

## LMR Plus Electric Fire Pump Controllers

### Typical Specifications

#### 1. Approvals

- A. The Fire Pump Controller shall meet the requirements of the latest edition of NFPA 20 and shall be listed by [Underwriters Laboratories (UL)] and approved by [Factory Mutual Research (FM)] [Canadian Standards Association (CSA)] [New York Department of Buildings (NYSB)] and carry the CE marking for fire pump service.

#### 2. Starting Type

- A. The controller shall be of the combined manual and automatic type designed for [Full Voltage Starting] [Part Winding Starting] [Primary Resistor Starting] [Autotransformer Starting] [Wye-Delta (Star-Delta) Open Transition Starting] [Wye-Delta (Star-Delta) Closed Transition Starting] [Solid State Soft Start Starting]

#### 3. Ratings

- A. The Controller shall have a withstand rating of 100,000 RMS symmetrical amperes @ [208V] [240V] [380V] [400V] [415V] [480V] [25,000 @ 600VAC].

#### 4. Construction

- A. The controller shall include a motor rated combination isolating switch and circuit breaker, mechanically interlocked and operated with a single externally mounted handle.
- B. The isolating switch shall be rated to disconnect the motor load.
- C. The isolating switch/circuit breaker combination shall be mechanically interlocked such that the enclosure door cannot be opened when the handle is in the on position except by a tool operated defeater mechanism.
- D. The controller manufacturer shall manufacture the contactor, isolating switch, circuit breaker, pushbuttons, and enclosures. Brand-labeled components will not be accepted.

#### 5. Enclosure

- A. The controller shall be housed in a NEMA Type 2 (IEC IP11) drip-proof, powder baked finish, freestanding enclosure.
- B. Optional Enclosures:
  - 1. NEMA 3R (IEC IP14) rain-tight enclosure.
  - 2. NEMA 4 (IEC IP66) watertight enclosure.
  - 3. NEMA 4X (IEC IP66) watertight 304 stainless steel enclosure.
  - 4. NEMA 4X (IEC IP66) watertight 316 stainless steel enclosure.
  - 5. NEMA 4X (IEC IP66) watertight corrosion resistant enclosure.
  - 6. NEMA 12 (IEC IP52) dust-tight enclosure.

#### 6. Microprocessor Control

- A. The controller shall come complete with a 4 line by 40 character LCD display mounted on a panel opening in the front door. The LCD display shall indicate the following:
  - 1. Main screen displaying system pressure, three-phase voltage and amperage readings, system frequency, date, and time.
  - 2. Set point review screen displaying the programmed pressure start and stop points, and weekly test time.
  - 3. Controller statistics screen, including:
    - a. Powered Time
    - b. Motor Run Time
    - c. Number of Calls to Start
    - d. Number of Starts
    - e. Last Motor Start Time
    - f. Last Motor Run Time
    - g. Last Low Pressure Start
    - h. Minimum System Voltage
    - i. Maximum System Voltage
    - j. Minimum System Frequency
    - k. Maximum System Frequency
    - l. Minimum System Pressure
    - m. Maximum System Pressure
    - n. Last System Startup
    - o. Last Phase Failure
    - p. Last Phase Reversal
    - q. Last Locked Rotor Trip
    - r. Maximum Run Current
    - s. Last Locked Rotor Current
  - 4. Controller diagnostics screen, including:
    - a. Date & Time
    - b. Firmware Version
    - c. Shop Order Number
    - d. Customer Order Number
    - e. Transformer Output Voltage
    - f. Current Transformer Outputs
    - g. Pressure Transducer Calibrated Settings
    - h. Input Status
    - i. Output Status
  - 5. Display last messages screen that will display up to 10,000 alarms/messages stored in the controllers' memory.
  - 6. Display up to ten (10) custom messages of up to 100 characters each, which will continually scroll across the fourth line of the display.
  - 7. Remaining time left on active timers.
- B. The controller shall be supplied with ten (10) green status LED's for the following:
  - 1. Power On
  - 2. Pump Running
  - 3. Local Start
  - 4. Remote Start
  - 5. Deluge Valve
  - 6. Emergency Start

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7. Interlock On
  8. Low Pressure
  9. Auto Shutdown Enabled
  10. Programmable LED #1
  - C. The controller shall be supplied with ten (10) red alarm LED's to indicate the following:
    1. Phase Reversal
    2. Phase Failure
    3. Fail to Start
    4. Undervoltage
    5. Overvoltage
    6. Low Room Temperature
    7. Locked Rotor Trip
    8. Low Suction Pressure
    9. Source 2 Disconnected
    10. Programmable LED #2
  - D. The microprocessor logic board shall be available with:
    1. A USB port for transference of message history, controller status, diagnostics, and statistics and the ability to update firmware.
    2. An optional Ethernet port for direct connection to a computer for data transfer.
    3. An optional RS485 Serial port for communication to various external software programs.
  - E. The controller shall be available with an embedded web page to allow viewing of the controllers' current status, data values, programmed set points, and history.
  - F. A Fail-to-Start alarm shall occur if the motor controller sees less than 20% of the motor full load amps after an adjustable time delay of 1-90 seconds.
  - G. Locked rotor protection shall be provided. After a trip condition and restoration of power, the LCD display shall indicate "LOCKED ROTOR TRIP".
  - H. A sequential start timer and weekly test timer shall be provided as standard.
  - I. A restart time delay of two (2) seconds shall be provided to allow the residual voltage of the motor to decay prior to re-starting the motor. In the event that the pump motor continues to run after a request to stop, then the controller must display a fail to stop message to indicate this condition.
  - J. Overvoltage (5-20%) and undervoltage (5-30%) sensing and alarming shall be provided as standard.
  - K. The controller shall be supplied with interlock and shutdown circuits as standard. A flashing green LED shall indicate an interlock on condition.
  - L. Where shutdown of the pump(s) due to low suction pressure is required, it shall be accomplished without the addition of a separate panel or enclosure. The LCD display shall indicate low suction shutdown. Resetting of the condition shall be automatic or manual as selected by the user.
  - M. Means shall be provided to test the operation of all LED's to ensure their functionality.
7. **Programming Menu**
    - A. The programming menu shall have the ability to enable an entry password.
    - B. The programming menu shall be limited to two (2) levels of password protection.
    - C. The controller shall have three (3) languages as a standard, English, French, and Spanish, with the ability to add a fourth language.
    - D. The programming menu shall be grouped into 6 main menu headings as follows:
      1. Regional Settings
      2. Pressure Settings
      3. Timer Values
      4. Alarm Set points
      5. Input/Output Menu
      6. System Configuration (password protected)
  8. **Pressure Sensor**
    - A. A solid-state 4-20mA pressure sensor shall be provided. The pressure Start and Stop points shall be adjustable in increments of one (1) PSI. A low pressure pre-alarm, indicated with a flashing green LED, shall denote a potential pump starting condition and will remain lit once the pump has started to indicate the starting cause.
  9. **Custom Inputs/Outputs**
    - A. The controller shall come standard with nine (9) future inputs, two (2) future LED indicators, and one (1) future output, with the ability to add up to another 8 outputs via optional relay boards.
    - B. The user shall be able to program the future inputs/outputs through the main programming menu.
    - C. The inputs shall be selectable based on the following criteria:
      1. User selected message or thirteen (13) predetermined messages.
      2. Energize the common alarm relay when the input is received.
      3. Link to a future relay and/or LED indicator.
      4. Alarm latched until reset.
      5. Normally open or closed input.
      6. On-delay timer.
    - D. The LED indicators shall be selectable based on the following criteria:
      1. Indication based on a minimum of twelve (12) predetermined alarms or a custom input.
    - E. The future relays shall be selectable based on the following criteria:
      1. Output based on a minimum of twenty-seven (27) predetermined alarms, controller status or a custom input.
      2. Latched until reset.
      3. Energized under normal conditions.
      4. On or off delay timer on the output.

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### **10. Alarm Relays**

- A. All relays shall be of the plug-in type. An LED on the relay panel shall indicate the energized state of the relay. All relay contacts shall be rated @ 8A, 277VAC/30VDC. Two (2) sets of Form-C contacts shall be provided for each of the following:
  - 1. Phase Reversal
  - 2. Phase Failure
  - 3. Common Alarm
  - 4. Future #1
  - 5. Pump Run.
- B. The Common Alarm and Phase Failure relays shall be energized under normal conditions.

### **11. Audible Alarm Buzzer**

An audible alarm buzzer, capable of being heard while the motor is operating, shall operate if Fail to Start, Hardware Malfunction or any Common Alarm condition exists.

### **12. Manufacturer**

- A. The controller shall be of the LMR Plus type as manufactured by Eaton Corporation.