

# AP-224

Combined Over-voltage and Under-voltage Monitor with 2 Independent Relays

**A-LINE**  
MONITORING RELAYS



## ORDERING CODE

| TYPE | MODEL | VOLTAGE | POWER SUPPLY | RELAY CONTACTS |
|------|-------|---------|--------------|----------------|
| AP   | 224   | 230V    | A            | S              |

SEE PAGE 32 FOR ORDERING OPTIONS

## Application Examples

- Phase monitoring of voltage transformers to ensure the voltage integrity of control circuits in high voltage panels.
- Monitoring of the line supply in rural areas for overvoltage and undervoltage protection.
- Monitoring of supply voltage from standby generator sets to ensure a constant supply.

## Features

- Fail-to-safe design.
- DIN rail format.
- Combined over-voltage and under-voltage monitoring.
- Monitoring of own supply voltage.
- Selectable power supply voltages.
- High precision and repetitive accuracy.
- Independent adjustment of over-voltage and under-voltage setpoints.
- Adjustable response times - available on trip and / or recovery (0.1 to 10 seconds).
- LED indication of Over-voltage Relay ON, and Under-voltage Relay ON (Power LED flashes when timing).
- 8A SPDT Over-voltage Relay output.

## Description of Operation

The **AP-224** is a combined over-voltage and under-voltage monitor for single phase AC and DC applications. It has separate relay outputs for indicating over-voltage and under-voltage tripping. The voltage to be monitored is tapped off internally from the supply to the unit.

**Voltage Sensing:** The relays are energised when the voltage is maintained between the over-voltage and under-voltage setpoints. If the voltage rises above the over-voltage setpoint, the over-voltage relay de-energises. If the voltage drops below the under-voltage setpoint, the under-voltage relay de-energises.

**Hysteresis:** Hysteresis represents the difference between the setpoint and the recovery point of the unit. The hysteresis is fixed at 2% to prevent relay chatter when the voltage fluctuates around either of the setpoints.

**Latching:** When latching is enabled, the relay will not recover from a tripped condition, but will remain de-

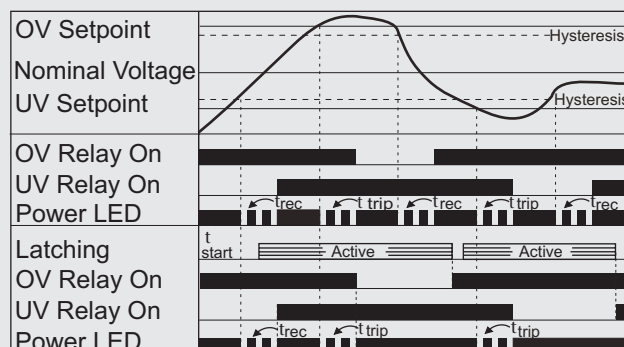
energised until reset. The unit can be reset by either interrupting its power supply to the unit or by momentarily disabling the latching circuit (e.g. push to open switch).

**Start-up delay:** The latching circuit is inhibited at start-up for a period of time which is adjustable from 0 to 10 seconds.

**Delay on Trip:** Response time on trip for over-voltage and under-voltage is adjustable from 0.1 to 10 seconds. When a trip condition is detected the relevant relay will de-energise after the set response time.

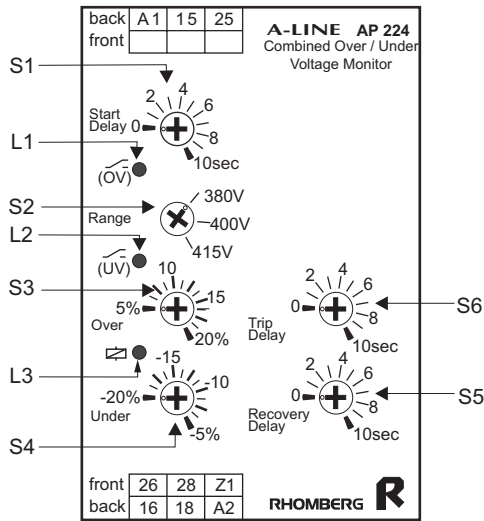
**Delay on Recovery:** Response time on recovery for over-voltage and under-voltage is adjustable from 0.1 to 10 seconds. When a recovery condition is detected the relevant relay will energise after the set recovery time.

## Operational Diagram





## Description of Controls



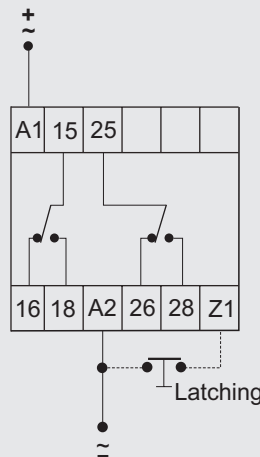
- L1: The yellow “Over-voltage” LED marked (OV) illuminates when the over-voltage relay is energised.
- L2: The yellow “Under-voltage” LED marked (UV) illuminates when the under-voltage relay is energised.
- L3: The red “Power On” LED marked  $\square$  illuminates when power is supplied to the unit. It also flashes during the response time for trip and recovery.
- S1: **Start-up delay** (for disabling latching) is set on S1. This time is adjustable from 0 to 10 seconds.
- S2: **Supply voltage** is set on S2 (e.g. 380, 400 or 415V).
- S3: **Over-voltage** setpoint is adjusted on S3 (5 - 25%).
- S4: **Under-voltage** setpoint is adjusted on S4 (-20 to -5%).
- S5: **Recovery Delay** response time for the over-voltage and under-voltage is set on S5.
- S6: **Trip Delay** response time for over-voltage and under-voltage is set on S6.

## Wiring and Connection

| Power Supply     |    |
|------------------|----|
| Phase/Positive   | A1 |
| Neutral/Negative | A2 |

| Undervoltage Relay Contacts |         |
|-----------------------------|---------|
| Normally Open               | 15 + 18 |
| Normally Closed             | 15 + 16 |

| Overvoltage Relay Contacts |         |
|----------------------------|---------|
| Normally Open              | 25 + 28 |
| Normally Closed            | 25 + 26 |



**NOTE:** Position of relay contacts are shown in the de-energised state.

## Technical Specifications

| POWER SUPPLY      |   |                        |
|-------------------|---|------------------------|
| Supply type       | AC Transformer Supply   | DC Supply              |
| Supply voltage    | 12, 24, 115(110, 115 or 120), 230 (220, 230 or 240), 400(380, 400 or 415), 525VAC | 12, 24, 48, 60, 110VDC |
| Housing width     | 45mm  | 45mm                   |
| Power consumption | 2VA (approx.)   | 30mA (approx.)         |
| Isolation         | Galvanic (without latching)   | No galvanic isolation  |
| Voltage tolerance | ±20%  | ±20%                   |

| START-UP DELAY |                             |
|----------------|-----------------------------|
| Start-up delay | 0 - 10 seconds (Adjustable) |

| RESPONSE TIMES            |                               |
|---------------------------|-------------------------------|
| Response time on trip     | 0,1 - 10 seconds (Adjustable) |
| Response time on recovery | 0,1 - 10 seconds (Adjustable) |

| VOLTAGE SENSING     |   |
|---------------------|---|
| Setpoints           | The unit is calibrated to trip on the RMS value of the supply voltage (assuming no AC waveform distortion). |
| Repetitive accuracy | 1%  |
| Hysteresis          | 2% (fixed). Hysteresis relates to the supply voltage.   |

Additional information in Section J, page 131.