

# SP-510

## Single Phase Reverse Power Monitor

# SLIMLINE

MONITORING RELAYS



### ORDERING CODE

TYPE	MODEL	VOLTAGE	POWER SUPPLY	RELAY CONTACTS
SP	510	230V	AC	SP

SEE PAGE 32 FOR ORDERING OPTIONS

## Application Examples

- Protection of an engine-driven AC generator in the event of failure when feeding an AC bushbar, in parallel with other generators.
- Monitoring of AC power flow in one direction only.

## Features

- Failsafe feature.
- Reverse current tripping level adjustable up to 20% of maximum forward current.
- Current monitoring through internal shunt.
- Response time adjustable up to 10 seconds.
- Start-up delay adjustable up to 10 seconds.
- Insensitive to changes in power factor.
- LED indication for reverse power.
- LED indication for relay on.
- Latching facility.
- 10A SPDT relay output.

## Description of Operation

The **SP-510** is a precision current monitor for AC applications detecting an overload when the current flows in the reverse direction (i.e. reverse power). The unit interfaces with conventional current transformers (5A secondary rating). The internal shunt permits the SP-510 to be connected directly to loads drawing less than 5 amps.

**Start-up Delay:** When power is applied to the module, the relay energises immediately, ignoring abnormal load conditions experienced during power up. This time delay is adjustable up to 10 seconds.

**Forward Power:** Under normal conditions (i.e. forward power) the relay remains energised and the "relay ON" LED illuminates.

**Forward Current:** Forward current is the current that flows through the internal shunt during forward power flow.

**Reverse power:** When the power flow changes direction (i.e. reverse power) the "reverse power" LED illuminates.

**Reverse current:** Reverse current is the current that flows through the internal shunt during reverse power flow.

**Overload sensing:** The tripping level for reverse current is adjustable from 2% to 20% of maximum forward current (i.e. 100mA

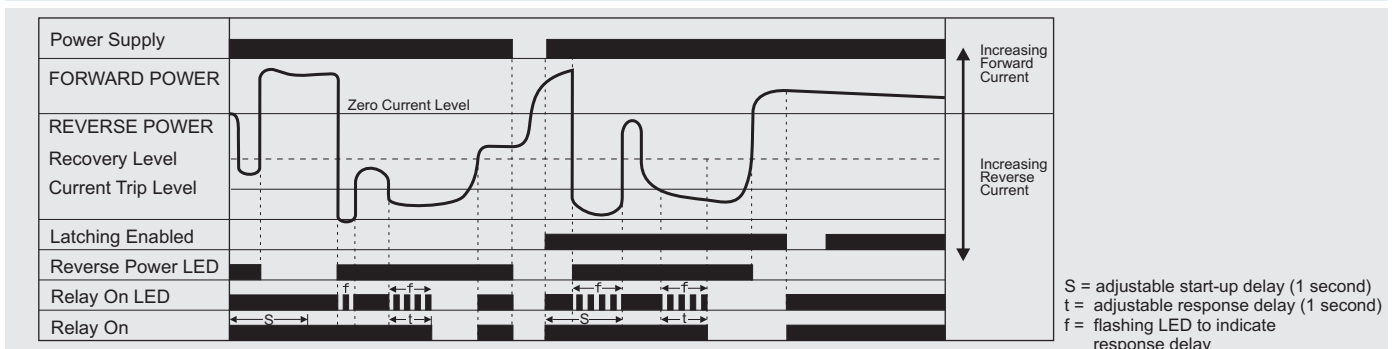
to 1A for 5 amp forward current).

**Hysteresis:** Hysteresis represents the difference between the tripping level and the recovery level of the unit. The hysteresis is fixed at 5% below the tripping level to prevent relay chatter when the load fluctuates around the set level.

**Response delay:** The relay de-energises when the reverse current exceeds the tripping level for longer than the response delay time period. The response delay is adjustable up to approximately 10 seconds. The "relay ON" LED flashes when the reverse current level is exceeded until the time delay expires (at which time the relay de-energises). If forward power is restored or the reverse current level drops below the hysteresis level before the response delay expires, the LED illuminates constantly and the relay remains energised.

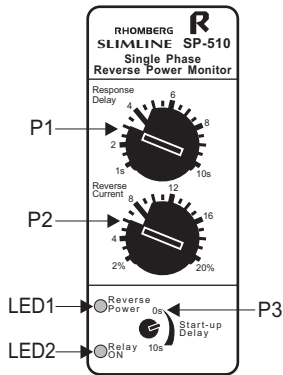
**Latching:** When latching is armed, the relay will not recover from a tripped condition, but will remain de-energised until reset. The unit can be reset by either breaking and re-applying power to the unit or by momentarily disabling the latching circuit (e.g. push-to-open switch). During the start-up delay, the latching circuit is disabled automatically. (See wiring and connection diagrams).

## Operational Diagram





## Description of Controls



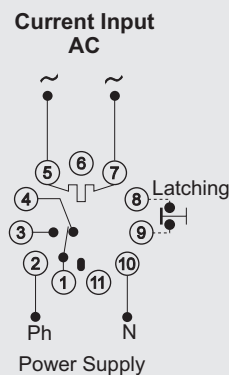
- P1: The **Response Delay** is adjusted on P1. This can be set from 1 to 10 seconds to delay the tripping of the relay.
- P2: The **Reverse Current** (tripping level) is adjusted on P2 and is set as a percentage of a forward current of 5A. Maximum setting of 20% corresponds with a current level of 1A.
- P3: The **Start-up Delay** is adjusted on P3. This can be set from 0 to 10 seconds to ignore abnormal load conditions experienced during power up.
- LED 1: The red LED marked “**Reverse Power**” will illuminate when the unit senses power flowing in the reverse direction regardless of whether the current tripping level set on P2 has been exceeded or not.
- LED 2: The green LED marked “**Relay ON**” will illuminate when the relay is energised. The LED flashes if the reverse current tripping level is exceeded and the response delay time has not expired. The LED is off when the relay is de-energised.

## Wiring and Connection

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

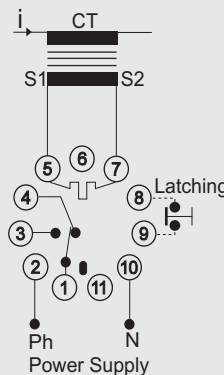
Relay Contacts	
Normally Open	1 + 3
Normally Closed	1 + 4

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



### APPLICATION 1

**Direct In-Line AC Current Sensing:**  
Connect the sensing pin 5 and pin 7 input in series with the AC current loop.



### APPLICATION 2

**AC Current Sensing with a Current Transformer:** Connect the secondary terminals of the current transformer (S1 and S2) to the current input pin 5 and pin 7. Other devices, such as ampere meters, may be connected in series with the current loop, provided the VA rating of the CT is not exceeded.

**Note:** Do not unplug the unit while the current loop is energised, since this will cause an open circuit of the current loop and may damage the transformer (see “CT protection” in the general section of the catalogue).

**Detecting Reverse Power:** Ensure that the unit is powered from the same phase as the phase in which the current is being measured. If the “reverse power” LED illuminates under normal operation, it means that the polarity is incorrect and the leads to the current transformer should be exchanged.

## Technical Specifications

### POWER SUPPLY

Supply voltage: 110, 230, 400, 415, 525V AC  $\pm 15\%$   
Power consumption: 3VA (approx.)  
6VA for 415, 525V AC (approx.)

### RESPONSE

Start-up delay: 0 to 10 seconds (adjustable)  
Response delay: 1 to 10 second (adjustable)

### CURRENT INPUT

Input current range: 0 to 5AAC  
Reverse current sensitivity: 100mA to 1AAC (adjustable)  
Repetitive accuracy: 1%  
Hysteresis: 5% (fixed)  
Maximum input current (continuous): 6A  
Peak short-term over-current (10 seconds): 20A  
Current input impedance: 50 milliohms

Additional information in Section J, page 131.