

## Warranty Service and Repair

If for some reason your product must be returned for factory service, contact Dwyer to receive a Material Return Authorization number first, providing the following information:

1. Part Number, Serial Number
2. Name and telephone number of someone who can answer technical questions related to the product and its application.
3. Return Shipping Address
4. Brief Description of the Symptom
5. Brief Description of the Application

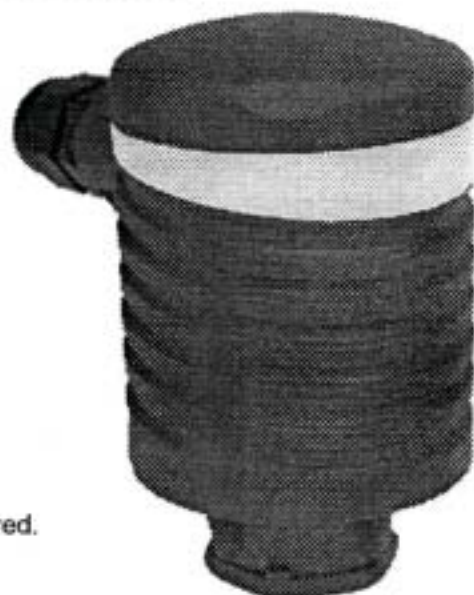
Once you have received a return authorization number, ship the product prepaid in its original packing to:

Dwyer Instruments, Inc.  
Highway 212 at 12  
Michigan City, IN 46360

Please include the information about the malfunction with your product. This information enables our service technicians to process your repair order as quickly as possible.



## Series TSP Flow Switch Controller Owner's Manual



Version 1.0  
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## SAFETY PRECAUTIONS

### Step One

#### ⚠ About This Manual:

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on two different models of Flow/No-Flow Controllers from Dwyer: TSP and TSP5. The TSP is a single-input controller with an optional Strobe Alert™ on the TSP5. Many aspects of installation and use are similar between the two models.

#### ⚠ User's Responsibility for Safety:

Dwyer manufactures several models of controller, with different mounting and switching configurations. It is the user's responsibility to select a controller model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components.

#### ⚠ Electrical Shock Hazard:

When the cap of the controller is removed, it is possible to contact components that carry high voltage, causing serious injury or death. All power to the controller and the relay circuit it controls should be turned OFF prior to working on the controller. If it is necessary to make adjustments during powered operation, use extreme caution and use only insulated tools. Making adjustments to powered controllers is not recommended.

#### ⚠ Flammable or Explosive Applications:

Controllers should not be used with explosive or flammable liquids, which require an intrinsically safe rating. If you are unsure of the suitability of a controller for your installation, consult your Dwyer representative for further information.

#### ⚠ Install in a Dry Location:

The TSP series of controller housing is liquid-resistant and made of Polypropylene (PP). When installed properly, the controller is not designed to be immersed. It should be mounted in such a way that it does not normally come into contact with fluid. Refer to an industry reference to ensure that compounds that may splash onto the controller housing will not damage it. Such damage is not covered by the warranty.

#### ⚠ Relay Contact Rating:

The relay is rated for a 10 amp resistive load. Many loads (such as a motor during start-up or incandescent lights) are reactive and have an inrush current characteristic that may be 10 to 20 times their steady-state load rating. The use of a contact protection circuit or a stepper relay may be necessary for your installation if the 10 amp rating does not provide an ample margin for such inrush currents.

# SPECIFICATIONS

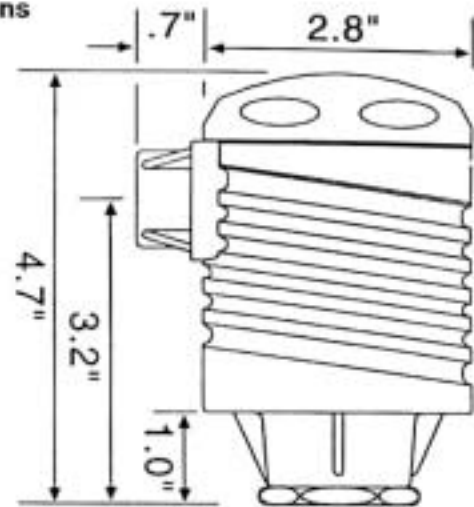
## Step Two

Supply voltage:	120 / 240 VAC, 50 - 60 Hz.
Consumption:	.25 amps
Sensor supply:	13.5 VDC @ 100 mA
Relay type:	(1) SPDT
Relay load:	250 VAC, 10A, 1/2 hp.
Relay mode:	Selectable, NO or NC
Time delay:	0 to 60 seconds
LED indication:	Sensor, relay & power status
Fail safety:	Power fail-safe
Enclosure rating:	NEMA 4X / IP65
Enclosure material:	Polypropylene (U.L. 94 VO)
Enclosure rotation:	300° swivel base
Temperature range:	F: -40° to 158° C: -40° to 70°
Conduit connection:	1/2" NPT
Certificate number:	LR 79326-3

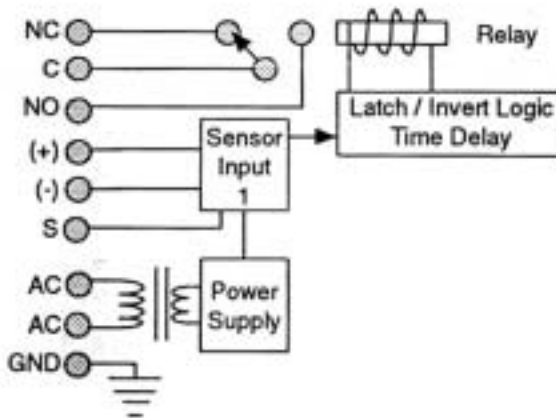
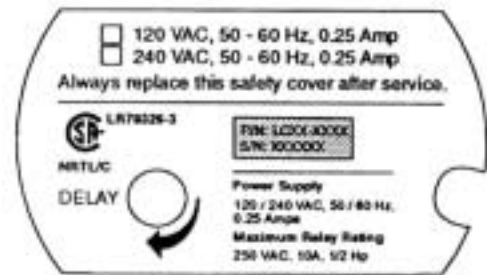
### Flash Alarm (Included with TSP5)

Flash type:	Xenon tube
Flash frequency:	1 per second
Strobe life:	10M cycles
Supply voltage:	120 VAC, 50 - 60 Hz.
Consumption:	5 Watts
Material:	Polycarbonate
Enclosure rating:	NEMA 4X / IP65
Color:	Amber

### Dimensions

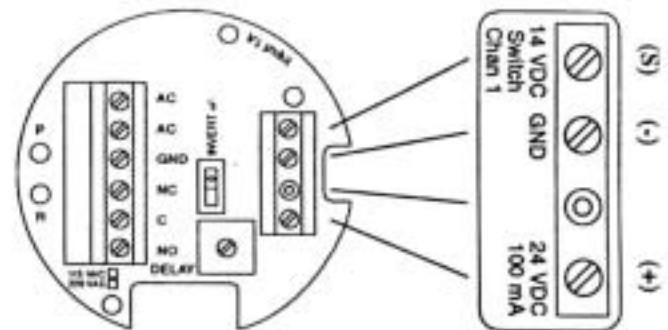


Faceplate Cover



TSP Label

Wiring Label



### Part Number Information:

Part #	Mat'l	Description
TSP	PP	Flow / No-flow Relay Controller
TSP5	PP	Flow / No-flow Relay Controller with Strobe Alert

### Make a Fail-Safe System:

Design a fail-safe system that accommodates the possibility of relay or power failure. If power is cut off to the controller, it will de-energize the relay. Make sure that the de-energized state of the relay is the safe state in your process. For example, if controller power is lost, a pump filling a tank will turn off if it is connected to the Normally Open side of the relay.

While the internal relay is reliable, over the course of time relay failure is possible in two modes; under a heavy load the contacts may be "welded" or stuck into the energized position, or corrosion may build up on a contact so that it will not complete the circuit when it should. In critical applications, redundant backup systems and alarms must be used in addition to the primary system. Such backup systems should use different sensor technologies where possible.

While this manual offers some examples and suggestions to help explain the operation of Dwyer products, such examples are for information only and are not intended as a complete guide to installing any specific system.

## GUIDE TO CONTROLS

### Step Three

**Power indicator:** This green LED lights when AC power is ON.

**Relay indicator:** This red LED will light whenever the controller energizes the relay, in response to the proper condition at the sensor input and after the time delay.

**AC Power terminals:** Connection of 120 VAC power to the controller. The setting may be changed to 240 VAC if desired. This requires changing internal jumpers; this is covered in the Installation section of the manual. Polarity (neutral and hot) does not matter.

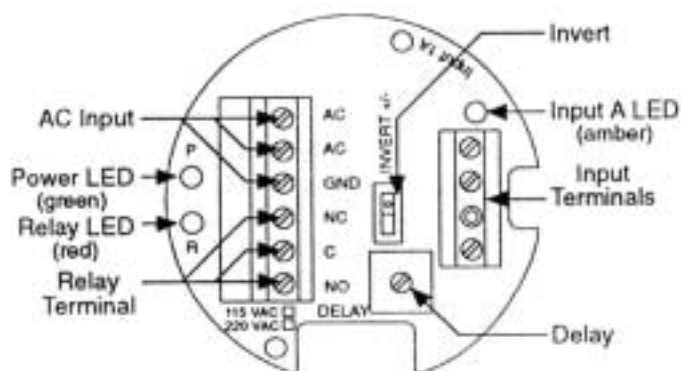
**Relay terminals (NC, C, NO):** Connect the device you wish to control (pump, alarm etc.) to these terminals: supply to the COM terminal, and the device to the NO or NC terminal as required. The switched device should be a noninductive load of not more than 10 amps; for reactive loads the current must be derated or protection circuits used. When the red LED is ON and the relay is in the energized state, the NO terminal will be closed and the NC terminal will be open.

**Invert switch:** This DIP switch reverses the logic of the relay control in response to the flow switch: conditions that used to energize the relay will make it turn off and vice versa.

**Time Delay:** After the input changes state, this control sets a delay from 0.15 to 60 seconds before the relay will respond.

**Input IA indicator:** This amber LED will indicate a flow or no-flow condition from the flow switch. With a Normally Closed switch, the LED will be on for no-flow and off for flow. With a Normally Open switch, the LED will be on for flow and off for no-flow.

**Input terminals:** Connect the wiring from the switch to these terminals: Note the polarity: (+) is a 24 VDC, 100 mA power supply (typically connected to the red wire of a Dwyer switch), and (-) is the ground for the circuit (typically connected to the black wire of a Dwyer sensor). (S) is the 14 VDC switch terminal (typically connected to the white wire of a Dwyer sensor). If polarity is reversed between the Red and Black wires, the status of the FET switch will be reversed.



## INSTALLATION

### Step Four

#### 3/4" NPT Mounting Thread

Installation of the compact relay controller takes advantage of the 3/4" NPT thread located on its base. This makes the controller fully compatible with any of Dwyer's flow switches with a 3/4" NPT thread.

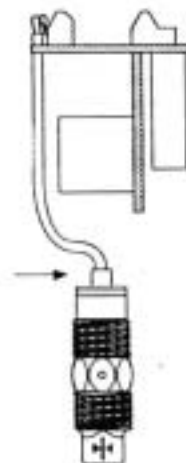


Always tighten the controller from the wrench flat located on the swivel base. Never tighten from the body of the controller.



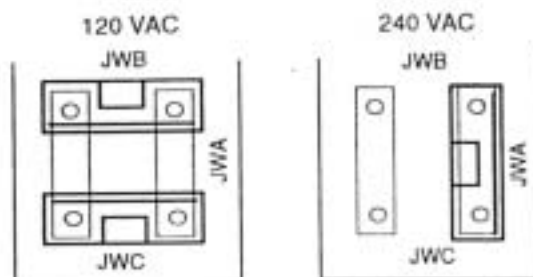
#### Switch Cable

When installing a Dwyer flow switch, adjust the cable away from the printed circuit boards in the controller body. Avoid breaking the seal between the top of the level switch and the plastic coated cable.



#### Changing from 120 to 240 VAC

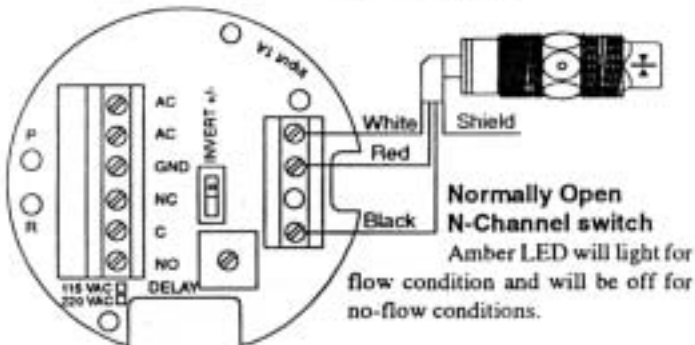
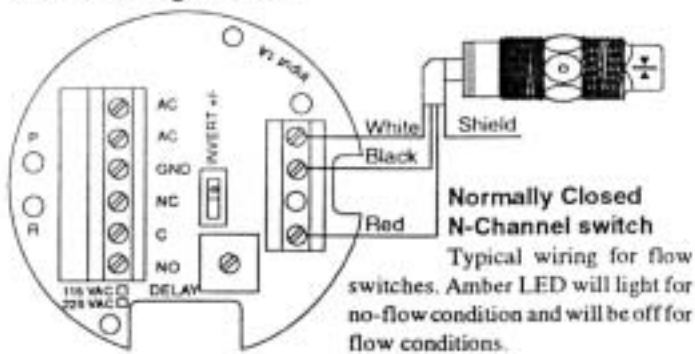
First, remove the printed circuit board from the controller body. Use caution when removing the PCB. Locate jumpers JWA, JWB and JWC on the end of the PCB. To change to 240 VAC, remove jumpers from JWB and JWC and place a single jumper across JWA. To change to 120 VAC, remove jumper JWA and place jumpers across JWB and JWC.



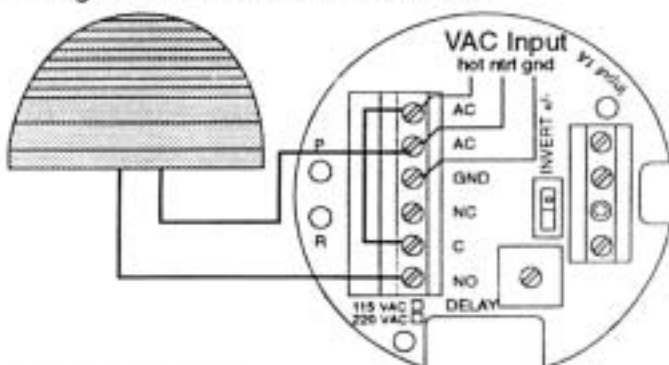
# INSTALLATION

## Step Five

### Switch Wiring for TSP

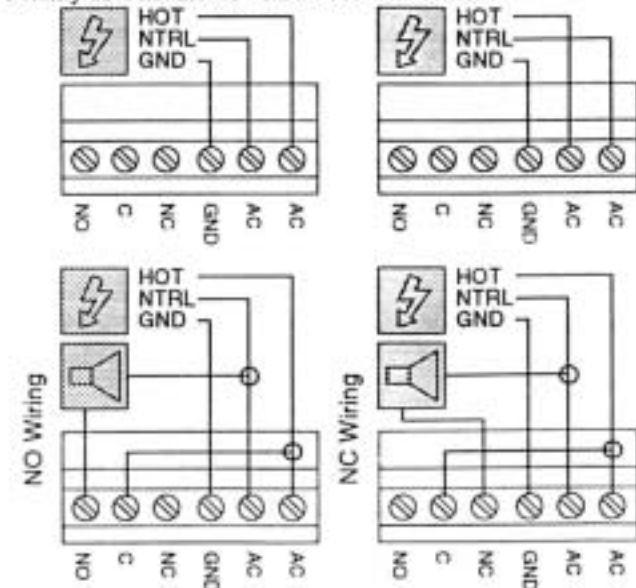


### Wiring VAC and Strobe Alert to TSP5



### 120/240 VAC Wiring

Polarity does not matter with the AC connections.



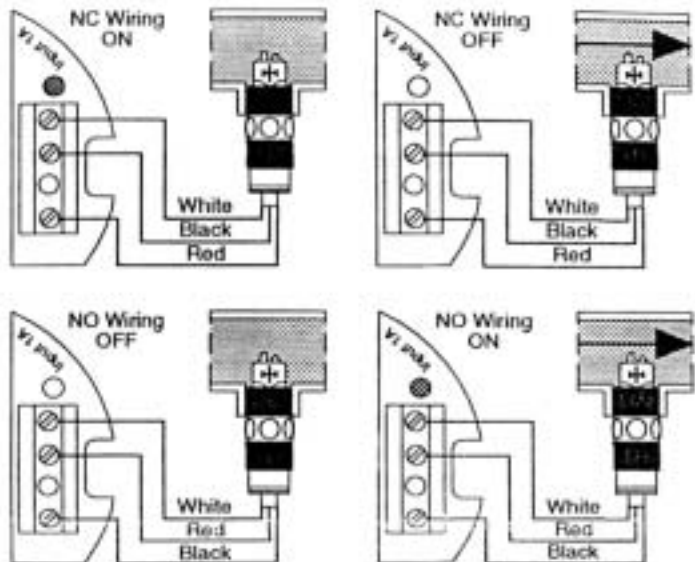
# TROUBLESHOOTING

## Step Six

### Controller Logic

For all controllers, please use the following guide to understand the operation of the Dwyer TSP controller.

1. Make sure the Green power LED is On when power is supplied to the controller.
2. The input LED is always controlled by the flow switch. When the flow switch is wired NC, the LED will be OFF during a flow condition and will be ON during a no-flow condition. When the flow switch is wired NO, the LED will be ON during a flow condition and will be OFF during a no-flow condition (see illustration below).



3. The relay LED ON indicates when the relay is energized. The relay LED OFF indicates the relay is de-energized. With the invert switch OFF, the relay is de-energized when the input LED is OFF and the relay is energized when the input LED is ON. With the invert switch in the ON position, the relay is energized when the input LED is OFF and the relay is de-energized when the input LED is ON.

Note: The normal state of the relay is de-energized. When the relay becomes energized, the normally closed side of the relay becomes open and the normally open side of the relay becomes closed (see illustration below).

