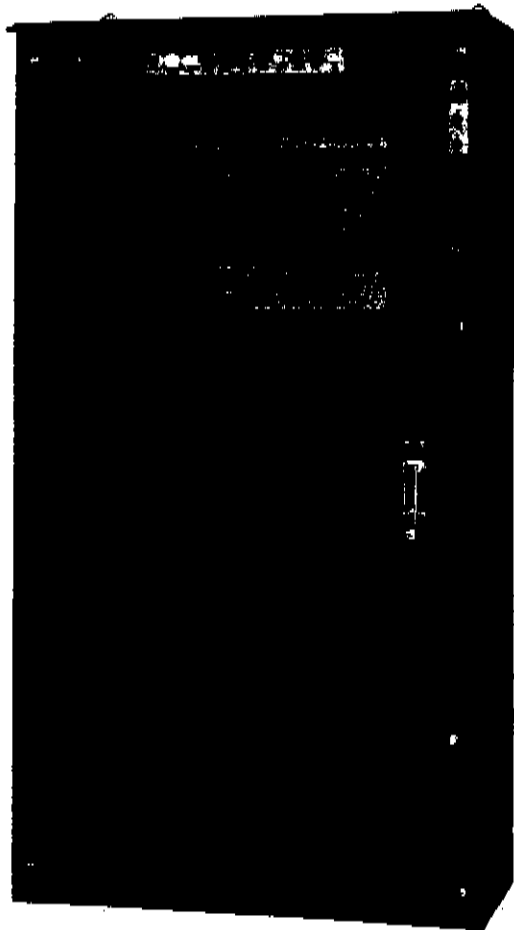


**Joslyn Clark** 

# ***INSTRUCTION BULLETIN***

**Fire Pump Controllers For Electrical Driven Centrifugal Pumps  
(Produced after January 1996)  
Installation - Start Up - Service - Trouble Shooting**



This instruction is a guide for personnel involved with Maintenance, Engineering, and Approval of Fire Pump equipment. It provides an understanding of the Joslyn Clark controller operation, to aid in installing and start-up; and later troubleshooting when necessary.

Joslyn Clark Fire Pump controllers differ from ordinary industrial motor controllers. The purpose is to provide fire protection. Operational and safety features are specified by the National Fire Protection Association, publication "NFPA-20 and NFPA-70". Also Factory Mutual System "Handbook of Industrial Loss Prevention", chapter 20.



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## INSTALLATION

Installation must meet requirements of the National Fire Protection Association publication "NFPA-20 and NFPA-70".

### SETTING IN PLACE

The controller must be located "within sight" of the motor, but so located that it will not be injured by water escaping from the pump or connections.

Mount the controller in a substantial manner on the wall, at a height which places current carrying parts not less than 12" above floor level (NFPA-20" requirements). Larger size floor-mounted enclosures include the necessary 12" floor clearance. A housekeeping floor pad is recommended.

### WIRING

Space available for entry of electrical conduits are detailed on controller submittal sheets and dimension outlines. All connections and service are made from the front. Rear access is not required.

Incoming line power connects to top terminals of Isolating Switch IS, terminals L1-L2-L3. For use as service entrance equipment application, connect service ground conductor.

Check controller nameplate to assure controller voltage is same as service voltage being installed.

Outgoing motor leads connect to bottom of Motor Contactor M, terminals T1, T2, T3 (Part winding and Wye-Delta types connect to 1M-2M contactors).

Ground cabinet by wiring to **ground lug** provided near Isolating Switch.

External control leads connect to control terminal board. Push Buttons: An optional remote "Start" push button can be added, wire to terminals 1-2, remove jumper 1-2.

Note the "Start" push button contacts are **normally closed**, and open when button is pressed. This provides best circuit reliability.

Note also that remote "Stop" push buttons **cannot** be added. "NFPA-20" regulations permit the use of **no other "Stop" push button** than the one mounted on the controller.

Deluge Valve: When used, this connects to terminals 3-4, remove jumper 3-4. Valve contacts are closed when valve is closed.

Remote Alarms: "NFPA-20" requires that remote alarms be connected when the pump room is not constantly attended. Alarms must be powered by a separate reliable supervised power source. Make the following contact connections:

Connect "Pump Power Failure" to terminals 11-12 for contact "close" to alarm or terminals 11-12A for contact "open" to alarm.

Connect "Pump Running" alarm to terminals 13-14 for contact "close" to alarm or terminals 14-14A for contact "open" to alarm.

Connect "Reverse Phase" alarm to terminals 76-77 for contacts "Close" to alarm. NOTE: when controller circuit breaker is open there will be a reversal phase alarm.

**NOTE: Joslyn Clark Bulletin 10665 Alarm Panels are designed for use with all bulletins of Joslyn Fire Pump Controllers.**

Manual Stop: Optional "Continuous Run" operation can be obtained by removing jumper 4-5 at controller terminal board. This provides for automatic start and continuous run until stopped manually.

If this mode of operation is to be permanent, the Running Period Timer RPT can be omitted from the controller.

## ELECTRICAL MAKE-READY

Remove all packing and bindings which protect relays and contactors during shipment. Operate all contactors and relays by hand to assure free motion. Operate the "Start-Stop" push buttons and the emergency start handle a few times to clean operating contacts from possible moisture or dust accumulated during shipping and installation work.

## PIPING

Threaded connection on the pressure switch is accessible from front. Recommended pipe entry is through the bottom of wall-mounted controllers, and through the lower left side of floor-mounted types. Dimension details are shown on the outline S diagram. When tightening piping, hold the square part of pressure switch connection with wrench to avoid strain on interior.

"NFPA-20" requires:

- a. Provision on the piping for relieving the pressure to test operation of the pressure switch (i.e.: drain valve).
- b. Pressure piping outside the controller be not less than 1/2" nonferrous. Piping entering controller may be 1/4".

## ADJUSTMENTS

1. Field setting of the Circuit Breaker is not needed. The Joslyn Clark Locked Rotor Protector is factory set at 300% motor full load current, there are no adjustments.

Circuit Breaker "instantaneous trip" is factory set to operate at no more than 2000% motor full load current. This set-point is stamped on controller nameplate, handy when needed for future verification.

2. Adjust Pressure Switch start and stop pressure settings to suit the exact installation (adjustment instruction page?)
3. The Running Period Timer, RPT can be set for a short delay or about 1/2 minute during tests to avoid unnecessary waiting. Re-adjust to at least 1-minute for each 10 horsepower of motor rating (but need not exceed 10 minutes) as shown on wiring diagram.

This relay is omitted from "Manual Stop" controllers, identified by a letter A suffix on Catalog Number stamped on controller nameplate.

4. On Reduced Voltage Controllers Accelerating Timer 1AT is factory set.  
10640 Autotransformer, Set 1AT - 3.0 Secs.  
10650 Primary Resistor, Set 1AT - 3 Secs.  
10670 Part Winding, Set 1AT - 1.5 Sec.  
10680 Y-Delta (Closed), Set 1AT - 2 Secs.  
10690 Y-Delta (Open), Set 1AT - 2.5 Secs.
5. On Sequence Starting Controllers, the Sequential Timer, ST must be field set, as determined by the controller position in the "sequence." Set timer at:  
0 Seconds for Number 1 pump  
5 Seconds for Number 2 pump  
10 Seconds for Number 3 pump, etc., at 5 second intervals.

# OPERATING INFORMATION FULL SERVICE ELECTRIC FIRE PUMP CONTROLLER WITHOUT TRANSFER SWITCH

## Tryout for checking direction of motor rotation

1. Power switch should be open.
2. Close power switch.
3. Pump will start if water pressure is lower than setting of pressure switch.
4. If pump starts open power switch to stop. (check motor rotation).
5. If pump does not start press "Start" button and stop by opening power switch. (check motor rotation).
6. While doing the above you will note the red light indicates "Power Available".

## Initial Start-Up

1. Power switch should be open.
2. Check pressure switch setting for start (Low setting) and stop (High setting).
3. Close power switch. Red light indicates power available pump starts if pressure is low.
4. Pump continues to run until running period timer (RPT), has timed out and pressure switch is satisfied (Contacts closed). Then the motor stops automatically. Motor may be stopped during the running period by pressing the "Stop" button, but will restart when button is released, if pressure is still low.
5. To stop motor while pressure is low, open power switch.
6. **NOTE:** For manual stop, rather than automatic if RPT is supplied, remove jumper 4-5.
7. MOD. A (Manual Stop) omits RPT timer and stopping is by "Stop" pushbutton.

## Start From Pushbutton

1. Low water pressure starts the motor automatically, but the motor may be started manually at normal water pressure by pressing the "Start" pushbutton on the controller cabinet or the remote "Start" pushbutton, if used. Red light must be on, indicating power available before motor can be started, if light is not on, follow initial start-up instructions.
2. Following a pushbutton start, motor will continue to run until stopped by the pushbutton, Running period timer does not keep motor running. Pressure switch operation does not stop motor.

## Start From Manual Emergency Start Handle

1. For manual emergency operation, if motor does not start with "Start" pushbutton, raise manual emergency start handle all the way and latch it in the raised position.
2. To stop motor when handle is latched in raised position.  
(A) Open power switch.  
(B) Unlatch manual handle.  
(C) Close power switch.

# OPERATING INFORMATION FULL SERVICE ELECTRIC FIRE PUMP CONTROLLER WITHOUT TRANSFER SWITCH Cont'd.

## Operating Sequence For Device

1. Under normal operating conditions
  - (A) Power switch is closed.
  - (B) Red light is on indicating power available
  - (C) Relays PA and PA1 are energized indicating normal line voltage is available
  - (D) Relays CR1 and CR2 are energized.
2. Relay PA or PA1 (or both), open to give remote signal in case of loss of normal power line voltage, loss of one phase, or opening of circuit breaker.
3. Relay CR1 is deenergized to start motor when "Start" pushbutton is pressed or manual start handle is raised.
4. Relay CR2 is deenergized to start motor when
  - (A) Pressure switch (PS) contact opens due to low water pressure.
  - (B) Deluge valve contacts open, if used.
5. Running period timer (RPT) starts timing on automatic start. When PS closed, pressure switch operation cannot stop motor until RPT reaches its timed-out position. The red light on RPT shows timer is timed out but not reset. When this red light is not lit it means the timer is reset or timing.
6. PRR relay (Phase sequence) provides signal of phase reversal. It may also signal on loss of a phase. The red light on this relay indicates proper phase rotation and no loss of a phase.
7. MOD B (Sequence start) delays starting (5 seconds) so on a two pump installation both pumps do not start at once.
8. (LOR) The lockout relay energizes CR2 when signalled by an external device, such as a low suction pressure cutoff contact. This stops the motor if it is running, or prevents it from starting by automatic means.

## Circuit Breaker Operation

1. The circuit breaker locked rotor protector is non-adjustable. It provides time delay of not over 20 seconds at 600% rated full load motor current (Locked rotor current). It is factory set at 300% of motor full load current.
2. The circuit breaker instantaneous trip is factory set to operate at not more than 2000% full load current.

# OPERATING INFORMATION FULL SERVICE ELECTRIC FIRE PUMP CONTROLLER WITH TRANSFER SWITCH

## Tryout for checking direction of motor rotation

1. Power switch should be open.
2. Close power switch.
3. Pump will start if water pressure is lower than setting of pressure switch.
4. If pump starts open power switch to stop. (check motor rotation).
5. If pump does not start press "Start" button and stop by opening power switch. (check motor rotation).  
**NOTE:** This controller is phase sequence sensitive. Correct phase sequence is indicated when light on phase reversal relay is "On". To correct, interchange two incoming normal power leads. To change motor rotation interchange two motor leads at controller or at motor. When checking motor rotation from alternate power supply interchange two incoming leads to alternate isolating switch to change the motor rotation.
6. Check rotation from alternate power supply by opening normal power circuit and close alternate isolating switch and follow steps 2,4, & 5 and stop motor by opening alternate isolating switch.
7. While doing the above you will note the following:
  - (A) Red light indicated "Power Available".
  - (B) White light indicates transfer on "Normal Power".
  - (C) Yellow light indicates transfer switch on "Alternate supply".
  - (D) Alarm sounds indicating alternate isolating switch "Open" can be silenced by pressing silence alarm button.

## Initial Start-Up

1. Power switch should be open.
2. Check pressure switch setting for start (Low setting) and stop (High setting).
3. Close power switch. Red light indicates power available pump starts if pressure is low.
4. Pump continues to run until running period timer (RPT), has timed out and pressure switch is satisfied (contacts closed). Then the motor stops automatically. Motor may be stopped during the running period by pressing the "Stop" button. But will restart when button is released. If pressure is still low.
5. To stop motor while pressure is low, open power switch.
6. **NOTE:** For manual stop, rather than automatic if RPT is supplied, remove jumper 4-5.
7. MOD. A (Manual Stop) omits RPT timer and stopping is by "Stop" pushbutton.

## Start From Pushbutton

1. Low water pressure starts the motor automatically, but the motor may be started manually at normal water pressure by pressing the "Start" pushbutton on the controller cabinet or the remote "Start" pushbutton, if used. Red light must be on, indicating power available before motor can be started. If light is not on, follow initial start-up instructions.
2. Following a pushbutton start, motor will continue to run until stopped by the stop pushbutton. Running period timer does not keep motor running. Pressure switch operation does not stop motor.

# OPERATING INFORMATION FULL SERVICE ELECTRIC FIRE PUMP CONTROLLER WITH TRANSFER SWITCH Cont'd.

## Start From Manual Emergency Start Handle

1. For manual emergency operation, if motor does not start with "Start" pushbutton, raise manual emergency start handle all the way and latch it in the raised position.
2. To stop motor when handle is latched in raised position.
  - (A) Open Circuit Breaker.
  - (B) Unlatch manual handle.
  - (C) Close Circuit Breaker.

## Power Supply Transfer From Test Switch

1. Close alternate supply isolating switch.
2. Place manual test selector in alternate position and hold allowing time for engine start and transfer to alternate supply. Selector switch will spring return to "Auto" position when released. Yellow light indicates transfer to alternate supply. The alarm sounds indicating it is in alternate mode. If the normal power switch is closed the transfer switch will return to normal automatically in 30 minutes.

## Normal Power Supply Failure

1. Close alternate supply isolating switch.
2. Open normal power switch.
3. After slight delay, control provides signal to start engine.
4. Automatic transfer to alternate supply occurs when alternate supply reaches required voltage and frequency. Yellow light indicates transfer to alternate supply.
5. Alarm may be silenced by pressing silence alarm button.
6. Pump will start on alternate supply same as with normal supply.
7. To stop motor while pressure is low or manual start handle is latched in raised position. Open alternate isolating means.

## Retransfer To Normal From Alternate

1. Close normal power switch.
2. Retransfer to normal will occur automatically after 30 minute time delay. Time delay may be by-passed by holding test selector switch in normal position for about 3 seconds.

## Operating Sequence For Device

1. Under normal operating conditions
  - (A) Both isolating switch and circuit breaker are closed.
  - (B) Red light is on indicating power available. White light is on indicating normal power supply.
  - (C) Relays PA and PA1 are energized indicating normal line voltage is available
  - (D) Relays CR1 and CR2 are energized.
2. If relay PA or PA1 (or both) is deenergized, there is a loss of normal power line voltage, loss of one phase, or the circuit breaker is open.
3. Relay CR1 is deenergized to start motor when "Start" pushbutton is pressed or manual start handle is raised.
4. Relay CR2 is deenergized to start motor when
  - (A) Pressure switch (PS) contact opens due to low water pressure.
  - (B) Deluge valve contacts open, if used.
5. The transfer switch control panel has a built in timer for 3 seconds before it transfers to prevent above normal in-rush currents, tripping of circuit breakers and damage to motor couplings.
6. Relay R1 closes to provide audible and remote signals in case alternate isolating means is open.
7. When transfer switch goes into alternate position an audible alarm sounds. The alarm can be silenced by the "Silence alarm" pushbutton which closes R2 relay.
8. Running period timer (RPT) starts timing on automatic start. When PS closes, pressure switch operation cannot stop motor until RPT reaches its timed-out period. The red light on RPT shows timer is timed out but not reset. When this red light is not lit it means the timer is reset or timing.
9. PRR relay (Phase sequence) provides signal of phase reversal. If there is a phase reversal or a loss of power, the PRR will cause a transfer to the alternate power supply. The red light on this relay indicates proper phase rotation and no loss of a phase.
10. MOD B (Sequence start) delays starting (5 seconds) so on a two pump installation both pumps do not start at once.
11. (LOR) The lockout relay energizes CR2 when signalled by an external device. This stops the motor if it is running, or prevents it from starting by automatic means.
12. The circuit breaker instantaneous trip is factory set to operate at about 1300% full load motor current or higher.

## Circuit Breaker Operation

1. The circuit breaker locked rotor protector is non-adjustable. It provides time delay of not over 20 seconds at 600% rated full load motor current (Locked rotor current). It is factory set at 300% of motor full load current.

# OPERATING INFORMATION FULL SERVICE ELECTRIC FIRE PUMP CONTROLLER WITH TRANSFER SWITCH Cont'd.

## How The Transfer Switch Operates

1. Normal supply close differential voltage sensing is set to pick up at 95% and drop out at 90% rated motor voltage.
2. Alternate supply sensing is set to pick up at 95% rated motor voltage and 95% rated frequency.
3. There is a three (3) second time delay to override momentary normal source outages and delay all transfer switch and engine start signals.
4. There is a thirty (30) minute time delay on retransfer to normal supply from alternate. Time delay is automatically by-passed if alternate supply fails and normal supply is available.
5. There is a five (5) minute unloaded running time delay for Diesel Engine generator cool down.

## OPERATING INFORMATION LIMITED SERVICE ELECTRIC FIRE PUMP CONTROLLER WITHOUT TRANSFER SWITCH

### Tryout for checking direction of motor rotation

1. Close circuit breaker.
2. Pump will start if water pressure is lower than setting of pressure switch.
3. If pump starts open circuit breaker to stop. (check motor rotation).
4. If pump does not start press "Start" button and stop by opening circuit breaker. (check motor rotation).
5. While doing the above you will note the red light indicates "Power Available".

### Initial Start-Up

1. Circuit Breaker should be open.
2. Check pressure switch setting for start (Low setting) and stop (High setting).
3. Close circuit breaker. Red light indicates power available. Pump starts if pressure is low.
4. Pump continues to run until running period timer (RPT), has timed out and pressure switch is satisfied (contact closed). Then the motor stops automatically. Motor may be stopped during the running period by pressing the "Stop" button, but will restart when button is released, if pressure is still low.
5. To stop motor while pressure is low, open circuit breaker.
6. **NOTE:** For manual stop, rather than automatic if RPT is supplied, remove jumper 4-5.
7. MOD. A (Manual Stop) omits RPT timer and stopping is by "Stop" pushbutton.

### Start From Pushbutton

1. Low water pressure starts the motor automatically, but the motor may be started manually at normal water pressure by pressing the "Start" pushbutton on the controller cabinet or the remote "Start" pushbutton, if used. Red light must be on, indicating power available before motor can be started, if light is not on, follow initial start-up instructions.
2. Following a pushbutton start, motor will continue to run until stopped by the pushbutton. Running period timer does not keep motor running. Pressure switch operation does not stop motor.

### Start From Manual Emergency Start Handle

1. For manual emergency operation, if motor does not start with "Start" pushbutton, raise manual emergency start handle all the way and latch it in the raised position.
2. To stop motor when handle is latched in raised position.
  - (A) Open Circuit Breaker.
  - (B) Unlatch manual handle.
  - (C) Close Circuit Breaker.

### Operating Sequence For Device

1. Under normal operating conditions
  - (A) Circuit Breaker is closed.
  - (B) Red light is on indicating power available.
  - (C) Relays PA and PA1 are energized indicating normal line voltage is available
  - (D) Relays CR1 and CR2 are energized.
2. If relay PA or PA1 (or both) is deenergized, there is a loss of normal power line voltage, loss of one phase, or the circuit breaker is open.
3. Relay CR1 is deenergized to start motor when "Start" pushbutton is pressed or manual start handle is raised.
4. Relay CR2 is deenergized to start motor when
  - (A) Pressure switch (PS) contact open due to low water pressure.
  - (B) Deluge valve contacts open, if used.
5. Running Period Timer RPT starts timing on Automatic Start. When CR2 opens, pressure switch operation cannot stop motor until RPT reaches its timed-out position.
6. PRR relay (Phase Sequence) provides signal of phase reversal. It may also signal on loss of a phase.
7. MOD B (Sequence Start) delays starting (5 seconds) so on a two pump installation both pumps do not start at once.
8. (LOR) The lockout relay energizes CR2 when signalled by an external device, such as a low suction pressure cutoff contact. This stops the motor if it is running, or prevents it from starting by automatic means.

# OPERATING INFORMATION LIMITED SERVICE ELECTRIC FIRE PUMP CONTROLLER WITH TRANSFER SWITCH

## Tryout for checking direction of motor rotation

1. Both Normal & Alternate switches should be open.
2. Close normal Circuit Breaker.
3. Pump will start if water pressure is lower than setting of pressure switch.
4. If pump starts open circuit breaker to stop. (check motor rotation).
5. If pump does not start press "Start" button and stop by opening circuit breaker. (check motor rotation).
6. Check rotation from alternate power supply by opening circuit breaker and close alternate switch and follow steps 3, 4, & 5 and stop motor by opening alternate switch.
7. While doing the above you will note the following.
  - (A) Red light indicated "Power Available".
  - (B) White light indicates Transfer ON "Normal Power".
  - (C) Yellow light indicates transfer ON "Alternate Supply".
  - (D) Alarm sounds indicating alternate switch "Open" can be silenced by pressing silence alarm button.

**NOTE:** Automatic transfer switch is shipped for operation from normal supply. If in alternate position, it will automatically transfer to normal in step 2 prior to pump starting.

## Initial Start-Up

1. Both Normal & Alternate switches should be open.
2. Check pressure switch setting for start (Low setting) and stop (High setting).
3. Close circuit breaker. Red light indicates power available pump starts if pressure is low.
4. Pump continues to run until running period timer (RPT), has timed out and pressure switch is satisfied (contacts closed). Then the motor stops automatically. Motor may be stopped during the running period by pressing the "Stop" button, but will restart when button is released, if pressure is still low.
5. To stop motor while pressure is low, open circuit breaker.
6. **NOTE:** For manual stop, rather than automatic if RPT is supplied, remove jumper 4-5.

## Start From Pushbutton

1. Low water pressure starts the motor automatically, but the motor may be started manually at normal water pressure by pressing the "Start" pushbutton on the controller cabinet or the remote "Start" pushbutton, if used. Red light must be on, indicating power available before motor can be started, if light is not on, follow initial start-up instructions.
2. Following a pushbutton start, motor will continue to run until stopped by the pushbutton, Running period timer does not keep motor running. Pressure switch operation does not stop motor.

# OPERATING INFORMATION LIMITED SERVICE ELECTRIC FIRE PUMP CONTROLLER WITH TRANSFER SWITCH

## Start From Manual Emergency Start Handle

1. For manual emergency operation, if motor does not start with "Start" pushbutton, raise manual emergency start handle all the way and latch it in the raised position.
2. To stop motor when handle is latched in raised position.
  - (A) Open circuit breaker.
  - (B) Unlatch manual handle.
  - (C) Close circuit breaker.

## Power Supply Transfer From Test Switch

1. Close alternate supply switch.
2. Place manual test selector in alternate position and hold allowing time for engine start and transfer to alternate supply. Selector switch will spring return to "Auto" position when released. Yellow light indicates transfer to alternate supply. The alarm sounds indicating it is in alternate mode.

## Normal Power Supply Failure Automatic Transfer

1. Close alternate supply switch.
2. Open normal supply circuit breaker.
3. After slight delay, control provides signal to start engine.
4. Automatic transfer to alternate supply occurs when alternate supply reaches required voltage and frequency. Yellow low light indicates transfer to alternate supply.
5. Alarm may be silenced by pressing silence alarm button.
6. Pump will start on alternate supply same as with normal supply.
7. To stop motor while pressure is low or manual start handle is latched in raised position. Open alternate switch.

## Retransfer To Normal From Alternate

1. Close normal supply circuit breaker.
2. Retransfer to normal will occur automatically after 30 minute time delay. Time delay may be by-passed by holding test selector switch for 3 seconds in normal position.

## Operating Sequence For Device

1. Under normal operating conditions
  - (A) Both Normal & Alternate supply switches are closed.
  - (B) Red light is on indicating power available. White light is on indicating normal power supply.
  - (C) Relays PA and PA1 are energized indicating normal line voltage is available
  - (D) Relays CR1 and CR2 are energized.
2. If relay PA or PA1 (or both) is deenergized, there is a loss of normal power line voltage, loss of one phase, or the circuit breaker is open.
3. Relay CR1 is deenergized to start motor when "Start" pushbutton is pressed or manual start handle is raised.
4. Relay CR2 is deenergized to start motor when
  - (A) Pressure switch (PS) contact open due to low water pressure.
  - (B) Deluge valve contacts open, if used.



# OPERATING INFORMATION LIMITED SERVICE ELECTRIC FIRE PUMP CONTROLLER WITH TRANSFER SWITCH Cont'd.

## Operating Sequence For Device Cont'd.

5. Timer "T" times on each operation of transfer switch to prevent higher than normal inrush currents when transferring the motor from one supply to the other.
6. Relay R1 closes to provide audible and remote signals in case alternate switch means is open.
7. When transfer switch goes into alternate position an audible alarm sounds. The alarm can be silenced by the "Silence Alarm" pushbutton which closes R3 relay.
8. Running Period Timer RPT starts timing on automatic start, when CR2 opens, pressure switch operation cannot stop motor until RPT reaches its timed-out period.
9. PRR relay (Phase Reversal) provides a signal of phase reversal and will cause a transfer to alternate power supply.
10. (LOR) The lockout relay energizes CR2 when signalled by an external device, such as a low suction pressure cutoff contact. This stops the motor if it is running, or prevents it from starting by automatic means.

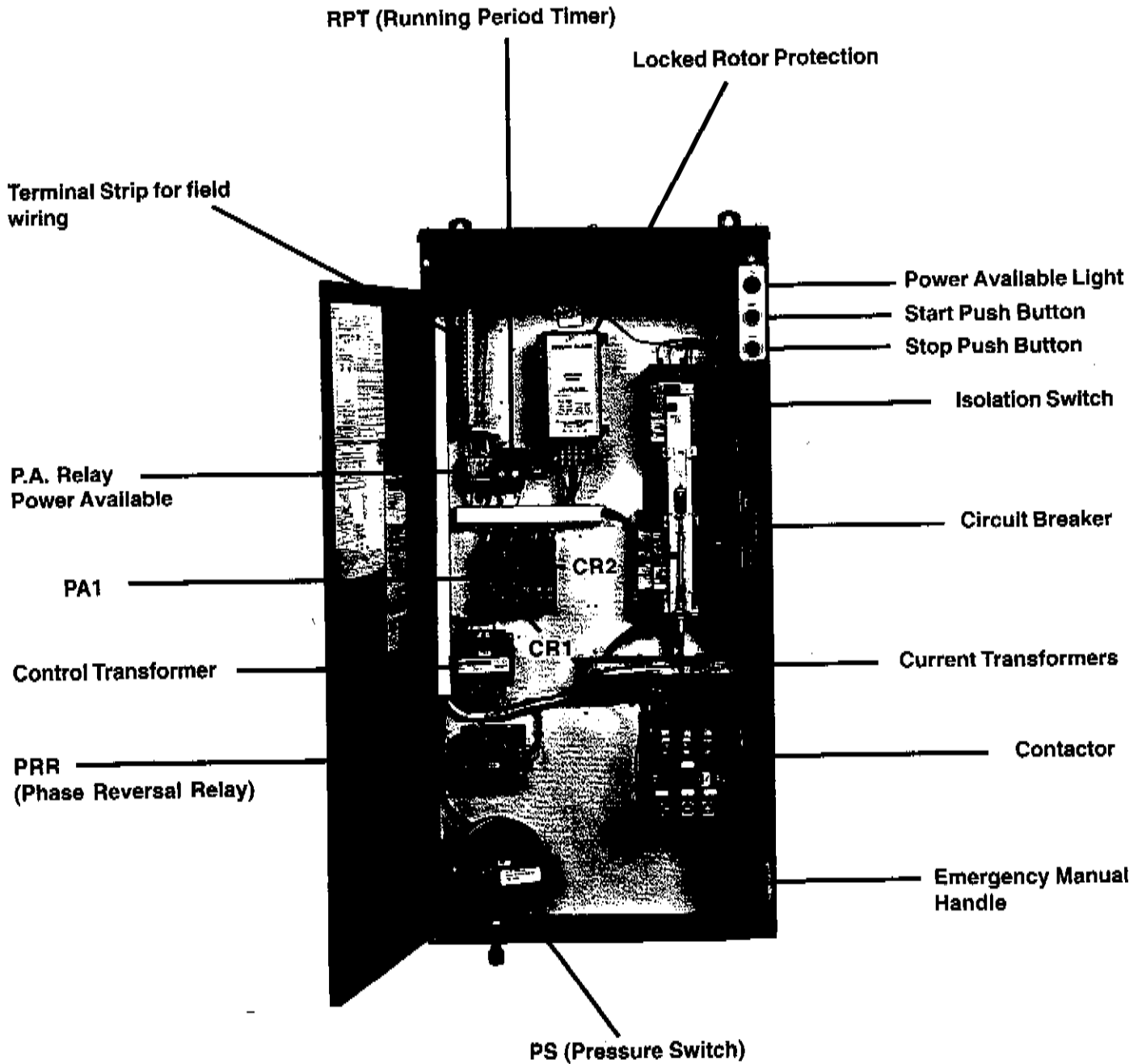
## Circuit Breaker Operation

1. The circuit breaker is factory set according to horsepower. There are no adjustments.

## How The Transfer Switch Operation

1. Normal supply close differential voltage sensing is set to pick-up at 95% and drop out at 90% rated motor voltage.
2. Alternate supply sensing is set to pick up at 95% rated motor voltage and 95% rated frequency.
3. There is a three (3) second time delay to override momentary normal source outages and delay all transfer switch and engine start signals.
4. There is a thirty (30) minute time delay on retransfer to normal supply from alternate, time delay is automatically be-passed if alternate supply fails and normal supply is available.
5. There is a five (5) minute unloaded running time delay for diesel engine generator cool down.

# Inside View of Controller Without Transfer Switch



# Electric Fire Pump Controller

## START-UP CHECK OFF LIST

DATE: \_\_\_\_\_

JOB NAME \_\_\_\_\_

### CONTROLLER INFO

LOCATION \_\_\_\_\_

BULL. NO. \_\_\_\_\_

PUMP MFG. \_\_\_\_\_

CAT. NO. \_\_\_\_\_

PUMP REP. \_\_\_\_\_

HP & VOLTS \_\_\_\_\_

SPRINKLER CO. \_\_\_\_\_

WITHSTAND \_\_\_\_\_

SPRINKLER REPS. \_\_\_\_\_

BREAKER SETTING \_\_\_\_\_

FIRE DEPT. REPS. \_\_\_\_\_

SER. NO. \_\_\_\_\_

INS. CO. REPS. \_\_\_\_\_

CONTROLLER TYPE \_\_\_\_\_

### A. With Circ. Breaker & Isolating SW. Off

YES   NO

- |  |       |       |
|--|-------|-------|
| 1. Voltage & HP Motor/Controller/Supply Agree  | _____ | _____ |
| 2. Supply Voltage On?  | _____ | _____ |
| 3. Is Controller Wye-Delta or Part Wind Type?<br>(Wye-Delta & PW Require 6 Cables To Motor?) | _____ | _____ |
| 4. How Many Cables From Controller To Motor?   | _____ | _____ |
| 5. Is Motor a 12 Lead Motor?   | _____ | _____ |
| 6. Are Motor Connections Correct:  |       |       |
| At Controller?   | _____ | _____ |
| At Motor?  | _____ | _____ |
| 7. Is Controller Free From Any Debris?   | _____ | _____ |
| 8. Are All Connections Tight?  | _____ | _____ |
| 9. Are All Contactors and Relays Mechanically Free?  | _____ | _____ |
| 10. Is Emergency Lever Mechanically Free?  | _____ | _____ |

	<u>YES</u>	<u>NO</u>
11. Is MICRO Switch Operation Audible?	_____	_____
12. Do Circuit Breaker Trip Settings Agree With Nameplate?	_____	_____
13. Is RPT Set For 10 Minutes?	_____	_____
14. Are Jumpers 1-2, 3-4, 4-5 All Installed?	_____	_____
15. What Customer Connections Are On Terminal Board?	_____	_____
16. If Connections on 1-2, or 3-4, Are They NC Circuits?	_____	_____
17. Are Alarm Connections Consistent W/NO Close To Alarm? W/NC Open To Alarm?	_____ _____	_____ _____
18. Is This a "Reduced" Voltage Type Controller?	_____	_____
19. If So, Is 1AT Timer Set Correctly? 10650 Primary Resistor, Set 1AT - 3 Secs. 10670 Part Winding, Set 1AT - 1.5 Secs. 10680 Y-Delta (Closed), Set 1AT - 2 Secs. 10690 Y-Delta (Open), Set 1AT - 2.5 Secs. 10640 Autotransformer, Set 1AT - 3.0 Secs.	_____	_____
20. Is Packing Material Removed From Pressure Switch?	_____	_____
21. Is Mercury In Pressure Switch Tube Bright & Shiny?	_____	_____
22. Does Controller Have A Transfer Switch?	_____	_____
23. If Not, We Are Ready To Bump Motor For Rotation Check.	_____	_____

## For Controllers With Transfer Switches

	<u>YES</u>	<u>NO</u>
1. What alternate power supply:		
A. Generator	_____	_____
B. Second Utility	_____	_____
C. Supply from other transfer switch	_____	_____
2. Is controller correct type for power supply?	_____	_____
3. Is alternate power supply in accordance with NFPA20 & NFPA70?	_____	_____
4. Are both supplies the same voltage?	_____	_____
5. Is Transfer SW. Compartment Completely Free of DEBRIS?	_____	_____
6. Is Packing Material Removed From Transfer Switch?	_____	_____
7. Any Loose Connections?	_____	_____
8. Are Relays Mechanically Free?	_____	_____
9. Are Terminals 51 & 52 In Controller Wired To Generator?	_____	_____
10. Manually Put Transfer SW. In Emergency Position! This Will Accomplish Two Things As Follows:		
A. That Transfer Switch Is Free To Transfer		
B. We Will Find Out If Transfer SW. Transfers Back To Normal Position Later When We Apply Normal Power To Controller. Many Times The Emergency Generator Is Not Ready And This Might Be All We Can Check.		
11. We Are Ready To Bump Pump Motor For Rotation Check.		

## Starting Pump For The First Time

### **B. Things To Remember!**

1. Pump Rep. Is Running The Show. Start Pump Only Upon His Instructions.
2. If Any Malfunction, Electrically Or Hydraulically Is Going To Occur, This Is When It Will Happen. (Arcing In Motor Terminal Box Or Controller, Pipe Or Valve Or Flange Breaking)
3. Controller Door Should Be Securely Closed And Latched.
4. All Check Off List Items Must Be Complete.

### **C. With Controller Door Or Doors Closed And Securely Latched**

1. With Stop Button Depressed, Close Isolation Switch and Circuit Breaker. Power Available Light Should Light.
2. Release Stop Button. If Pump Starts, After One Second, Depress And Hold Stop Button And Turn Breaker Off.
3. If Pump Did Not Start When Releasing Stop Button, It Means Enough Pressure Is In System To Hold Pressure Switch Contact Closed. In Which Case, Push Start Button. One Second after Pump Starts, Depress And Hold Stop Button, And Turn Breaker Off.
4. Pump Rep. Will Indicate Whether Pump Rotation Was Correct.
5. If Pump Rotation Was Wrong, Electrician Will Have To Reverse Any Two Leads From Controller To Motor. Remember That In Y-Delta And Part Wind Controllers, Two Motor Leads In Each Set Will Have To Be Interchanged, And They Will Have To Be The Same Two Leads In Each Set.

7. When Pump Rotation Has Been Determined Correct, Pump Rep. Will Probably Want The Pump To Run While He Adjusts Packing Etc. This Is A Good Opportunity To Accomplish The Following While Staying Alert And Ready To Turn The Pump Off Quickly:
  - A. Open Controller Door Using Defeater Or Defeaters.
  - B. Measure Motor Current First. With Pump At Shut-Off (No Water Flowing ), Current Is Usually Between 50% And 75% FLA.
  - C. If Current Is Approaching FLA or 115% FLA, Advise Pump Rep. (Something Is Wrong - Maybe A Main Relief Valve Is Open And Lots Of Water Is Actually Flowing.)
  - D. If Current Is Over 120% FLA, Advise Pump Rep. And Shut Pump Down, Using Stop Button And Breaker.
8. If Current Appears Close To Normal, Record Same (All Three Phases) And Proceed To Measure And Record Voltages (All 3 Phases). Current Should Be Pretty Well Balanced In All 3 Phases (Within 10%). Voltages should be pretty well Balanced (Within 2 Or 3 Volts).
9. Observe If Phase Reversal Light Is On. If Not, Make Mental Note That Two Of The Power Leads To Relay Will Have To Be Changed When Controller Is Off And Breaker And ISO SW. Open. This Will Be Some what Of A Delicate Operation Requiring Small Screw Driver. (Don't Leave Any Wire Strands Out And Don't Leave Any Bare Wire Sticking Ip Above Phase Reversal Relay Terminals.)
10. We Are Now Ready For Pump Test.

## Maintenance

Fire pump controllers are carefully engineered and are manufactured under most rigid quality standards to give satisfactory and dependable operation. However, like all mechanical and electrical apparatus, occasional adjustment and maintenance will assure best service. Damp environment tends to deteriorate equipment in time.

Contactors and relays occasionally "hum" when operating, caused by construction dirt or rust accumulation on magnet surfaces. Operate the magnet by hand a few times to jar the dirt loose. Remove the rust with a dry coarse rag. Do not use an abrasive as this mars the ground faces. Do not use oil as this ultimately accumulates dirt and may cause sticking shut.

## Trouble Shooting

### General

The suggestions to follow should help provide better understanding of the controller so troubles can be corrected quicker and easier. Should you need further assistance, contact your local representative.

In using this guide, keep in mind whether the controller is:

Across-The-Line Bulletin C10630  
Autotransformer Bulletin C10640  
Primary Resistor Bulletin C10650  
Part-Winding Bulletin C10670  
Wye-Delta Closed Transition Bulletin C10680  
Wye-Delta Open Transition Bulletin C10690  
Limited Service Bulletin C10663

And also whether

Automatic Stop (includes Running Period Timer RPT) or  
Manual Stop.

With normal circuits and pressure, IS and CB closed:

Red light is on

Relays PA, PA1, CR1, CR2 are all closed.

## Problem Index

	<b>Section</b>
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Accelerating resistor overheats .....	11
Remote alarm or signal will not operate .....	12

## Section 1

### Relay and Contactor Details

#### Red Light

Should light when IS and CB are closed.

- (A) Tap on bulb, loosen and retighten to clean contacts.
- (B) Check socket rear terminals for voltage with voltmeter or test light.
- (C) Check incoming line terminals L1, L2, L3 for supply voltage.

#### PA and PA1 Relays

Both relays should close with red light on when controller switch is on.

- (A) (With power "OFF") Check for binding in magnet by rasing magnet arm with finger.
- (B) Check for loose wires at coil terminals.
- (C) (With power "ON") Check for line voltage at coil terminals with voltmeter or test light.



## Section 1

### Relay and Contactor Details Cont'd.

#### PPR - Phase Reversal Relay

- (A) Green LED is lit when power is on and phase rotation is correct. If light is not lit and phase rotation is OK, turn power off and reverse any two power supply leads at the PRR terminals.

#### CR1 Relay

CR1 should close when power is turned "ON". Red light should also be "ON".

##### WITH POWER "OFF"

- (A) Check for binding in magnet by pushing the magnet arm up with finger.
- (B) Check for loose wires at coil.
- (C) Check that "Manual Emergency Start" Handle is fully down, closing auxiliary contact 9-15.
- (D) Check for 110/120 voltage at coil terminals. (With power "ON")
- (E) Check for looseness in jumper 1-2, or remote "Start" wiring (or contact open).
- (F) Check for dirty contacts in "Start" push button on controller, jiggle button.
- (G) Check for dirty contacts on contactor auxiliary terminals 9-10 or loose wiring.
- (H) Check for looseness or opens in control wires, 1, 2, 8, 9, 10, 15.

#### CR2 Relay

CR2 should close when power is turned "ON" and pressure switch is satisfied (Closed contacts). Red light should also be "ON".

##### With power "OFF"

- (A) Check pressure switch for setting and pressure. Contacts 3-6 closed on high pressure.
- (B) Check for binding in magnet by raising the magnet arm up with finger.
- (C) Check for loose wires at coil.
- (D) Check for 110/120 voltage at coil terminals. (With power "ON")
- (E) Check for looseness in Jumper 3-4 or wiring to Deluge Valve (or contact open).
- (F) Check for dirty contacts on contactor auxiliary terminals 4-7 or loose wiring.
- (G) Check for looseness or opens in control wires 3, 4, 6, 7, 8; also wires 3-6 inside pressure switch.

#### M Contactor in Across-The Line Controllers, 1A In Primary Resistor Controllers, 1M In Part Winding Controllers, 1S in Auto-Transformer Controllers or S In Wye-Delta controllers.

Contact should close when red light is lit, PA1 relay is closed and when either CR1 or CR2 relay opens:

##### With power "OFF"

- (A) Check for binding in magnet by operating with hand. **Turn power off first.**
- (B) Check for loose wires at coil.
- (C) Check for line voltage at coil terminals. (With power "ON")
- (D) If CR1 relay opens, check for loose wires at CR1 terminals 22-23, and make sure contacts engage. Also check for loose wires at PA1 Relay terminals L1B-22 or contacts not making. Finally, check for open in control wires L1B, 22, 23, L2B.
- (E) If CR2 relay open, check for loose wiring at CR2 relay terminals 22-23, or these contacts not making. Also check for opens in control wires L1B, 22, 23, L2B.
- (F) Check PA1 relay as outlined above.

#### 1AT Time delay "ON" for all Reduced Voltage Starting type Relays

Magnet should close when 1A contactor closes, (1M, 1S, or S contactor for Part Winding) and after a time interval the left hand "time" contacts should close.

##### With Power "OFF"

- (A) Check for binding in magnet by pulling the magnet arm down with finger. hold down to check time setting.
- (B) Check for loose lugs at coil.
- (C) Check for line voltage at coil terminals. With power "ON"
- (D) Check for loose wires.
- (E) Check for opens in control wires L1B, 26, L2B, 34.

#### M Contactor Reduced voltage types.

Should close after time delay on 1AT relay.

##### With power "OFF"

- (A) Check for binding in magnet by operating with hand. **Turn power off first.**
- (B) Check for loose wires at coil.
- (C) Check for line voltage at coil terminals. (With power "ON")
- (D) Check for loose wires at 1AT relay terminals.
- (E) Check for opens in control wires.

## Section 1 Relay and Contactor Details Cont'd.

**RPT - Running Period Timer** (Not used on Manual stop controllers)

This motor driven timer operates only when the controller starts automatically from the pressure switch (CR2, relay open). Pointer on dial indicates the "time set". Timing action is not visible, the pointer does not move.

Timing begins when CR2 opens. At end of "time" contacts close between wires 5-7 (terminals 15-18 on timer molding) They stay closed and CR2 will energize. When CR2 is deenergized again, the RPT will start timing again.

If time action does not operate"

- (A) Check for loose lugs on wires 17, 8 at timer (molded terminals A1, A2).
- (B) Check for loose wires at CR2 relay terminals 6, 17, or these contacts not making.
- (C) With controller "On" and CR2 open, check for 110/120 voltage at wire lugs 17-8 (molded terminals A1-A2).

## Section 2 Circuit Breaker Trips Out Prematurely

- (A) (With power "OFF") Check power wiring and motor for shorts or grounds. Make sure terminals are tight.
- (B) Check that horsepower and voltage of controller matches actual installation.
- (C) Check that 3 adjustments at bottom of breaker are all at the setting stamped on controller nameplate.
- (D) Check for excessive motor current with clamp-on ammeter. Compare with motor nameplate data.
- (E) Check M contactor (and 1A contactor on Primary Resistor type) for trouble on 1 pole which causes single phasing (1 pole not making because of worn contacts or weak spring).
- (F) Check rating for proper horsepower on Locked Rotor Protector nameplate and compare size of Current Sensors with data in Maintenance Service Bulletin packed with controller.

## Section 3 Motor Starts Immediately When Closing Circuit Breaker

- (A) Motor is supposed to start if pressure is low, check for low system pressure, which opens relay CR2. (Opens relay CR1 on Manual Stop Controllers).
- (B) Check to see which relay, CR1 or CR2, is deenergized.
- (C) If CR1 is deenergized, see section 1, CR1.
- (D) If CR2 is deenergized, see section 1, CR2.
- (E) Check microswitch on side of contactor. Does it operate properly with emergency handle?

## Section 4 Motor Will Not Start From Start Push Button, Red Light Lit

- (A) PA1 relay should be closed. "Start" push button operation should open CR1 relay to close M contactor (1A contactor on Primary Resistor, 1M on Part Winding). If CR1 does not open, check for short across "Stop" push button wires 6-9 holding CR1 closed.
- (B) If M or 1A contactors do not close, check Section 1.
- (C) If M or 1A contactors close, check for main contacts not making because of burned contacts or weak springs or broken contact arm.
- (D) Check for opens in power wiring to motor, or opens in motor winding or connections in terminal box.
- (E) On Primary Resistor types, check for open in 1 phase of accelerating resistor. Motor will not start single phased. Check resistance with ohmmeter.
- (F) Is there voltage between terminals 7 & 8. There should be voltage to make motor run.

## Section 5 Motor Starts But Stops When Start Push Button Released

- (A) CR1 relay should be open to start motor and stay open when button is released. Does CR1 contact in power circuit stay open?
- (B) Check contactor auxiliary contact 9-10 for failure to open when contactor closes.

## Section 6 Motor Will Not Start From Emergency Start Handle, Red Light Lit

Initial movement of handle should close M contactor electrically by opening CR1 relay (1A contactor on Primary Resistor, 1M on Part Winding). PA 1 relay should be closed. Further movement of lever closes M contactor mechanically (or 1A or 1M).

If M (or 1A or 1M) does not close electrically, check Section 1. If contactor closes, and motor still doesn't run, check Section 4 items c, d, e.

## Section 7 Motor Will Not Start Automatically From Pressure Switch, Red Light Lit

PA1 relay should be closed. Low pressure should open CR2 relay to close M contactor (1A contactor on Primary Resistor, 1M on Part Winding).

- (A) If contactor does not close, check Section 1.
- (B) If contactor closed, check Section 4 items c, d, and e.
- (C) Is there voltage between terminals 3 & 8? With pressure low, there should not be voltage.

## Section 8

### Motor Starts Automatically But Will Not Stop Automatically

If pressure has reached normal high, Run Period Timer RPT should close CR2 relay to stop motor.

- (A) Check for Jumper 4-5 at controller terminal board. If jumper between these terminals has been removed, the motor is supposed to continue running. Add jumper if automatic stop is desired, note first check with insurance authority. Continued run Manual Stop may be requirement on this installation.
- (B) Check Section 1 for operation of Run Period Timer RPT.
- (C) Check whether pressure in the system is still low, pressure switch contacts still open.
- (D) With power "OFF" Check continuity between terminals 6 & 3, 3 & 4, and 4 & 7. They should be closed to stop motor.

## Section 9

### Motor Starts Automatically But Runs Only For Short Time Periods, Restarts Frequently

Run Period Timer RPT should assure continued running for sufficient time to avoid motor burn-out from too frequent starting.

- (A) Check setting on Timer RPT.
- (B) Check Section 1 for operation of Run Period Timer RPT.

## Section 10

### Motor Will Not Stop From Stop Push Button

"Stop" push button should open M contactor, by reclosing relays CR1 and CR2.

- (A) Check that "Emergency Start Handle" is not latched in the raised position. Check microswitch on contactor.
- (B) Check for open coils on CR1 and CR2.
- (C) Turn circuit breaker "Off", check M contactor for welded contacts caused by overheating of badly worn contacts (for reduced voltage types 1A, 2M, 8S, 1S, S).

## Section 11

### Accelerating Resistor Overheating

The resistor is energized only during the accelerating period and is bypassed by closing M contactor.

- (A) Review contact and relay Operating Sequence.
- (B) Check Section 1 for M contactor, and 1AT relay.
- (C) Check for open in 1 phase of resistor, causing excessive current in remaining resistor sections because motor does not start.

## Section 12

### Remote Alarm Or Signal Will Not Operate

Remote alarm circuit to indicate Power Failure should operate when PA or PA1 relay opens.

- (A) Check that contacts 11-12 & 11A-12A on PA and PA1 relays make properly when both relays open.
- (B) Check that control wires in 11-12 & 11A-12A are tight at the relays and controller terminal board..
- (C) Test for failure in separate alarm power supply.

Remote signal to indicate Pump Operating should operate when M contactor is closed (2M on Part Winding)

- (D) Check that contacts 13-14 on contactor make properly when closed.
- (E) Check that control wires 13-14 are tight at contactor and also at controller terminal board.
- (F) Test for failure in separate alarm power supply.

Remote signal for phase reversal

- (A) Check all terminal connections.
- (B) Check section 1 for phase reversal relay operation.

## Section 13

### Transfer Switch will not transfer from Alternate to Primary Power Source

Transfer switch should automatically transfer to normal power source when normal power is available and phase rotation is correct.

- (A) Check phase reversal relay (PRR). Refer to section 1.
- (B) Check that correct voltage is available in all 3 phases. (NOTE: a 240 volt controller requires 240 volts supply not 208 volts).
- (C) Check transfer switch operator's manual.
- (D) Install jumper between terminals 6 & 7 on transfer switch
  - (1) Transfer switch should transfer back to normal power. If it goes back to normal power the problem is with the PRR, selector switch or normal power source. If it stays with the alternate power, there is a problem with the transfer switch. Write down all of the info on the transfer switch nameplate and the controller nameplate. Call your rep.
  - (2) Disconnect jumper after this test. This jumper must not be used when the controller is put in service.

#### Associated Bulletins

##### Publication Number

SB-C10600.1	-	Service Bulletin, Size 54
SB-C10600.2	-	Service Bulletin, Size 120
SB-C10600.3	-	Service Bulletin, Size 180
SB-C10600.4	-	Service Bulletin, Size 312
SB-C10600.5	-	Service Bulletin, Size 602
SB-C10663	-	Service Bulletin, Limited Service

All of the above Service Bulletins cover Maintenance Instructions and Renewal Parts information for the respective sizes shown.

# Fire Pump Controller Submittal Selection & Reference Drawings

## Fire Pump Controller Without Transfer Switch

Controller Type	Submittal Bulletin	Schematic Diagram (CAD File)	Field Connections (CAD Files)	Operating Information (Optional)
Across-The-Line	C10630	A10-10630-1 (106301.dxf)	A10-10630-5 (106302.dxf)	B10-10600-3
Autotransformer	C10640	A10-10640-1 (106401.dxf)	A10-10630-5 (106302.dxf)	B10-10600-3
Primary Resistor	C10650	A10-10650-1 (106501.dxf)	A10-10630-5 (106302.dxf)	B10-10600-3
Part-Winding	C10670	A10-10670-1 (106701.dxf)	A10-10670-5 (106702.dxf)	B10-10600-3
Wye-Delta Closed Transition	C10680	A10-10680-1 (106801.dxf)	A10-10680-5 (106802.dxf)	B10-10600-3
Wye-Delta Open Transition	C10690	A10-10690-1 (106901.dxf)	A10-10680-5 (106802.dxf)	B10-10600-3
Solid State RV	C10620	A10-10620-1T (106201T.dxf)	A10-10630-2T (106302T.dxf)	-----
Limited Service	C10663	A10-10663-1 (106631.dxf)	A10-10663-2 (106632.dxf)	B10-10663-3

## Fire Pump Controller With Transfer Switch

Controller Type	Submittal Bulletin	Schematic Diagram (CAD File)	Field Connections (CAD Files)	Operating Information (Optional)
Across-The-Line	C10630, C10600 Sh1&2	A10-10630-3T (106301T.dxf)	A10-10630-5T (106302T.dxf)	B10-10600-3T
Autotransformer	C10640, C10600 Sh1	A10-10640-3T (106401T.dxf)	A10-10630-5T (106302T.dxf)	B10-10600-3T
Primary Resistor	C10650, C10600 Sh1&2	A10-10650-3T (106501T.dxf)	A10-10630-5T (106302T.dxf)	B10-10600-3T
Part-Winding	C10670, C10600 Sh1	A10-10670-3T (106701T.dxf)	A10-10670-5T (106702T.dxf)	B10-10600-3T
Wye-Delta Closed Transition	C10680, C10600 Sh1	A10-10680-3T (106801T.dxf)	A10-10680-5T (106802T.dxf)	B10-10600-3T
Wye-Delta Open Transition	C10690, C10600 Sh1	A10-10690-3T (106901T.dxf)	A10-10680-5T (106802T.dxf)	B10-10600-3T
Solid State RV	C10620, C10600 Sh1	A10-10620-1T (106201T.dxf)	A10-10630-2T (106302T.dxf)	-----
Limited Service	C10663, C10600 Sh1	A10-10663-1T (106631T.dxf)	A10-10663-2T (106632T.dxf)	B10-10663-3T

Joslyn Clark Fire Pump Controllers for Diesel Engine  
and Electric Motor driven fire pumps are designed,  
assembled, wired, and tested by:

***Joslyn Clark Controls, Inc.***

P.O. Box 945, 2013 West Meeting Street  
Lancaster, S.C. 29721-0945

Phone: (800) 711-6627 FAX: (803) 286-6624