INSTALLATION AND MAINTENANCE MANUAL

FOR

DIESEL ENGINE FIRE PUMP CONTROLLER

FPD MODEL

FSD MODEL

INSTALLATION

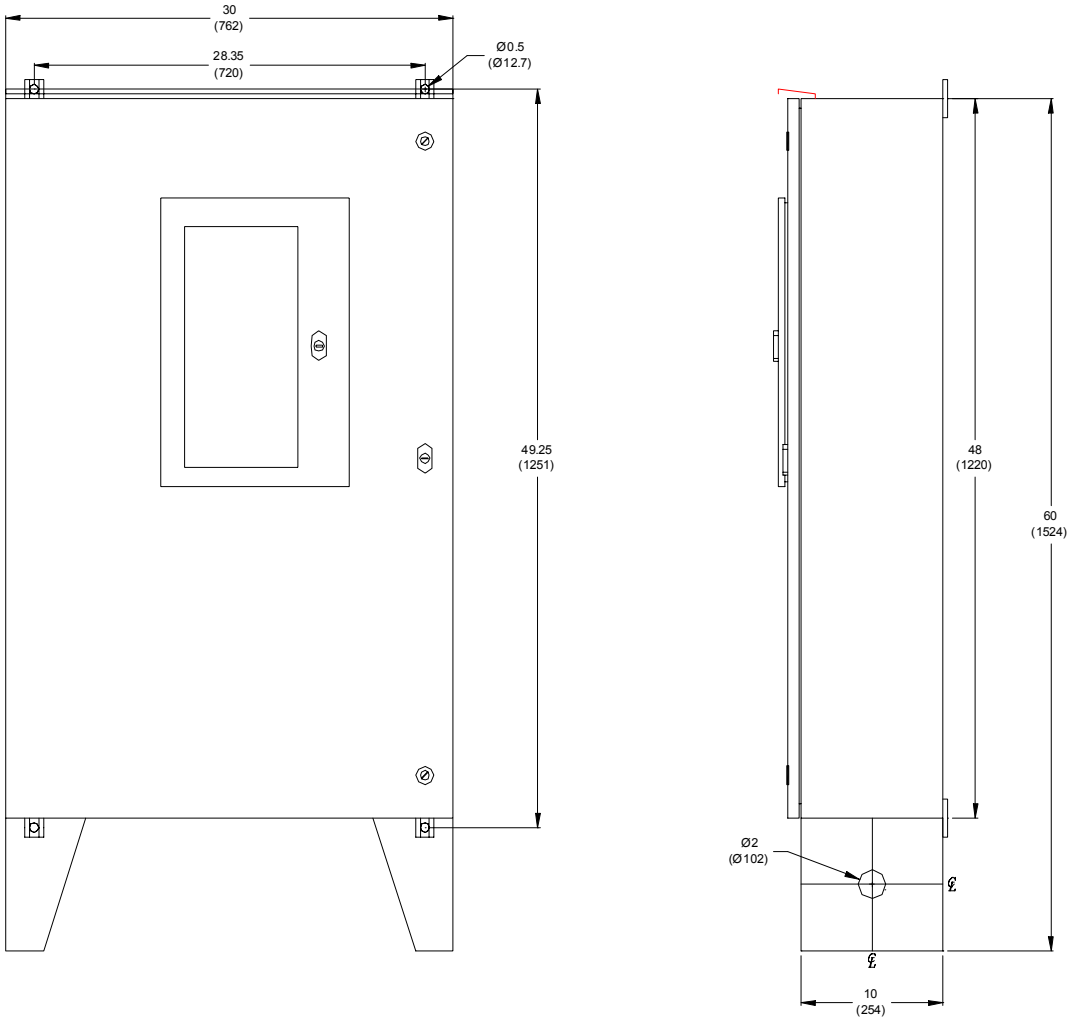
The diesel engine fire pump controller is supplied for floor, base or wall mounting.

Fastening of enclosure to wall should be accomplished with customary fastening devices compatible with the wall or floor material and of sufficient holding capacity to support a total weight of 300 lbs / 136 kg.

Ensure that controller is mounted level and that door is not obstructed to open for at least 90 degrees.

The controller should be mounted adjacent to and within the sight of the diesel engine and batteries.

DIMENSIONS



ELECTRICAL AND PRESSURE CONNECTIONS

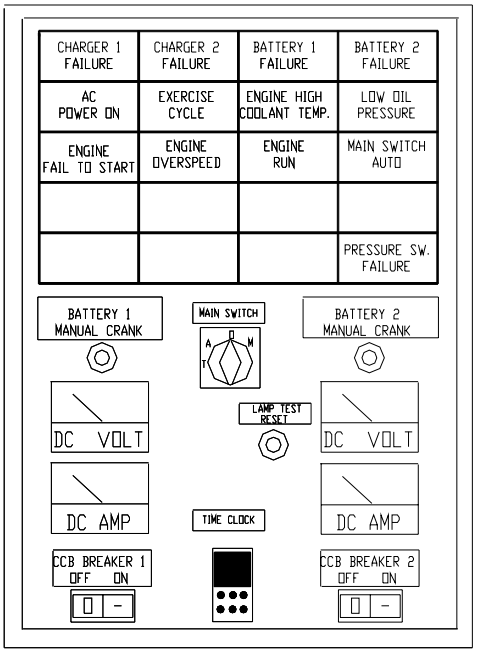
ELECTRICAL CONNECTIONS

- A licensed electrician should supervise electrical connections. The installation should meet national and local electrical codes and standards.
- Check electrical connections in controller and retighten if necessary.
- Check electrical rating labels on controller and battery chargers to ensure compatibility with incoming AC line, battery voltage and grounding polarity.
- Check pressure switch rating. If not factory adjusted, adjust to required cut in and cut out pressure settings.
- For control wiring, use no.14 AWG. wire minimum.
- For battery wiring, (terminals no 6, 7, 8 and 11) use no. 10 AWG wire minimum for up to 25' / 7.6 m. distance, no. 6 AWG wire for 26' / 7.9 m. to 50' / 15.2 m. distance.
- Inspect all factory-mounted components and wire connections for visible damage. Retighten loose connections.
- Connect AC power supply, batteries, engine wiring and all circuits as shown on wiring diagram.

PRESSURE CONNECTION

The controller is provided with a 1/4" NPT female system pressure connection. The drain connection is also 1/4" NPT female. This connection should be installed as outlined in NFPA20 standard no.20. Check that waterlines to pressure switch and solenoid valve are free of dirt and contamination.

MANUAL CONTROLS AND ANNUNCIATOR



CONTROLLER SEQUENCE OF OPERATION

MAIN SWITCH IN OFF POSITION

Shuts off engine and prevents engine start. Resets all alarm conditions.

Note: Overspeed switch must also be reset on engine.

MAIN SWITCH IN MANUAL POSITION

Provides for manual engine start.

Start push button battery 1 provides manual start with battery 1.

Start push button battery 2 provides manual start with battery 2.

By pressing both push buttons, batteries 1 and 2 can be utilized in parallel to start engine.

"LOW OIL PRESSURE" annunciator point lights up as soon as main switch is turned to the manual position and for a brief period after engine start until oil pressure switch opens contact. If low oil pressure prevails or develops during engine run, audible alarm will also energize. Engine will not stop.

All alarm signals except the automatic "FAILURE START" signal are operational in main switch "MANUAL" position.

Engine can only be stopped by turning main switch to OFF position, or automatically in case of over speed. In this case, overspeed annunciator point lights up and audible alarm is energized. Reset only by turning main switch to OFF position and by resetting overspeed switch on the engine.

MAIN SWITCH IN AUTO POSITION AND EXERCISE CYCLE

Annunciator point "MAIN SWITCH IN AUTO POSITION" lights up.

It allows engine to start in case of water system pressure drop sensed by the water pressure switch located in controller or by artificial water pressure drop created by opening water solenoid valve by the exercise time clock, or by the optional: remote start signal, or AC power failure.

Drop of water pressure will initiate the automatic engine cranking cycle. As soon as engine starts, "ENGINE RUN" annunciator point lights up. In case engine does not start during first 15 seconds crank attempt, start attempt module will provide a total of six 15 seconds engine cranks with 15 second rest periods. Battery 1 and 2 are alternated after each crank. If after the sixth attempt engine has not started the "ENGINE FAIL TO START" annunciator point lights up and the audible alarm is energized. Reset only by turning main switch to OFF position.

If engine is provided for manual stop only, engine can be stopped by the STOP push button, but only after all starting causes have been eliminated.

The time clock should be programmed for a ½ hour per week exercise cycle, see NFPA 20 (follow instructions for programming time clock located on the inside of the controller).

At the very start of the exercise cycle a water pressure drop is created by energizing the drain solenoid valve for a short time. This action causes the engine to start in the same manner as the foregoing automatic start sequence.

During exercise cycle annunciator point “EXERCISE CYCLE” lights up. Low oil pressure and high coolant condition will stop engine during exercise cycle only.

The pressure switch function test is part of the exercise cycle.

Engine stops automatically after 30 minutes.

NOTE: Contact function of time clock can be tested in the main switch auto position by pushing override button on time clock. First push closes contact and energizes engine start cycle. Time clock read out shows “ON”. Second push opens contact and stops engine. Time clock readout shows “OFF”.

MAIN SWITCH IN TEST POSITION

This position will start the engine under the same principle as the exercise cycle.

To terminate test run, turn main switch to AUTO or OFF position.

MAIN SWITCH REMOTE ALARM CONTACTS

Alarm contacts for remote alarm circuits are provided to indicate that main switch is in the "OFF" and "MANUAL" or "AUTO" position. Rated at 10 A 125 VAC.

ENGINE TROUBLE ALARM SIGNALS AND FUNCTIONS

ENGINE FAIL TO START

After 6 unsuccessful start attempts "ENGINE FAIL TO START" annunciator point lights up. Audible alarm and common alarm relay RX6 energize. Reset only by turning main switch to OFF position.

OVERSPEED

In case of overspeed engine will stop instantly regardless of start condition. Overspeed annunciator point will light up. Audible alarm and common alarm relay RX6 are energized. Reset only by turning main switch to OFF position and resetting speed switch on diesel engine.

LOW OIL PRESSURE

This annunciator point will light up during the crank cycle and for a brief period after engine start until oil pressure switch opens contact. If low oil pressure prevails or develops during engine run, audible alarm and common alarm relay RX6 will also energize. Engine will not stop. Alarm condition will only be removed by turning main switch to OFF position. This will also stop engine. During the exercise cycle, engine will stop in case of low oil pressure.

HIGH COOLANT TEMPERATURE

This condition will light up "HIGH COOLANT TEMPERATURE" annunciator point and energize audible alarm. Alarm condition is the same as Low Oil Pressure. During the exercise cycle, engine will stop in case of high coolant temperature.

ENGINE RUN

On engine start, "ENGINE RUN" annunciator point lights up and relay RB2 energizes providing 2 engine run contacts for remote alarm and louver control.

COMMON ENGINE ALARM

Alarm relay RX6 indicates trouble on controller or engine. Contacts provided for remote alarm circuit are rated 10 A, 125 VAC.

BATTERY CHARGERS

FUNCTIONNALITY

Each battery charger is equipped with its own individual power transformer. The solid state electronic battery charger incorporates the following supervisory and safety functions:

-Current limiting in every charging mode;

-Overcurrent shut off;

-Reverse voltage shut off;

-Automatic selection of bulk or float charge by sensing battery voltage;

-Trickle charge limited to less than 500 MA. Will compensate for additional current draw from relay control;

-Dead cell detection;

-Over and under voltage alarm.

-Opto-isolation on all input and output control signals.

In case of battery failure, the charger initiates an alarm and provides a signal to prevent the use of the defective battery during the start attempt cycle.

BATTERY FAILURE

In case of battery disconnect or low voltage condition, less than 50% of the nominal voltage rating (usually during crank cycle) battery failure annunciator point lights up, audible alarm and alarm relay RX6 are energized. In case one battery has failed the start attempt module will lock-in the other battery during the cranking cycle. After battery correction press charger reset push button to reactivate charging mode.

INTERFACE BOARD #3IFB001

FUNCTIONAL DESCRIPTION

The primary function of the interface board in the diesel fire pump controller is to provide both the voltage and circuit compatibility to all the various electric and electronic circuits as incorporated in the controller system. The various circuits are the relays, the battery chargers, the annunciator, the clock module, the pressure recorder and above all, the batteries.

The power supply units on the interface board is able to adjust automatically to the both 12V and the 24V versions of the Diesel Fire Pump Controller; and a voltage clamp has been incorporated at the power supply section to ensure that the output voltage on all drivers do not exceed their rated output voltage. The output voltage level of all the relay and lamp drivers is referenced to the power supply voltage (12V/24V respectively). The interfacing voltage of the chargers with the interface board is clamped at 8V. Furthermore, all the grounds voltage level between the interface and the chargers are independent of each other and allowed to float such that the Diesel Fire Pump controller can be configured either to positive or negative ground.

The inputs on the interface board are protected against input voltage of more than 200V and internally clamped to the internal logic level of 5V.The output drivers are all short circuit protected and will shutdown individually should a short circuit occur. The shutdown output drivers will remain inactive and LED #7 will be light until there is a manual reset.

The interface board incorporates two distinctive functional resets. The first reset activated by the LAMPTEST/CHARGER RESET push-button resets both the battery chargers as well as enabling a lamptest on the annunciator board. The second reset activated by the MAIN SWITCH being turned to the OFF-RESET position resets the following latched alarm conditions on the interface board: 1) Engine fail to start; 2) Engine overspeed; 3) Low oil pressure; 4) High coolant temperature; 5) Pressure switch failure and all output drivers

on the interface circuit board. When the MAIN SWITCH remains on the OFF-RESET position, all output drivers are disabled thereby de-energizing all the relays connected to the interface board and at the same time blank out the annunciator board.These two resets enable the service personnel to identify immediately the type of problem and to deal with it accordingly.

The alternating control of cranking the diesel motor is given directly by the interface board with preset cranking ON/OFF/Alternate cycle of 15 second each. After six cranks, an alarm signal is given for the failure to start the engine. A time-clock module provides for the weekly exercise cycle. On the exercise cycle only, there is a motor lock-out when either a low oil pressure or a high coolant temperature is detected. This lock-out condition is automatically overridden when the Fire Pump Controller receives a real fire alarm condition (a remote start signal or a drop of pressure in the water main).

Other salient features of the interface board are:

- Pressure switch failure alarm on exercise cycle
- 1.5V power supply output configured for pressure recorder.
- An eight second delay alarm output for low oil pressure condition.
- Unique polarization on all cable connectors enabling correct and exact insertion of cable plugs to the headers on the interface board.
- On board LED bar indicators for interface and output drivers verification. (See figure below.)

LED INDICATOR DESCRIPTION

	LED	ON	OFF
1	BATTERY #2	OK	FAILURE
2	CHARGER #2	OK	FAILURE
3	CHARGER #2 AC	OK	OFF
4	BATTERY #1	OK	FAILURE
5	CHARGER #1	OK	FAILURE
6	CHARGER #1 AC	OK	OFF
7	O/P DRIVER FAULT	FAULT	OK
8	PCB POWER ON	ON	OFF
9	CHARGERS RESET	RESET	-
10	CHARGERS STOPPED	STOP	-

OPTIONS

OPTION NO.2 SEQUENCE START TIMER

This option provides a time delay before engine start after automatic engine start signal has been initiated. NOTE: Controller is provided with terminal jumper J2. This jumper has to be removed in the field to allow sequence start time to be activated.

OPTION NO.3 DELAYED AUTOMATIC START ON AC POWER FAILURE (5 MIN. MAX.)

This option will start engine after a time delay in case of AC Power or Charger Failure. Engine will run as long as power failure prevails.

OPTION NO.5 4" BELL INSTEAD OF BUZZER

OPTION NO.6 STAINLESS STEEL T-316 MERCOID PRESSURE SWITCH 10-300 PSI

OPTION NO.7 SEAWATER RATED PIPING

OPTIONS: INDIVIDUAL ENGINE ALARM CONTACTS SPDT 10A. 120V.AC MAX.

OPTION NO.8 BATTERY 1 – BATTERY 2 FAILURE, INDIVIDUAL ALARM CONTACTS FOR EACH BATTERY

OPTION NO.9 OVERSPEED

OPTION NO.10 LOW OIL PRESSURE

OPTION NO.11 HIGH COOLANT TEMPERATURE

OPTION NO.12 FAILURE TO START

OPTION NO.13 CHARGER 1 – CHARGER 2 FAILURE, 2 INDIVIDUAL CONTACTS

OPTION NO.14 EXERCISE CYCLE RUN

OPTION NO.15 PRESSURE SWITCH FAILURE

OPTION NO.17 AC FAILURE

OPTIONS: PUMP ROOM INDIVIDUAL ALARM CONTACTS SPDT (DOES NOT INCLUDE PRESSURE, TEMPERATURE OR LEVEL SWITCH.)

OPTION NO.18 LOW SUCTION PRESSURE

OPTION NO.20 LOW FUEL LEVEL

OPTION NO.21 WATER RESERVOIR LOW

OPTION NO.22 WATER RESERVOIR EMPTY

OPTION NO.23 LOW PUMP ROOM TEMPERATURE

OPTION NO.24 FLOW METER ON

OPTION NO.25 RELIEF VALVE OPEN

OPTIONS: ACCESSORIES & MODIFICATIONS

OPTION NO.26A ANTICONDENSATION HEATER & THERMOSTAT 120VAC, 150W OR 220-240VAC, 175W

OPTION NO.26B ANTICONDENSATION HEATER & HUMIDISTAT

OPTION NO.27 LOW PUMP ROOM TEMPERATURE THERMOSTAT AND GUARD

OPTION NO.28A LOW FUEL LEVEL FLOAT SWITCH SUPPLIED AS SEPARATE ITEM (1.1/4")

OPTION NO.28B LOW FUEL LEVEL FLOAT SWTICH SUPPLIED AS SEPARATE ITEM (1.1/2")

OPTION NO.29 NEMA / UL / CSA 12 ENCLOSURE (OIL & DUST TIGHT)

OPTION NO.30 NEMA / UL / CSA 4 ENCLOSURE (WATER TIGHT)

OPTION NO.31LOW SUCTION PRESSURE SWITCH (ALLEN-BRADLEY) MOUNTED INSIDE CONTROLLER

OPTION NO.32 NEMA / UL / CSA 4X ENCLOSURE (WATERPROOF, CORROSION RESISTANT, PAINTED SS T-304)

OPTION NO.33A 220 V. / 50-60HZ INCOMING POWER

OPTION NO.33B 240 V. / 50-60HZ INCOMING POWER

OPTION NO.34 AC ISOLATING SWITCH (DOOR INTERLOCK) FOR EUROPE ONLY

OPTION NO.36 ENGINE BLOCK HEATER CIRCUIT (SAME VOLTAGE AS BATTERY CHARGER PRIMARY)

OPTION NO.37 FOAM PUMP CONTROLLER (W/O VALVE KIT, PRESSURE SWITCH & RECORDER)

OPTION NO.38 TROPICALIZATION

OPTION NO.39 CE LISTING (REQUIRES OPTION NO.34)

OPTION NO.40 ALTERNATOR OUTPUT CURRENT DIVIDER (IF CURRENT DIVIDER IS NOT LOCATED ON THE ENGINE)

OPTION NO.41 INTERLOCK CIRCUIT TO AN OTHER FIRE PUMP CONTROLLER (INTERLOCK FUNCTION MUST BE SPECIFIED WITH ORDER)

OPTION NO.42 LOCKOUT CIRCUIT FROM OTHER EQUIPMENT (SIGNAL VOLTAGE MUST BE SPECIFIED WITH ORDER)

OPTION NO.43 EXPORT PACKING

POWER UP

BATTERY CHARGER POWER UP

MAIN SWITCH IN OFF POSITION.

- Switch circuit breakers CB1 and CB2 on inner door for battery 1 and 2 to OFF position.
- Switch on AC power.
- Battery chargers should switch into full charge mode. Ammeters readout 10A.

NOTE: If battery is connected in wrong polarity, fuses on battery chargers will blow. Replace by 15 A fast acting fuse only. If batteries are in a low charge state wait until batteries are charged to proceed with next step.

In case of battery failure, battery charger shuts down. To reactivate battery charger, check battery and battery connections, then press "LAMPTEST - CHARGER RESET" push button. Charger will start with full charge current and automatically adjust to proper charging current.

CHECK CONTROL POWER CIRCUIT

MAIN SWITCH IN MANUAL POSITION.

- Switch on circuit breaker CB1, "AC POWER ON" pilot light should light up;
- Switch off circuit breaker CB1, "AC POWER ON" pilot light should be off;
- Switch on circuit breaker CB2, "AC POWER" pilot light should light up;
- Switch on circuit breaker CB1; control power circuit is now powered from both batteries.

SET EXERCISE CYCLE TIME CLOCK

Follow instructions located inside of the controller door.

LAMPTEST

MAIN SWITCH IN MANUAL POSITION.

Push "CHARGER RESET - LAMPTEST" button. All annunciator points should light up. Each annunciator point is equipped with 1 extra long life bulb.

START UP

MANUAL START TEST Main switch in MANUAL position; Low oil pressure annunciator point ON; Press manual crank push button battery no.1; Engine cranks and starts. Engine run annunciator point ON. Low oil pressure annunciator point should go off 8 seconds after engine starts.	_____
Turn main switch to OFF. Engine stops.	_____
Turn main switch to MANUAL and proceed manual start with manual crank pushbutton Battery no.2.	_____
Turn main switch to OFF. Engine stops.	_____
AUTOMATIC START TEST Turn main switch to AUTO position.	_____
Make sure that water pressure is available and water pressure switch contact in open position.	_____
Annunciator point "MAIN SWITCH AUTO" position on.	_____
Drop water pressure. Controller starts automatic start cycle. Low oil pressure annunciator point ON. Engine cranks and starts.	_____
Increase water pressure to open water pressure switch contact. Press stop push button on outer door. Engine stops, but only if pressure switch contact is in open position.	_____
NOTE: Option no.2 Sequence start timer. This option delays automatic start only. If required, disconnect Jumber J2. Option no.3 Automatic delayed start in case of AC power failure. Disconnect AC power. Engine should start after time delay.	
WEEKLY EXERCISE CYCLE TEST Main switch in AUTO position.	_____
Press override pushbutton on time clock. Water solenoid valve will open momentarily and reduce pressure on pressure switch. Controller will start engine in automatic mode. "ENGINE RUN" and "EXERCISE CYCLE" annunciator points ON. Press override pushbutton on time clock again and engine stops. NOTE: Low oil pressure or high coolant temperature conditions will stop engine during exercise cycle only.	_____
TEST START TEST Turn main switch to TEST position. Water solenoid valve will open momentarily and reduce pressure on pressure switch. Controler will start engine in automatic mode. “Engine run” annunciator points on.	_____
To stop turn main switch to AUTO or OFF position	_____

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