TROUBLESHOOTING GUIDE

SJE RHOMBUS®

www.sjerhombus.com
888-DIAL-SJE

Full Load Current Single-Phase Alternating-Current Motors

The following values of full load currents are typical for motors running at usual speeds and motors with normal torque characteristics.

The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120 and 220 to 240 volts.

Horsepower	115 Volts	200 Volts	208 Volts	230 Volts
1/6	4.4	2.5	2.4	2.2
1/4	5.8	3.3	3.2	2.9
1/3	7.2	4.1	4.0	3.6
1/2	9.8	5.6	5.4	4.9
3/4	13.8	7.9	7.6	6.9
1	16	9.2	8.8	8.0
1 1/2	20	11.5	11.0	10
2	24	13.8	13.2	12
3	34	19.6	18.7	17
5	56	32.2	30.8	28
7 1/2	80	46	44	40
10	100	57.5	55	50

Source: National Electric Code, 2005 Edition.

Full Load Current Three-Phase Alternating-Current Motors

The following values of full load currents are typical for motors running at speeds usual for belted motors and motors with normal torque characteristics.

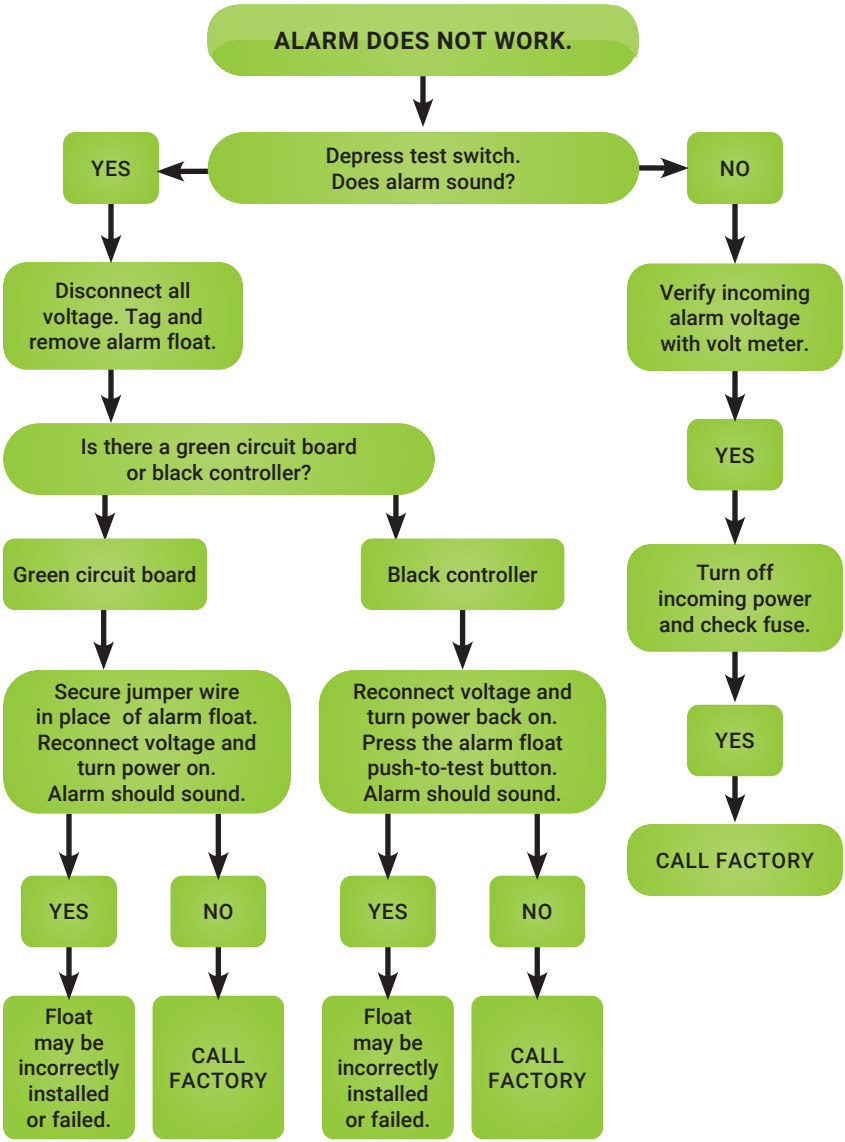
The voltages listed are rated motor voltages. The currents listed shall be permitted for system voltage ranges of 110 to 120, 220 to 240, 440 to 480, and 550 to 600 volts.

	Induction Type Squirrel Cage and Wound Rotor (Amperes)							Synchronous-Typen Unity Power Factor* (Amperes)			
Horse-power	115 Volts	200 Volts	208 Volts	230 Volts	460 Volts	575 Volts	2300 Volts	230 Volts	460 Volts	575 Volts	2300 Volts
1/2	4.4	2.5	2.4	2.2	1.1	0.9	--	--	--	--	--
3/4	6.4	3.7	3.5	3.2	1.6	1.6	--	--	--	--	--
1	8.4	4.8	4.6	4.2	2.1	1.7	--	--	--	--	--
1 1/2	12.0	6.9	6.6	6.0	3.0	2.4	--	--	--	--	--
2	13.6	7.8	7.5	3.8	3.4	2.7	--	--	--	--	--
3	--	11.0	10.6	9.6	4.8	3.9	--	--	--	--	--
5	--	17.5	16.7	15.2	7.6	6.1	--	--	--	--	--
7 1/2	--	25.3	24.2	22	11	9	--	--	--	--	--
10	--	32.2	30.8	28	14	11	--	--	--		
15	--	48.3	46.2	42	21	17	--				
20	--	62.1	59.4	54	27	22	--				
25	--	78.2	74.8	68	34	27	--	53	26	21	--
30	--	92	88	80	40	32	--	63	32	26	--
40	--	120	114	104	52	41	--	83	41	33	--
50	--	150	143	130	65	52	--	104	52	42	--
60	--	177	169	154	77	62	16	123	61	49	12
75	--	221	211	192	96	77	20	155	78	62	15
100	--	285	273	248	124	99	26	202	101	81	20
125	--	359	343	312	156	125	31	253	126	101	25
150	--	414	396	360	180	144	37	302	151	121	30
200	--	552	528	480	240	192	49	400	201	161	40
250	--	--	--	--	302	242	60	--	--	--	--
300	--	--	--	--	361	289	72	--	--	--	--
350	--	--	--	--	414	336	83	--	--	--	--
400	--	--	--	--	477	382	95	--	--	--	--
450	--	--	--	--	515	412	103	--	--	--	--
500	--	--	--	--	590	472	118	--	--	--	--

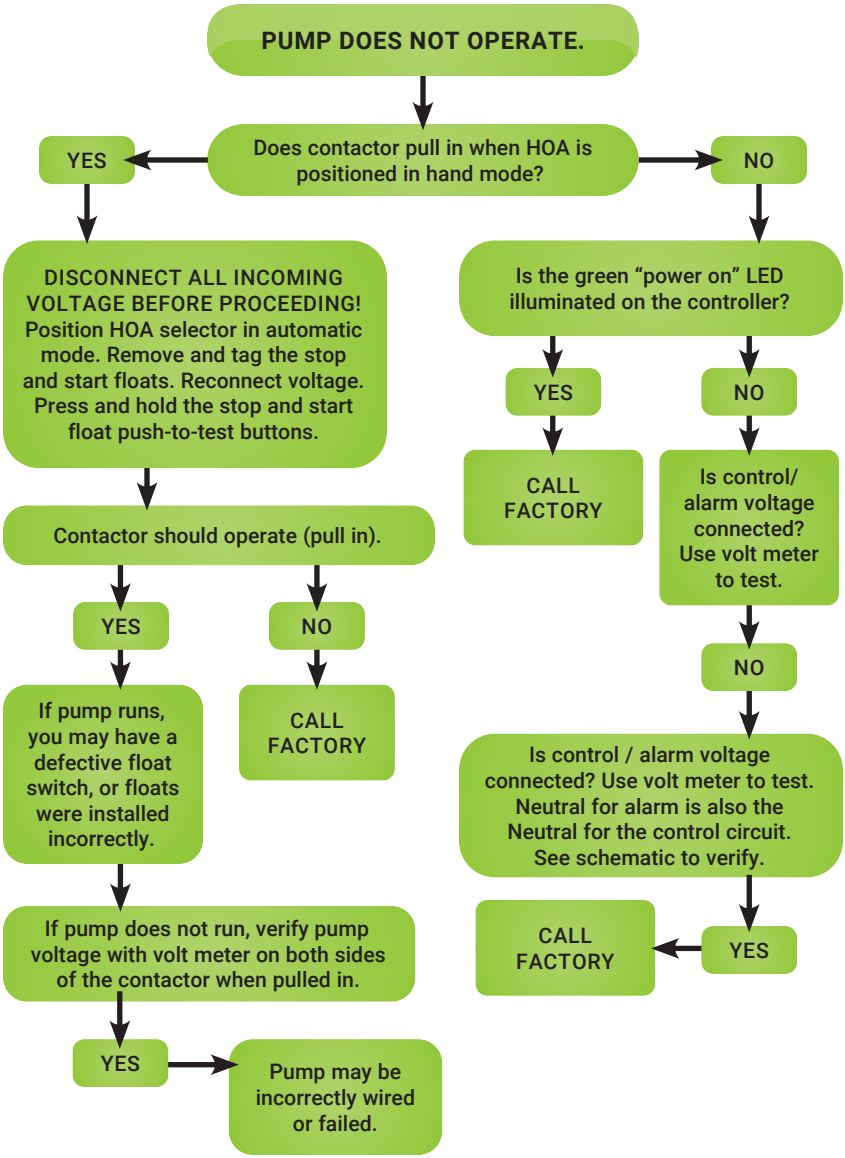
***For 90 and 80 percent power factor, the figures shall be multiplied by 1.1 and 1.25, respectively.**

Source: National Electric Code, 2005 Edition.

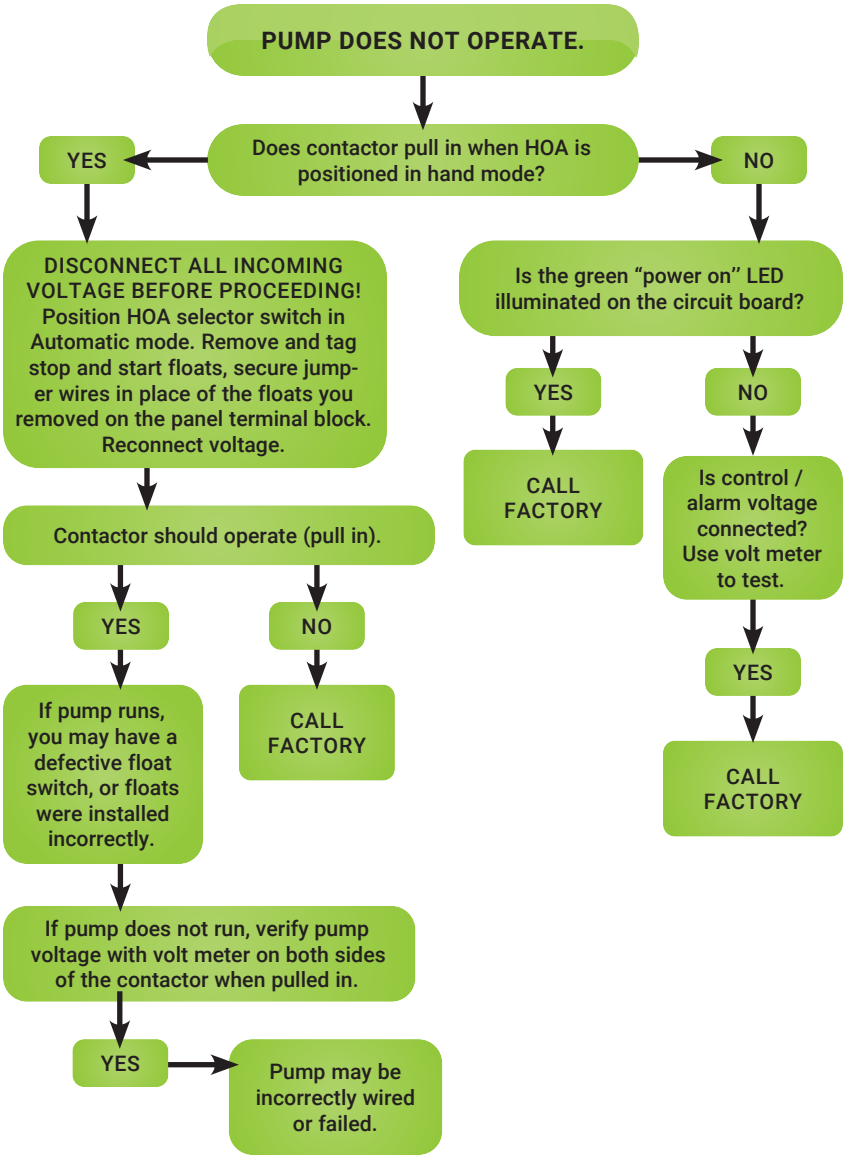
Alarm Circuit Troubleshooting

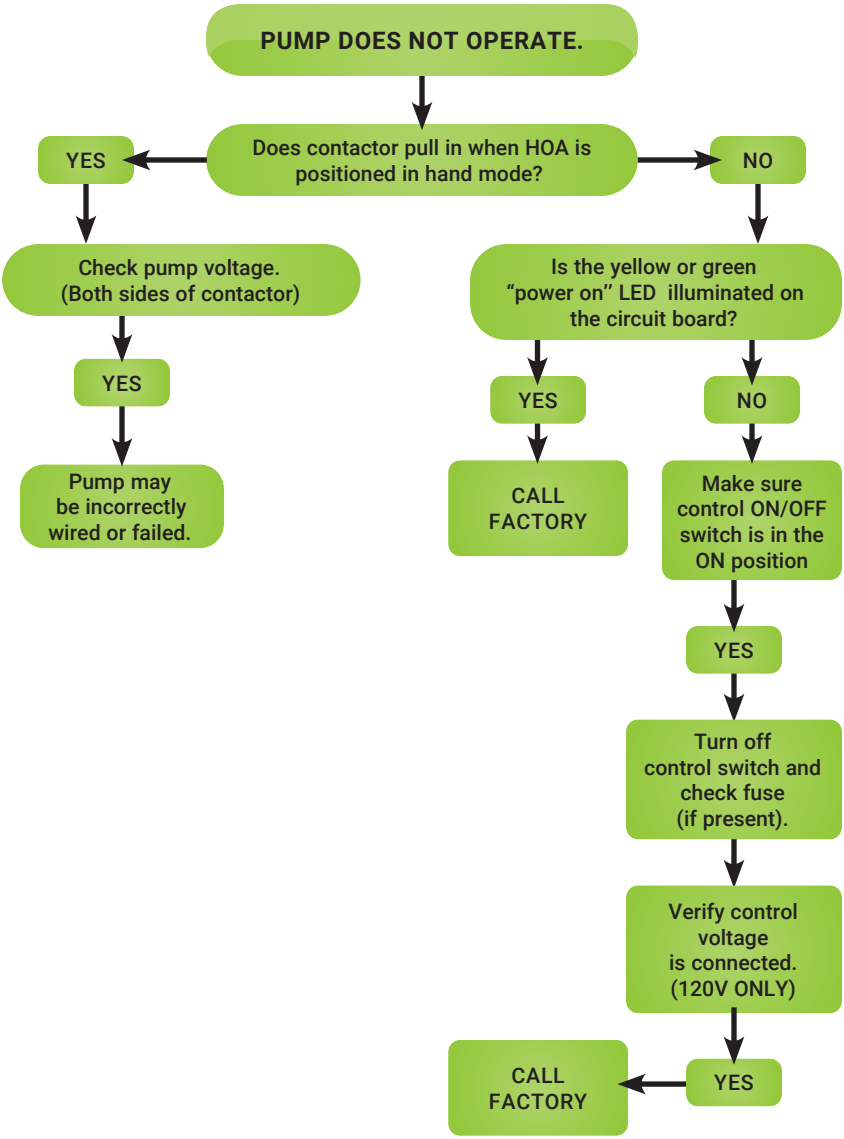


Green Simplex Circuit Board Troubleshooting
112, 312, 113, and 114 Control Panels

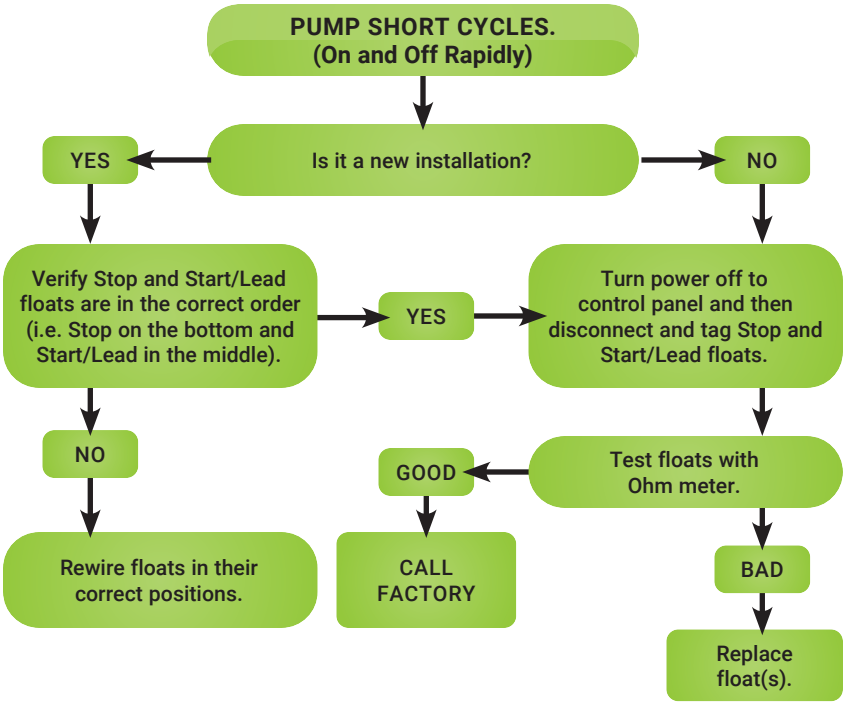


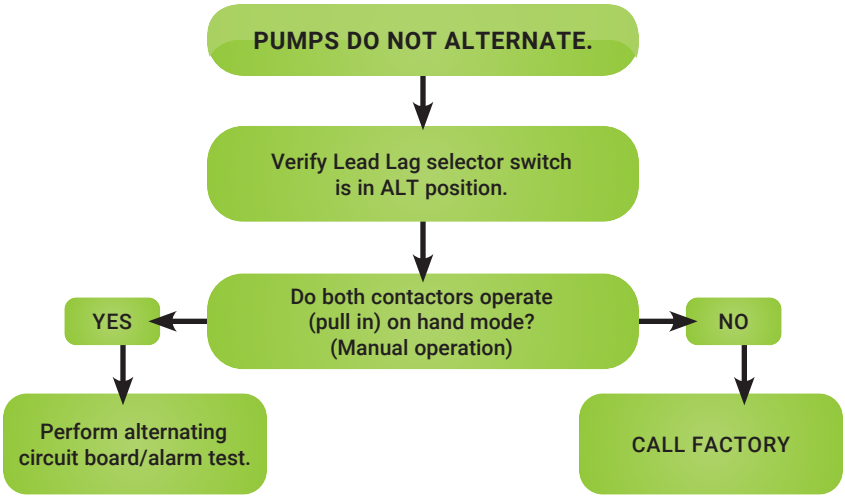
Black Simplex Controller Troubleshooting
112, 312, 113, and 114 Control Panels




PUMP DOES NOT OPERATE.
Does contactor pull in when HOA is positioned in hand mode?
YES
NO
Check pump voltage. (Both sides of contactor)
YES
Pump may be incorrectly wired or failed.
Is the yellow or green "power on" LED illuminated on the circuit board?
YES
CALL FACTORY
NO
Make sure control ON/OFF switch is in the ON position
YES
Turn off control switch and check fuse (if present).
Verify control voltage is connected. (120V ONLY)
YES
CALL FACTORY

Short Cycling
Simplex and Duplex Control Panels




PUMPS DO NOT ALTERNATE.
Verify Lead Lag selector switch is in ALT position.
Do both contactors operate (pull in) on hand mode? (Manual operation)
YES
NO
Perform alternating circuit board/alarm test.
CALL FACTORY

Alternating Circuit Board Test

For Panels That Have a Circuit Board without Black Cover

(Models 122, 123, 124, 322 and 324)

TO TEST PUMP ALTERNATION

1. Disconnect all power to the panel.
2. Turn the Control On/Off switch to the Off position.
3. Switch the HOA switches to the Auto position.
4. Tag the floats and remove them from the terminal block in the panel.
5. Place a jumper wire between positions 3 and 4.
6. Place a jumper wire between positions 5 and 6.
7. Reconnect power to the panel.
8. Turn the Control On/Off switch to the On position.
   a. One of the pumps should start.
   b. The stop and start float LED's should illuminate.
9. Turn the Control On/Off switch to the Off position.
10. Turn the Control On/Off switch to the On position.
    a. The other pump should start.
    b. The stop and start float LED's should illuminate
11. If the circuit board does not operate as indicated in steps 8 through 10 call the factory. If the circuit board operates as indicated, proceed to test alarm function.

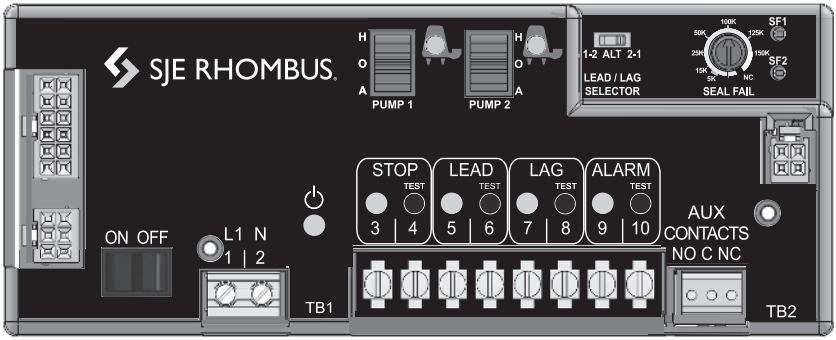
TO TEST ALARM FUNCTION

12. Disconnect all power to the panel.
13. Turn the Control On/Off switch to the Off position.
14. Remove jumper wires from 3 and 4; 5 and 6. Place a jumper wire between positions 7 and 8 (and 9 and 10 on a four float system)
15. Reconnect power to the panel.
16. Turn the Control On/Off switch to the On position.
    a. The alarm should activate.
    b. Lag/Alarm float LED should illuminate for 3 float system; or Alarm LED should illuminate on a 4 float system.
    c. Test the horn silence relay by pressing the Test/Normal/Silence switch. The horn should be deactivated.
17. If the circuit board does not operate as indicated in step 16, call the factory.

Alternating Circuit Board Test

For Panels That Have a Redesigned PCA with Black Cover

(Models 122, 123, 124, 322 and 324)



TO TEST PUMP ALTERNATION

1. Disconnect all power to the panel.
2. Tag the floats and remove them from the terminal block in the panel.
3. Reapply power to the control/alarm circuit.
4. Turn the Control On/Off switch to the on position.
5. Switch the HOA switches to the Auto position.
6. Move the Lead Lag selector switch to the ALT position.
7. Press and hold the STOP float push-to-test button (float status LED should illuminate).
8. Press and hold the LEAD float push-to-test button (float status LED should illuminate).
9. One of the motor contactors should engage. (Note which pump is being called to run by looking at pump call to run LEDs, one should be illuminated.)
10. Release both float push-to-test buttons.
11. Motor contactor should disengage.
12. Repeat steps 7-8, the other motor contactor should engage this time.
13. Press and hold the LAG float push-to-test button (float status LED should illuminate) both motor contactors should engage after three second lag pump delay.

TO TEST ALARM FUNCTION

14. Press and hold the ALARM float push-to-test button (float status LED should illuminate) beacon should illuminate and horn should sound.
15. Switch Silence/Test switch to silence, horn should stop sounding, beacon should remain illuminated until alarm float push-to-test button is released.
16. Release all float push-to-test buttons, both contactors should disengage and alarm should no longer be active.
17. If circuit board does not operate as indicated, call the factory.

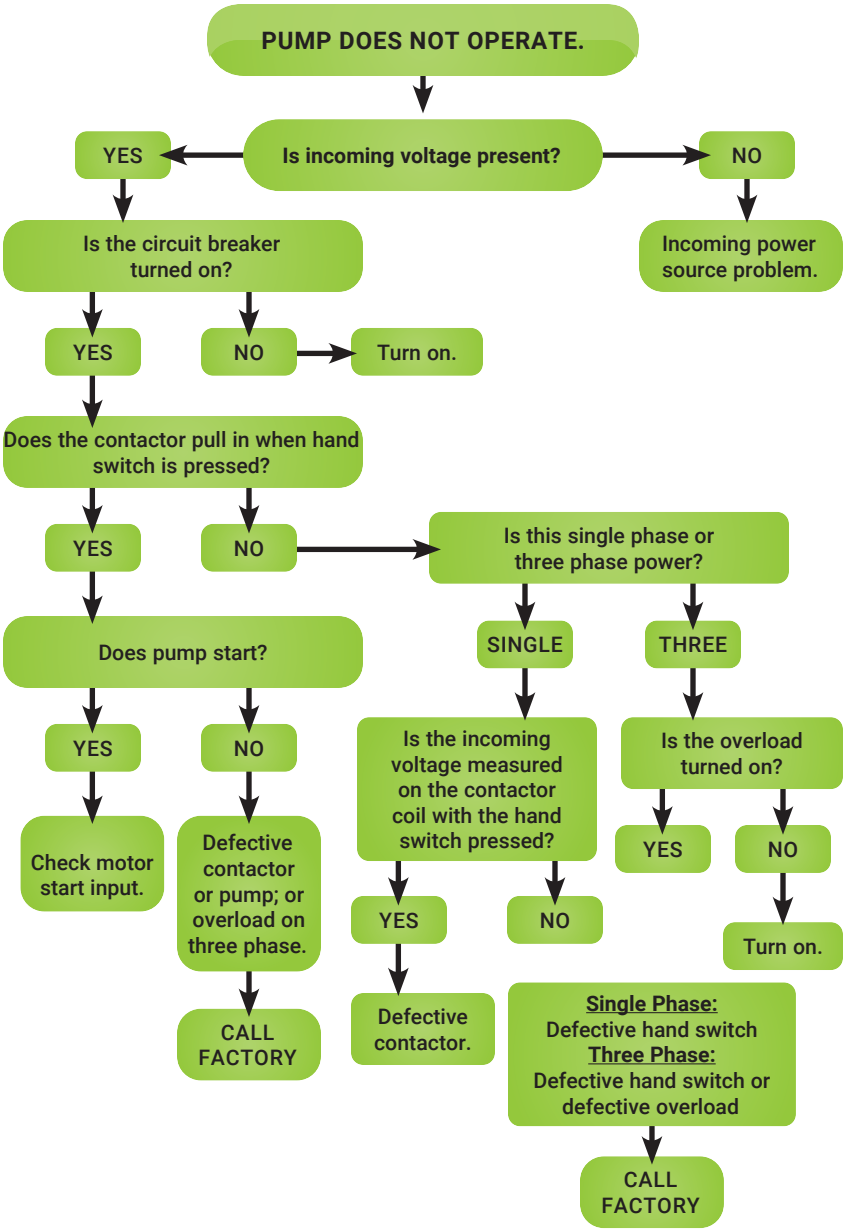
Duplex Three & Four Float Test

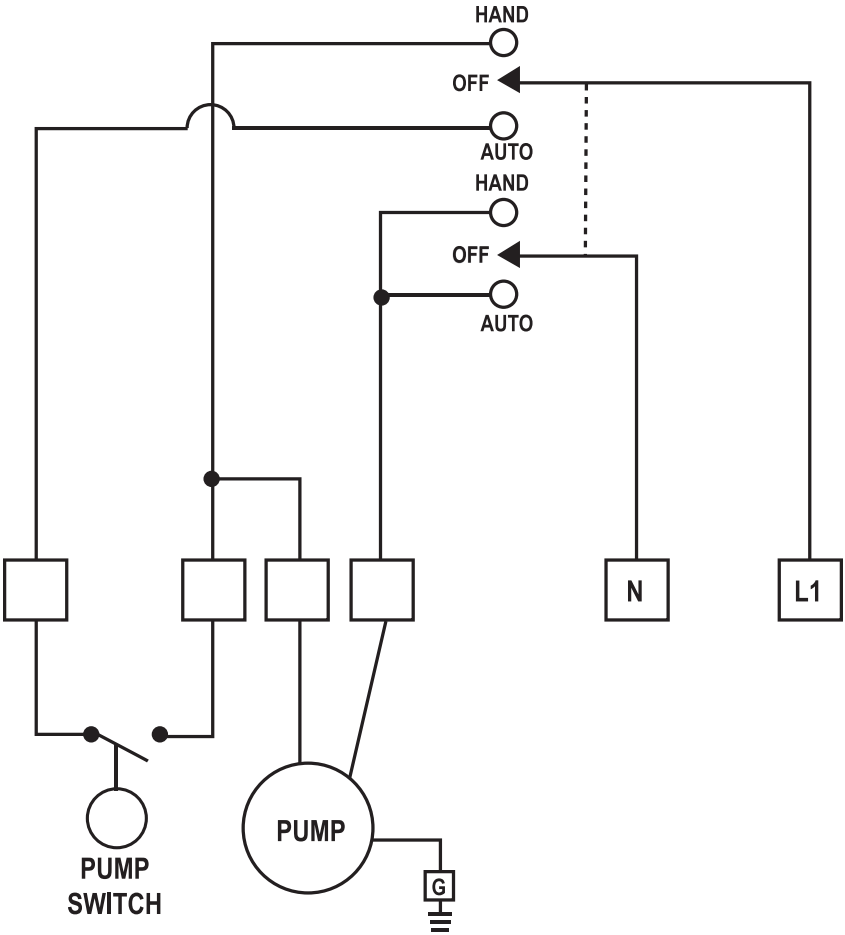
TO TEST FLOATS

1. If you have access to floats in tank, make sure control alarm power is ON and the yellow LED light is illuminated.
2. Turn HOA switches to OFF mode.
3. Lift up the stop float (lowest float in tank).
   Stop LED should illuminate.
4. Lift up the lead float (next one up from stop).
   Lead LED should illuminate.
5. Lift up Lag/Alarm float (3rd float from bottom).
   Lag/Alarm LED should illuminate.
6. 4 float panels only - Lift up alarm float.
   Alarm LED should illuminate.

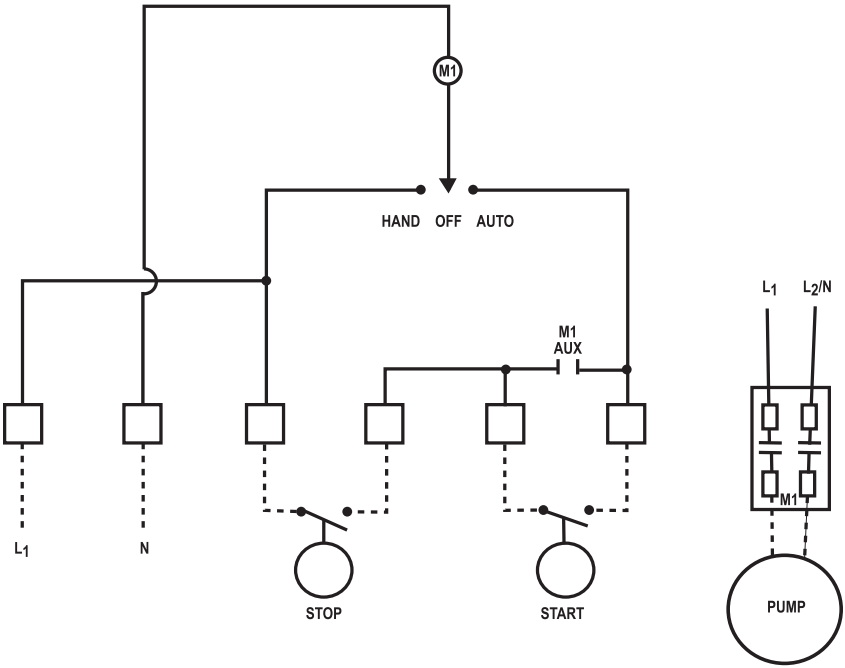
Timed Dosing Troubleshooting
TD, DTD and PS Control Panels

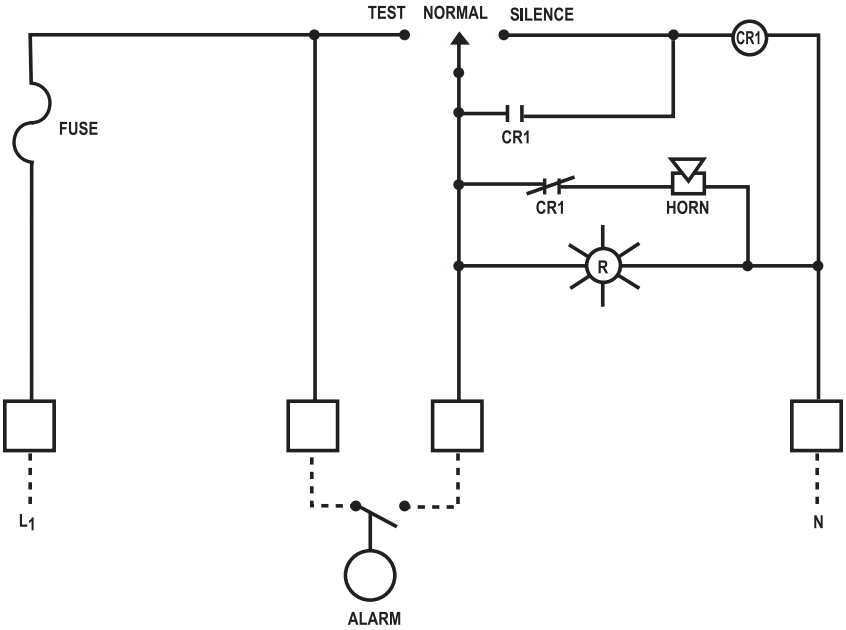
Starter Boxes Troubleshooting
All Models



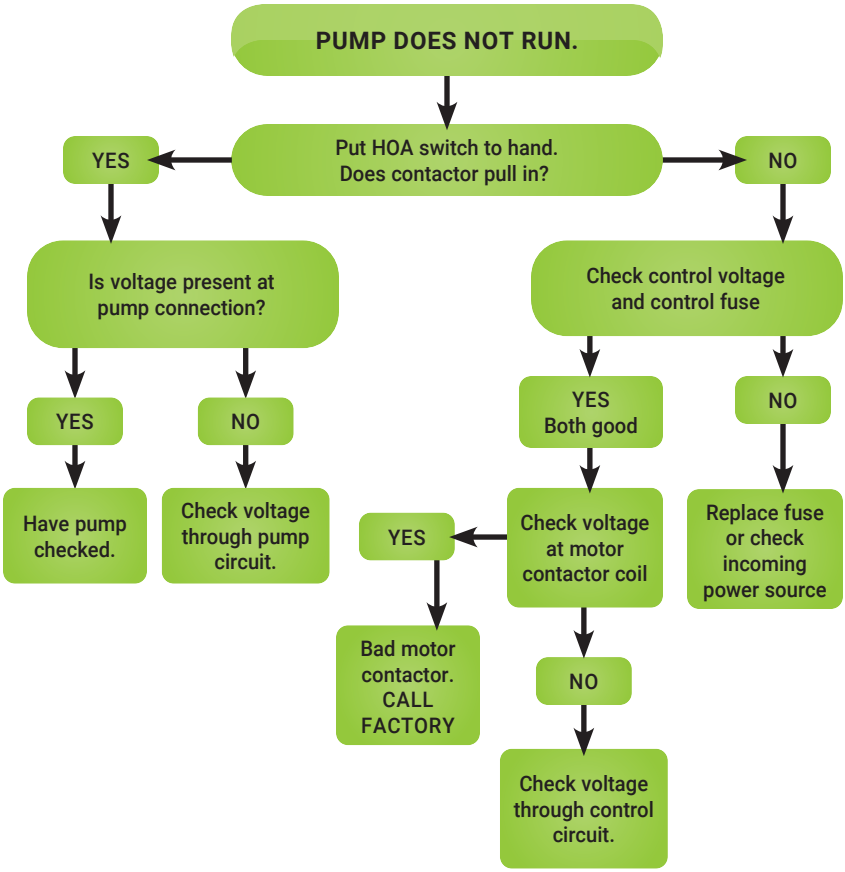

HAND
OFF
AUTO
HAND
OFF
AUTO
N
L1
PUMP
SWITCH
PUMP
G

Contactor Control




TEST
NORMAL
SILENCE
CR1
FUSE
CR1
CR1
HORN
R
L1
N
ALARM

Troubleshooting a Motor Circuit



Most Common New Installation Errors to Avoid:

Panels equipped with the redundant off option:
- Redundant off float not connected
- Pump will not run in hand or automatic mode on a TD type panel
- Pump will not run in automatic mode on a standard panel. It will however, run in hand mode
- If the float is not available, secure jumper wire in place of the redundant off float

Panels equipped with thermal cutout connection:
- Pump does not run in Hand or Automatic mode
- Verify thermal cutout is connected

To test panel operation:
- Disconnect voltage; Tag and remove the thermal cutout wires
- Use a jumper wire (on panel terminal block) in place of the thermal cutout wires
- Reconnect voltage. If pump runs in hand mode, thermal cutout connection is incorrect or possible defective thermal switch in pump

Installation Tips to Assist in New Installation:

Incoming power:
- Correct incoming voltage: Example---208V or 240V or 480V
- Control Alarm voltage: L1------L1------N
- Alarm-Control-Neutral
- For code some places require two 120V lines to come in and share neutral, otherwise bring in the hot lead to a L1 (TB1:1) and neutral to N (TB1:3) and jumper L1 (TB1:1) and L1 (TB1:2) together.

Floats: Have to be in correct order and on correct terminal block position

4-Float, Duplex	**3-Float Duplex**	**Simplex (Green Circuit Board)**	**Simplex (Black Controller)**
Alarm (TB1:9 & 10)	Lag Alarm (TB1:7 & 8)	Alarm (TB1:8 & 9)	Alarm (TB1:7 & 8)
Lag (TB1:7 & 8)	Lead (TB1:5 & 6)	Start (TB1:6 & 7)	Start (TB1:5 & 6)
Lead (TB1:5 & 6)	Stop (TB1:3 & 4)	Stop (TB1:4 & 5)	Stop (TB1:3 & 4)
Stop (TB1:3 & 4)	Jumper on (TB1:8 & 10)		

TD Panel (Simplex)	**DTD Panel (Duplex)**
Alarm (TB1:1 & 2)	Alarm (TB1:7 & 8)
Timer Override-wide	Timer Override-wide
Angle (optional) (TB1:3 & 4)	Angle (optional) (TB1:5 & 6)
Low Level Cutout-wide angle (TB1:5 & 6)	Low Level Cutout-wide angle (TB1:3 & 4)
Redundant Off (optional) (TB1:7 & 8)	Redundant Off (optional) (TB1:1 & 2)

Make sure:
- Breakers ON; Overload ON; Motor protective switch ON; Power switch (PCB) ON
- HOA (Hand/Off/Auto) switch to correct position
- Automatic is all the way down toward pump run lights on PCB
- Lead lag switch to correct position; 3 position switch, center is alternate

Three Phase panels:
- Floating wire, has a white tag, hooked up to correct transformer position for appropriate voltage

Seal Fail Thermal Cutout:
- Hooked up to correct terminal block connections.
- Seal fail = infinite ohms open
- Thermal cutout = 0 ohms closed

CIRCUIT BOARD REPLACEMENT

If a replacement circuit board is needed, please contact factory.

MODEL: 1121W914H10E

1 PHASE, SIMPLEX TYPE 4X | SCHEMATIC #: 1008001C | SERIAL #: 5554 – 00321

	VOLTS	HZ	PHASE	FL AMPS	TOTAL FLA
MOTOR 1:	120	60	1	8 TO 15	19
CONTROL CIRCUIT:	120	60	1	2	
ALARM CIRCUIT:	120	60	1	2	

STARTING DEVICE: MOTOR CONTACTOR

17134.0

Schematic Symbols


FUSE

SPST SWITCH

SPST PUSH SWITCH

HAND, OFF, AUTO SWITCH


GROUND


LIQUID LEVEL (N.O.) FLOAT

RED ALARM BEACON

AUDIO ALARM (HORN)

SOLID STATE FLASHER

MOTOR CONTACTOR COIL

ELAPSED TIME METER

EVENT COUNTER

GREEN INDICATOR LIGHT

START RELAY COIL

START RELAY (N.C.) CONTACT

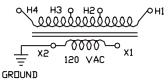
RUN CAPACITOR

START CAPACITOR

CONTROL RELAY COIL

(N.O.) CONTACT

(N.C.) CONTACT



MULTITAP TRANSFORMER

ANTI-CONDENSATION HEATER

LIGHTNING ARRESTOR


THERMAL CUTOUT (N.C.)

PUMP (MOTOR)

CIRCUIT BREAKER

Troubleshooting Tank Alert® Alarms

Tank Alert® alarm systems must be installed according to national and local electrical codes. Below are troubleshooting tips for some of the most common issues:

Tank Alert® AB Alarms

Is the voltage being applied directly to the screw terminals on the alarm? The screw terminals are for connection of the float switch only. The screw terminals should not be connected to an external power source or to contacts which provide an external power source.

Is voltage being applied directly to the SJE SignalMaster® control switch? The SJE SignalMaster® control switch closes the alarm circuit inside the alarm. It should not be connected to an external power source.

Is the green "power on" light off when the unit is plugged in? There may be a problem with the alarm. Check to see if there is power to the unit. Remove the battery if one is installed. Push the "Test" button. If the red light comes on and the horn sounds then the alarm has power. There may be problems with the green LED. Return the alarm to the factory. Note: The "Test" button tests the functionality of the alarm, not the whole system. Inspect the power cord for damage.

> **To check for continuity:** Disconnect power. Place the meter leads on flat plug terminals. If the volt/Vohm meter reads no continuity, there may be a problem with one of the alarm circuit elements. Return the alarm to the factory.

Are the warning light and horn off when the float is in the "on" position? (up for a high level application or down for a low level application) There may be a problem with the alarm wiring.

Tank Alert® I Alarms

Is the green "power on" light off when power is applied? There may be a problem with the alarm. Check to see if there is power to the unit. Push the "Push To Test" switch. If the red light comes on and the buzzer sounds then the alarm has power. There may be problems with the green LED. Return the alarm to the factory. Note: The "Push To Test" switch tests the functionality of the alarm, not the whole system. Inspect the power cord for damage.

> **To check for continuity:** Disconnect power. Place the meter leads on flat plug terminals. If the plug has been removed, place meter leads on bare wires at the end of the power cord. If the volt/ohm meter reads no continuity, there may be a problem with one of the alarm circuit elements. Return the alarm to the factory.

Are the warning light and horn off when the float is in the "on" position? (up for a high level application or down for a low level application) There may be a problem with the alarm wiring or the control switch. Push the test button. Horn and red light should come on. If they do not, return unit to the factory. Disconnect power from the unit

> **To test for continuity:** Place the meter leads on flat plug terminals. If the plug has been removed, place meter leads on bare wires at the end of the power cord. If the volt/ohm meter reads no continuity, there may be a problem with one of the alarm circuit elements. Return the alarm to the factory.
>
> **Float:** Make sure the float switch is the correct model for the application. A Normally Open (NO) float switch is used for high level alarm applications and Normally Closed (NC) float switch is used for low level alarm applications. Check the label on the float switch cable.
>
> **If the cable label is gone:** Raise the float up. If the alarm activates, the float switch is a high level alarm model. Lower the float down. If the alarm activates, the float switch is a low level alarm model. Check the installation instructions for correct terminal positions. Check the connection between the float cable leads and the terminal strip. Inspect the alarm power cord for damage. Check the float for proper positioning, tether length, or obstructions which may have caused the float to hang-up. Inspect the float cable for damage.

To test for continuity: Disconnect the float cable leads from the screw terminals. Connect a volt/ohm meter to the white and black leads. Move the float to the "on" position (up for high level alarm models, down for low level alarm models). If the volt/ohm meter reads no continuity, there may be a problem with the switch circuit elements.

Is the warning light on when the float is in the "off' position? (up for a for a normally closed application or down for a for a normally open application). There may be a problem with the alarm wiring or the control switch. Disconnect power from the unit.

Alarm: Check the connection between the float cable leads and the screw terminals under the alarm. Make sure the float switch is the correct model for the application. A Normally Open (NO) float switch is used for high level alarm applications and Normally Closed (NC) float switch is used for low level alarm applications. Check the label on the float switch cable.

If the cable label is gone: Raise the float up. If the alarm activates, the float switch is a high level alarm model. Lower the float down. If the alarm activates, the float switch is a low level alarm model. Check the float for proper positioning, tether length, or obstructions which may have caused the float to hang-up. Inspect the float cable for damage.

To test for continuity: Disconnect the float cable leads from the screw terminals. Connect a volUohm meter to the white and black leads. Move the float to the "off' position (down for high level alarm models, up for low level alarm models.) If the volt/ohm meter reads continuity, there may be a problem with the switch circuit elements.

Tank Alert® XT or 4X Alarms

Is proper voltage being applied to the system? The voltage of the unit is listed on the ratings label included inside the alarm panel. The internal components of the 120 VAC Tank Alert® XT or 4X will be damaged if 230 VAC is applied.

Is voltage being applied directly to the Sensor Float® control switch? The Sensor Float® control switch closes the alarm circuit inside the alarm. It should not be connected to an external power source. Check the installation instructions for correct terminal positions.

Disable Low Temperature Alarm:

Rapidly press the test/silence button 4 times then press and hold until the temperature LED stops flashing.

Enable Temperature Alarm:

Rapidly press the test/silence button 4 times then press and hold until the temperature LED stops flashing and remains illuminated.

LED low temperature indicator activates at 40°F (4°C) to alert of potential freezing conditions (green for temperature normal, red for low temperature).

Control Switch Overview

Narrow-angle control switches accurately monitor high (normally open) or low (normally closed) liquid level conditions in water and sewage applications to activate control panels and alarms. Select models have colored caps for easy identification.

Control Switch	Type of Activation	Control Differential	Electrical Rating	Mounting Options
 **EZconnex® Float Switch** Blue Cap = Normally Open (Narrow or Wide Angle) Red Cap = Normally Closed (Narrow or Wide Angle)	Mechanically Activated	Narrow 1.5 inch (4 cm) Wide 4 in (10 cm) above or below horizontal	125 VAC/30 VDC 0.160mA - 1A, 5 VDC 1mA min.	Mounting clamp or cable weight
 **SJE MegaMaster™**	Mechanically Activated	Approx 10° above or below horizontal	1mA - 1A 4 VDC - 125 VAC	Internal weight
 **SJE SignalMaster®** Yellow Cap = Normally Open	Mechanically Activated	Approx 1.5 in (4 cm) above or below horizontal	5 amp 125V or 250V	Mounting clamp or cable weight
 **SJE SignalMaster®** White Cap = Normally Closed	Mechanically Activated	Approx 1.5 in (4 cm) above or below horizontal	5 amp 125V or 250V	Mounting clamp or cable weight
 **SJE SignalMaster® SPDT** Green Cap = Single Pole, Double Throw	Mechanically Activated	Approx 1.5 in (4 cm) above or below horizontal	5 amp 125V or 250V	Mounting clamp or cable weight
 **SJE MilliAmpMaster® WPS** Orange Cap = WPS Control Switch ***For Use in Potable Water**	Mechanically Activated	Approx 1.5 in (4 cm) above or below horizontal	125 VAC/30 VDC 0.160mA - 1A, 5 VDC 1mA min.	Mounting clamp
 **SJE MilliAmpMaster®** Blue Cap = Narrow or Wide Angle	Mechanically Activated	Narrow 1.5 inch (4 cm) Wide 4 in (10 cm) above or below horizontal	125 VAC/30 VDC 0.160mA - 1A, 5 VDC 1mA min.	Mounting clamp or cable weight
 **Sensor Float®**	Mercury Activated	Approx .5 in (1 cm) above or below horizontal	5 amp 120V or 230V	Mounting clamp, cable weight, internal weight
 **Sensor Float® Mini**	Mercury Activated	Approx .5 in (1 cm) above or below horizontal	5 amp 120V or 230V	Mounting clamp or cable weight

Control Switch Installation

⚠WARNING **ELECTRICAL SHOCK HAZARD**
Disconnect power before installing or servicing this product. A qualified service person must install and service this product according to applicable electrical and plumbing codes.

⚠WARNING **EXPLOSION OR FIRE HAZARD**
Do not use with flammable liquids. Install in accordance with ANSI/NFPA 70. Suitable for usage with intrinsically safe circuit extensions as defined by UL 698A.

Failure to follow these precautions could result in serious injury or death. Replace product immediately if switch cable becomes damaged or severed. Keep these instructions with warranty after installation. This product must be installed in accordance with National Electric Code, ANSI/NFPA 70 so as to prevent moisture from entering or accumulating within boxes, conduit bodies, fittings, float housing, or cable.

MOUNTING THE SWITCH

WARNING: Do not install switch in direct line of incoming liquid.

1. Place the cord into the clamp as shown in Figure B.
2. Locate clamp at desired activation level and secure the clamp to the discharge pipe as shown in Figure A. **Note:** Do not install cord under hose clamp.
3. Tighten the hose clamp using screwdriver. Over tightening may result in damage to the plastic clamp. Make sure the float cable is not allowed to touch the excess hose clamp band during operation.
4. Wire switch.
5. Check installation. Allow system to cycle to insure proper operation.

Note: All hose clamp components are made of 18-8 stainless steel material. See your SJE Rhombus® supplier for replacements.

CABLE WEIGHT

1. Determine desired activation level.
2. Suspend switch and cable weight at desired activation level as shown in Figure B.
3. Wire switch.
4. Check installation. Allow system to cycle to insure proper operation.

To adjust cable weight tether length:

1. Release clip.
2. Adjust cable weight to desired position.
3. Lay switch cable in weight channel.
4. Align clip with weight channel and slide towards switch cable as shown in Figure B.
5. Snap clip snugly up to cable, moving clip to tightest possible position.

Figure A

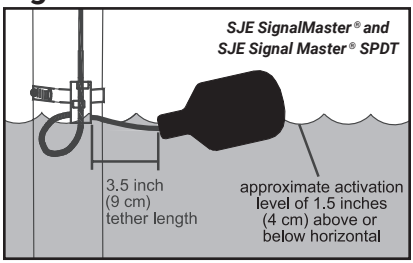
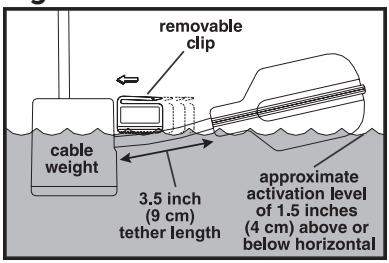


Figure B



Pump Switch Overview

Wide-angle pump switches directly control pumps up to 3 HP at 250 VAC. Each switch features an adjustable pumping range.

Pump Switch		Type of Activation	Pump Control	Max Pump Run Current	Max Pump Start Current	Pumping Range
	**SJE PumpMaster® WPS** *For Use in Potable Water	Mechanically Activated	1/2 HP, 120V 1 HP, 230V	13A, 120V 13A, 230V	85A, 120V 85A, 230V	7 - 36 in (18 - 91 cm)
	**SJE PumpMaster®**	Mechanically Activated	1/2 HP, 120V 1 HP, 230V	13A, 120V 13A, 230V	85A, 120V 85A, 230V	7 - 36 in (18 - 91 cm)
	**SJE PumpMaster® Plus**	Mechanically Activated	3/4 HP, 120V 2 HP, 230V	15A, 120V 15A, 230V	85A, 120V 85A, 230V	7 - 36 in (18 - 91 cm)
	**SJE PumpMaster® SPDT** (Single Pole, Double Throw)	Mechanically Activated	1/2 HP, 120V 1 HP, 230V	13A, 120V 13A, 230V	85A, 120V 85A, 230V	7 - 36 in (18 - 91 cm)
	**Double Float® Master**	Mechanically Activated	15 FLA, 90LRA 120 or 240V	15A, 120V 15A, 240V	90A, 120V 90A, 240V	3 - 48 in (7.6 - 122 cm)
	**SJE AmpMaster®**	Mechanically Activated	1 1/2 HP, 125V 3 HP, 250V	20A, 125V 20A, 250V	120A, 125V 120A, 250V	9 - 24 in (23 - 61 cm)
	**SJE VerticalMaster® 3 Plus** (For Limited Space Applications)	Mechanically Activated	1/2 HP, 120V 1 HP, 230V	13A, 120V 13A, 230V	78A, 120V 78A, 230V	2 - 6.5 in (5 - 17 cm)
	**SJE MicroMaster® AC/DC**	Mechanically Activated	Use pump run and start current	10A, 12VDC 10A, 12VDC 8A, 250VAC	100A, 12VDC 60A, 125V 60A, 250V	8 - 36 in (20 - 91 cm)
	**SJE MicroMaster® Plus WS**	Mechanically Activated	Use pump run and start current	13A, 125V 13A, 250V	78A, 125V 78A, 250V	8 - 36 in (20 - 91 cm)
	**SJE MicroMaster® RA**	Mechanically Activated	15 FLA, 120V	15A, 120V	90A, 120V	2.5 - 3.5 in cord tether length (16.5 - 48 cm)
	**Junior Super Single®**	Mercury Activated	1/2 HP, 120V 1 HP, 230V	13A, 120V 8A, 230V	40A, 120V 20A, 230V	6.5 - 19 in (16.5 - 48 cm)
	**Double Float®**	Mercury Activated	1 HP, 120V 2 HP, 230V	15A, 120V 12A, 230V	55A, 120V 35A, 230V	1.75 - 48 in (4.45 - 122cm)
	**SJE HiTempMaster™**	Mechanically Activated	Use pump run and start current	13A, 125V 13A, 250V	78A, 125V 78A, 250V	8 - 36 in (20 - 91 cm)

Mechanical Pump Switch Tether Lengths

SJE PUMPMASTER®

Mechanically-activated pump switch for direct control of pumps in:

- Sewage
- Water

U.S. Patent Nos. 5,087,801 & 5,142,108

tether length (inches)	3.5 min.	6	10	14	18	22	24 max.
pumping range (inches)	7	10	16	22	28	33	36

SJE PUMPMASTER® PLUS

Mechanically-activated pump switch for direct control of pumps in:

- Sewage
- Water

U.S. Patent Nos. 5,087,801 & 5,142,108

tether length (inches)	3.5 min.	6	10	14	18	22	24 max.
pumping range (inches)	7	10	16	22	28	33	36

SJE PUMPMASTER® SPDT

Mechanically-activated pump switch for direct control of pumps in:

- Sewage
- Water

U.S. Patent Nos. 5,087,801 & 5,142,108

tether length (inches)	3.5 min.	6	10	14	18	22	24 max.
pumping range (inches)	7	10	16	22	28	33	36

SJE AMPMASTER®

Mechanically-activated pump switch for direct control of pumps in:

- Sewage
- Water

U.S. Patent Nos. 5,087,801 & 5,142,108

tether length (inches)	5 min.	10	14	18	22 max.
pumping range (inches)	9	13	17	21	24

JUNIOR SUPER SINGLE®

Mercury-activated pump switch for direct control of pumps in:

- Sewage
- Water
- Non-turbulent applications

U.S. Patent Nos. 4,429,854 & 4,572,934

tether length (inches)	3.5 min.	6	8	10	12	15	17 max.
pumping range (inches)	6.5	8.5	11	13	14	17	19

Common Pump & Control Switch Part Numbers

SJE PumpMaster® Pump Switch			
Pump Down		Pump Up	
Part #	Description	Part #	Description
1002727	20PMD1WP	1002733	20PMU1WP
1002729	20PMD2WP	1002735	20PMU2WP
1002731	20PMDWOP	1002737	20PMUWOP
SJE PumpMaster® PLUS Pump Switch			
Pump Down		Pump Up	
Part #	Description	Part #	Description
1003255	20PMPD1WP	1003261	20PMPU1WP
1003257	20PMPD2WP	1003263	20PMPU2WP
1003259	20PMPDWOP	1003265	20PMPUWOP
Double Float Master® Pump Switch			
Pump Down		Pump Up	
Part #	Description	Part #	Description
1017660	20DFMMD1WP	1017672	20DFMMU1WP
1017661	20DFMMD2WP	1017673	20DFMMU2WP
1017662	20DFMMD1WOP	1017674	20DFMMU1WOP
1017663	20DFMMD2WOP	1017675	20DFMMU2WOP
SJE SignalMaster® Control Switch			
Normally Open		Normally Closed	
Part #	Description	Part #	Description
1006044	20SGMPCNO	1006048	20SGMPCNC
1006052	20SGMWENO	1006056	20SGMWENC
SJE MilliAmpMaster™ Control Switch			
Narrow Angle Normally Open		Narrow Angle Normally Closed	
Part #	Description	Part #	Description
1018846	20MANPCNO	1018847	20MANPCNC
1018848	20MANWENO	1018849	20MANWENC
Wide Angle Normally Open		Wide Angle Normally Closed	
Part #	Description	Part #	Description
1016211	20MAPCNO	1016212	20MAPCNC
1016213	20MAWENO	1016214	20MAWENC

D = Pump Down U = Pump Up 1 = 120 VAC 2 = 230 VAC
WP = With Plug WOP = Without Plug
PC = Pipe Clamp WE = Weighted Externally NO = Normally Open NC = Normally Closed

Troubleshooting Pump and Control Switches

SJE Rhombus pump and control switches must be installed according to national and local electrical codes. Below are troubleshooting tips for some of the most common issues:

- Is the pump load OFF when the float is in the “on” position or is the pump load ON when the float is in the “off” position?
- Is proper voltage being applied to the system?
- Is the Double Float® pump switch short cycling on one float?
- Is the control panel or alarm off when the control switch is in the “on” or “off” positions?
- Is there sloshing in the float?
- Was the switch used in an application other than those recommended in the product literature?

Is the pump load OFF when the float is in the “on” position or is the pump load ON when the float is in the “off” position?
The “on” position is up for a Pump Down model or down for a Pump Up model. The “off” position is down for a Pump Down and up for a Pump Up model. If so, there may be a problem with the wiring, the pump, or the float. Disconnect power before proceeding.

Wiring: Inspect the cable for damage. Double-check your wiring against the wiring diagram on the installation instructions.

Pump (to test the pump)
Without Plug Models - If wiring is consistent with installation instructions, remove the pump switch wires and install a jumper wire across terminals where pump switch wires were connected (red and black wires for the Double Float®). Turn on the power. If pump does not run, consult pump/control panel operation instructions. Note: a Junior Super Single® pump switch should not be directly wired to control a motor contactor or relay.

With Plug Models - Plug in the pump only. If the pump does not run, consult the pump operation instructions. Note: The pump may have experienced a thermal overload. Allow time for the pump to cool down and then test the motor again as defined above.

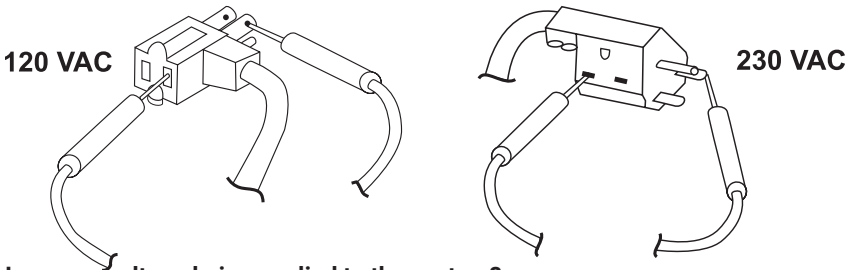
Troubleshooting Pump and Control Switches

Float: Make sure the float switch is the correct model for the application. (A Pump Up float switch is used for filling applications and a Pump Down float switch is used for emptying applications.) Check the label on the float switch cable. To determine float model in the absence of a label:
- Lower the float. If the pump activates, the float switch is a pump up model.
- Raise the float. If the pump activates, the float switch is a pump down model.

Note: An SPDT switch will have continuity between black and white wires when the float is up. It will have continuity between white and red when the float is down.

Check the float for proper positioning, tether length, or obstructions which may have caused it to hang-up. For the Double Float®, the gray float is always the top float and the black float is always the bottom float.

To test for continuity: Connect a volt/ohm meter to the black and white leads, see figure below for units with plug. Move the float to the "on" position (up for pump down models, down for pump up models). For a Double Float® both floats must be moved to the "on" position. If the volt/ohm meter reads no continuity, there may be a problem with the switch circuit elements. Return the float to your supplier.



Is proper voltage being applied to the system?

The voltage of the switch is listed on the label attached to the cable. A 120 VAC Double Float® will be damaged if 230 VAC is applied. A 230 VAC Double Float® will not operate on 120 VAC. In the absence of a cord label the voltage of a Double Float® can be discovered by measuring the resistance of the relay coil inside the switch. Disconnect power before proceeding. Disconnect the red and white wires, connect the volt/ohm meter leads to the wires. For a switch with a plug, place leads as shown below. The resistance values are: 120 VAC Switch - 3.6 ohms resistance, 230 VAC Switch - 13.6 ohms resistance.

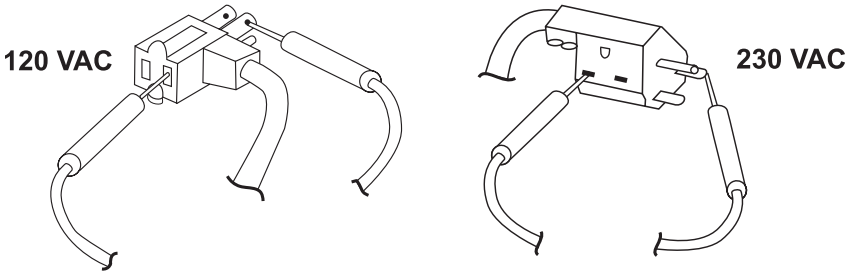
Troubleshooting Pump and Control Switches

Is Double Float® short cycling on one float?
If so, there may be a problem with the wiring, the floats or the relay. Disconnect power before proceeding.

Wiring: Inspect the cable for damage. Double-check your wiring against the wiring diagram on the installation instructions.

Float: Inspect float positioning. Check the float for proper positioning, tether length, or obstructions which may have caused it to hang-up. For the Double Float® the gray float is always the top float and the black float is always the bottom float.

Relay: To check the relay on pump up or pump down models, use a volt/ohm meter, touch one lead to the black wire and one lead to the white wire. For units with plug, see figure below. Lift the black float up and leave gray float hanging down. If the meter reads continuity, return float to your supplier.



Is the control panel or alarm off when the control switch is in the "on" or "off" positions?
("ON" position is up for a normally open application or down for a normally closed application; "OFF" position is down for a normally open application or up for a normally closed application) There may be a problem with the wiring, the control switch, or other panel components. Disconnect power before proceeding.

Control Panel/Alarm: Inspect the power cord for damage. Check the control panel/alarm installation instructions for correct wiring positions for power.

Control Switch: Make sure the float switch is the correct model for the application. A Normally Open (NO) float switch is used for high level alarm

applications and Normally Closed (NC) float switch is used for low level alarm applications. NOTE: On an SPDT switch, the black and white wires are used for a N/O switch and the red and white wires are used for a N/C switch.

Check the label on the float switch cable. If the cable label is gone:
- Raise the float up. If there is continuity through the switch, it is a normally open switch.
- Lower the float down. If there is continuity through the switch, it is a normally closed switch.

Check the control panel/alarm installation instructions for correct terminal positions. Check the connection between the float cable leads and the terminal strip. Check the float for proper positioning or obstructions which may have caused the float to hang-up. Inspect the float cable for damage.

To test for continuity: Disconnect the float cable leads from the terminal strip. Connect a volt/ohm meter to the black and white float leads. Move the float to the "on" position (up for high level alarm models, down for low level alarm models). If the volt/ohm meter reads no continuity, return the switch to your supplier. NOTE: On an SPDT switch, the black and white wires are used for a N/O switch and the red and white wires are used for a N/C switch.

Is there sloshing in the float?
Gently shake the float. If there is excessive sloshing, or if the float feels heavier than normal, there may be liquid in the float housing. If these conditions exist, return the float to the factory. NOTE: SJE Rhombus mercury switches will have some sloshing sound due to the mercury in the switch. Mechanical switches utilize metal components that will cause some sound as well.

Was the switch used in an application other than those recommended in the product literature?
Gather information from the customer or installer and consult the product literature or call the factory at 1-888-342-5753.

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