

**INSTALLATION AND OPERATING INSTRUCTIONS**

**APPLICATION**

The SP-81 universal single zone switching relay is operated by low voltage thermostats or any other low voltage controllers having a SPST switching action. The SP-81 provides intermediate switching to permit up to two separate line voltage loads such as circulators.

**FEATURES**

- Modern Design with Indicator lights (LEDs) on the front panel which provide functional status
- Fuse protection
- Power surge protection
- High Quality Electronics Circuit Board which simplifies wiring and control Operation
- High Capacity Field Replaceable Transformer
- Easy-Connect Terminals/Screwless Terminals for Thermostat Connections
- Common 24VAC transformer terminal provides compatibility with electronic thermostat
- Compatible with Most Digital/Mechanical Thermostats
- 100% Factory Tested
- RoHS compliance & Environmental Friendly - Do Not Contain hazardous substances (heavy metals such as lead, mercury, cadmium etc).
- Extended 3 year warranty

**SPECIFICATIONS**

Model: SP-81 Single Zone Switching Relay  
 Power Supply: 120 VAC, 50/60Hz  
 Dimensions: 6 3/8"(W) x 6 5/8"(H) x 2 3/4"(D)  
 Electrical Switch Rating: 10 A 1/3 HP @ 120VAC  
 Thermostat Anticipator Setting: 0.18 A  
 Enclosure: Flame Retardant Plastic 94V0  
 Shipping Weight: 2 lbs.

**CAUTION!**

1. Improper installation and operation of this control could result damage to the equipment and possibly even personal injury. All wiring must comply with national and local electrical codes, ordinances, and regulations. Use Copper wires only. 120 VAC wiring must have a minimum temperature rating of 75 C. 12-22 gauge wire is recommended for thermostat and 24 VAC source connections. 12-18 gauge wire is recommended for 120 VAC connections. Never connect the load terminals to a load that takes more current than the amount listed for the relay in the electrical ratings.
2. To prevent electrical shock hazard, disconnect power supply before installing.
3. Azel Technologies is not liable for an special, incidental, indirect or consequential damages resulting from the use of its products.
4. This literature is provided for informational purposes only.

**MOUNTING**

Mount the SP-81 to a suitable surface. Slotted keyholes and standard holes are provided for mounting purposes.

**ROUGH-IN WIRING**

Loosen the screw on the top and bottom of the enclosure and remove the wiring cover by swinging it away from the base(grey color) with the edge of the cover as pivot(see Figure 1). Note: The top fuse cover can be removed for mounting holes or changing the fuse.

The base has standard 7/8" (22mm) knockouts which accept common wiring hardware and conduit fittings. Before removing the knockouts, check the wiring diagrams and use the chamber with common voltages.

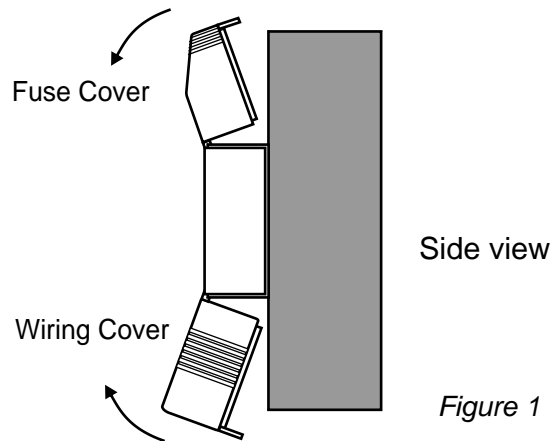
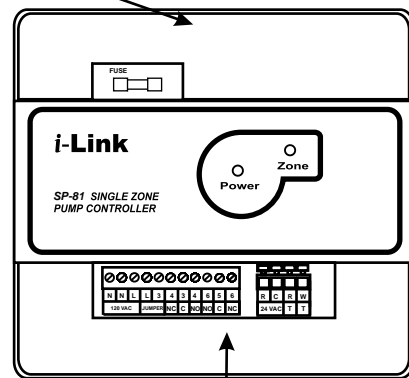


Figure 1

The Front Upper cover can be removed to access the mounting holes or the fuse.



The Front Lower cover can be removed to access the wiring

**L.E.D. SYSTEM STATUS INDICATION LIGHTS**

RED light indicates thermostat calling for heat.  
 GREEN light indicates presence of power supply.

## OPERATION

When the thermostats(or any other low voltage controller having SPST switching action) calls for heat, the relay is energized to turn on both circulator(or line voltage load) and boiler controller.

### Thermostat calling for heat (R/T and W/T circuit is made):

- Terminals 3/C & 4/NO are closed to turn on the circulator(jumper must be installed between L/JUMPER and 3/JUMPER)
- Terminals 3/C & 4/NC are open
- Terminals 5/C & 6/NO are closed to turn on the boiler/burner control
- Terminals 5/C & 6/NC are open

### Thermostat not calling for heat (R/T and W/T circuit is not made):

- Terminals 3/C & 4/NO are open(circulator is turned off)
- Terminals 3/C & 4/NC are closed
- Terminals 5/C & 6/NO are open(boiler/burner control is turned off)
- Terminals 5/C & 6/NC are closed

## JUMPER PLACEMENT

Factory installed jumper between L(JUMPER) and 3(JUMPER) allows power to be switched on terminal 4NC and 4NO

## TERMINAL DESCRIPTION

### Line Voltage Terminals(from left to right)

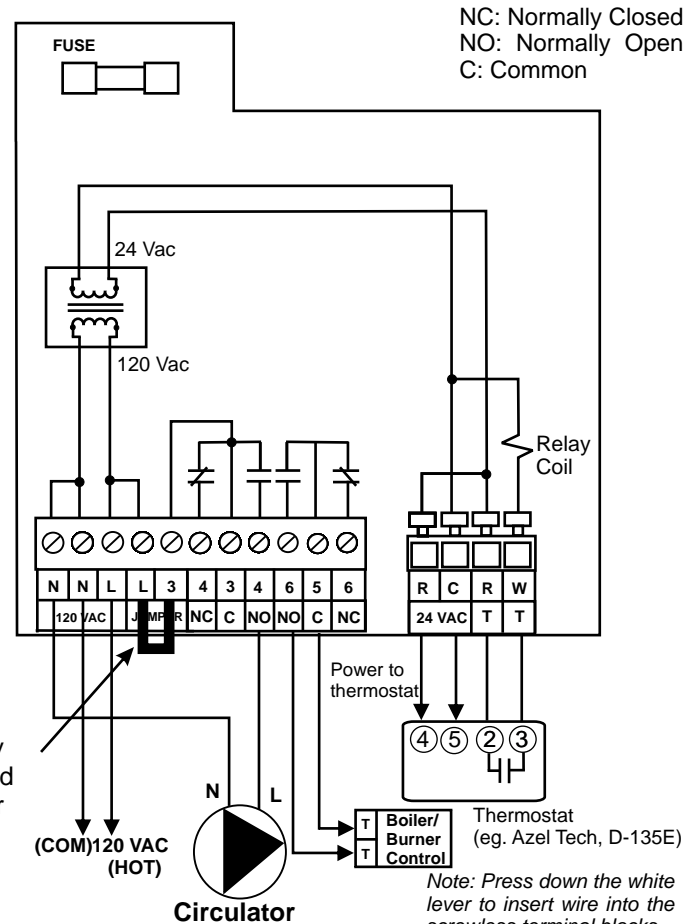
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|----------|---|
| N        | 120 VAC Neutral Terminal Output to Circulator                                   |
| N        | 120 VAC Neutral Terminal Input  |
| L        | 120 VAC Hot Terminal Input  |
| L/JUMPER | See JUMPER PLACEMENT section  |
| 3/JUMPER | See JUMPER PLACEMENT section  |
| 4/NC     | Normally Closed Terminal  |
| 3/C      | Common Terminal for 4/NC & 4/NO(connected to 3/JUMPER)                          |
| 4/NO     | Normally Open Terminal (120 VAC Hot Output to Circulator with jumper installed) |
- Note: Both N terminals are interconnected  
Both L terminals are interconnected

### Low Voltage Terminals

- |         |                                 |
|---------|---------------------------------|
| 6/NO    | Normally Open Terminal          |
| 5/C     | Common Terminal for 6/NO & 6/NC |
| 6/NC    | Normally Closed Terminal        |
| R/24VAC | 24VAC Hot Terminal Output       |
| C/24VAC | 24VAC Common Terminal Output    |
| R/T     | 24VAC Thermostat Hot Terminal   |
| R/W     | Thermostat Switching Terminal   |

Note: 24VAC outputs(R & C Terminals) can be used to power electronic thermostat(eg. Azel Technologies D-135E)

## TYPICAL WIRING DIAGRAM



## TROUBLE SHOOTING

When 120VAC is supplied to SP-81, the green indicator light should be on. When the thermostat calls for heat, both the red indicator light and the circulator should be on.

- **If the green light is on and the circulator cannot be turned on by the thermostat(red light is off)**, remove the thermostat and put a piece of wire across the thermostat terminals (R/T and W/T) to simulate thermostat calling for heat. If the circulator can be turned on along with the red light, then check the thermostat for functionality.
- **If both green light and red light are on and the circulator cannot be turned on**, re-tighten the screws for the jumper on terminal L and 3 and try again.
- **If red light is on all the time**, check the thermostat for functionality. Remove the thermostat from the SP-81 and put a piece of wire across R/T and W/T terminal to simulate the thermostat calling for heat. If everything works properly, then the thermostat is faulty.
- **If the green light is off**, check the fuse and the presence of 120VAC power supply. If the fuse is fine and there is no power output on R C (24VAC) terminals, the transformer (model: 0511F) needs to be replaced.

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