

ECL110



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1 Approvals and safety considerations

The ECL110 is compliant with the following CE directives when enclosed in a shielded enclosure:

- 2001/95/EC (General Product Safety), 2004/108/EC (EMC) as validated using the following standards: Safety: 61010-1:2001; EMC: 61326-1, 61326-2-3

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

- All I/O connecting cables must be less than three meters in length
- Use the CE approved power supply available for purchase with the sensor. 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.
- 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 2 0A
- Sensors must not be attached to parts operating at hazardous voltages in excess of 30VRMS or 60VDC
- All external connections must be SELV (Safety Extra Low Voltage). Use of the equipment in any other manner may impair the safety and EMI protections of the equipment.

2 Helpful Technical Support Documents Online

The IBS Precision Engineering's website 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 the products of IBS Precision Engineering.

The Technical Library can be accessed at:

<https://www.ibspe.com/expertise/technical-resources>

Some of the titles include:

- Understanding Capacitive and Inductive Sensors
- Comparing Capacitive and Inductive Sensors
- Z-height Measurement with Non-contact Sensors
- Sensor Operation and Optimization
- Using Capacitive Sensors in Vacuum Applications
- Understanding Electrical Runout When Using an Eddy-Current Sensor for Roundness Measurements
- Inductive Probe Cabling Considerations

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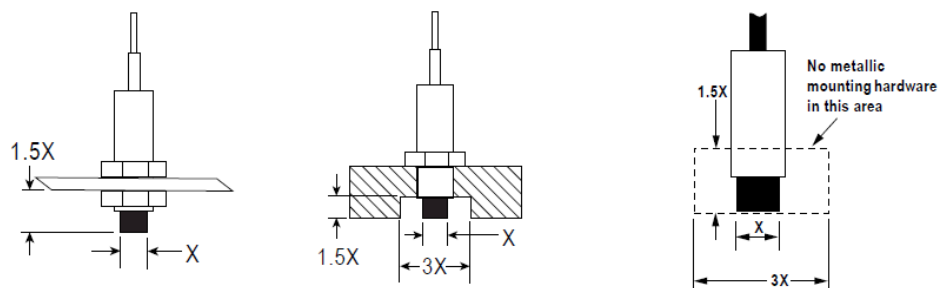
3 ECL110 Description

The Lion Precision ECL110 Eddy-Current Displacement Sensor provides up to eight channels of high-resolution, noncontact displacement measurement of a conductive target. The system consists of driver electronics and probes calibrated for a specific material, range, and ECL110 channel. The ECL110 provides linear ± 5 V outputs for each channel; more positive output voltage indicates the probe is further from the target. The calibration information is detailed on a calibration certificate which is shipped with the system.

4 Probe mounting

Probes must be mounted to avoid interaction with the mounting hardware and interaction between adjacent probe fields. The distance between multiple probes must be at least 3 probe diameters. The area within 3 probe diameters to the sides and 1.5 diameters behind should be kept clear of adjacent probes or any metallic objects other than the object to be measured.

If this is not possible, field calibration may be required.



5 Extension cables

If a probe extension cable is included, the sensor is calibrated with the extension cable attached. Operating the sensor without the extension cable may cause inaccurate results.

6 Range indicator operation

Dual color LEDs indicate the relative position of the target as shown in Figure 1. Green indicates the probe is in calibrated range; red indicates the probe is out of calibrated range. The Near and Far indicators indicate the last 20% of range in each direction.

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7 Zeroing the output

The sensor is factory calibrated to produce an output of zero volts when the Zero Adjustment is at the center of its adjustment range and the probe is at the Near Gap (nearest calibrated point). The Zero Adjustment provides a ± 0.5 VDC shift to the output. Do not turn the Calibration Adjustments unless recalibrating the device.

8 Connecting/matching the probes to the ECL110

The ECL110 drivers are calibrated to specific probes. The probes include small cable collars with a channel number. The channel number of each driver board is marked with a Channel Indicator label near the probe connector (Figure 1). The driver on the bottom of the stack is always CH 1 (Channel 1) and the rest are numbered sequentially upward. Using probes with unmatched drivers will degrade performance.

9 Connecting to the ECL110

Individual driver power supplies are interconnected. Power need only be connected to any one driver.

| | |
|-----------|--|
| 12-24 VDC | Power input: +12 to +24 VDC @2 W/Channel. Input voltage ripple must be less than 40 mV p-p to maintain specifications. |
| V Out | 0-10 VDC calibrated output. Actual output voltage can range from -5 V to +12.5 V when the probe is out of range. |
| Ground | Reference for analog output voltage and power supply return. |

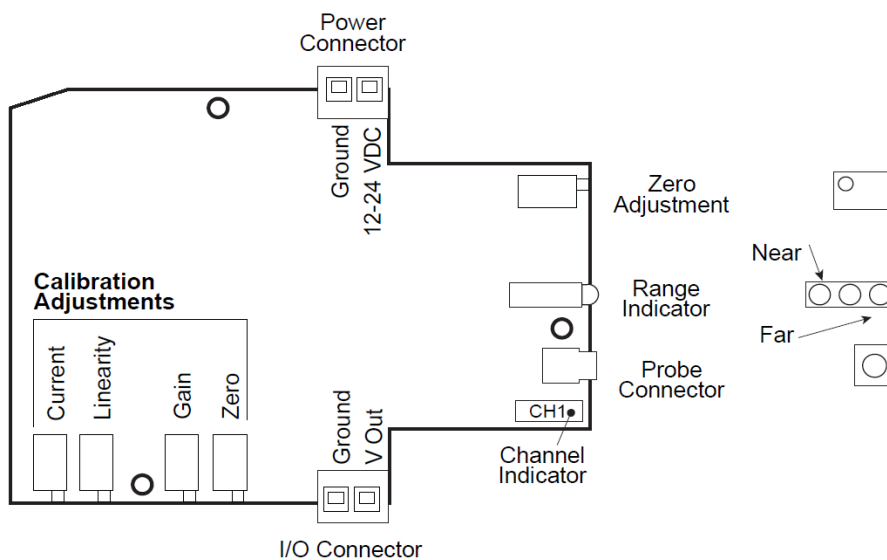


Figure 1

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10 Calibration adjustments

Any change in these adjustments will void the NIST traceable calibration certificate shipped with the sensor.

These instructions are for calibration of the same model probe to the original range as shipped from the factory. Calibration to a significantly different range and/or offset will adversely affect the sensor's performance and range LEDs operation.

A suitably precise method to accurately adjust the probe/target gap is required for calibration.

1. Position the Zero Adjustment to the midpoint (25 turns in one direction, and 12 turns back will center the adjustment).
2. Set the probe/target gap to the minimum (Near Gap).
3. Use the Calibration Adjustment: Zero on the bottom of the device to set the output voltage to 0.00 VDC.
4. Position the probe/target gap to the mid-point of the Range.
5. Use the Calibration Adjustment: Gain to set the output to 5.00 VDC.
6. Position the probe/target gap to maximum (Near Gap + Range).
7. Use the Calibration Adjustment: Linearity to set the output voltage to 10.00 VDC.
8. Repeat steps 2-7 until no further adjustments are needed (see hint below).

HINT: When adjusting linearity, adjust the output for the same but opposite amount of error voltage. For example, if the output is 9.950 VDC adjust it to 10.050 VDC. This will shorten the total number of iterations of steps 2-7.

11 Specifications

| | | |
|----------------------------------|-------------------------|--|
| Analog Output | | 0-10 VDC, 0 Ω , 15 mA max |
| Resolution* | | 0.008% typical dependent on calibration |
| Linearity | | 0.05% |
| Probe Thermal Drift at Mid-Range | | $\pm 0.04\%$ FS/ $^{\circ}$ C |
| Input Power | | 12-24 VDC, 2 W per channel |
| Driver Operating Environment | | 4 $^{\circ}$ C to 50 $^{\circ}$ C, IP40 |
| Probe Operating Environment | Standard Probes | -25 $^{\circ}$ C to 125 $^{\circ}$ C, IP67 |
| | High Temperature Probes | -25 $^{\circ}$ C to 200 $^{\circ}$ C, IP63 |

* Specifications are based on Aluminium and/or 4140 Steel targets. The ECL110 comes calibrated to either a standard or customer specified Near Gap and Range. Refer to the supplied calibration record for specific calibration information.

In high EMI environments (10 V/m) output level may shift and noise levels may rise to 50 mV RMS (0.5% resolution)

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12 Mechanical detail

