

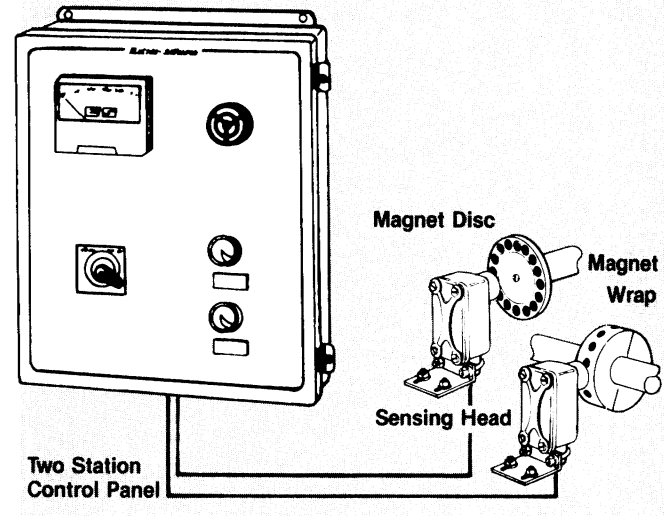
# Elevator Alarm System MODELS LM-1 and LM-2

## Electro-Sensors Inc. Installation and Operating Instructions

### Features:

- Explosion Proof Sensing Heads
- 0-100% Analog Meter
- 60DB Warning Horn and Indicator Lights
- Two Adjustable Set Points per Shaft
- Independent Power Supply for Each Leg
- Dusttight Steel Enclosure

The Elevator Leg Alarm is a complete system that continuously monitors one or two independent shafts from a central control panel. This is ideal for detecting undesired slowdowns and guards against consequential heat buildup from belt slippage on bucket elevators, or complimentary conveying equipment.



### Principle of Operation:

As the elevator or conveyor slows down due to clogging, the leg monitor system, with its sensor mounted at the boot or tail pulley, detects a 10% decrease in speed. At this set point, audible and visual warnings are given, and feeding equipment can be shut down to clear the problem. If a 15% decrease in speed is reached, the elevator leg itself will be shut down immediately or with an optional time delay up to 15 seconds.

### Installation Instructions

#### Magnet Disc:

The end of the shaft to be monitored must be center drilled to a depth of 1/2" with a No. 21 drill and tapped for 10-32UNF. After applying Loctite® or a similar adhesive on the threads to keep the magnet disc tight, the magnet disc should be attached, decal side out, with a 10-32UNF machine screw. (See Figure 1).

#### Magnet Wrap:

When the wrap is shipped, four allen-head cap screws hold the two halves of the wrap together. These screws must be removed so that the wrap is in two halves. Place the halves around the shaft and screw together so the wrap fits the shaft tightly. Wraps are custom made to fit a specific diameter. (See Figure 2).

### Sensing Head Installation:

The explosion proof sensing head is supplied with a slotted mounting bracket. Sensors should be installed so the center line of the sensor passes through the center line of the magnets as they rotate.

When using a disc (Figure 1) the pick-up gap (dimension A) should be adjusted between 1/16" and 1/4" for proper operation. This is achieved by adjusting the slotted mounting bracket. Dimension B is 1 1/8" from the center hole of a disc. When using a wrap (Figure 2), dimension A must be between 1/16" and 1/4".

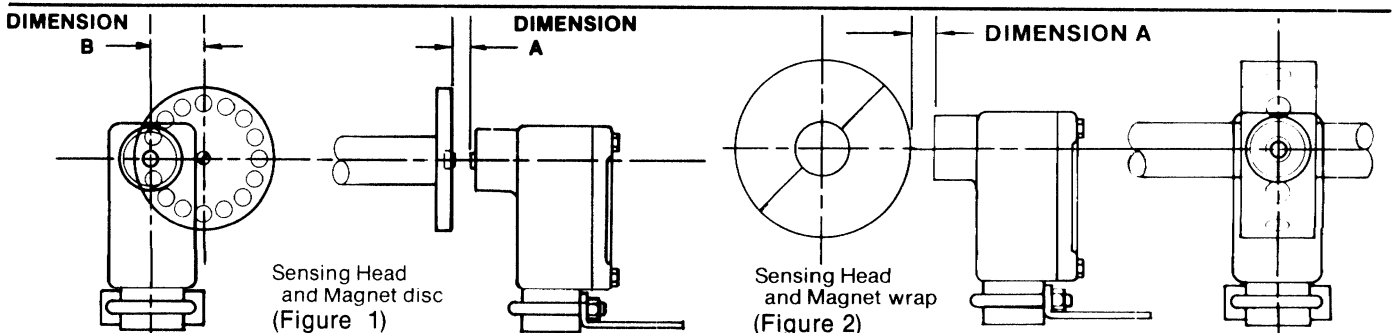
#### Installation Note:

*The complete chassis should be removed before punching or drilling the hole for cable entrance or conduit.*

#### Wiring Connections:

Inside the enclosure are one or two chassis mounted circuit boards that are identical. Model LM-1 has only one board and Model LM-2 has two. We shall refer to them as Board "A" on top and Board "B" in the bottom position.

Connect the sensing head cable to terminal strip TB2 on each board respectively, by attaching the red lead to terminal 7, the black lead to terminal 8 and both the clear lead and the shield to terminal 9 (Figure 3).



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Apply 115Vac power to terminal strip TB1 by connecting the hot lead to terminal 1, the neutral lead to terminal 2, and the ground lead to terminal 3. If your unit is a Model LM-2, with two circuit boards, run additional power leads to the same terminals of the second board.

To disable the warning horn and indicator light for a monitored leg when it is not in operation refer to Figure 4. A set of normally open motor starter auxiliary contacts must be wired across terminals 1 and 2 on terminal block TB3.

Consult the sample wiring diagram for use of the SP1 relay contact outputs. SP2 is used internally to sound the warning horn and light the indicator light when there is a slowdown. SP1 is used for motor shutdown. There is a set of SP2 relay contacts available for use in shutting down preceding or following equipment when an alarm condition exists. See Figures 3 and 4.

### Calibration:

If you have an LM-2 System, calibrate each leg separately using the analog meter on the front panel of the LM enclosure. Switch the shaft monitor selector switch located on the front panel below the meter to

the leg one position and calibrate the top board, "A". Consult Figure 3 and place the readout select switch (S1) in the "A" position, Figure A. Next place the range selector switch (S3), Figure 3, in the position corresponding to the RPM range in which the monitored shaft will be running.

With 115Vac applied and the monitored system off, turn the 0-10Vdc Zero Adjustment (R-16) clockwise to increase and counterclockwise to decrease until the reading is zero.

Now bring the monitored shaft up to full operating speed and calibrate the system using full-meter deflection as 100% of full operating speed.

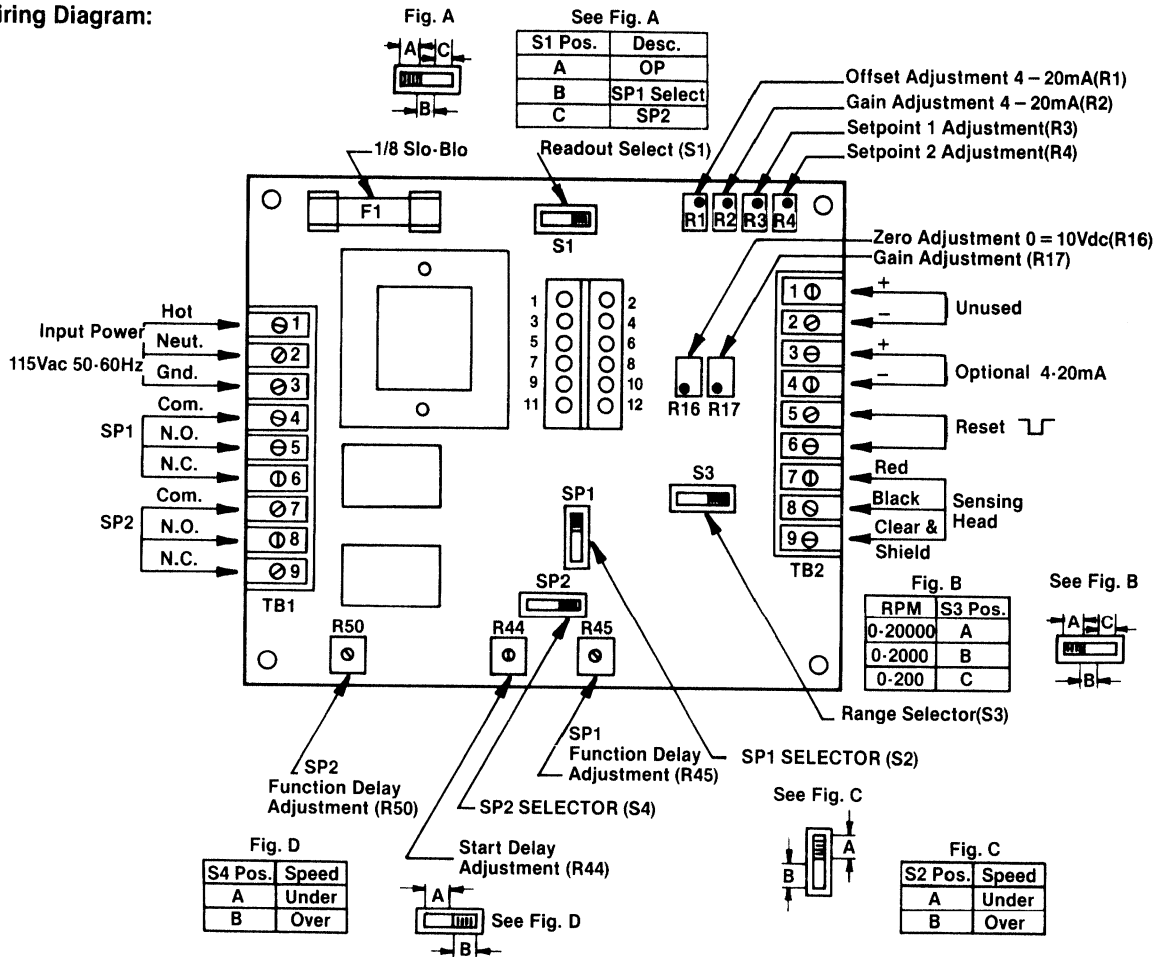
Turn the Gain Adjustment (R-17) clockwise to increase or counterclockwise to decrease until the reading is 100% or the full-known operating speed. Minimum full speed, i.e., 100% is 25 RPM.

Because there is a slight interaction between the zero and gain adjustments, it is recommended to repeat the calibration procedure to assure accuracy.

To calibrate Board "B" (LM-2 Systems only) switch the Shaft Monitor Selector Switch located on the front panel below the meter to the Leg Number 2 position and repeat the calibration procedure. Refer to Figures 3 and 4 as before, for the location of components on Board "B".

### Sample Wiring Diagram:

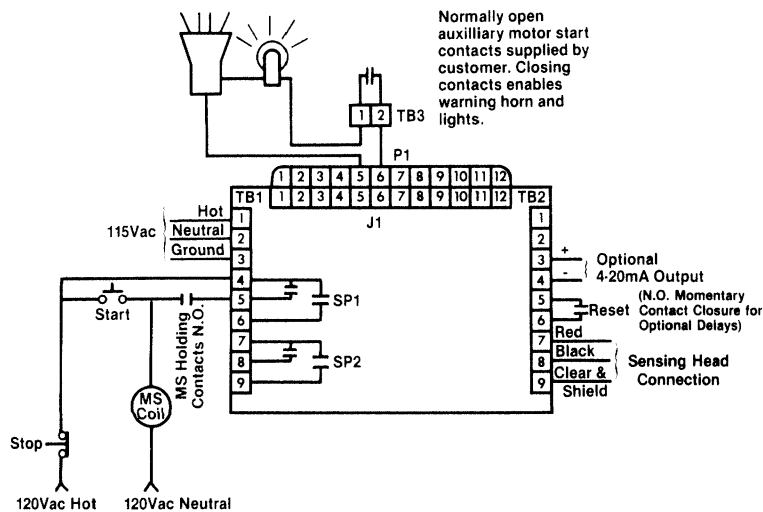
(Figure 3).



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### Wiring Diagrams:

Figure 4



### Set Point Adjustment:

Depending on the application, set the SP1 Selector (S2), Figure C, for underspeed or overspeed. Also set the SP2 Selector (S4), Figure D, for underspeed or overspeed. These selections must precede adjustment of set points. (See Figure 3).

Set points are independent and must be adjusted as such. There are no restrictions as to how distant or how close set points may be in relation to each other.

Place the Readout Select (S1) in the "B" position for set point 1. Turn the Set Point 1 Adjustment (R3) clockwise to increase and counterclockwise to decrease, until the desired reading is evident on the display. Place the Readout Select (S1) in the "C" position for set point 2. Turn the Set Point 2 Adjustment (R4) clockwise to increase and counterclockwise to decrease until the desired reading is displayed on the meter.

The green LED next to each relay will light when the relay is energized for the set point.

### Start Delay:

This feature affects both set point one and set point two. This allows the shaft to come up to speed without requiring the "start" switch to be held until operating speed is reached. The delay-timing range is between .1 second and 15 seconds and is field adjustable by a single turn potentiometer.

A momentary contact closure on the reset terminals, TB2-5 and TB2-6 on Figure 4, is required to start timing. This closure may come from either a set of motor starter auxiliary contacts or the motor start switch. Turn the Start Delay Adjustment (R44) clockwise to increase and counterclockwise to decrease, until the desired delay period is achieved. The adjustment may have to be made a few times to attain an exact desired delay time. The maximum travel is 3/4 turn.

### Options:

#### 4-20mA or 10-50mA Use:

This option will provide either a 4-20mA or 10-50mA current loop proportional to the monitored speed. The order will define which current output is available on the purchased unit. Calibration and functioning are totally independent of all other adjustments. The same adjustment pots and output terminals are used for either 4-20mA or 10-50mA.

Connect a milliammeter (maximum load of 500 Ohms) to TB2-3 and TB2-4 observing polarity as defined in Figure 4. When the shaft is at zero speed, adjust the Offset Adjustment 4-20mA (R1) clockwise to increase and counterclockwise to decrease, until the meter displays a 4mA or 10mA output.

With the shaft running at full operating speed (100%) adjust the Gain Adjustment, 4-20mA (R2) clockwise to increase or counterclockwise to decrease until the meter displays a 20mA or 50mA output. On LM-2 models, repeat above steps to calibrate current loop on Board "B".

### Set Point Delay:

The purpose of this option is to allow the monitored shaft a momentary slowdown without enabling a process function (alarm motor shutdown, etc.) to occur.

This option keeps the set point relay energized for a period of time (.1 second to 15 seconds) after a fault condition is detected. The delay will automatically reset when the fault condition is cleared. The delay timing range is field adjustable by potentiometer.

Each set point has an independent single turn adjustment for setting the delay time. For set point 1, turn the SP1 Delay Adjustment (R45 on Figure 3) clockwise to increase and counterclockwise to decrease until the desired delay cycle is achieved. For set point 2, turn the SP2 Delay Adjustment (R50) clockwise to increase the delay and counterclockwise to decrease the delay. These adjustments may have to be made more than once to achieve an exact desired delay time. Caution: Potentiometer overtravel may cause damage and subsequent malfunction of the equipment operation. Repeat this procedure for Board "B" on LM-2 models.

### Options:

- 4-20mA Analog Output
- Set Point Delay 0-15 Seconds
- Digital Meter
- Split Collar Magnet Wrap
- 230Vac Power Supply
- Standard Remote Horn (110 Db)
- Explosion Proof Remote Horn (110 Db)

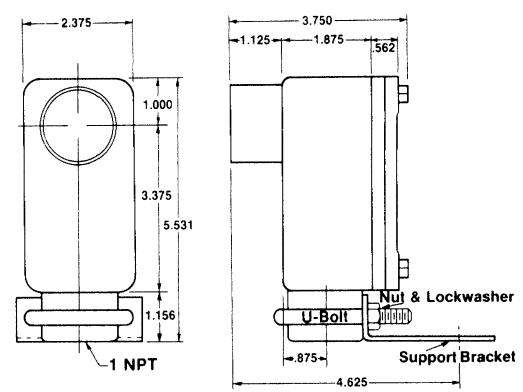
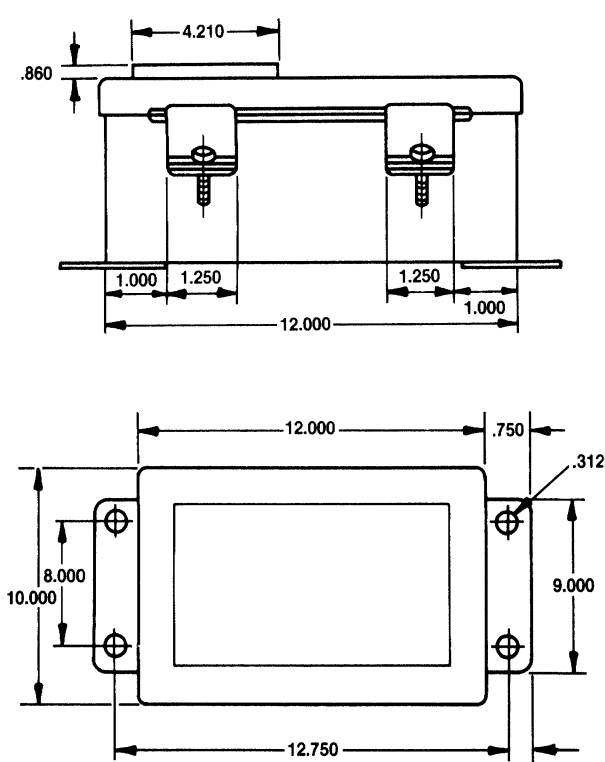
# Electro-Sensors Elevator Alarm System, LM-1 and LM-2

## Elevator Alarm System, General Specifications

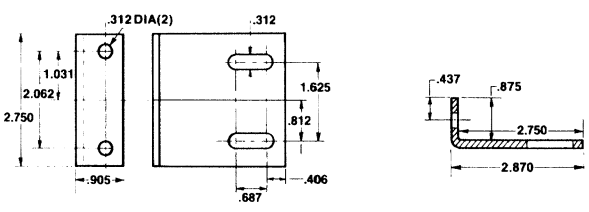
Power Required .....	115Vac, 50-60Hz
Electrical Connections .....	Terminal Strips
Housing .....	JIC Dusttight
Calibration .....	22 Turn Potentiometer
Set Point Adjustment .....	22 Turn Potentiometer
Set Point Repeatability .....	0.5%
Set Point Relay .....	SPDT, Isolated, 5Amp 115Vac Resistive
Magnet Disc .....	4 Inch Diameter, 16 Magnets, PVC

Sensing Head .....	Explosion Proof
Distance Between Sensor and Disc .....	1/16" to 1/4"
Signal Cable .....	Three Wire Shielded
Meter .....	Analog or Digital
Meter Calibration .....	0-100 Percent
Horn .....	60Db Sonalert
Indicator Lamps .....	Red Lamp for Each Leg

## Dimensional Drawings



Explosion Proof Sensing Head



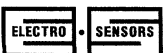
Mounting Bracket

### Conditional Limited Warranty

Electro-Sensors, Inc. warrants to the purchaser for one year from the date of purchase, any defect which upon our examination proves to have been caused by faulty material or workmanship. This warranty does not cover abuse, normal wear or careless handling, and it is void if the product has been repaired or serviced by personnel not authorized by Electro-Sensors, Inc. No other warranty,

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