

LION

PRECISION



MM190 USER'S GUIDE

Meter and Function Module

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APPROVALS AND SAFETY CONSIDERATIONS

The Elite Series is compliant with the following CE standards:

Safety: EN 61010-1:2010

EMC: IEC 61326-1:2013, IEC 61326-2-3:2013

To maintain compliance with these standards, the following operating conditions must be maintained:

- All I/O connecting cables must be shielded and less than three meters in length
- AC power cables must be rated at a minimum of 250 V and 5 A
- AC power must be connected to a grounded mains outlet rated less than 20A
- Use the included CE approved power supply with 1-, 2-, and 3- slot enclosures. If an alternative power supply is used, it must have equivalent CE certification and provide safety isolation from the mains according to IEC60950 or 61010.
- Sensors must not be attached to parts operating at hazardous voltages in excess of 33VRMS or 70VDC

Use of the equipment in any other manner may impair its safety and EMI protections.

CAUTION

Probe Tip Contact Caution

The sensing tips of capacitive probes produce voltages as high as 70 Vrms. These are high frequency voltages with very low power so they pose no danger. Normally when the probe tip is touched, the probe stops functioning and voltage is reduced to near zero. But under certain circumstances, the voltage may cause a slight tingle or burning sensation, especially with the second generation probes used with the CPL490. For maximum performance probe tips should remain free of oils or other contaminants.

For these reasons, it is recommended the probe tips not be touched.

HELPFUL TECHNICAL SUPPORT DOCUMENTS ONLINE

Lion Precision's web site has a large selection of technical documents (TechNotes and Application Notes) in the Technical Library. These documents provide detailed descriptions of the operation and use of Lion Precision high-performance sensors.

The Technical Library can be accessed at: www.lionprecision.com/technical-library/

Some of the titles include:

- Understanding Sensor Resolution Specifications and Effects on Performance
- Capacitive Sensor Theory of Operation
- Error Sources: Probe/Target Angle
- Capacitive Sensors in Vacuum
- Capacitive Sensor Phasing and Ungrounded Targets
- Capacitive Probe Cabling Considerations
- Elite Series Phase/Amplitude Frequency Response
- Z-Height Measurement with Capacitive and Eddy-Current Sensors
- Thickness Measurement with Capacitive Sensors
- Glue Sensing with Capacitive Sensors

MM190 METER AND FUNCTION MODULE

Description

The MM190 Module displays dimensional values derived from sensors within an Elite Series system. Any two channels can be summed and peak capture functions can be performed on an individual channel or a resulting sum. The displayed value is also provided as an analog voltage via a front panel BNC connector.

Capabilities

- Displays dimensional units derived from sensor output voltages
- Selectable input channels
- Sum and Difference of any two channels
- Peak capture functions
- Metric/Inch unit selection
- Analog voltage output proportional to displayed value

Setup

Pressing the appropriate button repeatedly rotates through selections.

1. Select sensor channels for A and B
2. Select individual channel to be displayed (A or B) or the sum or difference of A and B
3. Select a peak function
4. Select metric or inch units

Display Units

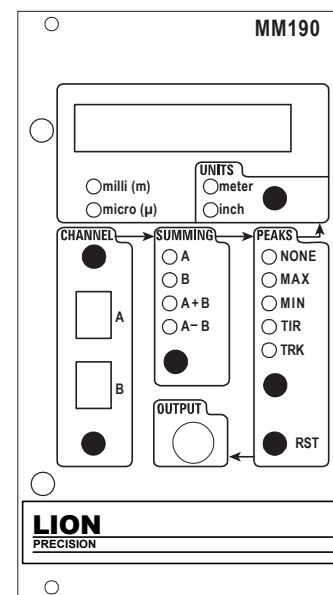
The MM190 measures the analog voltage from the selected sensor channel and uses digital signal processing to perform any summing and/or peak capture functions. The result is converted to actual dimensional units for display. The multiplier indicators (milli, micro) combined with the Metric or Inch units indicate the dimensions of the displayed value. The button selects either Metric or Inch units. The multipliers are not selectable; they are selected by the system based on the calibration values of the displayed channel.

Channel Selection

Any existing sensor channel can be selected for A or B.

Summing Options

A and B can be displayed independently or combined as a sum or a difference.



Peaks

Five options are available:

- NONE – Display is real-time value of input channels.
- MAX – Displays the most positive value since the Reset (RST) button was pressed.
- MIN – Displays the most negative value since the Reset (RST) button was pressed.
- TIR – Displays the maximum difference between the MAX and MIN values since the Reset (RST) button was pressed. TIR is always a positive value.
- TRK – Tracking TIR displays the current maximum difference between the MAX and MIN values. When the TIR value is reduced, the displayed value will decay to the lower value within approximately one second.

Analog Output (BNC)

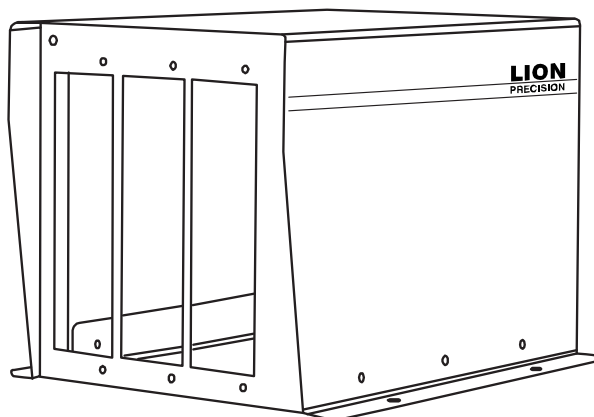
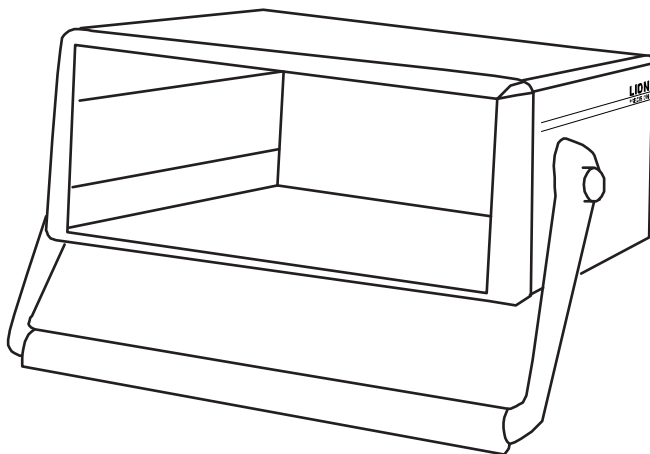
The analog voltage output from the MM190 BNC connector is scaled the same as the BNC output voltage from the selected sensor channels. For example, if the sensor channels are scaled at 1 V/1 μm , the MM190 will also scaled at 1 V/1 μm .

When two channels are summed, the MM190 BNC output voltage is divided by two. For example, summing sensor channels at 1 V/ 1 μm each will produce an MM190 output voltage scaled at 0.5 V/1 μm . This allows both sensor channels to operate at full ± 10 V without exceeding the ± 10 V of the MM190.

MM190 Specifications

BNC Output Scaling Error:	-0.3%
Internal Scaling Error:	0.2%
Difference Error:	0.2%
Summing Error:	0.2%
Tracking TIR Error Relative to Frequency: (not recommended below 100Hz)	10 Hz: -15.0% 100 Hz: $\pm 0.3\%$ 1 kHz: $\pm 1.5\%$ 5 kHz: $\pm 4.0\%$
TIR Error Relative to Input	DC: -15.0%
Frequency:	1 kHz: $\pm 1.3\%$ 5 kHz: $\pm 4.0\%$
Peak Droop:	1 mV/15 seconds
BNC Output Impedance:	150 Ohms

ELITE SERIES ENCLOSURES



Elite Series enclosures provide housing and critical signals to Elite Series modules. Sensor output signals are available via a rear-panel high-density connector which is configured for direct connection to National Instruments™ data acquisition hardware.

The specific Elite Series enclosure model number indicates the maximum number of slots available for plug-in modules as well as other features:

Model	Number of Module Slots	Input Power	Tin-up Handle	Mounting Flanges
EN191	1	±15 VDC	NO	YES
EN192	2	±15 VDC	NO	YES
EN193	3	±15 VDC	NO	YES
EN196	6	100-250 VAC 50/60 Hz	YES	NO
EN198	8	100-250 VAC 50/60 Hz	YES	NO

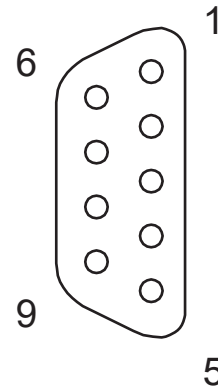
Power Specifications

Model	Power Input	Notes
EN191, EN192, EN193	±15 VDC ±5%, 400mA Max (A power supply is included with orders)	To maintain maximum resolution use a linear power supply or a power supply with switching frequency greater than 100 kHz such as Lion Precision Power Supply P014-5040. To maintain CE compliance, use the included power supply or equivalent CE compliant model.
EN196, EN198	100-250 VAC, 50/60 Hz, 250 VA Maximum	

EN191, EN192, EN193 POWER CONNECTOR

Pin	Connection
1	Ground
3	-15 VDC
4	+15 VDC

Power Connector
Pin Numbers
On Rear Panel

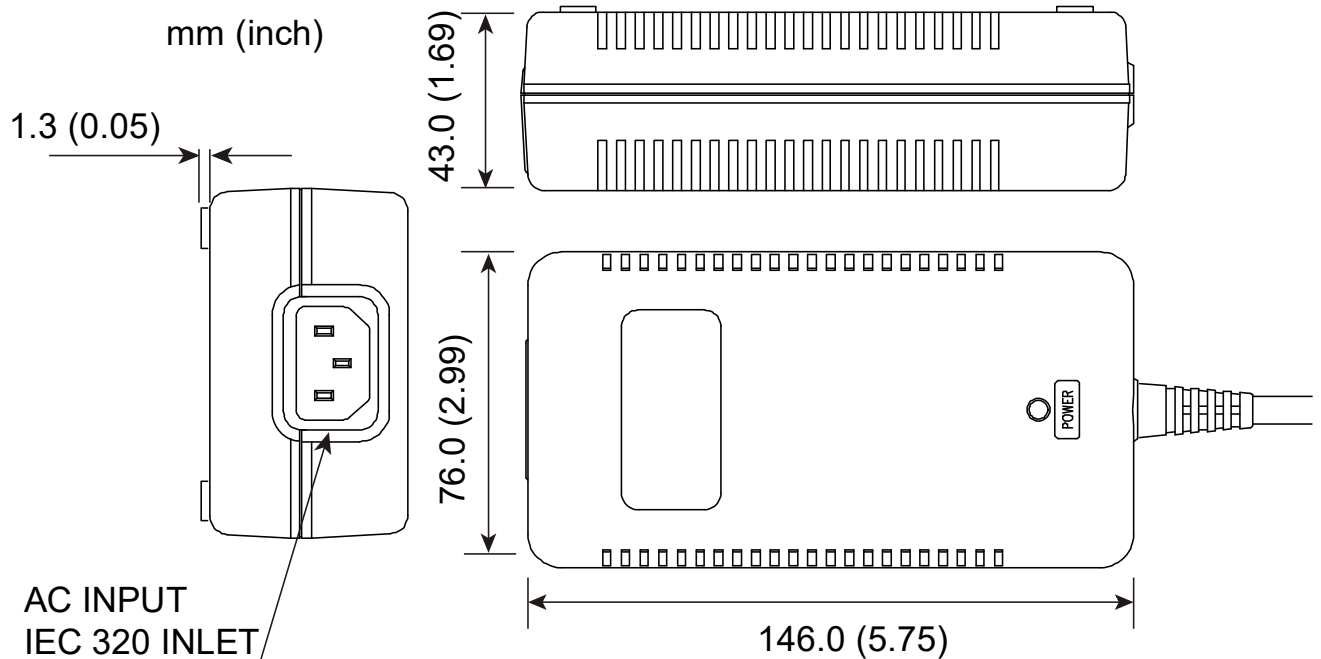


External Power Supply

EN191, EN192, and EN193 systems include an external power supply. The supply has a connector which allows direct connection to the enclosure.

This supply features a high-frequency (100kHz) switching supply. The high switching frequency allows the sensing modules to operate at maximum resolution.

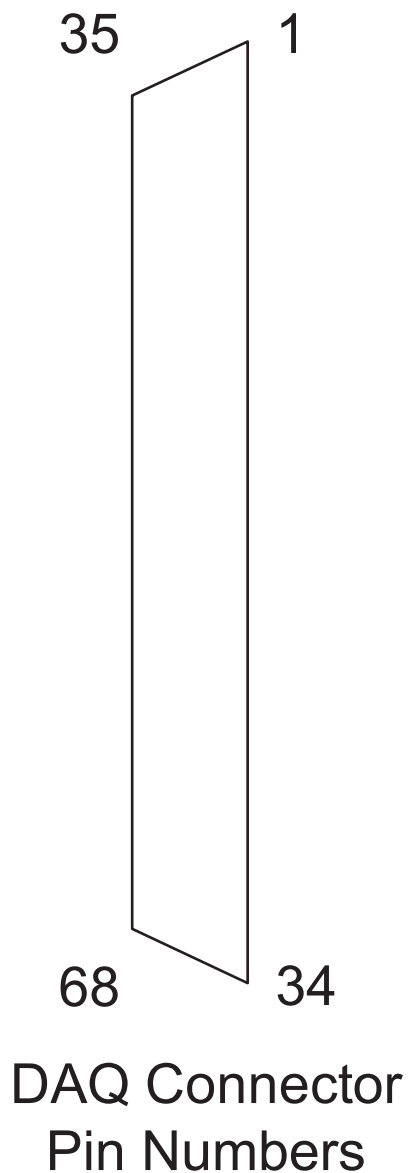
DC Output Voltage	+15 VDC ; 2.0 A -15 VDC ; 1.0 A
AC Input Voltage	100-240 VAC, 50/60 Hz, 1.35 A max



DAQ CONNECTOR PINOUT

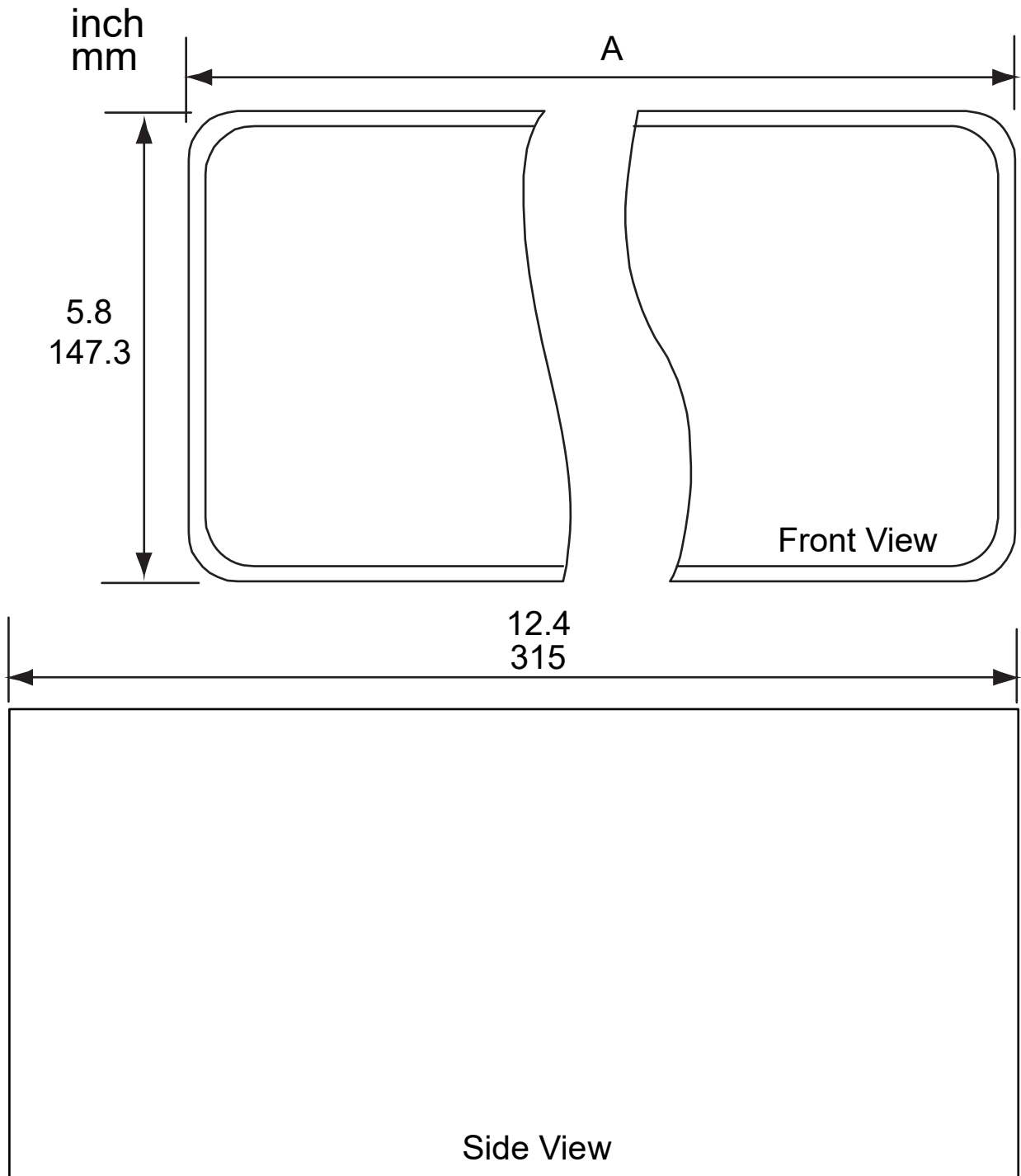
All unlisted pins are reserved for proprietary use by Lion Precision and should not be connected to external contacts.

Pin	Output Signals
11	Encoder
12, 13, 15, 18, 53	Digital Ground
29, 32, 64, 67	Analog Ground
23	- Analog Out; Channel 8
25	+ Analog Out; Channel 7
26	- Analog Out; Channel 6
28	+ Analog Out; Channel 5
30	+ Analog Out; Channel 4
31	- Analog Out; Channel 3
33	+ Analog Out; Channel 2
34	- Analog Out; Channel 1
57	+ Analog Out; Channel 8
58	- Analog Out; Channel 7
60	+ Analog Out; Channel 6
61	- Analog Out; Channel 5
63	- Analog Out; Channel 4
65	+ Analog Out; Channel 3
66	- Analog Out; Channel 2
68	+ Analog Out; Channel 1



MECHANICAL SPECIFICATIONS: EN196, EN198

Model	A
EN196	10.1" 257 mm
EN198	14.3" 364 mm



MECHANICAL SPECIFICATIONS: EN191, EN192, EN193

Model	A	B	C
EN191	3.33" 84.6 mm	2.606" 66.2 mm	3.806" 96.7 mm
EN192	4.73" 120.1 mm	4.006" 101.8 mm	5.206" 132.2 mm
EN193	6.13" 155.7 mm	5.406" 137.3 mm	6.606" 167.8 mm

