

# Single Phase Duplex Intrinsically Safe

## SJE-Rhombus® Type 124

### Installation Instructions and Operation/Troubleshooting Manual



Warranty void if panel is modified.

Call factory with servicing questions:  
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1009557D • Rev 11/14

This control panel must be installed and serviced by a licensed electrician in accordance with the National Electric Code NFPA-70, state and local electrical codes.

**IMPORTANT: BEFORE PROCEEDING TO INSTALL AND WIRE THE CONTROL PANEL, READ AND THOROUGHLY UNDERSTAND THESE INSTRUCTIONS.**

When installed according to these instructions and Article 504 of the National Electrical Code (NFPA 70) this control panel provides intrinsically safe sensing circuits for interface with Class 1, Division 1, Groups C and D hazardous locations. Intrinsically safe wiring must be in accordance with the enclosed control drawing of the specific intrinsically safe relay manufacturer. **NEMA 4X enclosures are for indoor or outdoor use**, primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water and hose-directed water. **Cable connectors must be liquid-tight in NEMA 4X enclosures.**

## Installation

Most Type 124 panels are designed to operate as three or four float systems. The three float system is standard performing the common pump stop, lead pump start, and lag pump start/high level alarm functions. The four float system utilizes separate floats for lag pump start and high level alarm.

**NOTE: Options ordered may affect the number of floats and their functions. Please reference the schematic provided with the control panel for proper installation.**

### Installation of Floats

**CAUTION:** If control switch cables are not wired and mounted in the correct location, the pump system will not function properly.

1. Use float label kit to identify and label cables for specific operation (stop, lead, lag, alarm, etc.). See schematic for float options.
2. Determine your normal operating level, as illustrated in **Figures 1-2**.
3. Mount float switches at appropriate levels as illustrated in **Figures 3-5**. Be sure that floats have free range of motion without touching each other, or other equipment in the basin.

**If using the mounting clamp; follow steps 4-6.**

4. Place the cord into the clamp as shown in **Figure 5**.
5. Locate the clamp at the desired activation level and secure the clamp to the discharge pipe as shown in **Figure 5**.

**NOTE:** Do not install cord under hose clamp.

6. Tighten the hose clamp using a 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.

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

# Installation Instructions

## Mounting the control panel

1. The control panel must be situated in a nonhazardous area in an appropriate NEMA rated enclosure, where an explosive atmosphere will not exist at any time. If distance exceeds the length of either the float switch cables or the pump power cables, splicing will be required. For outdoor or wet installation, we recommend the use of a SJE-Rhombus® liquid-tight junction box with liquid-tight connectors to make required connections. Use separate junction boxes for intrinsically safe wiring.

**WARNING:** Intrinsically safe wiring must be kept separate from non-intrinsically safe wiring. Intrinsically safe wiring and non-intrinsically safe wiring may occupy the same raceway if they are at least two inches (50 mm) apart and separately tied down. Inside panels, field wiring terminals for intrinsically safe circuits must be separate from non-intrinsically safe wiring. Do not exceed maximum cable length as stated in intrinsically safe relay control drawing.

2. Mount control panel with mounting flanges furnished.
3. Determine conduit entrance for intrinsically safe wiring. Entrance location must be within intrinsically safe barrier area. A separate rigid metallic conduit must be used to enclose the conductors of the intrinsically safe control circuit.

**NOTE:** Be sure that it is of adequate size to pull the switch cables through.

4. Determine conduit entrance for “power-in” and pump cables. The entrance location must be outside of the intrinsically safe barrier area.

**NOTE:** Be sure the power supply voltage, and phase are the same as the pump motor being installed. If in doubt, see the pump identification plate for voltage/phase requirements.

5. Drill proper size hole for “power-in” and pump cable conduit connections.

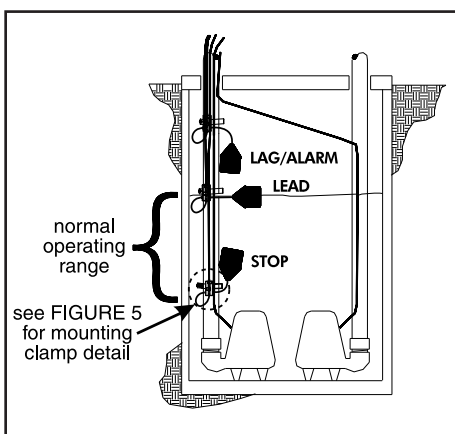
6. Attach conduit connectors to control panel.

**FOR INSTALLATION REQUIRING A SPLICE, FOLLOW STEPS 7-10; FOR INSTALLATION WITHOUT A SPLICE, GO TO STEP 11.**

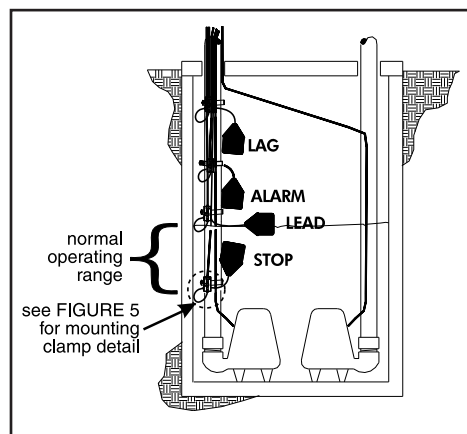
7. Determine location for mounting junction box according to NEC requirements. Separate junction boxes are required for pump wiring and float wiring. Mount junction boxes to proper supports. **Do not** mount the junction box inside the sump or basin.
8. Run conduit to junction box. Drill proper size holes for the type of conduit used. Attach connectors to junction box.
9. Identify and label each wire before pulling through conduit into control panel and junction box. Make wire splice connections at junction box.
10. Firmly tighten and seal all fittings on junction boxes.
11. If splicing is not required, identify and label pump cable before pulling through conduit into control panel.
12. Bring intrinsically safe circuits (i.e. float switches) through separate rigid metallic conduit into the control panel area marked for intrinsically safe wiring.

**WARNING:** All wiring entering the hazardous location must be sealed by an approved seal in accordance with the National Electric Code article 504.

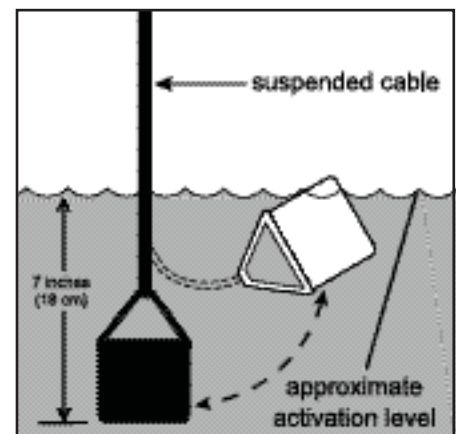
13. Wire switch cables according to the schematic provided.
14. Bring pump cables and “power-in” wiring through conduit into the control panel.
15. Wire the pump cables and the “power-in” cables according to the schematic provided with control panel.



**FIGURE 1 - Three float duplex (pump down installation)**



**FIGURE 2 - Four float duplex (pump down installation)**



**FIGURE 3 - Internally weighted float**

# Installation Instructions

16. Connect "power-in" conductors to proper locations: 120 VAC control/alarm power and 120/208/240 VAC to pump power to terminals block positions as seen on schematic provided with control panel.
17. The GROUND LUG (GL) is a redundant system ground terminal and **MUST BE CONNECTED TO THE EARTH GROUND BUSS OF THE CONTROL'S AC SUPPLY LINE FEEDER**. The resistance between the system ground terminals and the earth must be less than 1 ohm. Connect ground wire from conduit system to ground terminal (GL) in the panel.

**NOTE:** It is the recommendation of the factory to use separate pump and control/alarm power sources.

**VERIFY CORRECT OPERATION OF CONTROL PANEL AFTER INSTALLATION IS COMPLETE.**

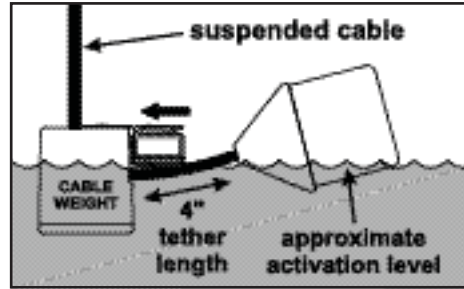


FIGURE 4 - Float with cable weight

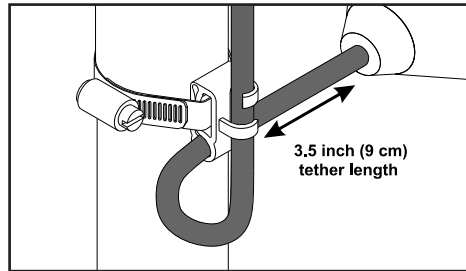


FIGURE 5 - Mounting clamp detail

## Operations

SJE-Rhombus® Type 124 panels are designed to operate with three or four floats for pump sequencing. The standard float functions are common pump stop, lead pump start, lag pump start/alarm (three floats), or separate lag and alarm floats (four floats).

**Three Float Operation:** When all floats are in the open or OFF position, the panel is inactive. As the liquid level changes and closes the stop float, the panel will remain inactive until the lead float closes. At this point, the lead pump will start. If the liquid level continues changing and closes the lag/alarm float, the lag pump will start and the audio/visual alarm will activate. Both pumps and the alarm will remain active until the lag float is opened. At this time, the alarm will silence. Both pumps will remain on until the liquid level changes to the normal level and all three floats are opened. When both pumps have stopped running, the alternator will switch the lead pump and lag pump operating functions for the next sequence.

**Four Float Operation:** The alarm will activate and remain on only if the alarm float is closed.

### Alarm System (Horn and Indicator - standard)

When an alarm condition occurs, a red light and a horn will be activated. If the test/normal/silence switch is moved to the silence position, the horn will be silenced. When the alarm condition is cleared, the alarm system is reset. The alarm system can be tested by pressing the test switch.

### Pump Run Lights

The run light will be ON in either the hand or the automatic mode when the pump is called to run unless other safety measures are employed.

### HOA Switch

A hand-off-automatic switch is provided for each pump. In the hand mode, the pump will turn on unless other safety features are employed. In the automatic mode, the pump will turn on and off from commands by the float switch(es).

### Control On/Off Switch

Allows the control/alarm power to be turned on or off.

### Circuit Breaker (optional)

The pump circuit has a thermal-magnetic circuit breaker provided for branch circuit, short circuit protection for the pump. In the OFF position, the circuit breaker will not allow power to the pump.

### Dry Auxiliary Contacts (optional)

**Normally open** - Contacts are open under normal conditions and closed when alarm condition is present.

**Normally closed** - Contacts are closed under normal conditions and open when alarm condition is present.

Both types automatically reset once alarm condition is cleared.

### Overload Relay (optional)

An overload relay is supplied in the pump circuit. The overload must be set in the field. Dial the amp scale to the pump full load amps. If the full load amps are unknown, use a calibrated ammeter to measure the pump amperage draw under loaded conditions. An auxiliary contact from the overload is wired in series with the magnetic contactor coil so that on a trip, the magnetic contactor will be disabled. The overload relay must be reset on an overload trip.

**NOTE:** Some options ordered may not be included in this manual. Certain options will require alternative circuitry.

# Troubleshooting

## Control/Alarm Circuit Board Power

If control ON/OFF switch is in the ON position but the yellow power status indicator is not illuminated:

1. Check to see if the fuse on the circuit board is blown.
2. Check to see if the incoming control/alarm power is present at TB1-1 and TB1-2.

If voltage is present and fuse is not blown, please call factory for assistance.

## Alarm Horn

Moving the test/normal/silence switch to the test position or activating the alarm float should turn on the alarm horn. If the horn does not sound, replace horn with same type.

## Alarm Light

Moving the test/normal/silence switch to the test position or activating the alarm float should turn on the alarm light. If the light does not activate, replace with bulb of same type.

## Circuit Breaker (optional)

Check each pole of the circuit breaker for proper resistance reading using the following procedure:

**Warning: Disconnect all incoming power to control panel. Failure to do so could result in serious or fatal electrical shock.**

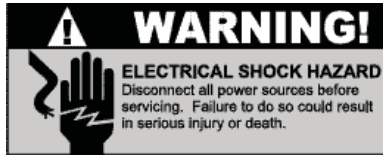
1. Isolate the circuit breaker by disconnecting either the line side or load side wires.
2. Place the ohmmeter leads across the corresponding line and load terminals of each pole.
3. With the ohmmeter on the R X 1 scale and the breaker in the OFF position, the reading should be infinity (very high resistance). With the breaker in the ON position, the reading should be nearly zero ohms (very low resistance). If the readings are not as stated, replace the circuit breaker with one of the same ratings.

## Float Controls

Check the floats during their entire range of operation. Clean, adjust, or replace damaged floats.

**Checking the float resistance** - The float resistance can be measured to determine if the float is operating correctly or is defective. Use the following procedure to measure the float resistance. **Warning: Disconnect all incoming power to panel. Failure to do so could result in serious or fatal electrical shock.**

1. Isolate the float by disconnecting one or both of the float leads from the float terminals.
2. Place one ohmmeter lead on one of the float wires, and the other ohmmeter lead on the other float wire.
3. Place the ohmmeter dial to read ohms and place on the R X 1 scale. With the float in the "off" position, the scale should read infinity (high



resistance). Replace the float if you do not get this reading. With the float in the ON position, the scale should read nearly zero (very low resistance). Replace the float if you do not get this reading.

**NOTE: Readings may vary depending on the length of wire and accuracy of the measuring device.**

## Fuses

Check the continuity of the fuse. With power OFF, pull the fuse out of the fuse block. With the ohmmeter on the R X 1 scale, measure resistance. A reading of infinity indicates a blown fuse and must be replaced. Replace fuse with same type, voltage and amp rating.

## Indicator Lights

If defective, replace all indicator lights with same type.

## Magnetic Contactor

**Contacts** - Check the contacts for severely burnt or welded contacts. The contactor arm should move freely.

**Coil** - Measure the coil by disconnecting one of the coil leads. Measure the coil resistance by setting the ohmmeter on the R X 1 scale. A defective coil will read zero or infinity, indicating a short or opened coil respectively. All defective contacts and coils must be replaced.

**NOTE: Readings may vary slightly depending on the accuracy of the measuring device.**

## Overload Relay (optional)

Test by moving the test pin on the relay to the left. The relay should trip. The relay must be reset once tripped.

## Start and Run Capacitor (CERTAIN MODELS ONLY)

A failed capacitor will have a bulged enclosure, leaking oil or a burnt smell. Using the following procedure, check the capacitor with an ohmmeter to determine if the capacitor is defective.

1. With the power OFF, discharge capacitor by shorting both terminals with an insulated handle metal screwdriver.
2. Label and remove the wires from the capacitor.
3. Set the ohmmeter on the R X 10,000 (10K) scale. Place an ohmmeter lead on each capacitor lead.
4. If the capacitor is good, the ohmmeter needle will go towards zero and then drift slowly toward infinity. If you do not get this reading, replace capacitor with one of the same type.

**NOTE: If the capacitor is checked a second time, be sure to reverse the ohmmeter leads to get a correct ohm reading.**

## Start Relay (CERTAIN MODELS ONLY)

1. With power OFF, label and disconnect the wires going to the start relay.
2. To check coil resistance, set the ohmmeter to the R X 1,000 scale. A reading of zero ohms indicates a defective relay.
3. When checking contact resistance, a reading other than zero indicates a defective relay. (See schematic for relay pin numbers.)

# SJE-Rhombus® Five-Year Limited Warranty

**SJE-RHOMBUS®** warrants to the original consumer that this product shall be free of manufacturing defects for five years after the date of consumer purchase. During that time period and subject to the conditions set forth below, **SJE-RHOMBUS®** will repair or replace, for the original consumer, any component which proves to be defective due to defective materials or workmanship of **SJE-RHOMBUS®**.

**THIS EXPRESS WARRANTY DOES NOT APPLY TO MOTOR START KIT COMPONENTS SJE-RHOMBUS® MAKES NO WARRANTIES OF ANY TYPE WITH RESPECT TO THE MOTOR START KIT.**

**ELECTRICAL WIRING AND SERVICING OF THIS PRODUCT MUST BE PERFORMED BY A LICENSED ELECTRICIAN.**

**THIS WARRANTY DOES NOT APPLY:** (A) to damage due to lightning or conditions beyond the control of **SJE-RHOMBUS®**; (B) to defects or malfunctions resulting from failure to properly install, operate or maintain the unit in accordance with printed instructions provided; (C) to failures resulting from abuse, misuse, accident, or negligence; (D) to units which are not installed in accordance with applicable local codes, ordinances, or

accepted trade practices, and (E) to units repaired and/or modified without prior authorization from **SJE-RHOMBUS®**.

*Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.*

**TO OBTAIN WARRANTY SERVICE:** The consumer shall assume all responsibility and expense for removal, reinstallation, and freight. Any item to be repaired or replaced under this warranty must be returned to **SJE-RHOMBUS®**, or such place as designated by **SJE-RHOMBUS®**.

**ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS ARE LIMITED TO THE DURATION OF THIS WRITTEN WARRANTY. SJE-RHOMBUS® SHALL NOT, IN ANY MANNER, BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES AS A RESULT OF A BREACH OF THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY.**

## NOTICE!

Products returned must be cleaned, sanitized, or decontaminated as necessary prior to shipment to ensure that employees will not be exposed to health hazards in handling said material. All applicable laws and regulations shall apply.