

INSTRUCTION MANUAL  
and  
DETAILED PRODUCT SPECIFICATION

TRIPLEX BACKUP PUMP CONTROL SYSTEM  
MODEL NUMBER BPC-3

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## **1.0 PURPOSE**

This document establishes the performance and design requirements for the Triplex Backup Controller

## **2.0 APPLICABLE DOCUMENTS**

None

## **3.0 REQUIREMENTS**

### **3.1 GENERAL DESCRIPTION**

The Triplex Backup Pump Control System (BPC-3) is a system, which automatically controls up to three pumps. It is primarily intended to be a backup pump controller in lift stations and other pump down applications. The BPC-3 can also function as a primary float switch controller. It has three possible modes of operation, two backups and one primary. It automatically selects the appropriate mode of operation. When operating as a backup controller it would only call for a pump if the primary controller failed to maintain the wet well level within normal operating limits. If the backup controller senses that the level has exceeded the primary control upper limit then it will take over and operate the pumps. When the backup controller takes over control it sets an alarm relay and lamp which will not clear until the backup controller is manually reset. The backup controller can function with either one or two float switches when in backup mode. When operating as a primary controller it uses four float switches to control the pumps and has an optional high alarm float input.

**3.1.1 SINGLE FLOAT BACKUP MODE** In this mode a single high float is suspended in the wet well above the main controllers operating range. If the primary controller should be unable to maintain the level below this point the float switch will close and the backup controller will be activated in the single float backup mode. When this happens the alarm relay will be closed and the alarm light will be illuminated. One of the pump control relays will close calling one of the pumps. After a delay of 8 seconds the second pump control relay will close calling the second pump. After another 8 second delay the third pump is called. The controller then waits for the level to pump down to a point where the float switch opens. After the high float switch opens the pumps remain on for a period of time selected by the delay time switches on the backup controller. After the delay has elapsed the three pumps will turn off. The alarm relay and lamp will remain energized. The backup controller will then wait for the high float to again close and repeat the above operation except that the three pumps will be called in a different order ( alternated ) to equalize pump wear. The delay time can be selected using eight switches on the backup pump controller for a time between 0 and 255 seconds ( 4.25 min.).

**3.1.2 DUAL FLOAT BACKUP MODE** In this mode two floats are suspended in the wet above the primary controllers operating range. These floats are a high alarm float and an off float. If the primary controller fails to maintain control, the level will rise and close the lower float ( off float ). As the level continues to rise it reaches and closes the high alarm float which causes the backup controller to set the alarm relay and call the three pumps ( 8 seconds apart). The pumps stay on until the level is pumped down to the point that the off float opens again and the pumps turn off. The alarm relay and lamp, however, stay on. Each cycle the pumps are alternated to equalize pump time. This mode has the advantage that both the on and off points can be selected by the position of the two floats.

**3.1.3 PRIMARY FLOAT SWITCH CONTROLLER MODE** The backup controller can also function as a primary float switch controller. This mode is a standard float switch controller with a high alarm. In this mode the pumps are controlled by four float switches ( off, lead, lag1, and lag2 ). As the level rises it closes the off float first. As it continues to rise the lead float is closed which starts one of the pumps. If the level continues to rise it will reach the lag1 float and call the second pump. If the water level continues to rise it will reach the lag2 float and call the third pump. The controller assures that at least 8 second have elapsed between pump calls. The pumps remain on until the level has been pumped down to the point where the off float opens. Each cycle the pumps are alternated. In this mode if the level reaches the high float then the alarm relay and lamp are energized but will turn off when the level drops below the high float

## **3.2 SYSTEM OPERATION**

As described above.

## **3.3 REQUIREMENTS**

The Backup Controller is a microcomputer based device which has the following hardware features:

1. Five float switch inputs for the float switch modes.
2. Four relays for driving three motor starters, and the alarm.
3. Five indicator light emitting diodes (lamps). Three for the pumps, one for alarm and a blinking OK light for normal standby mode.
4. Eight switches for setting the delay time.
5. A 68HC11 microcomputer.
6. A power supply for system power.
7. A reset push button for clearing the alarm.

3.3.1 The five float switch inputs are all self powered and optically isolated. The floats are connected between the float common pin ( pin 4 ) and the individual float input. The floats must be all normally open ( closed when submerged ) type floats. The float switch inputs have the following specifications:

Voltage when open	12.0 VDC
Current when closed	1.5 Ma
Isolation	2500 V rms

3.3.2 The Backup Controller System has four relays which have the following specifications:

Contact rating	10 amps at 125 VAC
Breakdown voltage	800 Volts RMS
Life	100,000 minimum cycles at rated load 5,000,000 cycles unloaded

3.3.3 The Backup Controller System has 5 LED indicators which have the following functions:

OK        Flashes green when the system is operating normally and the backup controller has not been called.

PUMP 1   Illuminates when pump 1 has been called by the backup controller

PUMP 2   Illuminates when pump 2 has been called by the backup controller

PUMP 3   Illuminates when pump 3 has been called by the backup controller

ALARM    Illuminates red when the backup controller has been called.

3.3.4 Eight switches have been included for setting the delay time for the single float backup controller mode. Figure 3 gives the details for setting these switches.

3.3.5. The controller has a reset push button which can be used to clear the alarm.

3.3.6 Input Power. The system is designed to operate on standard 115 VAC line power. It is fused, surge protected, and transformer isolated. The system has the following input power requirements

Input Voltage	115 VAC +/- 15%
Input Current	.5 amps max

Input power is transient protected. Transient protection is a metal oxide varistor. The power system is regulated.

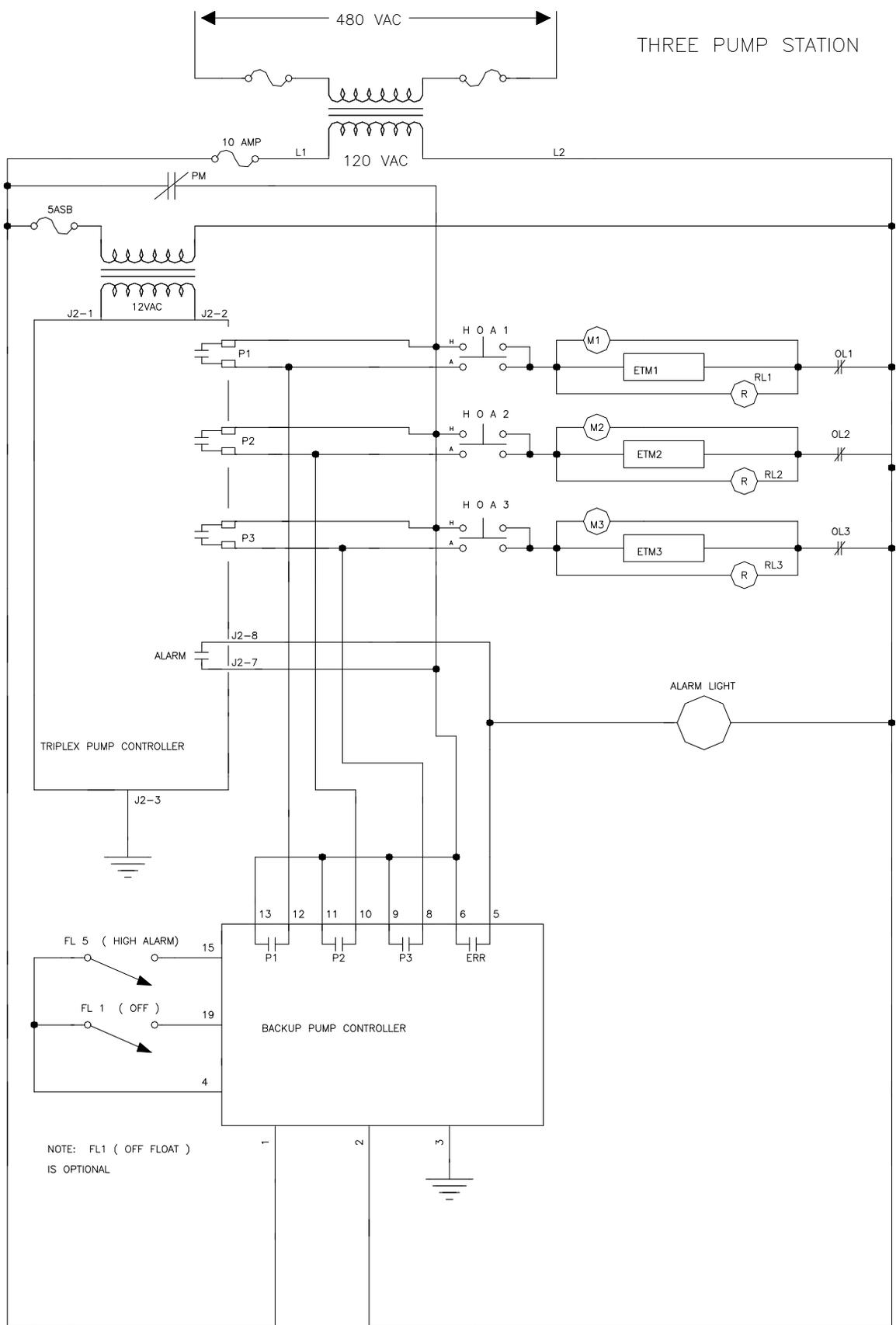
### 3.4 CONNECTOR PIN DEFINITIONS

All electrical connections to the controller are made through a 24 pin connector.

PIN NO.	FUNCTION
1	115 Volts A.C. power input
2	115 Volts A.C. power input
3	GROUND
4	FLOAT COMMON
5	HIGH ALARM RELAY normally open pin
6	HIGH ALARM RELAY common pin
7	HIGH ALARM RELAY normally closed pin
8	Pump 3 relay contact
9	Pump 3 relay contact
10	Pump 2 relay contact
11	Pump 2 relay contact
12	Pump 1 relay contact
13	Pump 1 relay contact
14	Ground
15	High float input
16	Lag2 float input
17	Lag1 float input
18	Lead float input
19	Off float input
20	(not used)
21	(not used)
22	(not used)
23	(not used)
24	GROUND



# THREE PUMP STATION



NOTE: FL1 ( OFF FLOAT )  
IS OPTIONAL