

# SP-101/SP-104

Current Monitor  
0-200mA AC (RMS)/DC  
60 mV/150mV (DC Shunt)  
0-5V AC(RMS)/DC

# SLIMLINE

MONITORING RELAYS



## ORDERING CODE

TYPE	MODEL	VOLTAGE	POWER SUPPLY	RELAY CONTACTS
SP	101	230V	AC	SP

SEE PAGE 32 FOR ORDERING OPTIONS

## Application Examples

- Protection for DC Motors against over-current.
- Supervision of 4-20mA control loops for open circuit or short circuit.
- Supervision of mA outputs from Rhomberg SC-320 Relay.
- Load monitoring DC winders in conjunction with DC shunt.
- AC Current control interfacing with current-to-voltage transducers.
- DC Current control of electroplating processes.

## Features

- Failsafe feature.
- Internal shunt for direct in-line sensing of currents up to 200mA (AC or DC).
- Adjustable response delay of 0.1 to 10 seconds on SP-104.
- Direct interface with DC shunt resistors.
- Trip point adjustable on calibrated scale 0-100%.
- Hysteresis adjustable 5-30%.
- Programmable for overload or underload detection.
- Latching on overload or underload (programmable).
- Start-up delay.
- 10A SPDT relay output.

## Description of Operation

The **SP-101** and **SP-104** are precision current monitors for both AC and DC applications. They can be programmed for either overload sensing or underload sensing. The internal shunt facilitates direct connection into a current loop up to 200mA. The units can also be used in conjunction with external DC shunt resistors (60mV, 150mV) or current-to-voltage transformers (5V secondary).

**AC Monitoring:** The units are suitable for direct-in-line sensing of current up to 200mA AC. The unit interfaces readily with current-to-voltage transformers (5V secondary rating) such as CT5.

**DC Monitoring:** The units are suitable for direct-in-line sensing of DC current. The internal shunt provides sensing up to 200 mA. For higher current, a suitable shunt (60mV or 150mV) is to be connected. The units are polarity sensitive and will not respond to current/voltage in the reverse direction.

**Start-up Delay:** When power is applied to the module, the relay energises immediately, ignoring abnormal load conditions experienced during start-up.

**Overload Sensing:** When programmed for overload sensing, the relay will de-energise if the current exceeds the setpoint. The relay will switch on again if the current drops by a certain percentage below the

set overload threshold. This percentage hysteresis is adjustable.

**Underload Sensing:** When programmed for minimum load sensing, the relay will de-energise if the current drops below the setpoint. The relay will switch on again if the current rises by a certain percentage above the set underload threshold. This percentage hysteresis is adjustable.

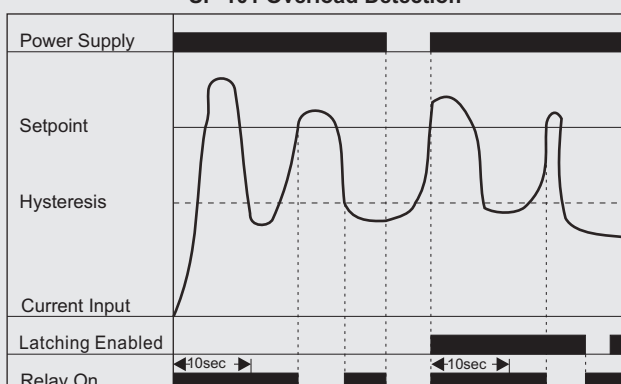
**Hysteresis:** Hysteresis represents the difference between the tripping point and the recovery point of the unit. The hysteresis can be adjusted as a percentage of set point to prevent relay chatter or hunting when the load current fluctuates around the setpoint.

**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 supply 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 diagram on page 5)

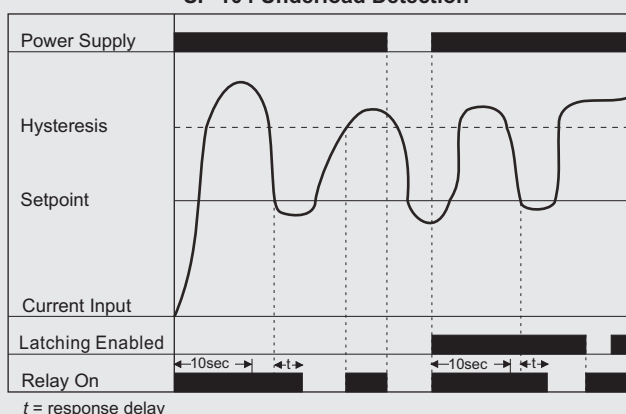
**Adjustable Response (SP-104):** Response delay can be adjusted from 0.1 to 10 seconds. When a trip condition is detected, the relay will only de-energise after the set response time (a delayed recovery is also available on special order).

## Operational Diagrams

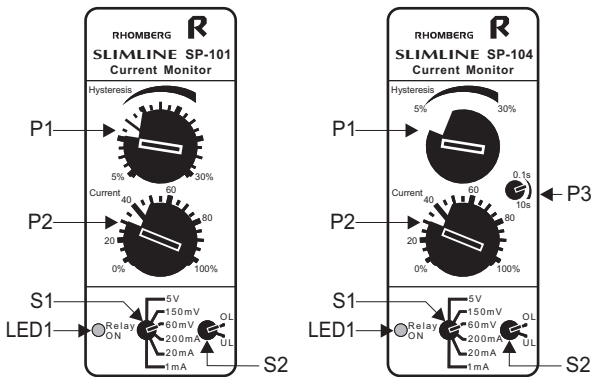
SP-101 Overload Detection



SP-104 Underload Detection



## Description of Controls



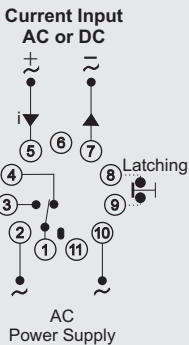
- P1: **Hysteresis** ie. The difference between the tripping point and the recovery point is set between 5% and 30% on P1. (Hysteresis relates to set-point P2)
- P2: **The Current Threshold** (tripping point) is adjusted on P2. Maximum setting of 100% corresponds with a current (millivolt) level selected on S1.
- P3: **Adjustable response** delay from 0.1 to 10 seconds on P3 (SP-104).
- S1: **The input Range** is set on S1 (1mA, 20mA, 200mA, 60mV, 150mV, 5V).
- S2: **Function Selection** is provided by S2. If set to "OL" the unit operates as an overload detector. If set to "UL" the unit operates as an underload detector.
- LED 1: The LED1 illuminates to indicate that the relay is energised. The LED will be off if the unit registers a fault condition (overload/underload) or the power supply to the unit is interrupted.

## Wiring and Connection

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

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

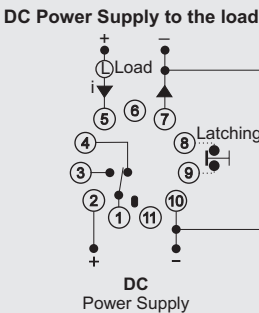
Latching:
Latching to be enabled by interconnecting pin 8 and pin 9 (e.g. Push-to-open reset switch)



### APPLICATION 1

**Direct In-line Sensing:** Connect the sensing input pin 5 and pin 7 in series with the current loop. For DC monitoring, the polarity must be observed (pin 5 positive, pin 7 negative).

**Note:** NOT suitable for DC supply on Pin 2 and pin 10.

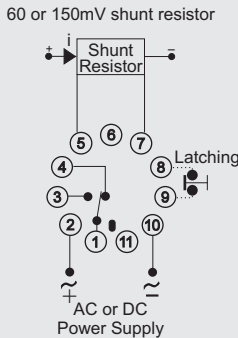


### APPLICATION 2

**DC Current Sensing:** DC power supply on pin 2 and pin 10: In this mode, the DC power supply and current sensing input share a common negative connection, since no galvanic isolation is provided.

Therefore, the current input, pin 5 and pin 7, has to be connected in series between the negative lead and the load.

**Note:** Pin10 and pin7 are to be externally linked.  
**DO NOT CONNECT THE LOAD BETWEEN PIN 7 AND PIN 10.**



### APPLICATION 3

**DC Current Sensing with External Shunt:** Connect the shunt between pin 5 (+) and pin 7 (-) observing the correct polarity. For extended wiring between the shunt and the module, screened wire is recommended to prevent induction of hum or noise on the sensing inputs. The screen should be connected to pin 7 or earth.

**Note:** For DC supply on pin 2 and pin 10, pin 7 and pin 10 are to be externally linked, (refer to application 2).

## Technical Specifications

POWER SUPPLY	
AC:	Supply voltage: 12, 24, 110, 230, 400, 415, 525V ±15% Isolation (current input to power supply): 2kV Power consumption: 3VA (approx.) 6VA for 415, 525V (approx.)
DC:	Supply voltage: 10-30V, 48, 60, 110V ± 15% Isolation: no galvanic isolation. Power consumption: 100mA (10-30V), 30mA for 48V and higher

CURRENT INPUT		
Repetitive accuracy: 1% Hysteresis: 5% to 30% (adjustable)		
Range	Input Impedance	Maximum Input (Continuous)
1mA	60 Ohm	60mA
20mA	3 Ohm	350mA
200mA	0.7 Ohm	800mA
60mV	10k	50V
150mV	10k	50V
5mV	10k	50V

RESPONSE	
Start-up delay: approximately 10 seconds, standard. (0.1 to 15 seconds also possible on special order)	
Response delay: SP-101 - 1 second. SP-104 - adjustable from 0.1 to 10 seconds (other ranges on special order).	