Diesel Engine
Fire Pump Controllers

Product Description
The DIESEL Plus Fire Pump Controllers from Eaton are designed to control and monitor 12 or 24 volt, diesel fire pump engines and are among the most technically advanced diesel engine controllers available.

They are an enhanced version of the original microprocessor-based, FD100 Series of diesel engine controllers. Programming is straightforward due to the use of the core firmware and menu structure utilized in the LMR Plus Series of electric controllers.

The controller can be ordered with the option to display and output current values and status, on command, from various software protocols.

An embedded web page for retrieving diagnostics and history reports, can be accessed from the optional Ethernet communication port. An optional RS485 serial port can be used for direct connection to a computer for data transfer.

Product Features
Communication
Embedded Web Page
The embedded web pages allow the user to view the current status of the controller as well as all amperage readings, set points, diagnostics, statistics, configuration and history. An external computer connected via the optional ethernet port is used to access the pages. The specific data required can be downloaded for reference purposes.

Communication Types
USB
The USB port is used to download the controller message history, statistics, diagnostics, status and configuration data to a USB disk drive. The USB port can also be used to upload custom messages, additional languages, and update the microprocessor firmware.

Ethernet
An external computer can communicate with the Diesel Plus controller via the optional ethernet port. An embedded web page will display the controller’s current status, as well as display all current readings, set points and history.

Modbus
The Diesel Plus fire pump controllers have the option to communicate to systems using the Regular level of Modbus (includes both RTU and ASCII transmission modes). Communication settings are user configurable through the Diesel Plus configuration menu.

Field Connections
Standard Inputs
- Remote Start
- Fuel Spill
- Deluge Valve
- Low Suction
- Interlock On
- Pump Start
- Low Fuel
- Programmable Inputs (9)

Programmable Inputs
Up to 9 additional, programmable inputs can be programmed to indicate up to 13 different types of inputs. They can be programmed to energize the common alarm output, link to relays and optional LED’s and latch until reset by the user.

All optional inputs, outputs and LED’s can be linked, as required. They can also be programmed with time delay functions.

Standard Output Relays
All standard output relays are 8 amp, DPDT.
- Future # 1
- Future # 2
- Low Fuel
- Auto Mode
- Common Alarm

Optional Output Relays
There is provision to add up to eight additional relay outputs, via four optional relay output boards which mount in a snap-on configuration. Each board contains a maximum of 2 additional relays.

Propulsion Outputs
Engine Run Relay
The Power I/O Board houses a 10 Amp engine run relay which is used for alarm purposes, or to power external louveres.

Common Alarm Relay
The FD120 controller has a common alarm relay which de-energizes whenever there are any alarm conditions present. This relay is energized under normal conditions and has LED status indication.

Alarm Relay Rating
All alarm relays are rated 8 amps, 250Vdc, resistive load only.

Programmable Outputs
Up to 10 additional, programmable outputs (two standard; eight via optional output boards) can be programmed to indicate up to 45 output conditions. They can be programmed for fail safe and latch until reset by the user. All optional inputs, outputs and LED’s can be linked, as required. They can also be programmed with time delay functions. As well, two optional alarm LED’s can be programmed for up to 28 alarm conditions.

Power / Voltage
Universal Voltage Supply
The controller can be powered with supply voltages from 100Vac to 240Vac by connecting to the three input terminals L,N,G located on the bottom left of the engine board.

Dual Output
12 or 24Vdc output is selectable via a DIP Switch located on the battery chargers. Note: Each controller is factory set for 12Vdc. If 24Vdc is required from the factory, it should be noted on the ordering information.

Line Filter
A line filter incorporated onto the engine board, is used to reduce/eliminate external incoming voltage transients.

AC Power Disconnect
A breaker located inside the controller on the Engine Board, is used to switch on and off AC power to the unit. It will illuminate when energized.

DC Power Disconnect
The engine board houses two on-board circuit breakers used to switch on or off DC power from the batteries. Each breaker has an LED mounted on the engine board that illuminates when the breaker is energized.

Alarm and Status Indication
Accessibility
All alarm and status LED’s as well as the LCD Display and programming buttons are accessible from the front of the controller.
Reduced Size
A streamlined internal design has allowed the overall size of the DIESEL Plus controllers to be reduced from previous models. See dimensional drawings on our website.

Technical Specifications
- Supply Voltage: 100-240Vac
- Output Voltage: 12-24Vdc
- Hertz: 50/60 Hz
- Enclosure: Standard NEMA 2
- Optional NEMA 3R, 4, 4X, 12
- Temperature: 4 to +50 deg. C
- Alarm Relays: DPDT 8amp
- Engine Run Relay: DPDT 10amp
- Crank / Fuel Stop Relays: SPDT
- Pressure Transducer: 500psi
- Immunity Compliance: Environment A
- Emission Compliance: Environment B

Standards & Certification
The FD120 Diesel Engine Fire Pump Controllers meet or exceed the requirements of Underwriters Laboratories, Factory Mutual Research (FM), the Canadian Standards Association, New York City building code, CE mark and U.B.C. / C.B.C Seismic requirements, and are built to NFPA 20 standards.

Battery Chargers
- Mode: Switching
- Dual 10 Amp
- Communication to Power I/O Board
- Diagnostics Recording
- Lead Acid or NiCad Three Step Charge
- Internal Temperature Monitoring
- Universal Voltage Input
- Selectable Dual Voltage Output
NOTES:
1. All enclosures finished in FirePump red.
2. Cable Entrance bottom only.
3. Standard Enclosure type NEMA 2
4. Enclosure made from #14 Gauge (0.75) HR Steel.
5. Feet are removable.
* NEMA 4, 4X enclosures are supplied:
   With 1/4 Turn latches instead of a standard handle.

Approximate Weight

<table>
<thead>
<tr>
<th>Lbs.</th>
<th>Kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>48</td>
</tr>
</tbody>
</table>

Dimensions

Diesel Plus Engine Controller
NOTES:
1. Refer to the DIESEL Plus technical manual for details and setup information, as well as programming and custom labeling for the Programmable LED's.
Diesel Plus Engine Controller

Dimensions
Fuel Level Switch
Effective April 2015

Adjustable height
Mounts in tank opening 1 1/4"
Threaded plug

Dimensions in Inches
3A14119G01: 16 inch unit
3A14119G02: 45 inch unit
**Field Connections**

**Engine Board Terminal Blocks**

- **100-240VAC POWER**
- **FUEL & WATER SOLENOID VALVE**
- **ENGINE RUN SW.**
- **OVERSPEED SW.**
- **OIL PRESSURE SW.**
- **ENGINE WATER TEMP. SW.**
- **BATTERY #1 INPUT(+)**
- **BATTERY #2 INPUT(+)**
- **BATTERY #1 CRANK**
- **BATTERY #2 CRANK**
- **BATTERIES (-)**
- **FUEL SOLENOID**
- **ECM IN ALTERNATE**
- **FUEL INJECTOR FAIL**
- **ECM WARNING**
- **ECM FAILURE**
- **HIGH RAW WATER TEMP**
- **LOW RAW WATER FLOW**
- **LOW ENGINE TEMPERATURE**

**Inputs**

- **INPUT #1**
- **INPUT #2**
- **INPUT #3**
- **INPUT #4**
- **INPUT #5**
- **INPUT #6**
- **INPUT #7**
- **INPUT #8**
- **INPUT #9**
- **INPUT #10**
- **INPUT #11**

**Outputs**

- **ENGINE RUN**
- **ENGINE RUN**
- **FUTURE #1**
- **FUTURE #1**
- **FUTURE #2**
- **FUTURE #2**

**Technical Data and Specifications**

**Line Terminals (Incoming Cables)**

<table>
<thead>
<tr>
<th>Recommended Wire Size</th>
<th>Terminal Number</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Board</td>
<td>11, 34-39, 60-95, Option Board Terminals</td>
<td>N. A.</td>
</tr>
<tr>
<td>Engine Board</td>
<td>1-5, 9, 10, 12, 301, 302, 303, 304, 310, 311, 312, L, N, G</td>
<td>N. A.</td>
</tr>
<tr>
<td>Battery Wire</td>
<td>6, 8, 11</td>
<td>0 feet to 25 feet (7.62m)</td>
</tr>
<tr>
<td></td>
<td>6, 8, 11</td>
<td>25 feet to 50 feet (7.62-15.24m)</td>
</tr>
</tbody>
</table>
Technical Data and Specifications - LMR Plus Electric Controllers

Line Terminals on Main Isolation Switch (Incoming Cables)

### Qty. & Cable Sizes

<table>
<thead>
<tr>
<th>American Wire Gauge (AWG /MCM)</th>
<th>Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)#14-1/0 PER Ø (CU/AL)</td>
<td>(1.63 - 5.83 mm)</td>
</tr>
<tr>
<td>(1)#4-4/0 PER Ø (CU)</td>
<td>(5.83 - 11.68 mm)</td>
</tr>
<tr>
<td>(1)#3-350MCM PER Ø (CU/AL)</td>
<td>(5.83 - 15.03 mm)</td>
</tr>
<tr>
<td>(2)/0-250MCM PER Ø (CU/AL)</td>
<td>(10.40 - 12.70 mm)</td>
</tr>
<tr>
<td>(2)/0-250-350MCM PER Ø (CU/AL)</td>
<td>(12.70 - 15.03 mm)</td>
</tr>
<tr>
<td>(2)/1-500MCM PER Ø (CU/AL)</td>
<td>(17.25 - 17.96 mm)</td>
</tr>
<tr>
<td>(3)/0-400MCM PER Ø (CU/AL)</td>
<td>(10.40 - 16.06 mm)</td>
</tr>
</tbody>
</table>

### Service Entrance Ground Lug - Qty. & Cable Sizes

<table>
<thead>
<tr>
<th>American Wire Gauge (AWG /MCM)</th>
<th>Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)#14-2/0 PER Ø (CU/AL)</td>
<td>(1.63 - 9.27 mm)</td>
</tr>
<tr>
<td>(1)#4-4/0 PER Ø (CU/AL)</td>
<td>(5.19 - 15.03 mm)</td>
</tr>
<tr>
<td>(2)/1-750MCM PER Ø (CU/AL)</td>
<td>(8.25 - 22.00 mm)</td>
</tr>
</tbody>
</table>

### Load Terminals (To Motor)

### Qty. & Cable Sizes

<table>
<thead>
<tr>
<th>American Wire Gauge (AWG /MCM)</th>
<th>Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)#4-#3 PER Ø (CU)</td>
<td>(1.63 - 5.83 mm)</td>
</tr>
<tr>
<td>(1)#4-4/0 PER Ø (CU/AL)</td>
<td>(1.63 - 8.25 mm)</td>
</tr>
<tr>
<td>(1)#6-250MCM PER Ø (CU/AL)</td>
<td>(4.11 - 12.70 mm)</td>
</tr>
<tr>
<td>(2)/0-250MCM PER Ø (CU/AL)</td>
<td>(8.25 - 12.70 mm)</td>
</tr>
<tr>
<td>(2)/0-500MCM PER Ø (CU/AL)</td>
<td>(9.27 - 17.96 mm)</td>
</tr>
</tbody>
</table>

For Proper Cable Size Refer to National Electrical Code NFPA-70.

Technical Data and Specifications - DIESEL Plus Diesel Engine Controllers

Line Terminals (Incoming Cables)

<table>
<thead>
<tr>
<th>Recommended Wire Size</th>
<th>Terminal Number</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stranded # 14 (1.63 mm)</td>
<td>11, 34-49, 60-95</td>
<td>N. A.</td>
</tr>
<tr>
<td>Stranded # 14 (1.63 mm)</td>
<td>Option Board Terminals</td>
<td>N. A.</td>
</tr>
<tr>
<td>Engine Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stranded # 14 (1.63 mm)</td>
<td>1-5, 9, 10, 12, 301, 302, 303, 304, 310, 311, 312, L, N, G</td>
<td>N. A.</td>
</tr>
<tr>
<td>Battery Wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stranded # 10 (2.59 mm)</td>
<td>6, 8, 11</td>
<td>0 feet to 25 feet (762m)</td>
</tr>
<tr>
<td>Stranded # 8 (3.26 mm)</td>
<td>6, 8, 11</td>
<td>25 feet to 50 feet (762 - 15.24m)</td>
</tr>
</tbody>
</table>
### DIESEL Plus Options

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>380*</td>
<td>Supply Voltage (380V 50/60Hz)</td>
</tr>
<tr>
<td>480*</td>
<td>Supply Voltage (480V 60Hz)</td>
</tr>
<tr>
<td>600*</td>
<td>Supply Voltage (600V 60Hz)</td>
</tr>
<tr>
<td>COM</td>
<td>Communications Option</td>
</tr>
<tr>
<td>CX</td>
<td>Extra Contacts (Two Form-C; Specify Function)</td>
</tr>
<tr>
<td>E1</td>
<td>NEMA 3R - Raintight Enclosure</td>
</tr>
<tr>
<td>E2</td>
<td>NEMA 4 - Watertight Enclosure</td>
</tr>
<tr>
<td>E3</td>
<td>NEMA 12 - Dust Tight Enclosure</td>
</tr>
<tr>
<td>E4</td>
<td>NEMA 4X - 304 Stainless Steel</td>
</tr>
<tr>
<td>E5</td>
<td>Tropicalization</td>
</tr>
<tr>
<td>E9</td>
<td>NEMA 4X - Painted Steel</td>
</tr>
<tr>
<td>E10</td>
<td>NEMA 4X - 316 Stainless Steel</td>
</tr>
<tr>
<td>EX</td>
<td>Export Crating</td>
</tr>
<tr>
<td>F2</td>
<td>Floor Stand - 2 Inch Height **</td>
</tr>
<tr>
<td>LO</td>
<td>Powered Louver Contacts - (1.6 Amp Max)</td>
</tr>
<tr>
<td>LO+</td>
<td>Powered Louver Contacts - (Up to 8.0 Amp)</td>
</tr>
<tr>
<td>LX</td>
<td>Extra Light (Specify Description)</td>
</tr>
<tr>
<td>Ni</td>
<td>Ni Cad Batteries</td>
</tr>
<tr>
<td>P5</td>
<td>Proof Pressure Switch - ALCO - 19-250 PSI</td>
</tr>
<tr>
<td>P7</td>
<td>Low Suction Pressure Switch</td>
</tr>
<tr>
<td>P8</td>
<td>Shutdown (Requires P7 Option)</td>
</tr>
<tr>
<td>P10</td>
<td>Pressure Transducer - Sea Water</td>
</tr>
<tr>
<td>P13</td>
<td>Externally Mounted Pressure Transducer **</td>
</tr>
<tr>
<td>R1</td>
<td>Space Heater (120 / 220V)</td>
</tr>
<tr>
<td>R2</td>
<td>Space Heater c/w Thermostat</td>
</tr>
<tr>
<td>R3</td>
<td>Space Heater c/w Humidistat</td>
</tr>
<tr>
<td>R4</td>
<td>Low Room Temperature Switch ***</td>
</tr>
<tr>
<td>R5</td>
<td>Space Heater (Internally powered - 120V / 240V)</td>
</tr>
<tr>
<td>S1</td>
<td>Fuel Level Switch, 16 Inch</td>
</tr>
<tr>
<td>S2</td>
<td>Fuel Level Switch, 45 Inch</td>
</tr>
<tr>
<td>S3</td>
<td>Fuel Level Switch, High-Low</td>
</tr>
<tr>
<td>USB</td>
<td>Externally Mounted USB Port</td>
</tr>
<tr>
<td>X1</td>
<td>Printer</td>
</tr>
<tr>
<td>X2</td>
<td>4 Inch Chart Recorder (10 - 300 psi fresh water)</td>
</tr>
</tbody>
</table>

Note: All controllers are factory set for 12Vdc operation, unless otherwise noted on the purchase order.

* Standard voltage supplied: 110 / 220V 50/60Hz
** Not available for NEMA 4 or NEMA 4X units.
*** When ordered with a NEMA4 / 4X enclosure, the temperature switch is shipped loose with 20 feet of wire.
Diesel Plus Fire Pump Controllers

Typical Specifications

1. Approvals
   A. The Fire Pump Controller shall meet Factory Mutual Research (FM) 1321/1323. It shall be 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

For more information visit: www.chfire.com

PS081002EN
Cooling Plus Fire Pump Controllers

Features

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 #2Amps
   p. Minimum System Pressure
   q. Maximum System Pressure
   r. Last System Startup
e. Last Engine Test
f. 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.
Diesel Plus Fire Pump Controllers

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.