

# SP-121/SP-124

## Current Window Comparator 0-200mA DC

### 60mV/150mV (DC SHUNT)

# SLIMLINE

MONITORING RELAYS



### ORDERING CODE

TYPE	MODEL	VOLTAGE	POWER SUPPLY	RELAY CONTACTS
SP	121	230V	AC	DP

SEE PAGE 32 FOR ORDERING OPTIONS

## Application Examples

- Level control used in conjunction with a 4-20mA transducer.
- Monitoring and protection of 4-20mA current loops.
- Synchronising the “take up” and “roll-off” rollers for tension control on paper machines.
- DC current control for electroplating processes.
- Cable fault detection (short or open circuit).
- Charge failure or overcharge detection on battery chargers.

## Features

- Failsafe feature.
- Combined overload and underload detection.
- Internal shunt for direct in-line sensing of currents up to 200mA DC.
- Adjustable response delay of 1 to 10 seconds on SP-124.
- Direct interface with DC shunt resistors.
- Separate adjustment of overload and underload thresholds.
- Latching in both modes.
- Range selector switch for 1mA, 20mA, 200mA, 60mV, 150mV and 5V.
- LED indication for overload, underload and normal load.
- Start-up delay.

## Description of Operation

The **SP-121** and **SP-124** are precision current window comparators for DC applications. They respond to both under-current and over-current conditions. The internal shunt facilitates direct interconnection into a current loop up to 200mA. The units can also be used in conjunction with external DC shunt resistors (60mV or 150mV) for high current applications.

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

**Load Sensing:** The relay remains energised when the current is maintained between the overload and underload setpoint. If the current rises above the overload setpoint or drops below the underload setpoint, the relay de-energises and the appropriate LED indicates ‘overload’ or ‘underload’ respectively. The relay energises again if the current recovers to within the set overload/underload window.

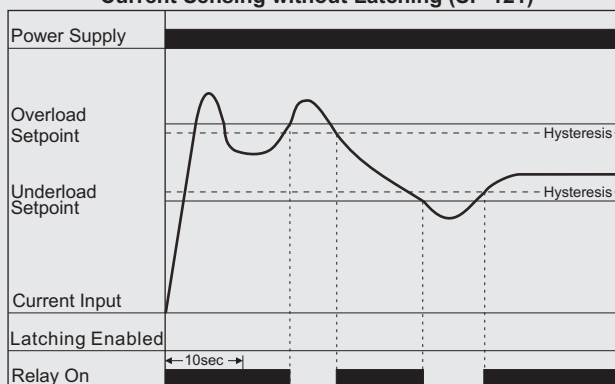
**Hysteresis:** Hysteresis represents the difference between the tripping point and the recovery point of the unit. The hysteresis is fixed 2% to prevent relay chatter or hunting when the load current fluctuates around the setpoint.

**Latching:** When latching is armed, the relay will not recover from a tripped condition, but will remain de-energised until reset. The 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). During the start-up delay, the latching circuit is disabled automatically.

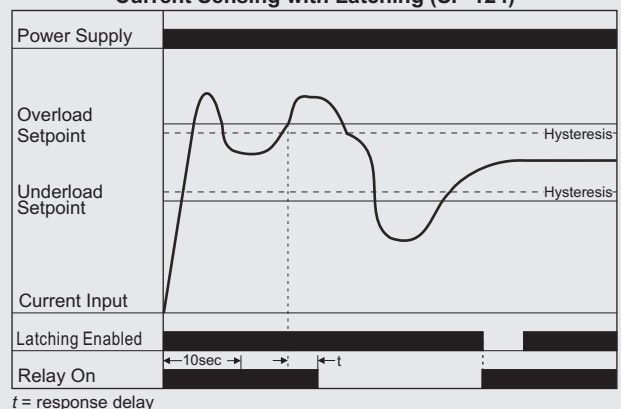
**Adjustable Response (SP-124):** Response delay can be adjusted from 1 to 10 seconds. When a trip condition is detected, the relay will only de-energise after the set response time (a delayed recovery is also available on special order).

## Operational Diagrams

Current Sensing without Latching (SP-121)

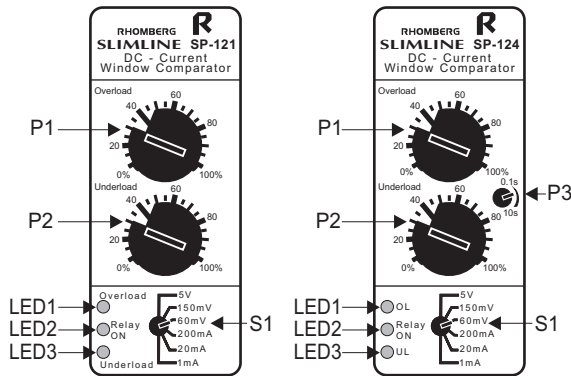


Current Sensing with Latching (SP-124)





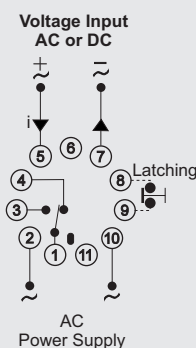
## Description of Controls



- P1: The **Overload Threshold** is adjusted on P1. Maximum setting of 100% corresponds with a current level set on S1.
- P2: The **Underload Threshold** is adjusted on P2. Maximum setting of 100% corresponds with a current level set on S1.
- Note:** P2 should be set to a level below that of P1, ie. The overload threshold and the underload threshold must not overlap.
- P3: **Adjustable reponse delay** from 0.1 to 10 seconds is set in P3.
- S1: The **Input Range** is set on S1 (1mA, 20mA, 200mA, 60mV, 150mV and 5V).
- LED 1: The red LED marked "**Overload**" will illuminate whenever the current exceeds the set overload threshold.
- LED 2: The green LED marked "**Relay ON**" will illuminate when the relay is energised.
- LED3: The red LED marked "**Underload**" will illuminate whenever the current drops below the set underload threshold.

## Wiring and Connection

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

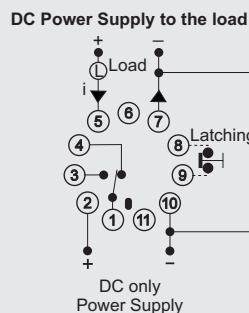


### APPLICATION 1

**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.)

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

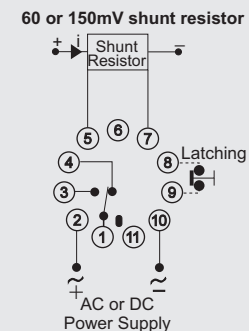


### APPLICATION 2

**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.

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



### 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	CURRENT INPUT	RESPONSE																					
<b>AC:</b> 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.) <b>DC:</b> Supply voltage: 12, 24, 48, 60, 110V ± 15% Isolation: no galvanic isolation. Power consumption: 100mA (12, 24V), 30mA for 48V and higher	Repetitive accuracy: 1% Hysteresis: 2% Fixed (relative to sensitivity setting)	Start-up delay: approximately 10 seconds, standard (1 to 15 seconds also possible on special order) Response delay: SP-121 - 1 second. SP-124 - adjustable from 0.1 to 10 seconds (other ranges on special order).																					
	<table border="1"> <thead> <tr> <th>Range</th> <th>Input Impedance</th> <th>Maximum Input (continuous)</th> </tr> </thead> <tbody> <tr> <td>1mA</td> <td>60 Ohm</td> <td>60mA</td> </tr> <tr> <td>20mA</td> <td>3 Ohm</td> <td>350mA</td> </tr> <tr> <td>200mA</td> <td>0.7 Ohm</td> <td>800mA</td> </tr> <tr> <td>60mV</td> <td>10k</td> <td>50V</td> </tr> <tr> <td>150mV</td> <td>10k</td> <td>50V</td> </tr> <tr> <td>5V</td> <td>10k</td> <td>50V</td> </tr> </tbody> </table>	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	5V	10k	50V	
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Additional information in Section J, page 131.