# DEFLECTOMETER™

# LMD624
## DEFLECTOMETER™ SERIES
### FOUR CHANNEL NEMA TS-2 TYPE B LOOP MONITOR™

**Built-in DEFLECTOMETER™ Technology Provides Users With:**

☑ **Call Strength Indicator for Optimum Sensitivity Programming**

☑ **One step / One vehicle dynamic Sensitivity programming**

☑ **Frequency Meter for immediate analysis of loop frequency, avoiding loop cross-talk problems**

☑ **Push Button Programming**

*Why guess when you can know* **your detector is optimally programmed and performing for all vehicle classes!**

## ENHANCED FEATURES

**DEFLECTOMETER Call Strength Indictor:** The *Call Strength Indicator* provides the technician with a simple one-step method for accurately setting the optimum level of sensitivity that ensures accurate vehicle detection of all vehicles, including motorcycles and high-bed trucks. *NO MORE GUESSING!*

When a medium size vehicle is over the roadway loop, a DEFLECTOMETER™ Call Strength value of "5" assures that the optimum sensitivity has been achieved. You can adjust the DEFLECTOMETER™ reading *DYNAMICALLY* without moving the vehicle by using the front panel UP or DOWN sensitivity buttons. *IT DOES NOT GET ANY EASIER THAN THIS!*

**Frequency Meter:** The built-in *Frequency Meter* reports the operating frequency of the loop network. Ensuring that adjacent loops are separated by at least 5 KHz will avoid crosstalk problems and future service calls.

**Output CALL Test Mode:** The Output Call Test Mode provides a straight forward way to test that the Controller Unit is receiving an active output from the detector. This eliminates the need for cabinet test switches and associated wiring. A huge time saving feature during system set-up and trouble-shooting.

**Advanced Loop Diagnostics:** The Fault (FLT) indicator displays the type of fault: Short, Open or 25% change of inductance. The Fault Monitor will report and store three types of loop faults; Open Loops, Shorted Loops, and 25% sudden changes in inductance. Each type of fault is indicated by a unique sequence of flashes allowing the user to diagnose loop failures at a glance.

**Half Width Version:** The LMD624H model provides four channels of detection with a half-width front panel.

## STANDARD FEATURES

☑ **Automatic Tuning**

☑ **Lightning & Surge Protection**

☑ **Four Frequency Levels**

☑ **Fail Safe Output Configuration**

☑ **Separate Color Coded LED indicators**

☑ **Wide Loop Inductance Range: 20 to 2500 micro Henries.**

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## General Characteristics

**Controls**: Front panel push buttons allow the user to set the Sensitivity Level, Operational mode, and nominal Frequency independently on each channel.

## Setting Sensitivity - Front Panel Push Buttons

The DEFLECTOMETER™ (front panel 7-segment LED) aids in setting the DETECTOR quickly and easily to the most optimum sensitivity level to ensure the trouble-free detection of all vehicles, including motorcycles and high bed vehicles. For typical vehicles (mid-size vehicle / small pick up) utilizing properly installed roadway loops, a Call Strength of 5 displayed on the DEFLECTOMETER™ during the DETECT output period indicates an optimum sensitivity setting. For high profile vehicles (commercial trucks, 4x4's, etc...), a Call Strength value of 4 will be optimum. For low profile vehicles (sports cars, etc...), a Call Strength value of 6 will be optimum.

## Adjusting sensitivity using the DEFLECTOMETER™ (recommended):

The DEFLECTOMETER™ should read zero (0) with no vehicle over the roadway loop. When a typical mid-sized vehicle is completely in the detection zone (DET indicator On), the Call Strength value should be adjusted up or down until the DEFLECTOMETER™ displays the desired optimum value of 5 (or 4 or 6 as described above).

If a typical vehicle located over the roadway loop causes the Call Strength "7" to be displayed on the DEFLECTOMETER™, the sensitivity should be decreased two levels. This can be done by pressing the front panel SENS⬇ button two times to achieve the Call Strength value of 5.

If a typical vehicle located over the roadway loop causes the number "2" to be displayed on the DEFLECTOMETER™, the sensitivity should be increased three levels. This can be done by pressing the front panel SENS⬆ button three times to achieve the Call Strength value of 5.

**NOTE: THE DEFLECTOMETER™ CALL STRENGTH <u>DYNAMICALLY</u> UPDATES AFTER EACH SENSITIVITY LEVEL CHANGE, ALLOWING YOU TO CHANGE SENSITIVITY SETTINGS WHILE A VEHICLE REMAINS IN THE LOOP DETECTION ZONE.**

## Adjusting sensitivity without using the DEFLECTOMETER™ (manually setting sensitivity):

The DETECTOR offers 9 levels of sensitivity (1 to 9). Level 9 is the highest sensitivity. Sensitivity Level can be manually set to any desired value by pressing the front panel SENS buttons (⬆ or⬇) when a vehicle is NOT over the roadway loop (DET indicator Off). The first time a SENS button (⬆ or⬇) is pressed, the current Sensitivity Level is displayed on the DEFLECTOMETER™ for 3 seconds. If either SENS button (⬆ or⬇) is pressed again before the 3 second period ends, the Sensitivity Level will increase (SENS ⬆) or decrease (SENS ⬇). The new Sensitivity Level value will be displayed on the DEFLECTOMETER™ display for 3 seconds. The factory default Sensitivity setting is level 6.

| Sensitivity | ΔL / L | Sensitivity | ΔL / L |
|---|---|---|---|
| 9 | 0.01% | 4 | 0.32% |
| 8 | 0.02% | 3 | 0.64% |
| 7 | 0.04% | 2 | 1.28% |
| **6** | **0.08%** | 1 | 2.56% |
| 5 | 0.16% | - | - |

**Loop Frequency / Loop Frequency Display**: One of four frequency settings may be selected via the front panel FREQ push button to alleviate interference which may occur when loops connected to different detectors are located adjacent to one another. To help prevent or diagnose crosstalk problems, the loop frequency is displayed on the front panel DEFLECTOMETER™. The current loop frequency is displayed after pressing the FREQ button to display the current Frequency Level. The frequency is shown in KHz with a "-" symbol displayed both before and after the numeric digits shown on the DEFLECTOMETER™.

For example, after pressing the FREQ button once the display sequence might show:

"3" ⇨ "-" ⇨ "2" ⇨ "7" ⇨ "-"

This sequence would indicate Frequency Level "3" and a loop reference frequency of 27 KHz. Detectors on adjacent loops should all be separated by at least 5 KHz.

**Loop Fault Monitoring**: The Detector continuously checks the integrity of the loop. The system is able to detect shorted or open circuit loops, or sudden changes in inductance exceeding 25% of the nominal inductance. If a fault is detected, the OUT and FLT indicators continuously emit a sequence of flashes. Additionally, the DEFLECTOMETER™ displays the letter "F" indicating a current loop fault. Each type of fault is identified by a unique flash sequence:

| Flash Sequence | Fault |
|---|---|
| 1 flash | Open Circuit Loop. |
| 2 flashes | Shorted Circuit Loop. |
| 3 flashes | 25% excessive change in inductance. |

If the Open or Shorted fault condition self heals, the DET indicator and DEFLECTOMETER™ will return to normal operation. The FLT indicator will continue to flash with the sequence signifying the type of fault that was last detected. In the case of the excessive inductance change fault, the unit will retune to the new inductance after a period of two seconds and continue operation. The fault condition will be indicated by the flash sequence of the FLT indicator.

## Operational Modes

**Presence:** For each channel, a Presence output mode may be selected from the front panel MODE push button. If presence mode is selected then a choice of short **(S)** or long **(L)** can be selected. Short Presence is defined as 30 minutes and Long Presence is defined as 120 minutes.

**Pulse:** For each channel, a Pulse output mode **(P)** may be selected from the front panel MODE push button. In Pulse mode, a 125 ms ± 25ms width pulse will be output for each vehicle entering the loop.

**Call:** For each channel, a continuous CALL output **(C)** may be selected from the front panel MODE push button which will simulate the presence of a vehicle. This mode is used for testing the CALL output of a channel.

**Channel Off:** For each channel, the Channel Off **(-)** may be selected from the front panel Mode push button. This option turns OFF the channel and disables the oscillator. An additional option allows the Status Output to be turned ON while the channel is OFF.

## Status Outputs:

Each channel includes a separate output which is used to transmit operational status information to a bus interface unit (BIU). Fault information is transmitted by means of pulse-width modulation. Pulse widths shown are +10ms.

| Status | Status Output Condition |
|---|---|
| Normal operation / No fault | Continuous ON (low) |
| Watchdog fail / Power Supply fail | Continuous OFF (high) |
| Open circuit loop | 50ms OFF, 50ms ON |
| Short circuit loop | 100ms OFF, 50ms ON |
| 25% change in inductance | 150ms OFF, 50ms ON |

## Specifications:

| | | |
|---|---|---|
| **DC Supply Voltage:** | Minimum | 10.8 Vdc |
| | Maximum | 28.8 Vdc |
| **DC Supply Current:** | Maximum | 100 mA |
| **DC Timer Control Inputs:** | True (low) | Less than 8 Vdc |
| | False (high) | Greater than 16 Vdc |
| **Optical Isolated Outputs**: | True (low, 50 mA) | Less than 1.5 Vdc |
| | Maximum Current | 100 mA |

Outputs are fail-safe such that a Detector with no power will provide the True (low) Call state.

**Environmental:** Operating Temperature Range: -30ºF to 165ºF (-34ºC to 74ºC)

**Mechanical:** International Card with 44 pin double sided edge connector

| | | |
|---|---|---|
| Height | | 4.5″ (114.3mm) |
| Width | | 2.34″ (59.4mm) |
| Width (LMD624H) | | 1.14″ (28.9mm) |
| Depth (excluding handle) | | 6.875″ (174.6mm) |

## Pin Assignment:

| PIN | FUNCTIONS | PIN | FUNCTIONS |
|---|---|---|---|
| A | Logic Ground | 1 | Reserved |
| B | DC Supply | 2 | Reserved |
| C | Ext. Reset | 3 | Reserved |
| D | Ch 1 Loop Input | 4 | Ch 1 Redundant Loop Input |
| E | Ch 1 Loop Input | 5 | Ch 1 Redundant Loop Input |
| F | Ch 1 Output (+) | 6 | Reserved |
| H | Ch 1 Output (-) | 7 | Ch 1 Status Output |
| J | Ch 2 Loop Input | 8 | Ch 2 Redundant Loop Input |
| K | Ch 2 Loop Input | 9 | Ch 2 Redundant Loop Input |
| L | Chassis Ground | 10 | Reserved |
| M | Reserved | 11 | Reserved |
| N | Reserved | 12 | Reserved |
| P | Ch 3 Loop Input | 13 | Ch 3 Redundant Loop Input |
| R | Ch 3 Loop Input | 14 | Ch 3 Redundant Loop Input |
| S | Ch 3 Output (+) | 15 | Reserved |
| T | Ch 3 Output (-) | 16 | Ch 3 Status Output |
| U | Ch 4 Loop Input | 17 | Ch 4 Redundant Loop Input |
| V | Ch 4 Loop Input | 18 | Ch 4 Redundant Loop Input |
| W | Ch 2 Output (+) | 19 | Reserved |
| X | Ch 2 Output (-) | 20 | Ch 2 Status Output |
| Y | Ch 4 Output (+) | 21 | Reserved |
| Z | Ch 4 Output (-) | 22 | Ch 4 Status Output |