

EAZY-CAL™ MME-1000 Mini-Module Signal Conditioner



User Manual



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DESCRIPTION

The Macro Sensors EAZY-CAL™ MME-1000 is a single channel LVDT signal conditioner that operates from +15 to +30V DC power input and provides a low noise 0 to +10V DC output. It can be remotely located by up to 100+ feet from the LVDT.

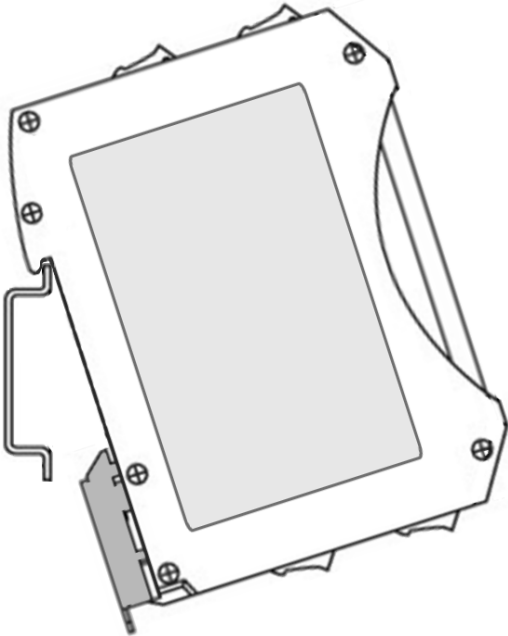
The EAZY-CAL™ intuitive user interface employs two push buttons and 4 LED status indicators on the front panel, allowing calibrations to be easily accomplished in seconds. (Switches, Jumpers, and Null and Span potentiometers associated with analog-based signal conditioners have been eliminated).

DIN-rail mountable compact high-impact flame-retardant plastic housing allows use in harsh factory and industrial environments.

Full calibration instructions, along with a connection diagram are conveniently outlined on the side panel for quick reference.

MOUNTING

Hook the EAZY-CAL™ on the DIN rail with the release clip facing down and push onto the rail until a 'click' is heard. To remove, use a screwdriver to lever the release clip down. Pull the bottom of the housing away from the rail and unhook.

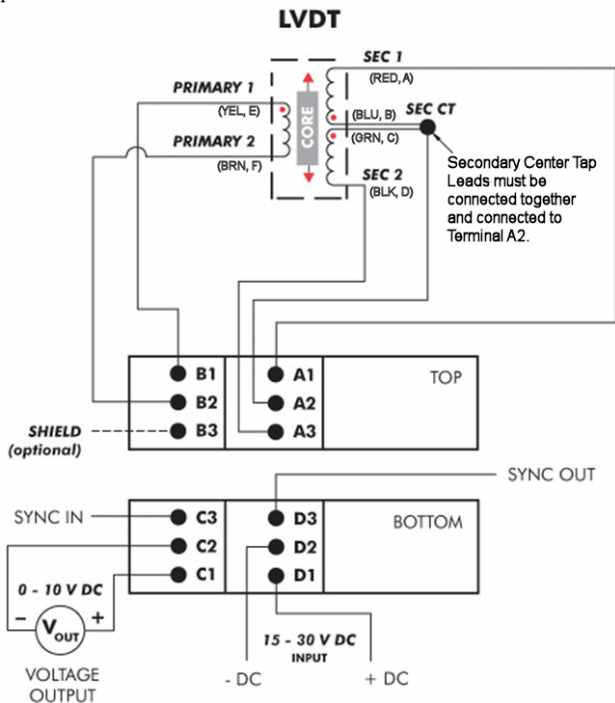


CONNECTIONS

There are 12 screw terminals on the top and bottom of the EAZY-CAL™, labeled A1, A2 ... D3. Terminal names and functions are shown below:

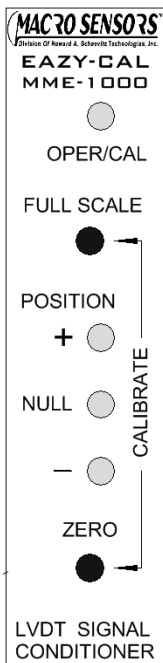
Terminal	Name	Function
A1	SEC-1	LVDT Secondary – 1
A2	SEC-CT	LVDT Secondary - Centertap
A3	SEC-2	LVDT Secondary – 2
B1	PRI-1	LVDT Primary - 1
B2	PRI-2	LVDT Primary - 2
B3	SHIELD	Optional cable shield (GND)
C1	VOOUT	Output Voltage, 0 – 10VDC
C2	VO-RTN	Output Voltage Return (GND)
C3	SYN-IN	Synchronization Input
D1	VDC-IN	Input Supply Voltage, 15 – 30VDC
D2	GND-IN	Input Supply Voltage Return (GND)
D3	SYN-OUT	Synchronization Input

Connections to the EAZY-CAL™ are as shown below. Typical Macro Sensors LVDT wire color and pin designations are shown in parenthesis.



FRONT PANEL

The front side of the EAZY-CAL™ contains the push buttons and LED indicators which are used for calibrating the EAZY-CAL™ to the LVDT. The buttons and LEDs are shown below:



<p>OPER / CAL LED (Red)</p>	<p>Steady ON indicates Operating Mode, Blinking indicates Calibration Mode.</p>
<p>POSITION LEDs:</p> <p>+ (Yellow)</p> <p>NULL (Green/Red)</p> <p>- (Yellow)</p>	<p>During Calibration:</p> <p>Indicates core is above null position (inserted)</p> <p>Green - Indicates core is at null position Red – Indicates error condition</p> <p>Indicates core is below null position (extended)</p>
<p>FULL SCALE / ZERO Buttons:</p>	<p>Press both buttons simultaneously for 3 seconds to enter Calibration Mode</p> <p>Press ZERO button to set core minimum (0V out) position</p> <p>Press FULL SCALE button to set core maximum (10V out) position</p>

CALIBRATION PROCEDURE:

Calibrating the EAZY-CAL™ consists of finding the NULL (center) position of the LVDT, and then setting the ZERO and FULL SCALE measurement positions that will correspond to the minimum and maximum output voltage. It is most important that when setting the NULL position, that it be set as close as possible to the center of the minimum and maximum linear stroke range. Otherwise, non-linearity errors may result at or near the endpoint positions.

The basic calibration instructions are printed on the side of the EAZY-CAL™ for reference.

Directions are as follows:

1. Connect the LVDT to the EAZY-CAL™ as shown in the connection diagram. Apply power, and allow 3 to 5 minutes warm-up time.
2. Press and hold both buttons for 3 seconds. The OPER/CAL LED will blink.
3. Move LVDT core to Null position by observing the 3 Position LEDs. The + and - LEDs indicate that the core is inserted or extended beyond the Null, respectively.
4. Attach the core to the workpiece to be measured so that the workpiece center of motion is aligned with the LVDT Null.
5. Move workpiece to its minimum position and press the ZERO button. Wait for the Position LEDs to stop blinking.
6. Move workpiece to its maximum position and press the FULL SCALE button. The unit will now operate with its new calibration. The OPER/CAL LED will be steady On.

NOTES ON CALIBRATION

The LVDT core **MUST NOT** protrude from the LVDT during the calibration, or erroneous calibration will result.

Calibration may be performed by setting the **FULL SCALE** position first, rather than the **ZERO** position. Either position may be on either side of **NULL**.

Swapping **SEC-1** & **SEC-2** connections will swap the direction indicated by the **Position LEDs**.

If Calibration mode has been entered but not completed within 90 seconds, Operation mode will be re-entered, and the **EAZY-CAL™** will resume functioning with its previous calibration parameters. Calibration mode can also be canceled by pressing the **2** buttons simultaneously for 3 seconds.

CALIBRATION ERRORS

If the NULL LED blinks red during a calibration step, an error condition has occurred. Calibration will continue after the error condition is removed or started over. Errors are as follows:

Blink	Meaning	Remedy
After ZERO button push	The ZERO button was pressed with core position at or too near to NULL	Set the ZERO position further away from NULL.
After FULL SCALE button push	The core position was not moved from the ZERO core position, or moved in the wrong direction.	Set the FULL SCALE position further towards the opposite end of core travel before pressing button.

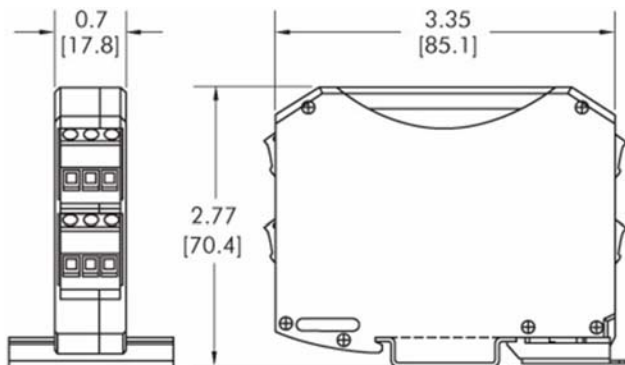
SYNCHRONIZATION

In configurations where multiple EAZY-CALs are used in proximity, interference may occur between them because of differing excitation frequencies. This may produce noise oscillations on the voltage outputs. In order to prevent this, the EAZY-CALs can be synchronized with each other.

To synchronize two or more EAZY-CALs, one EAZY-CAL is designated as the master. The SYN-OUT terminal of the master is connected to the SYN-IN terminal of one or more slaves.

MECHANICAL OUTLINE

Shown Mounted on DIN Rail



All dimensions in inches [mm]

ELECTRICAL SPECIFICATIONS

Input Power:	15 - 30 VDC (24 VDC nominal), 60 mA max.
LVDT Connection:	5 Wire (Secondary CT required)
Excitation Voltage:	1.0 to 3.0 Vrms for primary impedance $\geq 180\Omega$
Excitation Frequency:	2500 Hz
Full Scale Output:	0 to 10 V DC (5mA max.) (-0.5 to 10.5 VDC with over-travel)
Output Non-Linearity:	$\leq 0.05\%$ of Full Scale Output
Output Noise & Ripple:	≤ 5 mVrms
External Synchronization:	Master drives ≤ 10 Slaves
Operating Temperature:	32°F to 160°F 0°C to 70°C
Thermal Coefficient of Sensitivity:	$\leq 0.01\%$ of FSO/°F ($\leq 0.02\%$ of FSO/°C)
Mounting:	35mm DIN Rail
Terminal Wire Size:	#28AWG to #12AWG
Dimensions, Weight:	2.77" x 3.35" x 0.7", 2.3 oz.