

# SP-220/SP-221

Voltage Window Comparator  
Single Phase AC/DC

# SLIMLINE

MONITORING RELAYS



## ORDERING CODE

TYPE	MODEL	VOLTAGE	POWER SUPPLY	RELAY CONTACTS
SP	220	230V	AC	SP

SEE PAGE 32 FOR ORDERING OPTIONS

## Application Examples

- Monitoring of the line supply in rural areas for over-voltage and under-voltage protection.
- Monitoring of supply voltage from standby generator sets.
- System supervision for voltage regulators in AC and DC systems.
- Supervision of voltage levels on solar panels.
- Monitoring the voltage output of UPS systems.

## Features

- Failsafe feature.
- Combined over-voltage and under-voltage detection.
- Adjustable response delay of 0.1 to 10 seconds on SP-221.
- Monitoring of own supply voltage.
- High precision and repetitive accuracy.
- Independent setting of over-voltage and under-voltage tripping points.
- LED indication for type of fault and status of the relay.
- Latching facility.
- 10A SPDT relay output.

## Description of Operation

The **SP-220** and **SP-221** are precision voltage window comparators for single phase AC or DC applications. The voltage to be monitored is tapped off internally from the supply to the comparator. It responds to both over-voltage as well as under-voltage conditions.

**Voltage Sensing:** The relay is energised when the voltage is maintained between the set over-voltage and under-voltage thresholds. If the voltage rises above the over-voltage setpoint or drops below the set under-voltage setpoint, the relay de-energises and the appropriate LED indicates “over-voltage” or “under-voltage” respectively. The relay energises again if the voltage recovers to within the set voltage bandwidth.

**Hysteresis:** Hysteresis represents the difference between the tripping point and the recovery point of the unit. The hysteresis is fixed to 2% to prevent relay chatter when the voltage fluctuates around the set limits.

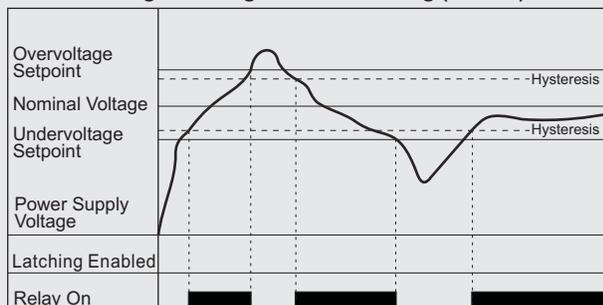
**Latching:** When latching is armed, the relay will not recover from a tripped condition, but will remain de-energised until reset. The appropriate LED will indicate the type of fault responsible for the tripped condition. The unit can be reset by either breaking and re-applying power supply to the unit, or by momentarily disabling the latching circuit (e.g. Push-to-open-switch). On power-up of the module, the latching is inactive for approximately 10 seconds.

**Adjustable Response (SP-201):** Response delay can be adjusted from 1 to 10 seconds. When a trip condition is detected, the relay will only de-energise after the set response time (a delayed recovery is also available on special order).

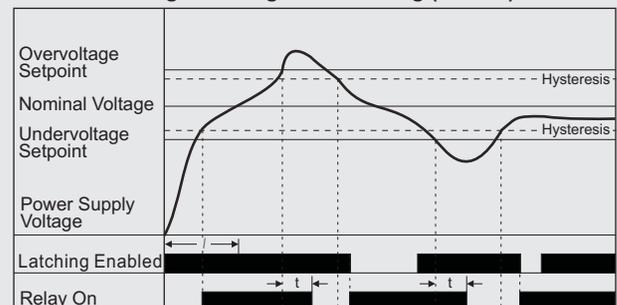
**Note:** In conditions of excessive undervoltage, trip response would be immediate (i.e. no delay).

## Operational Diagrams

Voltage Sensing Without Latching (SP-220)



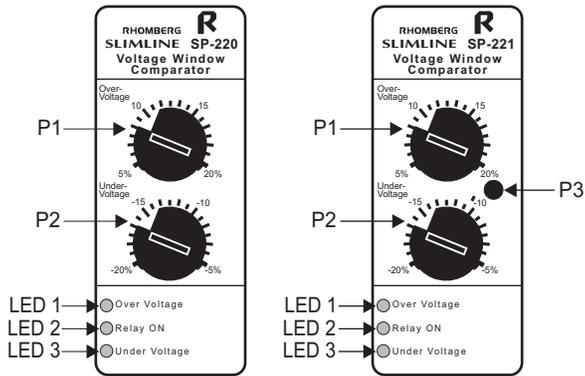
Voltage Sensing With Latching (SP-221)



$t$  = Latching disabled for approximately 10 seconds at power up.  
 $t$  = response delay



## Description of Controls



P1: The **Over-voltage Threshold** is adjusted on P1.

P2: The **Under-voltage Threshold** is adjusted on P2.

**Note:** The scales for over-voltage and under-voltage threshold settings are calibrated in percentage deviation from nominal (ideal) supply voltage.

P3: **Adjustable response delay** from 0.1 to 10 seconds.

LED 1: The red LED marked "**Over-voltage**" illuminates whenever the supply voltage exceeds the set over-voltage threshold.

LED 2: The green LED marked "**Relay ON**" illuminates when the relay is energised, i.e. Under normal supply conditions.

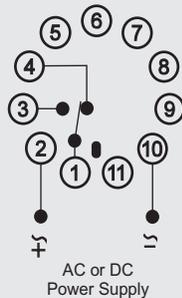
LED 3: The red LED marked "**Under-voltage**" illuminates whenever the supply voltage drops below the set under-voltage threshold.

## Wiring and Connection

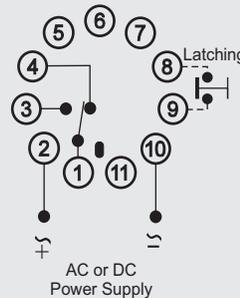
Power Supply	
Phase/ Positive	Pin 2
Neutral/ Negative	Pin 10

Relay Contacts	
Normally Open	1 + 3
Normally Closed	1 + 4

Latching
Latching to be enabled by interconnecting pin 8 and pin 9 (e.g. Push-to-open reset switch)



**APPLICATION 1**  
Without latching



**APPLICATION 2**  
With latching

## Technical Specifications

### POWER SUPPLY

- AC:** Supply voltage: 12, 24, 110, 230, 400, 415, 525V  $\pm 20\%$   
Isolation (current input to power supply): 2kV  
Power consumption: 3VA (approx.)  
6VA for 415, 525V (approx.)
- DC:** Supply voltage: 12, 24, 48, 60, 110V  $\pm 20\%$   
Isolation: no galvanic isolation.  
Power consumption: 100mA (12, 24V),  
30mA for 48V and higher

### VOLTAGE SENSING:

- Calibrated to respond to the RMS of a sinusoidal waveform.  
Repetitive accuracy: 1%  
Hysteresis: 2% fixed (relative to its supply voltage)  
Response delay: SP-230 - 1 second.  
SP-231 - adjustable from 0.1 to 10 seconds  
(other ranges on special order).  
Latching disabled during power-up: approx. 10 seconds