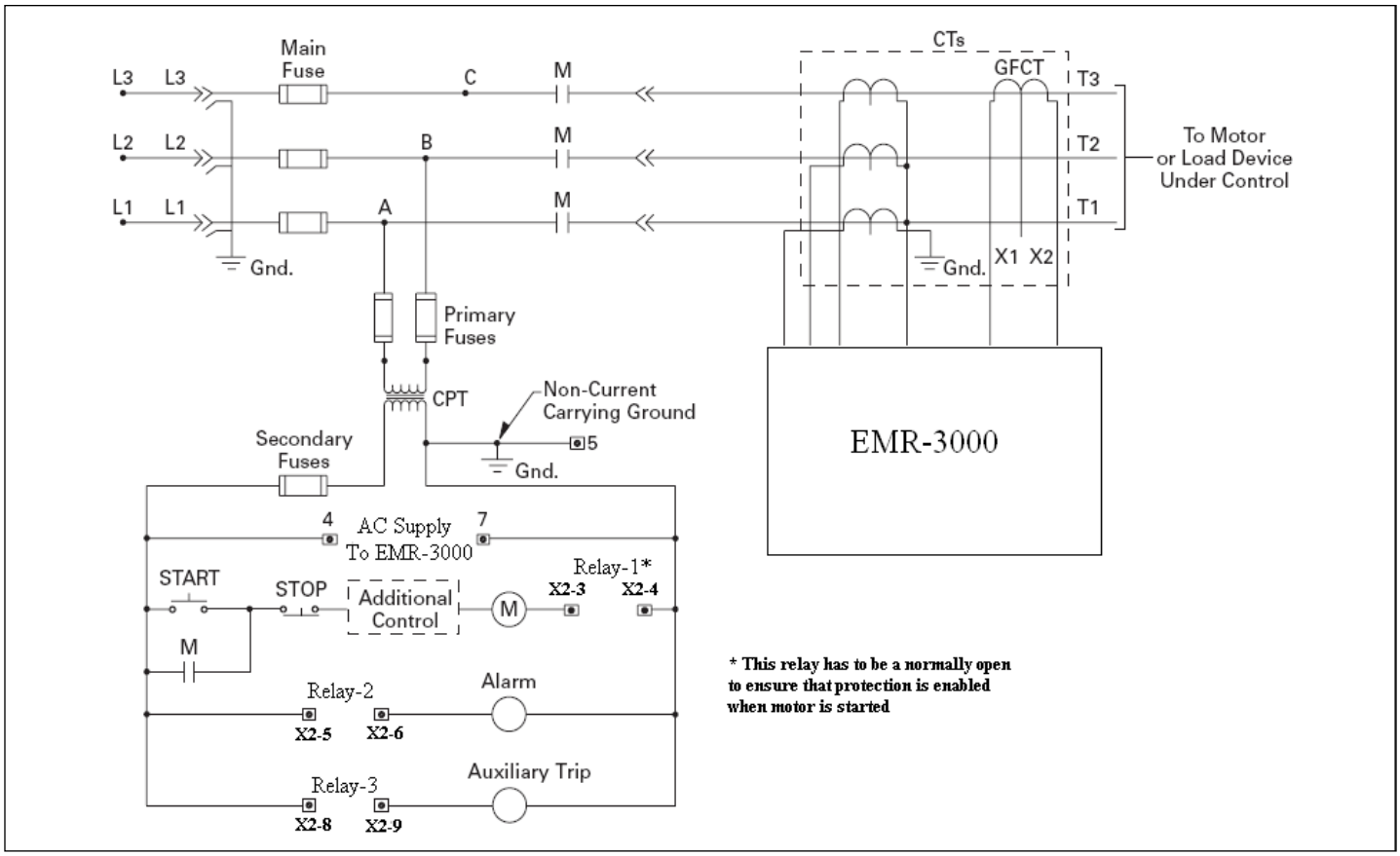

Figure 6. Typical Control Diagram.

Communication Software

Eaton provides PowerPort-E configuration software. It runs on a PC or laptop for easy access to a single relay to change set points or configuration and to view metered values and stored data. PowerPort-E is free and can be downloaded from the Eaton Web site at the following URL:

www.Eaton.com/pr

Powerport-E- EMR-3000 Device Planning

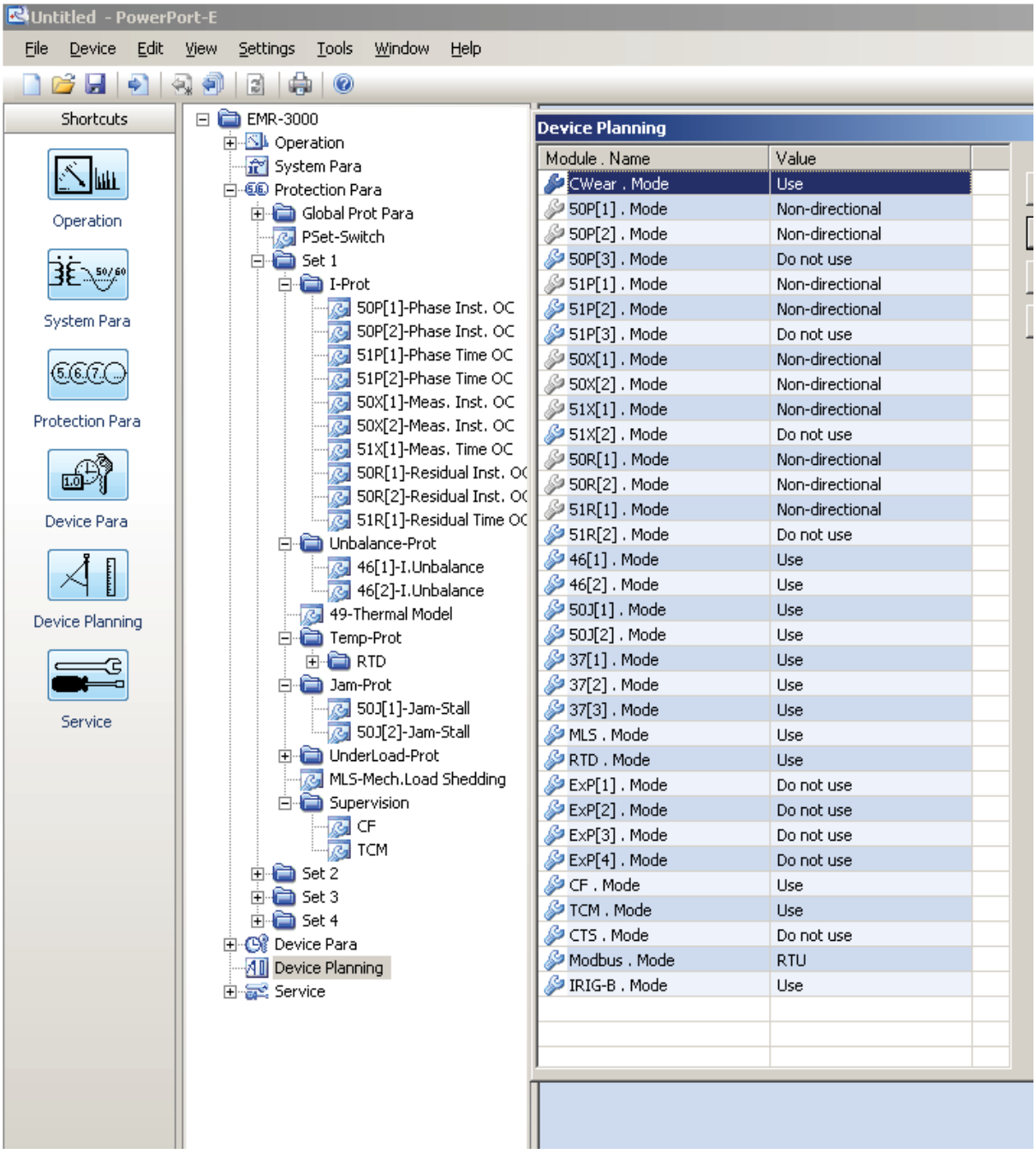

Figure 7. Powerport-E - EMR-3000 Device Planning.

Standards, Certifications and Ratings

Specifications

Climatic Environmental Conditions

- Storage Temperature: -25°C up to +70°C (-13°F to 158°F)
- Operating Temperature: -20°C up to +60°C (-4°F to 140°F)
- Permissible Humidity at Ann. Average: <75% rel. (on 56d up to 95% rel.)
- Permissible Installation Altitude: <2,000 m (6,561.67 ft) above sea level.
- If 4,000 m (13,123.35 ft) altitude applies, a changed classification of the operating and test voltages may be necessary.

Degree of Protection EN 60529

- HMI Front Panel with Seal: IP54
- Rear Side Terminals: IP30

Routine Test

- Insulation Test Acc. to IEC60255-5: All tests to be carried out against ground and other input and output circuits.
- Aux. Voltage Supply, Digital Inputs, Current Measuring Inputs, Signal Relay Outputs: 2.5 kV (eff.) / 50 Hz
- Voltage Measuring Inputs: 3.0 kV (eff.) / 50 Hz
- All Wire-Bound Communication Interfaces: 1.5 kV DC

Housing

- Housing B1: Height / Width 183 mm (7.205 in.)/ 141.5 mm (5.571 in.)
- Housing Depth (Incl. Terminals): 208 mm (8.189 in.)
- Material, Housing: Aluminum extruded section
- Material, Front Panel: Aluminum/Foil front
- Mounting Position: Horizontal (±45° around the X-axis must be permitted)
- Weight EMR-3000 Housing B1: Approx. 2.4 kg (5.291 lb)

Plug-in Connector with Integrated Short-Circuiter (Conventional Current Inputs)

- Nominal Current: 1 A and 5 A
- Continuous Loading Capacity: 4 x In / continuously
- Overcurrent Withstand: 30 x In / 10 s
- 100 x In / 1 s
- 250 x In / 10 ms (1 half-wave)
- Screws: M4, captive type acc. to VDEW
- Connection Cross Sections:
- 2 x 2.5 mm² (2 x AWG 14) with wire end ferrule.
- 1 x or 2 x 4.0 mm² (2 x AWG 12) with ring cable sleeve or cable sleeve.
- 1 x or 2 x 6mm² (2 x AWG 10) with ring cable sleeve or cable sleeve.

Voltage Supply

- Aux. Voltage: 19 - 300 Vdc / 40 – 250 Vac
- Buffer Time in Case of Supply Failure: > = 50 ms at minimal aux. voltage communication is permitted to be interupted.
- Max. Permissible Making Current:
  - 18 A peak value for <0.25 ms
  - 12 A peak value for <1 ms
- The voltage supply must be protected by a fuse of:
  - 2,5 A time-lag miniature fuse 5 x 20 mm (approx. 0.2 x 0.8 in.) according to IEC 60127
  - 3,5 A time-lag miniature fuse 6,3 x 32 mm (approx. 0.25 x 1.25 in.) according to UL 248-14

Power Consumption

- Power Supply Range:
- 19 – 300 Vdc: 6 W idle mode/ 8 W max. power
- 40 – 250 Vac 6 W idle mode/ 8 W max. power
  (For frequencies of 40-70 Hz)

Real Time Clock

- Running reserve of the real time clock: 1 year min.

Display

- Display Type: LCD with LED background illumination
- Resolution - Graphics Display: 128 x 64 pixel
- LED - Type: Two colored: red / green
- Number of LEDs, Housing B1: 8

Digital Inputs

- Max. Input Voltage: 300 Vdc / 270 Vac
- Input Current: <4 mA
- Reaction Time: <20 ms
- Fallback Time: <30 ms
- (Safe State of the Digital Inputs)
- Switching Thresholds: Un = 24 Vdc, 48 Vdc, 60 Vdc,
- 110 Vac / dc, 230 Vac / dc Un = 24 Vdc
- Switching Threshold 1 ON:
- Switching Threshold 1 OFF:
- Min. 19.2 Vdc
- Max. 9.6 Vdc
- Un = 48 V / 60Vdc
- Switching Threshold 2 ON:
- Switching Threshold 2 OFF:
- Min. 42.6 Vdc
- Max. 21.3 Vdc
- Un = 110 / 120 Vac / dc
- Switching Threshold 3 ON:
- Switching Threshold 3 OFF:
- Min. 88.0 Vdc / 88.0 Vac
- Max. 44.0 Vdc / 44.0 Vac
- Un = 230 / 240 Vac / dc
- Switching Threshold 4 ON:
- Switching Threshold 4 OFF:
- Min. 184 Vdc / 184 Vac
- Max. 92 Vdc / 92 Vac
- Terminals: Screw-type terminal

Current and Ground Current Measurement

- Nominal Currents: 1 A / 5 A
- Max. Measuring Range:
  - Up to 40 x In (phase currents)
  - Up to 25 x In (ground current standard)
  - Up to 2.5 x In (ground current sensitive)
- Continuous Loading Capacity: 4 x In/continuously
- Overcurrent Proof:
  - 30 x In / 10 s
  - 100 x In / 1 s
  - 250 x In / 10 ms (1 half-wave)
- Power Consumption: Phase current inputs
  - At In = 1A Burden = 0.15 mVA
  - At In = 5A Burden = 0.15 mVA
- Ground current input
- At In = 1A Burden = 0.35 mVA
- At In = 5A Burden = 0.35 mVA
- Frequency Range: 50 Hz / 60 Hz ±10%
- Terminals: Screw-type terminals with integrated short-circuiters (contacts)

Binary Output Relays

- Continuous Current: 5 A ac/dc
- Switch-on Current: 25 A ac/dc for 4s
- Max. Breaking current: 5 A ac up to 125 V ac
- 5 A dc up to 50 V (resistive)
- 0.2 A dc at 300 V
- Max. Switching Voltage: 250 V ac/300 V dc
- Switching Capacity: 2000 VA
- Contact Type: 1 Changeover Contact
- Terminals: Screw-type Terminals

Front Interface RS232

- Baud Rates: 115200 Baud
- Handshake: RTS and CTS
- Connection: 9-pole D-Sub plug

RS485

Master/Slave: Slave

- Connection: 6 screw-clamping terminals RM 3.5 mm (138 MIL) (terminating resistors internal)

Design Standards

- Generic Standard EN 61000-6-2, EN 61000-6-3
- Product Standard EC 60255-6, EN 50178
- UL 508 (Industrial Control Equipment)
- CSA C22.2 No. 14-95 (Industrial Control Equipment)
- ANSI C37.90

Tolerances of the Real Time Clock

- Resolution: 1 ms
- Tolerance: < 1 minute / month (+20°C)

Measuring Accuracy

- Max. Measuring Range: Up to 40 x In (phase currents)
- Up to 25 x In (ground current standard)
- Frequency Range: 50 Hz / 60 Hz ± 10%
- Accuracy: Class 0.5
- Amplitude Error if I < 1 In: ±0.5% of the rated value
- Amplitude Error if I > In: ±0.5% of the measured value
- Amplitude Error if I > 2 In: ±1.0% of the measured value
- Resolution: 0.01 A
- Harmonics: Up to 20% 3rd harmonic ±2% Up to 20% 5th harmonic ±2%
- Frequency Influence: <±2% / Hz in the range of ±5 Hz of the parametrized nominal frequency
- Temperature Influence: <±1% within the range of 0°C up to +60°C

Protection Elements Tolerances

Note: The tripping delay relates to the time between pickup and trip. The tolerance of the operating time relates to the time between the measured value has exceeded the threshold until the protection stage is alarmed.

Table 1. Protection Stages Tolerances

Overcurrent Protection Elements: 50P[x], 51P[x]		**Range**	**Step**	**Tolerance**
Pickup	If the Pick-up Value is Exceeded the Module Stage is Started	0.01 40.00 x in	0.01 x in	±1.5% of the Setting Value Resp. 1% x In
Resetting Ratio		97% or 0.5% x In		
t	Tripping Delay	0.00 300.00 x s	0.01 x s	DEFT ±1% Resp. ±10 ms
Operating Time	Starting from I Higher than 1.1 x I>			<35 ms
Disengaging Time				<45 ms
t-Multiplier	Time Multiplier Tripping Characteristic factor IEC NINV IEC VINV IEC EINV IEC LINV ANSI MINV ANSI VINV ANSI EINV Flat It I^2t I^4t	0.05..2.00	0.01	±5%
Reset Mode	Only available if IEC Characteristics IEC NINV IEC VINV IEC EINV IEC LINV	0.00...60.00	0.01 x s	±1% Resp. ±10 ms
	Reset Curves if ANSI Characteristics ANSI MINV ANSI VINV ANSI EINV Flat It I^2t I^4t			5%

Table 1. Protection Stages Tolerances (continued)

Ground Current Stages: 50G (X), 50N[x], 51G (X), 51N[x]		**Range**	**Step**	**Tolerance**
Pickup	If the Pick-up Value is Exceeded the Module Stage is Started	0.01 20.00 x in	0.01 x in	±1.5% of the Setting Value Resp. 1% In
Resetting Ratio		97% or 0.5% x In		
t	Tripping Delay	0.00 300.00 x s	0.01 x s	DEFT ±% Resp. ±10 ms
Operating Time	Starting from IG Higher than 1.1 x IG>			< +35 ms
Disengaging Time				< +45 ms
t-Multiplier	Tripping Characteristic Factor IEC NINV IEC VINV IEC EINV IEC LINV ANSI MINV ANSI VINV ANSI EINV Flat It I^2t I^4t	0.05..2.00	0.01	±5%
Reset Mode	Only available if IEC Characteristics IEC NINV IEC VINV IEC EINV IEC LINV	0.00...60.00	0.01 x s	±1% resp. ±10 ms
	Reset Curves if ANSI Characteristics ANSI MINV ANSI VINV ANSI EINV Flat It I^2t I^4t			5%

Circuit Breaker Failure Protection 50BF		**Range**	**Step**	**Tolerance**
I-CBF>	If the Pick-up Value is Exceeded the Module Stage is Started	0.0 0.1 x 1	0.01 x in	±1.5% of the Setting Value Resp. 1% In
Resetting Ratio		0.5% x In		
t-CBF	If the Delay Time is Expired an CBF Alarm is Given Out			< +40 ms
Operating Time	Starting from I Higher than 1.3 x ICBF>			< +40 m
Disengaging Time				< +40 m

Ordering Information

Sample Catalog Number

The catalog number identification chart defines the electrical characteristics and operation features included in the EMR-3000. For example, if the catalog number were EMR-3000A0BA1, the device would have the following:

EMR-3000

(A) - Four Digital Inputs, Four Output Relays, 1 4-20 mA Analog Output, URTD Interface

(0) - 5A/1A phase and ground CTs, Power Supply Range: 19-300 Vdc, 40-250 Vac

(B) - Modbus-RTU or DNP3 (RS-485)

(A) - Without Conformal Coating

(1) - Projection Panel Mount

Table 2. Catalog Ordering Information for EMR-3000 Eaton Motor Relay.

EMR-3000 Eaton Motor Relay Removable Terminals					
EMR-3000-2	**A**	**0**	**B**	**A**	**1**
Choose from the following options. **Hardware Option 1**					
4 DI, 4 Outputs, Removable Terminals, 1 4-20ma Analog Output, URTD interface, IRIG-B Small Display,	A				
4 DI, 4 Outputs, Removable Terminals, Zone Interlocking, URTD interface, IRIG-B, Small Display	B				
Hardware Option 2					
Phase Current 5A/1A, Ground Current 5A/1A, Power Supply Range: 19-300 Vdc, 40-250 Vac		0 (Zero)			
Phase Current 5A/1A Sensitive Ground Current, 0.5A/0.1A, Power Supply Range: 19-300 Vdc, 40-250 Vac		1*			
Communication Options					
Modbus/DNP3 RTU over RS485			B		
Modbus/DNP3 TCP over Ethernet RJ45			C		
Profibus-DP over Fiber Optic ST			D		
Profibus-DP over D-SUB / RS485			E		
Modbus RTU or DNP3 RTU over Fiber Optic ST			F		
Modbus/DNP3 RTU over D-SUB / RS485			G		
IEC61850/Modbus/DNP3 TCP over Ethernet RJ45			H		
Modbus/DNP3 RTU over RS485 or Modbus/DNP3 TCP over Ethernet RJ45			I		
IEC61850/Modbus/DNP3 TCP over LC duplex FO Ethernet			K		
Modbus/DNP3 TCP over LC duplex FO Ethernet			L		
Conformal Coating Options					
None				A	
Conformal Coated Circuit Boards				B	
Mounting Options					
Standard Mount					0 (Zero)
Projection Panel Mount					1

Table 2. Catalog Ordering Information for EMR-3000 Eaton Motor Relay (continued).

Standard Accessories EMR-3000

Catalog Number	Description
URTDII-01	UNVL RTD Mod with Modbus-RTU 48-240VAC/48-250VDC
URTDII-02	UNVL RTD Mod with Modbus-RTU 24-48VDC
ER-IQRETROKIT	E-SERIES 3000 IQ ADAPTER KIT PROJECTION MOUNTED*
MPFO-1	1 M FIBER OPTIC CABLE FOR RELAYS/URTD COMMUNICATIONS
MPFO-5	5 M FIBER OPTIC CABLE FOR RELAYS/URTD COMMUNICATIONS
MPFO-10	10M FIBER OPTIC CABLE FOR RELAYS/URTD COMMUNICATIONS
MPFO-25	25 M FIBER OPTIC CABLE FOR RELAYS/URTD COMMUNICATIONS
ESERIESUSBCB	E-Series mini USB cable 6 foot

*Retrofitting Mounting Plate MP3000 Relay, Projection Panel Mount Necessary.

NOTES:

NOTES:

These technical data materials are published solely for information purposes and should not be considered all-inclusive. If further information is required, you should consult an authorized Eaton sales representative.

The sale of the product shown in this literature is subject to the terms and conditions outlined in appropriate Eaton selling policies or other contractual agreement between the parties. This literature is not intended to and does not enlarge or add to any such contract. The sole source governing the rights and remedies of any purchaser of this equipment is the contract between the purchaser and Eaton.

NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, ARE MADE REGARDING THE INFORMATION, RECOMMENDATIONS, AND DESCRIPTIONS CONTAINED HEREIN. In no event will Eaton be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information, recommendations and description contained herein.

Eaton
Electrical Sector
1000 Eaton Boulevard.
Cleveland, OH 44122
United States
877-ETN-CARE (877-386-2273)
Eaton.com

Printed in USA
Publication No. TD02602014E / TBG000421
March 2017

Powering Business Worldwide