



LEX-100

Light measurement sensor



Operating Instructions

CAUTIONS AND WARNINGS

CAUTION: The discrete output must not be connected to outputs from other sensors (i.e. outputs from multiple sensors must not be connected in parallel). Parallel connections may damage sensor output circuitry.

CAUTION: Sensor is not suitable for wash down or hazardous environments; a separate enclosure with the appropriate ratings is recommended for these applications"

IMPORTANT:

This product is an accessory or part of a system. Always read and follow the manufacturer's instructions for the equipment before connecting this product. Comply with all applicable codes and safety regulations. Failure to do so may result in damage, injury or death.

CERTIFICATIONS: CE, CSA, UL



PRODUCT OVERVIEW

Verify presence and measure relative light intensity of a wide variety of visible light sources, such as LEDs, monitors, and lamps. The LEX provides a receiver with a broad-spectrum response from 350nm to 1000nm. A fiber optic cable provides a light guide from the target source to the sensor receiver circuit allowing precise directional control. The LEX employs our field-proven, patented technology for fast response and presence indication making it suitable for many high-speed automation processes. The metal alloy case and metal fittings provide robust construction expected in an industrial environment.

The LEX features a 2-digit display that provides an indication of signal strength making set-up and integration quick and easy. The versatile sensor provides user set-up parameters including detection threshold and gain adjustment. A 2-meter fiber optic cable with threaded end fitting make mounting and positioning easy.

The LEX includes both a discrete PNP/NPN output and an analog output. The discrete output is automatically set for PNP or NPN operation. The analog output signal may be used to access light sources based on their light intensity. User supplied filters may be used to selectively measure specific colors.

Specifications

Optical input	2.2mm PMMA fiber optic
Fiber optic cable length	2 meter
Receiver spectral response	350...1000nm
Response time	<150uS
Switching Frequency	6kHz
Relative intensity display range	00...99
Sensitivity	Adjustable
Signal level	Two 7 segment digits
Detection threshold	Two 7 segment digits
Digital Output	Auto-Detect PNP / NPN
Output Function	NO/NC selectable
Analog output	0...5V (% of full-scale, 20mV resolution)
Security	LOCK / UN-LOCK keypad
Power indicator	Green LED
Detect indicator	Red LED
Programming indicator	Yellow LED
Data retention	EEPROM non-volatile memory
Dimensions	51mm (2.0") x 61mm (2.4") x 25mm (1.0")
Weight	95 g. (0.21 lbs)
Supply Voltage	10...24 VDC
Operating Current	60 mA
Short Circuit Protection	Discrete output
Overload / Reverse Polarity Protection	Supply voltage
Operating temperature	-20°C...55°C
Storage temperature	-20°C...70°C
Housing	Metal alloy
Mechanical protection	IP65 NOT FOR PRESSURE WASHDOWN

QUICKSTART GUIDE

1. The display range is 00 through 99. The RED LED above the display indicates that the intensity level is above the threshold setting.
2. Connect cable to power supply observing correct polarity. Reference wiring diagram.
3. Apply power; sensor will initialize and perform its power up sequence.
4. The light that is collected by the fiber optic is focused onto the receiving element and the intensity of the light results in a relative value from 00-99 on the display.
5. Aim the fiber optic at a light source and observe the values on the display. A 0-5V analog output is available for connection to external data acquisition equipment allowing the light level to be monitored real-time.
6. Various adjustments may be made to increase or decrease sensitivity; refer to the Sections Calibration Adjustment. Refer to Section: Threshold, to alter threshold setting.
7. User programmable parameters are discussed in detail in the following sections.

OPERATION

Power up

Upon power up, the sensor initializes by turning on all segments on the display and sequencing through red, yellow and green on the status LED located above the display.

Intensity display mode

During normal operation the sensor display will indicate the relative intensity of a light source or illuminated surface within the viewing area of the fiber. The range of the relative intensity display is 00 through 99. The decimal points on the display indicate the LED output intensity. No decimal points indicate low, one decimal point indicates medium and two decimal points indicate high intensity.

Calibration Adjustment

The calibration feature allows the displayed measurement to be adjusted to the desired value by the user.

Adjusting the measured value:

1. Place target in sensor's field-of-view. The sensor will display the current reading.
2. Press either key (for less than 3 seconds); while the current reading is displayed the value is flashed slowly indicating that the sensor is in the adjustment mode.
3. Press T/+ to increment the reading and P/- to decrement the reading.
4. Stop pressing either key and the sensor returns to normal operating mode in 3 seconds.

Note:

- While adjusting the reading, when a limit is reached the display flashes at a faster rate.
- The selected gain is stored in memory and is retained when power is removed.

Local Lock

The local lock feature allows the sensor to be locked out, preventing adjustments by unauthorized personnel. To lock the sensor, press the P/- and T/+ buttons for 3 seconds until LL is displayed. To un-lock the sensor, press the T/+ and P/- for 3 seconds until LL is not displayed. While the sensor is locked, pressing either P/- or T/+ will result in LL (Local Lock) indication on the display.

Programmable Parameters

All adjustments made to these parameters are stored in memory and are retained when power is removed. To enter programming mode press and hold the **P/-** key for several seconds, the current threshold setting will be displayed. Press and release the **P/-** key to scroll through the various settings. Press and release the **T/+** key to change a particular setting. Press and hold the **P/-** for several seconds to return to the normal intensity display mode. The user programmable items are described below.

Threshold

When the relative intensity level increases to the threshold setting or higher, the red status LED will turn on and the discrete output will activate, indicating detection of the mark. When the relative intensity level returns below the threshold (as determined by the hysteresis setting), the red LED will extinguish and the discrete output will de-activate. The threshold setting allows the user to select the level at which a mark will be detected. The default setting is 30.

To adjust the threshold, enter programming mode, press and hold the **P/-** key for several seconds, the current threshold setting will be displayed. Press and release the **T/+** key to increase the threshold level, to decrease the threshold level, continue to hold the **T/+** key until the value approaches 99 then wraps around to 00.

LED Intensity Level (U)-----NOT USED-----

Hysteresis Level (H)

The hysteresis setting is indicated by H0 through H9. The hysteresis level is how far above the threshold the signal increase to de-activate or un-detect. The hysteresis can be set from 0 to 9. For example, if the threshold is set at 25 and the drops to 25 or lower, the sensor will detect and activate its output. With the hysteresis set to 4, the signal must increase to 30 to un-detect. This feature is useful in cases where there may be variation within a target that might cause the intensity to increase above the threshold slightly; the hysteresis allows the output to remain activated until the level increases significantly. Press and release the **T/+** key to change the hysteresis setting. The default setting is 2.

Discrete Output Configuration

This setting allows the user to select either normal open (no) or normally closed (nc) configuration. The normally open configuration de-activates the output during normal un-detect operation, and activates the output upon detect. The normally closed configuration activates the output during normal un-detect operation, and de-activates the output upon detect. Press and release the **T/+** key to toggle through the selections. Default is normally open.

Extend Output Pulse (P)

This feature allows extending the minimum length of time that the discrete output remains active following target detection. The sensor response can be in the 25uS (microsecond) range, i.e. a target can move through the sensing range in 25uS and the discrete output would active for only that duration. A slower acquisition system (PLC) may not sample its inputs at a fast enough rate to capture the signal. The discrete output pulse can be extended from 0 to 90mS (milliseconds) in 10 mS increments as indicated by P0 though P9 on the display. Press and release the **T/+** key to toggle through the selections.

Null Offset (nu)

This feature is generally not required, however, the null feature allows the sensor to be “zeroed”. Nulling allows the sensor to subtract an intensity level from all subsequent measurements. Press and hold the **T/+** key to null the sensor. The display will flash the value that is being subtracted.

Output Signals

Discrete Output

The discrete output is a PNP/NPN configuration allowing the user to provide a load on this output that is either pulled high to VDC or low to ground. The sensor monitors this level and automatically determines whether to operate the PNP/NPN driver. This output is typically connected to a PLC. The output remains active as long as the intensity level exceeds the threshold, in high-speed applications it may be useful to use the Extend Output Pulse feature to lengthen the signal duration to meet acquisition requirements of the PLC.

CAUTION: The discrete output must not be connected to outputs from other sensors (i.e. outputs from multiple sensors must not be connected in parallel). Parallel connections may damage sensor output circuitry.

Analog Output

The analog output is 0-5V with 20mV resolution (8-bit). Any standard analog input channel typically available on a PLC may monitor this output. The analog output signal is useful in applications where simply triggering on the threshold is insufficient. For example, constant real-time monitoring of intensity in process allows minor fluctuations or trends to be detected permitting corrective action to be taken. The analog output response time is slower than the discrete output response time and should be evaluated per the requirements of each application.

Remote Lock/Unlock Input

The remote lock feature allows the user to lock out the local controls (keys) to prevent operators from making unauthorized adjustments. This signal line must be connected to VDC to lock the sensor. This line may be left unconnected if the lock feature is not used. While the sensor is locked, pressing either **P/-** or **T/+** will result in **rL** (remote Lock) indication on the display.

Application Notes

Since the LEX is designed to measure light from external sources, ambient light may affect measurements. A cover or shroud will reduce these effects. Distance and/or angle may be used to control the level of light collected by the fiber optic as a means of adjusting the sensitivity.

Filters may be placed over the end of the fiber to control the sensitivity to various colors.

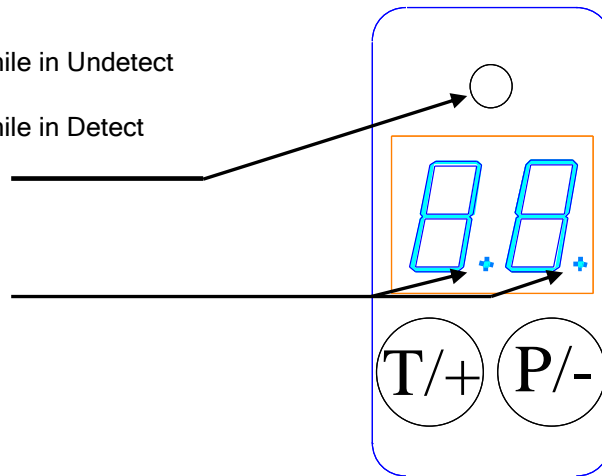
Display Indicators

Indicators

- Green LED Threshold Mode while in Undetect
- Red LED Detect
- Yellow LED Threshold Mode while in Detect

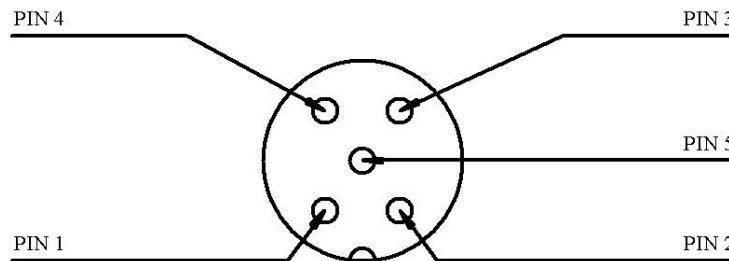
Display decimal points

- None illuminated LED low intensity
- One illuminated LED medium intensity
- Two illuminated LED high intensity



M12 connector pin assignments

M12 Connector	Wire Color	Description
Pin 1	Brown	Power 10 to 24VDC
Pin 2	White	Discrete output, PNP/NPN, NO/NC
Pin 3	Blue	Ground
Pin 4	Black	Analog output
Pin 5	Yellow	Remote lock



Ordering information

LEX-100 Light measurement sensor

Accessories



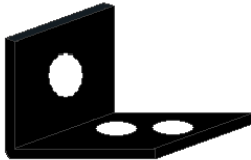
UVX300-BRKT
Bracket



UVX 300-C
5-meter cable with M12
5-pin connector

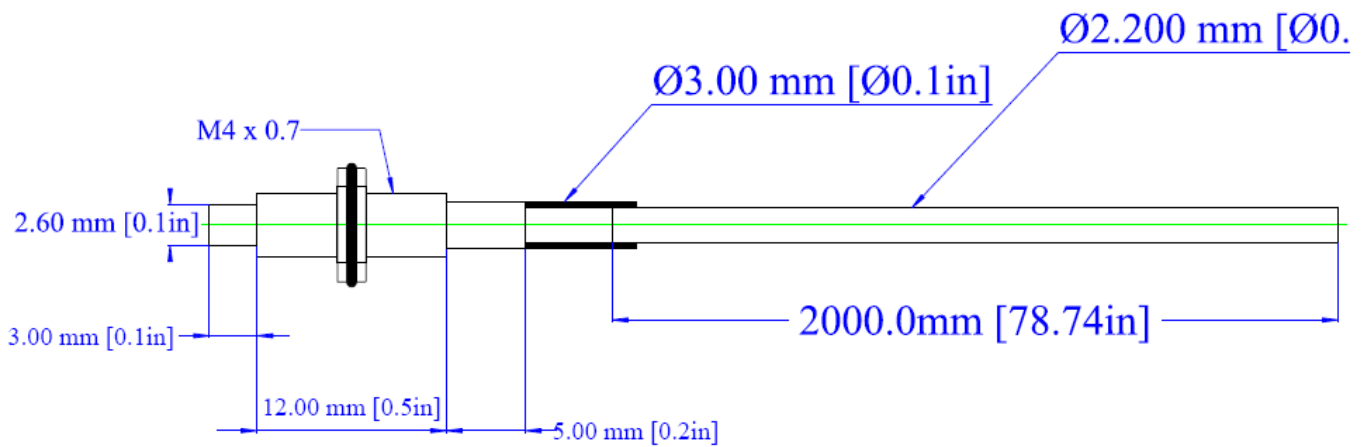
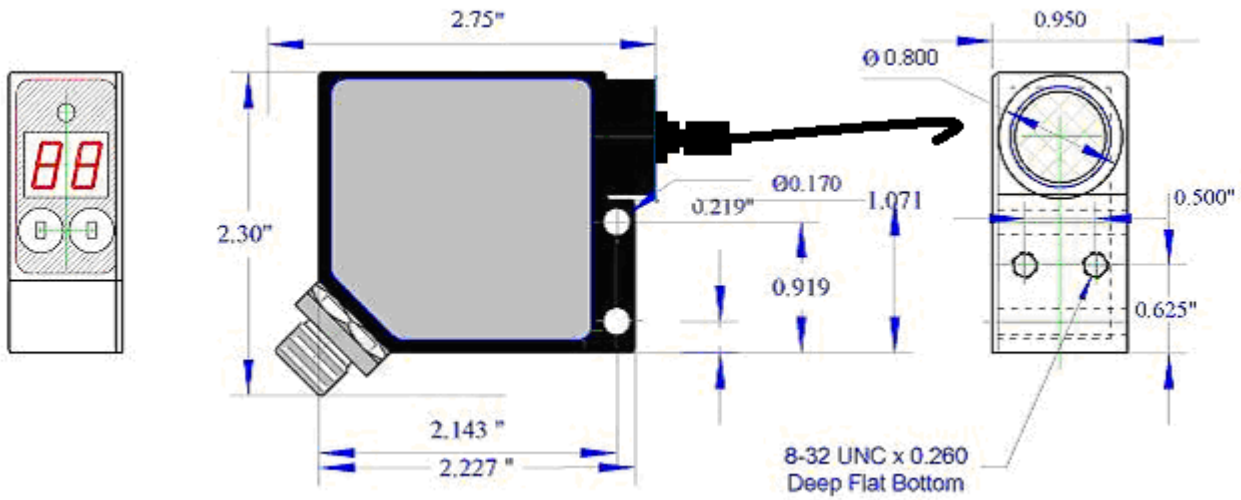


LEX-FBR
2-meter fiber optic
cable

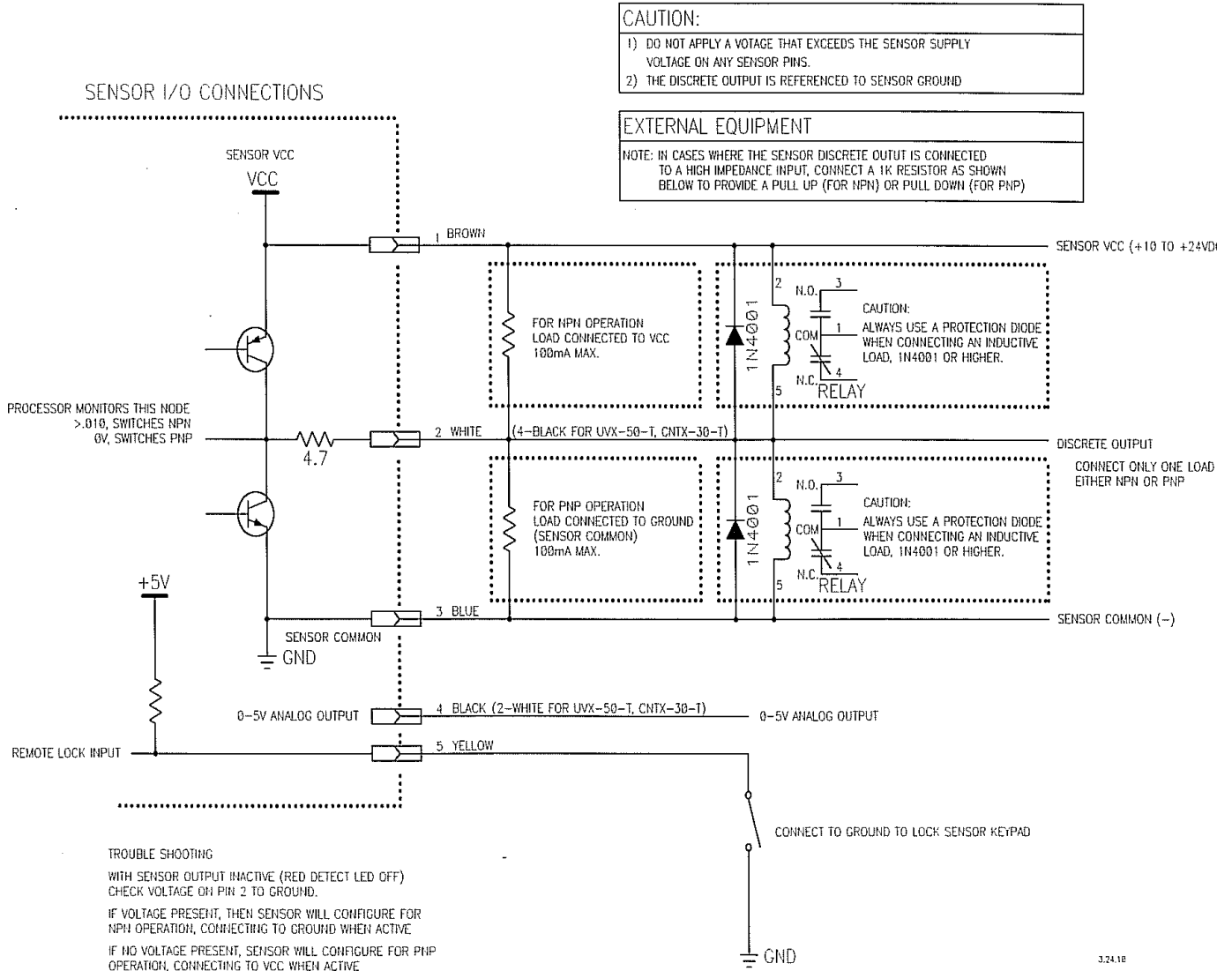


130-10250162
Fiber optic mounting
bracket

Dimensional Details



Sensor I/O Connections



WARRANTY

EMX Industries Incorporated warrants all products to be free of defects in materials and workmanship for a period of two years under normal use and service from the date of sale to our customer. This warranty does not cover normal wear and tear, abuse, misuse, overloading, altered products, damage caused by incorrect connections, lightning damage, or use other than intended design.

There is no warranty of merchantability. There are no warranties expressed or implied or any affirmation of fact or representation except as set forth herein.

EMX Industries Inc. sole responsibility and liability, and the purchaser's exclusive remedy shall be limited to the repair or replacement at EMX Industries option of a part or parts found not conforming to the warranty. In no event shall EMX Industries Inc. be liable for damages of any nature, including incidental or consequential damages, including but not limited to damages resulting from non-conformity, defect in material or workmanship.

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