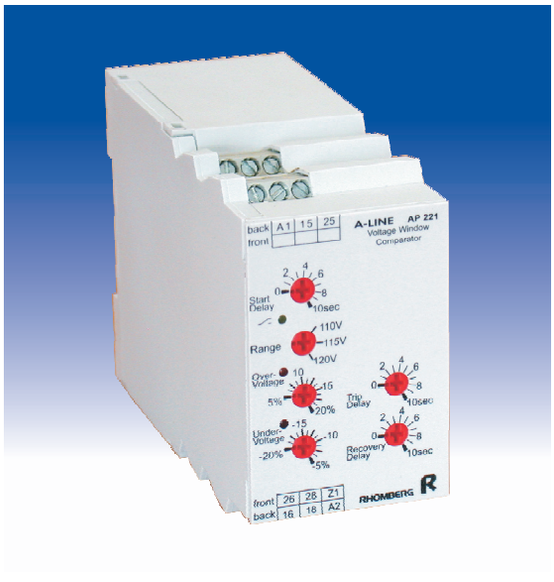
AP-221

Voltage Window Comparator, Single Phase AC/DC Application

A-LINE
MONITORING RELAYS



ORDERING CODE

TYPE	MODEL	VOLTAGE	POWER SUPPLY	RELAY CONTACTS
AP	221	230V	A	D

SEE PAGE 32 FOR ORDERING OPTIONS

Application Examples

- Monitoring of the line supply in rural areas for overvoltage and undervoltage 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

- 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 (0,1-10 seconds).
- Adjustable start-up delay (0-10 seconds).
- Latching on over-voltage or under-voltage fault conditions (programmable).
- LED indication for Relay On, over-voltage and under-voltage.
- 10A SPDT relay output.
- 5A DPDT relay output.

Description of Operation

The **AP-221** is a precision voltage window comparator for single phase AC and DC applications. The voltage to be monitored is tapped off internally from the supply to the comparator. The unit responds to both over-voltage and under-voltage conditions.

Voltage Sensing: The relay is energised when the voltage is maintained between the overv-oltage and under-voltage setpoints. If the voltage rises above the over-voltage setpoint or drops below the under-voltage setpoint, the relay de-energises and the appropriate LED indicates “Over-voltage” and “Under-voltage” respectively. The relay energises again if the voltage recovers to within the set voltage window (i.e. between the two setpoints).

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.

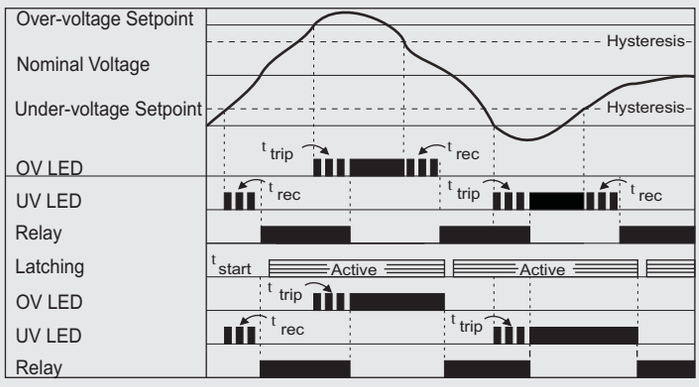
Latching: When latching is enabled, the relay will not recover from a tripped condition, but will remain de-energised until reset. The unit can be reset by either interrupting its power supply or by momentarily disabling the latching circuit (e.g. push-to-open switch).

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

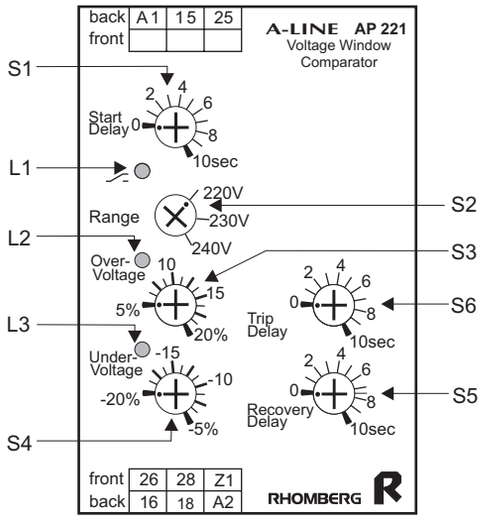
Delay on Trip: Response time on trip for over-voltage and under-voltage is adjustable from 0,1 to 10 seconds. When a trip condition is detected the relay will de-energise after the set trip delay time.

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 relay will energise after the set recovery delay time.

Operational Diagram



Description of Controls



L1: The yellow **"Relay ON"** LED marked ⏦ illuminates when the relay is energised.

L2: The red **"Over-voltage"** LED illuminates if the supply voltage exceeds the over-voltage setpoint. It also flashes during an over-voltage response time for trip and recovery.

L3: The red **"Under-voltage"** LED illuminates if the supply voltage drops below the under-voltage setpoint. It also flashes during an under-voltage 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. (eg. 220, 230 and 240 single phase AC supply).

S3: **Over-voltage** setpoint is adjusted on S3. (5 to 20% of nominal voltage).

S4: **Under-voltage** setpoint is adjusted on S4. (-20 to -5% of nominal voltage).

S5: **Recovery Delay** response time for the over-voltage and under-voltage is set on **S5**. This time is adjustable from 0,1 to 10 se-conds.

S6: **Trip Delay** response time for the over-voltage and under-voltage is set on S6. This time is adjustable from 0,1 to 10 seconds.

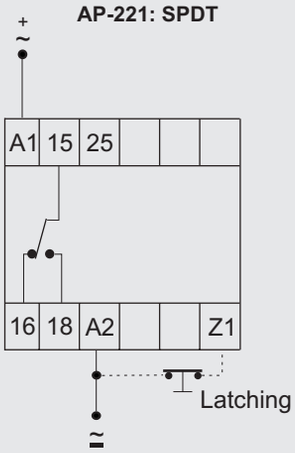
Wiring and Connection

Power Supply	
Phase / Positive	A1
Neutral / Negative	A2

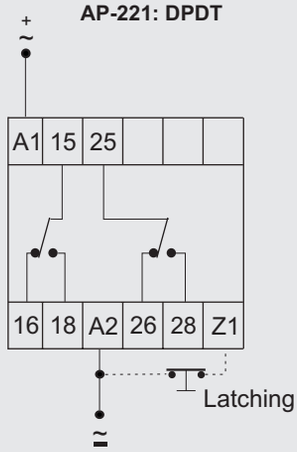
Relay Contacts - SPDT	
Normally open	15 + 18
Normally closed	15 + 16

Relay Contact -DPDT		
Normally open	15 + 18	25 + 28
Normally closed	15 + 16	25 + 26

AP-221: SPDT



AP-221: DPDT



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

Technical Specifications

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

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.

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)

Additional information in Section J, page 131.