Series FD4

The Metron Model FD4 controller is designed to specifically meet the latest NFPA 20 and UL 218 standards for Diesel Engine Fire Pump Controllers.

This controller implements the latest component and microprocessor logic technology available. It incorporates years of experience in the design and manufacture of fire pump control systems.

The components are installed in a NEMA 2 dust and drip proof enclosure with optional NEMA 3R, 4, 4X, or 12 ratings available. The Operator Interface Device (OID), manual start pushbuttons, stop push button and Auto-Off-Manual selector switch are located on the exterior door for easy access. The battery disconnect switches are located on the main mounting panel inside the enclosure.

The controller's logic is based on discrete components using the latest technology with high quality, highly reliable printed circuit boards (PCBs) and PCB mounted relays. The controller uses a microprocessor to control automatic engine and alternation between batteries during cranking. It also monitors and records system alarms and pressure, battery voltage and engine functions. This controller is suitable for all engine types with either 'energized to run' or 'energize to stop' fuel solenoids.

Inside the controller are two independent fully automatic microprocessor controlled battery chargers rated at 10 Amps each. The battery chargers operate in such a manner as to ensure that the engine batteries are fully charged within 24 hours. PCB mounted LED's are provided for indication of AC Power On, and Battery Power On.

The controller is supplied with wall mounting brackets as standard. It may be supplied with optional 24" (609.6 mm) legs for free standing floor or skid mounting.

FD4 Fire Pump Controller

Standard Features

Operator Interface Device (OID) with LED Annunciator and Digital Display:

General Controller Description
The Fire Pump Controller conforms to all requirements of the latest edition of NFPA 20, NFPA 70 and is Listed by Underwriters Laboratories (UL) and Approved by Factory Mutual (FM).

The controller is available for either 12VDC or 24VDC operation. Included as standard, the controller is suitable for 120VAC or 208/240VAC input power at no additional cost.

Controller Standard Features
• The controller includes two 10 Amp battery chargers that are temperature compensated and includes integral LED's for indication of charge AC Failure, and Battery Power On.

• Two outer door mounted manual crank pushbuttons and two battery on/off switches located on the interior back panel.

• Outer door mounted AUTO, OFF, MANUAL selector switch with mode condition illuminated on OID with colored LED's

• Operator Interface Device (OID) with 4 lines by 20 character display with large character backlit LCD capable of being read in both direct sunlight or dark lighting conditions. English or Spanish languages are standard and selectable through the OID. Additional languages available upon request.

• The OID includes 12 pushbuttons for easy screen navigation, system mode changes, alarm reset, horn silencing, and lamp test.

• The built in annunciator includes multicolored LED's for alarm and mode indications. The annunciation LED's have removable labels that allow the user to easily make changes, if additional alarms and/or language changes are needed.

• All controller settings are programmable through the OID. Programming changes are protected by two levels of passwords to prevent unauthorized modification.

• All features are enabled or disabled through the OID, so no jumpers or external wires are needed, making control logic field modification very easy.

• The OID displays System Pressure, Start Pressure, Battery 1 Voltage, Battery 2 Voltage, Battery 1 Charger Amps, and Battery 2 Charger Amps providing the operator instant system status, Status of Automatic Stop Setting. LED indication of Loss of DC Power. A detailed Battery Voltage and Charging Current screen is also supplied. Current time and date, Number of starts, Total engine run hours, Displayed countdown timers for: Sequential engine start and engine stop, and Time until AC Power fail start.

• The state of the art microprocessor based logic includes a real time/date clock that can operate for a minimum of 14 days without DC power connected to controller.

• An SD Memory card is used to record pressure log, event log, and auxiliary user programs. The pressure log is stored in separate comma delimited ASCII text files with each file containing data for one day. The SD card is removable and can be read by any PC equipped with an SD card reader.

• One RS485 data port is included as standard.

• MODBUS Communication Protocol via RS485 port

• If there is ever a need to change the internal components all wiring to the internal board is removable without the use of any special tools or soldering.

Auxiliary alarms and contacts
As standard the controller includes 6 discrete auxiliary inputs, 8 form 'C' auxiliary relay outputs. These auxiliary inputs and outputs are in addition to those mandated by NFPA 20. All auxiliary inputs, outputs, and OID LED's are field programmable making it very easy to make changes to the controller in the field. Through the OID the operator can select any 8 of the following auxiliary alarms which will be recorded in the event/alarm logs and annunciated with an LED and/or output relay contact:

ENGINE QUIT FAULT	HIGH ENGINE OIL TEMP
PRESSURE TRANSDUCER FAULT	LOW JACKET WATER FLOW
PUMP ON DEMAND	LOW JACKET WATER LEVEL
LOW DISCHARGE PRESSURE	LOW HYDRAULIC PRESSURE
HIGH DISCHARGE PRESSURE	GAS DETECTION
REMOTE START SIGNAL	LOW FIREWATER PRESSURE
DELUGE VALVE START	AIR DAMPER CLOSED
HIGH FUEL LEVEL	AIR DAMPER OPEN

FUEL SPILL	LOW PURGE PRESSURE
FUEL TANK RUPTURE	LOW GEAR OIL PRESSURE
LOW PUMP ROOM TEMP	LOW COOLANT LEVEL
RESERVOIR LOW	HIGH GEAR OIL TEMP
RESERVOIR EMPTY	HIGH VIBRATION
RESERVOIR HIGH	LOW FUEL PRESSURE
FLOW METER ON	HIGH EXHAUST TEMP
RELIEF VALVE OPEN	HIGH FUEL TEMP
LOW SUCTION PRESSURE	PUMP ON DEMAND

Data logging:

Pressure Log: The Pressure log provides a continuous pressure recording for one month of data. Each time the pressure log records a pressure it includes the time and date of the reading and is stored on the SD memory card.

The data recorded in the pressure log can be searched by each sample, by minute, or by hour allowing for easy access to specific data.

Event Log: The event log is also stored on the SD memory card. It will hold a maximum of 3000 events. These events include any of the following events/alarms:

BATTERY 1 FAULT	SYSTEM AUTO MODE
BATTERY 2 FAULT	ENGINE LOCKOUT SIGNAL
BATTERY 1 LOW VOLTAGE	SYSTEM AUTO MODE
BATTERY 2 LOW VOLTAGE	SYSTEM MANUAL MODE
CHARGER 1 FAULT	SYSTEM OFF MODE
CHARGER 2 FAULT	SYSTEM TEST RUN
AC POWER FAIL	ALARM RESET
ENGINE OVERSPEED	LOW PRESSURE CONDITION
ENGINE FAILED TO START	LOW PRESSURE START
ENGINE QUIT	DELUGE START
ENGINE LOW OIL PRESSURE	REMOTE START
ENGINE HIGH WATER TEMP	AC POWER FAIL START
PRESSURE DROP	HORN SILENCED
STOP PUSHBUTTON PRESSED	PRESSURE TRANSDUCER FAULT
SPEED SWITCH FAILURE	CONTACTOR COIL FAILURE

Plus any of the 8 programmable auxiliary alarms listed above

Every event or alarm that is recorded includes the following data with the recorded event or alarm:
- Time and Date of Event or Alarm
- System Pressure
- Descriptive Text Message of the Event/Alarm
- System Auto Mode Status
- Engine Running Status
- Charger 1 Status
- Charger 2 Status
- Battery 1 Status
- Battery 2 Status

Controller Operation

Automatic Mode:

Starting conditions such as pressure drop, and deluge valve start, will cause the user adjustable sequential start delay timer to begin operation. After start delay is completed the engine will start and the operation will be recorded in the event log. In addition to the sequential start timer the Automatic Weekly Test Start, AC Power Fail Start are programmable by the user through the OID. All system statistics are continuously monitored and changes are logged into the internal logs. System statistics include, but are not limited to, battery charger volts/amps, battery voltage, and system pressure are continuously monitored and changes are logged.

Stopping conditions: Auto engine stop delay, engine lockout, low suction shutdown, automatic stop during automatic weekly test for low oil pressure and high water temperature are all OID user programmable features.

Manual Mode:

If a control logic failure occurs, two crank pushbuttons are provided that will bypass all internal logic and allow manual operation of the engine.

Options

Option H: Space Heater

If the ambient atmosphere is especially damp or humid, a space heater rated at 100 watts may be supplied to reduce moisture in the cabinet. A thermostat is supplied as standard with this option. A humidistat may be substituted at no additional charge.

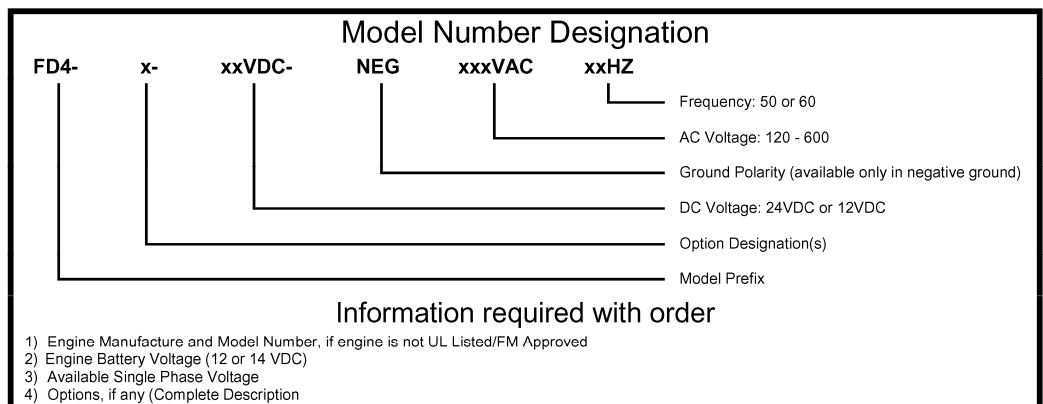**Option N: Step-down Transformer**

When AC voltage exceeds 240 VAC single phase, an integral transformer may be provided for operation from 380 to 600 VAC 50/60 Hz input. Exact voltage and frequency must be specified when ordering.

Option W: 24 Inch (609.6 mm) Legs

Provided for free standing installations when wall mounting is not practical. If specified, lifting eyes may also be supplied.

Enclosure

The following NEMA type enclosures are also available: 3R, 4, 4X (Painted Cold Rolled Steel), 4X (304 or 316 Stainless Steel), and 12.

Model Number Designation

FD4-   x-   xxVDC-   NEG   xxxVAC   xxHZ

- Frequency: 50 or 60
- AC Voltage: 120 - 600
- Ground Polarity (available only in negative ground)
- DC Voltage: 24VDC or 12VDC
- Option Designation(s)
- Model Prefix

Information required with order

1) Engine Manufacture and Model Number, if engine is not UL Listed/FM Approved
2) Engine Battery Voltage (12 or 14 VDC)
3) Available Single Phase Voltage
4) Options, if any (Complete Description

Specifications

General Controller Description

The Fire Pump Controller shall be factory assembled, wired and tested as a unit and shall conform to all requirements of the latest edition of NFPA 20, NFPA 70 and be Third Party Listed by Underwriters Laboratories (UL) and Approved by Factory Mutual (FM). The controller shall be available for either 12VDC or 24VDC systems.

Controller Equipment Features

The controller shall include the following standard features:
• NEMA Type 2 drip proof metal wall mount enclosure
• Dual Battery chargers, 10 amp microprocessor temperature compensated with integral volt/amp digital display and integral LEDs for indication of AC Power On and Battery Power On
• Two outer door mounted crank pushbuttons and two inner panel mounted battery on/off switches
• Outer door mounted key operated AUTO, OFF, MANUAL, mode selector switch
• Operator Interface Device (OID) with 4 lines by 20 character display with large character backlit LCD capable of being read in both direct sunlight or dark lighting conditions
• 12 pushbuttons for easy screen navigation, alarm reset, and horn silencing
• Multicolored LED's for alarm and mode annunciation
• LEDs shall be labeled with removable labels to allow for easy field modification if additional alarms and/or language changes
• All controller settings shall be programmable through the OID and shall be protected by two password levels
• All features shall be enabled or disabled through the OID, no jumpers or external wires shall be needed or allowed to activate or de-activate a feature
• The system status data shall be displayed on the OID. The displayed items shall include: Speed Switch Failure, Contactor Coil Failure, System pressure, Battery 1 Voltage, Battery 2 Voltage, Battery 1 Charger Amps, Battery 2 Charger Amps, Current time and date, Number of starts, Total engine run hours, Displayed countdown timers for:
Sequential engine start and engine stop, and Time until AC Power fail start, Status of Automatic Stop Setting. LED indication of Loss of DC Power.
• Audible horn with horn silence feature for silenceable alarms
• Lamp test feature
• English or Spanish languages selectable through the OID
• Microprocessor based logic with real time/date

clock capable of running a minimum of 14 days without DC power connected to controller and non-volatile flash memory to permanently store the continuous pressure log, event log, alarm log and all user changeable set points and system data. Battery backup of any kind not allowed.
• Input and output status LED's to provide visual indication of each discrete input's or output's on/off status
• One RS485 Serial Port
• MODBUS Communication Protocol via RS485 port
• All wiring terminals on PCB's shall be removable type

Auxiliary alarms:

As standard the controller shall include 6 discrete auxiliary inputs, 8 form 'C' auxiliary relay outputs. These auxiliary inputs and outputs are in addition to those mandated by NFPA 20. All auxiliary inputs, outputs, and OID LED's shall be field programmable through the OID. This permits a multitude of customizable controller configurations to meet each installations unique needs without adding cost to the controller. The use of jumpers, soldering, or other external components is not allowed.

The user can select any 8 of the following auxiliary alarms that can be programmed and recorded in the event/alarm logs and annunciated with an LED and output relay contact:

ENGINE QUIT FAULT	HIGH ENGINE OIL TEMPERATURE
PRESSURE TRANSDUCER FAULT	LOW JACKET WATER FLOW
PUMP ON DEMAND	LOW JACKET WATER LEVEL
LOW DISCHARGE PRESSURE	LOW HYDRAULIC PRESSURE
HIGH DISCHARGE PRESSURE	
REMOTE START SIGNAL	GAS DETECTION
DELUGE VALVE START	LOW FIREWATER PRESSURE
HIGH FUEL LEVEL	AIR DAMPER CLOSED
FUEL SPILL	AIR DAMPER OPEN
FUEL TANK RUPTURE	LOW PURGE PRESSURE
LOW PUMP ROOM TEMPERATURE	LOW GEAR OIL PRESSURE
RESERVOIR LOW	LOW COOLANT LEVEL
RESERVOIR EMPTY	HIGH GEAR OIL TEMPERATURE
RESERVOIR HIGH	HIGH VIBRATION
FLOW METER ON	LOW FUEL PRESSURE
RELIEF VALVE OPEN	HIGH EXHAUST TEMPERATURE
LOW SUCTION PRESSURE	HIGH FUEL TEMPERATURE
	PUMP ON DEMAND

Data logging:

The controller shall have separate data logs for storing system event and pressure data that is readable through the OID or printable on the internal printer. The data logs shall be stored on a removable SD memory card. The file format shall be standard ASCII text. These logs shall be as follows:

Pressure Log: The controller shall have a Pressure log with continuous pressure recording one month of data. Each day's data shall be in a separate file. The pressure log samples shall be time and date stamped and stored in permanent non-volatile flash memory. The pressure log shall be searchable by each sample, by minute, or by hour.

Event Log: The event log shall be capable of storing no less than 3000 events. These events shall include any of the following events/alarms:

BATTERY 1 FAULT	SYSTEM AUTO MODE
BATTERY 2 FAULT	ENGINE LOCKOUT SIGNAL
BATTERY 1 LOW VOLTAGE	SYSTEM AUTO MODE
BATTERY 2 LOW VOLTAGE	SYSTEM MANUAL MODE
CHARGER 1 FAULT	SYSTEM OFF MODE
CHARGER 2 FAULT	SYSTEM TEST RUN
AC POWER FAIL	ALARM RESET
ENGINE OVERSPEED	LOW PRESSURE CONDITION
ENGINE FAILED TO START	LOW PRESSURE START
ENGINE QUIT	DELUGE START
ENGINE LOW OIL PRESSURE	REMOTE START
ENGINE HIGH WATER TEMP	AC POWER FAIL START
PRESSURE TRANSDUCER FAULT	HORN SILENCED
STOP PUSHBUTTON PRESSED	PRESSURE DROP
SPEED SWITCH FAILURE	CONTACTOR COIL FAILURE

(PLUS ANY OF THE 8 PROGRAMMABLE AUXILIARY ALARMS LISTED ABOVE)

Each event or alarm recorded in the either event log or alarm logs shall have the following data recorded with the event/alarm:

• Time and Date of Event or Alarm
• System Pressure
• Descriptive Text Message of the Event/Alarm
• System Auto Mode Status
• Engine Running Status
• Charger 1 Status
• Charger 2 Status
• Battery 1 Status
• Battery 2 Status

The internal logic of the controller shall be capable of operation in a temperature range of 4.4°C to 40°C and high, non-condensing, humidity levels.

The controller shall be manufactured by Metron Inc.

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