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QL55 Series Luminescence Sensor

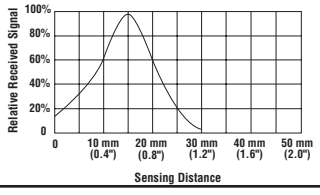
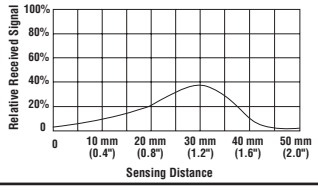
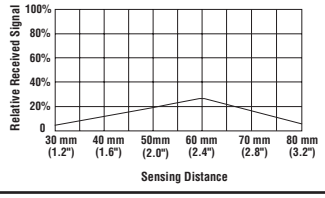
Self-contained, microprocessor-based luminescence sensor



Features

- Self-contained design in a robust, compact metal housing
- High sensitivity
- Microprocessor-controlled
- Senses luminescent marks, even on luminescent backgrounds
- Senses luminescence on reflective surfaces, such as ceramic, metal, or mirrored glass
- Easy-to-set sensing threshold
- Fast 250-microsecond sensing response time; high 2 kHz switching frequency
- Switch-selectable NPN or PNP discrete output, plus 0 to 5.5V dc analog output
- Switch-selectable output OFF-delay
- 3-position swivel QD connector

Models

Models	Sensing Range	Cable/ Connector*	Supply Voltage	Outputs	Sensor Performance
QL55M6XD15BQ	9 to 18 mm (0.35" to 0.71")	4-pin Euro-style (M12) QD connector with 3-position swivel (locking screw-secured)	10 to 30V dc	One selectable NPN or PNP discrete plus one 0 to 5.5V dc analog	
QL55M6XD30BQ	20 to 40 mm (0.79" to 1.57")				
QL55M6XD50BQ	40 to 75 mm (1.57" to 2.95")				

* Mating cable required; see back cover for cable options.

WARNING . . . Not To Be Used for Personnel Protection

Never use these products as sensing devices for personnel protection. Doing so could lead to serious injury or death.

These sensors do NOT include the self-checking redundant circuitry necessary to allow their use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition. Consult your current Banner Safety Products catalog for safety products which meet OSHA, ANSI and IEC standards for personnel protection.

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ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Overview

The QL55 Series Sensor is an easy-to-use, extremely sensitive microprocessor-based luminescence sensor that emits ultraviolet light from a high-power LED and scans for luminescence in materials. The QL55 senses the luminescence inherent in a material, or it can sense luminophores added to a material in process to make it luminescent.

The sensor can be set to accurately sense a wide range of luminescence intensities and background conditions. The two-step QL55 Sensor programming procedure sets the threshold for target luminescence and background. The Luminescent Target condition is taught first, followed by the Luminescent Target Absent (background) condition. During operation, the sensor outputs will be ON when the luminescent target object is present, and OFF for the background condition. (The sensor may instead be taught to respond to the Background condition; see page 3.)

Located within the QL55 Sensor, two selector switches may be used to enable an output OFF-delay option and for setting the discrete output to NPN or PNP (see Figure 5). The QL55 is available with one of three operating ranges, to a maximum of 75 mm (2.95"), depending on the model.

The sensor housing has two push buttons, Mark and Background, for easy programming; it has two LEDs, Ready/Overload and Output, for easy monitoring during operation. See Figure 1.

For easier understanding, the sensor faces are described in this data sheet as labeled in Figure 2. The key pad is considered the sensor back, and the lens is on the bottom.

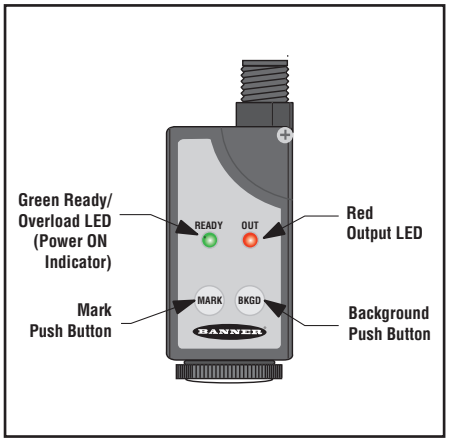


Figure 1. QL55 Luminescence Sensor features (sensor back)

Luminescence Sensing

Luminescence sensing detects a form of electromagnetic radiation, caused by the shining of UV light ("black" light, invisible to the human eye) on a luminescent substrate material, such as a petroleum-based adhesive. When the UV light shines on the adhesive, the light "excites" electrons in the material (effecting a change of state), causing it to reflect visible light. Thus an invisible light source can produce a visible reflection. Because it emits UV light but detects visible waves, the sensor can distinguish between the fluorescent material and other highly reflective materials.

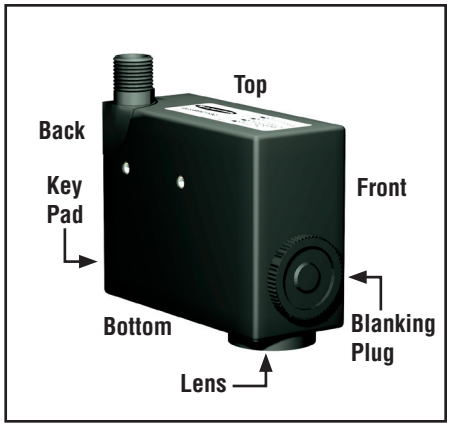


Figure 2. QL55 orientation of features

Cost Factors

When comparing luminescence sensors to make a selection, it is important to consider whether luminophores must be added to the product sensed, in order for the sensor to detect luminescence. Generally speaking, the more sensitive the sensor, the lower the level of luminescence required for detection. Less sensitive (and usually less expensive) sensors may require an additional step in the production process, and a substantial cost over time, to add luminophores. For information on less expensive, less sensitive luminescence sensor models, refer to data sheet p/n 112151, Model QL50 Luminescence Sensor, or contact a Banner applications engineer for more information (see back page for addresses).

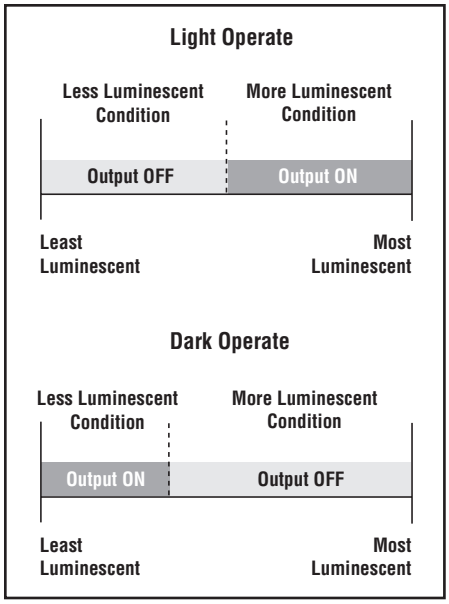


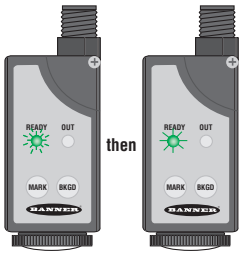
Figure 3. Sensor automatically selects light operate or dark operate, when configured as described below

Sensor Configuration

In this simple two-step procedure, the sensor samples the luminescence levels of both the target (Mark) and the background (Background) conditions. The sensor automatically selects light operate or dark operate (see Figure 3) based on the relative luminescence of the two conditions. Using the procedure described below, sensing the more luminescent condition (in this case the target to be sensed) will close the normally open output, turn on the red Output LED, and cause the output to conduct current (light operate).

If the application requires the output to conduct for a less luminescent condition, reverse the procedure (dark operate):

- Present the less luminescent condition first (Mark push button) and then
- Present the more luminescent condition (Background push button).

	Procedure	Result
SET Output ON Condition	• Position luminescent target in front of sensing lens. • Press Mark push button (approx. 4 sec.) until green Ready LED turns OFF. 	**Green Ready LED**: turns OFF **Red Output LED:** OFF Green Ready LED stays OFF, and sensor stores the Output ON condition. 
SET Output OFF Condition	• Remove luminescent target from sensor's field of view. • Press and hold Background push button (approx. 4 sec.) until green blinks. 	**Programming Accepted** **Green Ready LED:** Flashes 1x, then ON **Red Output LED:** OFF Green Ready LED stays ON, and sensor stores the Output OFF (background) condition.  **Programming Error** (Due to insufficient contrast between target and background luminescence) **Green Ready LED:** flashes slowly (approx. 2 Hz) Repeat programming procedure from the beginning. If programming fails again, increase the target luminescence or subdue the background.

Sensor Setup

Output OFF-Delay

Setting an output OFF-delay extends the duration of the QL55 sensor's ON output by 20 ms. See Figure 4. The sensor default is for no OFF-delay.

NOTE: Take precautions against potential static discharge.

To activate the output OFF-delay option:

1. Remove power from sensor.
2. Remove the four cover screws and the sensor side cover.
3. Slide DIP switch 2 (shown in Figure 5) to the ON position.

   NOTE: Leave DIP switch 1 in its factory-set position.
4. Change NPN/PNP output selection, if applicable.
5. Replace the sensor side cover and screws.

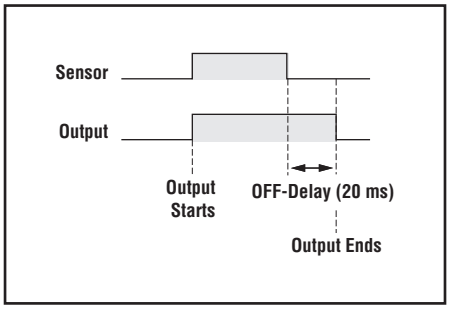


Figure 4. Output OFF-delay: Output continues for 20 ms after sensing stops

Setting NPN / PNP Output

The QL55 has a selector switch for setting the output to NPN (current sinking) or PNP (current sourcing). The sensor is pre-set with the output set to NPN. If the sensor will be operating with an NPN output (and no output OFF-delay), the sensor housing does not need to be opened.

NOTE: Take precautions against potential static discharge.

To set NPN or PNP output:

1. Remove power from sensor.
2. Access the red sliding NPN/PNP selector switch by removing the four cover screws and the sensor side cover. The switch is located deep within the sensor housing; do not confuse it with the bank of two DIP switches. The NPN/PNP selector switch is visible below the circuit board, next to the exposed mounting screw location (see Figure 5).
3. Carefully use a small screwdriver (preferably non-metallic) to select the NPN or PNP switch position.
4. Replace the sensor side cover and screws before installing the sensor.

   NOTE: If a cover screw is lost, contact the Banner applications group for a free replacement (see back page for addresses).

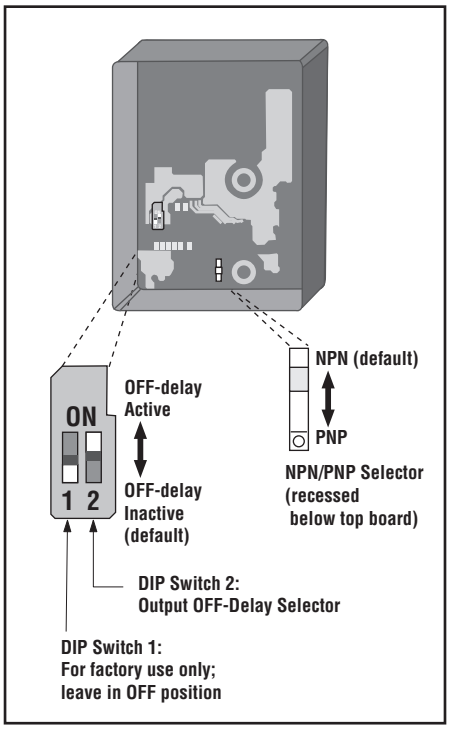


Figure 5. Selector switches: Output OFF-Delay and NPN/PNP output select

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Sensor Installation

Do not attempt to change the lens position on the sensor housing. The sensor will work only with the lens in the bottom port (see Figure 2). No optical components exist behind the blanking plug on the sensor front; do not remove the blanking plug.

1. Loosen the connector locking screw (several turns), and position the QD connector as needed (back, side, or bottom of the sensor). Tighten the locking screw after the connector is properly positioned.
2. Measure the appropriate operating distance from the front surface of the sensor optics to the surface or object to be sensed. Do not exceed the sensing range for your model (see page 1 for sensor model and range).
3. Fasten the sensor to its intended location using two to four M5 mounting screws and washers. There are four mounting holes on the bottom (lens side) of the sensor and two on each side (see page 7).

   NOTE: Proper mounting screw length depends on mounting bracket thickness. Additional washers may be necessary to make sure the screws do not exceed the thread depth.

4. Attach the QD cable to the sensor's connector; see hookups on page 7.

Sensor Operation

Power up the QL55 Sensor after programming, setup, and installation. The green Ready LED turns ON to indicate that the sensor is in RUN mode and ready to sense the luminescent target as programmed. When configured as described on page 3, sensing the target object will cause the normally-open output to close and the red Output LED to turn ON.

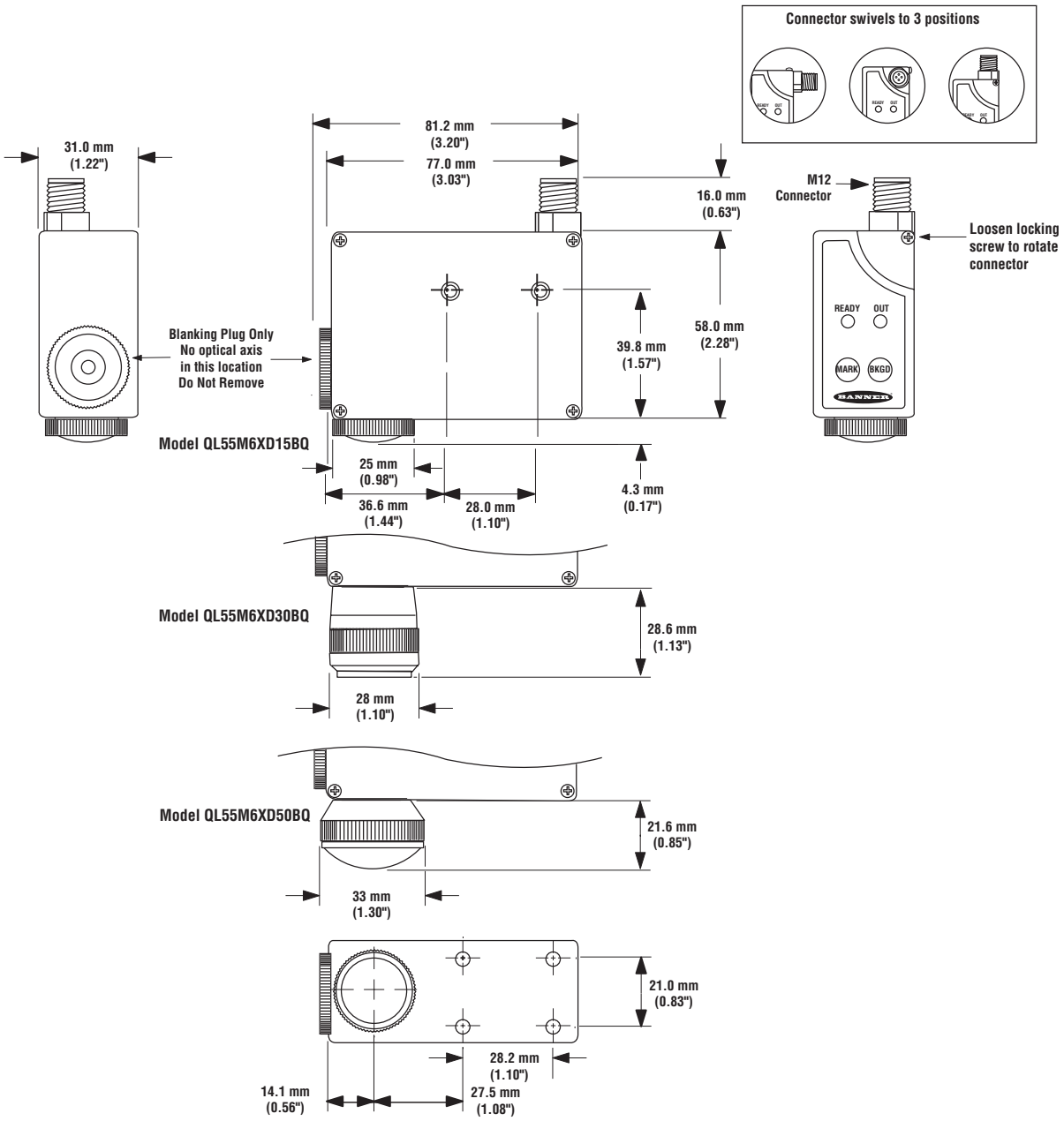
If the sensor experiences an output overload condition during operation, the green Ready LED will flash fast (approx. 4 Hz). Verify that output current is less than 200 mA.

QL55 Series Luminescence Sensor

Specifications

Sensing Beam	Ultraviolet high-power LED (370 nm)
Supply Voltage	10 to 30V dc, 2 V pp max ripple 80 mA max, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity
Output Configuration	Discrete NPN or PNP Analog 0 to 5.5V dc ± 10%, ripple 40 mV pp max. **Saturation Voltage:** 1V max. NPN / 2V max PNP **Leakage Current:** <100 µA
Output Rating	200 mA maximum load
Output Protection	**NPN/PNP:** Protected against reverse polarity, overload, and short circuit (pull down/up resistance 10 kΩ) **Analog:** Protected against short circuit (output resistance 2.2 kΩ)
Output Response Time	250 microseconds
Adjustments	2 push buttons (MARK and BKGD) determine switching threshold and Light/Dark operate (see page 3) 2 selector switches (see Figure 5) • 20 ms Output OFF-delay • NPN/PNP output
Indicators	**Red Output LED** **ON:** output is conducting **Green Ready/Overload LED** **ON:** normal operating condition, RUN mode **Flashing 2 Hz:** setup failure due to insufficient contrast **Flashing 4 Hz:** output overload condition (verify output current ≤ 200 mA)
Construction	**Housing:** zinc, aluminum, and magnesium alloy **Lens:** glass
Environmental Rating	IEC IP62
Connections	4-pin Euro-style (M12) QD connector. See back cover for required accessory cable options.
Operating Conditions	**Temperature:** -10° to +55°C (+14° to +131°F) **Max. Relative Humidity:** 85% at 50°C (non-condensing)
Data Retention	EEPROM nonvolatile memory
Scanning Range	**QL55M6XD15BQ:** 9 to 18 mm (0.35" to 0.71") **QL55M6XD30BQ:** 20 to 40 mm (0.79" to 1.57") **QL55M6XD50BQ:** 40 to 75 mm (1.57" to 2.95")
Spot Diameter	**QL55M6XD15BQ:** 2 mm (0.08") **QL55M6XD30BQ:** 3 mm (0.12") **QL55M6XD50BQ:** 4 mm (0.16")
Ambient Light Rejection	According to EN 60947-5-2
Shock Resistance	30 G; 3 shocks per axis; 11 ms duration
Vibration	0.5 mm (0.02") amplitude; 10 to 60 Hz frequency, 30 minutes for each X, Y, Z axis
Certifications	CE

Dimensions

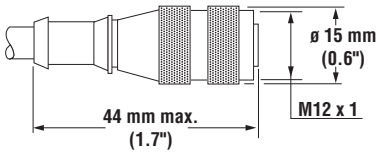
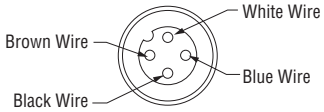


Hookups



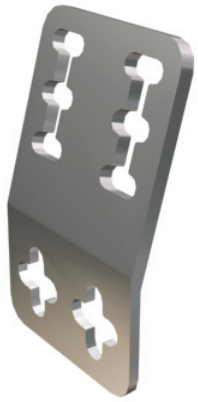
QL55 Series Luminescence Sensor

Quick-Disconnect Cables

Style	Model	Length	Dimensions	Pinout
4-Pin Straight Euro-style	**MQDC-406** **MQDC-415** **MQDC-430**	2 m (6.5') 5 m (15') 9 m (30')		

Accessory Mounting Brackets

See the current Banner Photoelectric Catalog or website, www.bannerengineering.com, for bracket dimensions.

SMB55A • 15° offset bracket • 12-gauge stainless steel	**SMB55RA** • Right-angle bracket • 12-gauge stainless steel	**SMB55F** • Flat-mount bracket • 12-gauge stainless steel	**SMB55S** • 15° offset bracket • 12-gauge stainless steel
			

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