Q45BW22 Series Sensors

90 to 250V ac photoelectric sensors with protected solid-state relay output

Status indicators and adjustments beneath transparent, o-ring sealed cover (see page 9)

Rugged housing rated IEC IP67; withstands 1200 psi washdown

Choose integral cable or quick-disconnect

Q45BW22 Series Features

- Advanced one-piece photoelectric sensors with outstanding optical performance and extremely rugged design

- 90 to 250V ac

- Protected solid-state relay output; 300 mA max. load at up to 250V ac

- Multiple sensing modes include: opposed, diffuse, retroreflective and convergent, plus glass and plastic fiber optic models

- Switchable light/dark operate

- Versatile plug-in modules available for output timing logic and/or signal strength display

- Highly visible Power, Signal (AID™ System*), and Output indicator LEDs

- Choice of prewired 2 m (6.5') or 9 m (30') unterminated cable, plus Mini-style or Micro-style quick-disconnect fittings

- Versatile mounting options

- Designed to withstand 1200 psi washdown; exceeds its NEMA 6P and IEC IP67 rating

*U.S. Patent no. 4356393

Because of their extremely high excess gain, these opposed-mode sensors are an excellent option for sensing in contaminated or dirty areas, and are also the best choice for long-range sensing.

Infrared, 880 nm

Q45BW22 Series Opposed-Mode Emitter (E) and Receiver (R) Models

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Q452E Emitter Q45BW22R Receiver	60 m (200')	2-wire 2m (6.5') 3-wire 2m (6.5')	90 to 250V ac	SPST Solid-state Relay	Effective Beam: 13 mm	
Q452EQ Emitter Q452EQ1 Emitter Q45BW22RQ Receiver Q45BW22RQ1 Receiver		3-Pin Mini-style QD 4-Pin Micro-style QD 3-Pin Mini-style QD 4-Pin Micro-style QD				

NOTES: i) 9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **Q452E W/30**)

ii) A model with a QD connector requires a mating cable; see page 10.

IMPORTANT: SEE SAFETY USE WARNING ON BACK PAGE

Q45BW22 Series

The visible red sensing beam of these sensors makes them very easy to align. Model Q45BW22LP polarizes the emitted light and filters out unwanted reflections, making sensing possible in applications otherwise considered unsuited to retroreflective sensing. Performance is specified using the model BRT-3 3" reflector (see the Accessories section of your current Banner Photoelectric Sensors catalog for further information).

Visible red, 680 nm
Non-Polarized   Polarized
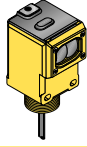
Q45BW22 Series Retroreflective-Mode Models

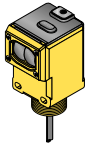| Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
Non-Polarized						
Q45BW22LV Q45BW22LVQ Q45BW22LVQ1	0.08 to 9 m (3" to 30')	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		
Polarized						
Q45BW22LP Q45BW22LPQ Q45BW22LPQ1	0.15 to 6 m (6" to 20')	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		

NOTES:
i)   9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **Q45BW22LV W/30**)
ii) A model with a QD connector requires a mating cable; see page 10.
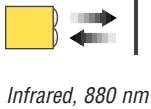
These diffuse-mode models detect objects by sensing the reflection of their own emitted light. Ideal for use when the reflectivity and profile of the object to be sensed are sufficient to return a large percentage of emitted light back to the sensor. Model Q45BW22DX is the first choice for diffuse-mode applications when there are no background objects to falsely return light.

Infrared, 880 nm

Q45BW22 Series Diffuse-Mode Models

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
Short Range						
Q45BW22D Q45BW22DQ Q45BW22DQ1	45 cm (18")	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		
Long Range						
Q45BW22DL Q45BW22DLQ Q45BW22DLQ1	1.8 m (6')	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		
High Power						
Q45BW22DX Q45BW22DXQ Q45BW22DXQ1	3 m (10')	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		

Q45BW22 Series
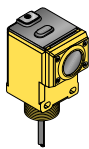
These sensors are ideal for reflective sensing of very small parts or profiles, and can accurately sense the position of parts approaching from the side. Will ignore all but highly reflective objects that are outside the sensing range.

Visible red. 680 nm

Q45BW22 Series Convergent-Mode Models

Models	Focus	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Performance based on 90% reflectance white test card	
Q45BW22CV Q45BW22CVQ Q45BW22CVQ1	38 mm (1.5") **Spot Size at Focus:** 1.3 mm (0.05")	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		
Q45BW22CV4 Q45BW22CV4Q Q45BW22CV4Q1	100 mm (4") **Spot Size at Focus:** 1.5 mm (0.06")	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		

NOTES:
i)   9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **Q45BW22CV W/30**)
ii) A model with a QD connector requires a mating cable; see page 10.

These models are an excellent choice for glass fiber optic applications where faster sensor response is not important. Their high excess gain means that opposed individual fibers can operate reliably in many very hostile environments. Also, special miniature bifurcated fiber optic assemblies with bundle sizes as small as .5 mm (.020") dia. may be used successfully for diffuse-mode sensing when using sensor model Q45BW22F(Q). For more information on compatible glass fiber optics, refer to your current Banner Photoelectric Sensors catalog.
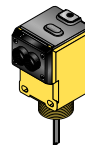
Infrared, 880 nm and Visible Red, 650 nm

Q45BW22 Series Glass Fiber-Optic Models

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
Infrared, 880 nm						
Q45BW22F **Q45BW22FQ** **Q45BW22FQ1**	Range varies by sensing mode and fiber optics used	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		
Visible Red, 650 nm						
Q45BW22FV **Q45BW22FVQ** **Q45BW22FVQ1**	Range varies by sensing mode and fiber optics used	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		
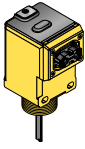
Lower in cost than glass fiber optics, plastic fiber optics are ideal for use in situations where environmental conditions allow (for example, low levels of acids, alkalis, and solvents). Most are easily cut to length in the field, and are available in a variety of sensing end styles. For more information on compatible plastic fiber optics, refer to your current Banner Photoelectric Sensors catalog.

Visible red, 660 nm

Q45BW22 Series Plastic Fiber-Optic Models

Models	Range	Cable	Supply Voltage	Output Type	Excess Gain	Beam Pattern
					Diffuse mode performance based on 90% reflectance white test card	
Q45BW22FP **Q45BW22FPQ** **Q45BW22FPQ1**	Range varies by sensing mode and fiber optics used	3-wire 2 m (6.5') 3-Pin Mini-style QD 4-Pin Micro-style QD	90 to 250V ac	SPST Solid-state Relay		

NOTES:

    i)   9 m (30') cables are available by adding suffix "W/30" to the model number of any cabled sensor (e.g., **Q45BW22FP W/30**)

    ii) A model with a QD connector requires a mating cable; see page 10.

Q45BW22 Series Specifications

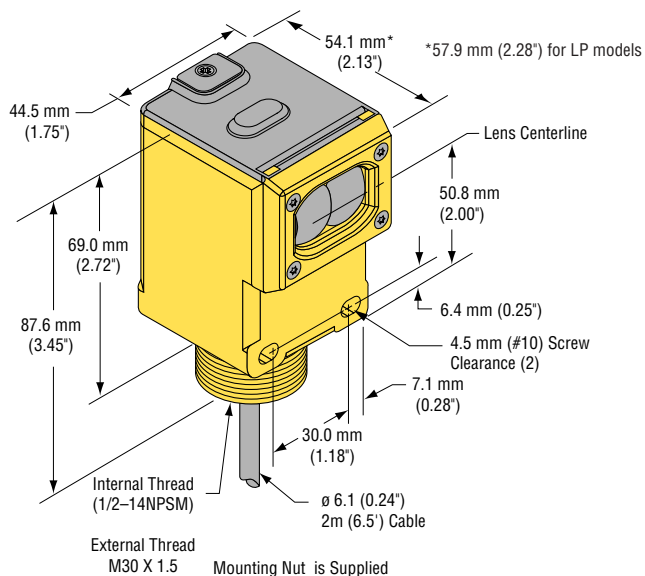|	
Supply Voltage and Current	90 to 250V ac (50 - 60 Hz). Average current 20 mA. Peak current 500 mA at 120C ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages.
Output Configuration	Short circuit/overload protected FET solid-state relay
Output Rating	**Continuous current:** 300 mA max. to 50° C (derate to 200 mA at 70°C, 5 mA/°C) **Inrush current:** 3A max. for 100 milliseconds, 5A max. for 1 millisecond **Off-state leakage current:** <100 microamps **Saturation voltage:** <3V at 200 mA
Output Protection Circuitry	Manually-resettable output latch-out trips in the event of an output overload or short circuit condition. The green Power LED flashes to indicate the latch-out. To reset the output, remove power to the sensor and load for 5 seconds, then restore power.
Output Response Time	**Opposed mode:** 2 milliseconds ON, 1 millisecond OFF **All other sensing modes:** 2 milliseconds ON/OFF (NOTE: 100 millisecond delay on power-up. Output is non-conducting during this time.)
Repeatability	**Opposed mode:** 0.25 milliseconds **All other sensing modes:** 0.5 milliseconds Response time and repeatability specifications are independent of signal strength.
Adjustments	**Beneath sensor's transparent cover:** Light/Dark Operate select switch; and multi-turn Sensitivity control (allows precise sensitivity setting – turn clockwise to increase gain). Optional logic and logic/display modules have adjustable timing functions (see page 10).
Indicators	Indicator LEDs are clearly visible beneath a raised transparent Lexan® dome on top of the sensor. **Power (green) LED** lights whenever 90 to 250V ac power is applied, and flashes to indicate output overload or output short circuit **Signal (red) AID™ System LED** lights whenever the sensor sees its modulated light source, and pulses at a rate proportional to the strength of the received light signal **Load (yellow) LED** lights whenever the output relay is energized **Optional 7-element LED** signal strength display module
Construction	Molded reinforced thermoplastic polyester housing, o-ring-sealed transparent Lexan® cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a 1/2" NPS integral internal conduit thread.
Environmental Rating	NEMA 6P, IEC IP67
Connections	PVC-jacketed 2 m (6.5') or 9 m (30') cables, or 3-pin Mini-style ("Q" suffix models) or 4-pin Micro-style ("Q1" suffix models) quick-disconnect (QD) fittings are available. QD cables are ordered separately. See page 10.
Operating Conditions	**Temperature:** -40° to +70° C (-40° to +158°F) **Maximum relative humidity:** 90% at 50°C (non-condensing)
Application Notes	Optional output timing modules are available. See page 10 for more information.
Certifications	CE CSA® NRTL/C UL LISTED

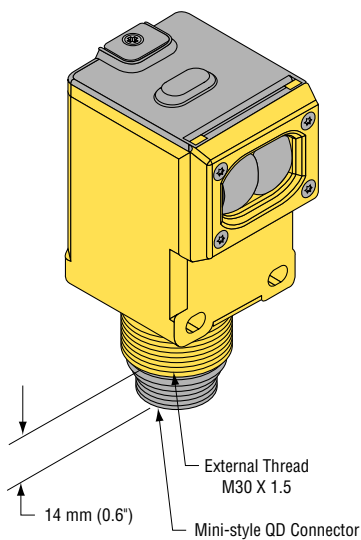Lexan® is a registered trademark of General Electric Co.

Q45BW22 Series

Q45BW22 Series Dimensions

Opposed, Retro, and Diffuse Sensing Modes
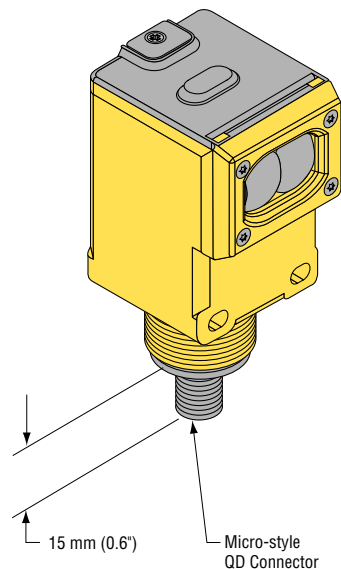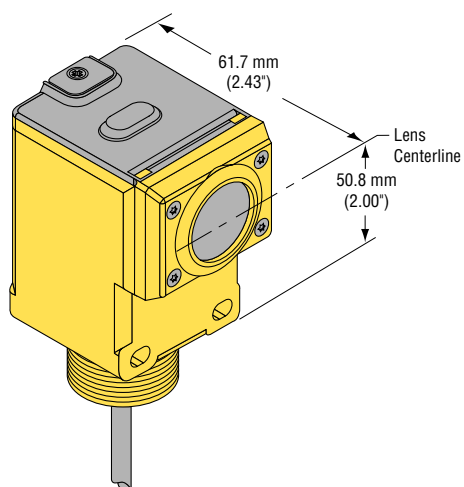### (model suffix E, R, D, DL, DX, LP & LV)

Cabled

54.1 mm*
(2.13") *57.9 mm (2.28") for LP models

44.5 mm
(1.75")

Lens Centerline

50.8 mm
(2.00")

69.0 mm
(2.72")

6.4 mm (0.25")

87.6 mm
(3.45")

4.5 mm (#10) Screw
Clearance (2)

7.1 mm
(0.28")

30.0 mm
(1.18")

Internal Thread
(1/2–14NPSM)

ø 6.1 (0.24")
2m (6.5') Cable

External Thread
M30 X 1.5   Mounting Nut is Supplied

Mini-style Quick-disconnect

External Thread
M30 X 1.5

14 mm (0.6")

Mini-style QD Connector

Micro-style Quick-disconnect

15 mm (0.6")

Micro-style
QD Connector

Convergent Sensing Mode
(model suffix CV & CV4)

61.7 mm
(2.43")

Lens
Centerline

50.8 mm
(2.00")

Glass Fiber Optic
(model suffix F and FV)

60.5 mm
(2.38")
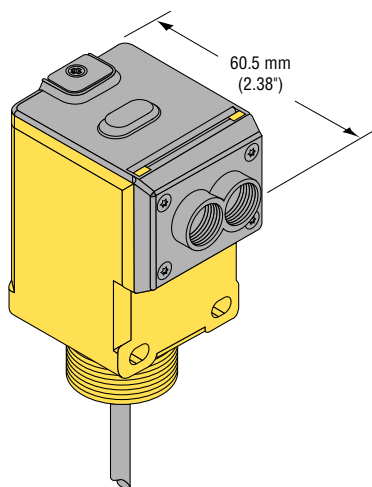
Plastic Fiber Optic
(model suffix FP)

59.8 mm
(2.35")

Q45BW22 Series Indicators and Controls
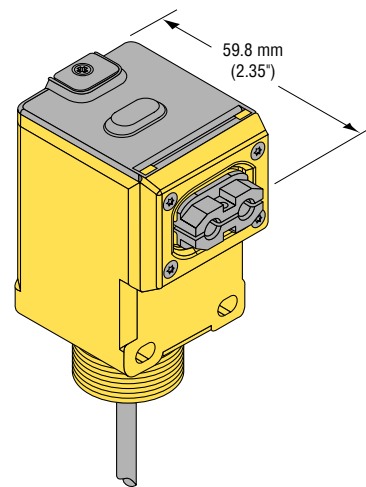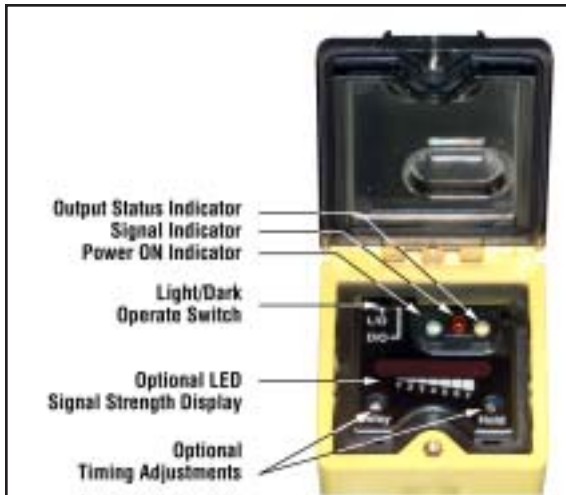

Figure 1. Indicators and controls on the Q45BW22 Series Sensors

Status indicator LEDs for Power, Signal and Output are clearly visible beneath a raised dome in the sensor's transparent o-ring-sealed Lexan® cover. The Power indicator lights whenever power is applied to the sensor. The Signal LED lights whenever the sensor sees its modulated light source, and pulses at a rate proportional to the strength of the received light signal; this is the AID™ Alignment Indicating Device*. The Output indicator lights whenever the sensor's output relay is energized. This indicator is especially useful when a timing logic module is used and Signal and Output conditions are not concurrent.

Also located beneath the sensor's o-ring-sealed cover are controls for light/dark operate selection and Sensitivity adjustment.
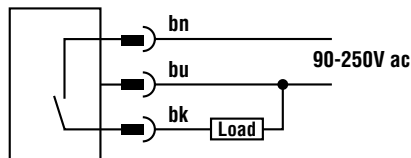
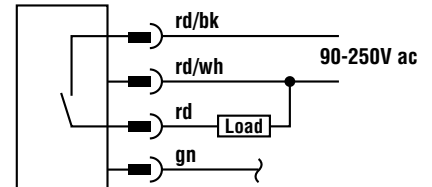* US patent no. 4356393

Q45BW22 Series Hookups
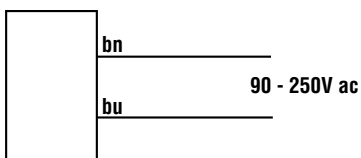
Q45BW22 Sensors with Attached Cable
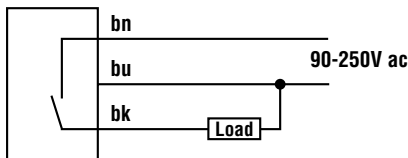
Q45BW22 Sensors with Quick-Disconnect 3-Pin Mini-Style (model suffix Q)
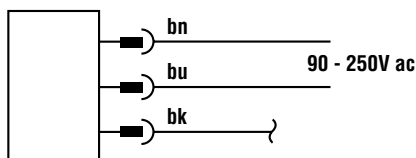

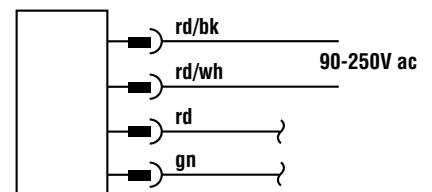**Q45BW22 Sensors with Quick-Disconnect 4-Pin Micro-Style (model suffix Q1)**

Q452E Emitter with Attached Cable

Q452E Emitter with Quick-Disconnect 3-Pin Mini-Style (model suffix Q)

Q452E Emitter with Quick-Disconnect 4-Pin Micro-Style (model suffix Q1)

Quick Disconnect (QD) Option

AC Q45BW22 Series sensors are sold with either a 2 m (6.5') or a 9 m (30') PVC-covered unterminated cable, or with a 3-pin Mini-style or 4-pin Micro-style QD cable fitting.

AC 3-pin Mini-style QD sensors are identified by the letter "Q" in their model number suffix and 4-pin Micro-style are identified by "Q1". Mating cables for QD Q45BW22 sensors are specified on page 10.

Q45BW22 Series

Accessories

Quick-Disconnect Cables

Cable: PVC jacket, polyurethane connector body; nylon coupling nut (Mini), chrome-plated brass coupling nut (Micro)
Conductors: 18 AWG (Mini), 22 or 20 AWG (Micro) high-flex stranded, PVC insulation, gold plated contacts
Temperature: -40° to +80°C (-40° to +176°F)

Style	Model	Length	Dimensions	Pin-Out (Female View)
3-Pin Mini-style Female Pin-out Straight	**MBCC-306** **MBCC-312** **MBCC-330**	2 m (6.5') 4 m (12') 9 m (30')	61 mm max. (2.4") 7/8-16UN-2B ø28 mm max. (1.1")	Black Wire, Blue Wire, Brown Wire
4-Pin Micro-style Female Pin-out Straight	**MQAC-406** **MQAC-415** **MQAC-430**	2 m (6.5') 5 m (15') 9 m (30')	ø15 mm (0.6") 44 mm max. (1.7") ø1/2-20UNF-2B	Red Wire, Green Wire, Red/Black Wire, Red/White Wire

Retroreflective Targets

Banner offers a wide selection of high-quality retroreflective targets. See the Accessories section of your current Banner Photoelectric Sensors catalog for complete information.

NOTE: Polarized sensors require corner cube type retroreflective targets only. Non-polarized sensors may use any retroreflective target.
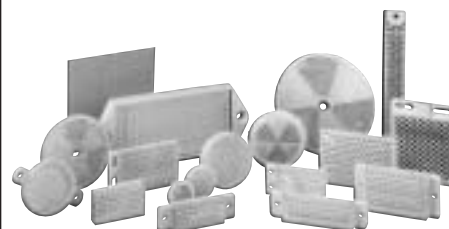
Output Timing Logic and Signal Strength Display Modules

Q45 sensors easily accept the addition of output timing logic and signal strength display functions. Display modules have a seven-element display which gives a more precise indication of excess gain than does the AID™ system LED that is standard on Q45 sensors. The modules listed below may be used with all Q45VR2 sensors. See the data sheet packed with the module for more information.

Model	Logic and/or Display Function
45LM58 **45LM58D** **45LMD**	Programmable output timing logic Programmable output timing logic plus signal strength display Signal strength display only (no timing function)

Banner Engineering Corp. • Minneapolis, MN U.S.A.
www.bannerengineering.com • Tel: 763.544.3164

Mounting Brackets

Model	Description	Dimensions
SMB30C	• 30 mm split clamp, black PBT bracket • Stainless steel mounting hardware included	
SMB30MM	• 30 mm, 11-gauge, stainless steel bracket with curved mounting slots for versatility and orientation • Clearance for M6 ($^1/_4$") hardware	
SMB30SC	• 30 mm swivel, black PBT bracket • Stainless steel mounting hardware included	

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⚠ **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.