INSTALLATION AND MAINTENANCE MANUAL FOR ELECTRIC FIRE PUMP CONTROLLERS MODEL FPx

GENERAL DESCRIPTION

All electric fire pump controllers are designed to automatically start an electric driven fire pump upon detection of a pressure drop in the fire protection system. It is intended to control 3-phase squirrel cage induction motors and is arranged for electrical/manual starting and stopping and for automatic start, controlled by the low-pressure contact of the pressure switch. The combination automatic/non-automatic option provides a 10 minute automatic stop after automatic start but only after all starting causes have returned to normal.

If the fire pump controller is coupled with an automatic transfer switch, this manual should be read together with the appropriate transfer switch manual (9MAN502).

TYPES OF ELECTRIC FIRE PUMP CONTROLLERS

FIRE PUMP CATALOGUE NUMBER				
MODEL NO. EXAMPLE: FPA - 480 / 20 / 3 / 60				
FPA	480	20	3	60
Model prefix	Voltage	HP rating	Phase	Frequency

LIMITED SERVICE CONTROLLERS

MODEL FPL :

This model consists of an automatic controller for across-the line starting of squirrel-cage motors for 30 HP or less, 600 V. or less and is allowed where such use is acceptable to the authority having jurisdiction. It is the installer's responsibility to obtain this approval.
A single phase 240 V. or less, 15 HP or less is also available.
Full voltage is applied to the motor as soon as the controller receives a start command.

FULL SERVICE CONTROLLERS, ACROSS-THE-LINE STARTER

MODEL FPA :

This model is intended to be used where the local utility or the capacity of the power source permits across-the-line starting.

Full voltage is applied to the motor as soon as the controller receives a start command.

FULL SERVICE CONTROLLERS, REDUCED VOLTAGE STARTER

These models are intended to be used where the local utility or the capacity of the power source does not permit full voltage starting.
In all the reduced voltage models, the manual "EMERGENCY RUN" device will initiate across-the-line starting.

MODEL FPP : PART WINDING STARTER

This model requires the use of a motor with two separate windings and 6 power conductors between the controller and the motor.
Upon a start command, the first winding is connected to the line immediately. The second winding is connected to the line after a very short time delay.

MODEL FPR : AUTOTRANSFORMER STARTER

This model does not require a multi-connection motor. It only requires 3 conductors between the controller and the motor.
Upon a start command, an autotransformer is utilized to supply reduced voltage to the motor. After a time delay, the autotransformer is shunted out and the motor is connected to full voltage by a closed transition switching sequence.

MODEL FPS : SOLID STATE STARTER

This model does not require a multi-connection motor. It only requires 3 conductors between the controller and the motor.
Upon a start command, a solid state starter is utilized to supply a step less ramp-up voltage to the motor until the motor reaches its full speed. At that time, a fully horse power rated by-pass contactor is energized connecting the motor directly to full voltage and eliminating all heat loss within the solid state starter.
This controller also features a soft motor stopping mode.

MODEL FPV : ACCELERATION RESISTOR STARTER

This model does not require a multi-connection motor. It only requires 3 conductors between the controller and the motor.
Upon a start command, a set of acceleration resistors in each phase is utilized to supply a reduced voltage to the motor. After a time delay, the resistors are shunted out and the motor is connected to full voltage by a closed transition switching sequence.

MODEL FPW : WYE-DELTA CLOSED TRANSITION STARTER

This model requires a multi-connection motor and 6 conductors between the controller and the motor.
Upon a start command, the motor is connected to the line in the Wye connection. After a time delay, the motor is reconnected to the line in the Delta configuration applying full voltage to the motor windings by a closed transition switching sequence.

MODEL FPY : WYE-DELTA OPEN TRANSITION STARTER

This type of starter requires a multi-connection motor and 6 conductors between the controller and the motor.
Upon a start command, the motor is connected to the line in the Wye connection. After a time delay, the motor is reconnected to the line in the Delta configuration applying full voltage to the motor windings. This controller is of the open transition type. The motor is disconnected from the line during the transition from start (wye) to run (delta) mode.

METHODS OF STARTING / STOPPING

The controllers are available as combination automatic / non-automatic with provision for manual or automatic shutdown (automatic shutdown only possible after automatic start)

WATER PRESSURE CONTROL

The controller will start automatically on demand of the low-pressure contact of the pressure switch, provided the controller was not already manually started. The controller is supplied with the automatic shutdown provision factory defeated (to offer manual shutdown only), the motor can only be stopped by depressing the STOP push-button located on the controller after the pressure is re-established. If the controller is field converted to automatic shutdown (removal of jumper J1), a running period timer set for a minimum of 10 minutes will automatically shutdown the motor after all starting causes have returned to normal. When option A1 is supplied (omit run period timer), the motor can only be stopped by depressing the STOP push-button located on the controller after all starting causes have returned to normal.

MANUAL ELECTRIC CONTROL AT CONTROLLER

The controller can be electrically manually started by depressing the START push-button on the controller independently of the pressure actuated switch and can only be manually stopped by depressing the STOP push-button located on the controller.

EMERGENCY RUN MECHANICAL CONTROL AT CONTROLLER

The controller may be started with a manual mechanical method by operating the handle labeled EMERGENCY START. This handle provides for AN ACROSS-THE-LINE STARTING and non-automatic continuous running operation of the motor. This handle can be latched in the actuated position.

MANUAL ELECTRIC CONTROL AT REMOTE STATION

The controller can be electrically manually started by the momentary closing of a remote contact independently of the pressure actuated switch and can only be manually stopped by depressing the STOP push-button located on the controller.

SEQUENCE STARTING

In case of multiple pump application, it may be necessary to delay the starting of each motor in case of water pressure drop to prevent simultaneous starting of all motors. Option no.A2 provides installation of sequential start timer in the automatic start circuit.

FIRE PROTECTION EQUIPMENT CONTROL

When option A3 is supplied (deluge valve provision), the controller can be started by the opening of a normally closed contact (fail safe circuit) on the fire protection equipment (deluge valve) independent of the pressure switch. The controller can only be manually stopped by the STOP push-button located on the controller but only after the fire protecting equipment contact has returned to normal.

STANDARD ALARM AND SIGNAL DEVICES ON CONTROLLER

POWER AVAILABLE VISIBLE INDICATOR

A white pilot light (PL2) located on controller and labeled POWER ON indicates power available on all 3 phases.

PHASE REVERSAL

A red pilot light (PL1) located on controller and labeled WRONG PHASE ROTATION indicates phase reversal of the power source to which the line terminals of the motor contactor are connected.

NOTE: This pilot light is not available in single phase limited service fire pump controller.

STANDARD CONTROLLER ALARM CONTACTS FOR REMOTE INDICATION

All alarm contacts are rated for 240V. 10A. maximum and are intended to be connected to a separate reliable power source not exceeding 125VAC.

MOTOR RUNNING CONDITION

A normally open and a normally closed contact of the Run contactor (1M) is provided. Rated for 10 A., 240 VAC.
The normally open contact is connected to terminals 5 and 6 and will close to signal motor run.
The normally closed contact is connected to terminals 7 and 8 and will open to signal motor run.

LOSS OF ANY PHASE OR POWER AT LINE TERMINALS OF MOTOR CONTACTOR

A SPDT contact of the Phase failure relay (CR2) is provided. Rated for 10A., 240V.
The normally open contact (held in closed position when power is available) is connected to terminals 9 and 10 and will open to signal loss of power.
The normally closed contact (held in open position when power is available) is connected to terminals 10 and 11 and will close to signal loss of any phase or power.

PHASE REVERSAL

A SPDT contact of the Phase reversal relay (PR1) is provided. Rated for 5A., 240V.
The normally open contact is connected to terminals 12 and 13 and will close to signal phase reversal.
The normally closed contact is connected to terminals 13 and 14 and will open to signal phase reversal.
NOTE: The phase reversal alarm contacts are not available for the single phase limited service fire pump controllers.

INSTALLATION

The fire pump controller is intended to be installed in accordance with the Standard of the National Fire Protection Association for the Installation of Centrifugal Fire Pumps, NFPA No.20 (Centrifugal Fire Pumps latest Edition) and

in USA	National Electrical Code NFPA 70
in Canada	Canadian Electrical Code, Part 1
others *	Local Electrical Codes *

* Only American and Canadian applicable codes have been considered during the design of the controllers and the selection of components.

LOCATION: (REF.: NFPA 20, 7.2, 7.3.1)

Controller shall be located as close as practical to the motor they control and shall be within sight of the motor.
Controller shall be so located or so protected that it will not be injured by water escaping from pump or pump connections. Current carrying parts of controller shall be not less than 12 in. (305 mm) above the floor level.
Working clearances around controller shall comply with NFPA 70, National Electrical Code, Article 110 or C22.1, Canadian Electrical Code, Article 26.302 or other local codes.

Controller shall be suitable for use in locations subject to a moderate degree of moisture, such as a damp basement. The pump room ambient temperature shall be between 41°F (5°C) and 104°F (40°C).
The standard controller enclosure is rated NEMA 2, 3 and 12. It is the installer's responsibility to assure that either the standard enclosure meets the ambient conditions or that an enclosure with an appropriate rating has been provided. (See option D11 or D12.)

MOUNTING: (REF.: NFPA 20, 7.3.2)

The fire pump controller shall be mounted in a substantial manner on a single noncombustible supporting structure.
Wall mounted controller shall be attached to the structure or wall using all four (4) mounting ears provided on the controller with hardware designed to support the weight of the controller at a height not less than 12 in. above floor level.

Floor mounted controller shall be attached to the floor using all holes provided on the mounting feet with hardware designed to support the weight of the controller. Mounting feet provide the necessary 12 inch (305 mm) clearance for current carrying parts.
A concrete slab is recommended to avoid water accumulation on the controller's feet.

CONNECTIONS

WATER CONNECTIONS

The threaded connection of the pressure switch (1/4" NPT. F.) is flush with the bottom of the enclosure. See dimensions drawing for exact location.

The pump start - stop pressure switch (PS1) shall be connected to the system as per NFPA 20, Chapter 7-5.2.1 (b) and (c) and figure A-7-5.2.1 (a) and (b).

The optional low suction pressure switch (PS2) shall be connected to the suction side of the system following standard practice.

ELECTRICAL WIRING AND CONNECTIONS

ELECTRICAL WIRING

The electrical wiring between the power source and the fire pump controller shall meet the NFPA 20, Chapter 6-3, NFPA 70 National Electrical Code Article 695 or C22.1 Canadian Electrical Code, Section 32-200 or other local codes. Electrical wiring shall be typically sized to carry at least 125% of the full load current of the fire pump motor. Incoming power terminals on the controller are suitable to accept wire based on that selection with an insulation not less than 60°C. (Refer to terminal diagram for terminal sizes.)

The electrical wiring between the fire pump controller and the pump motor shall be in rigid , intermediate, or liquid tight flexible metal conduit or Type MI cable and meet the requirements of NFPA 70 National Electrical Code or C22.1 Canadian Electrical Code or other local codes.

The number of conductors required varies depending on the model of starter:

- 3-wires plus ground sized at 125% of full load current for:
  - Model FPA: Full Service Full Voltage / Across-The-Line Starter
  - Model FPR: Full Service Reduced Voltage / Autotransformer Starter
  - Model FPS: Full Service Reduced Voltage / Solid State Starter
  - Model FPV: Full Service Reduced Voltage / Acceleration Resistor Starter
  - Model FPL: Limited Service Full Voltage / Across-The-Line Starter
- 6-wires plus ground sized at 125% of 50% of the motor full load current for:
  - Model FPP: Full Service Reduced Voltage / Part Winding Starter
- 6-wires plus ground sized at 125% of 58% of the motor full load current for:
  - Model FPW : Full Service Reduced Voltage / Wye-Delta Closed Circuit Starter
  - Model FPY : Full Service Reduced Voltage / Wye-Delta Open Circuit Starter
  - Motor power terminals on the controller are suitable to accept wire based on above selection with insulation not less than 60°C. (Refer to terminal diagram for terminal sizes.)

Fire pump controllers without an automatic transfer switch are not intended to be connected to an emergency power source, such a connection will not meet NFPA20 requirements. It is the responsibility of the installer to obtain proper waiver from the authority having jurisdiction to deviate from the NFPA20 standard.

ELECTRICAL CONNECTIONS

The dimension drawings show the area suitable for incoming power and motor connections. No other location shall be used. Only water tight hub fittings shall be used when entering the cabinet to preserve the NEMA rating of the cabinet.
The installer is responsible for adequate protection of fire pump controller components against metallic debris or drilling chips. Failure to do so may cause injuries to personnel, damage the controller and subsequently void warranty.

INCOMING POWER CONNECTIONS

Incoming power connections on the controller are suitable to accept copper wire sized at minimum 125% of full load motor current with an insulation not less than 60°C. (Refer to terminal diagram for terminal sizes.) Minimum bending space is provided in accordance with wire size for wires entering the cabinet from the wall opposite to the terminals.
Incoming power is to be connected to terminals identified L1-L2 and L3 located on the isolating switch (IS).

MOTOR CONNECTIONS

Motor connections on the controller are suitable to accept copper wire sized at minimum ampacity with an insulation not less than 60°C. (Refer to terminal diagram for terminal sizes.) Minimum bending space is provided in accordance with wire size for wires entering the cabinet from the wall opposite to the terminals. Motor connections are connected to terminals identified by:

- T1-T2 and T3 located on contactor (1M) for:
  - Model FPA : Full Service Full Voltage Across-The-Line Starter
  - Model FPR : Full Service Reduced Voltage / Autotransformer Starter
  - Model FPS : Full Service Reduced Voltage / Solid State Starter
  - Model FPV : Full Service Reduced Voltage / Acceleration Resistor Starter
  - Model FPL : Limited Service Full Voltage Across-The-Line Starter

- T1-T2 and T3 located on contactor (1M) and T7-T8 and T9 located on contactor (2M) for:
  - Model FPP : Full Service Reduced Voltage / Part Winding Starter

- T1-T2 and T3 located on contactor (1M) and T6-T4 and T5 located on contactor (2M) for
  - Model FPW : Full Service Reduced Voltage / Wye-Delta Closed Circuit Starter
  - Model FPY : Full Service Reduced Voltage / Wye-Delta Open Circuit Starter

It is the responsibility of the installer to obtain connection information on the motor and to assure that the motor is connected as per motor manufacturer recommendations. Failure to do so may cause injuries to personnel, damage the motor and/or the controller and subsequently void warranty on both items.

ALARM CONNECTIONS FOR REMOTE INDICATIONS

Since these alarm connections are derived from control relays or motor contactor auxiliary contacts located inside a metallic enclosure with wiring that can pick up induction from the line voltage, an induced voltage can be present at the terminal connections. It is the responsibility of the alarm contractor to evaluate the potential danger for their equipment. A remote alarm panel Tornatech Inc. Type APE with interface relays may be required if induced voltages cause problems to electronic equipment.

(NOTE: This induction problem is more likely to occur in 600 V. models.)

STANDARD ALARM CONTACT

The three following sets of alarm contacts are available in each electric fire pump controller to meet NFPA 20, Chapter 7-4.7. These alarm circuits shall be powered by a separate reliable supervised power source not exceeding 125 V.

MOTOR RUNNING CONDITION

A normally open and a normally closed contact of the Run contactor (1M) is provided. Rated for 10 A., 240 VAC.

The normally open contact is connected to terminals 5 and 6 and will close to signal motor run.

The normally closed contact is connected to terminals 7 and 8 and will open to signal motor run.

LOSS OF ANY PHASE OR POWER AT LINE TERMINALS OF MOTOR CONTACTOR

A SPDT contact of the Phase failure relay (CR2) is provided. Rated for 10A., 240V.
The normally open contact (held in closed position when power is available) is connected to terminals 9 and 10 and will open to signal loss of power.

The normally closed contact (held in open position when power is available) is connected to terminals 10 and 11 and will close to signal loss of power.

PHASE REVERSAL

A SPDT contact of the Phase reversal relay (PR1) is provided. Rated for 10A., 240V.
The normally open contact is connected to terminals 12 and 13 and will close to signal phase reversal.

The normally closed contact is connected to terminals 13 and 14 and will open to signal phase reversal.

NOTE: The phase reversal alarm contacts are not available for the single-phase limited service fire pump controllers.

OPTIONAL ALARM CONTACTS

The following optional sets of alarm contacts are available for the electric fire pump controllers. These optional alarm circuits shall be powered by a separate reliable supervised power source not exceeding 125 V. If the optional alarm contacts are supplied, the field connections terminals will be located on the main terminal strip.

FIRE PUMP CONTROLLER LOCK OUT ALARM CONTACTS (OPTION NO. A6)

A SPDT contact of control relay (CR13) is provided for the lock out condition alarm signal. Rated for 10 A., 240 VAC.

The normally open contact is connected to terminals 150 and 151 and will close in case of a remote lock out signal.

The normally closed contact is connected to terminals 151 and 152 and will open in case of a remote lock out signal.

INTERLOCK ALARM CONTACTS (OPTION NO. A7)

A SPDT contact of control relay (CR22) is provided for the remote interlock circuit. Rated for 10 A., 240 VAC.

The normally open contact is connected to terminals 155 and 156 and will close to signal interlock to remote equipment.

The normally closed contact is connected to terminals 156 and 157 and will open to signal interlock to remote equipment.

EXTRA MOTOR RUN ALARM CONTACTS (OPTION NO. C1)

An additional normally open and normally closed alarm contact is provided for the motor running condition. Rated for 10 A., 240 VAC.

The normally open contact is connected to terminals 78 and 79 and will close to signal motor run.

The normally closed contact is connected to terminals 80 and 81 and will open to signal motor run.

EXTRA PHASE REVERSAL ALARM CONTACTS (OPTION NO. C2)

An additional SPDT alarm contact is provided in case of phase reversal.

The normally open contact is connected to terminals 82 and 83 and will close to signal phase reversal.

The normally closed contact is connected to terminals 83 and 84 and will open to signal phase reversal.

NOTE: The above alarm contacts are not available for the single-phase limited service fire pump controllers.

EXTRA LOSS OF ANY PHASE OR POWER ALARM CONTACTS (OPTION NO. C3)

An additional SPDT alarm contact is provided for the loss of any phase or power alarm signal.

The normally open contact (held in closed position when power is available) is connected to terminals 85 and 86 and will open to signal loss of or any phase or power.

The normally closed contact (held in open position when power is available) is connected to terminals 86 and 87 and will close to signal loss of any phase or power.

WEEKLY EXERCISE CYCLE ALARM CONTACTS (OPTION NO. C4)

An additional SPDT alarm contact is provided for the weekly exercise cycle.

The normally open contact is connected to terminals 88 and 89 and will close during the weekly exercise cycle.

The normally closed contact is connected to terminals 89 and 90 and will open during the weekly exercise cycle.

LOW SUCTION ALARM CONTACTS (OPTION NO. C5)

An additional SPDT alarm contact is provided for the low suction condition.

The normally open contact is connected to terminals 91 and 92 and will close in case of low suction condition.

The normally closed contact is connected to terminals 92 and 93 and will open in case of low suction condition.

LOW DISCHARGE ALARM CONTACTS (OPTION NO. C6)

An additional SPDT alarm contact is provided for the low discharge condition.

The normally open contact is connected to terminals 94 and 95 and will close in case of low discharge condition.

The normally closed contact is connected to terminals 95 and 96 and will open in case of low discharge condition.

LOW TEMPERATURE ALARM CONTACTS (OPTION NO. C7)

An additional SPDT alarm contact is provided for the low temperature condition.

The normally open contact is connected to terminals 97 and 98 and will close in case of low temperature condition.

The normally closed contact is connected to terminals 98 and 99 and will open in case of low temperature condition.

PUMP MOTOR OVERLOAD ALARM CONTACTS (OPTION NO. C8)

An additional normally open and a normally closed alarm contact of the overload sensor is provided. Rated for 10 A., 240 VAC.

The normally open contact is connected to terminals 100 and 101 and will close in case of pump overload condition.

The normally closed contact is connected to terminals 102 and 103 and will open in case of pump overload condition.

FAIL TO START ALARM CONTACTS (OPTION NO. C9)

An additional SPDT alarm contact is provided for the fail to start condition.

The normally open contact is connected to terminals 104 and 105 and will close in case of fail to start condition.

The normally closed contact is connected to terminals 105 and 106 and will open in case of fail to start condition.

LOW RESERVOIR LEVEL ALARM CONTACTS (OPTION NO. C10)

An additional SPDT alarm contact is provided for the low level condition.

The float switch is connected to terminals 55-192 and the float switch contact must close in low level condition.

The normally open contact 193-194 will close on low level condition.

The normally closed contact 194-195 will open on low level condition.

STANDARD FIELD DEVICES PROVISION

REMOTE START SIGNAL CONNECTION

Each electric fire pump controller has provision for connection to a manual remote start station (remote start contact). This remote start contact shall be normally open and connected to terminals 3 and 4 on the main terminal strip. Contact closure will start the pump motor. Pump motor can only be stopped by the stop push button on the controller.

OPTIONAL FIELD DEVICE CONNECTION PROVISION

The following optional field devices may need to be connected to the fire pump controller. If the optional field device connections are ordered, the connection terminals will be located on the main terminal strip.

DELUGE VALVE PROVISION (OPTION NO. A3)

Two additional control terminals 3 and 53 are installed on the main terminal strip for the connection of a deluge valve or other fire protection equipment control contacts supplied by others. To meet NFPA 20, Chapter 7-5.2.2.,

the starting of the motor shall be initiated by the opening of a normally closed contact on the fire protection equipment.

FLOW SWITCH PROVISION (OPTION NO. A4)

Two additional control terminals 2 and 3 are installed on the main terminal strip for the connection of a flow switch contact supplied by others. The flow switch contact shall be normally open and close on detection of water flow to initiate pump motor start.

WEEKLY EXERCISE CYCLE (OPTION NO. A5)

(For programming information, see 9FOR161)

A 7-day time clock is provided and three control terminals are installed on the main terminal strip for the connection of an aquastat and a drain solenoid valve supplied by others. The aquastat contact connected to terminals 56 and 57 shall be normally open and shall close upon detection of high temperature in order to energize the normally closed 120 VAC drain solenoid connected to terminals 57 and 58.

The aquastat and the drain solenoid valve installation are left to the pump manufacturer's discretion. If only a drain solenoid valve is required, installing a jumper between terminals 56 and 57 can jump the aquastat connection out.

FIRE PUMP CONTROLLER LOCK OUT SIGNAL FROM REMOTE EQUIPMENT (OPTION NO. A6)

Two additional control terminals are installed on the main terminal strip. The remote lock out signal (consisting of an AC or DC source of power from the equipment initializing the lock out) is connected to terminals 133 and 135. Lockout signal voltage must be the same as indicated next to terminals 133 and 135.

INTERLOCK PROVISION TO REMOTE EQUIPMENT (OPTION NO. A7)

Two additional control terminals are installed on the main terminal strip. The interlock output signal (consisting of 120 V.AC signal to the equipment to be interlocked) is connected to terminals 58 and 154.

FOAM PUMP APPLICATION (OPTION NO. A8)

Three additional control terminals are installed on the main terminal strip for connection of the remote fire alarm contact (pump start contact). If the remote fire alarm contact is normally open (closing to start the pump), it should be connected between terminals 2 and 3. If the remote fire alarm contact is normally closed (opening to start the pump), it should be connected to terminals 3 and 40. The pressure switch within the fire pump controller is omitted.

LOW ZONE PUMP (OPTION NO. A9)

Four additional control terminals are installed on the main terminal strip.

The terminals 3-2 are connected to the high (or medium) zone pump controller (162-163) in order to start low zone fire pump motor.

The terminals 163-164 are connected to the high (or medium) zone pump controller (terminals 165-3) in order to signal that low zone pump is running.

MEDIUM ZONE PUMP (OPTION NO. A10)

Eight additional control terminals are installed on the main terminal strip.

The terminals 3-2 are connected to the high zone pump controller (162-163) in order to start medium zone fire pump motor.

The terminals 163-164 are connected to the high zone pump controller (terminals 165-3) in order to signal that medium zone pump is running.

The terminals 162-163 are connected to the low zone pump controller (3-2) in order to give a start signal to the low zone controller.

The terminals 165-3 are connected to the low zone pump controller (163-164) in order to signal that low zone pump is running.

HIGH ZONE PUMP (OPTION NO. A11)

Four additional control terminals are installed on the main terminal strip.

The terminals 162-163 are connected to the low (or medium) zone pump controller (3-2) in order to give a start signal to the low zone pump controller.
The terminals 165-3 are connected to the low (or medium) zone pump controller (163-164) in order to signal that low zone pump is running.

LOW SUCTION PRESSURE SWITCH AS COMPLEMENT (OPTION NO. B7 AND/OR C5)

If options B7 (pilot light) and/or C5 (alarm contact) are supplied on the fire pump controller and Option D1 (low suction pressure switch) has not been requested, it is necessary to connect a remote installed pressure switch to terminals 55 and 70. This pressure switch contact shall close on pressure drop at the low-pressure value selected on the pressure switch.

LOW DISCHARGE PRESSURE SWITCH AS COMPLEMENT (OPTION NO. B9 AND/OR C6)

If options B9 (pilot light) and/or C6 (alarm contact) are supplied on the fire pump controller and Option D2 (low discharge pressure switch) has not been requested, it is necessary to connect a remote installed pressure switch to terminals 55 and 71. This pressure switch contact shall close under low discharge pressure condition.

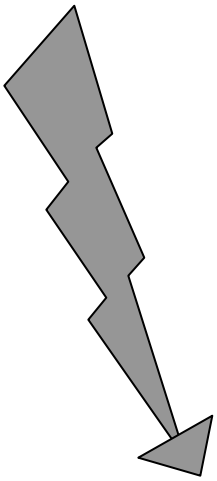
LOW PUMP ROOM TEMPERATURE THERMOSTAT AS COMPLEMENT (OPTION NO. B10 AND/OR C7)

If options B10 (pilot light) and/or C7 (alarm contact) are supplied on the fire pump controller and Option D3 or D4 (low temperature thermostat) has not been requested, it is necessary to connect a remote mo unted thermostat to terminals 55 and 72. This thermostat contact shall close under low temperature condition (41ºF or 5ºC).

LOW RESERVOIR LEVEL ALARM CONTACT (OPTION NO. C10)

The float switch supplied by others must be connected to terminals 55-192. The float switch contact must close in low level condition.

START-UP AND TEST PROCEDURES



DANGER

HAZARDOUS VOLTAGE IS PRESENT IN THE ENCLOSURE WHICH WILL CAUSE SEVERE PERSONAL INJURY OR DEATH.

MAINTENANCE OR START UP SHOULD BE PERFORMED ONLY BY EXPERIENCED LICENSED ELECTRICIANS.

ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT.

VERIFICATIONS

ELECTRICAL INSTALLATION

A representative for the electrical contractor responsible for the installation shall be available on-site to assist during the verification of the following points and the actual start-up:

All electrical label ratings meet incoming power voltage and frequency as well as motor voltage, HP and frequency.

All electrical connections in controller are tight. Retighten if necessary.

All electrical connections are properly completed and power is available. (See Electrical Wiring and Connections for reference.)

PIPING INSTALLATION

A representative for the sprinkler contractor responsible for the installation shall be available on-site to assist during the verification of the following points and the actual start-up:

All water connections are properly completed, water is available and free of dirt and/or contamination. (See Water Connections for reference.)

NOTE: Standard controllers have pressure switch rated for fresh water only. If other conditions exist, make sure that the controller pressure switch is compatible.

IMPORTANT : If the fire pump controller is coupled with an automatic transfer switch, it is important to read both installation and maintenance manuals before proceeding with the following fire pump start-up.

It is necessary to proceed with the fire pump start-up before proceeding with the transfer switch start-up. At any time, the transfer switch isolating switch must stay in OFF position during the fire pump start-up.

SETTINGS

TIMERS	Required	N/A
TIMER TR1 SETTING Standard controllers are supplied with provision for automatic or manual stop after automatic start. Controllers are always factory set for manual stop. If automatic stop is required and accepted by authority having jurisdiction. - The jumper J1 between terminals 1 and 2 must be removed. - The timer TR1 adjustable from 3 to 30 minutes must be set at not less than 10 minutes. (For test purposes the timer can temporarily be set to 3 minutes.) Note : Controllers equipped with Option A1 (Omit run period timer) only have provision for manual stop after automatic start.		
TIMER TR3 SETTING Controllers equipped with Option A2 (Sequential start timer) have an additional timer TR3 adjustable from 3 to 30 seconds. On a multiple pump application, this timer must be field set as determined by the controller position in the pumping sequence of operation: Lead fire pump controller sequential start timer TR3 shall be bypassed by installing internal jumper IJ-1. Second and consecutive fire pump controllers sequential start timers TR3 shall be set at 5 to 10 second intervals (10 seconds max.).		
TIMER TR5 SETTING Controllers equipped with Option E1 (Permanent load shedding), Option no. E2 (Temporary load shedding) or Option no. E3 (Permanent and temporary load shedding) have an additional timer TR5 adjustable from .3 to 3 seconds Adjust timer TR5 to 1 to 1.5 seconds (this should be sufficient to allow for load shedding).		
TIMER TR6 SETTING Controllers equipped with Option no. E2 (Temporary load shedding) or Option no. E3 (Permanent and temporary load shedding) have an additional timer TR6 adjustable from 3 to 30 seconds. Adjust timer TR6 to approximately 10 seconds (this should be sufficient to allow for fire pump motor starting).		
TIME CLOCK TC1 SETTING Controllers equipped with Option A5 or A5A (Weekly exercise cycle) have a time clock TC1 that must be set in accordance with the instructions (9FOR161) supplied with the controller. An exercise cycle of 15 minutes is recommended at a time when personnel are available for supervision. Unattended automatic weekly exercising cycles are not an alternative to regular inspection.		

DANGER

Hazardous voltage is present in the enclosure and will cause severe personal injury or cause death.

SETTINGS con't

PRESSURE SWITCHES	Required	N/A
PRESSURE SWITCH PS1 Standard controllers are supplied with a Mercoid pressure switch 10-300 PSIG, the pressure switch cut-in (pump start) and cut-out (pump stop) must be set to suit the exact installation requirements. Refer to form (9FOR165) for detailed instructions. Note: The installer must assure that the pump cut-out setting is lower than the maximum output pressure of the fire pump, otherwise the controller will never stop. If the controller is equipped with option D5 (Mercoid pressure switch 75-800 PSIG), the pressure switch cut-in (pump start) and cut-out (pump stop) must be set to suit the exact installation requirements. Refer to form (9FOR165) for detailed instructions. Note: The installer must assure that the pump cut-out setting is lower than the maximum output pressure of the fire pump, otherwise the controller will never stop.		
PRESSURE SWITCH PS2 If the controller is equipped with option D1 (Low suction pressure switch) an Allen-Bradley pressure switch (4-150 PSIG) is supplied. The pressure switch cut-in (low suction pressure alarm) and cut-out (low suction pressure alarm reset) must be set to suit the exact installation requirements. Refer to form (9FOR167) for detailed instructions.		
PRESSURE SWITCH PS3 If the controller is equipped with option D2 (Low discharge pressure switch) an Allen-Bradley pressure switch (6-250 PSIG) is supplied. The pressure switch cut-in (low discharge pressure alarm) and cutout (low discharge pressure alarm reset) must be set to suit the exact installation requirements. Refer to form (9FOR168) for detailed instructions.		

DANGER

Hazardous voltage is present in the enclosure and will cause severe personal injury or cause death.

THERMOSTAT		
LOW PUMP ROOM TEMPERATURE THERMOSTAT TH1 If the controller is equipped with option D3 (Low pump room temperature thermostat) a room thermostat is installed. The thermostat must be set to lowest acceptable room temperature. (Not lower than 41ºF or 5ºC.)		

ACTUAL START-UP

CHECK MOTOR ROTATION		
♦ Turn circuit breaker handle to the ON position. • If the system pressure is above the pressure switch setting (pressurized system), the motor will not start right away. If motor does not start, press the START pushbutton. ♦ Turn the circuit breaker handle to the OFF position as soon as motor starts to stop motor. ♦ Check the motor rotation. • If the motor rotation is correct, no further adjustment is required, move to the next section. ♦ Correct the motor rotation. • Motor rotation can be changed by reversing any two motor wires either at the motor junction box or on the motor connection terminals inside the controller. In both cases, the operator shall assure that the power is disconnected before proceeding. Special care shall be taken when the motor connections consist in more than three wires, in this case it is necessary to reverse connections on all the motor winding connections. NOTE: Under no circumstances shall the internal wiring of the controller be tampered with. Failure to comply will void warranty, may cause injuries and damage the controller. Only the wires directly feeding the motor can be reversed. ♦ Turn circuit breaker handle to the ON position. ♦ Check the motor rotation once more.		

CHECK WRONG PHASE ROTATION INDICATION (Applicable to all models except FPL, single-phase)		
♦ Turn circuit breaker handle to the ON position. • Pilot light PL1 WRONG PHASE ROTATION is not energized, controller phase rotation module is in the right phase sequence. No further adjustment is required, move to the next section. • Pilot light PL1 WRONG PHASE ROTATION is energized, controller phase rotation module is in the wrong phase sequence and needs to be adjusted. - Turn circuit breaker handle to the OFF position. - Open control panel door. - Locate the 2 red terminals on the terminal strip. - Connect wire “A” to terminal “B” and wire “B” to terminal “A”. - Close controller panel door. - Turn circuit breaker to the ON position. ♦ Verify that WRONG PHASE ROTATION pilot light is not energized, controller phase rotation module is in the right phase sequence. No further adjustment is required.		

INITIAL START-UP

INITIAL START-UP	Required	N/A
♦ Turn the circuit breaker handle to the On position. - If the system pressure is above the pressure switch setting (pressurized system), the motor will not start. The system is ready for further tests. If the system pressure is under the pressure switch setting (under-pressurized system), the motor starts automatically to build up pressure. Once pressure is up, pressing the STOP pushbutton can stop the motor. The system is ready for further tests.		

MANUAL START TEST

START FROM START PUSHBUTTON PB1		
♦ Press the START pushbutton on the controller, pump motor will start regardless of the system pressure and continues to run. (No possibility of automatic stop.) ♦ Measure and record on the Start-up report form (9TES200) the current drawn by the motor on phase 1, 2 and 3 under no load condition and full load condition. ♦ Press STOP pushbutton on the controller, pump motor will stop.		

START FROM EMERGENCY START HANDLE		
♦ Pull the emergency start handle to its ON position, the pump motor will always start in full voltage regardless of the system pressure and continues to run (no possibility of automatic stop) even when the handle is released to its OFF position. NOTE: on model FPS, delay stop pushbutton will stop instantly. ♦ Press STOP pushbutton on the controller, pump motor will not stop. ♦ Put handle back to OFF position ♦ Press STOP pushbutton on the controller, pump motor will stop.		

MANUAL START TEST con't

START FROM REMOTE START STATION	Required	N/A
♦ If the remote start circuit consists of a momentary pushbutton or contact : • Press the remote START pushbutton or initiate closure of the remote start contact, the pump motor will start regardless of the system pressure and continues to run. (No possibility of automatic stop.) • Press STOP pushbutton on the controller, pump motor will stop. ♦ If the remote start circuit consists of a maintained contact: • Initiate closure of the remote start contact, the pump motor will start regardless of the system pressure and continues to run. (No possibility of automatic stop.) • Initiate opening of the remote contact. (No possibility of automatic or manual stop if contact remains closed unless the circuit breaker is turned off.) • Press STOP pushbutton on the controller, pump motor will stop.		

START FROM FIRE EQUIPMENT CONTROL (DELUGE VALVE) (Option no. A3)		
♦ Initiate opening of the contact, the pump motor will start regardless of the system pressure and continues to run. (No possibility of automatic stop.) ♦ Initiate closure of the contact. (No possibility of automatic or manual stop if contact remains opened unless the circuit breaker is turned off.) ♦ Press the STOP pushbutton, the pump motor will stop.		

AUTOMATIC START TEST

WATER PRESSURE CONTROL	Required	N/A
♦ Verify that the control panel is set for manual stop, (jumper J1 in place). ♦ Simulate a pressure drop in the system by draining water off the pressure sensing line. ♦ The pressure switch automatically starts the pump motor when the pressure falls below its cut-in setting. ♦ Verify that the pump motor starts at the desired pressure. If not, refer to previous paragraph for readjustment. ♦ Let the pump build up pressure. ♦ Press the STOP pushbutton when the system pressure has reached the desired value. The pump motor will stop. If it refuses to stop, the pressure switch cutout setting needs to be readjusted to a lower value. Refer to previous paragraph for readjustment. ♦ Remove jumper J1 located on the terminal strip to convert controller to automatic stop,. ♦ Simulate a pressure drop in the system by draining water off the pressure sensing line. The pressure switch automatically starts the pump motor when the pressure falls below its cut-in setting. ♦ Verify that the pump motor starts at the desired pressure. If not, refer to previous paragraph for readjustment. ♦ Let the pump build up pressure. When the pressure has reached the desired value, the pump motor will automatically stop after the expiration of a run period delay adjusted on timer TR1. If it does not stop after expiration of the time delay, cut out pressure has not been restored or cut out pressure setting on pressure switch may have to be readjusted. Refer to previous paragraph for readjustment. **The pump motor can be stopped before the expiration of the run period delay by pressing the STOP push button if the pressure is higher than the cutout setting of the pressure switch.**		

AUTOMATIC START TEST con't

SEQUENTIAL START (Option no. A2)	Required	N/A
The sequential start timer TR2 delays the start of the motor upon detection of a pressure drop by the pressure switch PS1 or detection of a flow by the flow switch (Option no. A4). ♦ To simulate, proceed the same way as water pressure control simulation. Once the pressure is lower than the cut-in setting of the pressure switch, the pump will automatically start after the expiration of the time delay set on sequential start timer TR2.		

FLOW SWITCH PUMP START (Option no. A4)		
The flow switch automatically starts the pump motor as soon as the flow exceeds the setting on the flow switch. Usually this condition will be detected faster than a pressure drop. ♦ Verify that the motor starts when a water flow is detected. **(NOTE: No possibility of automatic or manual stop if the flow switch contact remains closed unless the circuit breaker is turned off.)** • If the controller is set for automatic stop, the pump motor stops when water flow has subsided and after the run period time has expired. • In the automatic mode, pressing the STOP pushbutton can stop the pump motor if the water flow has subsided before the run period time has expired. • If the controller is set for manual shut down only, press the STOP pushbutton, the pump motor will stop if water flow has subsided.		

WEEKLY EXERCISE START (Option no. A5 & A5A)		
♦ Verify the time clock setting. Refer to form (9FOR161) for detailed instructions. ♦ For A5 option only, connect a jumper across terminals 56 and 57 to bypass the aquastat or simulate a temperature raise. ♦ Program a new short start-stop test cycle. ♦ At the beginning of the new test cycle, the pump motor will start and run continuously and the drain solenoid valve (if installed) will be energized and water will be drained. ♦ At the end of the test cycle, the pump motor will stop automatically and the drain solenoid valve will be de-energized. ♦ Reprogram the time clock to the desired exercising schedule.		

LOCK OUT AND INTERLOCK PROVISION TEST

LOCK OUT PROVISION FROM OTHER EQUIPMENT (Option no. A6)	Required	N/A
Lock out is only effective on automatic start signals ♦ Energize the lock out signal on the remote equipment. ♦ The lock out pilot light PL10 is energized. ♦ Simulate all the available manual start sequences: Start push button on the controller, emergency start handle, remote start, start from the fire equipment control (deluge valve). • The pump motor should start in any of these conditions. ♦ Simulate all the available automatic start sequences: Water pressure control, flow switch, weekly exerciser. • The pump motor should not start in any of these conditions. ♦ De-energize the lock out signal on the remote equipment. • The lock out pilot light PL10 is de-energized. ♦ Simulate all the available automatic start sequences: Water pressure control, flow switch water pressure control, weekly exerciser. • The pump motor should start in any of these conditions		

INTERLOCK PROVISION TO OTHER EQUIPMENT (Option no. A7)		
♦ Create the interlock condition on the controller. (May vary based on the sequence of operation.) • The interlock pilot light PL11 is energized. ♦ Verify that the interlocked equipment is not operational. ♦ De-activate the interlock condition on the controller. • The interlock pilot light PL11 is de-energized. ♦ Verify that the interlocked equipment is operational.		

FOAM PUMP APPLICATION TEST

CONCENTRATE FOAM PUMP APPLICATION (Option no. A8)	Required	N/A
♦ Activate the remo te fire alarm signal. The fire pump motor starts. ♦ Deactivate the remote fire alarm signal. Motor can now be stopped by the STOP push button. (NOTE: No possibility of automatic or manual stops if the remote fire alarm contact remains activated unless the circuit breaker is turned off.) • If the controller is set for automatic stop, the pump motor stops after the run period time has expired or by the STOP push button on the controller. • If the controller is set for manual shut down only, press the STOP pushbutton on the controller, pump motor will stop.		

TEST ALARM CONDITIONS

LOW SUCTION ALARM CONDITION (Option no. B7 and/or C5)		
♦ Simulate a drop of pressure on the suction pipe by closing the pressure sensing line and draining water. • If Option no. B7 is installed, the pilot light PL4 is energized. • If Option no. C5 is installed, the control relay CR16 is energized, the normally open contact between terminals 91 and 92 closes and the N/C contact between terminals 92 and 93 opens. ♦ Restore the suction pressure to normal. • The pilot light PL4 and the control relay CR16 are de-energized.		

LOW DISCHARGE ALARM CONDITION (Option no. B9 and/or C6)		
♦ Simulate a drop of pressure on the discharge pipe by draining water on the pressure sensing line. • If Option no. B9 is installed, the pilot light PL6 is energized. • If Option no. C6 is installed, the control relay CR17 is energized, the normally open contact between terminals 94 and 95 closes and the normally closed contact between terminals 95 and 96 opens. ♦ Restore the suction pressure to normal. • The pilot light PL6 and the control relay CR17 are de-energized.		

TEST ALARM CONDITIONS con't

LOW PUMP ROOM TEMPERATURE ALARM CONDITION (Option no. B10 and/or C7)	Required	N/A
♦ Simulate a low temperature by adjusting the setting on the thermostat below the room temperature. • If Option no. B10 is installed, the pilot light PL7 is energized. • If Option no. C7 is installed, the control relay CR18 is energized, the normally open contact between terminals 97 and 98 closes and the normally closed contact between terminals 98 and 99 opens. ♦ Restore the temperature. • The pilot light PL7 and the control relay CR18 are de-energized.		

PUMP MOTOR OVERLOAD ALARM CONDITION (Option no. C8)		
♦ Simulate a pump motor overload by pushing the "Test" button located on the overload relay. • The normally open contact between terminals 100 and 101 closes and the normally closed contact between terminals 102 and 103 opens.		

FAIL TO START ALARM CONDITION (Option no C9)		
A fail to start alarm occurs when the energization of the master start relay CR6 is not followed by the instant energization of the run contactor 1M or within the delay set on timer TR4. ♦ In order to simulate this alarm it is necessary to prevent the contactor 1M to energize. This can be accomplished by disconnecting the wire no. 17 on the relay CR6, all necessary precaution should be taken so that the bare end of wire no. 17 is insulated. ♦ Once the wire is removed, initiate any of the start sequence and wait for the alarm to be activated at the expiration of time set on timer TR4. • The normally open contact between terminals 104 and 105 closes and the normally closed contact between terminals 105 and 106 opens. **NOTE : At the end of the test, reconnect wire no. 17 and perform a start sequence to validate the controller operation.**		

LOW RESERVOIR LEVEL ALARM CONDITION (Option no C10)		
♦ Simulate a low level alarm by lifting the float switch above liquid level • The normally open contact between terminals 193 and 194 closes and the normally closed contact between terminals 194 and 195 opens.		

TEST LOAD SHEDDING SIGNALS

PERMANENT LOAD SHEDDING (Option no. E1) (For non critical loads)	Required	N/A
A SPDT contact of relay CR20 is provided. Rated for 10A., 240V. The normally open contact is connected to terminals 107 and 108 and will close to provide for permanent load shedding signal. The normally closed contact is connected to terminals 108 and 109 and will open to provide for permanent load shedding signal. Two conditions must be met to energize relay CR20: 1) The transfer switch must be in alternate power position as indicated by the closing of a limit switch (energizing relay CR19) located on the transfer switch unit 2) The pressure switch PS1 must call for the pump to start (automatic mode only). To simulate the operation of option no. E1, it is necessary to : ♦ Verify that the load shedding circuit is inoperative if the two above conditions are not present. ♦ Start the generator by switching off the normal power. ♦ Initiate the system pressure start by dropping the system pressure. ♦ Verify that the load shedding circuit activates immediately. ♦ Verify that the fire pump motor starts at the end of time set on timer TR5. ♦ Verify that the load shedding circuit stays activated as long as the pump motor runs. ♦ Verify that the load shedding circuit deactivates when the pump motor stops.		

TEST LOAD SHEDDING SIGNALS con't

TEMPORARY LOAD SHEDDING (Option no. E2)	Required	N/A
An SPDT contact of relay CR21 is provided. Rated for 10A., 240V. The normally open contact is connected to terminals 110 and 111 and will close to provide for temporary load shedding signal. Contact will open after timer TR6 time interval. The normally closed contact is connected to terminals 111 and 112 and will open to provide for temporary load shedding signal. Contact will close after timer TR6 time interval. Two conditions must be met to energize relay CR21: 1) The transfer switch must be in alternate power position as indicated by the closing of a limit switch (energizing relay CR19) located on the transfer switch unit and 2) The pressure switch PS1 must call for the pump to start. (automatic mode only) To simulate the operation of option no. E2, it is necessary to: ♦ Verify that the load shedding circuit is inoperative if the two above conditions are not present. ♦ Start the generator by switching off the normal power. ♦ Initiate the system pressure start by dropping the system pressure. ♦ Verify that the load shedding circuit activates immediately. ♦ Verify that the fire pump motor starts at the end of time set on timer TR5. ♦ Verify that the load shedding circuit deactivates at the end of time set on timer TR6. ♦ Verify that the load shedding circuit deactivates when the pump motor stops before expiration of time set on timer TR6.		

TEST LOAD SHEDDING SIGNALS con't

PERMANENT AND TEMPORARY LOAD SHEDDING (Option no. E3)	Required	N/A
A SPDT contact of relay CR20 is provided. Rated for 10A., 240V. for the permanent load shedding. The normally open contact is connected to terminals 107 and 108 and will close to provide for permanent load shedding signal. The normally closed contact is connected to terminals 108 and 109 and will open to provide for permanent load shedding signal. A SPDT contact of relay CR21 is provided. Rated for 10A., 240V. for the temporary load shedding. The normally open contact is connected to terminals 110 and 111 and will close to provide for temporary load shedding signal. Contact will open after timer TR6 time interval. The normally closed contact is connected to terminals 111 and 112 and will open to provide for temporary load shedding signal. Contact will close after timer TR6 time interval. Two conditions must be met to energize relay CR21: 1) The transfer switch must be in alternate power position as indicated by the closing of a limit switch (driving relay CR19) located on the transfer switch unit 2) The pressure switch PS1 must call for the pump to start. (automatic mode only) To simulate the operation of option no. E3, it is necessary to: ♦ Verify that both load shedding circuits are inoperative if the two above conditions are not present. ♦ Start the generator by switching off the normal power. ♦ Initiate the system pressure start by dropping the system pressure. ♦ Verify that the permanent load shedding circuit activates immediately. ♦ Verify that the temporary load shedding circuit activates immediately ♦ Verify that the fire pump motor starts at the end of time set on timer TR5. ♦ Verify that the temporary load shedding circuit deactivates at the end of time set on timer TR6. ♦ Verify that the permanent load shedding circuit stays activated as long as the pump motor runs. ♦ Verify that the permanent load shedding circuit deactivates when the pump motor stops. ♦ Verify that the temporary load shedding circuit deactivates when the pump motor stops before expiration of time set on timer TR6.		

TROUBLESHOOTING HINTS

The following troubleshooting hints are intended to solve common field problems by qualified and authorized personnel only. This list is not exhaustive. If the problem is not solved with the following hints, please do not hesitate to contact factory.

1. Fire pump refuses to start in all starting modes.
   - Check if the flange handle is in the ON position. If the handle is in OFF position, move it to the ON position. If in Trip position, have an electrician verify the controller and motor connection for possible short circuit before resetting.
   - Check if line power on all phases is available to the controller.
   - Check if pump motor is properly connected.
2. Fire pump refuses to start in all starting modes except with emergency handle locked in On position.
   - Check if internal jumper IJ-5 is securely in place. (Internal jumper IJ-5 is factory removed on model FPS.)
   - Check the main control transformer XR1 feeding the control section.
   - Check the master start relay CR6.
   - Check the motor starter power components (contactors, autotransformer, resistors, …)
3. Fire pump refuses to start on a drop of system pressure.
   - Check if the system pressure switch PS1 is piped properly and if water is available and exempt of dirt.
   - Check if the system pressure switch PS1 is adjusted properly.
   - Check the auto start relay CR3.
   - Check if internal jumpers IJ-2, IJ-3 and IJ-4 are securely in place if required. (Refer to option list.)
   - If option no. A2, sequential start timer is provided, (IJ-2 factory removed) check timer TR3.
   - If option no. A6, lock out provision is provided, (IJ-3 factory removed) check relay CR13 and lock out signal.
   - If any of option no. E1, E2 or E3, load-shedding provision is provided, (IJ-4 factory removed) check timer TR5 and relay CR19.
4. Fire pump refuses to start with start push button or remote start signal.
   - Check if internal jumper IJ-1 is securely in place. (Internal jumper IJ-1 is factory removed on model FPS.)
   - Check manual start relay CR4.
   - Check if remote start signal is properly connected to terminals 3 and 4. (Remote contact should close to start the pump.)
5. Fire pump refuses to start with start push button or remote start signal.
   - Check if internal jumper IJ-1 is securely in place. (Internal jumper IJ-1 is factory removed on model FPS.)
   - Check manual start relay CR4.
   - Check if remote start signal is properly connected to terminals 3 and 4. (Contact should close to start the pump.)
6. Fire pump starts in all modes but refuses to stay ON after being started with the emergency handle.
   - Check emergency start relay CR5.
   - Check limit switch LS1 on emergency handle.
7. Fire pump motor refuses to ramp up on solid state model FPS.
   - Check solid state starter settings and functions.
8. Fire pump refuses to start upon a signal from the deluge valve. (Option no. A3.).
   - Check deluge valve relays CR10 and CR11.
   - Check if deluge valve signal is properly connected to terminals 3 and 53. (Contact should open to start the pump.)
9. Fire pump refuses to start on signal from flow switch. (Option no. A4.).
   - Check flow switch contact (contact should close upon flow detection between terminals 2 and 3).

10. Fire pump refuses to start on a weekly exerciser. (Option no. A5.).
    - Check if time clock is programmed and set properly. Refer to time clock instructions (9FOR…).
    - Check weekly exercise start relay CR12.
    - Check fuses FU1 and FU2.
11. Fire pump refuses to lock out upon a signal from remote equipment. (Option no. A6.).
    - Check if pump motor operation is not due to a manual start command.
    - Check lock out signal at terminals 133 and 135 (verify if voltage is compatible with controller.)
    - Check fuse FU14.
    - Check lock out relay CR13.
    - Check if internal jumper IJ-4 has been removed and replaced by a normally closed contact of relay CR13.
12. Foam fire pump refuses to start on signal from a fire alarm signal. (Option no. A8.).
    - Check remote fire alarm signal (either normally open contact between 2 and 3 or normally closed contact between 3 and 40).
13. Circuit breaker trips when motor starts:
    - Verify the motor connection and motor for any short circuits or grounds.
    - Check compatibility of controller with motor (voltage, HP, frequency).
    - Check if a lock rotor condition exists.
    - Check magnetic trip adjustment on circuit breaker and compare to name plate on the controller.
    - On some motors, the magnetizing current may be higher than the circuit breaker magnetic trip setting (usually set around 13 times the motor full load current). Contact factory for possibility of adjustment.
14. Fire pump motor starts immediately when circuit breaker is turned on.
    - Check if system pressure is not below setting of pressure switch PS1.
    - Check if emergency handle is not locked in ON position.
    - Check if remote start signal is not calling for the pump motor to run.
    - Check if the deluge valve is not calling for the pump motor to run. (Option no. A3)
    - Check if the flow switch is not calling for the pump motor to run. (Option no. A4)
    - Check if the weekly exerciser is not calling for the pump motor to run. (Option no. A5)
    - Check if a remote alarm signal is not calling for the foam pump motor to run. (Option no. A8)
15. Fire pump motor starts automatically on pressure drop but refuses to stop when system pressure is restored.
    - Check system pressure switch PS1 cut out setting. (If it is adjusted to a pressure higher than the pump capacity, it will never reset and therefore will prevent the pump to stop.)
    - Check if Option no. A1 is provided. (Run period timer TR1 not supplied.) In this case, there is no possibility of automatic shut down.
    - If Option no. A1 is not provided (run period timer is supplied), check if system is set for manual shut down. (Jumper J1 between terminals 1 and 2 is installed.) In this case, remove jumper J1 so that system can shut down at expiration of time set on timer TR1.
16. Power on pilot light is not on:
    - Check if incoming power is correct on all 3 phases.
    - Check if light bulb is burned.
    - Check if 120VAC control voltage is present between wires 3 and 51 and terminals 36 and 39.
17. Wrong phase rotation light is on:
    - If motor has the right rotation, follow instructions under Actual start-up, check wrong phase rotation.
    - If motor has the wrong rotation follow instructions under Actual start-up, check motor rotation.

PREVENTIVE MAINTENANCE AND TEST

Fire pump controllers are an important part of your fire protection system. They require a minimum preventive maintenance but must be periodically inspected and their operation simulated to assure constant performance.

NOTE: Qualified and authorized personnel only must do this maintenance.

VISUAL INSPECTION	OK	N/A
Inspect cleanliness of controller.		
Remove any object from the top of controller.		
Dust and clean the controller.		
Inspect controller for any evidence of corrosion outside.		
Inspect controller for any evidence of corrosion inside.		
Check for leaks in pressure switch and piping.		
Inspect door for proper alignment and function of door locks		
Inspect flange handle for proper operation		
Inspect flange handle for interlock with door		
Inspect interlock between isolating switch and circuit breaker		
Inspect shunt trip installation		
Inspect rotary handle for proper operation (model FPL only)		
Inspect rotary handle for interlock with door (model FPL only)		
Inspect emergency start handle operation		
Verify operation of limit switch on emergency start handle		
Inspect tightness of all connections		
Inspect tightness of all terminal jumpers		
Inspect controller grounding		
Inspect harness mechanical attachment		
Inspect relays, contactors, and timers for any evidence of damage.		
Inspect motor contactor power contacts.		
Inspect tightness of all mounting nuts and screws.		

OPERATIONAL INSPECTION	**OK**	**N/A**
Check wrong phase rotation indication.(Except model FPL, 1 phase)		
Check motor rotation.		
Start from start push button PB1.		
Start from emergency start handle.		
Start from remote start station. (If connected.)		
Start from fire equipment control (deluge valve). (Option no. A3.)		
Start from water pressure control.		
Verify sequential start. (Option no. A2.)		
Start from flow switch. (Option no. A4.)		
Start from weekly exerciser. (Option no. A5 or A5A)		
Verify lock out provision from other equipment. (Option no. A6.)		
Verify interlock provision to other equipment. (Option no. A7.)		
Start from fire alarm signal on foam pump application. (Option no. A8)		
Verify low suction alarm condition. (Option no. B7 and/or C5.)		
Verify low discharge alarm condition. (Option no. B9 and/or C6.)		
Verify low pump room temperature alarm condition. (Option no. B10 and/or C7.)		
Verify pump motor overload alarm condition. (Option no. B17 and/or C8.)		
Verify low reservoir level alarm condition. (Option no. B18 and/or C10.)		
Verify fail to start alarm condition. (Option no. C9.)		
Verify permanent load shedding signal. (Option no. E1.)		
Verify temporary load shedding signal. (Option no. E2.)		
Verify permanent & temporary load shedding signal. (Option no. E3.)		
Verify additional permanent load shedding signal. (Option no. E4.)		
Verify additional temporary load shedding signal. (Option no. E5.)		