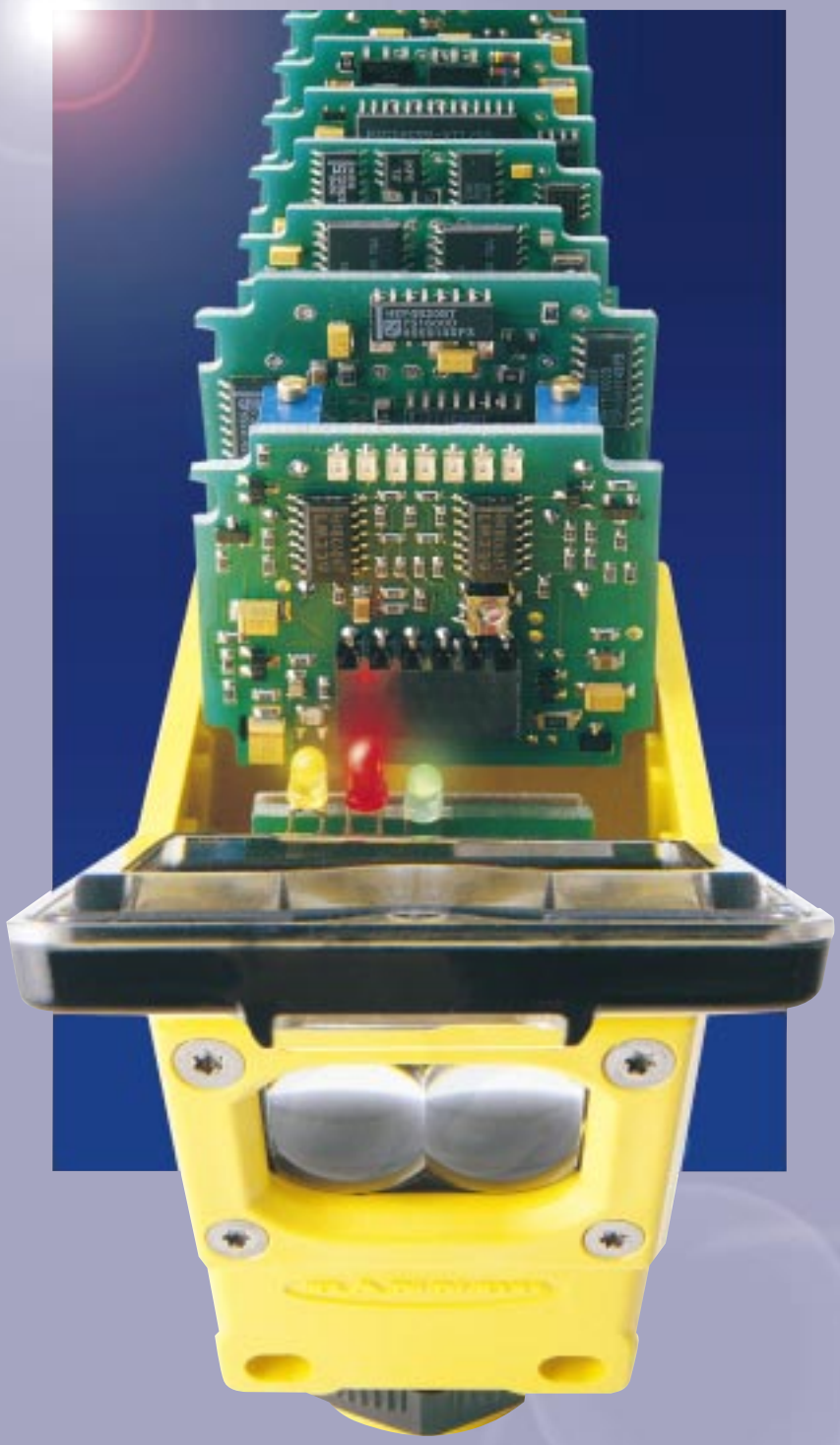


OMNI-BEAM

Q45

UPGRADABLE

Photoelectric Sensor

Q45 The sensor you'll use today. The sensor you must have tomorrow.

A basic low-cost sensor. The standard Q45 is a basic on-off sensor available at a very low price. But even in its most basic form, the Q45 makes your job easier with a host of advanced standard features including three LED's for "power", "signal" and "output" indication, plus patented diagnostics that alert you of output overloads, output short circuits and marginal sensing conditions. The Q45 even measures exact signal strength with Banner's exclusive AID™ system, so you'll be better informed on how your sensors are performing.

An advanced, full-featured sensor. Because of its unique, upgradable design, the Q45 can instantly become the most advanced photoelectric sensor you can buy. Simply raise the unit's built-in, hinged cover, and insert circuit board modules for advanced functions including timers, logic, bus systems and Banner's patented, 7-segment, LED bargraph display of received signal strength. And you can also add any other functions you need to meet your specific requirements.



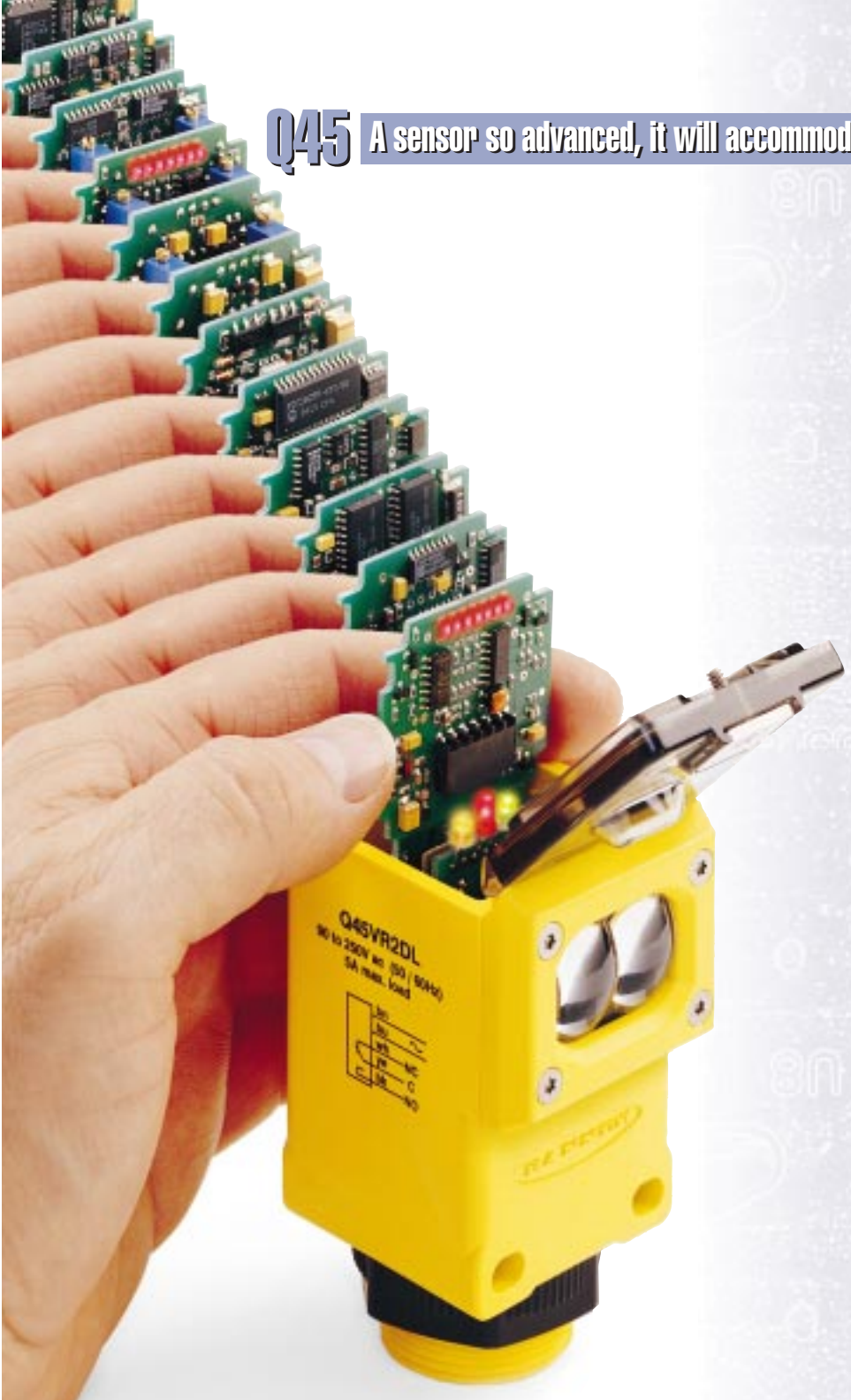
A sensor compatible with every fieldbus. Specify the Q45, and you can stop worrying about whether the photoelectrics you buy today will be compatible with the fieldbus you need tomorrow. And you don't need to feel pressured by the fieldbus suppliers to specify their sensors and their bus. With the Q45, you can instantly upgrade it, at any time, to any sensor/actuator bus, including DeviceNet™, SDS™, Seriplex™, CAN, ASI, PROFIBUS™ and others. You're not boxed in.

A sensor compatible with the future. Because of its patented design, the Q45 is the only photoelectric sensor with an eye on the future. As new technologies are available, the Q45 will be able to accommodate them. New circuit board modules will continually be developed to meet your sensing needs. To meet your unique control requirements, custom circuit board modules can also be developed for your special applications. This makes the Q45 the best sensor investment you can make.





Q45 A sensor so advanced, it will accommodate technologies yet to be invented.



A board for every function you need, today and tomorrow. Circuit board modules instantly plug in for delay and one-shot timers and numerous fieldbuses including DeviceNet™, SDS™ and Seriplex™ and others.

Advanced diagnostics display. Banner's patented, 7-segment, LED bargraph display of received signal strength continually tells you how your sensor is performing, making your sensitivity and alignment adjustments faster and more precise. Banner's advanced, diagnostic bargraph display can be purchased separately or combined on the same module with logic functions.

A slot for the future. Rapidly changing control technologies can be easily accommodated in the Q45 allowing an instant upgrade in performance by simply installing the latest circuit board module in the Q45's patented expansion slot. Custom modules can also be developed for your special requirements.

Patented diagnostic LED's, standard.

- Raised LED's indicate "power", "signal" and "output" operation.
- "Power" indicator flashes in the event of an output overload or output short circuit.
- "Signal" LED pulses at a rate proportional to the strength of the received light signal, making setup and maintenance easier. Operator is immediately alerted of a weakened signal due to operational or environmental factors.

Electrical interfaces.

- 0-30V dc sensors have both NPN (sinking) and PNP (sourcing) solid-state outputs.
- NAMUR intrinsically-safe DC models for potentially-explosive environments.
- 90-250V ac sensors have protected solid state relay output or economical SPDT electromechanical relay output for high switching capacity.

Hinged VISI-DOME™ Cover. Transparent, hinged Lexan® cover opens to adjust sensitivity and logic, and to insert circuit board modules. Raised dome makes LED's visible from all sides. Cover is O-ring sealed allowing the unit to be rated NEMA 6P (IEC IP67), withstanding washdowns to 1200 psi.

Q45 Down to earth features that save you money on the factory floor.



All sensing modes. Choose from five sensing modes including:

- Opposed (beam break) mode for long ranges up to 200 feet or heavy contamination.
- Regular or polarized retroreflective mode for medium ranges up to 30 feet using a retroreflector.
- Laser retroreflective for ranges up to 150 feet.
- Short or long-range diffuse (proximity) mode for ranges to 18 inches or 6 feet.
- Convergent mode for precise sensing distances of 1.5 or 4 inches.
- Fiber optic mode for use with glass or plastic fibers.

Easier setup, alignment and monitoring. Advanced features are standard on all Q45 sensors. Patented AID™ system gives the operator a constant visual indication of received signal strength during installation and operation. Operator is alerted immediately of a weakened signal due to operational or environmental factors. Three, raised LED's give the following indications:

- Power On
- Output Energized
- Signal Received
- Signal Strength
- Output Overload
- Output Short Circuit

Prewired or "plug and play" quick disconnects. Q45 sensors are available with 6½ or 30 foot attached cable or easy to install, 4-pin quick disconnect (QD) connector. QD connectors save time in installation and wiring, eliminating wire terminations and wiring errors. Mating cables are available in straight or right angle designs in mini, euro and micro styles.



Flexible, modular timing functions. Timing modules can be added at any time and four simple switches on the module program the output logic function, the timing range and the output state. Accurate timing adjustments are assured by precise 15-turn clutched potentiometer. Timing functions include:

- On-delay
- Off-delay
- On/Off delay
- One-shot
- Delayed One-shot



Output Protection. Q45 sensors offer complete protection against many common electrical problems including the following conditions:

- False Pulse on Powerup
- Inductive Load Transients
- Polarity Reversal
- Output Overload
- Short Circuited Output

Q45 A sensor that meets your specific application requirements.



Glass and plastic fiber optics. Banner has the widest range of fiber optics available, and they can all be used with the Q45. Reach places inaccessible to conventional sensors, withstand high temperatures, corrosive materials, extreme moisture, high vibration, and electrical noise. Inexpensive plastic fibers can be easily cut to length during installation, and are extremely flexible, allowing use for applications requiring articulated or reciprocating motion.



Rugged, NEMA 6P environmental protection. Q45 sensors feature rugged VALOX® thermoplastic polyester housings and O-ring sealed Lexan® top covers to withstand severe



environments including heavy washdown exceeding 1200 psi pressure. Unit is rated NEMA 6P and IEC IP67.

NAMUR intrinsically safe models. Q45 NAMUR sensors are ideal for potentially explosive environments. These special sensor models meet DIN 19 234 safety requirements, and are available in all sensing modes. They are designed to be used with approved switching amplifiers with intrinsically-safe input circuits, and can eliminate the need for extremely heavy, explosion-proof enclosures.

Flexible mounting options. A wide variety of mounting options for the Q45 provide the best access to your applications.

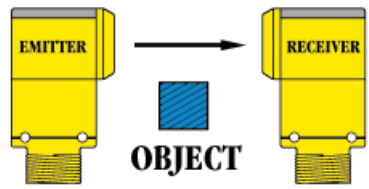
- Through hole mounting uses the Q45's threaded base and mounting nuts.
- Swivel mount allows positioning the sensor at any angle.
- Split clamp bracket mounts flat without swivel.
- Angled bracket has curved mounting slots for versatility in mounting and orientation.

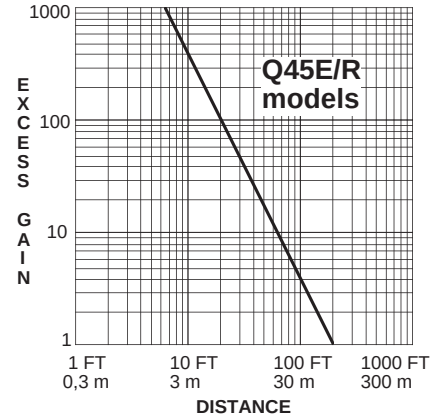
Long range, ultra-precise laser sensors. Special Q45 sensors with Class II laser diode combine the easy alignment of a visible-light sensor with the extremely long-range and very narrow, precise sensing beam of a laser light source. Now you can sense very small objects at long range with complete precision.



Q45 Opposed Mode Sensors







Curve does not apply to NAMUR sensors.

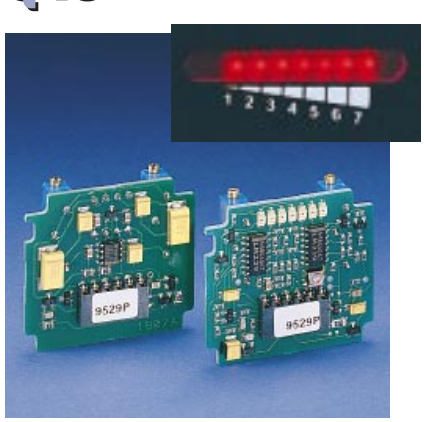
OPPOSED MODE

DC NAMUR AC

Sensor Model	Function	Termination: Cable or quick disconnect (QD)	Supply Voltage	Receiver Output				Emitter Beam	Sensing Range
				Type	Rating	Response	Repeatability		
Q456E	Emitter	4-wire 6-ft cable†	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.25 ms	Infrared LED 880nm	200 feet (60 m)
Q456EQ	Emitter	4-pin mini QD							
Q456EQ5	Emitter	4-pin euro QD							
Q45BB6R	Receiver	4-wire 6-ft cable†							
Q45BB6RQ	Receiver	4-pin mini QD							
Q45BB6RQ5	Receiver	4-pin euro QD							
*Q45X6EQ	Emitter	5-pin mini QD							
*Q45XB6RQ	Receiver	5-pin mini QD							
Q459E	Emitter	2-wire 6-ft cable†	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	2 ms	0.25 ms	Infrared LED 880nm	20 feet (6 m)
Q459EQ	Emitter	4-pin euro QD							
Q45AD9R	Receiver	2-wire 6-ft cable†							
Q45AD9RQ	Receiver	4-pin euro QD							
Q452E	Emitter	2-wire 6-ft cable†	90 to 250V ac				0.25 ms	Infrared LED 880nm	200 feet (60 m)
Q452EQ	Emitter	3-pin mini QD							
Q452EQ1	Emitter	4-pin micro QD							
Q45VR2R	Receiver	5-wire 6-ft cable†		SPDT e/m relay	5 A max.	15 ms			
Q45VR2RQ	Receiver	5-pin mini QD							
Q45BW22R	Receiver	3-wire 6-ft cable†		SPST solid-state relay	300 mA max.	2 ms			
Q45BW22RQ	Receiver	3-pin mini QD							
Q45BW22RQ1	Receiver	4-pin micro QD							

*NOTE: Q45X models may be used on sensor bus networks with addition of an optional plug-in expansion card. †NOTE: 30-foot cables are available.

Q45 Expansion Cards

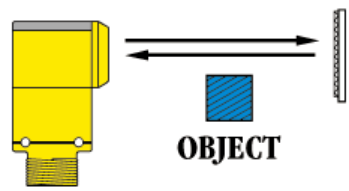


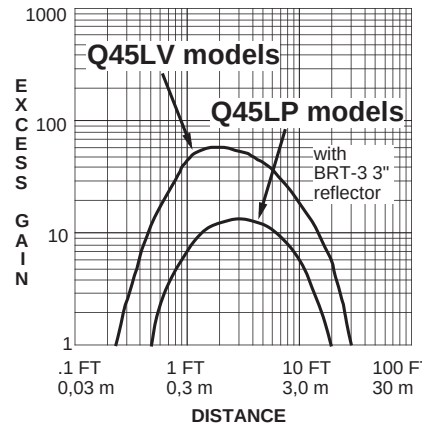
Card Model	Function
45LM5	Delay logic: on-delay, off-delay, or on/off delay
45LM8	Pulse logic: one-shot or delayed one-shot
45LM5D	Delay logic, plus signal strength display
45LM8D	Pulse logic, plus signal strength display
45LMD	Signal strength display, only (no timing function)

Card Model	Sensor bus protocol
45AS1	ASI
45DN1	DeviceNet™
45SD1	SDS™
45SP1	Seriplex®

Q45 Retroreflective Mode Sensors







Curves do not apply to laser sensors.

RETROREFLECTIVE MODE

DC NAMUR AC

Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6LL Q45BB6LLQ Q45BB6LV Q45BB6LVQ Q45BB6LVQ5 *Q45XB6LVQ	5-wire 6-ft cable† 5-pin mini QD 4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Visible red laser 670nm	9 in to 150 ft. (0,2 to 45m) with 3" dia. reflector
							Visible red LED 680nm	3 in to 30 ft. (0,08 to 9m) with 3" dia. reflector
Q45AD9LV Q45AD9LVQ	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Visible red LED 680nm	3 in to 30 ft. (0,08 to 9m) with 3" dia. reflector
Q45VR2LV Q45VR2LVQ Q45BW22LV Q45BW22LVQ Q45BW22LVQ1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Visible red LED 680nm	3 in. to 30 ft. (0,08 to 9m) with 3" dia. reflector
			SPST solid-state relay	300 mA max.	2 ms			

POLARIZED RETROREFLECTIVE MODE

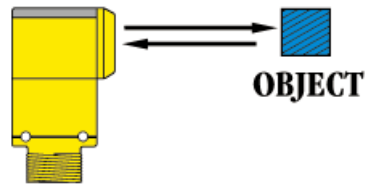
DC NAMUR AC

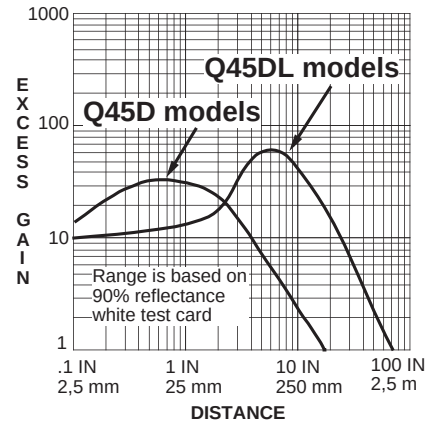
Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6LLP Q45BB6LLPQ Q45BB6LP Q45BB6LPQ Q45BB6LPQ5 *Q45XB6LPQ	5-wire 6-ft cable† 5-pin mini QD 4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Visible red laser 670nm	9 in to 100 ft. (0,2 to 30m) with 3" dia. reflector
							Visible red LED 680nm	6 in to 20 ft. (0,15 to 6m) with 3" dia. reflector
Q45AD9LP Q45AD9LPQ	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Visible red LED 680nm	6 in to 20 ft. (0,15 to 6m) with 3" dia. reflector
Q45VR2LP Q45VR2LPQ Q45BW22LP Q45BW22LPQ Q45BW22LPQ1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Visible red LED 680nm	6 in. to 20 ft. (0,15 to 6m) with 3" dia. reflector
			SPST solid-state relay	300 mA max.	2 ms			

*NOTE: Q45X models may be used on sensor bus networks with addition of an optional plug-in expansion card. †NOTE: 30-foot cables are available.

Q45 Diffuse Mode Sensors







Curves do not apply to NAMUR sensors.

SHORT-RANGE DIFFUSE (Proximity) MODE

DC NAMUR AC

Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6D Q45BB6DQ Q45BB6DQ5 *Q45XB6DQ	4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Infrared LED 880nm	18 in. (45 cm) using 90% reflectance test card
Q45AD9D Q45AD9DQ	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Infrared LED 880nm	12 in. (30 cm) using 90% reflectance test card
Q45VR2D Q45VR2DQ Q45BW22D Q45BW22DQ Q45BW22DQ1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Infrared LED 880nm	18 in. (45 cm) using 90% reflectance test card
			SPST solid-state relay	300 mA max.	2 ms			

LONG-RANGE DIFFUSE (Proximity) MODE

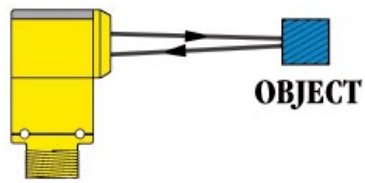
DC NAMUR AC

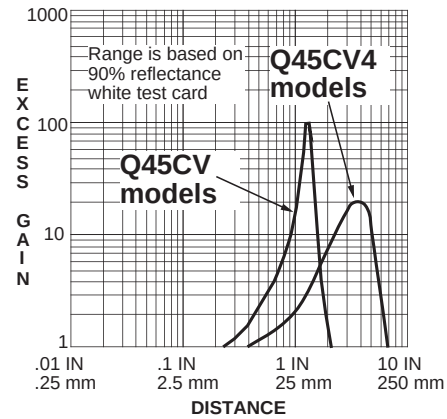
Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6DL Q45BB6DLQ Q45BB6DLQ5 *Q45XB6DLQ	4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Infrared LED 880nm	6 ft. (1,8 m) using 90% reflectance test card
Q45AD9DL Q45AD9DLQ	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Infrared LED 880nm	42 in. (107 cm) using 90% reflectance test card
Q45VR2DL Q45VR2DLQ Q45BW22DL Q45BW22DLQ Q45BW22DLQ1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Infrared LED 880nm	6 ft. (1,8 m) using 90% reflectance test card
			SPST solid-state relay	300 mA max.	2 ms			

*NOTE: Q45X models may be used on data bus networks with addition of an optional plug-in expansion card. †NOTE: 30-foot cables are available.

Q45 Convergent Mode Sensors







CONVERGENT BEAM MODE: 1.5-inch focus

DC NAMUR AC

Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6CV Q45BB6CVQ Q45BB6CVQ5 *Q45XB6CVQ	4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Visible red LED 680nm	Peak excess gain at 1.5 inches (38 mm)
Q45AD9CV Q45AD9CVQ	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Visible red LED 680nm	Peak excess gain at 1.5 inches (38 mm)
Q45VR2CV Q45VR2CVQ Q45BW22CV Q45BW22CVQ Q45BW22CVQ1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Visible red LED 680nm	Peak excess gain at 1.5 inches (38 mm)
			SPST solid-state relay	300 mA max.	2 ms			

CONVERGENT BEAM MODE: 4-inch focus

DC NAMUR AC

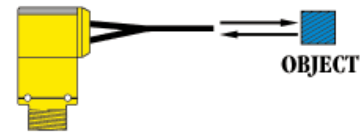
Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6CV4 Q45BB6CV4Q Q45BB6CV4Q5 *Q45XB6CV4Q	4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Visible red LED 680nm	Peak excess gain at 4 inches (100 mm)
Q45AD9CV4 Q45AD9CV4Q	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Visible red LED 680nm	Peak excess gain at 4 inches (100 mm)
Q45VR2CV4 Q45VR2CV4Q Q45BW22CV4 Q45BW22CV4Q Q45BW22CV4Q1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Visible red LED 680nm	Peak excess gain at 4 inches (100 mm)
			SPST solid-state relay	300 mA max.	2 ms			

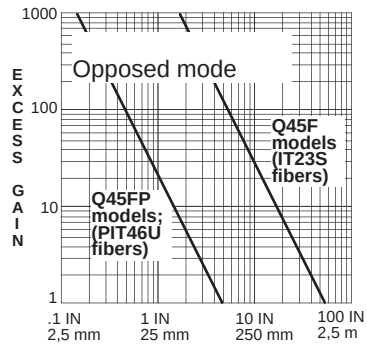
*NOTE: Q45X models may be used on sensor bus networks with addition of an optional plug-in expansion card. †NOTE: 30-foot cables are available.

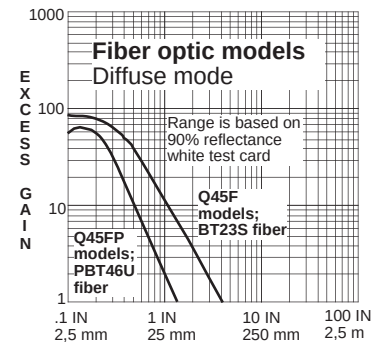
Q45 Fiber Optic Mode Sensors











Curves do not apply to NAMUR sensors.

FIBER OPTIC MODE: Glass fibers

DC NAMUR AC

Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6F Q45BB6FQ Q45BB6FQ5 *Q45XB6FQ	4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Infrared LED 880nm	Opposed to 54 in. (1,4 m) using (2) IT23S fibers Diffuse to 4 in. (10 cm) using BT23S fiber
Q45AD9F Q45AD9FQ	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Infrared LED 880nm	Opposed to 22 in. (56 cm) Diffuse to 1.8 in. (5 cm)
Q45VR2F Q45VR2FQ Q45BW22F Q45BW22FQ Q45BW22FQ1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Infrared LED 880nm	Opposed to 54 in. (1,4 m) using (2) IT23S fibers Diffuse to 4 in. (10 cm) using BT23S fiber
			SPST solid-state relay	300 mA max.	2 ms			

FIBER OPTIC MODE: Plastic fibers

DC NAMUR AC

Sensor Model	Termination: Cable or quick disconnect (QD)	Supply Voltage	Output				Beam	Sensing Range
			Type	Rating	Response	Repeatability		
Q45BB6FP Q45BB6FPQ Q45BB6FPQ5 *Q45XB6FPQ	4-wire 6-ft cable† 4-pin mini QD 4-pin euro QD 5-pin mini QD	10 to 30V dc	Bipolar: NPN + PNP	250 mA each output	2 ms	0.5 ms	Visible red LED 660nm	Opposed to 5 in. (13 cm) using .040 in. dia. fibers Diffuse to 1.7 in. (4,4 cm) using .040 in. dia. fiber
Q45AD9FP Q45AD9FPQ	2-wire 6-ft cable† 4-pin euro QD	5 to 15V dc	NAMUR	≤1.1 mA to ≥2.1 mA	5 ms	0.5 ms	Visible red LED 660nm	Opposed to 3.5 in. (9 cm) Diffuse to 1.2 in. (3 cm)
Q45VR2FP Q45VR2FPQ Q45BW22FP Q45BW22FPQ Q45BW22FPQ1	5-wire 6-ft cable† 5-pin mini QD 3-wire 6-ft cable† 3-pin mini QD 4-pin micro QD	90 to 250V ac	SPDT e/m relay	5 A max.	15 ms	0.5 ms	Visible red LED 660nm	Opposed to 5 in. (13 cm) using .040 in. dia. fibers Diffuse to 1.7 in. (4,4 cm) using .040 in. dia. fiber
			SPST solid-state relay	300 mA max.	2 ms			

*NOTE: Q45X models may be used on sensor bus networks with addition of an optional plug-in expansion card. †NOTE: 30-foot cables are available.

Q45 General Specifications & Dimensions

CONSTRUCTION: Molded VALOX® thermoplastic polyester housing. Molded acrylic lenses, stainless steel hardware. O-ring sealed transparent Lexan® top cover. NEMA 6P (IEC IP67) rated (1200 psi washdown).

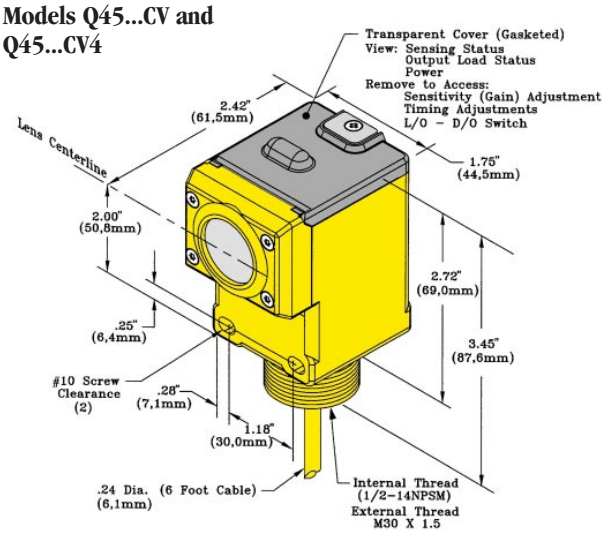
CABLE: Sensors may be supplied with either a PVC-covered cable, or an integral quick-disconnect connector (see selection tables).

ADJUSTMENTS: Multi-turn sensitivity (GAIN) adjustment. Internal switch for selection of LIGHT or DARK operate mode (except NAMUR). Optional logic modules have adjustable timing (except NAMUR).

STATUS INDICATORS: POWER (green) LED lights with power applied. SIGNAL (red) LED with AID™ system (except NAMUR) lights when sensor sees its modulated light source, and pulses at a rate proportional to received signal strength. LOAD (yellow) LED (except NAMUR) lights when output is energized. Optional 7-element signal strength display (except NAMUR).

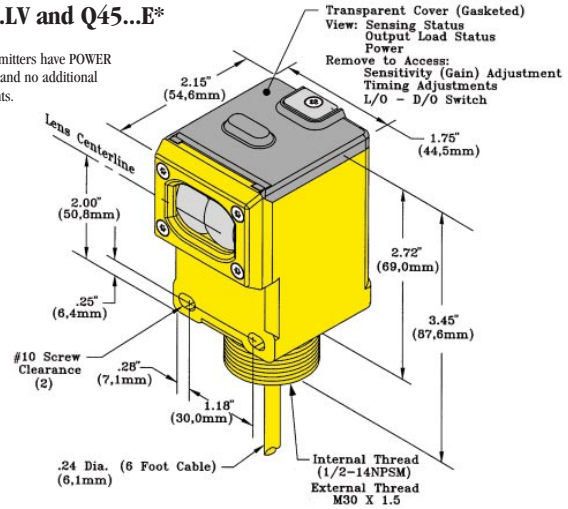
DIMENSIONS: Cabled sensors shown. Add 0.5" (12mm) to overall height for models with quick-disconnect cable fitting.

Models Q45...CV and Q45...CV4

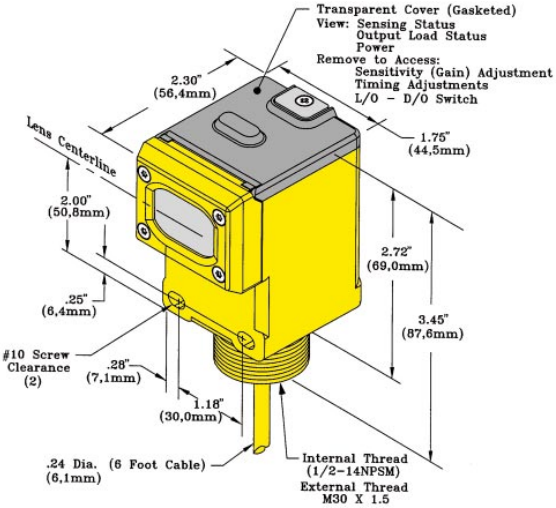


Models Q45...D, Q45...DL, Q45...R, Q45...LV and Q45...E*

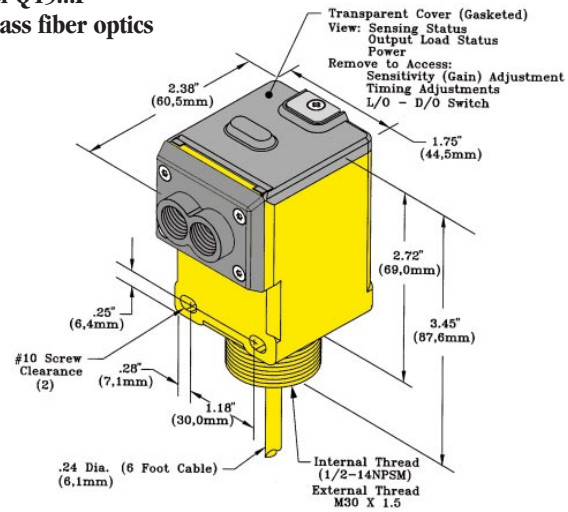
*Q456E emitters have POWER LED only, and no additional adjustments.



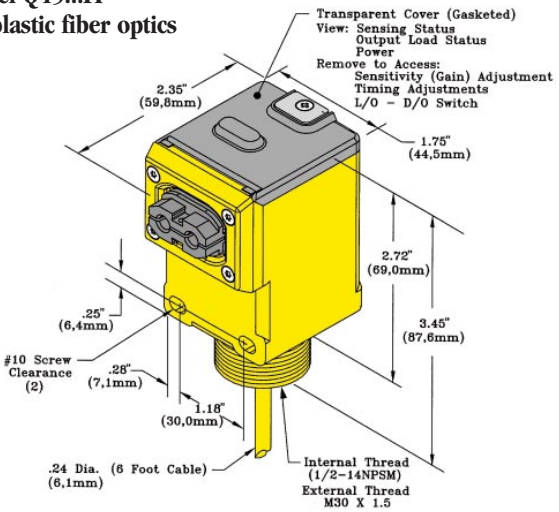
Model Q45...LP



Model Q45...F for glass fiber optics



Model Q45...FP for plastic fiber optics



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*Source: Control Engineering Manufacturer Recognition Study, 15th Edition.



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