EMX INDUSTRIES, INC.

Brite·X 100

Brightness sensor

Operating Instructions

CAUTIONS AND WARNINGS

WARNING:

1. The Brite-X is not intended for use in personal safety applications.
2. The Brite -X is not an explosion-proof enclosure. Do not use in an environment where flammable materials are present.
3. The Brite -X sensor uses a high intensity, blue LED, do not look directly into this light source.

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.

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

Standard for Industrial Control Equipment – ANSI/UL 508:2024 Ed. 19, Certified to CAN/CSA C22.2#14:2018 Ed.13

PRODUCT OVERVIEW

Brite-X 100 sensor was designed to measure the relative brightness of various materials. The brightness is a reflectance factor of diffused blue light (457nm) as defined by ISO 2470. Brite-X 1000 uses a blue LED to emit modulated light that is projected on to a test surface. This light is then reflected back to the Brite-X 100 optics and measured by the sensor software.

The output is provided as an analog, 0 – 5 V signal with high, 20mV resolution. A PLC or a computer can process the analog output, or the reflected level can be set on the Brite-X 100 to trigger a discrete output.

The Brite-X 100 is a compact sensor with a range of operation of up to 6 inches. Two seven segment displays provide visual representation of the relative brightness from 00 to 99. Easy, five step sensitivity, and 3 LED intensity settings provide for flexible operation over wide range of distances and materials.

Specifications

Blue Light source	457nm LED, min.100,000 hours
LED Intensity	3 levels
Relative Brightness Display Range	00 to 99
Sensitivity	X1, X2, X3, X4, X5
Detection Range	Up to 6” (150mm)
Switching Frequency	5 kHz
Brightness level	Two 7 segment digits
Brightness threshold	Two 7 segment digits
Analog Output	0 – 5 V (20mV resolution)
Digital Output	Auto-Detect PNP / NPN
Extend Output Pulse	0 - 90 mS (10 steps)
Output Function	NO/NC selectable
On/Off Delay	<200 uS
Detect indicator	Red LED
Programming indicator	Yellow LED
Data retention	EEPROM non—volatile memory
Dimensions	2” (51mm) x 4” (100mm) x 1” (25mm)
Weight	.26 lbs. (117g)
Supply Voltage	10…24 VDC
Operating Current	60 mA
Short Circuit Protection	Yes (Outputs)
Overload / Reverse Polarity Protection	Yes (Supply Voltage)
Operating temperature	-20ºC…55ºC
Storage temperature	-20ºC…70ºC
Housing	Metal alloy
Mechanical protection	IP65 NOT FOR PRESSURE WASHDOWN
Connector	M12 5 pin

QUICK START GUIDE

1. The display range is 00 through 99. The decimal points indicate the LED intensity level. The RED LED above the display indicates that the intensity level exceeds 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 relative intensity will be displayed. By aiming the sensor away from any objects the display will indicate 00. Aim the sensor at a white piece of paper and the display will indicate an intensity measurement. Move the paper further away from the sensor to decrease the intensity level.
5. Press and release either key located below the display to view the current gain setting. R1 indicates a gain of 1; R2 indicates a gain of 2 and so on through R5. After several seconds the sensor will return to the normal intensity display mode. While the current gain setting is shown on the display, press the + or – key to increase or decrease the setting, then wait for the sensor to return to the normal intensity display mode.
6. 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, amber 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 target within its field of view. 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.

Gain Adjustment (R)

Press and release either key located below the display to view the current gain setting. R1 indicates a gain of 1; R2 indicates a gain of 2 and so on through R5. After selecting the desired gain wait several seconds and the sensor will return to the normal intensity display mode. While the current gain is shown on the display, press the + or – key to increase or decrease the setting, then wait for the sensor to return to the normal intensity display mode. The selected gain is stored in memory and is retained when power is removed.

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 exceeds the threshold setting the red status LED will turn on and the discrete output will activate, indicating detection of the target. When the relative intensity level drops 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 detection level. The default setting is 15.

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)

The LED intensity is indicated on the display as U1, U2 and U3 for low, medium and high intensity. Press and release the **T/+** key to toggle through the 3 intensity levels. The default setting is U2, medium intensity.

Hysteresis Level (H)

The hysteresis setting is indicated by H0 through H9. The hysteresis level is how far below the threshold the signal must fall 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 intensity exceeds 25, the sensor will detect and activate its output. With the hysteresis set to 5, the signal must drop to 20 to un-detect. This feature is useful in cases where there may be variation within a target that might cause the intensity to drop below the threshold slightly; the hysteresis allows the output to remain activated until the level drops 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 100uS (microsecond) range, i.e. a target can move through the sensing range in 100uS 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)

The null feature allows the sensor to be "zeroed". For example, when the target is not in view and there is a background that causes a reading above zero, the null feature allows this level to be subtracted out, allowing the display to indicate 00. Press and hold the **T/+** key to null the sensor. The display will flash the value that is being subtracted. To set the sensor back to a true zero, aim the sensor away from any target and repeat the null process.

Teach Function

The teach function allows the user to set the threshold by placing a representative target located at the required distance and allowing the sensor to determine the optimum LED intensity and setting of the threshold level.

1. Press and hold the **T/+** key for several seconds until the yellow led flashes.
2. Place the target at the appropriate distance from the sensor and press the **P/-** key. The display will flash 3 times and the sensor will adjust the LED intensity level to achieve reasonable signal level. The green LED will flash.
3. Remove the target and press the **P/-** key. The display will flash 3 times.
4. Exit the teach function and return to the normal operating mode by Pressing the **T/+** key for several seconds.

When in the teach mode the LED flashes constantly, yellow, green or red. Yellow indicates that the sensor is ready to be taught the Detect level. Green indicates that the sensor is ready to be taught the Undetect level. Red indicates that the last attempt to teach resulted in an error. If the error occurred during the teaching of the Detect level then the signal intensity was less than 01. If the error occurred during the teaching of the Undetect level, then the signal intensity was greater than or equal to the threshold level. In either case, repeat the teach function to properly set the levels.

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.

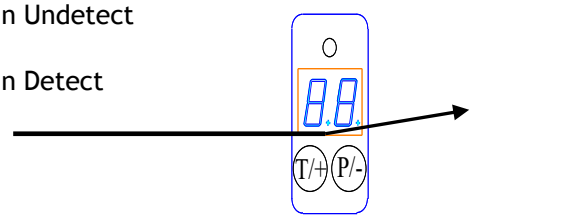
Analog Output

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. In applications where minor differences in color are to be detected, variations in brightness producing discernable level changes in the analog output can be used to differentiate between similar colors.

Display Indicators

Indicators

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

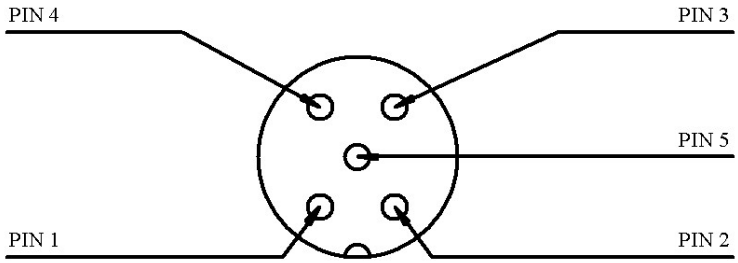


Display decimal points

- 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 0 to 5V DC
Pin 5	Yellow	Not used



Ordering information

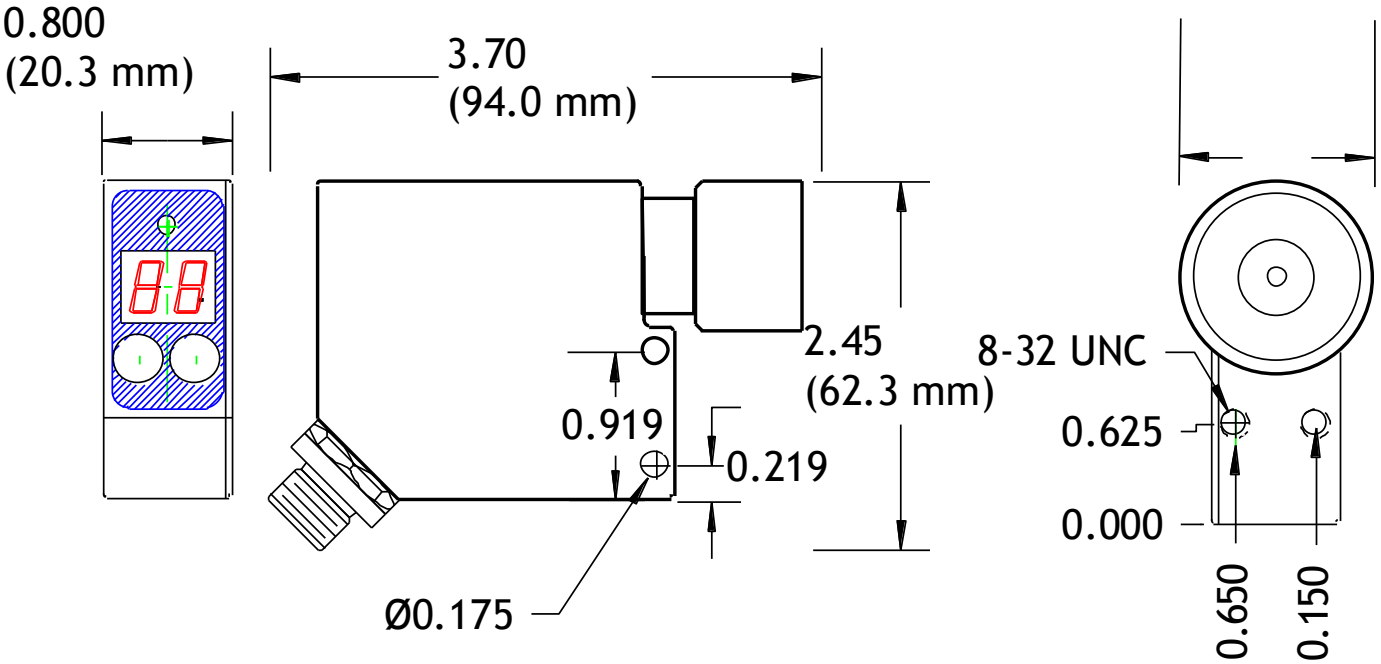
Brite-X 100 **Brightness sensor**

Accessories

UVX300-BRKT
Bracket

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

Dimensional Details



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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