

ENGINEERING SPECIFICATION
LITTELFUSE MODELS MP8000
Bluetooth® Overload Relay

PART 1 GENERAL

1.1 REFERENCES

- A. IEC 60947-1 Edition 5.2 (UL 60497), IEC 60947-8-1, IEC 60947-4-1
- B. CE EMC Directive Low-Voltage Directive
- C. CSA C22.2 No. 14
- D. MODBUS over Serial Line Specification and Implementation Guide V1.02
- E. UL 1053
- F. FCC
- G. AS/NZS 4417.1
- H. AS/NZS 4417.2

1.2 WARRANTY

- A. Manufacturer Warranty: The manufacturer shall guarantee the equipment to be free from material and workmanship defects for a period of five years from the date of manufacture when installed and operated according to the manufacturer's requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

The equipment specified shall be the Model MP8000, manufactured by Littelfuse, Inc.

2.2 DESCRIPTION

- A. Regulatory Requirements:
 - 1. The equipment shall be UL Listed
 - 2. The equipment shall be cUL Listed
 - 3. The equipment shall be CE marked for use in the European Union and evaluated against IEC 60947 Low Voltage Switchgear and Control gear
 - 4. Ground fault protection that meets UL1053 requirements
 - 5. The equipment shall have the RCM mark

2.3 PERFORMANCE/DESIGN CRITERIA: SINGLE-PHASE AND 3-PHASE ELECTRONIC OVERLOAD RELAY

- A. Protective Relay Functions
 - 1. The equipment shall provide protection against the following conditions:
 - a. Voltage Single-Phase/Phase Loss
 - b. Voltage Unbalance (47)
 - c. Rapid Cycling
 - d. Undercurrent (Load Loss) (37)
 - e. Current Unbalance and Phase Loss (46)
 - f. Overcurrent (Load Jam) (51)
 - g. Ground Fault—Zero-Sequence (50Ns)
 - h. Overcurrent (51)
 - i. Manual Motor Reset Input
 - j. Phase Time-Overcurrent (51)
 - k. Phase Reversal (47), Voltage Based
 - l. Motor Starting/Running
 - m. Start Motor Run Timer
 - n. Thermal Capacity Utilization (TCU)
 - o. Contactor Failure Protection
 - p. Positive Temperature Coefficient (PTC)
 - q. Overtemperature Switching Thermistor (49)
 - r. Undervoltage (27)
 - s. Overvoltage (59)
 - t. Power Elements (32)

Communication Capabilities

2. The equipment shall provide the following communications capabilities:
 - a. MP8000:
 - 1) Ethernet Modbus TCP
 - 2) Ethernet/IP
 - 3) Bluetooth® 4.0 – BLE
3. The equipment interface shall have the capability of connecting to the following smartphones and tablets via an app installed on the devices (see Littelfuse website for tested devices):
 - a. Apple® iPhone 4S and higher (iOS version 9.0 and higher)
 - b. Apple® iPad 3rd generation and higher (iOS version 9.0 and higher)
 - c. Android Smartphone with Bluetooth 4.0 – BLE (Google Android™ version 4.3 and higher)
 - d. Android Tablet with Bluetooth 4.0 – BLE (Google Android™ version 4.3 and higher)
 - e. Ethernet Modbus TCP based systems
 - f. Ethernet/IP based systems
4. The Bluetooth BLE interface shall be capable of the following functions via the smartphone and tablet app:
 - a. Programming the device
 - b. Reading real-time values
 - c. Viewing faults
 - d. Resetting the device
5. The MP8000 shall provide setpoints that are readable and writable via Ethernet Modbus TCP, Ethernet/IP and Bluetooth BLE interface.
6. The MP8000 shall provide the ability to reset the relay via Ethernet Modbus TCP, Ethernet/IP, and Bluetooth BLE interface, or via a reset button wired to the relay.
7. The MP8000 shall provide the ability to energize and de-energize an auxiliary relay via Ethernet Modbus TCP or Ethernet/IP.
8. The MP8000 shall provide the ability to change the IP address from dynamic to static.

B. Network Capabilities

1. The equipment shall provide registers to read the following values:
 - a. L1-L2 line voltage Vrms
 - b. L2-L3 line voltage Vrms
 - c. L3-L1 line voltage Vrms
 - d. Phase A current Arms
 - e. Phase B current Arms
 - f. Phase C current Arms
 - g. Voltage unbalance
 - h. Current unbalance
 - i. Power factor
 - j. Power in kW
 - k. Ground fault current
 - l. Restart Delay 0 (RD0) time remaining
 - m. Restart Delay 1 (RD1) time remaining
 - n. Restart Delay 2 (RD2) time remaining
 - o. Restart Delay 3 (RD3) time remaining
 - p. Relay status / Warning status / Trip status
 - q. Unit ID
 - r. Model code
 - s. Software revision
 - t. Thermal capacity used
 - u. Start count
 - v. Line frequency
 - w. Motor run time
2. The equipment shall provide the following readable/writable setpoints:
 - a. Low voltage trip point
 - b. High voltage trip point
 - c. Voltage unbalance trip point
 - d. Current multiplier, used to scale the current reading properly when Current Transformers (CTs) or amp turns are used
 - e. Potential transformer (PT) ratio
 - f. Overcurrent trip point
 - g. Underrcurrent trip point
 - h. Current unbalance trip point
 - i. High power trip point
 - j. Low power trip point
 - k. Underrcurrent or Low power trip delay

- I. Trip class setpoint
- m. Restart Delay 0 setpoint (power up timer)
- n. Restart Delay 1 setpoint (rapid cycle timer)
- o. Restart Delay 2 setpoint (cool down timer)
- p. Restart Delay 3 setpoint (underload restart timer)
- q. Number of restarts after an undercurrent fault (#RU) setpoint
- r. Number of restarts after a fault other than undercurrent (#RF) setpoint
- s. Ground fault trip point
- t. Ground fault trip delay setpoint
- u. Phase rotation ABC/ACB
- v. Single/3-phase motor
- w. Stall percentage
- x. Linear overcurrent trip delay
- y. Device shall store last faults 1 – 1,000 with date/time stamp and real-time conditions immediately prior to fault event

C. Capabilities and Features

- 1. Inputs
 - a. The equipment shall require no external CT's for motors with full load current ratings between 0.5 and 100 Amps
 - b. The equipment shall require external CT's for motors with full load current ratings greater than 100 Amps
 - c. The equipment shall require a single-phase or 3-phase input voltage of 90-690VAC
 - d. The equipment shall require a single-phase or 3-phase 50/60 Hz input voltage
 - e. The equipment shall provide a connection to an optional external remote reset switch
 - f. The equipment shall provide an input connection for an optional zero-sequence ground fault CT
 - g. The equipment shall provide an input connection for an optional PTC thermistor(s)
- 2. Outputs
 - a. The equipment shall include SPST output relay contacts, rated 5A continuous @240VAC, B300.
 - b. The equipment shall include auxiliary SPDT output relay contacts, rated 5A continuous @ 240VAC, B300

D. Security Capabilities

- 1. The equipment shall provide a unique code for each unit for pairing to a smartphone or tablet
- 2. The equipment shall provide a password for the user to change settings on the unit via a smartphone or tablet

E. Accuracy Requirements

- 1. The equipment shall provide a timing accuracy on all timers of 0.5% of setting ± 1 second
- 2. The equipment shall provide a current measurement accuracy of $\pm 2\%$ of setting $\pm 50\text{mA}$ for currents 0.5 to 100 Amps direct for A, B, C phase currents
- 3. The equipment shall provide a voltage measurement accuracy of $\pm 1\%$ of setting $\pm 0.5\text{Vrms}$
- 4. The equipment shall provide a ground fault measurement accuracy of $\pm 2\%$ of setting $\pm 10\text{mA}$

F. Electromagnetic Compatibility

- 1. The equipment shall be immune to electrostatic discharge per IEC 61000-4-2, Level 3, 6kV contact and 8kV air.
- 2. The equipment shall be immune to radiated radio frequency emissions per IEC 61000-4-3, Level 3. Specified limits shall be 10V/m.
- 3. The equipment shall be immune to conducted radio frequency emissions per IEC 61000-4-6, Level 3. Specified limits shall be 10V/m.
- 4. The equipment shall be immune to electrical fast transient bursts exceeding IEC 61000-4-4, Level 3. Specified limits shall be 3.5kV input power.
- 5. The equipment shall be immune to electrical surges per IEC 61000-4-5, Level 3. Specified limits shall be 2kV line-to-line and Level 4, 4kV line-to-ground.

G. Enclosure Class of Protection: The equipment shall provide IEC IP20 (finger-safe) protection
H. Pollution degree: 3 (conformal coating standard)
I. Short Circuit Requirements

- 1. The equipment shall provide a short circuit rating of 100kA symmetrical at 690VAC

J. Environmental Requirements

- 1. The equipment shall operate continuously without derating in ambient temperatures of -40° to 70°C (-40° to 158°F)
- 2. The equipment shall operate continuously without derating in relative humidity of up to 95% non-condensing
- 3. The equipment shall operate properly after storage in ambient temperatures of -40° to 85°C (-40° to 185°F)

K. Dimensions: The equipment dimensions shall not exceed 3.0" in height X 4.1" in width X 4.8" in depth.

L. Mounting:

1. The equipment shall be mountable on standard 35mm DIN rail
2. The equipment shall be surface mountable

M. Conformal coating as standard:

1. The equipment shall contain harsh environment conformal coating to help extend product life and to protect from hostile environments including moisture, temperature variations, salt spray, organic attack (fungus), and aggressive chemicals and vapors.

End of Section