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## Diesel Plus Fire Pump Controllers

### Typical Specifications

#### 1. Approvals

- A. The Fire Pump Controller shall meet Factory Mutual Research (FM) 1321/1323 ECA @/A listed by [Underwriters Laboratories (UL)] [Canadian Standards Association (CSA)] [New York Department of Buildings (NYSB)] for fire pump service.
- B. The controller shall be [12 volt / 24 volt] negative ground, for use with Diesel Engine, Model manufactured by \_\_\_\_\_.

#### 2. Construction

- A. All internal components shall be front mounted and wired for ease of inspection and maintenance. All relays shall have visual indication to show that the relays are energized. The controller shall include an LCD display to indicate battery voltage and amperes as well as system pressure, in PSI or Bars.
- B. The controller shall have twin battery chargers meeting Factory Mutual Research (FM) requirements. The battery chargers shall have reverse polarity protection/ indication and be capable of recharging a completely discharged battery within 24 hours. The chargers shall auto detect the input voltage of 100VAC to 240VAC and shall be able to be programmed for either 12VDC or 24VDC output.
- C. The controller shall come standard with a breaker disconnect on the AC line and for both battery connections.

#### 3. 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.

#### 4. Output Relays

- A. Two (2) sets of alarm contacts (Form-C) rated at 8A, 250VAC/30VDC, shall be provided for remote indication of:
  1. ENGINE RUN (10A)
  2. LOW FUEL
  3. AUTO MODE
  4. COMMON ALARM
- B. Two (2) 'FUTURE' relays, each containing two sets of alarm contacts (Form-C) shall be provided. Relays can be factory set to indicate a specific alarm and shall be field programmable / adjustable to meet future site requirements:
- C. The Common Alarm relay shall be energized under normal conditions.

#### 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 IP24) 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 IP54) dust-tight enclosure.

#### 6. Microprocessor Control

- A. The following parameters shall be programmable and included as standard:
  1. START and STOP PSI points
  2. High and Low Pressure Alarm Setpoints
  3. STOP MODE: Manual or Auto
  4. RUN PERIOD TIMER: 0-60 min
  5. AC POWER FAILURE: Enable or Disable
  6. SEQUENTIAL START TIMER: 0-300 sec.
  7. WEEKLY TEST TIMER
  8. PRESSURE DEVIATION: 1-99 PSI
  9. LANGUAGE: English/French/Spanish/Other
- B. The following visual and audible alarms shall be provided:
  - FAIL TO START
  - LOW OIL PRESSURE
  - ENGINE OVERSPEED
  - BATTERY #1 FAILURE
  - BATTERY #2 FAILURE
  - REMOTE START
  - LOW PRESSURE
  - SPEED SWITCH FAULT
  - ECM SELECTOR IN ALT POSITION
  - FUEL INJECTOR MALFUNCTION
  - STARTER #1 FAILURE
  - STARTER #2 FAILURE
  - TRANSDUCER FAILURE
  - DATA CABLE DISCONNECT
  - DC FAIL
  - HIGH ENGINE TEMP.
  - ENGINE RUN
  - LOW FUEL
  - CHARGER #1 FAILURE
  - CHARGER #2 FAILURE
  - DELUGE VALVE
  - INTERLOCK ON
  - LOW SUCTION
  - ECM WARNING
  - ECM FAILURE
  - HIGH RAW WATER TEMPERATURE
  - LOW ENGINE TEMPERATURE
  - LOW RAW WATER FLOW
  - FUEL SPILL

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- C. The controller shall have 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, Battery #1/#2 voltage and amperage, operation mode, shutdown mode, custom messages, alarms, timers, 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. Engine Run Time
    - c. Number of Cranks
    - d. Number of Starts
    - e. Last Engine Start Time
    - f. Last Engine Run Time
    - g. Last Low Pressure Start
    - h. Minimum Battery #1 Voltage
    - i. Maximum Battery #1 Voltage
    - j. Minimum Battery #2 Voltage
    - k. Maximum Battery #2 Voltage
    - l. Minimum Battery #1 Amps
    - m. Maximum Battery #1 Amps
    - n. Minimum Battery #2 Amps
    - o. Maximum Battery #2 Amps
    - p. Minimum System Pressure
    - q. Maximum System Pressure
    - r. Last System Startup
    - s. Last Engine Test
    - t. Last Low Oil Pressure
    - u. Last Overspeed
    - v. Last Fail To Start
    - w. Last Low Fuel
    - x. Last Charger Failure
    - y. Last Battery Failure
    - z. Last ECM Alarm
  - 4. Controller diagnostics screen, including:
    - a. Date & Time
    - b. Firmware Version
    - c. Shop Order Number
    - d. Customer Order Number
    - e. Battery Voltage
    - f. Internal Board Voltage
    - g. Transformer Output Voltage
    - h. Current Transformer Outputs
    - i. Pressure Transducer Calibrated Settings
    - j. Input Status
    - k. Relay Status
  - 5. Display last messages screen that will display at least the last 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.
- D. The controller shall be supplied with six (6) green status LED's for the following:
  - 1. Engine Run
  - 2. Remote Start
  - 3. Low Pressure
  - 4. Interlock On
  - 5. Deluge Valve
  - 6. One Programmable LED
- E. The controller shall be supplied with twenty (20) red alarm LED's to indicate the following:
  - 1. BATTERY #1 FAILURE
  - 2. BATTERY #2 FAILURE
  - 3. CHARGER #1 FAILURE
  - 4. CHARGER #2 FAILURE
  - 5. SPEED SWITCH FAULT
  - 6. ECM SELECTOR IN ALT POSITION
  - 7. FUEL INJECTION MALFUNCTION
  - 8. LOW SUCTION PRESSURE
  - 9. FAIL TO START
  - 10. HIGH ENGINE TEMP.
  - 11. LOW OIL PRESSURE
  - 12. ENGINE OVERSPEED
  - 13. LOW FUEL
  - 14. ECM WARNING
  - 15. ECM FAILURE
  - 16. HIGH RAW WATER TEMPERATURE
  - 17. LOW ENGINE TEMPERATURE
  - 18. LOW RAW WATER FLOW
  - 19. FUEL SPILL
  - 20. One Programmable LED
- F. The microprocessor logic board shall be available with:
  - 1. A USB port for transference of message history, controller status, diagnostics, configuration, 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.
  - 4. An optional RS232 Serial Port
- G. The controller shall come complete with an embedded web page which allows viewing of the controllers' current status, data values, programmed set points, and downloadable history.
- H. A Fail-to-Start alarm shall occur if the engine does not start after the crank cycle.
- I. A sequential start timer, weekly test timer and AC Failure Start timer shall be provided as standard.
- J. The controller shall be supplied with interlock and shutdown circuits as standard. A flashing green LED shall indicate an interlock on condition.

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- K. 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.
- L. 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 7 main menu headings as follows:
  - 1. Regional Settings
  - 2. Pressure Settings
  - 3. Timer Values
  - 4. Input/Output Menu
  - 5. System Configuration (password protected)
  - 6. Language
  - 7. Main Menu Password

### 8. Custom Inputs/Outputs

- A. The controller shall come standard with nine (9) custom inputs, two (2) programmable LED indicators, and two (2) future outputs, 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 and optional relays through the main programming menu.
- C. The inputs shall be selectable based on the following criteria:
  - 1. User selected message or twenty four (24) 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.
  - 7. Energize the buzzer when the input is received.
- D. The LED indicators shall be selectable based on the following criteria:  
Indication based on a minimum of fourteen (14) 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 forty (40) 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.

### 9. Manufacturer

- A. The controller shall be microprocessor based as manufactured by Eaton Industries (Canada) Co.