

MODEL H1 SERIES

SINGLE CHANNEL LOOP DETECTOR

OPERATING INSTRUCTIONS

I General

The Model H1 is a single channel detector with two solid state Presence outputs and a solid state Fail output. *Please verify source voltage before applying power.* The Model H1 will operate on voltages between 10 and 14 VDC

The Model H1 can be configured for Normal Operation or Low Power Mode and is available with a Male or Female connector. The model number designates the configuration as follows:

Model H1-XX-X ← **M** = Male connector, **F** = Female connector

↑
{ **12** = Normal operation
 LP = Low Power mode

Normal / Low Power Operation

The H1-LP detector can be configured to operate in a low power mode. When configured this way, the detector scans to conserve power, the output response times are slower, and the **DETECT** LED is automatically disabled three (3) minutes after reset or power up except when the detector is in Detect. When the Detection drops, the **DETECT** LED is disabled. When the shorting jumper (shunt) on the two pin header labeled **J2** is removed from a low power version (Model H1-LP-M or H1-LP-F), the detector will operate in normal mode. There is no jumper on the two pin header labeled **J2** on normal operation versions of the detector (Models H1-12-M and H1-12-F).

NOTE: The two pin header labeled **J2** is located under the protective cover.

II Indicators and Controls

i Power / Detect / Fail LEDs

The detector has two red LED indicators that are used to provide an indication of the detector's outputs state and/or loop failure conditions. The table below lists the various indications and their meanings.

Status	LED 1 (Detect)	LED 2 (Loop Fail)
Off	Outputs Off	Loop OK
On	Outputs On	N/A
Flash	2 Hz (50% duty cycle) Delay activated 4 Hz (50% duty cycle) Extension activated	1 Hz (50% duty cycle) Loop Failure One flash every five seconds Prior Loop Failure

ii Rotary Switch (Sensitivity)

The eight-position rotary switch selects one of eight (8). 0 is lowest and 7 is highest, with normal (factory default) being 4. Use the lowest sensitivity setting that will consistently detect the smallest vehicle that must be detected. Do not use a sensitivity level higher than necessary. Sensitivity, response times, and current consumption are listed in the table below.

Position	0	1	2	3	4*	5	6	7
-ΔL/L	2.56%	1.28%	0.64%	0.32%	0.16%*	0.08%	0.04%	0.02%
Response Time	60 ±20 ms (Normal Operation) 180 ±90 ms (Low Power Mode)							
Current Consumption	35 mA maximum, 25 mA typical (Normal Operation) 12.7 mA maximum, 5.2 mA typical (Low Power Mode)							

* Factory default setting.

iii **DIP Switches**

Switch	ON	OFF	Factory Default
1	Frequency		OFF
2	<i>(See table in Frequency section)</i>		ON
3	Fail-Secure Output A	Fail-Safe Output A	OFF
4	Sensitivity Boost	No Boost	OFF
5	Output Delay		OFF
6	<i>(See table in Output Delay section)</i>		OFF
7	Output Extension		OFF
8	<i>(See table in Output Extension section)</i>		OFF
9	Exit Pulse Output B	Entry Pulse Output B	OFF
10	Presence Mode Output B	Pulse Mode Output B	OFF

Frequency (DIP Switches 1 and 2)

In situations where loop geometry forces loops to be located in close proximity to one another, it may be necessary to select different frequencies for each loop to avoid loop interference, commonly known as crosstalk. DIP switches 1 and 2 can be used to configure the detector to operate at one of four frequencies corresponding to **Low**, **Medium / Low**, **Medium / High**, and **High** as shown in the table below.

NOTE: After changing any frequency DIP switch setting(s), the detector must be reset by momentarily changing the position of DIP switch 3 (Fail-Safe / Fail-Secure) or DIP switch 10 (Presence / Pulse Mode) or by removing and reapplying power.

Switch	Frequency			
	Low (0)	Medium / Low (1) *	Medium / High (2)	High (3)
1	ON	OFF *	ON	OFF
2	ON	ON *	OFF	OFF

* Factory default setting.

Fail-Safe / Fail-Secure (DIP Switch 3)

When DIP switch 3 is in the **OFF** position, the detector will operate in Fail-Safe mode during a loop fault. If a loop fault occurs while Fail-Safe mode is selected, the Output A will activate. When DIP switch 3 is in the **ON** position, the detector will operate in Fail-Secure mode during a loop fault or power failure condition. If a loop fault or power failure occurs while Fail-Secure mode is selected, the Output A **will not** activate. Additionally, one of two modes of Fail-Safe operation can be selected depending on the state of Pin 10.

NOTE: Changing the setting of this DIP switch will reset the detector.

Switch 3 Setting	Output	Pin 10 Grounded			Pin 10 No Connection		
		Detect	Power Failure	Loop Failure	Detect	Power Failure	Loop Failure
OFF *	A	On	Off	On	Off	Off	Off
	B	On	Off	Off	On	Off	Off
ON	A	On	Off	Off	On	Off	Off
	B	On	Off	Off	On	Off	Off

* Factory default setting.

NOTE: When used in conjunction with a Model HM1 Motherboard, the HM1 Motherboard correctly sets the state of Pin 10.

Sensitivity Boost (DIP Switch 4)

DIP switch 4 can be turned **ON** to increase sensitivity during the detect period without changing the sensitivity during the no detect period. The boost feature has the effect of temporarily increasing the sensitivity setting by up to two levels. When a vehicle enters the loop detection zone, the detector automatically boosts the sensitivity level. As soon as no vehicle is detected, the detector immediately returns to the original sensitivity level. This feature is particularly useful in preventing dropouts during the passage of high bed vehicles. The factory default setting is **OFF** (no Sensitivity Boost).

Output Delay (DIP Switches 5 and 6)

One of four output delay times can be selected to delay the signals on the Presence outputs. Delay intervals of zero, two, five, or ten seconds can be selected by setting DIP switches 5 and 6 as shown in the table below.

Switch	Output Delay Interval			
	Zero (0) Seconds *	Two (2) Seconds	Five (5) Seconds	Ten (10) Seconds
5	OFF *	ON	OFF	ON
6	OFF *	OFF	ON	ON

* Factory default setting.

Output delay timing controls how long a vehicle must be continually detected before the detector outputs are turned on. If the vehicle leaves the loop detection zone during this interval, the delay timing interval will be aborted and the next vehicle entering the loop detection zone will begin a new full two, five, or ten second delay time. The detector provides an indication that the delay interval is currently timing by flashing **LED 1 (Detect)** at a two Hz rate with a 50% duty cycle.

Output Extension (DIP Switches 7 and 8)

One of four output extension times can be selected to extend the signals on the Presence outputs. Extension intervals of zero, two, five, or ten seconds can be selected by setting DIP switches 7 and 8 as shown in the table below.

Switch	Output Extension Interval			
	Zero (0) Seconds *	Two (2) Seconds	Five (5) Seconds	Ten (10) Seconds
7	OFF *	ON	OFF	ON
8	OFF *	OFF	ON	ON

* Factory default setting.

Output extension timing controls how long the detector output is extended after a vehicle exits the loop detection zone. When the specified amount of time passes, and the loop detection zone is still vacant, the detector output will be turned off. If another vehicle enters the loop detection zone during this interval, the extension interval will be reset and the vehicle currently occupying the loop detection zone will initiate a new full two, five, or ten second extension time once it exits the loop detection zone. The detector will indicate that the extension interval is currently timing by flashing **LED 1 (Detect)** at a four Hz rate with a 50% duty cycle.

Pulse on Entry / Pulse on Exit (DIP Switch 9)

When Output B is set to operate in Pulse Mode (DIP switch 10 set to **OFF**), it can be programmed to output a 250 millisecond pulse only upon vehicle entry into the loop detection zone or only upon vehicle exit from the loop detection zone. When DIP switch 9 is **OFF**, the detector will output an **Entry Pulse** each time a vehicle enters the loop detection zone. When DIP switch 9 is **ON**, the detector will output an **Exit Pulse** each time a vehicle leaves the loop detection zone. The factory default setting of DIP switch 9 is **OFF** (Pulse on Entry). (DIP switch 9 has no effect on Output A, the Presence output.)

NOTE: When there is a Delay timing interval programmed, and Output B is set to operate in Pulse on Entry mode, Output B will only output the pulse after the delay timing interval has expired. When there is an Extension timing interval programmed, and Output B is set to output in Pulse on Exit mode, Output B will output the pulse at the start of the extension timing interval. If a second vehicle comes into the detection zone and then leaves the detection zone, Output A will not change its Detect state, but Output B will output a second pulse for the second vehicle.

Presence / Pulse Mode (DIP Switch 10)

Output B has two modes of operation, Presence or Pulse. When set to operate in Pulse mode (DIP switch 10 set to **OFF**), Output B can be set to provide a 250 millisecond pulse when a vehicle enters or exits the loop detection zone. DIP switch 9 is used to select Pulse-on-Entry or Pulse-on-Exit. When in Presence mode (DIP switch 10 set to **ON**), the presence hold time is the same as Output A. The factory default setting of DIP switch 10 is **OFF** (Pulse Mode).

NOTE: Changing the setting of this DIP switch will reset the detector.

III Reset

Changing the position of DIP switch 3 (Fail-Safe / Fail-Secure) or DIP switch 10 (Presence / Pulse) will reset the detector. The detector can also be reset by momentarily pulling Pin 5 (Reset pin) to ground or by removing and reapplying power. After changing the frequency selection switches, the detector must be reset.

IV Failed Loop Diagnostics

The **LED 2 (Loop Fail)** indicates whether or not the loop is currently within tolerance. If the loop is within tolerance, the **LED 2** will be **OFF**. If the loop is out of tolerance, the **LED 2** indicates a current loop failure condition by flashing at a one Hz flash rate with a 50% duty cycle. If and when the loop returns to within tolerance, the **LED 2** will flash at a rate of one flash every five seconds to indicate that an intermittent loop failure has occurred and has been corrected. This flash rate will continue until another loop failure occurs, the detector is reset, or power to the detector is interrupted.

V Relay or Solid State Operation

One of two modes of Fail-Safe operation can be selected depending on the state of Pin 10. If Output A is driving a Solid-State device, Pin 10 should be grounded; if Output A is driving a Relay device, Pin 10 should have no connection.

Pin 10 State	Detect	No Detect	Power Failure	Loop Failure
No Connection (Relay Operation)	OFF	ON	OFF	OFF
Grounded (Solid-State Operation)	ON	OFF	OFF	ON

NOTES: The state of Pin 10 has no affect on Output B, Fail Output, or Fail-Secure operation.

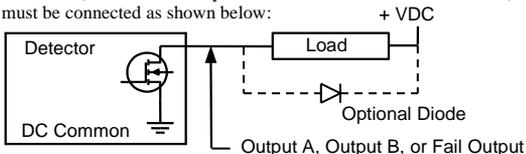
When used in conjunction with a Model HM1 Motherboard, the HM1 Motherboard correctly sets the state of Pin 10.

VI Pin Connections

Pin	Function
1	Loop
2	Loop
3	DC Common
4	DC +
5	Reset
6	Fail Output Collector
7	DC Common
8	Output A Collector
9	Output B Collector
10	Relay / Solid State Fail-Safe Operation

NOTES: Pin 6 (Fail Output) is in a conducting state when power is applied and a functioning loop is connected to the detector. If power or the loop fails, the Fail Output will open to provide an indication of the failure.

The three outputs (Output A, Output B, and the Fail Output) are FET devices that sink current to DC Common (i.e. the FET Output switches the load to DC Common). To operate properly, the output must be connected as shown below:



If the output is being used to turn on an inductive device such as a relay, a snubber diode should be wired in parallel with the relay coil.