

# BALANCED FLOW™ SUBMERSIBLE PUMP CONTROLLER

## *Installation, Operation and Troubleshooting Manual*

### Owner's Information

Controller Model Number: \_\_\_\_\_  
 Controller Serial Number: \_\_\_\_\_  
 Pump Model Number: \_\_\_\_\_  
 Pump Serial Number: \_\_\_\_\_  
 Motor Model Number: \_\_\_\_\_  
 Tank Serial Number: \_\_\_\_\_  
 Dealer: \_\_\_\_\_  
 \_\_\_\_\_  
 Dealer Telephone Number: \_\_\_\_\_  
 Installation Date: \_\_\_\_\_  
 Motor SFA: \_\_\_\_\_  
 Wire Lengths (Feet)  
     Service Entrance to Controller: \_\_\_\_\_  
     Controller to Well: \_\_\_\_\_  
     Top of Well to Motor: \_\_\_\_\_  
 Incoming Voltage: \_\_\_\_\_

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## SAFETY INSTRUCTIONS

**TO AVOID SERIOUS OR FATAL PERSONAL INJURY OR MAJOR PROPERTY DAMAGE, READ AND FOLLOW ALL SAFETY INSTRUCTIONS IN MANUAL AND ON PUMP.**

**THIS MANUAL IS INTENDED TO ASSIST IN THE INSTALLATION AND OPERATION OF THIS UNIT AND MUST BE KEPT WITH THE PUMP.**



This is a **SAFETY ALERT SYMBOL**. When you see this symbol on the pump, the controller or in the manual, look for one of the following signal words and be alert to the potential for personal injury or property damage.

**⚠ DANGER** Warns of hazards that **WILL** cause serious personal injury, death or major property damage.

**⚠ WARNING** Warns of hazards that **CAN** cause serious personal injury, death or major property damage.

**⚠ CAUTION** Warns of hazards that **CAN** cause personal injury or property damage.

**NOTICE:** INDICATES SPECIAL INSTRUCTIONS WHICH ARE VERY IMPORTANT AND MUST BE FOLLOWED.

**THOROUGHLY REVIEW ALL INSTRUCTIONS AND WARNINGS PRIOR TO PERFORMING ANY WORK ON THIS CONTROLLER.**

**MAINTAIN ALL SAFETY DECALS.**

**⚠ WARNING** This controller is not designed for use in swimming pools, open bodies of water, hazardous liquids, or where flammable gases exist.

**⚠ WARNING** Disconnect and lockout electrical power before installing or servicing any electrical equipment.

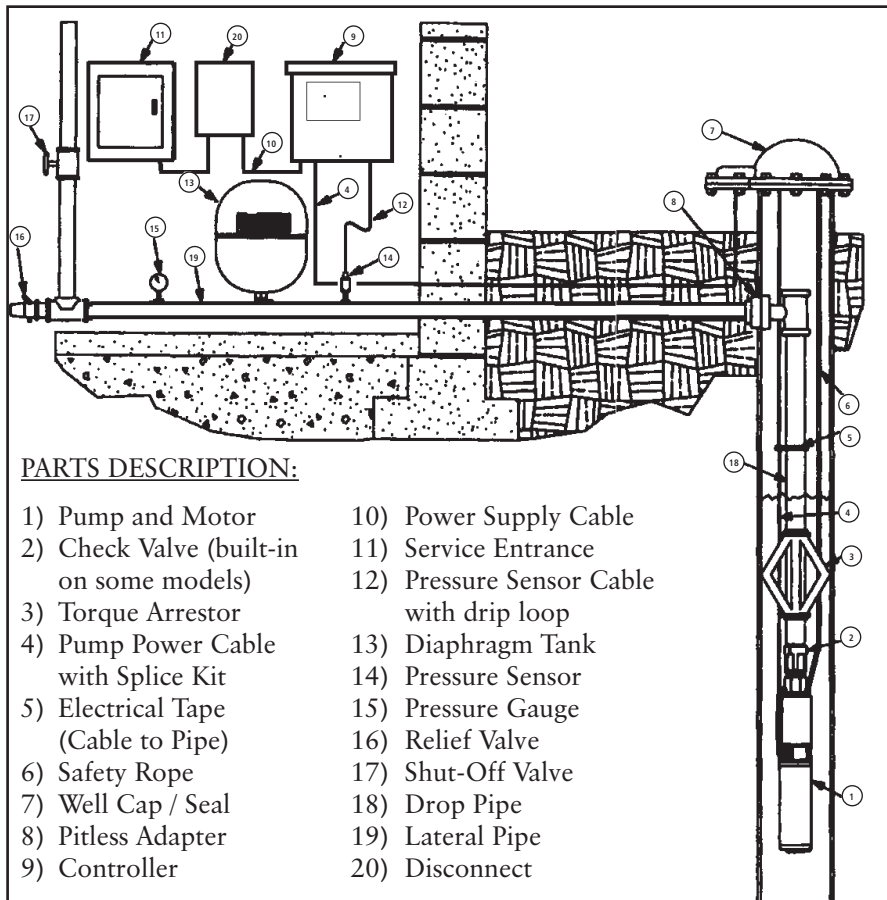
**NOTICE: RECORD THE MODEL NUMBERS AND SERIAL NUMBERS FROM THE PUMP AND CONTROLLER ON THE FRONT OF THIS INSTRUCTION MANUAL FOR FUTURE REFERENCE. GIVE IT TO THE OWNER OR AFFIX IT TO THE CONTROLLER WHEN FINISHED WITH THE INSTALLATION.**

## 1: OVERVIEW

**⚠ WARNING** **ELECTROCUTION HAZARD.** CONTROLLER, MOTOR, PLUMBING, AND ALL OTHER METAL NEAR THE MOTOR CABLE MUST BE CONNECTED TO THE SERVICE ENTRANCE GROUND TERMINAL.

**⚠ WARNING** All electrical work must be performed by a qualified technician. Always follow the National Electrical Code (NEC), or the Canadian Electrical Code, as well as all local, state and provincial codes. Code questions should be directed to your local electrical inspector. Failure to follow electrical codes and OSHA safety standards may result in personal injury or equipment damage. Failure to follow manufacturer's installation instructions may result in electrical shock, fire hazard, personal injury or death, damaged equipment, unsatisfactory performance, and may void manufacturer's warranty.

## TYPICAL INSTALLATION



## Ratings

Refer to serial number label on outside bottom of enclosure.

## Required Materials

- BF Pump Controller with 100 psi Sensor and Sensor Wire
- Pump (water end)  
(see *Pump Speed Selector Switch Section*)
- Motor: 230 V, three phase (3Ø), 3450 RPM
- Tank (see *Tank Selection*)
- Pressure Relief Valve – for safety
- Pressure Gauge – for setting system pressure
- Heat Shrink Kit – one required for each underwater or underground splice
- Tank Tee or (2) 1/4" NPT Female pipe fittings for pressure sensor and pressure gauge connections
- Pipe and fittings – as necessary per each system
- Disconnect Switch: 230 V, 2 pole, properly sized  
(see *Motor Data Chart*)
- Copper Wire: Minimum 75°C rated wire, double jacketed is recommended but not mandatory  
(see *Wire Size table*)
- Tank: diaphragm style tank  
(see *Tank Sizing Section and Chart*)
- Pipe grounding clamp  
(see *Sensor Wiring*)

## 2: INSTALLATION

### Pump and Piping

**⚠ WARNING** EXPLODING TANK CAN INJURE OR KILL.

- DO NOT install any shut-off valves, flow control devices, or filters between pump and pressure sensor.
- DO NOT allow tank or pressure relief valve to freeze.
- Ensure pressure relief valve is large enough to limit tank pressure to a safe value.

For optimum performance, as a minimum, we recommend using the same size pipe as the pump discharge between the pump and the tank. Smaller diameter pipe may severely limit the maximum capacity of the system. On long runs larger pipe may be beneficial for optimum performance and flow.

**⚠ CAUTION** If using a torque arrestor, install it on the discharge pipe before connecting pipe to the discharge head

Many pumps are assembled with left-hand threads. Always hold discharge head with pipe wrench when installing discharge pipe into pump. Holding casing, motor or motor adapter will allow pump to unscrew and result in premature pump failure.

To prevent galvanic corrosion, use stainless steel fittings when discharge head is stainless steel.

If a barb type fitting is used, double clamp where it connects to drop pipe.

Ensure pressure rating of pipe is higher than maximum pump discharge pressure. Refer to pump catalog information or consult supplier for maximum discharge pressure.

Set pump at least 10' off bottom of well

It is allowable to run branches off of the pipe between the pump and pressure sensor as long as no devices that could restrict flow are between the pump and pressure sensor.

## Splicing Wire To Motor Leads

**⚠ CAUTION** Vinyl electrical tape is not acceptable for underwater splices when using variable speed drives due to the high potential for leakage to ground through taped joints. Failure to use a waterproof heat shrink kit will void the warranty.

Before installing the motor in the well, the drop cable must be connected to the motor wires. Refer to the wire size chart when selecting wire size for the drop cable.  
*See Wire Sizing Table.*

The underwater connection where the drop cable connects to the motor wires must be done using a waterproof heat shrink kit. To make the connection, first strip the wires 1/2" and place the heat shrink tubes over the wires. Then, connect the wires using the crimps. Finish by shrinking the tubes over the crimps heating from the center outward. The sealant in the tube will flow out the ends making a watertight seal. If a heat shrink tube is burnt or split, the connection will need to be remade.

## Pressure Tank Installation and Selection

**⚠ WARNING** EXPLODING TANK CAN INJURE OR KILL.

Refer to pump catalog or contact your supplier for maximum discharge pressure of pump. Ensure pressure rating of pipe is greater than maximum discharge pressure of pump.

**⚠ CAUTION** It is likely that the pressure relief valve will open sometime during the life of the system. Plan ahead by running drain to a location where water will not cause damage.

### Diaphragm Tank Sizing and Pre-Set Pressure Recommendations:

Diaphragm type (captive air) tanks are required on these systems.

Total Tank Volume, not drawdown volume, is used to select the proper tank size. The total tank volume should be approximately 20% of the pump's maximum flow. For example, when using a 10 gpm pump the system requires a 2 gallon (total volume) tank, i.e. a V6P or TP6P. A 50 gpm pump requires a minimum 10 gallon total volume tank, a V25 at 8.2 gallons may be too small, in this case we recommend the next larger tank, a V45 or TP45 at 13.9 gallons. Due to the many variables in a pump system there may be installations where a smaller than recommended tank will operate the system properly. The tank sizing recommendations are field proven to prevent objectionable pressure drops on start-up and provide smooth operation for the majority of variable speed pump systems.

Set the tank pressure, while tank is empty of water, to 20 psi below the desired system pressure setting. Ex. for a 50 psi system pressure, charge the tank to 30 psi. Tanks sold by ITT Water Products brands are all factory pre-charged to 38 psi. Locate the tank where it will not freeze.

### Pressure Sensor

Locate the tank and pressure sensor in an area where temperatures stay above 32°F (0°C).

The relief valve, pressure sensor and pressure gauge must ALWAYS sense tank pressure. No valves, filters, or flow control devices can be between the pressure sensor and the tank.

**Table 1: Controller, Breaker, Generator Sizing**

3 Phase Motor			Controller Model ②				Circuit Breaker ③	Generator ④ (VA)
HP	Voltage ①	SFA	BF10	BF20	BF30	BF50		
1/2	230	2.9					15	2200
	200	3.4						
3/4	230	3.8						2900
	200	4.4						
1	230	4.7						3500
	200	5.4						
1 1/2	230	5.9					20	4400
	200	6.8						
2	230	8.1					30	6100
	200	9.3						
3	230	10.9					40	8100
	200	12.5						
5	230	17.8					50	13300
	200	20.5						

**NOTES:**

- ① Motor Nameplate must be the same as supply voltage.
- ② Shaded areas indicate which controller models can be used with which motors. Lighter shading indicates combinations where controller will limit peak performance to 85% of catalog value for pump/motor.
- ③ Circuit Breaker or Dual Element Time Delay Fuse Size (Amps) protecting branch circuit supplying controller.
- ④ Minimum size of single phase 240 V generator required.

**Table 2: Wire Sizing**

**Maximum Cable Lengths in Feet to Limit Voltage Drop to 5% for 230 V Systems⑤**

**Service Entrance to Controller ⑥**

Controller Input	Motor HP	Copper Wire Size 75°C Insulation ⑥ Exposed to a Maximum of 50°C (122°F) Ambient Temperature																		
		14	12	10	8	6	4	3	2	1	1/0	2/0	3/0	4/0	250	300	350	400	500	
230V 1 PH	1/2	366	583	925	1336	2107	3345	4175	5267	6637	8364									
	3/4	279	445	706	1020	1608	2552	3186	4019	5065	6383	8055								
	1	226	360	571	824	1300	2064	2576	3250	4095	5161	6513	8201							
	1 1/2	*	<b>286</b>	455	657	1036	1644	2052	2589	3262	4111	5188	6533	8236	9710					
	2	*	*	<b>331</b>	478	754	1197	1495	1886	2376	2995	3779	4759	5999	7073	8455	9852			
	3	*	*	<b>246</b>	355	561	890	1111	1401	1766	2225	2808	3536	4458	5256	6283	7321	8343		
	5	*	*	*	*	<b>343</b>	545	680	858	1081	1363	1720	2165	2730	3219	3847	4483	5109	6348	

**Controller to Motor ⑥**

Controller Input	Motor HP	Copper Wire Size 75°C Insulation ⑥ Exposed to a Maximum of 50°C (122°F) Ambient Temperature																		
		14	12	10	8	6	4	3	2	1	1/0	2/0	3/0	4/0	250	300	350	400	500	
230V 3 PH	1/2	905	1442	2290	3306	5213	8276													
	3/4	690	1100	1748	2523	3978	6316	7884	9945											
	1	558	890	1413	2040	3216	5106	6375	8041											
	1 1/2	445	709	1126	1625	2562	4068	5078	6406	8072										
	2	324	516	820	1184	1866	2963	3699	4666	5879	7410	9351								
	3	241	384	609	880	1387	2202	2749	3467	4369	5506	6949	8750							
	5	*	235	373	539	849	1348	1683	2123	2675	3372	4255	5358	6755	7964	9520				

⑤ Reduce lengths by 13% for 200 V systems.

⑥ Lengths in bold require 90°C wire.

\* Wire does not meet the N.E.C. ampacity requirement.

The lengths in each of the Wire Sizing tables represent 100% of the allowable voltage drop when motor is running at full load. When sizing wire, the voltage drop of each wire segment must be included. The total must not exceed 100% of the allowable drop. Take for example a 1.5 HP motor with a distance from Service Entrance to Controller of 100' and 500' between the Controller and Motor.

- Service Entrance to Controller = 100' of 10 AWG (100/455) = 22 % (455' is from the S.E. to Controller chart)
  - Controller to Motor = 500' of 12 AWG (500/709) = 71 % (709' is from the Controller to Motor chart)
- Total Drop (must be ≤ 100%)    93 %

If the distance from the Controller to Motor was 600' (600/709) = 85% + 22% = 107%, we would need to use #10 wire for that segment, ex. 600/1126 = 53% + 22% (for 100' of #10) = 75% which is acceptable. It is also acceptable to use different wire sizes for the Buried and Well sections of wire.

The pressure sensor will be connected to the controller. See “Wiring Pressure Sensor” when determining allowable distance between sensor and controller.

To prevent the pressure sensor from filling with sediment, it must not be mounted upside down. Any orientation between horizontal and vertical is acceptable.

Maximum Pump GPM	Recommended Tanks		
	Total Volume	Order No.	or Order No.
10	2	V6P	TP6P
23	4.5	V15P	TP15P
41	8.2	V25P	TP25P
70	13.9	V45	TP45
100	19.9	V60	TP60
130	25.9	V80	TP80
160	31.8	V100	TP100
225	45.2	V140	TP140
325	65.1	V200	TP200
418	83.5	V250	TP250
425	84.9	V260	TP260
580	115.9	V350	TP350

## Controller

The controller is rated NEMA 3R (Raintight) so it may be located outdoors if needed. It must be mounted vertically. Locate the enclosure in a shaded area where the temperature stays within 0°F to +122°F (-18°C to +50°C). Since the controller is designed for outdoor mounting it may be located at the wellhead in cases where replacement of an existing two-wire submersible is desired without digging up the lawn to install new power supply wire. The new installation which uses a three-phase motor will require new drop cable with three wires plus a ground from the controller to the motor. See the wiring sizing chart in this manual.

## Opening Controller Cover

**CAUTION** Lay the controller on a flat surface or hang on wall before removing the cover screw.

Failure to do so may result in dropping and damaging the unit. Once screw is removed, lift the cover up and out to remove. There is a locking tab on the bottom of the unit to accommodate a padlock if so desired.

## Mounting Controller

Three screws are provided for mounting the enclosure (Figure 1).

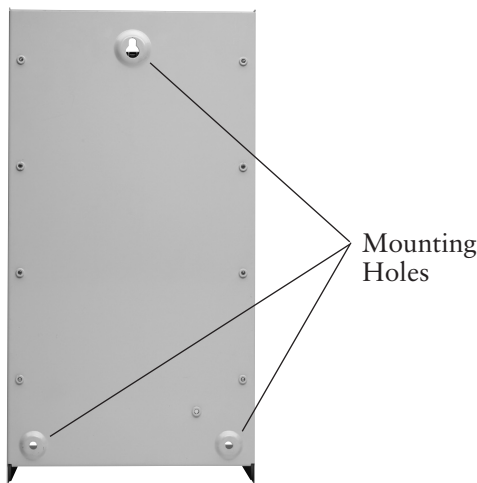


Figure 1: Mounting Holes

Using the enclosure as a guide, select a mounting location.

First install the top screw in the mounting surface leaving the head of the screw approximately 1/8" from the surface. Hang the enclosure on this screw. Finish by installing the two bottom screws and tightening the top screw.

## Wiring Pressure Sensor

The pressure sensor cable is pre-wired at the factory. If desired, the length of the cable can be changed. The cable can also be put in conduit to protect against damage.

To change the length of the sensor cable:

- Cable length cannot exceed 200'.
- Find the terminal block to which the sensor cable is connected.
- Disconnect sensor wires from terminal block by pushing down on tabs at rear of block one at a time and pulling the wires out of the terminal.
- Splice additional cable (18 AWG, 3 conductor unshielded) to sensor wire, cut off excess as required.
- Reconnect wires to terminal block. Be sure wire colors match labels on circuit board (B = Black, R = Red, W = White).

**NOTICE: TO HELP PROTECT THE PRESSURE SENSOR FROM LIGHTNING WE RECOMMEND “BONDING” THE SENSOR TO A CONTROLLER GROUND TERMINAL. USE A #12 COPPER WIRE AND A GROUNDING CLAMP ATTACHED TO THE METAL BODY OF THE SENSOR, BEING CAREFUL NOT TO CRUSH THE SENSOR.**

The controller is supplied with a 25 foot pressure sensor cable. Additional sizes of cable are available.

Catalog Description	Length (Ft.)
PSC80	3
PSC300	25 (standard)
PSC600	50
PSC1200	100

To put the sensor cable in conduit, do the following. Disconnect the cable from the terminal block and remove the cable strain relief in the bottom of the enclosure. Starting at the enclosure, run flexible or rigid 1/2" conduit to where the sensor is located. The last few feet of conduit adjacent to the sensor will need to be flexible. The conduit must be well supported – NO stress can be placed on the pressure sensor connector. Use a strain relief bushing to seal around the pressure sensor connector.

**CAUTION** After reconnecting the sensor wires to the terminal block, tug on each wire individually to ensure they are tight.

## Motor Wires – See Table 2

**NOTE: 75°C COPPER WIRE IS MANDATORY.**

Refer to the wiring chart in this manual for wire sizing and maximum wire lengths. Keep in mind that the charts are designed to limit voltage drop to 5%, in situations with high voltage smaller wire may work. As a rule, it is best to size wire for worst case scenarios (low or high voltage) and to stay with the charts recommendations. Insure that the wire is rated for direct burial and/or submergence.

Figure 2 shows the terminal block where the motor and input wires connect. The protective cover on the terminal block snaps off and on. Attach the motor wires to the terminals according to colors marked on circuit board: GND = Green, RED = Red, BLK = Black, YEL = Yellow. Reversing any two leads on RED/BLK/YEL will change the direction of motor rotation. Later during start-up you may need to change motor rotation.

## Input Power

**WARNING** SHOCK OR ELECTROCUTION HAZARD

Controller enclosure has high voltage if not grounded. Connect controller ground to service entrance ground terminal.

The wiring chart in this manual specifies the length and size of wires to use between the service entrance and the controller.

Connect a ground wire from the service panel to the terminal marked GND. Controller has high leakage to ground. Controller ground terminal must be connected to the service entrance ground terminal. Failure to do so will result in high voltage being present on the controller chassis. Connect two “hot” wires from the 2 pole circuit breaker to the terminals marked L1 & L2.

**NOTE: SUGGESTED GENERATOR SIZES FOR THE VARIOUS BF CONTROLLERS ARE LISTED IN TABLE 1.**

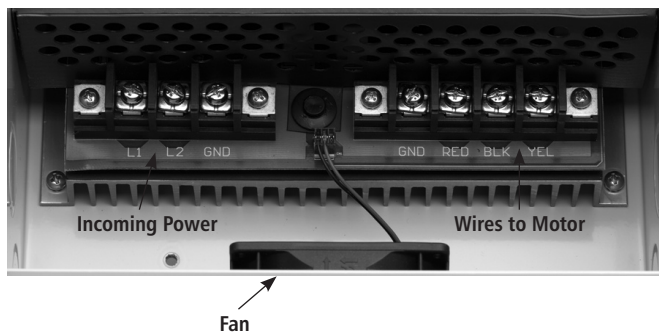


Figure 2: Wiring Connections

**NOTE: IT MAY BE NECESSARY TO PLACE A DISCONNECT SWITCH IN FRONT OF AND WITHIN SIGHT OF THE CONTROLLER – CONSULT LOCAL CODES.**

## 3: START-UP

Before starting-up the system, check to ensure all wiring and piping connections are complete and tight.

### Speed Selector Switch for 60 Hertz or 80 Hertz Operation:

Set switch for either 60 Hz or 80 Hz, your selection must match the water end being used, *see Figure 3*.

We recommend using the 60 Hertz setting and using matched HP motors and Pumps (water ends).

Most pump brands and motors available today were originally designed for operation at 3450 rpm or 60 hertz. The 80 Hz selection allows installers to replace other brands of variable speed controllers which were designed to operate motors between 30 – 80 hertz, rather than the normal 30 – 60 hertz.

### Pump and Motor Sizing:

Controller	30-60 Hz Speed		30-80 Hz Speed	
	Pump	Motor	Pump	Motor
BF10*	1 HP	1 HP	.5 HP	1 HP
BF20	2 HP	2 HP	1 HP	2 HP
BF30	3 HP	3 HP	1.5 HP	3 HP
BF50*	5 HP	5 HP	NA	NA

\* WHEN AVAILABLE

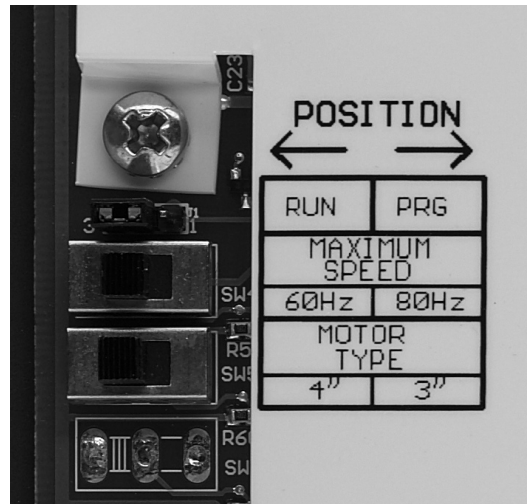


Figure 3: Speed Selector

### Motor Selection Switch

**WARNING** Before applying power, the Motor Overload must be set by the installer. Failure to properly adjust or set the controller overload to the correct motor SFA setting will void the motor warranty and may cause wire damage.

Turn the dial until the overload pointer is aligned with the Service Factor Amperage (SFA) as shown on the motor nameplate of the motor you are installing. Overloads are factory set at the controller’s maximum amperage setting. If using a controller on a smaller than maximum HP motor, ex. a BF30 with a 2 HP motor, the overload must be set for that motor’s maximum SFA rating.

See Table 1 showing typical ratings for Motor SFA, fuse and circuit breaker size and generator sizing.

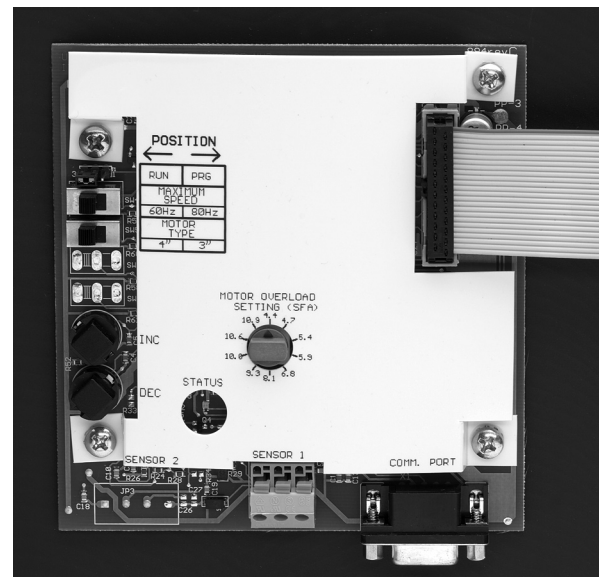


Figure 4: Motor Overload Setting Switch

## Status Light

**⚠ WARNING** SHOCK OR ELECTROCUTION HAZARD

Status light is NOT a voltage indicator.

Hazardous voltage may be present when light is off.

A status light shines through a small window in the cover to indicate system status. This status light will be green, red, or off. The color and flashing of the light is interpreted using the following table. This information is also on the controller label on the front cover.

Light	System Status
Green Not Blinking	Pump not running. Standby mode. Pressure satisfied and no flow, or, voltage below 190 V.
Green Blinking	Pump running. There is flow to maintain pressure.
Red blinking or not blinking	Fault. Refer to troubleshooting section for detailed instructions.
Off	Low voltage, or system failure.

Status Light Key Table

## Purging System

Open a valve and turn power on to the controller. If the system pressure is below the factory preset pressure setting (50 psi), the status light will begin blinking green indicating that pump is running. The controller hums when it is running. This is normal.

It is common for the pump to be air bound at first, especially with shallow wells. In this case, the controller will begin testing for a dry well (refer to the troubleshooting section for a description of Dry Well Detection).

Once the water is flowing, be sure to open all valves to purge air from the system.

## Checking Rotation

It's possible the motor is rotating in the wrong direction. The pump will work but will have greatly reduced performance if rotating backwards. To check rotation, perform the following test.

Connect an amp probe to one of the power supply wires. Run the system with several valves open and note the pressure and amps. Leave the valves open, turn the power off, and wait 5 minutes for the hazardous voltages to discharge.

Swap red and black motor leads where they connect to the controller terminal block (not L1 and L2).

Turn power back on and let the system pressure stabilize. Again note the pressure and amps. Whichever wire position provided the most pressure/flow is the correct wire position. If there was little difference in the pressure/flow, then whichever had the lower amp reading is the correct wire position.

Turn the power off, wait 5 minutes and swap the wires back if necessary.

Replace the plastic protective cover on the terminal block.

## Setting System Pressure

**⚠ WARNING** System pressure can be adjusted anywhere between 20 and 70 PSI. To adjust system pressure, the pump must be running. Open a valve and then PRESS and HOLD (do not tap) the increase or decrease pushbutton as necessary until the desired pressure is displayed on the pressure gauge. To save the pressure setting, the system must go into standby mode. Close all valves and allow pump to stop (light green and not blinking). The new pressure setting is now recorded.

## Checking for leaks

Constant pressure systems utilizing small tanks run whenever there is demand. Even small leaks can prevent a pump from turning off. To check for leaks, close all valves, turn power off to the controller, and note the pressure displayed on the pressure gauge. Tap the gauge to ensure you get an accurate reading.

Wait ten minutes and check the gauge again tapping to prevent the needle from sticking. If the pressure dropped then the system may have a leak\*.

\*If a system is pressurized after having been unpressurized, it will continue to expand for several minutes. This expansion causes the pressure to drop and can be misinterpreted as a leak. Allow a system to stabilize for 10 minutes under pressure before performing the aforementioned leak test.

## 4: TROUBLESHOOTING

The status light described in Section 3 Start-Up is used to indicate system status i.e. running, stopped, or faulted. When faulted, the status light will be red. The error code is the number of quick flashes followed by a 1 second pause. The number of flashes can be any number from 2 to 8. The error code will be repeated until cleared. Some errors will clear themselves with time. Others must be cleared manually by turning the power off for 1 minute. Table 3 Describes the various errors that can occur.

Green Light Codes																																														
Flashes	Controller Status	Description																																												
Constant	Standby/Low Voltage	Constant Green Light indicates the pump is off. The system is in Standby mode when there is no flow in the system and the pressure setting has been reached. The system is in a Low Voltage condition when the line input voltage drops below 190VAC.																																												
Blinking	Pump Running	Flashing Green Light indicates the pump is running.																																												
Red Light Codes																																														
Number of Flashes	Controller Status	Fault Description.																																												
	Controller Action	This information is to be used by professional installers or qualified personnel only.																																												
Constant	<p>Controller Error</p> <p>-----</p> <p>To clear the fault, turn off power to the controller, wait 1 minute, turn on power to the controller. If fault persists contact installer.</p>	Internal controller fault. Replace controller.																																												
2 Blinks	<p>Dry Well</p> <p>-----</p> <p>The controller will automatically restart according to the chart shown on the right. If fault persists contact installer</p>	<p>This fault can be caused by:</p> <ul style="list-style-type: none"> <li>• Water level in well falls below suction inlet of pump.</li> <li>• Plugged suction screen.</li> <li>• Restriction in pipe between pump and pressure sensor.</li> <li>• Air bound pump - see "Purging System"</li> <li>• Filling long irrigation lines on start-up</li> </ul> <p>In systems where the motor operates at less than Service Factor Amps the controller may show a false "dry well" fault. Reducing the motor overload setting will eliminate the false readings.</p> <p>If problem persists, please verify well capacity.</p> <p>The controller will automatically restart according to the chart below:</p> <div data-bbox="597 1453 1276 1818" data-label="Figure"> <table border="1"> <caption>Dry Well Restart Time</caption> <thead> <tr> <th>Dry Well Conditions</th> <th>Minutes Between Restarts</th> </tr> </thead> <tbody> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>4</td></tr> <tr><td>5</td><td>5</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>7</td></tr> <tr><td>8</td><td>8</td></tr> <tr><td>9</td><td>9</td></tr> <tr><td>10</td><td>10</td></tr> <tr><td>11</td><td>10</td></tr> <tr><td>12</td><td>10</td></tr> <tr><td>13</td><td>10</td></tr> <tr><td>14</td><td>10</td></tr> <tr><td>15</td><td>10</td></tr> <tr><td>16</td><td>10</td></tr> <tr><td>17</td><td>10</td></tr> <tr><td>18</td><td>10</td></tr> <tr><td>19</td><td>10</td></tr> <tr><td>20</td><td>10</td></tr> <tr><td>21</td><td>10</td></tr> </tbody> </table> </div> <p>For example: The 1st fault will clear in 1 minute, the 5th fault will clear in 5 minutes.</p>	Dry Well Conditions	Minutes Between Restarts	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	10	12	10	13	10	14	10	15	10	16	10	17	10	18	10	19	10	20	10	21	10
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Table 3: Fault Blink Codes (continued on next page)

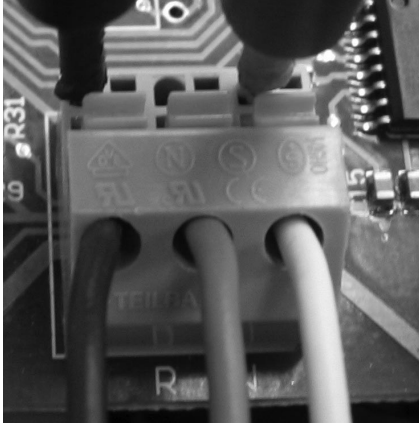
<p>3 Blinks</p>	<p style="text-align: center;">Sensor Fault</p> <p>-----</p> <p>The controller will not run if the signal from the sensor is disconnected or out of tolerance. The controller will automatically restart when the signal is within tolerance. If fault persists contact installer.</p>	<p>This fault can be caused by:</p> <ul style="list-style-type: none"> <li>• Disconnected sensor. Disconnect sensor from sensor cable connector and reconnect to ensure a good connection.</li> <li>• Disconnected sensor cable lead inside the controller. Check for loose wires where the sensor cable connects to the circuit board by tugging on each wire.</li> <li>• Broken wire in the sensor cable.</li> <li>• Miswired sensor cable. Check that the wires are connected to the correct terminals on the sensor connector. The correct location of the wires is indicated on the circuit board. B=Black, R=Red, W=White.</li> <li>• Failed sensor. With the sensor cable connected to the circuit board, measure the DC voltage between the black and white wires of the sensor cable at the sensor connector, as shown below.</li> </ul>  <p>The voltage measured should be between 0.5Vdc and 4.5Vdc.</p>
<p>4 Blinks</p>	<p style="text-align: center;">Pump or Motor Bound</p> <p>-----</p> <p>The controller will try to restart the motor three times before displaying this fault. To clear the fault, turn off power to the controller, wait 1 minute, turn on power to the controller. If fault persists contact installer.</p>	<p>This fault can be caused by:</p> <ul style="list-style-type: none"> <li>• Mechanical binding from debris in pump.</li> <li>• Electrical failure of the motor.</li> <li>• Incorrect setting of “Motor Type” switch.</li> </ul> <p>Verify the error by turning power to controller off for 1 minute and then on. Pump/Motor must be checked if fault persists.</p>
<p>5 Blinks</p>	<p style="text-align: center;">Short Circuit</p> <p>-----</p> <p>If this fault was detected while the pump was running, the controller will attempt to restart three times before displaying this fault. To clear the fault, turn off power to the controller, wait 1 minute, turn on power to the controller. If fault persists contact installer.</p>	<p>This fault can be caused by:</p> <ul style="list-style-type: none"> <li>• Electrical failure of the motor</li> <li>• Electrical failure of wiring between controller and motor.</li> </ul> <p>Verify the error by turning power to controller off for 1 minute and then on. If error persists, motor and wiring between controller and motor must be checked. Turn power off for 1 minute. Remove the three motor wires from the terminal block. Check wiring and motor for shorting phase to phase and phase to ground. 230 V motor typical phase-phase resistances:</p> <p>.5 HP = 10 Ohms, .75 HP = 7 Ohms, 1 HP = 5 Ohms, 1.5 HP = 3.5 Ohms,  2 HP = 2.5 Ohms, 3 HP = 2 Ohms, 5 HP = 1 Ohm, 7.5 HP = .75 Ohms,  10 HP = .5 Ohms</p>

Table 3: Fault Blink Codes (continued on next page)

6 Blinks	<p style="text-align: center;">Ground Fault</p> <p>-----</p> <p>The controller will not restart if displaying this fault. To clear the fault, turn off power to the controller, wait 1 minute, turn on power to the controller. If fault persists contact installer.</p>	<p>This fault can be caused by:</p> <ul style="list-style-type: none"> <li>• Electrical failure of the motor</li> <li>• Electrical failure of wiring between controller and motor.</li> <li>• Miswiring of motor cable.</li> </ul> <p>Verify the error by turning power to controller off for 1 minute and then on. If error persists, motor and wiring between controller and motor must be checked. Turn power off and wait 1 minute. Remove the three motor wires and ground wire from the terminal block. Check wiring and motor for shorting phase to ground using a megohmmeter (“megger”). A reading less than 200K Ohms indicates faulty insulation in the motor cable or motor. Test each to determine fault location.</p>
7 Blinks	<p style="text-align: center;">Temperature</p> <p>-----</p> <p>The controller will automatically restart when the temperature reaches an acceptable level. If fault persists contact installer.</p>	<p>This fault can be caused by:</p> <ul style="list-style-type: none"> <li>• High ambient temperature. The maximum ambient temperature rating is 122°F (50°C).</li> <li>• Low ambient temperature. The minimum ambient temperature rating is -4°F (-20°C).</li> </ul> <p>Check for a fan failure. The fan will turn on when the temperature inside the controller reaches 140°F (60°C). The fan will turn on for 1 second each time the controller starts the motor. If the fan never turns on, check fan connections and replace as needed. Ensure that the external fan intake filter is not blocked or clogged. It can be removed for cleaning and replacements are available.</p>
8 Blinks	<p style="text-align: center;">Open Lead</p> <p>-----</p> <p>The controller will not restart if displaying this fault. To clear the fault, turn off power to the controller, wait 1 minute, turn on power to the controller. If fault persists contact installer.</p>	<p>This fault can be caused by:</p> <ul style="list-style-type: none"> <li>• Disconnected or broken wire between the controller and motor.</li> </ul> <p>Verify the error by turning power to controller off for 1 minute and then on. If error persists, motor and wiring between controller and motor must be checked. Turn power off for 1 minute. Remove the three motor wires from the terminal block. Using an ohmmeter, measure the resistance from phase to phase. A disconnected or broken wire will be indicated by a high resistance reading (20 Ohms or higher).</p>

**Table 3: Fault Blink Codes** *(continued from previous page)*

## NOTES

### GOULDS PUMPS LIMITED WARRANTY

This warranty applies to the Balanced Flow Series Controller manufactured by Goulds Pumps.

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever period is shorter.

A dealer who believes that a warranty claim exists must contact the authorized Goulds Pumps distributor from whom the equipment was purchased and furnish complete details regarding the claim. The distributor is authorized to adjust any warranty claims utilizing the Goulds Pumps Customer Service Department.

**The warranty excludes:**

- (a) Labor, transportation and related costs incurred by the dealer;
- (b) Reinstallation costs of repaired equipment;
- (c) Reinstallation costs of replacement equipment;
- (d) Consequential damages of any kind; and,
- (e) Reimbursement for loss caused by interruption of service.

**For purposes of this warranty, the following terms have these definitions:**

- (1) "Distributor" means any individual, partnership, corporation, association, or other legal relationship that stands between Goulds Pumps and the dealer in purchases, consignments or contracts for sale of the subject equipment.
- (2) "Dealer" means any individual, partnership, corporation, association, or other legal relationship which engages in the business of selling or leasing equipment to customers.
- (3) "Customer" means any entity who buys or leases the subject equipment from a dealer. The "customer" may mean an individual, partnership, corporation, limited liability company, association or other legal entity which may engage in any type of business.

**THIS WARRANTY EXTENDS TO THE DEALER ONLY.**

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