

SI-509 VIBRATION TRIP MODULE

1. Overview

The SI-509 is a configurable trip amplifier capable of accepting a 4-20mA signal from a SI-420 sensor and providing two trip action relay outputs along with an analogue output mirroring the 4-20mA input (the output is configurable to either 0-10V or 4-20mA). Input signal, trip configuration and power supply information are required to define any unit exactly. This information, together with a unique serial number is printed on the side label of each unit; records of the exact configuration of every product shipped are maintained at the factory.

The input stage of the SI-509 produces an internal process signal of 0 - 10V DC corresponding to the input span. The trip set point potentiometers produce set point signals of 0 - 10V DC corresponding to the input span. These signals can be measured between terminal 13 (0V) and terminal 8 for set point 1 and terminal 4 for set point 2. This enables set points to be accurately set without the need for an input simulator. 0-10 V corresponds to 0-100% of the input range (see table 1 for common configurations).

Internal circuitry compares the process signal with each of the set point levels and changes the state of the output relays and indicator LED's as the signal passes through the set point, using the internal switch settings the relays can be configured to either be latching or non-latching (see figure 3). The latching relays can be reset using either the small push button mounted on the front of the module, or via an external DC voltage applied to terminal 12.

A factory configured start up delay is built in to prevent the relays being triggered for 30 seconds after the SI-509 has been powered up. Another user configurable delay of 5, 10, 30 or 60 seconds is applied to each relay to prevent any spurious vibration accidentally triggering an alarm, see figure 3 for switch settings.

2. Connection Details

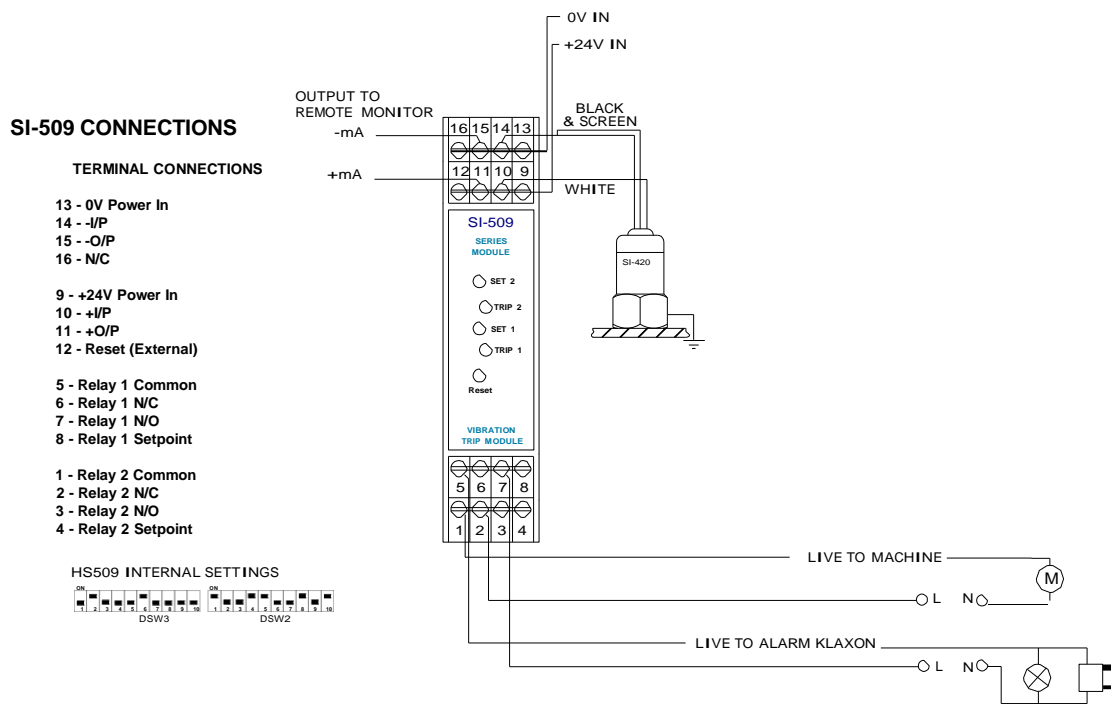


Figure 1: SI-509 Example Wiring Diagram

3. Power Supply

The power supply is connected into terminals 13 (negative) and 9 (positive). The supply voltage is indicated on the serial number label.

APPLICATION OF VOLTAGES HIGHER THAN THAT STATED FOR THE SUPPLY MAY CAUSE DAMAGE TO THE INSTRUMENT.

4. Sensor Connections

All sensor connections are made to terminals numbered 14 (-I/P) and 10 (+I/P) on the module. The -I/P terminal requires sensor ground (black in the SI-420) and shield be connected together.

5. Standard operation

The SI-509 is configured to support either latching or non-latching relays. In the case of a non-latching configuration the relay is triggered when the input value passes through the pre-configured set point level, and stays above the level for the duration of the relay delay. The relay will then disengage when the input value falls below the set point; this is highlighted in the top half of figure 2.

When the SI-509 is configured to work in latched mode, the relay will again activate after the input has been above the set point value for at least the duration of the time delay, then it will not deactivate until either the internal reset or external reset are activated, regardless of the input value. The internal reset is a push-button mounted on the front of the module; the external reset is activated by applying a voltage (greater than 5V DC) to terminal 12. The principle of latched operation is shown in the second half of figure 2.

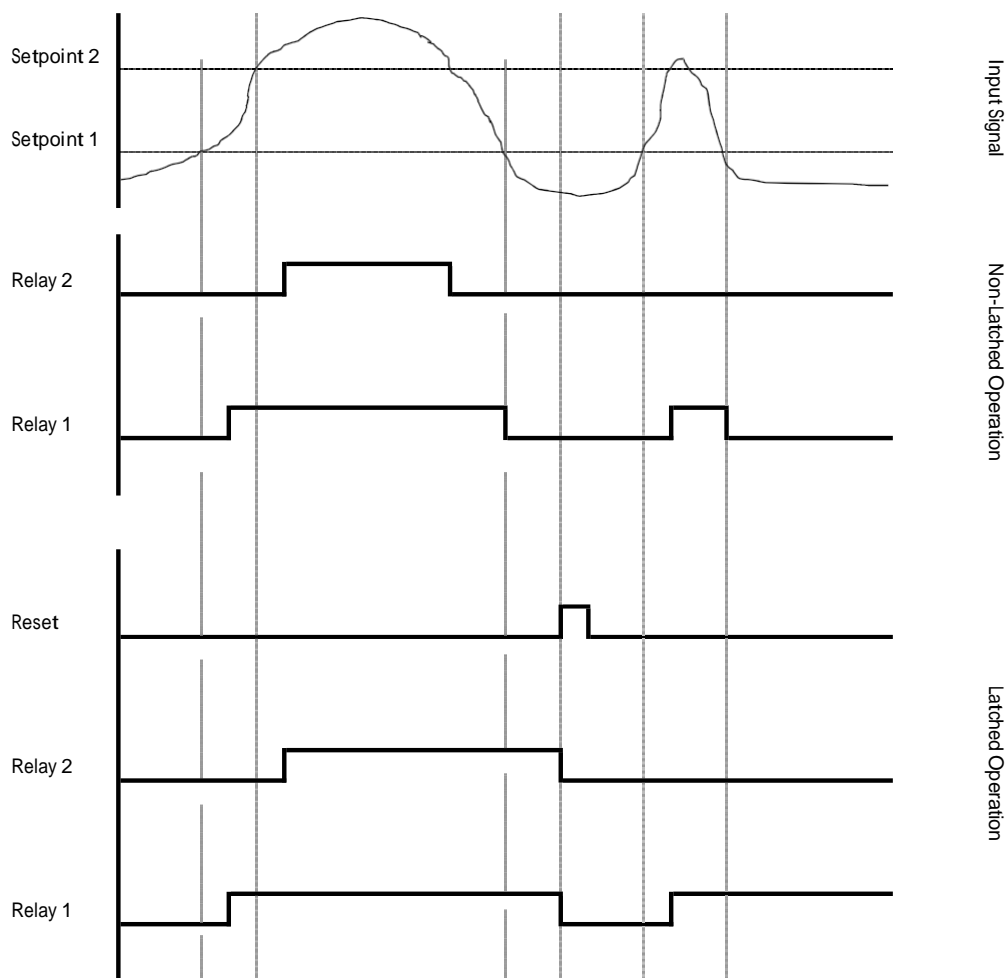


Figure 2: SI-509 Relay Non-Latching / Latching Principle of Operation

6. Set Points

The set point values are determined via two variable resistors on the front of the module. To determine the value of the set point a voltage can be measured on either terminal 8 (set point 1) or terminal 4 (set point 2). This voltage is a 0-10V value which is proportional to the input value, table 1 provides information for common input ranges and the corresponding set points.

Unless specified the set point for relay 1 will be 50% of full scale (terminal 8 will be at 5V) and relay 2 will be 75% of full scale (terminal 4 will be at 7.5V).

Terminal Voltage	Input Current	25mm/s Input	50mm/s Input	100mm/s Input
1	5.6	2.5	5	10
2	7.2	5	10	20
3	8.8	7.5	15	30
4	10.4	10	20	40
5	12	12.5	25	50
6	13.6	15	30	60
7	15.2	17.5	35	70
8	16.8	20	40	80
9	18.4	22.5	45	90
10	20	25	50	100

Table 1: Set Point Configuration Table

Using this table it can be shown that using a 50mm/s accelerometer and a required alarm level of 20mm/s the input current would be 10.4mA and the voltage at the set point terminal would be 4V.

7. Repeated Output

The SI-509 is capable of re-transmitting the input for use with other data analysis tools. This output can either be a direct representation of the 4-20mA input or a proportionally scaled 0-10V signal, this option can be configured using the internal switches, see figure 3.

8. Customer Configurable Options.

On the circuit board for the SI-509 there are a number of switch settings which can be adjusted by the user to alter the configuration of the module. The following table shows how the switch settings can be altered to change the modules operation.

DSW2			DSW2		
ON	OFF	Function	ON	OFF	Function
1	[J] ●	Relay 1 Latching	1	● [J]	Relay 1 Non-Latching
2	● [J]		2	[J] ●	
3	● [J]		3	[J] ●	
4	[J] ●		4	● [J]	
5	[J] ●	Relay 2 Latching	5	● [J]	Relay 2 Non-Latching
6	● [J]		6	[J] ●	
7	● [J]		7	[J] ●	
8	[J] ●	4-20mA Output	8	● [J]	0-10V Output
9	● [J]		9	[J] ●	
10	[J] ●		10	● [J]	

DSW3		
ON	OFF	Function
1	● [J]	5-second time delay
2	[J] ●	10-second time delay
3	● [J]	30-second time delay
4	● [J]	60-second time delay
5	● [J]	5-second time delay
6	[J] ●	10-second time delay
7	● [J]	30-second time delay
8	● [J]	60-second time delay
9	● [J]	N/A
10	● [J]	N/A

Figure 3: DSW2 and DSW3 Settings

WARNING: DO NOT OPEN THE MODULE WHILE IT IS POWERED, DANGER OF ELECTRICAL SHOCK.

9. Electrical Characteristics:

Input	4-20mA from SI-420
Power Requirements	16-30VDC
Maximum Current	120mA
Set Points	Dual Relays (front panel programmable)
Relay Rating	3 Amps at 240VAC
Relay Status	N/O or N/C, Latching / Non-Latching
Relay Delays	5, 10, 30 or 60 seconds (selectable)
Outputs	4-20mA or 0-10VDC
Reset	Internal Push Button, External Voltage
Operating Temperature Range	0 to 55°C
Emission	EN6100-6-4:2001
Immunity	EN6100-6-2:1999
Installation Category (IEC664)	II
Equipment Class (IEC536)	III