

FLOAT SWITCHES

Mechanical Float Switch

Mechanically activated float switches offer a reliable low current control for dewatering applications.

How It Works

The mechanical float switch control will turn **ON** (close) when the float tips 45° above -horizontal, indicating a high level, and turns **OFF** (opens) when the float switch drops 45° below horizontal. Reference Figure 4 and Figure 5. Maximum pumping range is 120 degrees. See Figure 3 below.

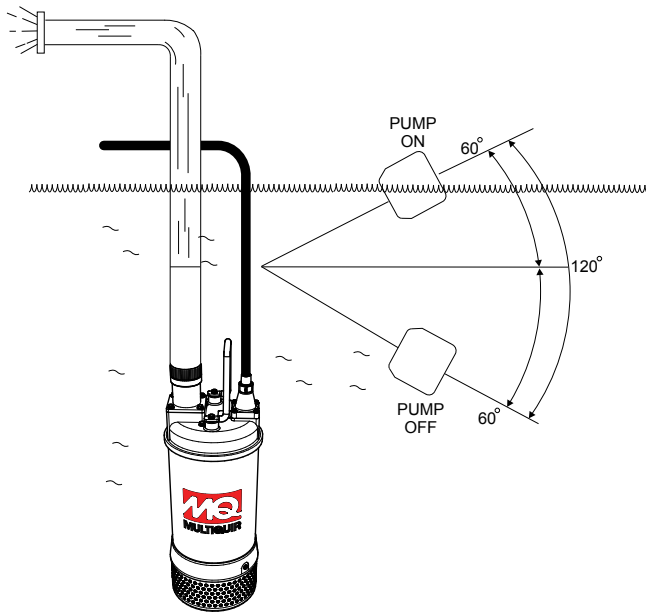


Figure 3. Pumping Range (Float Switch)

Pumping Range

The pumping range of the pump is determined by the float switch tether cord. Use Table 3 as guide line to determine your required pumping range. Pumping ranges are based on non-turbulent conditions. Range may vary due to water temperature and cord shape. Please note as the tether length increases, so does the variance of the pumping range.

Table 3. Pumping Range

Tether Length	2 in. 5.08 cm.	4 in. 10.16 cm.	6 in. 15.24 cm.	8 in. 20.32 cm.	10 in. 25.4 cm.	12 in. 30.48 cm.	14 in. 35.56 cm.	16 in. 40.46 cm.
Pumping Range	6 in. 15.24 cm.	10 in. 25.4 cm.	14 in. 35.56 cm.	18 in. 45.72 cm.	22 in. 55.88 cm.	27 in. 68.58 cm.	31 in. 78.74 cm.	35 in. 88.9 cm.

Design Features

Float switch housings are constructed of high-impact, corrosion resistant polypropylene with mechanically activated, snap action contacts.

- Suitable for most liquid environments.
- Hermetically sealed.
- Thick-walled non-corrosive PVC plastic enclosure.
- Pressure tested to 30 ft. (9 meters).
- Standard SJO, 16-gauge, 2 conductor cord (20 ft./6.09 m).

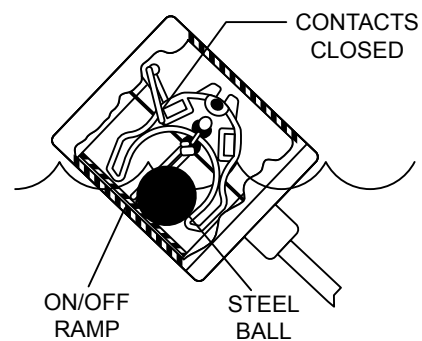


Figure 4. Float Switch (Closed)

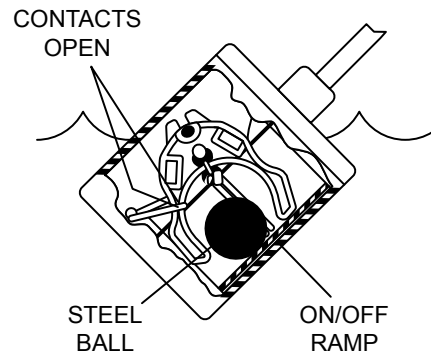


Figure 5. Float Switch (Open)

Float Switches

For unattended operation of the submersible pump two single float switches (Model SW-1WO PA) will be required. These float switches can be connected directly to a control box (bare wires) and will allow the pump to turn on and off depending on the length of the tether.

Mounting The Float Switches

1. Determine the required **cord tether length** as shown in Figure 3 and Table 3.
2. Place the cord into the clamp as shown in Figure 6.
3. Secure the clamp to the discharge hose as shown in Figure 6. **DO NOT** install cord under hose clamp.
4. Using a screwdriver, tighten the hose clamp. **DO NOT** over-tighten. Make sure the float cord is not allowed to touch the excess hose clamp band during operation.

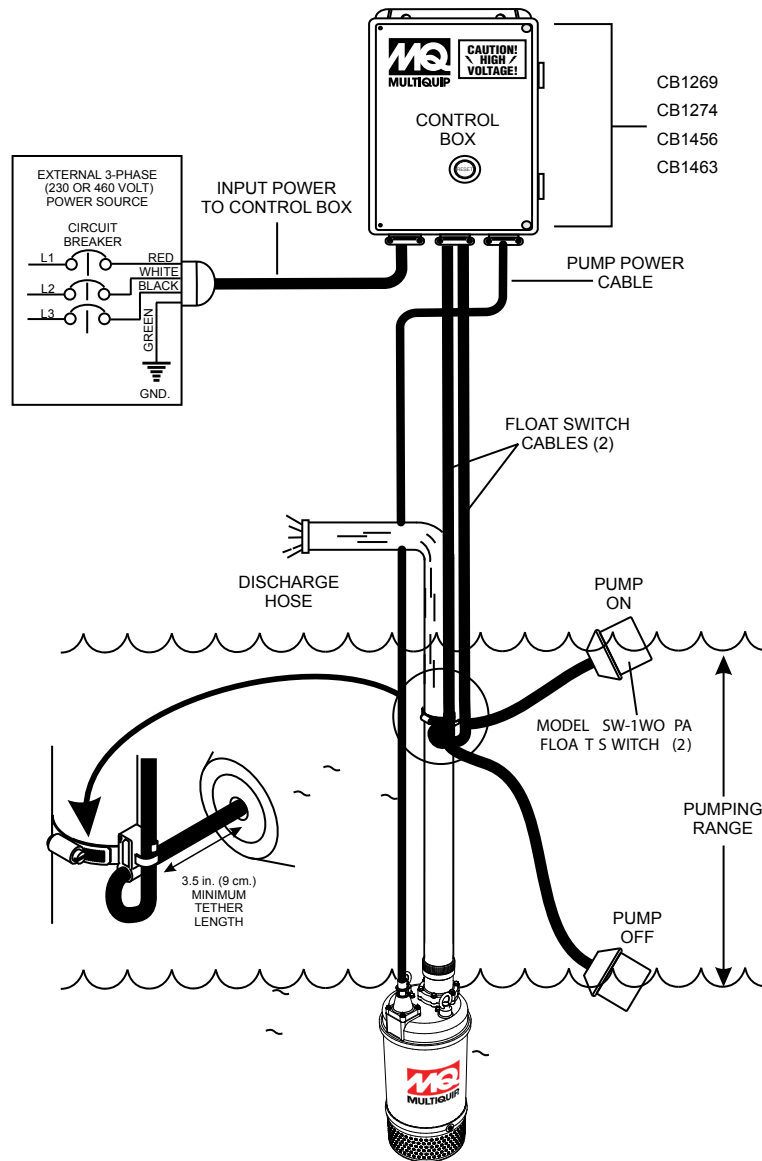


Figure 6. Float Switch Application

FLOAT SWITCHES

Control Boxes

For remote pumping applications, all four model submersible pumps will require a control box (Figure 7).

For each model submersible pump there is an associated control box. Reference Table 4 for the desired control box and applicable heater. The heater size is determined by the the full load amps the pump will draw.

These water-resistant control boxes provide electronic overload protection a watertight enclosure and glands to prevent water from leaking into the box, and a float switch interface.

Each control box will require the use of **two** SW-1WOPA float switches, no plug, bare wires for direct connection to the control box. Reference Figure 20 and Figure 21 for a schematic representation of each control box.

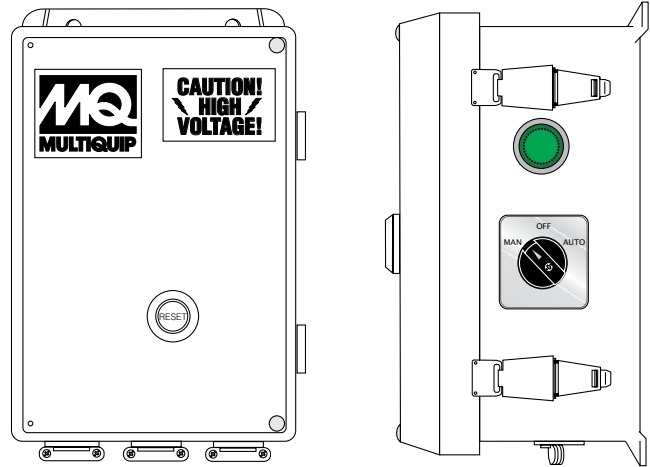


Figure 7. Electrical Control Box (Typical)

NOTICE

Contact Multiquip sales department to order control boxes as listed in Table 4.

Table 4. Control Box Specifications


Control Box Model No.	Used With Pump Model	Voltage, 3Ø	Heater Size	Heater Amps	Running Amps	UL/CSA Listed	Thermal Overload Protection	Float Switch Capability
CB1269	ST41230	230	K69	27.7~30.1	28.6	YES	YES	YES
CB1274	ST61230	230	K74	40.2~45.5	43.0	YES	YES	YES
CB1456	ST41460	460	K56	13.6~14.5	14.3	YES	YES	YES
CB1463	ST61460	460	K63	20.6~22.5	21.5	YES	YES	YES

CONTROL BOX INSTALLATION

Control Box Installation


The following procedure outlines the steps for connecting the pump to a control box.

! DANGER




Each submersible pump is designed to work with a control box. This control box contains the necessary electronics (float switch connections) to operate the pump. Remember this control box contains hazardous voltages. Disconnect all sources of power before installing or servicing. There exists the possibility of electrocution, electric shock or burn, which can cause severe bodily harm or even **death!**

! DANGER



When installing the control box, the possibility exists of electrical shock, electrocution and possibly death! **NEVER** have untrained personnel perform the installation. **ALWAYS** have qualified service personnel (licensed electrician) perform the installation.

! WARNING



Explosion or Fire Hazard exists if this pump is used with flammable liquids. **DO NOT** use this pump with **flammable liquids**. **DO NOT** install this pump in hazardous locations as defined by the National Electrical Code, ANSI/NFPA 70.

CONTROL BOX MOUNTING

Mount the control box in an upright vertical position. Make sure the control box is securely fastened to a flat surface, that is free of dust, dirt, moisture or any elements that may contaminate or erode the electronic components of the control box.

3-Phase Power Installation (Input)

Each pump is either configured for 230 or 460 VAC voltage input. Reference Table 1 for the correct input voltage for your pump.

If you cannot determine what your pump's power requirements are, look at the vendor supplied identification name tag attached to the pump or please contact Multiquip's Service/Technical Assistance department.

! CAUTION

Applying incorrect power (voltage phasing) to the submersible pump can cause severe damage to the pump. Please make sure that the correct voltage and phase are applied to the pump at all times.

Power Cord Requirements

When routing the 230/460 VAC, 60 Hz., 3-phase power via a power cord to the control box, **ALWAYS** use the correct wire size. Please refer to Table 5 to determine the correct wire size. Incorrect wire size can adversely affect the performance of the pump and may ultimately burn out the pump motor.

Table 5. Power Cord Length and Wire Size

AMPS	10 FT. (3.0 m)	20 FT. (6.0 m)	30 FT. (9.1 m)	50 FT. (15.2 m)
15	12 AWG	10 AWG	8 AWG	6 AWG
20	10 AWG	8 AWG	6 AWG	4 AWG
25	10 AWG	6 AWG	6 AWG	4 AWG
30	10 AWG	6 AWG	4 AWG	2 AWG
40	8 AWG	6 AWG	4 AWG	2 AWG

CONTROL BOX INSTALLATION

Connecting SW-1WOPA Float Switches to Control Box

1. Remove the float switch input connector housing, then route the float switch wires through the cable gland on the control box. Attach the wires of the float switch to the terminal block as indicated by Table 6 and Figure 8.

Table 6. Dual Float switch Connections

Float Switch	Terminal Block No.	Wire Color
Start	TB1-A1	Black
	TB1-A2	White
Stop	TB1-A3	Black
	TB1-A4	White

2. Tighten the connector housing to ensure a tight fit between the cord and the connector body. This will prevent the cable from pulling out of the terminal block and also prevent moisture from entering the control box.
3. Determine the tether length of the float switch wires then secure float switch wires to pump discharge hose. See Figure 3 and Table 3 to determine the pumping range.

CONTROL BOX POWER CONNECTIONS

3-Phase Power Installation (Input to Control Box)

1. The 3-phase input power cord should have four wires. Each wire is color coded. The colors are **RED**, **WHITE**, **BLACK** and **GREEN**.
2. Remove the 3-phase AC input connector housing from the control box, then route the three phase input power cable through the cable gland on the control box. Attach the wires to the AC terminal block inside the control box as indicated by Table 7 and Figure 8.

Table 7. 3Ø-230/460 VAC Input Power Connections	
Wire Color	Input Power Terminal Block
RED	L1
WHITE	L2
BLACK	L3
GREEN	GROUND

3. Tighten the connector housing to ensure a tight fit between the power cord and the connector body. This will prevent the cable from pulling out of the terminal block and also prevent moisture from entering the control box.
4. Connect the other end of the 3-phase input power cord to the voltage source. Remember to provide a means of disconnecting the power from the control box (circuit breaker or quick disconnect switch). Also make sure to provide a good earth ground to the control box.

NOTICE

It is recommended that the power being supplied to the control box **ALWAYS** be connected to a circuit breaker or a quick disconnect switch. This safety feature allows for quick removal of power from the control box in the event of an emergency.

3-Phase Power Installation (Output To Pump)

1. The 3-phase output power cord should have four wires. Each wire is color coded. The colors are **RED**, **WHITE**, **BLACK** and **GREEN**.
2. Remove the 3-phase AC output power connector housing on the control box, then route the output power cable through the cable gland on the control box. Attach the wires to the AC terminals on the overload relay module (heaters load side) as indicated by Table 8 and Figure 8.

Table 8. 3Ø-230/460 VAC Output Power Connections	
Wire Color	Output Power Overload Relay
RED	T1
WHITE	T2
BLACK	T3
GREEN	GROUND

CONTROL BOX WIRING LAYOUT

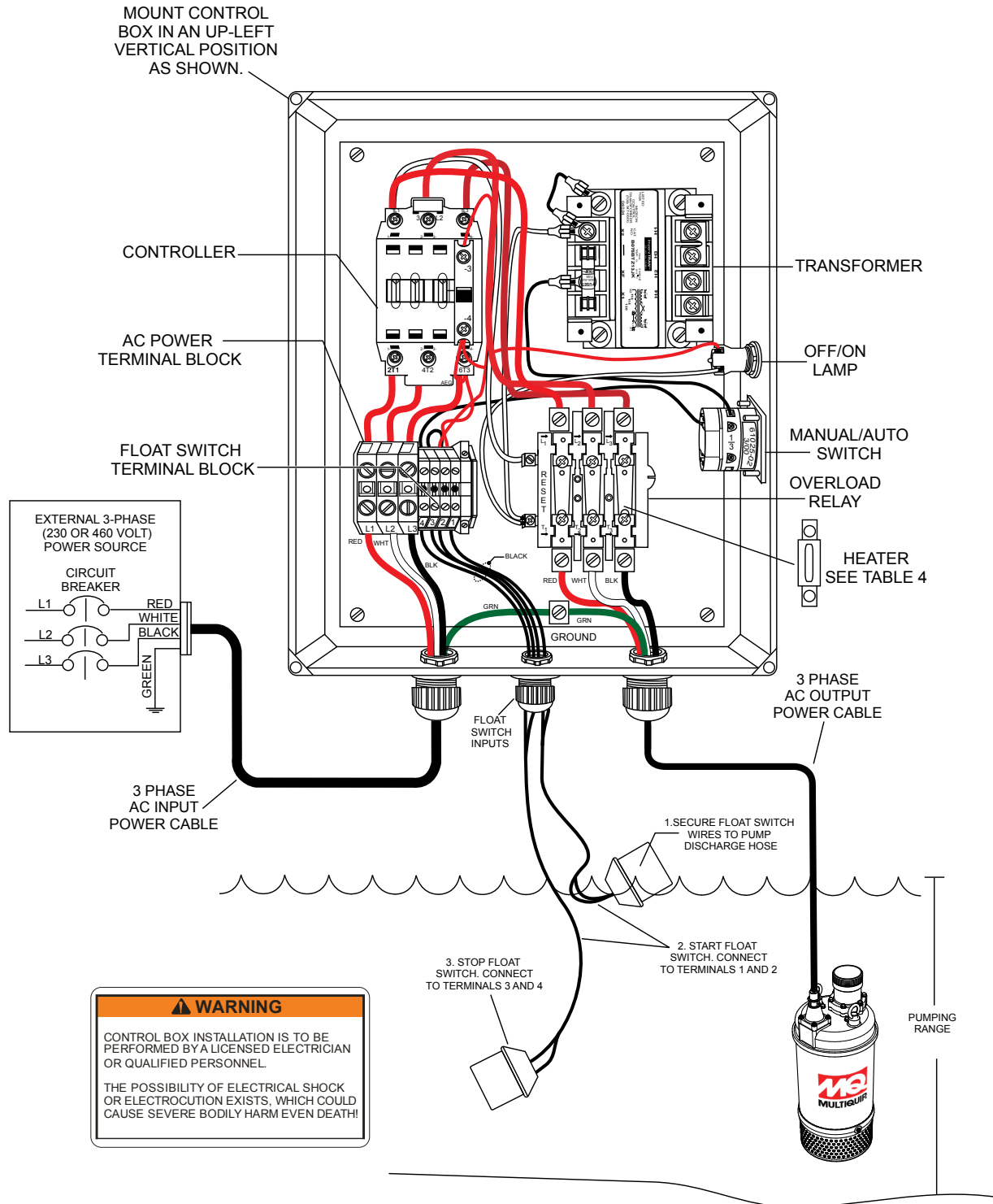


Figure 8. Three Phase Control Box/Pump System Diagram

Pump Placement

1. Attach a suitable lifting chain to the eye bolts or lift handle (Figure 9) on the pump. Use a crane, or similar lifting device and lower the pump into place. For applications where there is an excessive amount of mud, grit or silt, the use of a support platform is desirable.

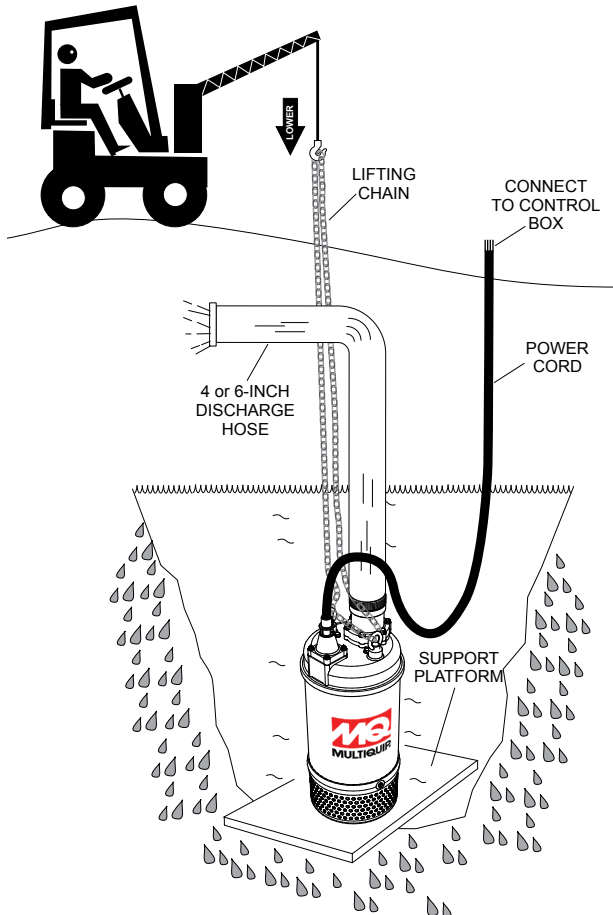


Figure 9. Placing the Submersible Pump (Correct Upright Position)

2. Make sure the pump is always placed in an upright position, not tilted (Figure 10). Never position the pump directly on a soft, loose bottom. To attain maximum pumping capacity and prevent excessive wear, position the pump so it will not burrow itself into sand or clay.

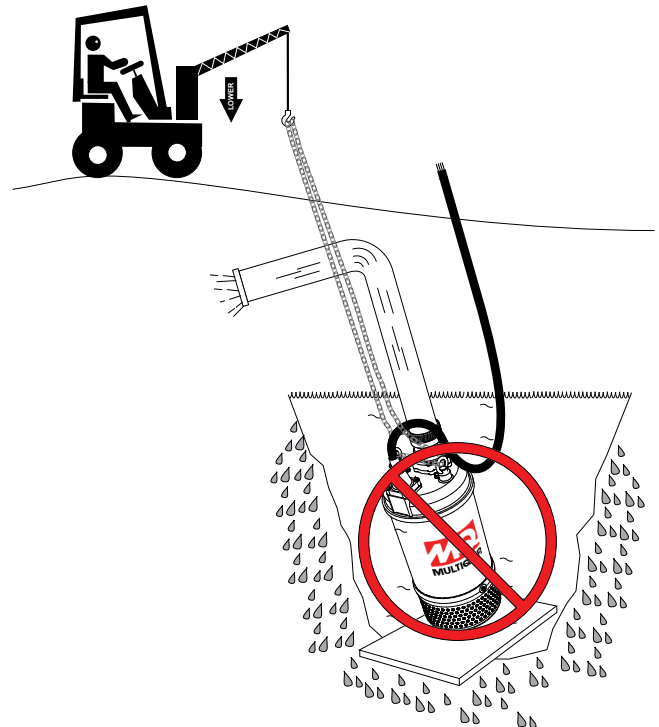
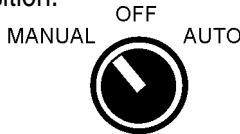


Figure 10. Tilted Position (Incorrect)

Control Box Operation (Manual Mode)

1. From the voltage source, set the circuit breaker or quick disconnect switch to the **ON** position.
2. For manual operation of the pump, place the 3-position operation switch (Figure 11) on the control box in the **MANUAL** position.



**Figure 11. Manual-Off-Auto SW.
(Manual Position)**

3. Verify that the **ON** indicator (Figure 12) on the control box is **LIT**. This means that power is being supplied to the control box.

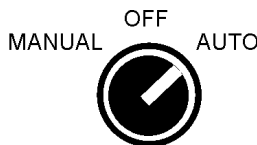


Figure 12. Control Box Power ON Indicator

4. In the manual mode the pump will run continuously. Pay close attention when running the pump in this mode. **DAMAGE** to the pump may occur if pump is not fully immersed in water.

Control Box Operation (Auto Mode)

1. To operate the pump automatically (float switches), place the 3-position operation switch in the **AUTO** position (Figure 13).



**Figure 13. Manual-Off-Auto SW.
(Auto Position)**

2. In the **AUTO** mode the pump will run as long as there is a sufficient amount of water. This amount of water is determined by the setting of the float switches. The **stop float** switch contacts will open when the water level is low and power will be removed from the pump's electric motor.

Once the water level has risen back to the appropriate level the **start float** switch contacts will close and power will be restored to the pump's motor.

Reset Button

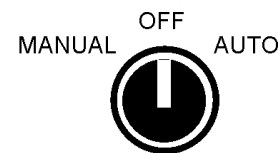
1. When the electronic overload module detects an overload condition, the pump will shut down. Check the pump and correct the cause of the overload.
2. Let the pump cool down, then press the **RESET** button (see Figure 14) on the front of the control box to restore power.



Figure 14. RESET Button

Shut-Down

1. Place the 3-position operation switch on the control box to the **OFF** position (Figure 15).



**Figure 15. Manual-Off-Auto SW.
(OFF Position)**

2. Verify that the control box power **ON** light is **OFF**.
3. Turn the circuit breaker or quick disconnect switch to the **OFF** position.
4. Using a suitable lifting device, lift the pump up from its current position and place on a secure flat surface.
5. Remove the discharge hose from the discharge port on the pump.
6. Remove all power cables and float switches from the control box. Place cables and float switches in a suitable container where they will not get damaged.
7. If the pump was used to pump mud, grit or silt, flush vigorously with clean water.
8. Wipe off any mud or debris that might have attached itself to the pump.
9. Store pump in a clean dry place away from dirt and debris.