

QMT42 Series Fixed-Field Sensors



Datasheet

Sensing cutoff point at 500, 750, 1000, 1500, or 2000 millimeters (20, 30, 39, 59, or 79 inches)



- Fixed-field technology allows direct detection of objects within a defined sensing-field, while completely ignoring objects located beyond the sensing-field cutoff point
- Low-cost, compact, rugged sensors in metal die-cast housings
- Leakproof IP67 (NEMA 6) construction for reliable sensing in harsh environments
- Outstanding electrical noise immunity
- Dual LED system indicates sensor performance
- Choice of unterminated cable or quick-disconnect connector



WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

Models

| Models | Sensing Cutoff Point | Cable | Output Type |
|-----------------|----------------------|---------------|-------------|
| QMT42VN6FF500 | 500 mm (20 in) | 2 m (6.5 ft) | NPN |
| QMT42VN6FF500Q | | 4-pin Euro QD | |
| QMT42VP6FF500 | | 2 m (6.5 ft) | PNP |
| QMT42VP6FF500Q | | 4-pin Euro QD | |
| QMT42VN6FF750 | 750 mm (30 in) | 2 m (6.5 ft) | NPN |
| QMT42VN6FF750Q | | 4-pin Euro QD | |
| QMT42VP6FF750 | | 2 m (6.5 ft) | PNP |
| QMT42VP6FF750Q | | 4-pin Euro QD | |
| QMT42VN6FF1000 | 1000 mm (39 in) | 2 m (6.5 ft) | NPN |
| QMT42VN6FF1000Q | | 4-pin Euro QD | |
| QMT42VP6FF1000 | | 2 m (6.5 ft) | PNP |
| QMT42VP6FF1000Q | | 4-pin Euro QD | |
| QMT42VN6FF1500 | 1500 mm (59 in) | 2 m (6.5 ft) | NPN |
| QMT42VN6FF1500Q | | 4-pin Euro QD | |
| QMT42VP6FF1500 | | 2 m (6.5 ft) | PNP |
| QMT42VP6FF1500Q | | 4-pin Euro QD | |
| QMT42VN6FF2000 | 2000 mm (79 in) | 2 m (6.5 ft) | NPN |
| QMT42VN6FF2000Q | | 4-pin Euro QD | |
| QMT42VP6FF2000 | | 2 m (6.5 ft) | PNP |
| QMT42VP6FF2000Q | | 4-pin Euro QD | |



Fixed-Field Sensing – Theory of Operation

The QMT...FF... compares the reflections of its emitted light beam (E) from an object back to the sensor's two differently aimed detectors, R1 and R2. See [Figure 1](#) on page 2. If the near detector's (R1) light signal is stronger than the far detector's (R2) light signal (see object A in the Figure below, closer than the cutoff distance), the sensor responds to the object. If the far detector's (R2) light signal is stronger than the near detector's (R1) light signal (see object B in the Figure below, beyond the cutoff distance), the sensor ignores the object.

The cutoff distance for model QMT...FF... sensors is fixed at 500, 750, 1000, 1500, or 2000 millimeters (20, 30, 39, 59, or 79 inches). Objects lying beyond the cutoff distance are ignored, even if they are highly reflective. However, under certain conditions, it is possible to falsely detect a background object (see [Placement](#) on page 2).

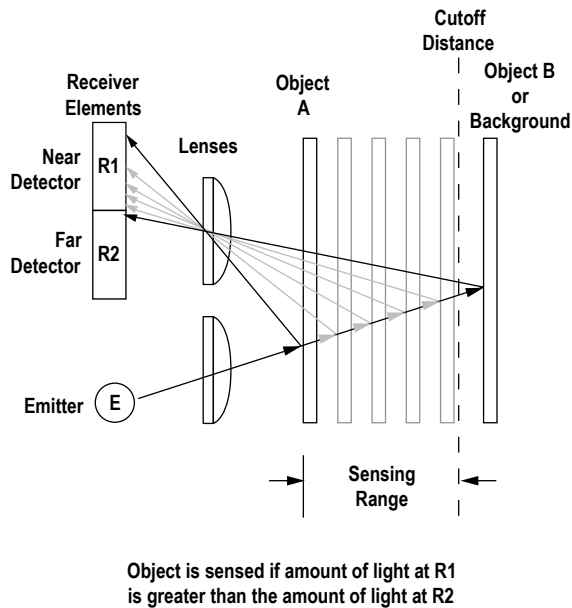


Figure 1. Fixed-Field Concept

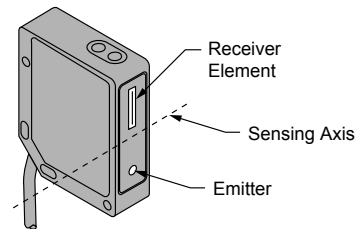
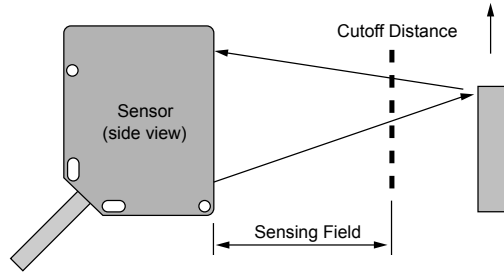


Figure 2. Fixed-Field Sensing Axis

In the drawings and information provided in this document, the letters E, R1, and R2 identify how the sensor's three optical elements (Emitter "E", Near Detector "R1", and Far Detector "R2") line up across the face of the sensor. The location of these elements defines the sensing axis, see [Figure 2](#) on page 2. The sensing axis becomes important in certain situations, such as those illustrated in [Figure 3](#) on page 3 and [Figure 4](#) on page 3.

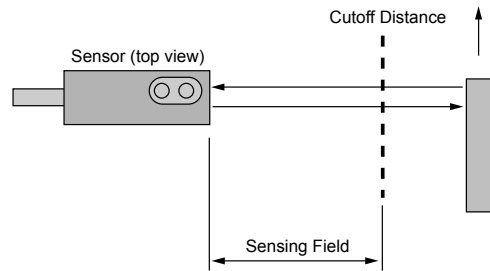
Placement

An object beyond the cutoff distance, either stationary (and when positioned as shown in [Figure 3](#) on page 3), or moving past the face of the sensor in a direction perpendicular to the sensing axis, may cause unwanted triggering of the sensor if more light is reflected to the near detector than to the far detector. Correct the problem by rotating the sensor 90° ([Figure 4](#) on page 3). The object then reflects the R1 and R2 fields equally, resulting in no false triggering. A better solution, if possible, may be to reposition the object or the sensor.



A reflective background object in this position or moving across the sensor face in this axis and direction may cause a false sensor response.

Figure 3. Object Beyond Cutoff - Problem



A reflective background object in this position or moving across the sensor face in this axis is ignored.

Figure 4. Object Beyond Cutoff - Solution

Specifications

Sensing Beam

Infrared, 880 nm

Supply Voltage and Current

10 to 30 V dc (10% max. ripple) at less than 40 mA

Supply Protection Circuitry

Protected against reverse polarity and transient voltages

Output Configuration

SPDT (complementary) solid-state dc switch; choose NPN or PNP models

Light operate: N.O. output conducts when the sensor sees its own modulated light

Dark operate: N.C. output conducts when the sensor sees dark

Output Rating

100 mA maximum (each output)

OFF-state leakage current: < 5 microamps at 30 V dc

ON-state saturation voltage: < 1 V at 10 mA dc; < 1.5 V at 100 mA dc

Output Protection Circuitry

Protected against false pulse on power-up and continuous overload or short-circuit of outputs

Overload trip point \geq 150 mA, typical, at 20 °C

Output Response Time

1 millisecond on and off



NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time

Repeatability of Response

250 microseconds

Sensing Hysteresis

Less than 5% of cutoff distance - 2000 mm models

Less than 4% of cutoff distance - 1500 mm models

Less than 3% of cutoff distance - 1000 mm models

Less than 2% of cutoff distance - 750 mm models

Less than 1% of cutoff distance - 500 mm models

Cutoff Point Tolerance

\pm 10% of nominal cutoff distance

Range

50 mm (2.0 in) to cutoff point

10 mm (0.4 in) to 6 m (20 ft)

Indicators

Two LEDs: Green and Amber

Green on steady = power to sensor is ON

Green flashing = output is overloaded

Amber on steady = light is sensed; normally open output ON

Amber flashing = marginal excess gain (1-1.5x) in light condition

Construction

Housings are die-cast zinc alloy with black acrylic polyurethane finish; lenses are acrylic

Environmental Rating

IEC IP67

NEMA 6

Connections

2 m (6.5 ft) or 9 m (30 ft) attached cable, or 4-pin M12/Euro-style quick-disconnect fitting; cables for QD models are purchased separately

Operating Conditions

-20 °C to +55 °C (-4 °F to +131 °F)

90% at +50 °C maximum relative humidity (non-condensing)

Required Overcurrent Protection



WARNING: Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

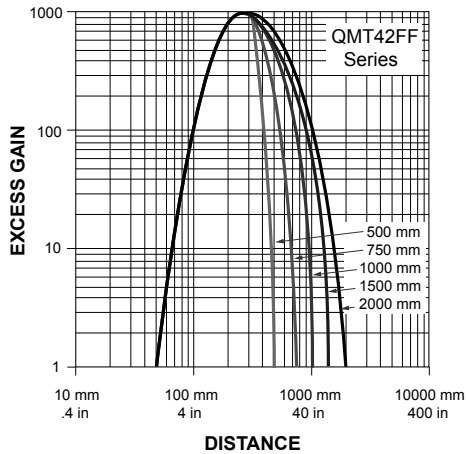
For additional product support, go to <http://www.bannerengineering.com>.

| Supply Wiring | Required Overcurrent Protection |
|---------------|---------------------------------|
| 20 | 5.0 Amps |
| 22 | 3.0 Amps |
| 24 | 2.0 Amps |
| 26 | 1.0 Amps |
| 28 | 0.8 Amps |
| 30 | 0.5 Amps |

Certifications

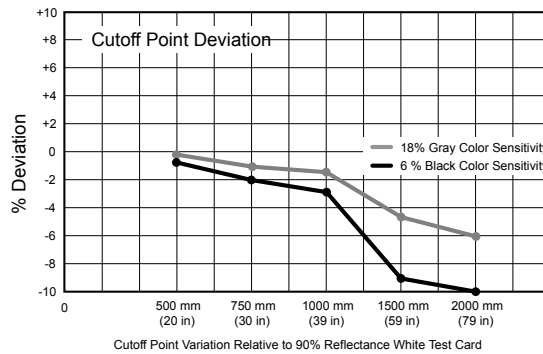


Performance Curves



Cutoff Point Deviation

The percentage of deviation indicates a change in the cutoff point for either 18% gray or 6% black targets, relative to the cutoff point for a 90% reflective white test card. As an example, the cutoff point decreases 10% for a 6% reflectance black target when the cutoff point is 2000 millimeters (79 inches) using a 90% reflectance white test card. In other words, the cutoff point for the black target is 1800 millimeters (71 inches).



Dimensions

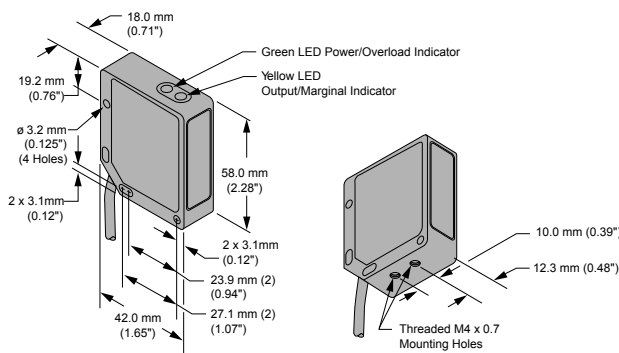


Figure 5. Cabled Models

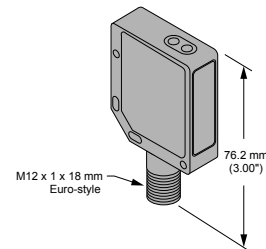
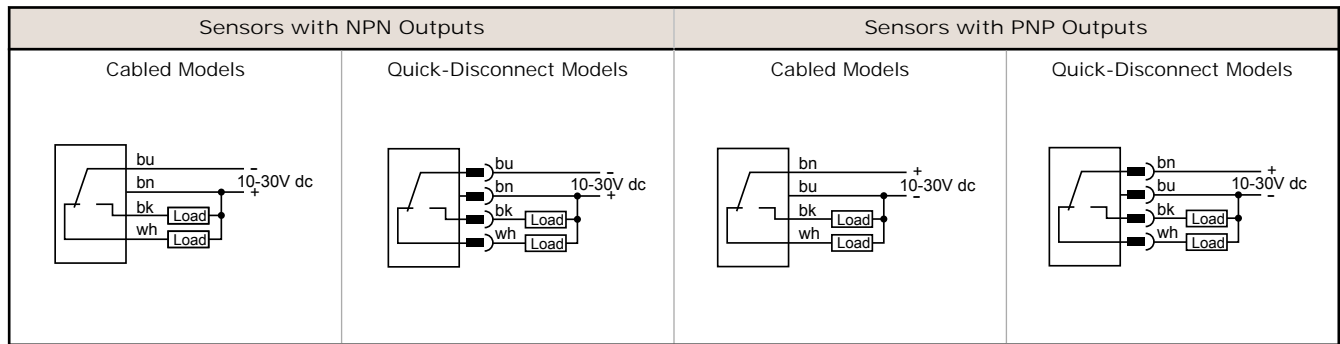


Figure 6. Quick-Disconnect Models

All measurements are listed in millimeters (inches), unless noted otherwise.

Wiring



Accessories

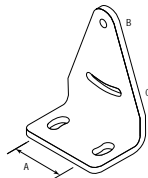
Quick-Disconnect (QD) Cables

| 4-Pin Threaded M12/Euro-Style Cordsets | | | | |
|--|----------------|-------------|------------|---|
| Model | Length | Style | Dimensions | Pinout (Female) |
| MQDC-406 | 1.83 m (6 ft) | Straight | | 1 = Brown 2 = White 3 = Blue 4 = Black |
| MQDC-415 | 4.57 m (15 ft) | | | |
| MQDC-430 | 9.14 m (30 ft) | | | |
| MQDC-450 | 15.2 m (50 ft) | | | |
| MQDC-406RA | 1.83 m (6 ft) | Right-Angle | | |
| MQDC-415RA | 4.57 m (15 ft) | | | |
| MQDC-430RA | 9.14 m (30 ft) | | | |
| MQDC-450RA | 15.2 m (50 ft) | | | |

Mounting Brackets

SMB42T

- Stainless steel 2-axis side-mounting bracket
- Nut strap included for replacing two M3 mounting nuts

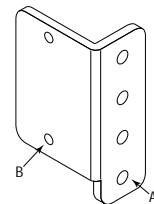


Hole center spacing: A = 20.3, B to C = 24.1

Hole size: A = ϕ 4.3 \times 20°, B = ϕ 3.0, C = ϕ 3.0 \times 30°

SMB42L

- 13-ga. stainless steel
- Hardware included



Hole center spacing: A = 10.0, B = 25.4

Hole size: A = ϕ 3.4, B = ϕ 2.5