Miniature Sensors

WORLD-BEAM® Q12 page 46

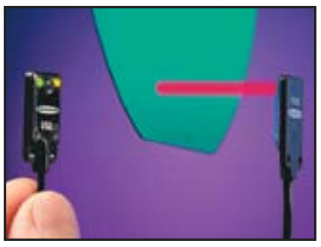
- Universal housing provides consistent mounting regardless of sensing modes.
- Powerful sensor fits extremely confined areas.
- Opposed, retroreflective and fixed-field sensing modes are available.
- Three fixed-field models offer precise cutoff background suppression.
- Overmolded design delivers enhanced durability and shielding.
- Solid-state outputs are bipolar (NPN and PNP).
- Models with PFA jacket are available for wet or corrosive environments.

VS1 page 58

- Convergent beam sensors
- 10 or 20 mm convergent point
- Repeatability of 250 microseconds

T8 page 49

- 8 mm thread ultra-miniature sensor
- Convenient T-shaped package
- 50 or 100 mm diffuse range
- Powerful 2 m opposed range



VS2 page 61

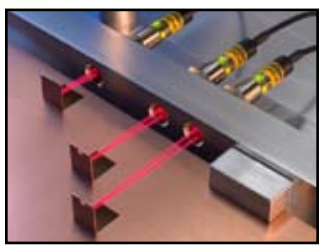
- Ultra-thin opposed and convergent
- Flat front mounting
- Range up to 3 m

MINI-BEAM®2 page 52

- Single push-button programming
- Wrap-around status indicators
- 12 mm threaded barrel or side mount
- One-third the size of original MINI-BEAM®

VS3 page 64

- Advanced coaxial lens design
- Range up to 1200 mm
- Accurate detection of shiny objects
- Sensing up to the face of retroreflective models



M12 page 55

- 12 mm threaded metal barrel
- Ideal replacement for range limited proximity sensors
- Opposed, retroreflective, diffuse and fixed-field modes
- Excellent background suppression for fixed-field models

VS4 page 67

- Low-profile, long-range sensing
- Unique, optically correct lens for narrow side light emission
- Opposed mode, 1000 mm range
- Rugged, overmolded housing
- Optional beam-shaping apertures

WORLD-BEAM®

Q12 Series
Universal Sensors

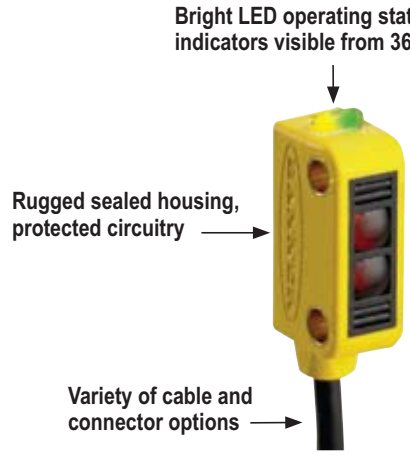
- Sets a new industry standard for ultra-miniature photoelectric sensors
- Features a housing as small as 22 by 8 by 12 mm with bipolar NPN/PNP outputs
- Delivers powerful sensing performance in extremely confined areas
- Rated IP67 for use in the widest range of locations and applications
- Mounts directly on or inside manufacturing equipment, with robust metal-lined mounting holes consistently located on all models
- Uses unique overmolded design for enhanced durability and shielding
- Available in dark- or light-operate models
- Features models with liquid-tight PFA jackets for use in wet and corrosive environments
- Provides excellent crosstalk avoidance circuitry for multiple sensor applications

OPPOSED
RETRO
POLAR RETRO
FIXED-FIELD
BRACKETS
PAGE 370
QD CABLES
3- or 4-Pin Pico or 4-pin Euro
PAGE 411 & 412
REFLECTORS
PAGE 425
APERTURES
PAGE 444

Q12 Opposed
- 2 m range
- 1.3 millisecond response time
- Embedable in confined spaces

Q12 Retroreflective
- 700 microsecond response time
- Range of 1.5 m
- Ideal for difficult to access areas and detection of transparent objects (polarized retroreflective models)

Q12 Fixed-Field
- Range of 15, 30 or 50 mm, depending on model
- Excellent background cutoff
- Low color sensitivity

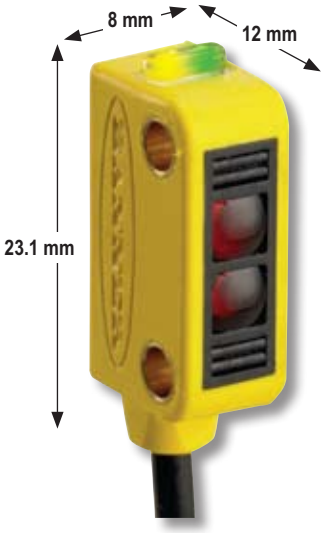


PFA-jacketed chemical-resistant models are ideal in a wide variety of level control, cleaning, etching and other chemical processes.

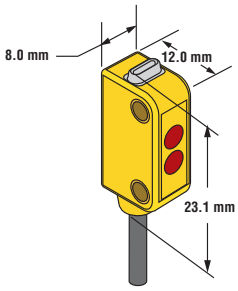
WORLD-BEAM® Q12 Sensors

- *Bright, visible red (640 nm) sensing beam*
- *Solid-state bipolar outputs: one current sourcing (PNP) and one current sinking (NPN)*
- *Integral cable or 150 mm pigtail with threaded Pico-style quick-disconnect*
- *Light operate (LO) or dark operate (DO) by model*
- *PFA-jacketed models for easy cleanup of the sensor optics*

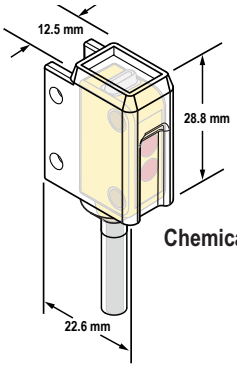
MORE INFO ONLINE Detailed Dimensions



Opposed, Retroreflective and Fixed-field Models
Suffix E, R, LV and FF



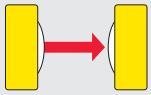
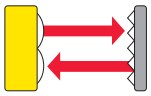
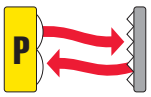
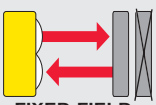
Polarized Retroreflective Models
Suffix LP



Chemical-resistant Models
Suffix CR

WORLD-BEAM® Q12, 10-30V dc

MORE INFO ONLINE Download PDF

Models†	Sensing Mode/LED*	Range**	Cable***	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q126E Emitter	 OPPOSED	2 m	2 m	—	EGCO-1 (p. 468)	BPO-1 (p. 492)	119223
Q126EQ Emitter			Threaded 4-Pin Pico Pigtail QD				
Q12AB6R			2 m	Bipolar LO			
Q12AB6RQ			Threaded 4-Pin Pico Pigtail QD				
Q12RB6R			2 m	Bipolar DO			
Q12RB6RQ			Threaded 4-Pin Pico Pigtail QD				
Q12AB6LV	 RETRO	1.5 m	2 m	Bipolar LO	EGCR-1 (p. 471)	BPR-1 (p. 495)	
Q12AB6LVQ			Threaded 4-Pin Pico Pigtail QD				
Q12RB6LV			2 m	Bipolar DO			
Q12RB6LVQ			Threaded 4-Pin Pico Pigtail QD				
Q12AB6LP	 POLAR RETRO	1 m	2 m	Bipolar LO	EGCR-2 (p. 471)	BPR-2 (p. 495)	
Q12AB6LPQ			Threaded 4-Pin Pico Pigtail QD				
Q12RB6LP			2 m	Bipolar DO			
Q12RB6LPQ			Threaded 4-Pin Pico Pigtail QD				
Q12AB6FF15	 FIXED-FIELD	15 mm Cutoff	2 m	Bipolar LO	EGCF-1 (p. 482)	—	
Q12AB6FF15Q			Threaded 4-Pin Pico Pigtail QD				
Q12RB6FF15			2 m	Bipolar DO			
Q12RB6FF15Q			Threaded 4-Pin Pico Pigtail QD				

More on next page

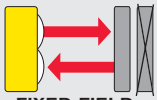
* Visible Red LED

** Retroreflective range is specified using one model BRT-60X40C retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.
PFA chemical-resistant models provide a range of 1.5 m in opposed mode and 12, 28 or 48 mm in fixed-field mode, depending on model.

*** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q126E W/30**). A model with a pigtail QD requires a mating cable (see pages 411 & 412).
Only 2 m cables are available for PFA chemical-resistant models.
QD models:
• For 4-pin 150 mm Euro-style pigtail, add suffix **Q5** (example, **Q126EQ5**). • For 3-pin 150 mm Pico-style pigtail, contact factory at 1-888-373-6767.

† For sensors with a PFA chemical-resistant jacket (opposed and fixed-field), add suffix **CR** to the 2 m model number (example, **Q12AB6FF15CR**).

WORLD-BEAM® Q12, 10-30V dc (cont'd)

Models†	Sensing Mode/LED*	Range**	Cable***	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q12AB6FF30	 FIXED-FIELD	30 mm Cutoff	2 m	Bipolar LO	EGCF-2 (p. 482)	—	119223
Q12AB6FF30Q			Threaded 4-Pin Pico Pigtail QD				
Q12RB6FF30			2 m	Bipolar DO			
Q12RB6FF30Q			Threaded 4-Pin Pico Pigtail QD				
Q12AB6FF50		50 mm Cutoff	2 m	Bipolar LO	EGCF-3 (p. 482)	—	
Q12AB6FF50Q			Threaded 4-Pin Pico Pigtail QD				
Q12RB6FF50			2 m	Bipolar DO			
Q12RB6FF50Q			Threaded 4-Pin Pico Pigtail QD				

* Visible Red LED

** PFA chemical-resistant models provide a range of 1.5 m in opposed mode and 12, 28 or 48 mm in fixed-field mode, depending on model.

*** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q126E W/30**). A model with a pigtail QD requires a mating cable (see pages 411 & 412). Only 2 m cables are available for PFA chemical-resistant models.

QD models:

• For 4-pin 150 mm Euro-style pigtail, add suffix **Q5** (example, **Q126EQ5**). • For 3-pin 150 mm Pico-style pigtail, contact factory at 1-888-373-6767.

† For sensors with a PFA chemical-resistant jacket (opposed and fixed-field), add suffix **CR** to the 2 m model number (**example, Q12AB6FF30CR**).

WORLD-BEAM® Q12 Specifications

Sensing Beam	640 nm visible red
Supply Voltage and Current	10 to 30V dc (10% max. ripple) @ 20 mA max. current
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** One NPN (current sinking) and one PNP (current sourcing); light operate (LO) or dark operate (DO), depending on model
Output Rating	50 mA total across both outputs with overload and short circuit protection **OFF-state leakage current:** **NPN:** 200 µA **PNP:** 10 µA **ON-state saturation voltage:** **NPN:** 1.25V @ 50 mA **PNP:** 1.45V @ 50 mA
Output Protection Circuitry	Protected against false pulse on power-up; short-circuit protected.
Output Response Time	**Opposed:** 1.3 milliseconds ON; 900 microseconds OFF **All others:** 700 microseconds ON/OFF NOTE: 120 milliseconds delay on power-up; outputs do not conduct during this time.
Repeatability	175 microseconds
Switching Frequency	**Opposed models:** 385 Hz **All other models:** 715 Hz
Indicators	**2 LED indicators** (Emitters-Green only)**:** **Green ON steady**—power ON **Green flashing**—output overloaded **Yellow ON steady**—light sensed **Yellow flashing**—marginal signal
Construction	**Polarized Retroreflective:** Thermoplastic elastomer housing with glass lens **Standard:** Thermoplastic elastomer housing with polycarbonate lens **Chemical-resistant:** Housing encased in PFA jacket; cable encased in 3/16" O.D. PFA tubing.
Environmental Rating	**Standard:** IEC IP67 **Chemical-resistant:** IEC IP67 and 1200 psi washdown NEMA ICS 5, Annex F-2002
Connections	**Standard:** 2 m or 9 m attached PVC cable, or 150 mm pigtail with threaded 4-pin Pico-style (**Q**) or 4-pin Euro-style (**Q5**) quick-disconnect fitting. QD cables are ordered separately. See pages 411 & 412. Contact factory for 150 mm pigtail with threaded 3-pin Pico QD. **Chemical-resistant:** 2 m attached cable encased in 3/16" O.D. PFA tubing
Operating Conditions	**Temperature:** -20° to +55° C **Storage temperature:** -30° to +75° C **Relative humidity:** 95% max. @ 50° C (non-condensing)
Certifications	CE c UL us
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC04 (p. 520)

T8

8 mm Threaded-Mount Right-Angle Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Ideal for presence sensing in small areas previously accessible only to remote sensors and fiber optic cable
- Can replace range-limited 8 mm threaded-mount inductive proximity sensors
- Offers visible sensing beam
- Available in dark- or light-operate models
- Available with integral cable or 150 mm pigtail quick-disconnect
- Offered in opposed mode with 2 m range or diffuse mode with 50 and 100 mm ranges

OPPOSED
DIFFUSE
BRACKETS
PAGE 370
QD CABLES
3-Pin Threaded Pico
PAGE 410

T8 Sensors

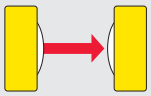
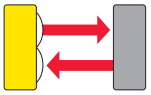
- *Visible red sensing beam*
- *Integral cable or 150 mm pigtail with threaded Pico-style quick-disconnect*
- *Bright LED output indicator on backside of housing*

MORE INFO ONLINE Detailed Dimensions

Opposed and Diffuse Models
Suffix E, R and D

T8, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
T86EV Emitter	 OPPOSED	2 m	2 m	—	EGCO-2 (p. 468)	BPO-2 (p. 492)	68669
T86EVQ Emitter			Threaded 3-Pin Pico Pigtail QD				
T8AN6R			2 m	NPN/LO			
T8AN6RQ			Threaded 3-Pin Pico Pigtail QD				
T8RN6R			2 m	NPN/DO			
T8RN6RQ			Threaded 3-Pin Pico Pigtail QD				
T8AP6R			2 m	PNP/LO			
T8AP6RQ			Threaded 3-Pin Pico Pigtail QD				
T8RP6R			2 m	PNP/DO			
T8RP6RQ			Threaded 3-Pin Pico Pigtail QD				
T8AN6D50	 DIFFUSE	50 mm	2 m	NPN/LO	EGCD-1 (p. 475)	BPD-1 (p. 498)	67584
T8AN6D50Q			Threaded 3-Pin Pico Pigtail QD				
T8RN6D50			2 m	NPN/DO			
T8RN6D50Q			Threaded 3-Pin Pico Pigtail QD				
T8AP6D50			2 m	PNP/LO			
T8AP6D50Q			Threaded 3-Pin Pico Pigtail QD				
T8RP6D50			2 m	PNP/DO			
T8RP6D50Q			Threaded 3-Pin Pico Pigtail QD				
T8AN6D100		100 mm	2 m	NPN/LO	EGCD-2 (p. 475)	BPD-2 (p. 498)	
T8AN6D100Q			Threaded 3-Pin Pico Pigtail QD				
T8RN6D100			2 m	NPN/DO			
T8RN6D100Q			Threaded 3-Pin Pico Pigtail QD				
T8AP6D100			2 m	PNP/LO			
T8AP6D100Q			Threaded 3-Pin Pico Pigtail QD				
T8RP6D100			2 m	PNP/DO			
T8RP6D100Q			Threaded 3-Pin Pico Pigtail QD				

* → Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **T8AN6D50 W/30**). A model with a pigtail QD requires a mating cable (see page 410).

T8 Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model. Light Operate (LO) or Dark Operate (DO), depending on model.
Output Rating	50 mA max. **OFF-state leakage current:** less than 1 µA at 24V dc **ON-state saturation voltage:** less than 0.25V at 10 mA dc; less than 0.5V at 50 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Output Response Time	1 millisecond ON; 0.5 milliseconds OFF NOTE: Maximum 100 milliseconds (150 milliseconds for Diffuse) delay on power-up; output does not conduct during this time.
Repeatability	**Opposed:** 100 microseconds **Diffuse:** 160 microseconds

More on next page

T8 Specifications (cont'd)	
Indicators	**Opposed:** Receiver has Green and Red LED Emitter has one Green LED **Green ON steady:** power ON **Green flashing:** output overloaded **Red ON steady:** light sensed **Red flashing:** marginal excess gain (1-1.5x) in light condition **Diffuse:** **Red ON steady:** light is sensed
Construction	Reinforced polycarbonate/ABS alloy housing, acrylic window with 8 mm ABS nut
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m attached cable, 3-wire with PVC outer cable jacket; or 150 mm pigtail with threaded 3-pin Pico-style quick-disconnect fitting. QD cables are ordered separately. See page 410.
Operating Conditions	**Temperature:** -20° to +55° C **Relative humidity:** 80% at 50° C (non-condensing)
Vibration and Mechanical Shock	**Vibration:** All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak **Shock:** All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
Certifications	CE
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC01 (p. 520)

MINI-BEAM®2

12 mm Threaded-Barrel Right-Angle Sensors

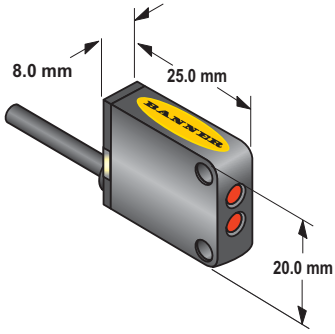
- Delivers MINI-BEAM® performance in a package 66% smaller than the original
- Available in opposed, polarized and non-polarized retroreflective, diffuse and divergent diffuse, and convergent modes
- Features easy push-button setup
- Solid-state complementary outputs

OPPOSED
RETRO
POLAR RETRO
CONVERGENT
DIFFUSE
BRACKETS PAGE 370
QD CABLES 4-Pin Pico PAGE 410
REFLECTORS PAGE 425

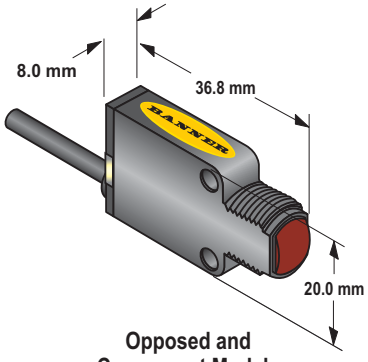
MINI-BEAM®2 Sensors

- Incremental Gain control push button
- Dual-LED multi-function indicators
- 2 m or 9 m attached cable, or 150 mm Pico-style quick-disconnect pigtail
- 12 mm threaded lens or flush mounting

Retroreflective and Diffuse Models
Suffix LV, LP and D



Divergent Diffuse Models
Suffix DBZ and W

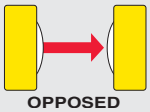
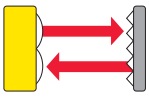
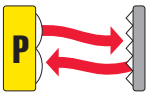
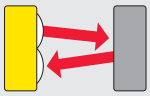
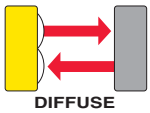
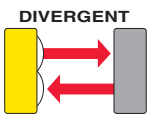


Opposed and Convergent Models
Suffix E, R and CV

MORE INFO ONLINE Detailed Dimensions

MINI-BEAM®2, 10-30V dc

MORE INFO ONLINE Download PDF

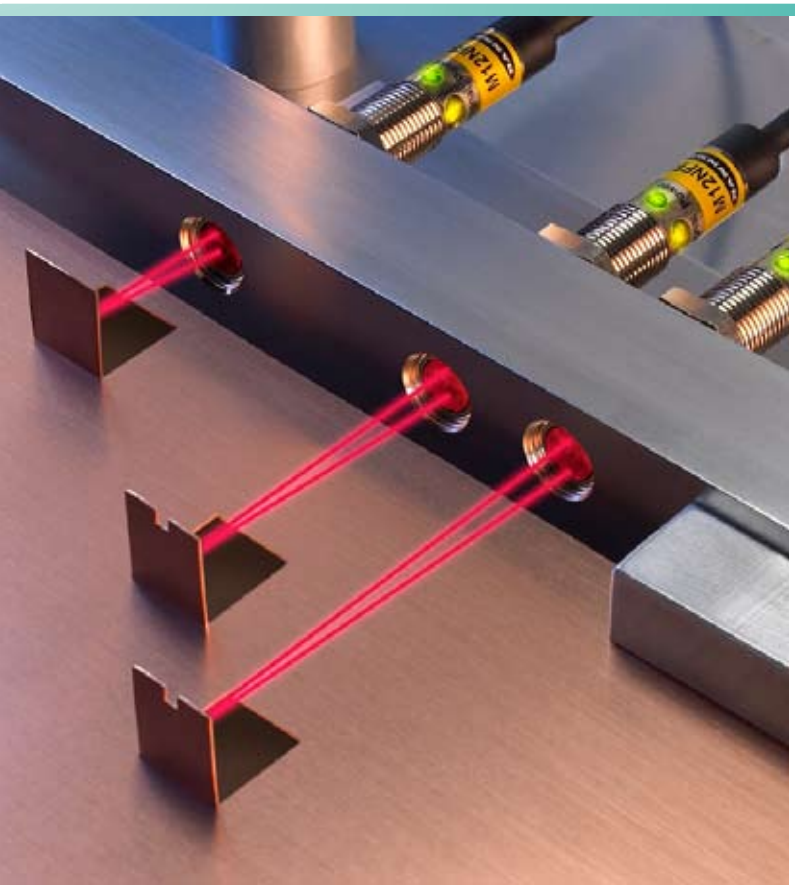
Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS126E Emitter	 OPPOSED	4 m	2 m	—	EGCO-3 (p. 468)	BPO-3 (p. 492)	59040
QS126EQ Emitter			4-pin Pico Pigtail QD				
QS12VN6R			2 m	NPN			
QS12VN6RQ			4-pin Pico Pigtail QD				
QS12VP6R			2 m	PNP			
QS12VP6RQ			4-pin Pico Pigtail QD				
QS12VN6LV	 RETRO	2 m†	2 m	NPN	EGCR-3 (p. 471)	BPR-3 (p.495)	59040
QS12VN6LVQ			4-pin Pico Pigtail QD				
QS12VP6LV			2 m	PNP			
QS12VP6LVQ			4-pin Pico Pigtail QD				
QS12VN6LP	 POLAR RETRO	1 m†	2 m	NPN	EGCR-4 (p. 471)	BPR-4 (p. 495)	
QS12VN6LPQ			4-pin Pico Pigtail QD				
QS12VP6LP			2 m	PNP			
QS12VP6LPQ			4-pin Pico Pigtail QD				
QS12VN6CV10	 CONVERGENT	10 mm	2 m	NPN	EGCC-1 (p. 478)	BPC-1 (p. 501)	59040
QS12VN6CV10Q			4-pin Pico Pigtail QD				
QS12VP6CV10			2 m	PNP			
QS12VP6CV10Q			4-pin Pico Pigtail QD				
QS12VN6CV20		20 mm	2 m	NPN	EGCC-2 (p. 478)	BPC-2 (p. 501)	
QS12VN6CV20Q			4-pin Pico Pigtail QD				
QS12VP6CV20			2 m	PNP			
QS12VP6CV20Q			4-pin Pico Pigtail QD				
QS12VN6D	 DIFFUSE	180 mm	2 m	NPN	EGCD-3 (p. 475)	BPD-3 (p. 498)	59040
QS12VN6DQ			4-pin Pico Pigtail QD				
QS12VP6D			2 m	PNP			
QS12VP6DQ			4-pin Pico Pigtail QD				
QS12VN6DBZ			2 m	NPN	EGCD-4 (p. 475)	BPD-4 (p. 498)	
QS12VN6DBZQ			4-pin Pico Pigtail QD				
QS12VP6DBZ			2 m	PNP			
QS12VP6DBZQ			4-pin Pico Pigtail QD				
QS12VN6W	 DIVERGENT DIFFUSE	50 mm	2 m	NPN	EGCD-5 (p. 475)	BPD-5 (p. 498)	
QS12VN6WQ			4-pin Pico Pigtail QD				
QS12VP6W			2 m	PNP			
QS12VP6WQ			4-pin Pico Pigtail QD				

* Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS12VN6D W/30**). A model with a pigtail QD requires a mating cable (see page 410).

† Retroreflective range is specified using a BRT-50 retroreflector. Actual sensing range may differ depending on efficiency and reflective area of the retroreflector in use. See Accessories section for more information on reflectors.

MINI-BEAM®2 Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid state complementary: NPN or PNP (current sinking or sourcing) output models available
Output Rating	150 mA max. each output at 25° C **OFF-state leakage current:** less than 10 µA @ 30V dc **ON-state saturation voltage:** less than 1V @ 10 mA; less than 2.0V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 8 milliseconds ON; 4 milliseconds OFF **All others:** 1.5 milliseconds NOTE: 500 millisecond delay on power-up, outputs do not conduct during this time
Repeatability	**Opposed:** 1 millisecond **All others:** 175 microseconds
Adjustments	One rubber-sealed push button **Hold:** max. gain **Click:** reduce gain one increment
Indicators	2 LEDs, visible from back and side of sensor: 1 Green, 1 Yellow **Green ON steady:** power ON **Amber steady:** light sensed **Green flashing rapidly 5 times:** max. gain **Green single flash:** click registered, gain reduced by one increment **Yellow/Green alternating:** minimum gain (can not reduce further)
Construction	Black polycarbonate/ABS alloy housing; totally encapsulated circuitry
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m PVC cable, or 4-pin Pico-style 150 mm pigtail QD. QD cables are ordered separately. See page 410.
Operating Conditions	**Temperature:** -20° to +55° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	CE c UL us
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC03 (p. 520)



M12

12 mm Threaded-Barrel Sensors

- Features compact 12 mm threaded metal barrel
- Available in opposed, polarized and non-polarized retroreflective, diffuse and fixed-field modes
- Provides single-turn sensitivity adjustment on opposed, retroreflective and diffuse models
- Features fixed-field models with excellent background suppression and recessed mounting
- Fully encapsulated electronics–rated IP67
- Provides excellent crosstalk avoidance circuity for diffuse, retroreflective and fixed-field models

OPPOSED
RETRO
POLAR RETRO
CONVERGENT
DIFFUSE
BRACKETS PAGE 370
QD CABLES 4-Pin Euro PAGE 412
REFLECTORS PAGE 425

M12 Sensors

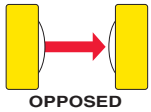
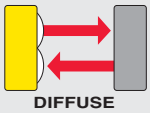
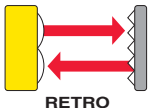
- *Visible red sensing beam for easy alignment*
- *12 mm threaded barrel*
- *10 to 30V dc with NPN or PNP output, depending on model*
- *Dual-LED multi-function indicator system*
- *2 m or 9 m attached cable, or Euro-style quick-disconnect fitting*

MORE INFO ONLINE Detailed Dimensions

Opposed, Retroreflective Diffuse and Fixed-field Models Suffix E, R, LP, LV, D and FF

M12, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
M12E Emitter	 OPPOSED	5 m	2 m	—	EGCO-4 (p. 468)	BPO-4 (p. 492)	129721
M12EQ8 Emitter			4-pin Euro QD				
M12NR			2 m	NPN			
M12NRQ8			4-pin Euro QD				
M12PR			2 m	PNP			
M12PRQ8			4-pin Euro QD				
M12ND	 DIFFUSE	400 mm	2 m	NPN	EGCD-6 (p. 475)	BPD-6 (p. 498)	
M12NDQ8			4-pin Euro QD				
M12PD			2 m	PNP			
M12PDQ8			4-pin Euro QD				
M12NLV	 RETRO	2.5 m†	2 m	NPN	EGCR-5 (p. 471)	BPR-5 (p. 495)	
M12NLVQ8			4-pin Euro QD				
M12PLV			2 m	PNP			
M12PLVQ8			4-pin Euro QD				
M12NLP	 POLAR RETRO	1.5 m†	2 m	NPN	EGCR-6 (p. 471)	BPR-6 (p. 495)	
M12NLPQ8			4-pin Euro QD				
M12PLP			2 m	PNP			
M12PLPQ8			4-pin Euro QD				
M12NFF25	 FIXED-FIELD	25 mm Cutoff	2 m	NPN	EGCF-4 (p. 482)	–	
M12NFF25Q8			4-pin Euro QD				
M12PFF25			2 m	PNP			
M12PFF25Q8			4-pin Euro QD				
M12NFF50		50 mm Cutoff	2 m	NPN	EGCF-5 (p. 482)	–	
M12NFF50Q8			4-pin Euro QD				
M12PFF50			2 m	PNP			
M12PFF50Q8			4-pin Euro QD				
M12NFF75		75 mm Cutoff	2 m	NPN	EGCF-6 (p. 482)	–	
M12NFF75Q8			4-pin Euro QD				
M12PFF75			2 m	PNP			
M12PFF75Q8			4-pin Euro QD				

* Visible red LED

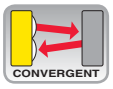
** **Cabled models**: For 9 m cable, add suffix **W/30** to the 2 m model number (example, **M12PD W/30**).
QD models: For a 4-pin 150 mm Euro-style pigtail, add suffix **Q5** (example, **M12PDQ5**). A model with a QD requires a mating cable (see page 412).

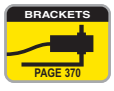
† Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the reflector used. See Accessories for more information.

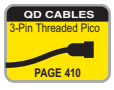
M12 Specifications	
Sensing Beam	**Fixed-field:** 680 nm visible red **All others:** 660 nm visible red
Supply Voltage and Current	10 to 30V dc (10% max. ripple) @ 20 mA max current (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Complementary (1 normally open and 1 normally closed) solid-state, NPN or PNP, depending on model
Output Ratings	100 mA total across both outputs with overload and short circuit protection **OFF-state leakage current:** **ON-state saturation voltage:** **NPN:** 200 µA **NPN:** 1.6V @ 100 mA **PNP:** 10 µA **PNP:** 3.0V @ 100 mA
Output Protection Circuitry	Protected against false pulse on power-up, short-circuit protected
Output Response Time	**Opposed:** 625 microseconds ON/375 mircoseconds OFF **All others:** 500 microseconds ON/OFF NOTE: 100 milliseconds delay on power-up; outputs do not conduct during this time.
Repeatability	**Opposed:** 85 microseconds **All others:** 95 microseconds
Indicators	**2 LED indicators**: **Green ON steady**–power ON **Green flashing**–output overload **Yellow ON steady**–light sensed **Yellow flashing**–marginal signal
Adjustments	**Fixed-field:** none **All others:** single-turn Gain (sensitivity) potentiometer
Construction	**Housing:** Nickel-plated brass **Lenses:** PMMA **Cable endcap and Gain potentiometer adjuster:** PBT
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m 4-wire PVC-jacketed cable, 4-pin integral Euro-style QD (**Q8**), or 150 mm pigtail with threaded 4-pin Euro-style quick-disconnect fitting (**Q5**), depending on model. See page 412
Operating Conditions	**Operating temperature:** –20° to +60° C **Relative humidity:** 90% max @ +50° C
Certifications	Approvals are pending, contact factory for status at 1-888-373-6767.
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC03 (p. 520)

VS1
Miniature Convergent-Mode Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available with 10 or 20 mm focal length
- Available in dark- or light-operate models
- Provides high-quality, low-cost replacement for competitive miniature sensors
- Available with integral cable or 150 mm pigtail quick-disconnect
- Includes M2 stainless steel mounting hardware; optional mounting brackets available



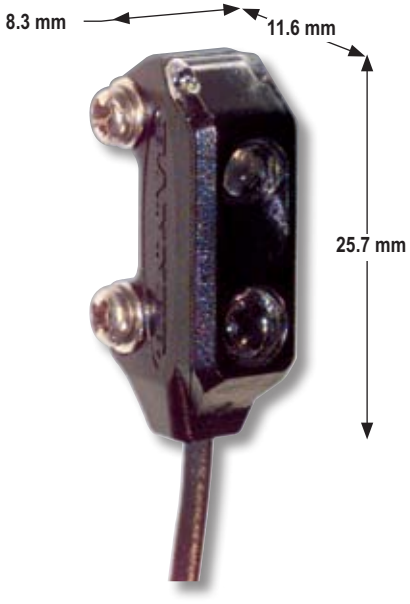




VS1 Sensors

- *Dual-LED multi-function indicators*
- *Visible red or infrared convergent sensing beam*
- *2 m or 9 m attached cable, or 150 mm pigtail with threaded 3-pin Pico-style quick-disconnect*

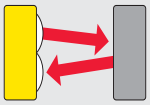
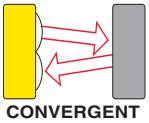
MORE INFO ONLINE Detailed Dimensions



Convergent Models Suffix CV, C1 and C2

VS1, 10-30V dc

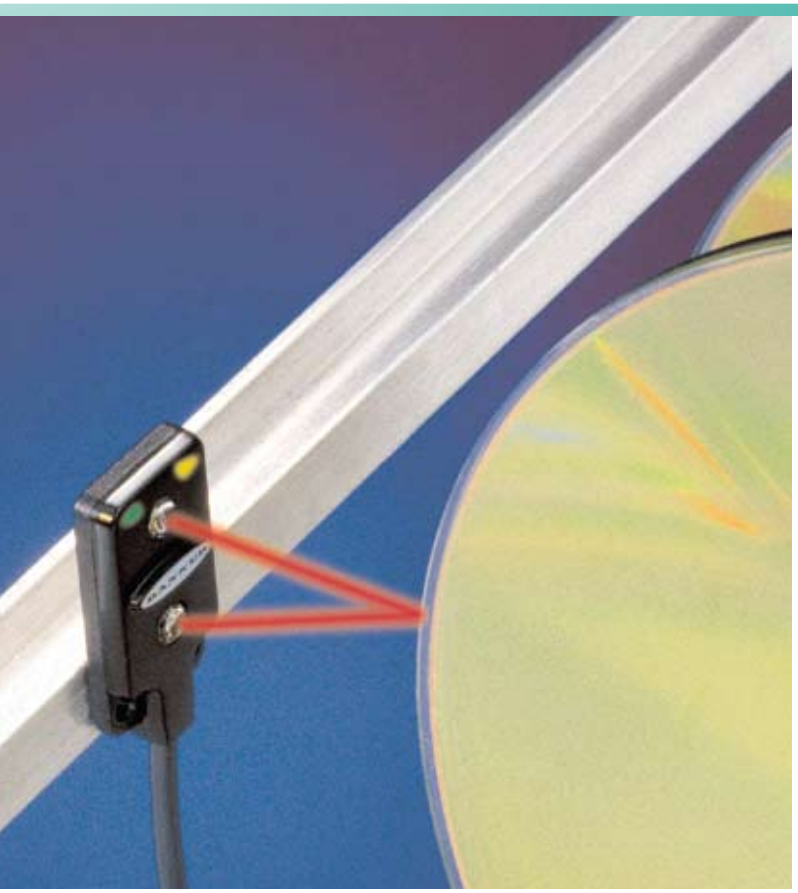
MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
VS1AN5CV10	 CONVERGENT	10 mm ±5 mm	2 m	NPN/LO	EGCC-3 (p. 478)	BPC-3 (p. 501)	56465
VS1AN5CV10Q			Threaded 3-Pin Pico Pigtail QD				
VS1RN5CV10			2 m	NPN/DO			
VS1RN5CV10Q			Threaded 3-Pin Pico Pigtail QD				
VS1AP5CV10			2 m	PNP/LO			
VS1AP5CV10Q			Threaded 3-Pin Pico Pigtail QD				
VS1RP5CV10			2 m	PNP/DO			
VS1RP5CV10Q			Threaded 3-Pin Pico Pigtail QD				
VS1AN5CV20		20 mm ±10 mm	2 m	NPN/LO	EGCC-4 (p. 478)	BPC-4 (p. 501)	
VS1AN5CV20Q			Threaded 3-Pin Pico Pigtail QD				
VS1RN5CV20			2 m	NPN/DO			
VS1RN5CV20Q			Threaded 3-Pin Pico Pigtail QD				
VS1AP5CV20			2 m	PNP/LO			
VS1AP5CV20Q			Threaded 3-Pin Pico Pigtail QD				
VS1RP5CV20			2 m	PNP/DO			
VS1RP5CV20Q			Threaded 3-Pin Pico Pigtail QD				
VS1AN5C10	 CONVERGENT	10 mm ±5 mm	2 m	NPN/LO	EGCC-5 (p. 478)	BPC-5 (p. 501)	56465
VS1AN5C10Q			Threaded 3-Pin Pico Pigtail QD				
VS1RN5C10			2 m	NPN/DO			
VS1RN5C10Q			Threaded 3-Pin Pico Pigtail QD				
VS1AP5C10			2 m	PNP/LO			
VS1AP5C10Q			Threaded 3-Pin Pico Pigtail QD				
VS1RP5C10			2 m	PNP/DO			
VS1RP5C10Q			Threaded 3-Pin Pico Pigtail QD				
VS1AN5C20		20 mm ±10 mm	2 m	NPN/LO	EGCC-6 (p. 478)	BPC-6 (p. 501)	
VS1AN5C20Q			Threaded 3-Pin Pico Pigtail QD				
VS1RN5C20			2 m	NPN/DO			
VS1RN5C20Q			Threaded 3-Pin Pico Pigtail QD				
VS1AP5C20			2 m	PNP/LO			
VS1AP5C20Q			Threaded 3-Pin Pico Pigtail QD				
VS1RP5C20			2 m	PNP/DO			
VS1RP5C20Q			Threaded 3-Pin Pico Pigtail QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **VS1AN5CV10 W/30**). A model with a pigtail QD requires a mating cable (see page 410).

VS1 Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO) models
Output Rating	50 mA max. **OFF-state leakage current:** less than 1 µA at 24V dc **ON-state saturation voltage:** less than 0.25V at 10 mA dc; less than 0.5V at 50 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Output Response Time	1 millisecond ON/OFF
Repeatability	250 microseconds
Indicators	Two LEDs: Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** light sensed **Yellow flashing:** marginal excess gain (1-1.5x) in light condition
Construction	Black ABS/polycarbonate housing with clear acrylic lens
Environmental Rating	IP54; NEMA 3
Connections	2 m or 9 m attached cable, 3-wire with PVC outer cable jacket; or 150 mm pigtail with threaded 3-pin Pico-style quick-disconnect fitting. QD cables are ordered separately. See page 410.
Operating Conditions	**Temperature:** -20° to +55° C **Relative humidity:** 80% at 50° C (non-condensing)
Application Notes	M2 stainless steel mounting hardware is included. Optional mounting brackets are available. See page 370.
Certifications	CE
Hookup Diagrams	DC01 (p. 520)



VS2
Ultra-Thin Miniature Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in opposed and convergent modes
- Ideal as a low-cost, high-quality miniaturized solution for confined areas
- Available with integral cable or 150 mm pigtail with threaded Pico-style quick-disconnect
- Available in dark- or light-operate models
- Includes M2 stainless steel mounting hardware; optional mounting brackets available

OPPOSED
CONVERGENT
BRACKETS PAGE 370
QD CABLES 3-Pin Threaded Pico PAGE 410
APERTURES PAGE 444

VS2 Sensors

- *Dual-LED multi-function indicators*
- *8 mm mounting centers*
- *Visible or infrared sensing beam*
- *2 m or 9 m attached cable, or 150 mm pigtail with threaded 3-pin Pico-style quick-disconnect*

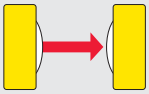
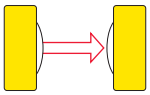
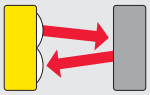
MORE INFO ONLINE Detailed Dimensions

Opposed Models
Suffix E and R

Convergent Models
Suffix C

VS2, 10-30V dc

MORE INFO ONLINE Download PDF

Models†	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
VS25EV Emitter	 OPPOSED	Optimum up to 600 mm, 1.2 m max.	2 m	—	EGCO-5 (p. 468)	BPO-5 (p. 492)	57248
VS25EVQ Emitter			Threaded 3-Pin Pico Pigtail QD				
VS2AN5R			2 m	NPN/LO			
VS2AN5RQ			Threaded 3-Pin Pico Pigtail QD				
VS2RN5R			2 m	NPN/DO			
VS2RN5RQ			Threaded 3-Pin Pico Pigtail QD				
VS2AP5R			2 m	PNP/LO			
VS2AP5RQ			Threaded 3-Pin Pico Pigtail QD				
VS2RP5R			2 m	PNP/DO			
VS2RP5RQ			Threaded 3-Pin Pico Pigtail QD				
VS25E Emitter	 OPPOSED	3.0 m	2 m	—	EGCO-6 (p. 468)	BPO-6 (p. 492)	57248
VS25EQ Emitter			Threaded 3-Pin Pico Pigtail QD				
VS2AN5R			2 m	NPN/LO			
VS2AN5RQ			Threaded 3-Pin Pico Pigtail QD				
VS2RN5R			2 m	NPN/DO			
VS2RN5RQ			Threaded 3-Pin Pico Pigtail QD				
VS2AP5R			2 m	PNP/LO			
VS2AP5RQ			Threaded 3-Pin Pico Pigtail QD				
VS2RP5R			2 m	PNP/DO			
VS2RP5RQ			Threaded 3-Pin Pico Pigtail QD				
VS2AN5CV15	 CONVERGENT	15 mm ±5 mm	2 m	NPN/LO	EGCC-7 (p. 478)	BPC-7 (p. 501)	65411
VS2AN5CV15Q			Threaded 3-Pin Pico Pigtail QD				
VS2RN5CV15			2 m	NPN/DO			
VS2RN5CV15Q			Threaded 3-Pin Pico Pigtail QD				
VS2AP5CV15			2 m	PNP/LO			
VS2AP5CV15Q			Threaded 3-Pin Pico Pigtail QD				
VS2RP5CV15			2 m	PNP/DO			
VS2RP5CV15Q			Threaded 3-Pin Pico Pigtail QD				
VS2AN5CV30		30 mm ±10 mm	2 m	NPN/LO	EGCC-8 (p. 478)	BPC-8 (p. 501)	
VS2AN5CV30Q			Threaded 3-Pin Pico Pigtail QD				
VS2RN5CV30			2 m	NPN/DO			
VS2RN5CV30Q			Threaded 3-Pin Pico Pigtail QD				
VS2AP5CV30			2 m	PNP/LO			
VS2AP5CV30Q			Threaded 3-Pin Pico Pigtail QD				
VS2RP5CV30			2 m	PNP/DO			
VS2RP5CV30Q			Threaded 3-Pin Pico Pigtail QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **VS2RP5R W/30**). A model with a pigtail QD requires a mating cable (see page 410).

† Opposed-mode models also sold as pairs. Contact factory for more information.

VS2 Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state switch: NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO), depending on model
Output Rating	50 mA max. **OFF-state leakage current:** less than 1 µA at 24V dc **ON-state saturation voltage:** less than 0.25V at 10 mA dc; less than 0.5V at 50 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Output Response Time	**Opposed:** 1 millisecond ON; 0.5 millisecond OFF **Convergent:** 1 millisecond ON; OFF NOTE: Maximum 100 millisecond (opposed) and 150 millisecond (convergent) delay on power-up; output does not conduct during this time.
Repeatability	**Opposed:** 100 microseconds **Convergent:** 160 microseconds
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** light sensed **Yellow flashing:** marginal excess gain (1-1.5x) in light condition (opposed mode only)
Construction	**Opposed:** Black ABS housing with clear MABS lens **Convergent:** Black ABS housing with acrylic lens
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m attached cable, 3-wire with PVC outer cable jacket; or 150 mm pigtail with threaded 3-pin Pico-style quick-disconnect fitting. QD cables are ordered separately. See page 410.
Operating Conditions	**Temperature:** -20° to +55° C **Relative humidity:** 80% at 50° C (non-condensing)
Vibration and Mechanical Shock	**Vibration:** All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak **Shock:** All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
Application Notes	M2 stainless steel mounting hardware is included. Optional mounting brackets are available. See page 370.
Certifications	CE
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others**: DC01 (p. 520)

VS3

Miniature Sensors with Advanced Optics

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Offers extremely compact self-contained miniature design
- Available in opposed and retroreflective sensing modes
- Uses coaxial optics on retroreflective models to eliminate blind areas at close range
- Features visible sensing beam for easy alignment
- Available in dark- or light-operate models
- Available with integral cable or threaded Pico-style quick-disconnect

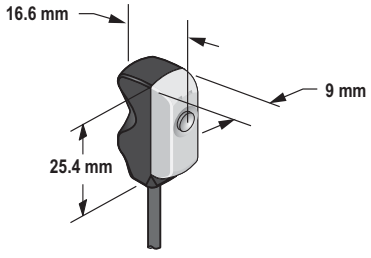
OPPOSED
COAXIAL RETRO
COAXIAL
POLAR RETRO
BRACKETS
PAGE 370
QD CABLES
3-Pin Threaded Pico
PAGE 410
REFLECTORS
PAGE 425

VS3 Sensors

- *Dual-LED multi-function indicators*
- *2 m or 9 m integral cable, or 3-pin threaded Pico-style quick-disconnect*
- *Extremely compact housing*

Opposed, Non-Polarized Retroreflective Models
Suffix R, EV and LV

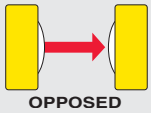
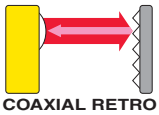
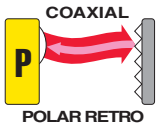
MORE INFO ONLINE Detailed Dimensions



Polarized Retroreflective Models
Suffix LP

VS3, 10-30V dc

MORE INFO ONLINE Download PDF

Models†	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
VS35EV Emitter	 OPPOSED	1.2 m	2 m	—	EGCO-7 (p. 468)	BPO-7 (p. 492)	63227
VS35EVQ Emitter			Threaded 3-Pin Pico QD				
VS3AN5R			2 m	NPN/LO			
VS3AN5RQ			Threaded 3-Pin Pico QD				
VS3RN5R			2 m	NPN/DO			
VS3RN5RQ			Threaded 3-Pin Pico QD				
VS3AP5R			2 m	PNP/L0			
VS3AP5RQ			Threaded 3-Pin Pico QD				
VS3RP5R			2 m	PNP/DO			
VS3RP5RQ			Threaded 3-Pin Pico QD				
VS3AN5XLV	 COAXIAL RETRO	250 mm††	2 m	NPN/LO	EGCR-7 (p. 471)	BPR-7 (p. 495)	63226
VS3AN5XLVQ			Threaded 3-Pin Pico QD				
VS3RN5XLV			2 m	NPN/DO			
VS3RN5XLVQ			Threaded 3-Pin Pico QD				
VS3AP5XLV			2 m	PNP/LO			
VS3AP5XLVQ			Threaded 3-Pin Pico QD				
VS3RP5XLV			2 m	PNP/DO			
VS3RP5XLVQ			Threaded 3-Pin Pico QD				
VS3AN5XLP		250 mm††	2 m	NPN/LO	EGCR-8 (p. 471)	BPR-8 (p. 495)	
VS3AN5XLPQ			Threaded 3-Pin Pico QD				
VS3RN5XLP			2 m	NPN/DO			
VS3RN5XLPQ			Threaded 3-Pin Pico QD				
VS3AP5XLP			2 m	PNP/LO			
VS3AP5XLPQ			Threaded 3-Pin Pico QD				
VS3RP5XLP			2 m	PNP/DO			
VS3RP5XLPQ			Threaded 3-Pin Pico QD				

* Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **VS3AN5XLV W/30**). A model with a QD requires a mating cable (see page 410).

† Opposed-mode models also sold as pairs. Contact factory for more information.

†† Retroreflective range is specified using one model BRT-32X20AM retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

VS3 Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO), depending on model
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs. Overload trip point ≥ 100 mA
Output Rating	50 mA max. **OFF-state leakage current:** less than 1 µA at 24V dc **ON-state saturation voltage:** less than 0.25V at 10 mA dc; less than 0.5V at 50 mA dc
Output Response Time	**Opposed:** 1 millisecond ON; 0.5 millisecond OFF **Retroreflective:** 1 millisecond ON/OFF NOTE: Maximum 100 millisecond (opposed mode) and 150 millisecond (retroreflective) delay on power-up; output does not conduct during this time.
Repeatability	**Opposed:** 100 microseconds **Retroreflective:** 160 microseconds
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** light sensed **Yellow flashing:** marginal excess gain (1-1.5x) in light condition (opposed mode only)
Construction	**Opposed and Non-polarized Retroreflective:** Black ABS housing with acrylic lens **Polarized Retroreflective:** Black ABS housing with glass lens and acrylic cover
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m attached cable, 3-wire with PVC outer cable jacket; or 3-pin Pico-style threaded quick-disconnect fitting. QD cables are ordered separately. See page 410.
Operating Conditions	**Temperature:** -20° to +55° C **Relative humidity:** 80% at 50° C (non-condensing)
Vibration and Mechanical Shock	**Vibration:** All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak **Shock:** All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
Application Notes	M3 stainless steel mounting hardware is included. Optional mounting brackets are available. See page 370.
Certifications	CE
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC01 (p. 520)

VS4

Ultra-Thin Right-Angle Miniature Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Features totally self-contained opposed-mode miniature design
- Offers advanced sensing circuitry for powerful, precise sensing
- Features bright visible red sensing beam for easy alignment
- Delivers powerful 1.0 m sensing range
- Available in dark- or light-operate models
- Provides horizontal mounting capability and extremely small size for mounting in narrow confines

OPPOSED
BRACKETS PAGE 370
QD CABLES 3-Pin Threaded Pico PAGE 410
APERTURES PAGE 444

VS4 Sensors

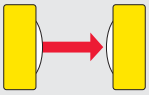
- *Two bright LED indicators*
- *Visible red sensing beam*
- *2 m or 9 m attached cable, or 150 mm pigtail with threaded 3-pin Pico-style quick-disconnect*
- *Low-profile housing—only 4.75 mm thick*

MORE INFO ONLINE Detailed Dimensions

Opposed Models
Suffix E and R

VS4, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
VS4EV Emitter	 OPPOSED	1 m	2 m	—	EGCO-8 (p. 468)	BPO-8 (p. 492)	69421
VS4EVQ Emitter			Threaded 3-pin Pico Pigtail QD				
VS4AN5R			2 m	NPN/LO			
VS4AN5RQ			Threaded 3-pin Pico Pigtail QD				
VS4RN5R			2 m	NPN/DO			
VS4RN5RQ			Threaded 3-pin Pico Pigtail QD				
VS4AP5R			2 m	PNP/LO			
VS4AP5RQ			Threaded 3-pin Pico Pigtail QD				
VS4RP5R			2 m	PNP/DO			
VS4RP5RQ			Threaded 3-pin Pico Pigtail QD				

* → Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **VS4RP5R W/30**). A model with a pigtail QD requires a mating cable (see page 410).

VS4 Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple) **Emitter:** 25 mA **Receiver:** 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state switch NPN (current sinking) or PNP (current sourcing), depending on model Light Operate (LO) or Dark Operate (DO), depending on model
Output Rating	50 mA max. **OFF-state leakage current:** less than 1 µA at 24V dc **ON-state saturation voltage:** less than 0.25V at 10 mA dc; less than 0.5V at 50 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs Overload trip point ≥ 100 mA
Output Response Time	1 millisecond ON; 0.5 milliseconds OFF NOTE: 100 millisecond delay on power-up; output does not conduct during this time.
Repeatability	100 microseconds
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Yellow ON steady:** light sensed **Green flashing:** output overloaded **Yellow flashing:** marginal excess gain (1 to 1.5x) in light condition
Construction	Polycarbonate mounting holes and lens. Low pressure molded thermoplastic housing (UL 94-V0)
Environmental Rating	IP67; NEMA 6
Connections	2 m or 9 m attached cable, 3-wire with PVC outer cable jacket; or 150 mm pigtail with threaded 3-pin Pico-style quick-disconnect fitting. QD cables are ordered separately. See page 410.
Operating Conditions	**Temperature:** -20° to +55° C **Relative humidity:** 80% at 50° C (non-condensing)
Vibration and Mechanical Shock	**Vibration:** All models meet IEC 60068-2-6, IEC 60947-5-2, UL491 Section 40, MIL-STD-202F Method 201A; 10 to 60 Hz, 0.5 mm peak to peak **Shock:** All models meet IEC 60068-2-27, IEC 60947-5-2; 30g peak acceleration, 11 millisecond pulse duration, half-sine wave pulse shape
Application Notes	M2 stainless steel mounting hardware is included. Optional mounting bracket available.
Certifications	CE
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC01 (p. 520)

Compact Sensors

WORLD-BEAM® QS18 page 70

- Universal photoelectric family offers 18 mm threaded lens or side mounts.
- One sensor family replaces hundreds of other sensor styles.
- One housing design fulfills all mounting requirements.
- All sensing modes are available including laser, fiber optic and ultrasonic.
- *Expert*™ models offer push-button TEACH-mode setup.
- Ranges are up to 30 m.
- A wide variety of connecting options are available.

Coming Soon!

QS18 ac/dc universal power models will be available soon–contact factory or visit www.bannerengineering.com for more information.

MINI-BEAM® page 79

- Extensive family in all sensing modes and ranges to 30 m
- *Expert*™ push-button teachable models
- Models for special needs—clear plastic detection, NAMUR outputs
- World's most popular photoelectric

M18 page 95

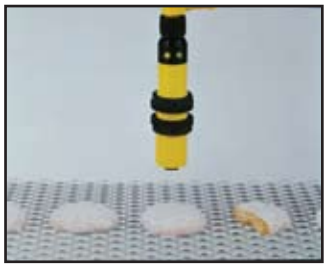
- Rugged 18 mm stainless steel threaded barrels
- Opposed, polarized and non-polarized retroreflective, diffuse and fixed-field modes
- Dual LED indicators
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments

WORLD-BEAM® Q20 page 92

- High power in a small package
- Rugged overmolded design for enhanced durability
- Ranges to 15 m
- Four sensing modes
- Universal threaded inserts with 25.4 mm hole spacing

T18 page 101

- Completely epoxy encapsulated Right-angle, T-shaped package
- Specialized fixed-field and polarized retroreflective models
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments
- Models for ac or dc power



S18 page 95

- Completely epoxy encapsulated 18 mm threaded plastic barrels
- Specialized laser diode emitter models
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments
- Models for ac or dc power

Q25 page 106

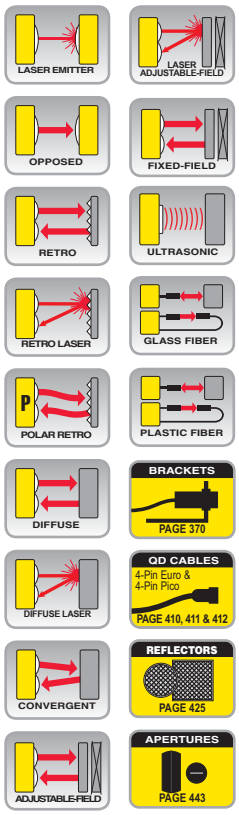
- Compact rectangular 25 mm right-angle housing with 18 mm threaded mounting base
- Completely epoxy encapsulated
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments
- Models for ac or dc power

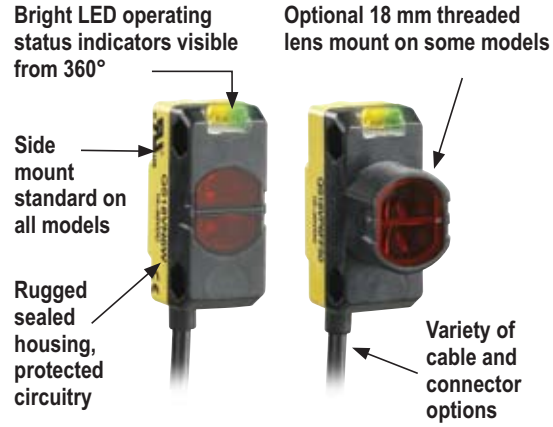
WORLD-BEAM®

QS18 Series Universal Sensors

- Features a universal housing with an 18 mm threaded lens or side mounts
- Replaces hundreds of other sensors
- Meets IP67 and NEMA 6 standards for harsh environments
- Available in opposed, polarized and non-polarized retroreflective, convergent, regular and wide-angle diffuse, laser, ultrasonic, plastic or glass fiber optic, fixed-field and adjustable-field sensing modes
- Offers easy push-button TEACH-mode setup in *Expert*™ QS18E and ultrasonic models
- Ranges up to 20 m

Coming Soon! ***ac/dc universal power models***





QS18

- Eight sensing modes for solving most applications: opposed, retroreflective, convergent, diffuse, plastic and glass fiber optic, and adjustable field and fixed field
- High power, infared or visible red sensing beam
- Highly visible diagnostics

QS18 *Expert*™

- Advanced teachable microprocessor
- Single push-button programming
- Instant learning of difficult sensing condition
- Reliable detection of transparent and reflective objects

QS18 Laser

- Opposed, diffuse, retroreflective and adjustable-field models
- High-performance sensing with visible Class 1 and 2 lasers
- Long sensing ranges
- Ideal for confined areas
- Emitter models available with five beam shapes

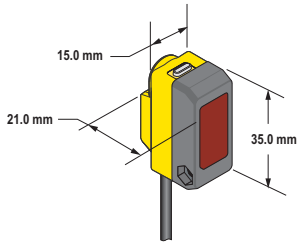
QS18 Background Suppression

- Adjustable-field models with cutoff point from 20 to 100 mm, 30 to 150 mm or 50 to 250 mm
- Fixed-field models sensing range of 50 or 100 mm
- Visible red LED or laser sensing beam
- Accurate and reliable even with low-reflectivity targets
- Ideal for small, difficult-to-access areas

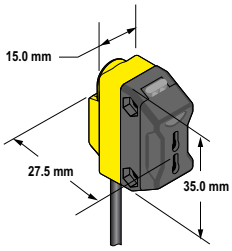
WORLD-BEAM® QS18 Sensors

- *18 mm threaded lens mount on some models*
- *A variety of cable and connector options*
- *Rugged sealed housing, protected circuitry*
- *Bright LED operating status indicators visible from 360°*

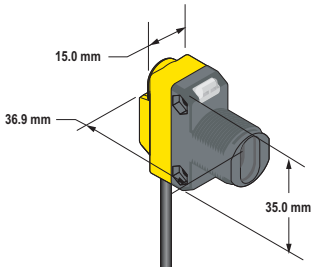
Opposed, Retroreflective, Laser Retroreflective, Convergent, Diffuse, Laser Diffuse and Fixed-field Models
Suffix E, R, LV, LP, LLP, CV15, CV45, D, LD, LE and FF



Opposed, Diffuse and Adjustable-field Models
Suffix EB, RB, DB, W and AF

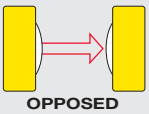


Plastic Fiber Models
Suffix FP



Glass Fiber Models
Suffix F

WORLD-BEAM® QS18, 10-30V dc

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS186E Emitter	 OPPOSED	20 m	2 m	—	EGCO-9 (p. 468)	BPO-9 (p. 492)	63908
QS186EQ8 Emitter			4-pin Euro QD				
QS18VN6R			2 m	NPN			
QS18VN6RQ8			4-pin Euro QD				
QS18VP6R			2 m	PNP			
QS18VP6RQ8			4-pin Euro QD				
QS186EB Emitter		3 m	2 m	—	EGCO-10 (p. 468)	BPO-10 (p. 492)	
QS186EBQ8 Emitter			4-pin Euro QD				
QS18VN6RB			2 m	NPN			
QS18VN6RBQ8			4-pin Euro QD				
QS18VP6RB			2 m	PNP			
QS18VP6RBQ8			4-pin Euro QD				

More on next page

* ⇨ Infrared LED

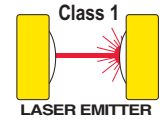
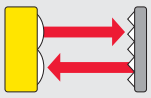
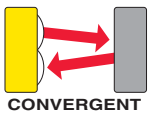
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS186E W/30**). A model with a QD requires a mating cable (see pages 410 & 412).

QD models:

- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS186EQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS186EQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS186EQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS186EQ**).

WORLD-BEAM® QS18, 10-30V dc (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS186LE***		15 m (4500 X excess gain)	2 m	—	See Data sheet for more information.		109415
QS186LEQ8***			4-pin Euro QD				
QS186LE10	LASER SPOT	See Data sheet for more information.	2 m				
QS186LE10Q8			4-pin Euro QD				
QS186LE11	LASER SPOT		2 m				
QS186LE11Q8			4-pin Euro QD				
QS186LE12	LASER SPOT		2 m				
QS186LE12Q8			4-pin Euro QD				
QS186LE14	LASER SPOT		2 m				
QS186LE14Q8			4-pin Euro QD				
QS18VN6LV		6.5 m†	2 m	NPN	EGCR-9 (p. 471)	BPR-9 (p. 495)	63908
QS18VN6LVQ8			4-pin Euro QD				
QS18VP6LV			2 m	PNP			
QS18VP6LVQ8			4-pin Euro QD				
QS18VN6LP		3.5 m†	2 m	NPN	EGCR-10 (p. 471)	BPR-10 (p. 495)	
QS18VN6LPQ8			4-pin Euro QD				
QS18VP6LP			2 m	PNP			
QS18VP6LPQ8			4-pin Euro QD				
QS18VN6LLP		10 m††	2 m	NPN	EGCR-11 (p. 471)	—	118900
QS18VN6LLPQ8			4-pin Euro QD				
QS18VP6LLP			2 m	PNP			
QS18VP6LLPQ8			4-pin Euro QD				
QS18VN6CV15		16 mm	2 m	NPN	EGCC-9 (p. 478)	BPC-9 (p. 501)	63908
QS18VN6CV15Q8			4-pin Euro QD				
QS18VP6CV15			2 m	PNP			
QS18VP6CV15Q8			4-pin Euro QD				
QS18VN6CV45		43 mm	2 m	NPN	EGCC-10 (p. 478)	BPC-10 (p. 501)	
QS18VN6CV45Q8			4-pin Euro QD				
QS18VP6CV45			2 m	PNP			
QS18VP6CV45Q8			4-pin Euro QD				

More on next page

* Visible Red LED Visible Red Laser

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18VN6LV W/30**). A model with a QD requires a mating cable (see pages 410 & 412).
QD models (except Laser Emitters):
• For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18VN6LVQ8**). • For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VN6LVQ5**).
• For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18VN6LVQ7**). • For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18VN6LVQ**).

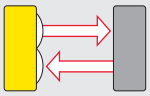
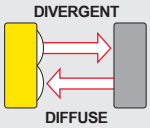
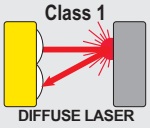
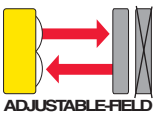
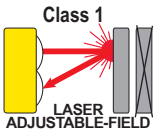
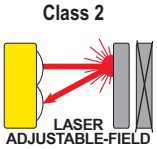
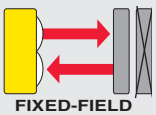
*** Specified with QS18 threaded lens receiver. Not recommended for dusty or dirty environments; the scattered light would greatly reduce excess gain.

† Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

†† Retroreflective range is specified using one model BRT-51X51BM or BRT-TVHG-2X2 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

WORLD-BEAM® QS18, 10-30V dc (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Laser Class	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS18VN6D	 DIFFUSE	450 mm	—	2 m	NPN	EGCD-7 (p. 475)	BPD-7 (p. 498)	63908
QS18VN6DQ8				4-pin Euro QD				
QS18VP6D				2 m	PNP			
QS18VP6DQ8				4-pin Euro QD				
QS18VN6DB				2 m	NPN	EGCD-8 (p. 475)	BPD-8 (p. 498)	
QS18VN6DBQ8				4-pin Euro QD				
QS18VP6DB				2 m	PNP			
QS18VP6DBQ8				4-pin Euro QD				
QS18VN6W	 DIVERGENT DIFFUSE	100 mm	—	2 m	NPN	EGCD-9 (p. 475)	BPD-9 (p. 498)	63908
QS18VN6WQ8				4-pin Euro QD				
QS18VP6W				2 m	PNP			
QS18VP6WQ8				4-pin Euro QD				
QS18VN6LD	 Class 1 DIFFUSE LASER	300 mm	Class 1	2 m	NPN	EGCD-10 (p. 475)	BPD-10 (p. 498)	118899
QS18VN6LDQ8				4-pin Euro QD				
QS18VP6LD				2 m	PNP			
QS18VP6LDQ8				4-pin Euro QD				
QS18VN6AF100	 ADJUSTABLE-FIELD	1 mm to cutoff point (adjustable between 20-100 mm)	—	2 m	NPN	EGCA-1 (p. 481) Cutoff Point Deviation Curve CPDC-1 (p. 517)	—	66981
QS18VN6AF100Q5				4-pin Euro Pigtail QD				
QS18VP6AF100				2 m	PNP			
QS18VP6AF100Q5				4-pin Euro Pigtail QD				
QS18VN6LAF	 Class 1 LASER ADJUSTABLE-FIELD	1 mm to cutoff point (adjustable between 30-150 mm)	Class 1	2 m	NPN	EGCA-2 (p. 481) Cutoff Point Deviation Curve CPDC-2 (p. 517)	—	
QS18VN6LAFQ5				4-pin Euro Pigtail QD				
QS18VP6LAF				2 m	PNP			
QS18VP6LAFQ5				4-pin Euro Pigtail QD				
QS18VN6LAF250	 Class 2 LASER ADJUSTABLE-FIELD	20 mm to cutoff point (adjustable between 50-250 mm)	Class 2	2 m	NPN	EGCA-3 (p. 481) Cutoff Point Deviation Curve CPDC-3 (p. 517)	—	
QS18VN6LAF250Q5				4-pin Euro Pigtail QD				
QS18VP6LAF250				2 m	PNP			
QS18VP6LAF250Q5				4-pin Euro Pigtail QD				
QS18VN6FF50	 FIXED-FIELD	0-50 mm Cutoff	—	2 m	NPN	EGCF-7 (p. 482)	—	63908
QS18VN6FF50Q8				4-pin Euro Pigtail QD				
QS18VP6FF50				2 m	PNP			
QS18VP6FF50Q8				4-pin Euro Pigtail QD				

More on next page

* ⇨ Infrared LED ➡ Visible Red LED ✸ Visible Red Laser

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18VN6W W/30**). A model with a QD requires a mating cable (see pages 410 and 412)

QD models (except Adjustable-field):

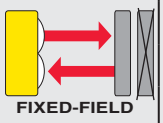
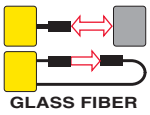
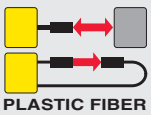
- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18VN6WQ8**)
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18VN6WQ7**)
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VN6WQ5**)
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18VN6WQ**)

QD models (Adjustable-field only):

- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18VP6AF100Q**)
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VP6AF100Q5**)

WORLD-BEAM® QS18, 10-30V dc (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Laser Class	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS18VN6FF100	 FIXED-FIELD	0-100 mm Cutoff	—	2 m	NPN	EGCF-8 (p. 482)	—	63908
QS18VN6FF100Q8				4-pin Euro QD				
QS18VP6FF100				2 m	PNP			
QS18VP6FF100Q8				4-pin Euro QD				
QS18VN6F	 GLASS FIBER	Range varies by sensing mode and fiber optics used	—	2 m	NPN	EGCG-1 & EGCG-2 (p. 485)	BPG-1 & BPG-2 (p. 504)	63908
QS18VN6FQ8				4-pin Euro QD				
QS18VP6F				2 m	PNP			
QS18VP6FQ8				4-pin Euro QD				
QS18VN6FP	 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	—	2 m	NPN	EGCP-1 & EGCP-2 (p. 488)	BPP-1 & BPP-2 (p. 507)	63908
QS18VN6FPQ8				4-pin Euro QD				
QS18VP6FP				2 m	PNP			
QS18VP6FPQ8				4-pin Euro QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18VN6F W/30**). A model with a QD requires a mating cable (see pages 410 & 412).

QD models:

- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18VN6FQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18VN6FQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18VN6FQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18VN6FQ**).

WORLD-BEAM® QS18 Specifications

Supply Voltage	**Retroreflective, Diffuse and Adjustable-field Laser:** 10 to 30V dc (10% max. ripple) at less than 15 mA, exclusive of load **Laser Emitters:** 10 to 30V dc (10% max. ripple) at less than 35 mA, exclusive of load **All others:** 10 to 30V dc (10% max. ripple) at less than 25 mA, exclusive of load
Laser Characteristics (Laser models only)	**Wavelength: Class 1:** 650 nm visible red **Class 2:** 658 nm visible red **Pulse width:** 7 microseconds (**Laser Emitter:** 5 microseconds) **Rep rate:** 130 microseconds (**Laser Emitter:** 27 microseconds) **Average output power: Adjustable-field laser (Class 2):** 0.2 mW **Laser Emitters:** less than 1.8 mW **All others:** 0.065 mW
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Laser Control	Enable beam by applying 0V dc to white wire; apply +10 to 30V dc to white wire to inhibit (extinguish) beam
Output Configuration*	**Solid-state complementary;** NPN (current sinking) or PNP (current sourcing), depending on model **Rating:** 100 mA max. each output at 25° C **OFF-state leakage current:** **Retroreflective, Diffuse and Adjustable-field Laser: NPN:** less than 200 µA @ 30V dc **PNP:** less than 10 µA @ 30V dc **Fixed-field:** less than 200 µA @ 30V dc **All others:** less than 50 µA @ 30V dc **ON-state saturation voltage:** **Retroreflective, Diffuse and Adjustable-field Laser: NPN:** less than 1.6V @ 100 mA **PNP:** less than 2.0V @ 100 mA **All others:** less than 1V @ 10 mA; less than 1.5V @ 100 mA Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time*	**Opposed:** 750 microseconds ON; 375 microseconds OFF **Retroreflective Laser, Diffuse Laser and Adjustable-field:** 700 microseconds ON/OFF **Fixed-field:** 850 microseconds ON/OFF **All others:** 600 microseconds ON/OFF
Delay at Power-up	**Laser Emitters:** 1.5 seconds **Retroreflective, Diffuse and Adjustable-field Laser:** 200 milliseconds; outputs do not conduct during this time. **All others:** 100 milliseconds; outputs do not conduct during this time.

* Does not apply to laser emitter models.

More on next page

WORLD-BEAM® QS18 Specifications (cont'd)

Repeatability*	**Opposed:** 100 microseconds **Retroreflective Laser, Diffuse Laser and Adjustable-field Laser:** 130 microseconds **Adjustable-field:** 175 microseconds **Fixed-field:** 160 microseconds **All others:** 150 microseconds
Sensing Hysteresis*	**Retroreflective Laser:** 12% of range typical **Diffuse Laser:** 15% of range typical **Adjustable-field:** 0.5% of range typical at 20 mm cutoff 1% of range typical at 50 mm cutoff 3% of range typical at 100 mm cutoff **Adjustable-field Laser (Class 1):** 1% range typical at 30 mm cutoff; 2% range typical at 75 mm cutoff; 5% range typical at 150 mm cutoff **Adjustable-field Laser (Class 2):** 1% range typical at 50 mm cutoff; 2% range typical at 150 mm cutoff; 5% range typical at 250 mm cutoff
Adjustments*	**Retroreflective, Retroreflective Laser, Convergent, Diffuse, Diffuse Laser and Glass & Plastic Fiber Optic:** Single-turn sensitivity (Gain) adjustment potentiometer **Adjustable-field:** Five-turn adjustment screw sets cutoff distance between min. and max. position, clutched at both ends of travel
Indicators	**Laser Emitters: Green LED:** Power applied **All others, 2 LED indicators:** **Green ON steady:** Power ON **Green flashing:** Output overloaded **Yellow† ON steady:** Light sensed **Yellow† flashing:** Marginal excess gain (1.0 to 1.5x excess gain) in the light condition **†NOTE: Prior to date code 0223, the output indicator was red instead of yellow.**
Construction	ABS housing, rated IEC IP67; NEMA 6; acrylic lens cover (Laser Emitter models have PMMA window) 2.5 mm (adjustable-field only) and 3 mm mounting hardware included
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD (**Q**), or 4-pin 150 mm pigtail Euro-style QD (**Q5**), or 4-pin Integral Pico-style QD (**Q7**), or 4-pin Integral Euro-style QD (**Q8**), depending on model. See pages 410 and 412.
Operating Conditions	**Laser** / **Adjustable-field** / **All others** **Temperature:** -10° to +50° C / 0° to +55° C / -20° to +70° C **Relative humidity:** 95% @ 50° C (non-condensing)
Laser Classification (Laser models only)	Class 1 and Class 2 laser product; complies with EN60825-1: 2001 and 21 CFR 1040.10, except deviations pursuant to Laser Notice 50, dated 7-26-01.
Certifications	**Ultrasonic:** CE **All others:** CE c UL us
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC03 (p. 520) **Laser Emitters:** DC20 (p. 524)

* Does not apply to laser emitter models.

Class 1 Laser Sensors
Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

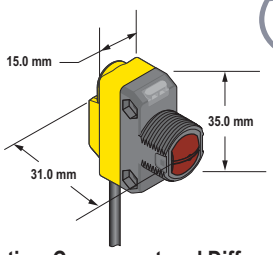
Class 2 Lasers
Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm, where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference IEC 60825-1:2001, section 8.2.

For safe laser use (Class 1 or Class 2):
- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Terminate the beam emitted by a Class 2 laser product at the end of its useful path. Locate open laser beam paths either above or below eye level, where practical.

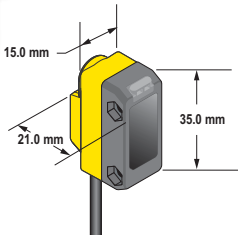
WORLD-BEAM® QS18 *Expert*™ and Ultrasonic Sensors

- *Bright LED status indicators visible from 360°*
- *Simple push-button programming*
- *18 mm threaded lens mount on some models*

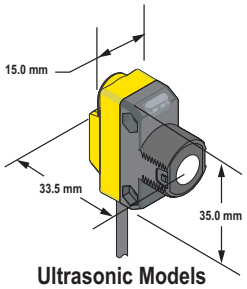
MORE INFO ONLINE Detailed Dimensions



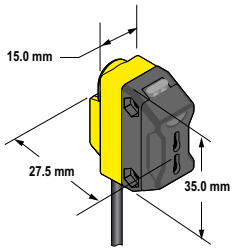
Retroreflective, Convergent and Diffuse Models
Suffix LP, CV15, CV45, D and DV



Diffuse Models
Suffix DB and W



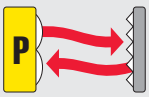
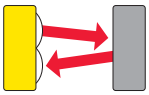
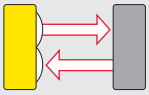
Ultrasonic Models
Suffix NA and PA



Plastic Fiber Models
Suffix FP

WORLD-BEAM® QS18 *Expert*™, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS18EN6LP	 POLAR RETRO	3.5 m†	2 m	NPN	EGCR-12 (p. 471)	BPR-11 (p. 495)	136564
QS18EN6LPQ8			4-pin Euro QD				
QS18EP6LP			2 m	PNP			
QS18EP6LPQ8			4-pin Euro QD				
QS18EN6CV15	 CONVERGENT	16 mm	2 m	NPN	EGCC-11 (p. 478)	BPC-11 (p. 501)	
QS18EN6CV15Q8			4-pin Euro QD				
QS18EP6CV15			2 m	PNP			
QS18EP6CV15Q8			4-pin Euro QD				
QS18EN6CV45		43 mm	2 m	NPN	EGCC-12 (p. 478)	BPC-12 (p. 501)	
QS18EN6CV45Q8			4-pin Euro QD				
QS18EP6CV45			2 m	PNP			
QS18EP6CV45Q8			4-pin Euro QD				
QS18EN6D	 DIFFUSE	800 mm	2 m	NPN	EGCD-11 (p. 475)	BPD-11 (p. 498)	
QS18EN6DQ8			4-pin Euro QD				
QS18EP6D			2 m	PNP			
QS18EP6DQ8			4-pin Euro QD				
QS18EN6DB		500 mm	2 m	NPN	EGCD-12 (p. 475)	BPD-12 (p. 498)	
QS18EN6DBQ8			4-pin Euro QD				
QS18EP6DB			2 m	PNP			
QS18EP6DBQ8			4-pin Euro QD				

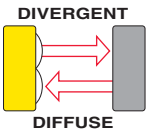
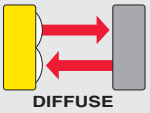
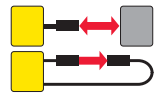
* ⇨ Infrared LED ➡ Visible Red LED

More on next page

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18EN6LP W/30**). A model with a QD requires a mating cable (see pages 410 and 412).
QD models:
- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18EN6LPQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18EN6LPQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18EN6LPQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18EN6LPQ**).

† Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

WORLD-BEAM® QS18 *Expert*™, 10-30V dc (cont'd)

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS18EN6W	 DIVERGENT / DIFFUSE	300 mm	2 m	NPN	EGCD-13 (p. 475)	BPD-13 (p. 498)	136564
QS18EN6WQ8			4-pin Euro QD				
QS18EP6W			2 m	PNP			
QS18EP6WQ8			4-pin Euro QD				
QS18EN6DV	 DIFFUSE	600 mm	2 m	NPN	EGCD-14 (p. 475)	BPD-14 (p. 498)	
QS18EN6DVQ8			4-pin Euro QD				
QS18EP6DV			2 m	PNP			
QS18EP6DVQ8			4-pin Euro QD				
QS18EN6FP	 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	NPN	EGCP-3 & EGCP-4 (p. 488)	BPD-3 & BPD-4 (p. 507)	
QS18EN6FPQ8			4-pin Euro QD				
QS18EP6FP			2 m	PNP			
QS18EP6FPQ8			4-pin Euro QD				

WORLD-BEAM® QS18 Ultrasonic, 12-30V dc

Models†	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS18UNA	 ULTRASONIC	50 - 500 mm	2 m	NPN	—	—	119287
QS18UNAQ8			4-pin Euro QD				
QS18UNAE††			2 m				
QS18UNAEQ8††			4-pin Euro QD				
QS18UPA			2 m	PNP	—	—	
QS18UPAQ8			4-pin Euro QD				
QS18UPAE††			2 m				
QS18UPAEQ8††			4-pin Euro QD				

* Visible Red LED Infrared LED Ultrasonic

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **QS18EN6W W/30**). A model with a QD requires a mating cable (see pages 410, 411 and 412).

QD models:

- For 4-pin integral Euro-style QD, add suffix **Q8** (example, **QS18EN6WQ8**).
- For 4-pin integral Pico-style QD, add suffix **Q7** (example, **QS18EN6WDQ7**).
- For 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **QS18EN6WQ5**).
- For 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **QS18EN6WQ**).

† For complete information see QS18U Ultrasonic Sensors on page 269.

†† Models are epoxy-encapsulated, IP68; NEMA6P with remote TEACH programming.

WORLD-BEAM® QS18 *Expert*™ Specifications	
Supply Voltage	10 to 30V dc (10% max. ripple) at less than 35 mA, exclusive of load; 10 to 24V dc @ greater than 55° C
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state NPN (current sinking) or PNP (current sourcing), depending on model. Configuration in TEACH sequence for light operate (LO) or dark operate (DO). **Rating:** 100 mA max. **OFF-state leakage current:** less than 50 µA @ 30V dc **ON-state saturation voltage:** less than 1.5V (2 m cable); 1.7V (9 m cable) Protected against false pulse on power-up and continuous overload or short circuit of output
Output Response Time	600 microseconds ON/OFF
Delay at Power-up	Momentary delay on power-up; outputs do not conduct during this time
Repeatability	75 microseconds
Adjustments	• **Thresholds:** Push-button/remote-wire configurable • **Five *Expert*™-style TEACH and SET options** **Static TEACH:** locates a single switchpoint at the optimal location between two taught conditions. The first condition taught is the ON condition. **Dynamic TEACH:** configures sensor during actual sensing conditions, taking multiple samples of light and dark conditions and automatically setting the threshold at the optimal level. **Window SET:** sets a single sensing window that extend 12.5% above and below presented condition. **Light SET:** sets a threshold approximately 12.5% below the presented sensing condition. **Dark SET:** sets a threshold approximately 12.5% above the presented condition. • **Light/dark operate:** selectable by programming order (load output follows the first taught target condition) • **Push-button enable/disable:** (remote wire only)
Indicators	**2 LED indicators:** **Green:** RUN mode, output short-circuit **Yellow:** Output ON/marginal, TEACH mode
Construction	Polycarbonate/ABS housing rated IEC IP67; NEMA 6 3 mm mounting hardware included
Connections	2 m or 9 m 4-wire PVC cable, or 4-pin 150 mm pigtail Pico-style QD (**Q**), or 4-pin 150 mm pigtail Euro-style QD (**Q5**), or 4-pin Integral Pico-style QD (**Q7**), or 4-pin Integral Euro-style QD (**Q8**). QD cables are ordered separately. See pages 410 and 412.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 95% @ 50° C (non-condensing)
Certifications	CE c UL US
Hookup Diagrams	DC07 (p. 521)

WORLD-BEAM® QS18 Ultrasonic Specifications

See page 269.

MINI-BEAM®

Broad Family of Compact Sensors

- Models are available for ac, dc or ac/dc universal voltage operation.
- Available models include opposed, opposed clear plastic detection, diffuse and divergent diffuse, polarized and non-polarized retroreflective, convergent, glass and plastic fiber optic.
- Convergent and fiber optic models offer infrared or visible red, blue, white, or green LED light source; select a color based on the application.
- SME312 *Expert*™ models offer easy, push-button TEACH-mode setup.
- MIAD9 series NAMUR models are for hazardous environments with approved switching amplifiers having intrinsically safe input circuits.
- MINI-BEAM models detect clear plastic; MINI-BEAM *Expert*™ models detect clear objects.

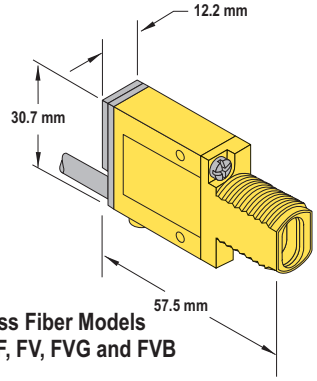
OPPOSED
CLEAR PLASTIC OPPOSED
RETRO
POLAR RETRO
CLEAR PLASTIC POLAR RETRO
DIFFUSE
DIVERGENT DIFFUSE
CONVERGENT

MINI-BEAM® DC Sensors

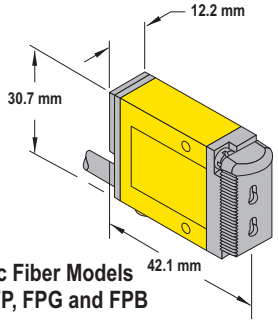
- *10 to 30V dc with bipolar NPN/PNP outputs*
- *Signal strength output indicator*
- *2 m or 9 m integral cable, or Euro-style quick-disconnect fitting*
- *18 mm threaded lens mount on some models*

MORE INFO ONLINE Detailed Dimensions

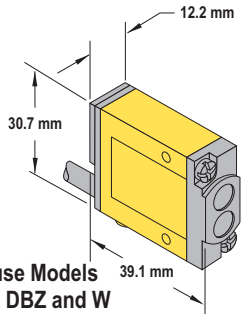
Opposed, Retroreflective, Diffuse and Convergent Models
Suffix E, R, EPD, RPD, D, LV, LP, C, C2, CV, CV2, CVB, CV2B, CVG and CV2G



Glass Fiber Models
Suffix F, FV, FVG and FVB



Plastic Fiber Models
Suffix FP, FPG and FPB

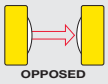
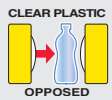
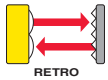
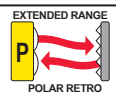
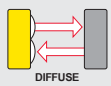
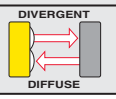
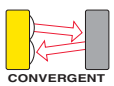
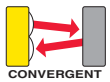
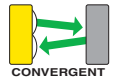
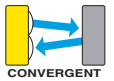


Diffuse Models
Suffix DBZ and W

PLASTIC FIBER
GLASS FIBER
REFLECTORS PAGE 425
BRACKETS PAGE 370
APERTURES PAGE 443
QD CABLES 4 or 5-Pin Euro + 3-Pin Micro PAGE 412, 414 & 419

MINI-BEAM®, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SM31E Emitter	 OPPOSED	3 m	2 m	Bipolar NPN/PNP	EGCO-11 (p. 468)	BPO-11 (p. 492)	69943
SM31EQD Emitter			4-Pin Euro QD				
SM31R			2 m				
SM31RQD			4-Pin Euro QD				
SM31EL Emitter		30 m	2 m		EGCO-12 (p. 468)	BPO-12 (p. 492)	
SM31ELQD Emitter			4-Pin Euro QD				
SM31RL			2 m				
SM31RLQD			4-Pin Euro QD				
SM31EPD Emitter	 CLEAR PLASTIC OPPOSED	0.3 m	2 m		See Note Below***		
SM31RPD Emitter							
SM31EPDQD			4-Pin Euro QD				
SM31RPDQD							
SM312LV	 RETRO	5 m†	2 m		EGCR-13 (p. 471)	BPR-12 (p. 495)	69943
SM312LVQD			4-Pin Euro QD				
SM312LVAG	 POLAR RETRO	50 mm - 2 m†	2 m		EGCR-14 (p. 471)	BPR-13 (p. 495)	
SM312LVAGQD			4-Pin Euro QD				
SM312LP	 EXTENDED RANGE POLAR RETRO	10 mm - 3 m†	2 m		EGCR-15 (p. 471)	BPR-14 (p. 495)	
SM312LPQD			4-Pin Euro QD				
SM312D	 DIFFUSE	380 mm	2 m		EGCD-15 (p. 475)	BPD-15 (p. 498)	69943
SM312DQD			4-Pin Euro QD				
SM312DBZ		300 mm	2 m		EGCD-16 (p. 475)	BPD-16 (p. 498)	
SM312DBZQD			4-Pin Euro QD				
SM312W	 DIVERGENT DIFFUSE	130 mm	2 m		EGCD-17 (p. 476)	BPD-17 (p. 499)	
SM312WQD			4-Pin Euro QD				
SM312C	 CONVERGENT	16 mm	2 m		EGCC-13 (p. 478)	BPC-13 (p. 501)	69943
SM312CQD			4-Pin Euro QD				
SM312C2		43 mm	2 m		EGCC-14 (p. 478)	BPC-14 (p. 501)	
SM312C2QD			4-Pin Euro QD				
SM312CV	 CONVERGENT	16 mm	2 m		EGCC-15 (p. 478)	BPC-15 (p. 501)	
SM312CVQD			4-Pin Euro QD				
SM312CV2		43 mm	2 m		EGCC-16 (p. 478)	BPC-16 (p. 501)	
SM312CV2QD			4-Pin Euro QD				
SM312CVG	 CONVERGENT	16 mm	2 m		EGCC-17 (p. 479)	BPC-17 (p. 502)	
SM312CVGQD			4-Pin Euro QD				
SM312CV2G		49 mm	2 m		EGCC-18 (p. 479)	BPC-18 (p. 502)	
SM312CV2GQD			4-Pin Euro QD				
SM312CVB	 CONVERGENT	16 mm	2 m		EGCC-19 (p. 479)	BPC-19 (p. 502)	
SM312CVBQD			4-Pin Euro QD				
SM312CV2B		49 mm	2 m		EGCC-20 (p. 479)	BPC-20 (p. 502)	
SM312CV2BQD			4-Pin Euro QD				

More on next page

* Infrared LED Visible Red LED Visible Green LED Visible Blue LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM312D W/30**). A model with a QD requires a mating cable (see page 412).

*** Actual range depends on light transmission through the plastic being sensed. Some clear plastic materials may not be detected. When in doubt, ask your Banner representative to evaluate material samples.

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

MINI-BEAM®, 10-30V dc (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SM312F	 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Bipolar NPN/PNP	EGCG-3 & EGCG-4 (p. 485)	BPG-3 & BPG-4 (p. 504)	69943
SM312FQD			4-Pin Euro QD				
SM312FV	 GLASS FIBER		2 m		EGCG-5 & EGCG-6 (p. 485)	BPG-5 & BPG-6 (p. 504)	
SM312FVQD			4-Pin Euro QD				
SM312FVG	 GLASS FIBER		2 m		EGCG-7 (p. 485)	BPG-7 (p. 504)	
SM312FVGQD			4-Pin Euro QD				
SM312FVB	 GLASS FIBER		2 m		EGCG-8 (p. 485)	BPG-8 (p. 504)	
SM312FVBQD			4-Pin Euro QD				
SM312FP	 PLASTIC FIBER		2 m		EGCP-5 & EGCP-6 (p. 488)	BPP-5 & BPP-6 (p. 507)	69943
SM312FPQD			4-Pin Euro QD				
SM312FPG	 PLASTIC FIBER		2 m		EGCP-7 (p. 488)	BPP-7 (p. 507)	
SM312FPGQD			4-Pin Euro QD				
SM312FPB	 PLASTIC FIBER		2 m		EGCP-8 (p. 488)	BPP-8 (p. 507)	
SM312FPBQD			4-Pin Euro QD				

* Infrared LED Visible Red LED Visible Green LED Visible Blue LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM312F W/30**). A model with a QD requires a mating cable (see page 412).

MINI-BEAM® DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 25 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** One current sourcing (PNP) and one current sinking (NPN) open-collector transistor; light operate (LO) or dark operate (DO) selectable.
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate ≈ 1 mA per ° C) **OFF-state leakage current:** less than 1 µA **Output saturation voltage (PNP output):** less than 1 V @ 10 mA; less than 2 V @ 150 mA **Output saturation voltage (NPN output):** less than 200 mV @ 10mA; less than 1 V @ 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a "light" or a "dark" signal of 1 millisecond or longer duration, 500 Hz max. 0.3 millisecond response modification is available. See note below†. NOTE: 100 millisecond delay on power-up: outputs do not conduct during this time.
Repeatability	**Opposed:** 0.14 milliseconds **Non-Polarized and Polarized Retroreflective, Diffuse, Convergent, and Glass and Plastic Fiber Optic:** 0.3 milliseconds. Response time and repeatability specifications are independent of signal strength.
Adjustments	LIGHT/DARK OPERATE select switch, and 15-turn slotted brass screw GAIN (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on rear panel of sensor and protected by a gasketed, clear acrylic cover.
Indicators	Alignment Indicating Device system (AID) lights a rear-panel mounted red LED indicator whenever the sensor sees a "light" condition, with a superimposed pulse rate proportional to the light signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67
Connections	PVC-jacketed 4-conductor 2 m or 9 m cables, or 4-pin Euro-style quick-disconnect (**QD**) fitting are available. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	CE c UL us
Hookup Diagrams	**Emitters:** DC02 (p. 520) **Other Models:** DC04 (p. 520)

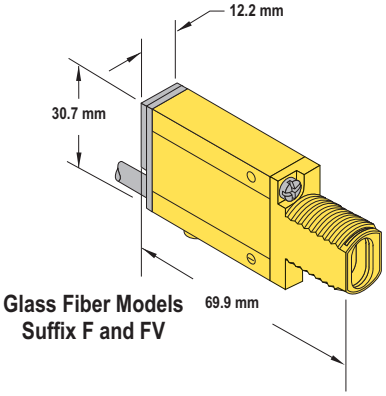
† NOTE: DC MINI-BEAMs may be ordered with 0.3 millisecond ON/OFF response by adding suffix **MHS** to the model number (example, **SM312LVMHS**). This modification reduces sensing range (and excess gain).

MINI-BEAM® AC Sensors

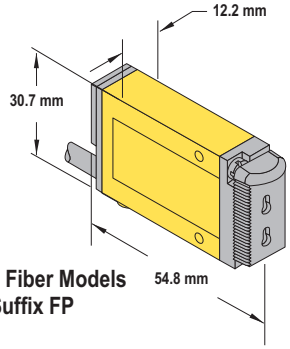
- *24 to 240V ac with solid-state outputs*
- *Signal strength or output indicator*
- *2 m or 9 m integral cable, Micro-style quick-disconnect fitting*
- *18 mm threaded lens mount on some models*

Opposed, Retroreflective, Diffuse and Convergent Models
Suffix E, R, EPD, RPD, D, LV, LP, C and CV

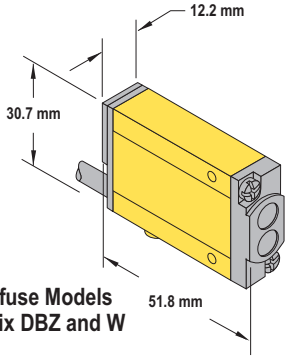
MORE INFO ONLINE Detailed Dimensions



Glass Fiber Models
Suffix F and FV



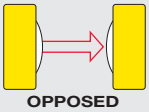
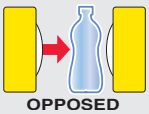
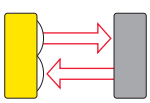
Plastic Fiber Models
Suffix FP



Diffuse Models
Suffix DBZ and W

MINI-BEAM®, 24-240V ac

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SMA31E Emitter	 OPPOSED	3 m	2 m	SPST Solid-State 2-Wire	EGCO-11 (p. 468)	BPO-11 (p. 492)	69942
SMA31EQD Emitter			3-Pin Micro QD				
SM2A31R			2 m				
SM2A31RQD			3-Pin Micro QD				
SMA31EL Emitter		30 m	2 m		EGCO-12 (p. 468)	BPO-12 (p. 492)	
SMA31ELQD Emitter			3-Pin Micro QD				
SM2A31RL			2 m				
SM2A31RLQD			3-Pin Micro QD				
SMA31EPD Emitter	 CLEAR PLASTIC OPPOSED	0.3 m	2 m		See Note Below***		
SMA31EPQD Emitter			3-Pin Micro QD				
SM2A31RPD			2 m				
SM2A31RPDQD			3-Pin Micro QD				
SM2A312D	 DIFFUSE	380 mm	2 m		EGCD-15 (p. 475)	BPD-15 (p. 498)	69942
SM2A312DQD			3-Pin Micro QD				
SM2A312DBZ		300 mm	2 m		EGCD-16 (p. 475)	BPD-16 (p. 498)	
SM2A312DBZQD			3-Pin Micro QD				

* ⇨ Infrared LED ➡ Visible Red LED

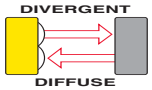
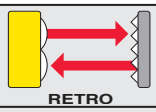
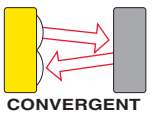
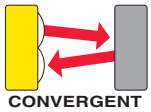
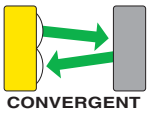
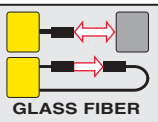
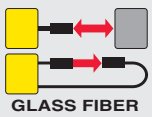
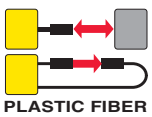
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM2A312D W/30**). A model with a QD requires a mating cable (see page 419).

*** Actual range depends on light transmission through the plastic being sensed. Some clear plastic materials may not be detected. When in doubt, ask your Banner representative to evaluate material samples.

More on next page

MINI-BEAM®, 24-240V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SM2A312W		130 mm	2 m	SPST Solid-state 2-Wire	EGCD-17 (p. 476)	BPD-17 (p. 499)	69942
SM2A312WQD			3-Pin Micro QD				
SM2A312LV		5 m†	2 m		EGCR-13 (p. 471)	BPR-12 (p. 495)	
SM2A312LVQD			3-Pin Micro QD				
SM2A312LVAG		50 mm - 2 m†	2 m		EGCR-14 (p. 471)	BPR-13 (p. 495)	69942
SM2A312LVAGQD			3-Pin Micro QD				
SM2A312LP		10 mm - 3 m†	2 m		EGCR-15 (p. 471)	BPR-14 (p. 495)	
SM2A312LPQD			3-Pin Micro QD				
SM2A312C		16 mm	2 m		EGCC-13 (p. 478)	BPC-13 (p. 501)	69942
SM2A312CQD			3-Pin Micro QD				
SM2A312C2		43 mm	2 m		EGCC-14 (p. 478)	BPC-14 (p. 501)	
SM2A312C2QD			3-Pin Micro QD				
SM2A312CV		16 mm	2 m		EGCC-15 (p. 478)	BPC-15 (p. 501)	
SM2A312CVQD			3-Pin Micro QD				
SM2A312CV2		43 mm	2 m		EGCC-16 (p. 478)	BPC-16 (p. 502)	
SM2A312CV2QD			3-Pin Micro QD				
SM2A312CVG		16 mm	2 m		EGCC-17 (p. 479)	BPC-17 (p. 502)	
SM2A312CVGQD			3-Pin Micro QD				
SM2A312F		Range varies by sensing mode and fiber optics used	2 m		EGCG-3 & EGCG-4 (p. 485)	BPG-3 & BPG-4 (p. 504)	69942
SM2A312FQD			3-Pin Micro QD				
SM2A312FV			2 m		EGCG-5 & EGCG-6 (p. 485)	BPG-5 & BPG-6 (p. 504)	
SM2A312FVQD			3-Pin Micro QD				
SM2A312FP		Range varies by sensing mode and fiber optics used	2 m		EGCP-5 & EGCP-6 (p. 488)	BPP-5 & BPP-6 (p. 507)	69942
SM2A312FPQD			3-Pin Micro QD				

* ⇨ Infrared LED ➡ Visible Red LED ➡ Visible Green LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SM2A312LP W/30**). A model with a QD requires a mating cable (see page 419).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

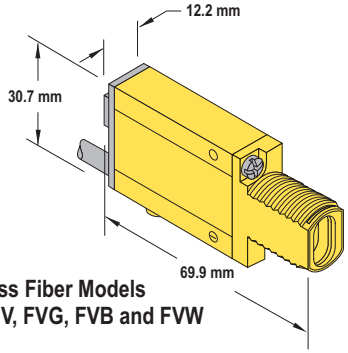
MINI-BEAM® AC Specifications	
Supply Voltage and Current	24 to 240V ac (50/60 Hz), 250V ac max
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	SPST SCR solid-state relay (light/dark operate selectable); 2-wire hookup
Output Rating	Min. load current 5 mA max. steady-state load capability 300 mA to 50° C ambient 100 mA to 70° C ambient **Inrush capability:** 3 amps for 1 second (non repetitive); 10 amps for 1 cycle (non repetitive) **OFF-state leakage current:** less than 1.7 mA rms **ON-state voltage drop:** ≤ 5 volts at 300 mA load, ≤ 10 volts at 15 mA load
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 2 milliseconds ON and 1 millisecond OFF **Non-Polarized and Polarized Retroreflective, Convergent and Plastic Fiber Optic:** 4 milliseconds ON and OFF **Diffuse and Glass Fiber Optic:** 8 milliseconds ON and OFF OFF response time specification does not include load response of up to ½ ac cycle (8.3 milliseconds). Response time specification of load should be considered when important. NOTE: 300 millisecond delay on power-up.
Repeatability	**Opposed:** 0.3 milliseconds **Non-Polarized and Polarized Retroreflective, Convergent and Plastic Fiber Optic:** 1.3 milliseconds **Diffuse and Glass Fiber Optics:** 2.6 milliseconds Response time and repeatability specifications are independent of signal strength.
Adjustments	LIGHT/DARK OPERATE select switch, and 15-turn slotted brass screw GAIN (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on rear panel of sensor and protected by a gasketed, clear acrylic cover.
Indicators	Red indicator LED on rear of sensor is “ON” when the load is energized
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67
Connections	PVC-jacketed 2-conductor 2 m or 9 m cables, or 3-pin Micro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately. See page 419.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	i) Overload conditions can destroy ac MINI-BEAM sensors. Directly wiring sensor without load series across hot and neutral will damage sensor (except emitter models). ii) Low voltage use requires careful analysis of the load to determine if the leakage current or on-state voltage of the sensor will interfere with proper operation of the load. iii) The false-pulse protection feature may cause momentary drop-out of the load when the sensor is wired in series or parallel with mechanical switch contacts.
Certifications	CE c UL us
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 525) **All Other QD Models:** AC02 (p. 525) **QD Emitters:** AC04 (p. 525) **All Other Cabled Models:** AC01 (p. 525)

MINI-BEAM® *Expert*™ Sensors

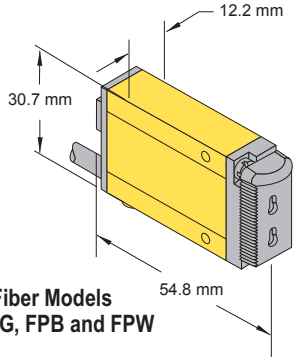
- *Simple push-button programming or remote TEACH via wire*
- *Dual-LED multi-function indicators*
- *2 m or 9 m integral cable, or Euro-style quick-disconnect fitting*
- *Popular 18 mm threaded lens mount*

MORE INFO ONLINE Detailed Dimensions

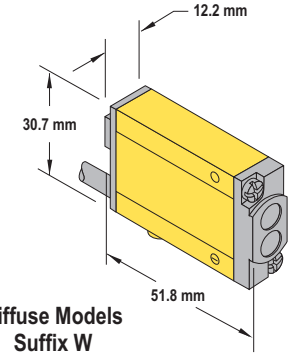
Retroreflective, Diffuse and Convergent Models
Suffix LV, LP, D, DV, CV, CV2, CVG, CVB and CVW



Glass Fiber Models
Suffix F, FV, FVG, FVB and FVW



Plastic Fiber Models
Suffix FP, FPG, FPB and FPW



Diffuse Models
Suffix W

MINI-BEAM® *Expert*™, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SME312LV	RETRO	5 m†	2 m	Bipolar NPN/PNP	EGCR-16 (p. 471)	BPR-15 (p. 495)	55214
SME312LVQD			5-Pin Euro QD				
SME312LP	P POLAR RETRO	10 mm - 3 m†	2 m		EGCR-17 (p. 472)	BPR-16 (p. 495)	55214
SME312LPQD			5-Pin Euro QD				
SME312LPC***	CLEAR OBJECT P POLAR RETRO	1 m	2 m		EGCR-18 (p. 472)	BPR-17 (p. 496)	
SME312LPCQD***			5-Pin Euro QD				
SME312D	DIFFUSE	380 mm	2 m		EGCD-18 (p. 476)	BPD-18 (p. 499)	55214
SME312DQD			5-Pin Euro QD				
SME312DV	DIFFUSE	1100 mm	2 m		EGCD-20 (p. 476)	BPD-20 (p. 499)	
SME312DVQD			5-Pin Euro QD				
SME312W	DIVERGENT DIFFUSE	130 mm	2 m		EGCD-19 (p. 476)	BPD-19 (p. 499)	
SME312WQD			5-Pin Euro QD				

More on next page

* ⇨ Infrared LED ➡ Visible Red LED

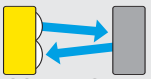
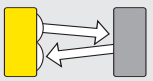
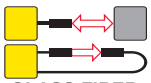
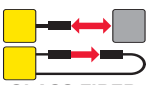
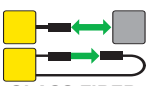
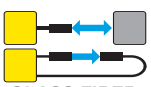
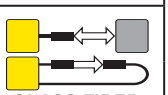
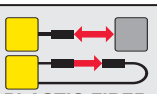
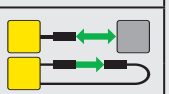
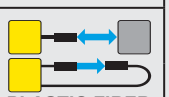
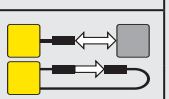
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SME312D W/30**). A model with a QD requires a mating cable (see page 414).

*** NOTE: For clear object detection, sensing range varies, according to the efficiency and reflective area of the retroreflector(s) used.
For these low-contrast applications, the model BRT-2X2 reflector is recommended and is included with each SME312LPC(QD) sensor.
- For applications with high vibration, the model BRT-51X51BM, with its micro-prism geometry, is recommended.
- For long-range applications, the BRT-77X77C reflector provides a range up to 2 m.
- SME312LPC(QD) are for use with corner cube type reflectors only; reflective tape is not recommended. See page 425 for more information.

† NOTE: Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

MINI-BEAM® *Expert*™, 10-30V dc (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SME312CV	 CONVERGENT	16 mm	2 m	Bipolar NPN/PNP	EGCC-21 (p. 479)	BPC-21 (p. 502)	55214
SME312CVQD			5-Pin Euro QD				
SME312CV2		43 mm	2 m		EGCC-22 (p. 479)	BPC-22 (p. 502)	
SME312CV2QD			5-Pin Euro QD				
SME312CVG	 CONVERGENT	16 mm	2 m		EGCC-23 (p. 479)	BPC-23 (p. 502)	
SME312CVGQD			5-Pin Euro QD				
SME312CVB	 CONVERGENT	16 mm	2 m		EGCC-24 (p. 479)	BPC-24 (p. 502)	
SME312CVBQD			5-Pin Euro QD				
SME312CVW	 CONVERGENT	16 mm	2 m		EGCC-25 (p. 479)	BPC-25 (p. 502)	
SME312CVWQD			5-Pin Euro QD				
SME312F	 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m		EGCG-9 & EGCG-10 (p. 485)	BPG-9 & BPG-10 (p. 504)	55214
SME312FQD			5-Pin Euro QD				
SME312FV	 GLASS FIBER		2 m		EGCG-11 & EGCG-12 (p. 485)	BPG-11 & BPG-12 (p. 504)	
SME312FVQD			5-Pin Euro QD				
SME312FVG	 GLASS FIBER		2 m		EGCG-13 (p. 485)	BPG-13 (p. 504)	
SME312FVGQD			5-Pin Euro QD				
SME312FVB	 GLASS FIBER		2 m		EGCG-14 (p. 485)	BPG-14 (p. 504)	
SME312FVBQD			5-Pin Euro QD				
SME312FVW	 GLASS FIBER		2 m		EGCG-15 (p. 485)	BPG-15 (p. 504)	
SME312FVWQD			5-Pin Euro QD				
SME312FP	 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m		EGCP-9 & EGCP-10 (p. 488)	BPP-9 & BPP-10 (p. 507)	55214
SME312FPQD			5-Pin Euro QD				
SME312FPG	 PLASTIC FIBER		2 m		EGCP-11 (p. 488)	BPP-11 (p. 507)	
SME312FPGQD			5-Pin Euro QD				
SME312FPB	 PLASTIC FIBER		2 m		EGCP-12 (p. 488)	BPP-12 (p. 507)	
SME312FPBQD			5-Pin Euro QD				
SME312FPW	 PLASTIC FIBER		2 m		EGCP-13 (p. 488)	BPP-13 (p. 507)	
SME312FPWQD			5-Pin Euro QD				

* Infrared LED Visible Red LED Visible Green LED Visible Blue LED Visible White LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SME312CV W/30**). A model with a QD requires a mating cable (see page 414).

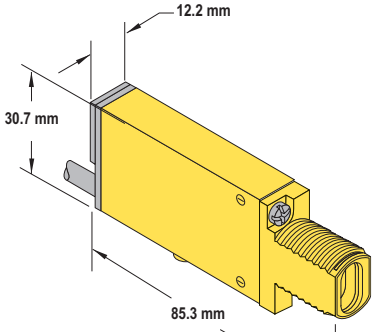
MINI-BEAM® *Expert*™ Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 45 mA, exclusive of load
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** One current sourcing (PNP) and one current sinking (NPN) open-collector transistor. Configuration in TEACH sequence for Light Operate (LO) or Dark Operate (DO).
Output Rating	150 mA max. each output at 25° C, derated to 100 mA at 70° C (derate ≈ 1 mA per ° C) **OFF-state leakage current:** less than 5 µA @ 30V dc **Output saturation voltage (PNP output):** less than 1 V at 10 mA and less than 2 V at 150 mA **Output saturation voltage (NPN output):** less than 200 mV at 10 mA and less than 1 V at 150 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Output Response Time	Sensors will respond to either a “light” or a “dark” signal of 500 microseconds or longer duration, 1 kHz max. NOTE: 1 second delay on power-up; outputs do not conduct during this time.
Repeatability	100 microseconds (all models)
Adjustments	Push-button TEACH mode sensitivity setting; remote TEACH mode input is provided (gray wire)
Indicators	**Two LEDs:** Yellow and Bicolor Green/Red **Green (RUN Mode):** ON when power is applied Flashes when received light level approaches the switching threshold **Red (TEACH Mode):** OFF when no signal is received. Pulses to indicate signal strength (received light level). Rate is proportional to signal strength (the stronger the signal, the faster the pulse rate). This is a function of Banner’s Alignment Indicating Device (AID). **Yellow (TEACH Mode):** ON to indicate sensor is ready to learn output ON condition OFF to indicate sensor is ready to learn output OFF condition **Yellow (RUN Mode):** ON when outputs are conducting
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring seal, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67
Connections	PVC-jacketed 5-conductor 2 m or 9 m unterminated cable, or 5-pin Euro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately. See page 414.
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	The first condition presented during TEACH mode becomes the output ON condition.
Certifications	CE c UL US
Hookup Diagrams	DC08 (p. 521)

MINI-BEAM® Universal Voltage Sensors

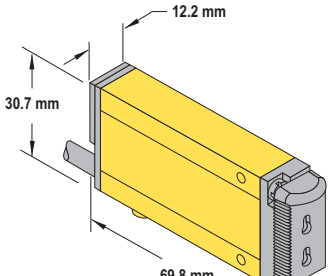
- *Popular, compact MINI-BEAM package with a SPDT electromechanical (E/M) relay*
- *Universal supply voltage: 24 to 240V ac, 50/60 Hz; 24 to 240V dc*
- *Easy-to-operate sensors with few required adjustments*

MORE INFO ONLINE Detailed Dimensions

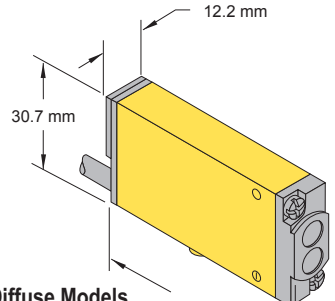
Opposed, Retroreflective, Diffuse and Convergent Models
Suffix E, EL, R, RL, LV, LP, D, CV and CV2



Glass Fiber Models
Suffix F and FV



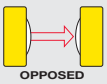
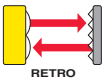
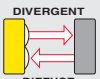
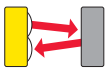
Plastic Fiber Models
Suffix FP



Diffuse Models
Suffix W

MINI-BEAM® Universal Voltage, 24-240V ac or dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SMU31E Emitter	 OPPOSED	3 m	2 m	SPDT E/M Relay	EGCO-13 (p. 468)	BPO-13 (p. 492)	55230
SMU31R							
SMU31EL Emitter		30 m	2 m		EGCO-14 (p. 468)	BPO-14 (p. 492)	
SMU31RL							
SMU315LV	 RETRO	5 m†	2 m		EGCR-19 (p. 472)	BPR-18 (p. 496)	
SMU315LP	 POLAR RETRO	10 mm - 3 m†	2 m		EGCR-20 (p. 472)	BPR-19 (p. 496)	
SMU315D	 DIFFUSE	380 mm	2 m		EGCD-21 (p. 476)	BPD-21 (p. 499)	
SMU315W	 DIVERGENT DIFFUSE	130 mm	2 m		EGCD-22 (p. 476)	BPD-22 (p. 499)	
SMU315CV	 CONVERGENT	16 mm	2 m		EGCC-26 (p. 479)	BPC-26 (p. 502)	
SMU315CV2		43 mm	2 m		EGCC-27 (p. 479)	BPC-27 (p. 502)	

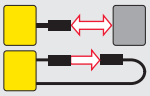
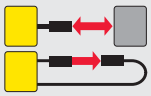
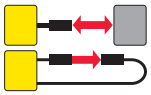
More on next page

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SMU315D W/30**).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

MINI-BEAM® Universal Voltage, 24-240V ac or dc (cont'd)

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SMU315F	 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	SPDT E/M Relay	EGCG-16 (p. 485) & EGCG-17 (p. 486)	BPG-16 (p. 504) & BPG-17 (p. 505)	55230
SMU315FV	 GLASS FIBER		2 m		EGCG-18 & EGCG-19 (p. 486)	BPG-18 & BPG-19 (p. 505)	
SMU315FP	 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m		EGCP-14 & EGCP-15 (p. 488)	BPP-14 & BPP-15 (p. 507)	

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **SMU315F W/30**).

MINI-BEAM® Universal Voltage Specifications

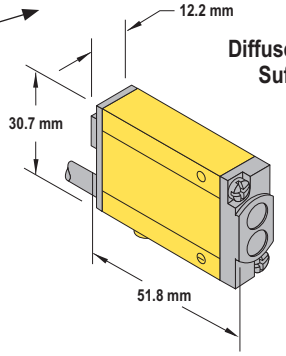
Supply Voltage	**Universal voltage:** 24 to 240V ac, 50/60Hz or 24 to 240V dc (1.5 watts or 2.5 VA max.)
Supply Protection Circuitry	Protected against transient voltages. DC hookup is without regard to polarity.
Output Configuration	SPDT (Single-Pole, Double Throw) (form C) electromechanical relay, ON/OFF output.
Output Rating	**Max. switching power (resistive load):** 90W, 250VA **Max. switching voltage (resistive load):** 250V ac or 30V dc **Max. switching current (resistive load):** 3A **Min. voltage and current:** 5V dc, 10 mA **Mechanical life:** 20,000,000 operations **Electrical life at full resistive load:** 100,000 operations
Output Protection Circuitry	Protected against false pulse on power-up.
Output Response Time	**Closure time:** 20 milliseconds max. **Release time:** 20 milliseconds max. **Max. switching speed:** 25 operations per second
Repeatability	1 millisecond
Adjustments	Light/Dark Operate select switch, and 15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel). Both controls are located on rear panel of sensor and are protected by a gasketed, clear acrylic cover.
Indicators	Alignment Indicator Device system (AID) lights a rear-panel-mounted LED indicator whenever the sensor sees a "light" condition, with a superimposed pulse rate proportional to the light signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring seal, acrylic lenses, and stainless steel screws.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12, and 13; IEC IP67.
Connections	PVC-jacketed 5-conductor 2 m or 9 m unterminated cable. Opposed mode emitter cables are 2-conductor.
Operating Conditions	**Temperature:** -20° to +55° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	Install transient suppressor (MOV) across contacts switching inductive loads.
Certifications	CE
Hookup Diagrams	**Emitters:** UN02 (p. 528) **Other AC/DC Models:** UN01 (p. 528)

MINI-BEAM® NAMUR Sensors

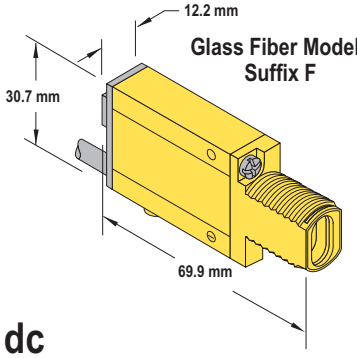
- *Intrinsically safe sensors with MINI-BEAM performance and small size*
- *For use with approved switching amplifiers with intrinsically safe input circuits*
- *Output 1 mA or less in dark conditions and 2 mA or more in light conditions*
- *Models with integral cable or quick-disconnect*

Opposed, Retroreflective, Diffuse and Convergent Models
Suffix E, R, LV, D and CV

MORE INFO ONLINE Detailed Dimensions



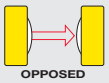
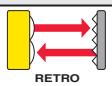
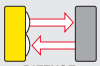
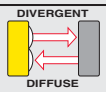
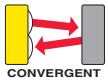
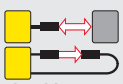
Diffuse Models
Suffix W



Glass Fiber Models
Suffix F

MINI-BEAM® NAMUR, 5-15V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
MI9E Emitter	 OPPOSED	6 m	2 m	—	EGCO-15 (p. 468)	BPO-15 (p. 492)	39616
MI9EQ Emitter			4-Pin Euro QD				
MIAD9R			2 m	Constant Current ≤1.2 mA dark ≥2.1 mA light			
MIAD9RQ			4-Pin Euro QD				
MIAD9LV	 RETRO	5 m †	2 m		EGCR-21 (p. 472)	BPR-20 (p. 496)	
MIAD9LVQ			4-Pin Euro QD				
MIAD9LVAG	 POLAR RETRO	50 mm - 2 m †	2 m		EGCR-22 (p. 472)	BPR-21 (p. 496)	
MIAD9LVAGQ			4-Pin Euro QD				
MIAD9D	 DIFFUSE	380 mm	2 m		EGCD-23 (p. 476)	BPD-23 (p. 499)	
MIAD9DQ			4-Pin Euro QD				
MIAD9W	 DIVERGENT DIFFUSE	75 mm	2 m		EGCD-24 (p. 476)	BPD-24 (p. 499)	
MIAD9WQ			4-Pin Euro QD				
MIAD9CV	 CONVERGENT	16 mm	2 m		EGCC-28 (p. 479)	BPC-28 (p. 502)	
MIAD9CVQ			4-Pin Euro QD				
MIAD9CV2		43 mm	2 m		EGCC-29 (p. 479)	BPC-29 (p. 502)	
MIAD9CV2Q			4-Pin Euro QD				
MIAD9F	 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m		EGCG-20 & EGCG-21 (p. 486)	BPG-20 & BPG-21 (p. 505)	
MIAD9FQ			4-Pin Euro QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **MIAD9LV W/30**). A model with a QD requires a special 4-pin Euro QD mating cable (see page 413).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

MINI-BEAM® NAMUR Specifications	
Supply Voltage	5 to 15V dc (provided by the amplifier to which the sensor is connected)
Output	**Constant current output:** ≤ 1.2 mA in the "dark" condition and ≤ 2.1 mA in the "light" condition
Output Response Time	**Opposed receiver:** 2 milliseconds ON/400 microseconds OFF **All others:** 5 milliseconds ON/OFF (does not include amplifier response)
Adjustments	15-turn slotted brass screw GAIN (sensitivity) adjustment potentiometer (clutched at both ends of travel); located on rear panel and protected by a clear gasketed acrylic cover
Indicators	Red LED Alignment Indicator Device (AID) located on rear panel lights when the sensor sees a "light" condition; pulse rate is proportional to signal strength (the stronger the signal, the faster the pulse rate).
Construction	Reinforced thermoplastic polyester housing, totally encapsulated, o-ring sealing, acrylic lenses, and stainless steel screws
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 4X, 6, 12 and 13; IEC IP67
Connections	PVC-jacketed 2-conductor 2 m or 9 m cables, or special 4-pin Euro-style quick-disconnect (QD) fitting are available; QD cables are ordered separately. See page 413.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Design Standards	MIAD9 Series sensors comply with the following standards: DIN 19 234, EN 50 014 Part 1. 1977, EN50 020 Part 7. 1977, Factory Mutual #3610 and 3611, CSA 22.2 #157-92 and 22.2 #213-M1987
Certifications	CE Ex KEMA FM APPROVED ETL LISTED CSA®
Hookup Diagrams	SP01 (p. 530)

APPROVALS

CSA:	#LR 41887	Instrinsically Safe, with Entity for Class I, Groups A-D Class I, Div. 2, Groups A-D
FM:	#J.I. 5Y3A4.AX	Intrinsically Safe, with Entity for Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G
KEMA:	#03ATEX1441X	II IG EEx ia IIC T6
ETL:	#553868	

WORLD-BEAM®

Q20 Series
Rectangular Sensor

- Features compact, rectangular housing with industry-standard mounting configuration
- Available in opposed, polarized and non-polarized retroflective, and diffuse models
- Offers visible red beam for easy alignment on most models
- Provides water-tight, IP67 and NEMA 6 rated enclosure for rugged, reliable sensing
- Rated to 1200 psi for washdown environments
- Features ranges to 15 m
- Offers 10 to 30V dc supply voltage with complementary NPN or PNP outputs, depending on the model
- Provides versatile mounting options, including M3 (3 mm) inserts and 25.4 mm hole spacing
- Includes single-turn gain potentiometer for easy configuration, depending on model

OPPOSED
RETRO
POLAR RETRO
DIFFUSE
FIXED-FIELD
BRACKETS PAGE 370
QD CABLES 4-Pin Euro + 4-Pin Pico PAGE 410 & 412
REFLECTORS PAGE 425
APERTURES PAGE 443

WORLD-BEAM® Q20 Sensors

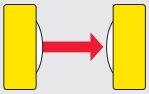
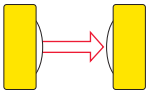
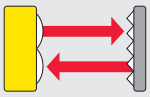
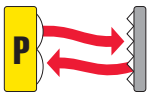
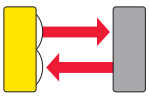
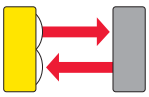
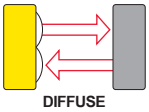
- *Easy-to-see sensor LED*
- *2 m or 9 m attached cable, or Pico- or Euro-style quick-disconnect*
- *Molded-in threaded mounting holes on standard 25.4 mm spacing*
- *Rugged overmolded housing*
- *Excellent optical crosstalk and electronic noise immunity*

MORE INFO ONLINE Detailed Dimensions

Opposed, Retroreflective and Diffuse Models
Suffix E, EL, R, RL, LP, LV,
D, DL and DXL

WORLD-BEAM® Q20, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q20E Emitter	 OPPOSED	10 m	2 m	—	EGCO-16 (p. 468)	BPO-16 (p. 492)	127816
Q20EQ5 Emitter			4-pin Euro Pigtail QD				
Q20NR			2 m	NPN			
Q20NRQ5			4-pin Euro Pigtail QD				
Q20PR			2 m	PNP			
Q20PRQ5			4-pin Euro Pigtail QD				
Q20EL Emitter	 OPPOSED	15 m	2 m	—	EGCO-17 (p. 469)	BPO-17 (p. 493)	127816
Q20ELQ5 Emitter			4-pin Euro Pigtail QD				
Q20NRL			2 m	NPN			
Q20NRLQ5			4-pin Euro Pigtail QD				
Q20PRL			2 m	PNP			
Q20PRLQ5			4-pin Euro Pigtail QD				
Q20NLV	 RETRO	6 m †	2 m	NPN	EGCR-23 (p. 472)	BPR-22 (p. 496)	127816
Q20NLVQ5			4-pin Euro Pigtail QD				
Q20PLV			2 m	PNP			
Q20PLVQ5			4-pin Euro Pigtail QD				
Q20NLP	 POLAR RETRO	4 m †	2 m	NPN	EGCR-24 (p. 472)	BPR-23 (p. 496)	127816
Q20NLPQ5			4-pin Euro Pigtail QD				
Q20PLP			2 m	PNP			
Q20PLPQ5			4-pin Euro Pigtail QD				
Q20ND	 DIFFUSE	250 mm	2 m	NPN	EGCD-25 (p. 476)	BPD-25 (p. 499)	
Q20NDQ5			4-pin Euro Pigtail QD				
Q20PD			2 m	PNP			
Q20PDQ5			4-pin Euro Pigtail QD				
Q20NDL	 DIFFUSE	800 mm	2 m	NPN	EGCD-26 (p. 476)	BPD-26 (p. 499)	
Q20NDLQ5			4-pin Euro Pigtail QD				
Q20PDL			2 m	PNP			
Q20PDLQ5			4-pin Euro Pigtail QD				
Q20NDXL	 DIFFUSE	1500 mm	2 m	NPN	EGCO-27 (p. 476)	BPO-22 (p. 499)	
Q20NDXLQ5			4-pin Euro Pigtail QD				
Q20PDXL			2 m	PNP			
Q20PDXLQ5			4-pin Euro Pigtail QD				

More on next page

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q20ND W/30**). A model with a QD requires a mating cable (see pages 410 & 412).

QD models:

- For a 4-pin 150 mm Euro-style pigtail QD, add suffix **Q5** (example, **Q20NDQ5**).
- For a 4-pin 150 mm Pico-style pigtail QD, add suffix **Q** (example, **Q20NDQ**).
- For a 4-pin integral Pico-style QD, add suffix **Q7** (example, **Q20NDQ7**).

† Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the reflector used. See Accessories for more information.

WORLD-BEAM® Q20 Specifications	
Supply Voltage	10 to 30V dc (10% maximum ripple) at less than 18 mA, exclusive of load
Supply Protection Circuity	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; PNP (sourcing) or NPN (sinking), depending on model
Output Rating	100 mA with short circuit protection **OFF-state leakage current:** **NPN:** less than 10 µA sinking **PNP:** less than 200 µA sourcing **ON-state saturation voltage:** **NPN:** less than 1.6V @ 100 mA **PNP:** less than 3.0V @ 100 mA
Output Response Time	**Opposed:** 1 millisecond; 600 microseconds OFF **All others:** 800 microseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs do not conduct during this time
Repeatability	**Opposed:** 140 microseconds **All others:** 155 microseconds
Adjustments	**Diffuse, Retroreflective and Polarized Retroreflective:** single-turn sensitivity (Gain) adjustment potentiometer
Indicators	**Emitters:** Green power ON only **All others:** **Two LED Indicators:** Green and Yellow **Green ON:** power ON **Yellow ON:** light sensed **Green flashing:** output overload **Yellow flashing:** marginal excess gain (1 x 1.5)
Construction	**Housing:** ABS **Lenses:** PPMA **Gain Adjuster:** PBT
Connections	2 m or 9 m 4-wire PVC cable, 4-pin 150 mm pigtail Pico-style QD (**Q**), or 4-pin 150 mm pigtail Euro-style QD (**Q5**), or 4-pin integral Pico-style QD (**Q7**), depending on model. QD cables are ordered separately. See pages 410 and 412.
Operating Conditions	**Temperature:** –20° to 60° C **Relative humidity:** 95% @ 50° C (non-condensing)
Enviromental Rating	IEC IP67; NEMA 6 and 1200 psi washdown NEMA ICS 5, Annex F-2002
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements method 201A (vibration: 10 to 60 Hz max., double amplitude 0.06", maximum acceleration 10G). Also meets IEC 947-5-2: 30G 11 ms duration, half sine wave
Certification	Approvals pending, contact factory for status at 1-888-373-6767.
Hookup Diagram	**Emitters:** DC02 (p. 520) **All others:** DC03 (p. 520)

S18 and M18
18 mm Threaded-Barrel Sensors

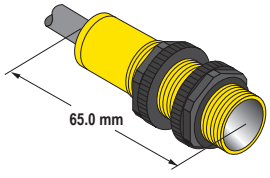
- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in plastic threaded barrel sensor (S18) and stainless steel threaded barrel sensor (M18)
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments (S18)
- Uses innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)
- Meets rigorous IP69K standards for use in washdown (S18) applications

S18 and M18 DC Sensors

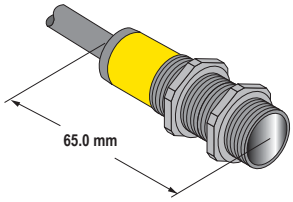
- *Advanced self-diagnostics with separate alarm output; dual-LED multi-function indicators*
- *Popular 18 mm threaded barrel*
- *10 to 30V dc with NPN or PNP outputs*
- *2 m or 9 m integral cable, or Euro-style quick-disconnect fitting*

S18 Opposed, Non-polarized Retroreflective and Diffuse Models Suffix E, R, L and D

S18 Polarized Retroreflective and Fixed-field Models Suffix LP and FF



M18 Opposed, Non-polarized Retroreflective and Diffuse Models Suffix E, R, L, D and DL

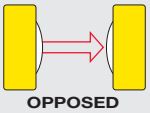
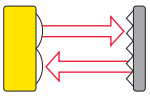
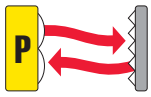
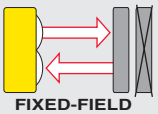
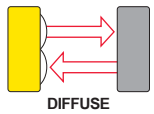


M18 Polarized Retroreflective and Fixed-field Models Suffix LP and FF

MORE INFO ONLINE Detailed Dimensions

S18, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
S186E Emitter	 OPPOSED	20 m	2 m	—	EGCO-18 (p. 469)	BPO-18 (p. 493)	121522
S186EQ Emitter			4-Pin Euro QD				
S18SN6R			2 m	NPN			
S18SN6RQ			4-Pin Euro QD				
S18SP6R			2 m	PNP			
S18SP6RQ			4-Pin Euro QD				
S18SN6L	 RETRO	2 m†	2 m	NPN	EGCR-25 (p. 472)	BPR-24 (p. 496)	
S18SN6LQ			4-Pin Euro QD				
S18SP6L			2 m	PNP			
S18SP6LQ			4-Pin Euro QD				
S18SN6LP	 POLAR RETRO	2 m†	2 m	NPN	EGCR-26 (p. 472)	BPR-25 (p.496)	
S18SN6LPQ			4-Pin Euro QD				
S18SP6LP			2 m	PNP			
S18SP6LPQ			4-Pin Euro QD				
S18SN6FF25	 FIXED-FIELD	0 - 25 mm Cutoff	2 m	NPN	EGCF-9 (p. 482)	—	
S18SN6FF25Q			4-Pin Euro QD				
S18SP6FF25			2 m	PNP			
S18SP6FF25Q			4-Pin Euro QD				
S18SN6FF50		0 - 50 mm Cutoff	2 m	NPN	EGCF-10 (p. 482)	—	
S18SN6FF50Q			4-Pin Euro QD				
S18SP6FF50			2 m	PNP			
S18SP6FF50Q			4-Pin Euro QD				
S18SN6FF100		0 - 100 mm Cutoff	2 m	NPN	EGCF-11 (p. 482)	—	
S18SN6FF100Q			4-Pin Euro QD				
S18SP6FF100			2 m	PNP			
S18SP6FF100Q			4-Pin Euro QD				
S18SN6D	 DIFFUSE	100 mm	2 m	NPN	EGCD-28 (p. 476)	BPD-28 (p. 499)	
S18SN6DQ			4-Pin Euro QD				
S18SP6D			2 m	PNP			
S18SP6DQ			4-Pin Euro QD				
S18SN6DL		300 mm	2 m	NPN	EGCD-29 (p. 476)	BPD-29 (p. 499)	
S18SN6DLQ			4-Pin Euro QD				
S18SP6DL			2 m	PNP			
S18SP6DLQ			4-Pin Euro QD				

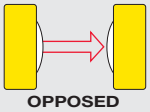
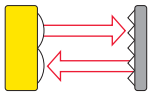
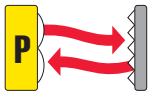
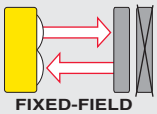
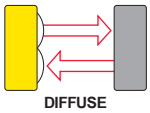
* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S18SP6D W/30**). A model with a QD requires a mating cable (see page 412).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

M18, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
M186E Emitter	 OPPOSED	20 m	2 m	–	EGCO-19 (p. 469)	BPO-19 (p.493)	49201
M186EQ Emitter			4-Pin Euro QD				
M18SN6R			2 m	NPN			
M18SN6RQ			4-Pin Euro QD				
M18SP6R			2 m	PNP			
M18SP6RQ			4-Pin Euro QD				
M18SN6L	 RETRO	2 m†	2 m	NPN	EGCR-27 (p. 472)	BPR-26 (p. 496)	
M18SN6LQ			4-Pin Euro QD				
M18SP6L			2 m	PNP			
M18SP6LQ			4-Pin Euro QD				
M18SN6LP	 POLAR RETRO	2 m†	2 m	NPN	EGCR-28 (p. 472)	BPR-27 (p. 496)	
M18SN6LPQ			4-Pin Euro QD				
M18SP6LP			2 m	PNP			
M18SP6LPQ			4-Pin Euro QD				
M18SN6FF25	 FIXED-FIELD	0 - 25 mm Cutoff	2 m	NPN	EGCF-12 (p. 482)	—	
M18SN6FF25Q			4-Pin Euro QD				
M18SP6FF25			2 m	PNP			
M18SP6FF25Q			4-Pin Euro QD				
M18SN6FF50		0 - 50 mm Cutoff	2 m	NPN	EGCF-13 (p. 482)	—	
M18SN6FF50Q			4-Pin Euro QD				
M18SP6FF50			2 m	PNP			
M18SP6FF50Q			4-Pin Euro QD				
M18SN6FF100		0 - 100 mm Cutoff	2 m	NPN	EGCF-14 (p. 482)	—	
M18SN6FF100Q			4-Pin Euro QD				
M18SP6FF100			2 m	PNP			
M18SP6FF100Q			4-Pin Euro QD				
M18SN6D	 DIFFUSE	100 mm	2 m	NPN	EGCD-30 (p. 476)	BPD-30 (p. 499)	
M18SN6DQ			4-Pin Euro QD				
M18SP6D			2 m	PNP			
M18SP6DQ			4-Pin Euro QD				
M18SN6DL		300 mm	2 m	NPN	EGCD-31 (p. 476)	BPD-31 (p. 499)	
M18SN6DLQ			4-Pin Euro QD				
M18SP6DL			2 m	PNP			
M18SP6DLQ			4-Pin Euro QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **M18SN6D W/30**). A model with a QD requires a mating cable (see page 412).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

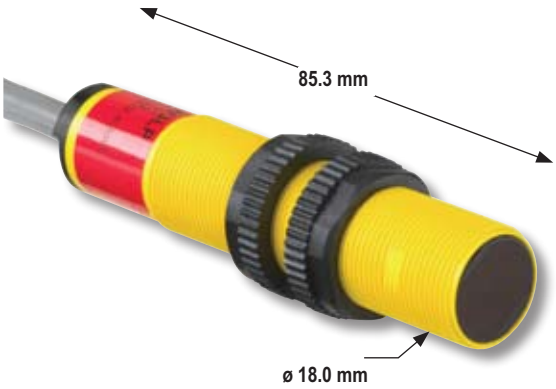
S18 and M18 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Non-polarized Retroreflective:** 25 mA **Fixed-field:** 35 mA **Diffuse:** 25 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON, 1.5 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 3 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 750 microseconds. Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power is ON **Green flashing:** output overloaded **Yellow ON steady:** Light Operate (LO) output is energized **Yellow flashing:** excess gain marginal (1-1.5x) in light condition, LO output energized
Construction	**M18 models:** stainless steel housing **S18 models:** thermoplastic polyester housing Lenses are polycarbonate or acrylic; S18 and M18 models come with two jam nuts.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	**S18 and M18 models:** CE **S18 models:** CSA® UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 520) **NPN Models:** DC05 (p. 521) **PNP Models:** DC06 (p. 521)

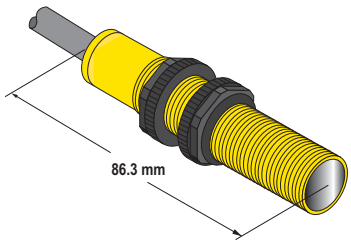
S18 AC Sensors

- *18 mm thermoplastic polyester threaded barrel sensor*
- *Dual LED indicators*
- *20 to 250V ac (3-wire hookup)*
- *Solid-state switch output, maximum load 300 mA*

MORE INFO ONLINE Detailed Dimensions



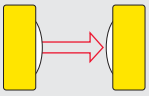
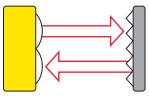
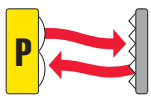
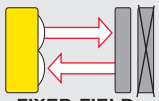
Opposed, Non-polarized
Retroreflective and Diffuse Models
Suffix E, R, L and D



Polarized Retroreflective
and Fixed-field Models
Suffix LP and FF

S18, 20-250V ac

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
S183E Emitter	 OPPOSED	20 m	2 m	—	EGCO-18 (p. 469)	BPO-18 (p. 493)	121521
S183EQ1 Emitter			4-Pin Micro QD				
S18AW3R			2 m	LO			
S18AW3RQ1			4-Pin Micro QD				
S18RW3R			2 m	DO			
S18RW3RQ1			4-Pin Micro QD				
S18AW3L	 RETRO	2 m†	2 m	LO	EGCR-25 (p. 472)	BPR-24 (p. 496)	
S18AW3LQ1			4-Pin Micro QD				
S18RW3L			2 m	DO			
S18RW3LQ1			4-Pin Micro QD				
S18AW3LP	 POLAR RETRO	2 m†	2 m	LO	EGCR-26 (p. 472)	BPR-25 (p. 496)	
S18AW3LPQ1			4-Pin Micro QD				
S18RW3LP			2 m	DO			
S18RW3LPQ1			4-Pin Micro QD				
S18AW3FF25	 FIXED-FIELD	0 - 25 mm Cutoff	2 m	LO	EGCF-9 (p. 482)	—	
S18AW3FF25Q1			4-Pin Micro QD				
S18RW3FF25			2 m	DO			
S18RW3FF25Q1			4-Pin Micro QD				
S18AW3FF50		0 - 50 mm Cutoff	2 m	LO	EGCF-10 (p. 482)	—	
S18AW3FF50Q1			4-Pin Micro QD				
S18RW3FF50			2 m	DO			
S18RW3FF50Q1			4-Pin Micro QD				
S18AW3FF100		0 - 100 mm Cutoff	2 m	LO	EGCF-11 (p. 482)	—	
S18AW3FF100Q1			4-Pin Micro QD				
S18RW3FF100			2 m	DO			
S18RW3FF100Q1			4-Pin Micro QD				

* ⇨ Infrared LED ➡ Visible Red LED

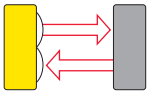
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S18AW3LP W/30**). A model with a QD requires a mating cable (see page 419).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

More on next page

S18, 20-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
S18AW3D	 DIFFUSE	100 mm	2 m	LO	EGCD-28 (p. 476)	BPD-28 (p. 499)	121521
S18AW3DQ1			4-Pin Micro QD				
S18RW3D			2 m	DO			
S18RW3DQ1			4-Pin Micro QD				
S18AW3DL		300 mm	2 m	LO	EGCD-29 (p. 476)	BPD-29 (p. 499)	
S18AW3DLQ1			4-Pin Micro QD				
S18RW3DL			2 m	DO			
S18RW3DLQ1			4-Pin Micro QD				

* ⇨ Infrared LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **S18AW3D W/30**). A model with a QD requires a mating cable (see page 419).

S18 AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz). **Average current:** 20 mA. **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model. **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 µA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON, 8 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 16 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Yellow ON steady:** light sensed **Yellow flashing:** excess gain marginal (1-1.5x) in light condition
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cables are ordered separately. See page 419.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 525) **Other Cabled Models:** AC05 (p. 526) **QD Emitters:** AC07 (p. 526) **Other QD Models:** AC06 (p. 526)

T18

18 mm Threaded Right-Angle Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments on most models
- T-style plastic housing with 18 mm threaded lens mount
- Available in opposed, retroreflective, diffuse and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments
- Uses innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

OPPOSED
RETRO
POLAR RETRO
DIFFUSE
FIXED-FIELD
BRACKETS PAGE 371
QD CABLES 4-Pin Euro + 4-Pin Micro PAGE 412 & 419
REFLECTORS PAGE 425
APERTURES PAGE 443

T18 DC Sensors

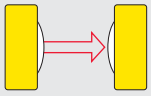
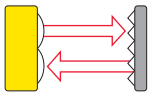
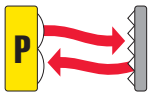
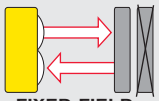
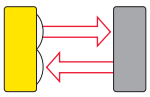
- *Dual-LED multi-function indicators*
- *Popular 18 mm threaded lens mount*
- *10 to 30V dc with NPN or PNP outputs*
- *2 m or 9 m attached cable, or Euro-style quick-disconnect*

MORE INFO ONLINE Detailed Dimensions

DC Sensors (all models)

T18, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
T186E Emitter	 OPPOSED	20 m	2 m	–	EGCO-20 (p. 469)	BPO-20 (p. 493)	121526
T186EQ Emitter			4-Pin Euro QD				
T18SN6R			2 m	NPN			
T18SN6RQ			4-Pin Euro QD				
T18SP6R			2 m	PNP			
T18SP6RQ			4-Pin Euro QD				
T18SN6L	 RETRO	2 m†	2 m	NPN	EGCR-29 (p. 472)	BPR-28 (p. 496)	
T18SN6LQ			4-Pin Euro QD				
T18SP6L			2 m	PNP			
T18SP6LQ			4-Pin Euro QD				
T18SN6LP	 POLAR RETRO	2 m†	2 m	NPN	EGCR-30 (p. 472)	BPR-29 (p. 496)	
T18SN6LPQ			4-Pin Euro QD				
T18SP6LP			2 m	PNP			
T18SP6LPQ			4-Pin Euro QD				
T18SN6FF25	 FIXED-FIELD	0 - 25 mm Cutoff	2 m	NPN	EGCF-15 (p. 482)	—	
T18SN6FF25Q			4-Pin Euro QD				
T18SP6FF25			2 m	PNP			
T18SP6FF25Q			4-Pin Euro QD				
T18SN6FF50		0 - 50 mm Cutoff	2 m	NPN	EGCF-16 (p. 482)	—	
T18SN6FF50Q			4-Pin Euro QD				
T18SP6FF50			2 m	PNP			
T18SP6FF50Q			4-Pin Euro QD				
T18SN6FF100		0 - 100 mm Cutoff	2 m	NPN	EGCF-17 (p. 483)	—	
T18SN6FF100Q			4-Pin Euro QD				
T18SP6FF100			2 m	PNP			
T18SP6FF100Q			4-Pin Euro QD				
T18SN6D	 DIFFUSE	500 mm	2 m	NPN	EGCD-32 (p. 476)	BPD-32 (p. 499)	
T18SN6DQ			4-Pin Euro QD				
T18SP6D			2 m	PNP			
T18SP6DQ			4-Pin Euro QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **T18SN6L W/30**). A model with a QD requires a mating cable (see page 412).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

T18 DC Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Non-polarized Retroreflective:** 25 mA **Diffuse:** 25 mA **Fixed-field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON, 1.5 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 3 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time
Adjustments	T18 Series infrared non-polarized retroreflective and diffuse mode models (only) have a single-turn rear-panel SENSITIVITY control for adjustment of system gain (turn clockwise to increase)
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 750 microseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** Light Operate (LO) output energized **Yellow flashing:** excess gain marginal (1-1.5x) in light condition, LO output energized
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 520) **NPN Models:** DC05 (p. 521) **PNP Models:** DC06 (p. 521)

T18 AC Sensors

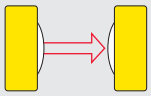
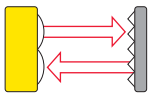
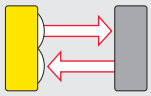
- *Dual-LED multi-function indicators*
- *Popular 18 mm threaded barrel*
- *20 to 250V ac with solid-state outputs*
- *2 m or 9 m attached cable, or Micro-style quick-disconnect*

MORE INFO ONLINE Detailed Dimensions

AC Sensors (all models)

T18, 20-250V ac

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
T183E Emitter	 OPPOSED	20 m	2 m	–	EGCO-20 (p. 469)	BPO-20 (p. 493)	121525
T183EQ1 Emitter			4-Pin Micro QD				
T18AW3R			2 m	LO			
T18AW3RQ1			4-Pin Micro QD				
T18RW3R			2 m	DO			
T18RW3RQ1			4-Pin Micro QD				
T18AW3L	 RETRO	2 m†	2 m	LO	EGCR-29 (p. 472)	BPR-28 (p. 496)	
T18AW3LQ1			4-Pin Micro QD				
T18RW3L			2 m	DO			
T18RW3LQ1			4-Pin Micro QD				
T18AW3LP	 POLAR RETRO	2 m†	2 m	LO	EGCR-30 (p. 472)	BPR-29 (p. 496)	
T18AW3LPQ1			4-Pin Micro QD				
T18RW3LP			2 m	DO			
T18RW3LPQ1			4-Pin Micro QD				
T18AW3D	 DIFFUSE	300 mm	2 m	LO	EGCD-33 (p. 477)	BPD-33 (p. 500)	
T18AW3DQ1			4-Pin Micro QD				
T18RW3D			2 m	DO			
T18RW3DQ1			4-Pin Micro QD				

* ⇨ Infrared LED ➡ Visible Red LED

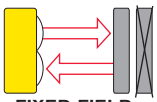
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **T18AW3L W/30**). A model with a QD requires a mating cable (see page 419).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

More on next page

T18, 20-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
T18AW3FF25	 FIXED-FIELD	0 - 25 mm Cutoff	2 m	LO	EGCF-15 (p. 482)	—	121525
T18AW3FF25Q1			4-Pin Micro QD				
T18RW3FF25			2 m	DO			
T18RW3FF25Q1			4-Pin Micro QD				
T18AW3FF50		0 - 50 mm Cutoff	2 m	LO	EGCF-16 (p. 482)	—	
T18AW3FF50Q1			4-Pin Micro QD				
T18RW3FF50			2 m	DO			
T18RW3FF50Q1			4-Pin Micro QD				
T18AW3FF100		0 - 100 mm Cutoff	2 m	LO	EGCF-17 (p. 483)	—	
T18AW3FF100Q1			4-Pin Micro QD				
T18RW3FF100			2 m	DO			
T18RW3FF100Q1			4-Pin Micro QD				

* ⇨ Infrared LED

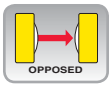
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **T18AW3FF25 W/30**). A model with a QD requires a mating cable (see page 419).

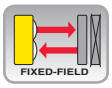
T18 AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz) **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; Light Operate (LO) or Dark Operate (DO), depending on model. **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 µA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON, 8 milliseconds OFF **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 16 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 4 milliseconds Repeatability and response are independent of signal strength.
Adjustments	T18 Series infrared non-polarized retroreflective and diffuse mode models (only) have a single-turn rear-panel SENSITIVITY control for adjustment of system gain (turn clockwise to increase)
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Yellow ON steady:** light sensed **Yellow flashing:** excess gain marginal (1-1.5x) in light condition
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4 pin Micro-style quick-disconnect fitting. QD cables are ordered separately. See page 419.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 525) **Other cabled Models:** AC05 (p. 526) **QD Emitters:** AC07 (p. 526) **Other QD Models:** AC06 (p. 526)

Q25
Right-Angle Rectangular Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in opposed, retroreflective or fixed-field modes in rectangular 25 mm plastic housing with 18 mm threaded mounting base
- Completely epoxy-encapsulated for superior durability, even in harsh sensing environments
- Uses an innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)





BRACKETS
PAGE 371

QD CABLES
4-Pin Euro +
4-Pin Micro
PAGE 412 & 419

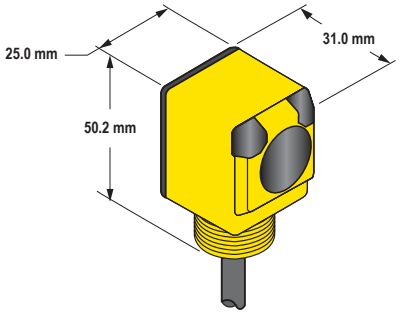
REFLECTORS
PAGE 425

Q25 Sensors

- *Yellow LED output indicator*
- *18 mm threaded mounting base*
- *2 m or 9 m attached cable, or Euro- or Micro-style quick-disconnect*
- *Green LED power indicator*

Opposed and Retroreflective Models
Suffix E, R and LP

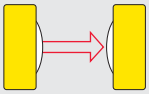
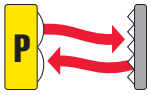
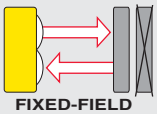
MORE INFO ONLINE Detailed Dimensions



Fixed-field Models
Suffix FF

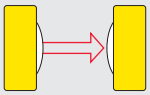
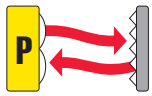
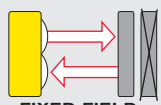
Q25, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q256E Emitter	 OPPOSED	20 m	2 m	–	EGCO-21 (p. 469)	BPO-21 (p. 493)	121518
Q256EQ Emitter			4-Pin Euro QD				
Q25SN6R			2 m	NPN			
Q25SN6RQ			4-Pin Euro QD				
Q25SP6R			2 m	PNP			
Q25SP6RQ			4-Pin Euro QD				
Q25SN6LP	 POLAR RETRO	2 m†	2 m	NPN	EGCR-31 (p. 472)	BPR-30 (p. 496)	
Q25SN6LPQ			4-Pin Euro QD				
Q25SP6LP			2 m	PNP			
Q25SP6LPQ			4-Pin Euro QD				
Q25SN6FF25	 FIXED-FIELD	0 - 25 mm Cutoff	2 m	NPN	EGCF-18 (p. 483)	—	
Q25SN6FF25Q			4-Pin Euro QD				
Q25SP6FF25			2 m	PNP			
Q25SP6FF25Q			4-Pin Euro QD				
Q25SN6FF50		0 - 50 mm Cutoff	2 m	NPN	EGCF-19 (p. 483)	—	
Q25SN6FF50Q			4-Pin Euro QD				
Q25SP6FF50			2 m	PNP			
Q25SP6FF50Q			4-Pin Euro QD				
Q25SN6FF100		0 - 100 mm Cutoff	2 m	NPN	EGCF-20 (p. 483)	—	
Q25SN6FF100Q			4-Pin Euro QD				
Q25SP6FF100			2 m	PNP			
Q25SP6FF100Q			4-Pin Euro QD				

Q25, 20-250V ac

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q253E Emitter	 OPPOSED	20 m	2 m	–	EGCO-21 (p. 469)	BPO-21 (p. 493)	121517
Q253EQ1 Emitter			4-Pin Micro QD				
Q25AW3R			2 m	LO			
Q25AW3RQ1			4-Pin Micro QD				
Q25RW3R			2 m	DO			
Q25RW3RQ1			4-Pin Micro QD				
Q25AW3LP	 POLAR RETRO	2 m†	2 m	LO	EGCR-31 (p. 472)	BPR-30 (p. 496)	
Q25AW3LPQ1			4-Pin Micro QD				
Q25RW3LP			2 m	DO			
Q25RW3LPQ1			4-Pin Micro QD				
Q25AW3FF25	 FIXED-FIELD	0 - 25 mm Cutoff	2 m	LO	EGCF-18 (p. 483)	—	
Q25AW3FF25Q1			4-Pin Micro QD				
Q25RW3FF25			2 m	DO			
Q25RW3FF25Q1			4-Pin Micro QD				

* ⇨ Infrared LED ➡ Visible Red LED

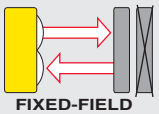
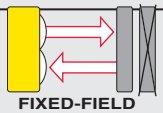
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q25AW3LP W/30**). A model with a QD requires a mating cable (see pages 412 and 419).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories for more information.

More on next page

Q25, 20-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q25AW3FF50	 FIXED-FIELD	0 - 50 mm Cutoff	2 m	LO	EGCF-19 (p. 483)	—	121517
Q25AW3FF50Q1			4-Pin Micro QD				
Q25RW3FF50			2 m	DO			
Q25RW3FF50Q1			4-Pin Micro QD				
Q25AW3FF100	 FIXED-FIELD	0 - 100 mm Cutoff	2 m	LO	EGCF-20 (p. 483)	—	
Q25AW3FF100Q1			4-Pin Micro QD				
Q25RW3FF100			2 m	DO			
Q25RW3FF100Q1			4-Pin Micro QD				

* ⇨ Infrared LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q25AW3FF50 W/30**). A model with a QD requires a mating cable (see page 419).

Q25 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Fixed-field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary dc switch; NPN (current sinking) or PNP (current sourcing), depending on model. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup. When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON, 1.5 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 3 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs do not conduct during this time
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective and Fixed-field:** 750 microseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** Light Operate (LO) output energized **Yellow flashing:** excess gain marginal (1-1.5x) in light condition, LO output energized
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 520) **NPN Models:** DC05 (p. 521) **PNP Models:** DC06 (p. 521)

Q25 AC Specifications	
Supply Voltage and Current	20 to 250V ac (50/60 Hz. **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; Choose Light Operate (LO) or Dark Operate (DO), depending on model. **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **Off-state leakage current:** less than 100 mA **On-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON, 8 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 16 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up
Repeatability	**Opposed:** 2 milliseconds; **Polarized Retroreflective and Fixed-field:** 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Yellow ON steady:** light sensed **Yellow flashing:** excess gain marginal (1-1.5x) in light condition
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P, DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cables are ordered separately. See page 419.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE CSA® UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 525) **Other Cabled Models:** AC05 (p. 526) **QD Emitters:** AC07 (p. 526) **Other QD Models:** AC06 (p. 526)

Midsize Sensors

WORLD-BEAM® QS30 page 112

- Universal housing offers 30 mm threaded lens or side mount.
- Opposed, retroreflective, diffuse, fixed-field and adjustable-field modes are available.
- High-power opposed sensing is available with some models.
- Popular supply options include dc or ac/dc universal power.
- *Expert*™ models offer push-button TEACH-mode setup.
- New models to detect water, or liquids that contain water.
- Cable choice is 2 m integral or Euro-style quick-disconnect.
- Two bright LED indicators are visible from 360 degrees.

S30 page 121
- EZ-BEAM® technology for reliable sensing without adjustments
- 30 mm plastic threaded barrel sensor in opposed, retroreflective and fixed-field modes
- Completely epoxy encapsulated
- Models for ac or dc power

Q40 page 133
- Rectangular 40 mm plastic housing with 30 mm threaded mounting base in opposed, retroreflective and fixed-field modes
- Models for ac or dc power
- Completely epoxy encapsulated
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments

SM30/SMI30 page 125
- Economical, easy-to-use opposed mode barrel sensors
- Models certified as intrinsically safe for use in hazardous atmospheres
- Quad-ring sealed lens to eliminate capillary leakage
- Very high excess gain; 200 m sensing range

PicoDot® page 137
- Convergent and retroreflective mode laser sensors for accurate position detection, inspection or counting
- Convergent models with precise 0.25 mm focus point beam width
- Retroreflective models for sensing small objects at close range or larger objects to 10.6 m

T30 page 129
- Right-angle T-style housing with 30 mm threaded lens
- Completely epoxy encapsulated
- Models for ac or dc power and bus network compatible connection
- Specially designed EZ-BEAM® style optics and electronics for reliable sensing without adjustments

QM42/QMT42 page 140
- Rugged low-cost dc sensor in die-cast housing
- Outstanding immunity to noise
- Opposed, retroreflective, diffuse, fixed-field, adjustable-field and plastic fiber models

WORLD-BEAM®

QS30 Series Universal Sensors

- Features compact universal housing with 30 mm threaded lens or side mounts
- Available with Class 1 visible laser in diffuse and retroreflective models, and Class 2 in diffuse models, and high-power infrared in opposed mode and adjustable-field background suppression
- Offers easy push-button *Expert*™ configuration in laser, adjustable-field and visible red diffuse models
- Available in models for detecting water
- Features easy-to-read operating status indicators
- Provides bipolar discrete NPN or PNP outputs

OPPOSED WATER DETECTION
OPPOSED
RETRO
POLAR RETRO
LASER POLAR RETRO
DIFFUSE
DIFFUSE LASER
FIXED-FIELD
ADJUSTABLE-FIELD
BRACKETS PAGE 371
QD CABLES 5-Pin Euro PAGE 414
REFLECTORS PAGE 425
APERTURES PAGE 444

QS30

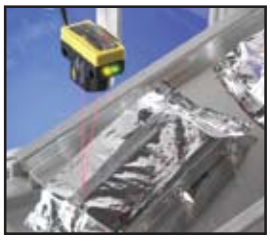
- Large bright output state indicator
- Power and signal indicators visible from 360°
- Precise fixed-field background suppression
- High-power opposed and water detecting models
- Configurable for LO/DO through hookup

QS30 *Expert*™

- Visible red LED or laser for easy alignment
- Adjustable-field, visible red diffuse and laser models
- Push-button configuration
- 8-segment LED display for easy setup

QS30 Laser Diffuse and Retroreflective

- High-performance sensing with visible Class 1 and Class 2 lasers
- 8-segment LED display for easy setup
- Convenient push-button TEACH for fine tuning



QS30 Background Suppression

- Push-button SET adjustable-field background suppression
- Fixed-field model sensing range of 200, 400 or 600 mm
- Accurate and reliable even with low reflectivity targets

QS30 Universal Voltage

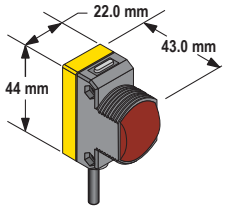
- Universal voltage for use anywhere regardless of supply voltage
- Operation from 12 to 250V dc or 24 to 250V ac
- Convenient SPDT electromechanical relay to switch up to 5 A

WORLD-BEAM® QS30 DC Sensors

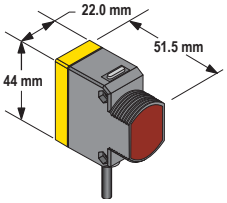
- *Popular 30 mm threaded lens or side mount*
- *Two bright LED indicators visible from 360°*
- *Extra-large Output indicator on some models*
- *IP67 or IP69K environmental rating, depending on model*
- *Choice of 2 or 9 m integral, or 5-pin Euro-style quick-disconnect cable*

Opposed, Retroreflective, Diffuse and Fixed-field Models
Suffix E, R, LP, LV, D and FF

MORE INFO ONLINE Detailed Dimensions



Opposed High-Power Models
Suffix EX and RX

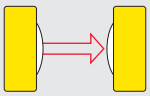
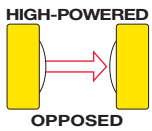
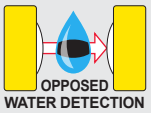


Opposed Water Detector Models
Suffix H2O

QPMA EURO-STYLE • PIGTAIL • PUR CABLE CALL FACTORY

WORLD-BEAM® QS30, 10-30V dc

MORE INFO ONLINE Download PDF

Model	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS30E Emitter	 OPPOSED	60 m	2 m	—	EGCO-22 (p. 469)	BPO-22 (p. 493)	119165
QS30EQ Emitter			5-pin Euro QD				
QS30R			2 m	Bipolar NPN/PNP			
QS30RQ			5-pin Euro QD				
QS30EX Emitter	 HIGH-POWERED OPPOSED	213 m	2 m	—	EGCO-23 (p. 469)	BPO-23 (p. 493)	115011
QS30EXQ Emitter			5-pin Euro QD				
QS30ARX			2 m	Bipolar NPN/PNP LO			
QS30ARXQ			5-pin Euro QD				
QS30RRX			2 m	Bipolar NPN/PNP DO			
QS30RRXQ			5-pin Euro QD				
QS30EXH2O	 OPPOSED WATER DETECTION	4 m	2 m	—	EGCO-25 (p. 469)	BPO-25 (p. 493)	136166
QS30EXH2OQ5			5-pin Euro Pigtail QD				
QS30ARXH2O			2 m	Bipolar NPN/PNP LO			
QS30ARXH2OQ5			5-pin Euro Pigtail QD				
QS30RRXH2O			2 m	Bipolar NPN/PNP DO			
QS30RRXH2OQ5			5-pin Euro Pigtail QD				

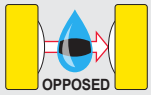
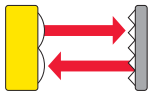
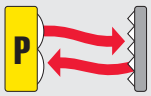
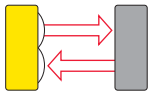
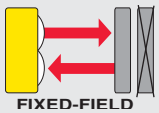
* Visible Red LED Infrared LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **QS30EX W/30).** A QD model requires a mating cable (see page 414).

More on next page

WORLD-BEAM® QS30, 10-30V dc (cont'd)

MORE INFO ONLINE Download PDF

Model	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS30ARH2O	 OPPOSED WATER DETECTION	2 m	2 m	Bipolar NPN/PNP LO	EGCO-25 (p. 469)	BPO-25 (p. 493)	136166
QS30ARH2OQ5			5-pin Euro Pigtail QD				
QS30RRH2O			2 m	Bipolar NPN/PNP DO			
QS30RRH2OQ5			5-pin Euro Pigtail QD QD				
QS30LV	 RETRO	12 m†	2 m	Bipolar NPN/PNP	EGCR-32 (p. 472)	BPR-31 (p. 496)	119165
QS30LVQ			5-pin Euro QD				
QS30LP	 POLAR RETRO	8 m†	2 m		EGCR-33 (p. 473)	BPR-32 (p. 496)	119165
QS30LPQ			5-pin Euro QD				
QS30D	 DIFFUSE	1 m	2 m		EGCD-34 (p. 477)	BPD-34 (p. 500)	119165
QS30DQ			5-pin Euro QD				
QS30FF200	 FIXED-FIELD	200 mm Cutoff	2 m		EGCF-21 (p. 483)	—	119165
QS30FF200Q			5-pin Euro QD				
QS30FF400		400 mm Cutoff	2 m		EGCF-22 (p. 483)	—	
QS30FF400Q			5-pin Euro QD				
QS30FF600		600 mm Cutoff	2 m		EGCF-23 (p. 483)	—	
QS30FF600Q			5-pin Euro QD				

* Visible Red LED Infrared LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **QS30FF200 W/30**). A QD model requires a mating cable (see page 414).

† Retroreflective range is specified using one model BRT-84 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

WORLD-BEAM® QS30 DC Specifications

Supply Voltage	**Emitters (High-Powered):** 10 to 30V dc (10% max. ripple) at less than 70 mA **Receivers (High-Powered and water):** 10 to 30V dc (10% max. ripple) at less than 22 mA **Receivers (Water):** 10 to 30V dc (10% max. ripple) at less than 50 mA (exclusive of load) **All others:** 10 to 30V dc (10% max. ripple) at 45 mA, (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity, over voltage, and transient voltages
Delay at Power-Up	100 milliseconds; outputs do not conduct during this time (except Opposed High-Powered)
Output Configuration	**Bipolar:** One PNP (current sourcing) and one NPN (current sinking); light operate (LO) or dark operate (DO) selectable or configurable (depending on model).
Output Rating	**Opposed (High-Power):** 100 mA max. load **OFF-state leakage current:** less than 200 µA **ON-state saturation voltage:** less than 1.5V at 100 mA; less than 900 mV at 10 mA **All others:** 100 mA max. each output at 25° C **OFF-state leakage current: NPN:** less than 200 µA @ 30V dc **PNP:** less than 10 µA **ON-state saturation voltage: NPN:** less than 1.6V @ 100 mA **PNP:** less than 2.0V @ 100 mA
Output Protection	Protected against output short-circuit, continuous overload, transient over-voltages, and false pulse on power-up

More on next page

WORLD-BEAM® QS30 DC Specifications (cont'd)

Output Response Time	**Opposed:** 5 milliseconds ON/OFF **Opposed (High-Power):** 30 milliseconds ON/OFF **Opposed (Water):** less than 1 millisecond **Fixed-field:** 2 milliseconds ON/OFF **All others:** 2 milliseconds ON/OFF
Repeatability	**Opposed:** not applicable **Opposed (High-Power):** 5 milliseconds **Fixed-field models:** 500 microseconds **All others:** 500 microseconds
Adjustments	**Opposed (High-Power and Water):** Light Operate/Dark Operate–dependent on model selected Frequency via gray wire: **A:** Gray (+) **B:** Gray (-) **Emitter only:** LED inhibit, via white wire White (-) turns emitter LED OFF (to allow verification of sensor operation) **Opposed, Retroreflective, and Polarized Retroreflective:** Selectable Light/Dark Operate is achieved via the gray wire. **Light Operate** - Low (0 to 3V)* **Dark Operate** - High (open or 5 to 30V)* **Diffuse and Fixed-field:** **Light Operate** - High (open or 5 to 30V)* **Dark Operate** - Low (0 to 3V)* **Diffuse, Retroreflective, and Polarized Retroreflective (only):** Single-turn sensitivity (Gain) adjustment potentiometer * Input impedance 10 kΩ
Indicators	**Opposed (High-Power)*:** 4-LED Signal Strength light bar **Green LED:** Power ON **Frequency indicator:** (A or B) **Receiver only: Yellow LED:** Output conducting **All others (except emitters):** Large, oval LED indicator on sensor back **Yellow ON steady:** Output conducting 2 indicators on top **Green ON Steady:** Power ON **Green Flashing:** Output overloaded (except receivers) **Yellow ON steady:** Light sensed **Yellow Flashing:** Marginal excess gain (1.0 to 1.5x excess gain) *See data sheets for more detailed information
Construction	PC/ABS blend plastic housing; acrylic lens cover
Environmental Rating	**Opposed (High-Power): Cabled:** IP67; NEMA 6P **QD:** IP69K; DIN 40050-9 **Opposed (Water):** IEC IP67 (NEMA 6) and 1200 PSI washdown NEMA ICS 5, Annex F-2002 **All others:** IP67; NEMA 6
Connections	5-conductor 2 or 9 m PVC cable, or 5-pin integral Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 414.
Operating Conditions	**Opposed (High-Power and Water):** -20° to +60° C **Relative humidity:** 95% (non-condensing) **All others:** -20° to +70° C **Relative humidity:** 95% (non-condensing)
Vibration and Mechanical Shock	All models (except Opposed High-Power) meet Mil. Std. 202F requirements. Method 201A (Vibration: 10 to 60Hz max. double amplitude 0.06", max. acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half sine wave.
Certifications	CE
Hookup Diagrams	**High-Powered and Water models: Emitters:** DC09 (p. 522) **Receivers:** DC10 (p. 522) **All other models:** **Emitters:** DC02 (p. 520) **Bipolar NPN/PNP:** DC08 (p. 521)

WORLD-BEAM® QS30 *Expert*™ Sensors

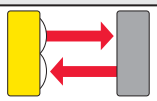
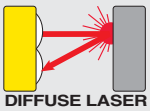
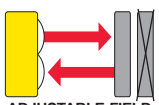
- *Popular 30 mm lens or side mount*
- *Two bright LED indicators visible from 360°*
- *8-segment LED display for easy setup*
- *Simple push-button programming*
- *Choice of 2 or 9 m integral, or 5-pin Euro-style quick-disconnect cable*
- *High-performance sensor with red laser or LED*
- *Laser polarized retroreflective models with high gain or high sensitivity*

MORE INFO ONLINE Detailed Dimensions

Laser Retroreflective, LED Diffuse, Laser Diffuse and Adjustable-field Models Suffix LLP, LLPC, EDV, LD, LDL, and AF

WORLD-BEAM® QS30 *Expert*™, 10-30V dc

MORE INFO ONLINE Download PDF

Model	Sensing Mode/LED*	Laser Class	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS30LLP	 LASER POLAR RETRO	Class 1	0.2-18 m†	2 m	Bipolar NPN/PNP	EGCR-34 & EGCR-35 (p. 473)	—	112355
QS30LLPQ				5-pin Euro QD				
QS30LLPC				2 m				
QS30LLPCQ				5-pin Euro QD				
QS30EDV	 DIFFUSE	—	**High-Speed:** 1100 mm **Normal:** 1400 mm	2 m		EGCD-37 (p. 477)	BPD-37 (p. 500)	127755
QS30EDVQ				5-pin Euro QD				
QS30LD	 DIFFUSE LASER	Class 1	400 mm	2 m		EGCD-35 (p. 477)	BPD-35 (p. 500)	109027
QS30LDQ				5-pin Euro QD				
QS30LDL		Class 2	800 mm	2 m		EGCD-36 (p. 477)	BPD-36 (p. 500)	
QS30LDLQ				5-pin Euro QD				
QS30AF	 ADJUSTABLE-FIELD	—	50-300 mm Cutoff	2 m		ECGA-4 (p. 481) Cutoff Point Deviation CPDC-4 & CPDC-5 (p. 517)	—	111384
QS30AFQ				5-pin Euro QD				

* Visible Red LED Visible Red Laser

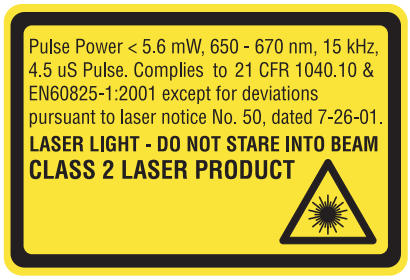
** For 9 m cable, add **W/30** to the 2 m model number (example, **QS30LLP W/30**). A QD model requires a mating cable (see page 414).

† Retroreflective range is specified using one model BRT-36X40BM retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. BRT-TVHG-2X2 and BRT-36X40BM are included. See Accessories for more information.

WORLD-BEAM® QS30 *Expert*™ Specifications	
Supply Voltage and Current	**Adjustable-field LED:**10 to 30V dc (10% max. ripple) at less than 45 mA, exclusive of load **Diffuse LED:** 10 to 30V dc (10% max. ripple) at less than 25 mA, exclusive of load **Diffuse Laser and Retroreflective Laser:** 10 to 30V dc (10% max. ripple @ 10% duty cycle) @ 35 mA max current, exclusive of load
Sensing Beam	**LED models:** 660 nm visible Red **Laser models:** **Class 1:** 650 nm visible Red **Class 2:** 658 nm visible Red
Beam size at Aperture	**Diffuse Laser:** Approx. 2 mm **Retroreflective Laser:** Approx. 3 mm
Supply Protection Circuitry	Protected against reverse polarity, over voltage and transient voltages
Output Configuration	**Bipolar:** One NPN (current sinking) and one PNP (current sourcing); light operate (LO) or dark operate (DO) configurable
Output Rating	**Adjustable-field LED and Diffuse LED:** 150 mA max. load (derate ~ 1 mA/° C above 25° C) **OFF-state leakage current:** less than 50 µA @ 30V dc **ON-state saturation voltage:** **NPN:** less than 200 mV @ 10 mA; less than 1V @ 150 mA **PNP:** less than 1.25V @ 10 mA; less than 2V @ 150 mA **Diffuse Laser and Retroreflective Laser:** 150 mA max. load **OFF-state leakage current:** less than 10 µA at 30V dc **ON-state saturation voltage:** **NPN:** less than 1.0V @ 150 mA load **PNP:** less than 2.0V @ 150 mA load
Output Protection Circuitry	Protected against output short-circuit, continuous overload, transient over-voltages and false pulse on power-up
Output Response Time	**Adjustable-field LED:** 1 millisecond **Diffuse LED:** **High-speed mode:** 300 microseconds **Normal mode:** 1.8 milliseconds **Diffuse Laser and Retroreflective Laser:** 500 microseconds
Delay at Power-up	**Adjustable-field LED and Diffuse LED:** 250 milliseconds; outputs do not conduct during this time. **Diffuse Laser and Retroreflective Laser:** 1 second max.; outputs do not conduct during this time.
Repeatability	**Adjustable-field LED:** 170 microseconds **Diffuse LED:** **High-speed mode:** 100 microseconds **Normal mode:** 150 microseconds **Diffuse Laser and Retroreflective Laser:** 75 microseconds
Hysteresis	See chart HC-1 on page 512.
Adjustments	2 push buttons and remote wire • Push-button SET programming; manually adjust (+/-) cutoff (Adjustable-field LED and Retroreflective Laser models) • *Expert*™ TEACH programming (two-point static, dynamic and single-point static) for Diffuse Laser and Diffuse LED models • Manually adjust (+/-) cutoff (push buttons only) • NO/NC or LO/DO and OFF-delay configuration options (push buttons only) • Push-button lockout (from remote wire only)
Indicators	**8-segment Red bargraph*:** distance relative to cutoff point **2 LED indicators on top:** Green and Yellow **Green:** Power ON **Yellow:** Output conducting * See data sheets for more detailed information.
Construction	PC/ABS housing with acrylic lens cover
Environmental Rating	IP67; NEMA 6

More on next page

WORLD-BEAM® QS30 *Expert*™ Specifications (cont'd)	
Connections	5-conductor 2 m or 9 m attached PVC cable, or 5-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 414.
Operating Conditions	**Adjustable-field LED and Diffuse LED:** **Temperature:** -10° to +55° C **Relative humidity:** 95% @ 55° C (non-condensing) **Diffuse Laser and Retroreflective Laser:** **Temperature:** -10° to +50° C **Relative humidity:** 95% @ 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz max., double amplitude 0.06-inch acceleration 10G). Also meets IEC 947-5-2 requirements: 30G, 11 milliseconds duration, half-sine wave.
Certification	CE
Hookup Diagrams	DC08: (p.521)



Class 1 Lasers
Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

For safe laser use:
- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Locate open laser beam paths either above or below eye level, where practical.

Class 2 Lasers
Lasers that emit visible radiation in the wavelength range from 400 to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

For safe laser use:
- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Locate open laser beam paths either above or below eye level, where practical.

WORLD-BEAM® QS30 Universal Voltage Sensors

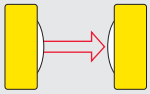
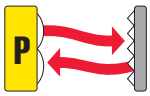
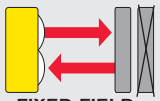
- *Popular 30 mm threaded lens or side mount*
- *Two bright LED indicators visible from 360°*
- *Extra-large Output indicator on some models*
- *IP67 environmental rating*
- *SPDT e/m relay output*

MORE INFO ONLINE Detailed Dimensions

Opposed, Retroreflective and Fixed-field Models Suffix R, E, LP and FF

WORLD-BEAM® QS30 Universal Voltage, 12-250V dc or 24-250V ac

MORE INFO ONLINE Download PDF

Model	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QS303E Emitter	 OPPOSED	60 m	2 m	—	EGCO-24 (p. 469)	BPO-24 (p. 493)	119166
QS30VR3R			2 m	SPDT e/m Relay			
QS30VR3LP	 POLAR RETRO	8 m†	2 m		EGCR-36 (p. 473)	BPR-33 (p. 497)	
QS30VR3FF200	 FIXED-FIELD	200 mm Cutoff	2 m		EGCF-24 (p. 483)	—	
QS30VR3FF400		400 mm Cutoff	2 m		EGCF-25 (p. 483)	—	
QS30VR3FF600		600 mm Cutoff	2 m		EGCF-26 (p. 483)	—	

* ⇨ Infrared LED ➡ Visible Red LED

** Connection Options:
Cabled models: For 9 m cable, add **W/30** to the 2 m model number (example, **QS303E W/30**).
QD models: Available with modified specification, contact factory at 1-888-373-6767.

† Retroreflective range is specified using model BRT-84 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

WORLD-BEAM® QS30 Universal Voltage Specifications	
Supply Voltage	24 to 250V ac, 50/60 Hz or 12 to 250V dc (1.0 watt max.)
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	SPDT (Single-Pole Double-Throw) electromechanical relay output (all models except emitters)
Output Rating	**Max. Switching Power (resistive load):** 150 W, 1250 VA **Max. Switching Voltage (resistive load):** 250V ac; 125V dc **Max. Switching Current (resistive load):** 5 A @ 250V ac; 5 A @ 30V dc derated to 200 mA @ 125V dc **Min. Voltage and Current:** 5V dc, 10 mA **Mechanical life of relay:** 50 million operations **Electrical life of relay at full resistive load:** 100,000 operations
Output Response	15 milliseconds ON/OFF
Delay at Power-Up	100 millisecond delay; output does not conduct during this time.
Indicators	**2 LED indicators on sensor top:** **Green ON steady:** Power ON **Yellow ON steady:** Light sensed **Yellow flashing:** Marginal excess gain (1.0 to 1.5X excess gain) **Large, oval LED indicator on sensor back (except emitters):** **Yellow ON steady:** Output conducting
Construction	ABS housing; Acrylic lens cover
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m 5-wire PVC cable
Operating Conditions	**Temperature:** -20° to +70° C **Relative humidity:** 95% @ 50° C (non-condensing)
Certifications	CE
Hookup Diagrams	**Emitters:** UN02 (p. 528) **All other models:** UN01 (p. 528)

S30

30 mm Threaded-Barrel Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in 30 mm plastic threaded barrel sensor in opposed, retroreflective and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh environments
- Uses innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

OPPOSED
POLAR RETRO
FIXED-FIELD
BRACKETS PAGE 371
QD CABLES 4-Pin Euro + 4-Pin Micro PAGE 412 & 419
REFLECTORS PAGE 425

S30 DC Sensors

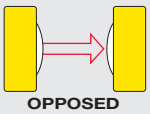
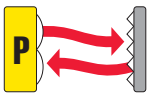
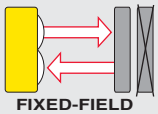
- *Dual-LED multi-function indicators*
- *Popular 30 mm threaded barrel*
- *10 to 30V dc with NPN or PNP outputs*
- *2 m or 9 m attached cable, or Euro-style quick-disconnect*

MORE INFO ONLINE Detailed Dimensions

Opposed, Polarized Retroreflective and Fixed-field Models
Suffix E, R, LP and FF

S30, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
S306E Emitter	 OPPOSED	60 m	2 m	–	EGCO-26 (p. 469)	BPO-26 (p. 493)	121520
S306EQ Emitter			4-Pin Euro QD				
S30SN6R			2 m	NPN			
S30SN6RQ			4-Pin Euro QD				
S30SP6R			2 m	PNP			
S30SP6RQ			4-Pin Euro QD				
S30SN6LP	 POLAR RETRO	6 m†	2 m	NPN	EGCR-37 (p. 473)	BPR-34 (p. 497)	
S30SN6LPQ			4-Pin Euro QD				
S30SP6LP			2 m	PNP			
S30SP6LPQ			4-Pin Euro QD				
S30SN6FF200	 FIXED-FIELD	0 - 200 mm Cutoff	2 m	NPN	EGCF-27 (p. 483)	—	
S30SN6FF200Q			4-Pin Euro QD				
S30SP6FF200			2 m	PNP			
S30SP6FF200Q			4-Pin Euro QD				
S30SN6FF400		0 - 400 mm Cutoff	2 m	NPN	EGCF-28 (p. 483)	—	
S30SN6FF400Q			4-Pin Euro QD				
S30SP6FF400			2 m	PNP			
S30SP6FF400Q			4-Pin Euro QD				
S30SN6FF600		0 - 600 mm Cutoff	2 m	NPN	EGCF-29 (p. 483)	—	
S30SN6FF600Q			4-Pin Euro QD				
S30SP6FF600			2 m	PNP			
S30SP6FF600Q			4-Pin Euro QD				

* Infrared LED Visible Red LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **S30SP6LP W/30**). A QD model requires a mating cable (see page 412).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

S30 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Fixed-field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON; 1.5 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 3 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective and Fixed-field:** 750 microseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** Light Operate (LO) energized **Yellow flashing:** excess gain marginal (1-1.5x) in light condition, LO energized
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included.

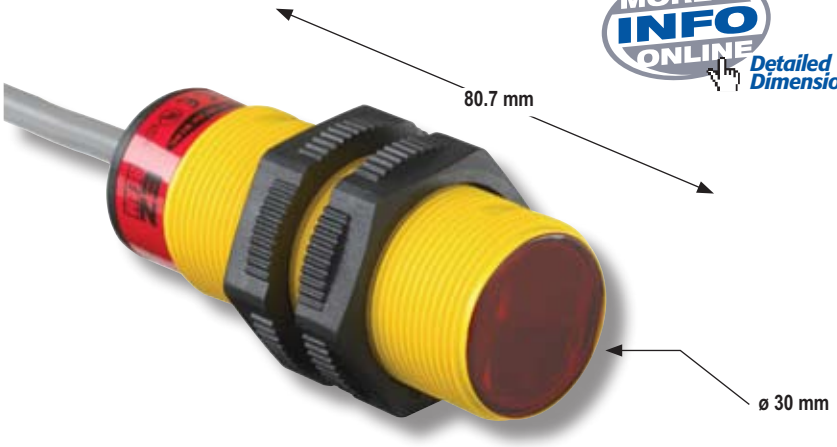
More on next page

S30 DC Specifications (cont'd)	
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE UL LISTED CSA®
Hookup Diagrams	**Emitters:** DC02 (p. 520) **NPN Models:** DC05 (p. 521) **PNP Models:** DC06 (p. 521)

S30 AC Sensors

- *Dual-LED multi-function indicators*
- *Popular 30 mm threaded barrel*
- *20 to 250V ac with solid-state outputs*
- *2 m or 9 m attached cable, or Micro-style quick-disconnect*

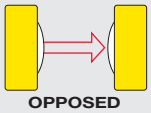
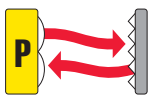
MORE INFO ONLINE Detailed Dimensions



Opposed, Polarized Retroreflective and Fixed-field Models
Suffix E, R, LP and FF

S30, 20-250V ac

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
S303E Emitter	 OPPOSED	60 m	2 m	–	EGCO-26 (p. 469)	BPO-26 (p. 493)	121519
S303EQ1 Emitter			4-Pin Micro QD				
S30AW3R			2 m	LO			
S30AW3RQ1			4-Pin Micro QD				
S30RW3R			2 m	DO			
S30RW3RQ1			4-Pin Micro QD				
S30AW3LP	 POLAR RETRO	6 m†	2 m	LO	EGCR-37 (p. 473)	BPR-34 (p. 497)	
S30AW3LPQ1			4-Pin Micro QD				
S30RW3LP			2 m	DO			
S30RW3LPQ1			4-Pin Micro QD				

* Infrared LED Visible Red LED

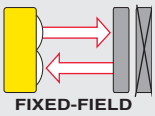
** For 9 m cable, add **W/30** to the 2 m model number (example, **S30AW3LP W/30**). A QD model requires a mating cable (see page 419).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

More on next page

S30, 20-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
S30AW3FF200	 FIXED-FIELD	0 - 200 mm Cutoff	2 m	LO	EGCF-27 (p. 483)	—	121519
S30AW3FF200Q1			4-Pin Micro QD				
S30RW3FF200			2 m	DO			
S30RW3FF200Q1			4-Pin Micro QD				
S30AW3FF400		0 - 400 mm Cutoff	2 m	LO	EGCF-28 (p. 483)	—	
S30AW3FF400Q1			4-Pin Micro QD				
S30RW3FF400			2 m	DO			
S30RW3FF400Q1			4-Pin Micro QD				
S30AW3FF600		0 - 600 mm Cutoff	2 m	LO	EGCF-29 (p. 483)	—	
S30AW3FF600Q1			4-Pin Micro QD				
S30RW3FF600			2 m	DO			
S30RW3FF600Q1			4-Pin Micro QD				

* ⇨ **Infrared LED**

** For 9 m cable, add **W/30** to the 2 m model number (example, **S30AW3FF200 W/30**). A QD model requires a mating cable (see page 419).

S30 AC Specifications

Supply Voltage and Current	20 to 250V ac (50/60 Hz). **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; choose light operate (LO) or dark operate (DO) models; **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 µA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON; 8 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 16 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective and Fixed-field**: 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Yellow steady:** light sensed **Yellow flashing:** excess gain marginal (1-1.5x) in light condition
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; two jam nuts included
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cables are ordered separately. See page 419.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE UL LISTED CSA®
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 525) **Cabled Models:** AC05 (p. 526) **QD Emitters:** AC07 (p. 526) **QD Models:** AC06 (p. 526)

SM30 and SMI30

High-Power, Opposed-Mode Barrel Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Operates in opposed mode with very high excess gain
- Available in models for either ac or dc operation (standard SM30 Series)
- Certified as intrinsically safe for use in hazardous atmospheres (SMI30 Series)
- Uses positive sealing to eliminate even capillary leakage, with quad-ring-sealed lens
- Exceeds IEC IP67 (NEMA 6P) ratings; ideal in equipment washdown environments

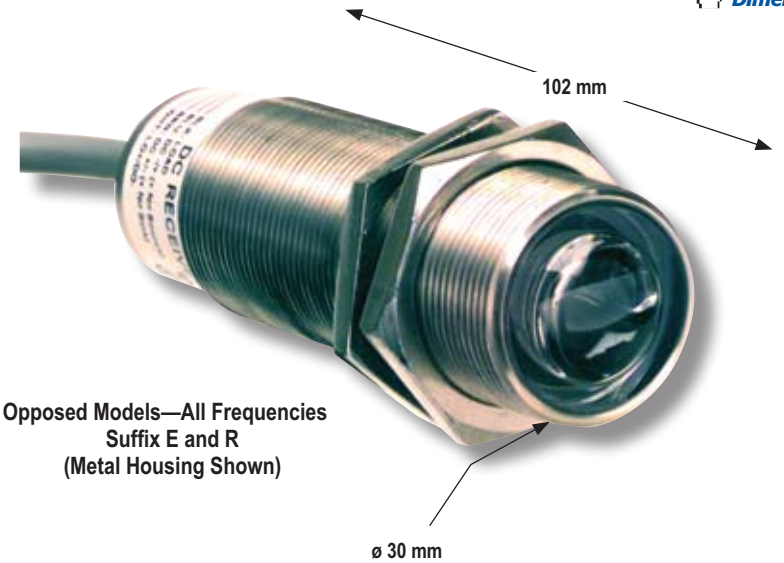
SM30	**page 126**
SMI30 Intrinsically Safe	**127**

OPPOSED
BRACKETS PAGE 371
QD CABLES 3-Pin Mini + 4-Pin Mini PAGE 420
APERTURES PAGE 443

SM30 Sensors

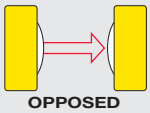
- *LED alignment indicator visible from side and through lens*
- *Popular 30 mm threaded barrel*
- *Metal or plastic housing*
- *2 m or 9 m attached cable, or Mini-style quick-disconnect fitting*

MORE INFO ONLINE Detailed Dimensions

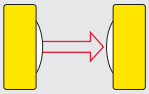


Opposed Models—All Frequencies
Suffix E and R
(Metal Housing Shown)

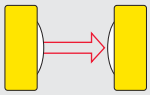
SM30 Emitters, 10-30V dc or 12-240V ac, Frequency A†

Models	Sensing Mode/LED*	Housing	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SMA30PEL	 OPPOSED	Plastic	200 m	2 m	N/A	EGCO-27 (p. 469)	BPO-27 (p. 493)	03541
SMA30PELQD				3-Pin Mini QD				
SMA30SEL		Stainless Steel		2 m				
SMA30SELQD				3-Pin Mini QD				

SM30 Receivers, 10-30V dc, Frequency A†

Models	Sensing Mode/LED*	Housing	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SM30PRL	 OPPOSED	Plastic	200 m	2 m	Bi-Modal™ NPN or PNP	EGCO-27 (p. 469)	BPO-27 (p. 493)	03541
SM30PRLQD				4-Pin Mini QD				
SM30SRL		Stainless Steel		2 m				
SM30SRLQD				4-Pin Mini QD				

SM30 Receivers, 24-240V ac, Frequency A†

Models	Sensing Mode/LED*	Housing	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
SM2A30PRL	 OPPOSED	Plastic	200 m	2 m	LO	EGCO-27 (p. 469)	BPO-27 (p. 493)	03541
SM2A30PRLQD				3-Pin Mini QD				
SM2A30SRL		Stainless Steel		2 m				
SM2A30SRLQD				3-Pin Mini QD				
SM2A30PRLNC		Plastic		2 m	DO			
SM2A30PRLNCQD				3-Pin Mini QD				
SM2A30SRLNC		Stainless Steel		2 m				
SM2A30SRLNCQD				3-Pin Mini QD				

* ⇨ Infrared LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **SM30PRL W/30**). A QD model requires a mating cable (see page 420).

† Modulation frequency "A" is standard; frequencies "B" and "C" are also available to minimize optical crosstalk potential between adjacent pairs and are specified by adding "B" or "C" at the end of the standard model number (example, **SM30PRLB or SM30PRLC**).

SM30 Specifications

Supply Voltage and Current	**Emitters:** 12 to 240V ac (50/60 Hz) or 10 to 30V dc (10% max. ripple) at 20 mA **DC Receivers:** 10 to 30V dc (10% max. ripple) at 10 mA max, exclusive of load **AC Receivers:** 24 to 240V ac (50/60 Hz)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**DC Receivers:** Bi-Modal™ output (PNP sourcing or NPN sinking). Selection of sourcing or sinking configuration depends upon receiver's power supply hookup polarity. Once wired, the unit performs as a solid-state switch. **AC Receivers:** Solid-state switch offer light operate (LO) or dark operate (DO) by model

More on next page

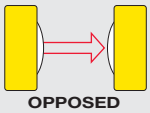
SM30 Specifications (cont'd)	
Output Rating	**DC Receivers:** 250 mA continuous **Output saturation voltage:** (PNP & NPN configuration) less than 1 volt at 10 mA; less than 2 volts at 250 mA **OFF-state leakage current:** less than 10 µA **AC Receivers:** Max. steady-state load capability is 500 mA **Inrush capability:** 10 amps for 1 second (non-repeating) **OFF-state leakage:** current less than 1.7 mA rms **ON-state voltage drop:** less than 3.5 volts rms across a 500 mA load; less than 5 volts rms across a 15 mA load
Output Protection Circuitry	Outputs of dc receivers are short circuit protected
Output Response Time	10 milliseconds ON/OFF
Repeatability	**"A" frequency units:** 1 millisecond **"B" frequency units:** 1.5 milliseconds **"C" frequency units:** 2.3 milliseconds
Indicators	Internal Red LED, visible through the lens or from side of the sensor. **Emitters:** Red "Power ON" indicator LED **DC Receivers:** Lights whenever receiver sees its modulated light source **AC Receivers:** Lights whenever receiver's output is conducting
Construction	Fully epoxy-encapsulated tubular threaded housing, positive sealed at both ends, quad-ring sealed acrylic lens. **Plastic models:** 30 mm diameter thermoplastic polyester housing and jam nuts **Stainless Steel models:** 30 mm diameter 303 stainless steel housing and jam nuts
Environmental Rating	Exceeds NEMA 6P; IEC IP67 standards
Connections	PVC-jacketed 2 m or 9 m cables or Mini-style quick-disconnect (QD) fitting are available. QD cables are ordered separately. See page 420.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	
Hookup Diagrams	**Cabled Emitters:** UN06 (p. 529) **AC Cabled Receivers:** AC10 (p. 527) **DC Receivers:** DC18 (p. 524) **QD Emitters:** AC04 (p. 525) **AC QD Receivers:** AC11 (p. 527)

SMI30 Intrinsically Safe DC Sensors

- *Extremely rugged and powerful opposed-mode intrinsically safe barrel sensors are designed for the most demanding hazardous area sensing applications.*
- *Sensor is certified as intrinsically safe for use in all hazardous atmospheres as defined by Article 500 of the National Electrical Code, when used with approved "positive input" intrinsic safety barriers.*
- *Sensor is certified by Factory Mutual and CSA as non-incendive devices when used in Division 2 locations (except Groups E and F) without intrinsic safety barriers.*
- *10 millisecond sensor pairs have a 140 m range; 1 millisecond pairs have a 60 m range.*
- *Use each sensor pair with model CI3RC2 current trip point amplifier and dual-channel intrinsic safety barrier for a complete intrinsically safe sensing system (components available as a kit).*

MORE INFO ONLINE Detailed Dimensions

SMI30, 10-30V dc, Frequency A†

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Response Time	Excess Gain	Beam Pattern	Data Sheet
SMI306EQ	 OPPOSED	140 m	3-Pin Mini QD	—	10 ms	Frequency: A: EGCO-28 B: EGCO-29 C: EGCO-30 (p. 469)	BPO-28 (p. 493)	35331
SMI30AN6RQ				NPN/LO				
SMI30RN6RQ				NPN/DO				
SMI306EYQ		60 m		—	1 ms		BPO-29 (p. 493)	
SMI30AN6RYQ				NPN/LO				
SMI30RN6RYQ				NPN/DO				

* ⇨ **Infrared LED**
** A model with a QD requires a special Mini-style mating cable (see page 420).
† Modulation frequency "A" is standard; frequencies "B" and "C" are also available to minimize optical crosstalk potential between adjacent pairs and are specified by adding "B" or "C" in the standard model number (**example, SMI306EBQ or SMI306ECQ**).

Intrinsic Safety Kits for Use with SMI30 Intrinsically Safe Sensors

Model	Description
CI2BK-1	Includes a CI3RC2 current amplifier, one RS-11 socket, one DIN-rail mount and one single-channel instrinsically safe barrier
CI2BK-2	Includes a CI3RC2 current amplifier, one RS-11 socket, one DIN-rail mount and one dual-channel instrinsically safe barrier
CI3RC2	Current trip point amplifier
CIB-1	Single channel intrinsic safety barrier
CI2B-1	Dual channel intrinsic safety barrier

SMI30 Specifications

Supply Voltage and Current	**Emitters:** 10 to 30V dc at 25 mA **Receivers:** 10 to 30V dc at 15 mA max. Division 1 use, with barriers, requires minimum system supply voltage of 10V.
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Receivers:** Current sinking NPN open-collector transistor
Output Rating	Three-wire hookup sinks 15 mA max. continuous, 10 to 30V dc. Two-wire hookup sinks ≤10 mA
Output Protection Circuitry	Outputs are short circuit protected
Output Response Time	10 milliseconds or 1 millisecond ON/OFF, depending on models; independent of signal strength
Repeatability	**"A" frequency units:** 10 millisecond receiver is 1 milliseconds and 1 millisecond receiver is 360 microseconds **"B" frequency units:** 1.6 milliseconds **"C" frequency units:** 10 millisecond receiver is 2.3 milliseconds and 1 millisecond receiver is 210 microseconds Repeatability is independent of signal strength
Indicators	Internal Red LED lights whenever the receiver sees the emitter's modulated light source. Emitters have Red "power on" indicator LED. All indicators are visible through the lens or from side of the sensor.
Construction	30 mm diameter tubular threaded thermoplastic polyester housing, fully epoxy-encapsulated, positive sealing at both ends, quad-ring sealed acrylic lens. Two thermoplastic polyester jam nuts provided.
Environmental Rating	IP67; NEMA 6P
Connections	3-wire Mini-style quick-disconnect (QD) fitting. Use cable models SMICC-3xx (p. 420). Cable electric properties: 40 pf/ft; 20 µH/ft. Order cable separately from sensor.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	CE, CSA Exia NRTL/C, KEMA, FM APPROVED
Hookup Diagrams	See data sheet (p/n 35331) for detailed Hookup Diagrams.

T30

30 mm Threaded Nose Right-Angle Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Features T-style plastic housing with 30 mm threaded lens in opposed, retroreflective and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments
- Uses an innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

OPPOSED
POLAR RETRO
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BRACKETS
PAGE 371
QD CABLES
4-Pin Euro + 4-Pin Micro
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REFLECTORS
PAGE 425

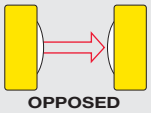
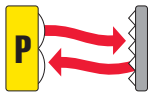
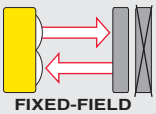
T30 AC and DC Sensor

- *Dual-LED multi-function indicators*
- *Popular 30 mm threaded lens*
- *2 m or 9 m attached cable, or Euro- or Micro-style quick-disconnect*

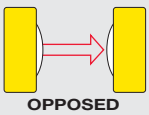
MORE INFO ONLINE Detailed Dimensions

Opposed, Polarized Retroreflective and Fixed-field Models
Suffix E, R, LP and FF

T30, 10-30V dc

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
T306E Emitter	 OPPOSED	60 m	2 m	–	EGCO-31 (p. 469)	BPO-30 (p. 493)	121524
T306EQ Emitter			4-Pin Euro QD				
T30SN6R			2 m	NPN			
T30SN6RQ			4-Pin Euro QD				
T30SP6R			2 m	PNP			
T30SP6RQ			4-Pin Euro QD				
T30SN6LP	 POLAR RETRO	6 m†	2 m	NPN	EGCR-38 (p. 473)	BPR-35 (p. 497)	
T30SN6LPQ			4-Pin Euro QD				
T30SP6LP			2 m	PNP			
T30SP6LPQ			4-Pin Euro QD				
T30SN6FF200	 FIXED-FIELD	0 - 200 mm Cutoff	2 m	NPN	EGCF-30 (p. 483)	—	
T30SN6FF200Q			4-Pin Euro QD				
T30SP6FF200			2 m	PNP			
T30SP6FF200Q			4-Pin Euro QD				
T30SN6FF400		0 - 400 mm Cutoff	2 m	NPN	EGCF-31 (p. 483)	—	
T30SN6FF400Q			4-Pin Euro QD				
T30SP6FF400			2 m	PNP			
T30SP6FF400Q			4-Pin Euro QD				
T30SN6FF600		0 - 600 mm Cutoff	2 m	NPN	EGCF-32 (p. 483)	—	
T30SN6FF600Q			4-Pin Euro QD				
T30SP6FF600			2 m	PNP			
T30SP6FF600Q			4-Pin Euro QD				

T30, 20-250V ac

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
T303E Emitter	 OPPOSED	60 m	2 m	–	EGCO-31 (p. 469)	BPO-30 (p. 493)	121523
T303EQ1 Emitter			4-Pin Micro QD				
T30AW3R			2 m	LO			
T30AW3RQ1			4-Pin Micro QD				
T30RW3R			2 m	DO			
T30RW3RQ1			4-Pin Micro QD				
T30AW3LP	 POLAR RETRO	6 m†	2 m	LO	EGCR-38 (p. 473)	BPR-35 (p. 497)	
T30AW3LPQ1			4-Pin Micro QD				
T30RW3LP			2 m	DO			
T30RW3LPQ1			4-Pin Micro QD				

* Infrared LED Visible Red LED

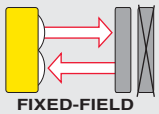
** For 9 m cable, add **W/30** to the 2 m model number (example, **T30SN6LP W/30**). A QD model requires a mating cable (see pages 412 and 419).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

More on next page

T30, 20-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
T30AW3FF200	 FIXED-FIELD	0 - 200 mm Cutoff	2 m	LO	EGCF-30 (p. 483)	—	121523
T30AW3FF200Q1			4-Pin Micro QD				
T30RW3FF200			2 m	DO			
T30RW3FF200Q1			4-Pin Micro QD				
T30AW3FF400		0 - 400 mm Cutoff	2 m	LO	EGCF-31 (p. 483)	—	
T30AW3FF400Q1			4-Pin Micro QD				
T30RW3FF400			2 m	DO			
T30RW3FF400Q1			4-Pin Micro QD				
T30AW3FF600		0 - 600 mm Cutoff	2 m	LO	EGCF-32 (p. 483)	—	
T30AW3FF600Q1			4-Pin Micro QD				
T30RW3FF600			2 m	DO			
T30RW3FF600Q1			4-Pin Micro QD				

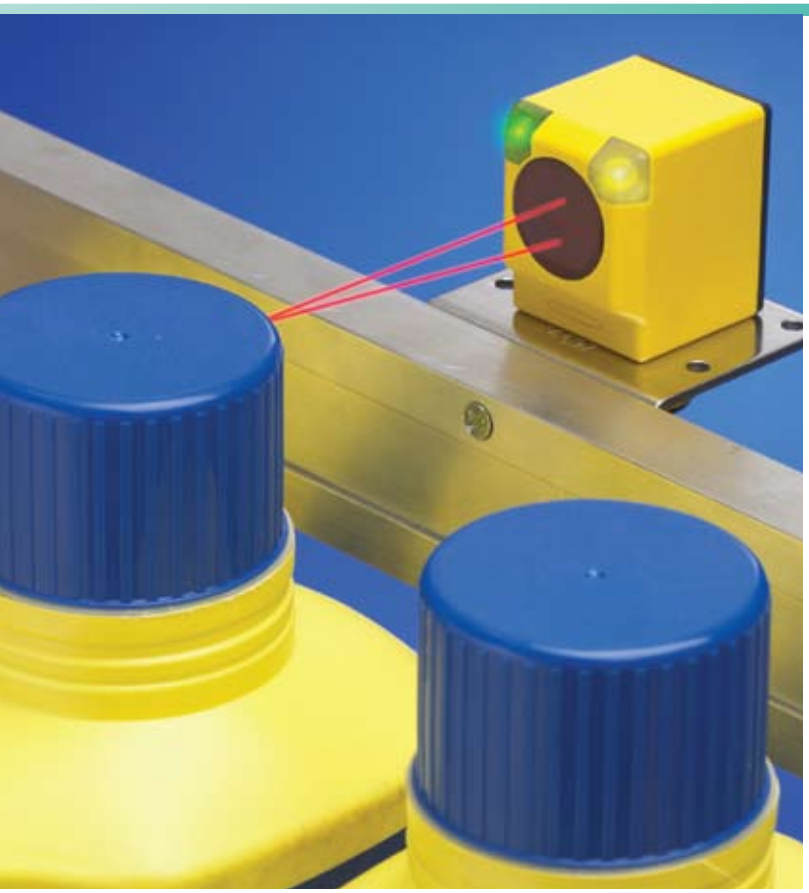
* ⇨ Infrared LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **T30AW3FF200 W/30**). A QD model requires a mating cable (see page 419).

T30 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Fixed-field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state dc switch; three-wire hookup; choose light operate (LO) or dark operate (DO) models **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON; 1.5 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 3 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time
Repeatability	**Opposed:** 375 microseconds **Polarized Retroreflective, Non-polarized Retroreflective, Fixed-field and Diffuse:** 750 microseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** light operate (LO) output energized **Yellow flashing:** excess gain marginal (1-1.5x) in light condition, LO output energized
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE UL LISTED
Hookup Diagrams	**Emitters:** DC02 (p. 520) **NPN Models:** DC05 (p. 521) **PNP Models:** DC06 (p. 521)

T30 AC Specifications	
Supply Voltage and Current	20 to 250V ac (50/60 Hz). **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; choose light operate (LO) or dark operate (DO) models **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 µA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed:** 16 milliseconds ON; 8 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 16 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective and Fixed-field:** 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady**: power ON **Yellow ON steady:** light sensed **Yellow flashing:** excess gain marginal (1-1.5x) in light condition
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cables are ordered separately. See page 419.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE UL LISTED
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 525) **Cabled Models:** AC05 (p. 526) **QD Emitters:** AC07 (p. 526) **QD Models:** AC06 (p. 526)



Q40

Right-Angle Rectangular Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Features rectangular 40 mm plastic housing with 30 mm threaded mounting base in opposed, retroreflective and fixed-field modes
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments rated to IP69K
- Uses an innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Uses advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)

OPPOSED
POLAR RETRO
FIXED-FIELD
BRACKETS PAGE 371
QD CABLES 4-Pin Euro + 4-Pin Micro PAGE 412 & 419
REFLECTORS PAGE 425

Q40 AC and DC Sensors

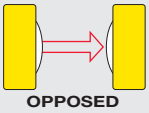
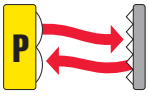
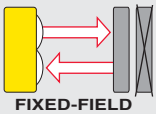
- *Dual LED multi-function indicators*
- *30 mm threaded mounting base*
- *2 or 9 m attached cable, or Euro- or Micro-style quick-disconnect*
- *Green LED Power indicator*

MORE INFO ONLINE Detailed Dimensions

Opposed, Polarized Retroreflective and Fixed-field Models Suffix E, R, LP and FF

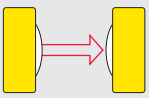
Q40, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q406E Emitter	 OPPOSED	60 m	2 m	–	EGCO-32 (p. 469)	BP0-31 (p. 493)	121516
Q406EQ Emitter			4-Pin Euro QD				
Q40SN6R			2 m	NPN			
Q40SN6RQ			4-Pin Euro QD				
Q40SP6R			2 m	PNP			
Q40SP6RQ			4-Pin Euro QD				
Q40SN6LP	 POLAR RETRO	6 m†	2 m	NPN	EGCR-39 (p. 473)	BPR-36 (p. 497)	
Q40SN6LPQ			4-Pin Euro QD				
Q40SP6LP			2 m	PNP			
Q40SP6LPQ			4-Pin Euro QD				
Q40SN6FF200	 FIXED-FIELD	0 - 200 mm Cutoff	2 m	NPN	EGCF-33 (p. 484)	—	
Q40SN6FF200Q			4-Pin Euro QD				
Q40SP6FF200			2 m	PNP			
Q40SP6FF200Q			4-Pin Euro QD				
Q40SN6FF400		0 - 400 mm Cutoff	2 m	NPN	EGCF-34 (p. 484)	—	
Q40SN6FF400Q			4-Pin Euro QD				
Q40SP6FF400			2 m	PNP			
Q40SP6FF400Q			4-Pin Euro QD				
Q40SN6FF600		0 - 600 mm Cutoff	2 m	NPN	EGCF-35 (p. 484)	—	
Q40SN6FF600Q			4-Pin Euro QD				
Q40SP6FF600			2 m	PNP			
Q40SP6FF600Q			4-Pin Euro QD				

Q40, 20-250V ac

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q403E Emitter	 OPPOSED	60 m	2 m	–	EGCO-32 (p. 469)	BP0-31 (p. 493)	121515
Q403EQ1 Emitter			4-Pin Micro QD				
Q40AW3R			2 m	LO			
Q40AW3RQ1			4-Pin Micro QD				
Q40RW3R			2 m	DO			
Q40RW3RQ1			4-Pin Micro QD				
Q40AW3LP	 POLAR RETRO	6 m†	2 m	LO	EGCR-39 (p. 473)	BPR-36 (p. 497)	
Q40AW3LPQ1			4-Pin Micro QD				
Q40RW3LP			2 m	DO			
Q40RW3LPQ1			4-Pin Micro QD				

More on next page

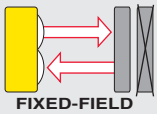
* Infrared LED Visible Red LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **Q40SN6LP W/30**). A QD model requires a mating cable (see pages 412 and 419).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

Q40, 20-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q40AW3FF200	 FIXED-FIELD	0 - 200 mm Cutoff	2 m	LO	EGCF-33 (p. 484)	—	121515
Q40AW3FF200Q1			4-Pin Micro QD				
Q40RW3FF200			2 m	DO			
Q40RW3FF200Q1			4-Pin Micro QD				
Q40AW3FF400		0 - 400 mm Cutoff	2 m	LO	EGCF-34 (p. 484)	—	
Q40AW3FF400Q1			4-Pin Micro QD				
Q40RW3FF400			2 m	DO			
Q40RW3FF400Q1			4-Pin Micro QD				
Q40AW3FF600		0 - 600 mm Cutoff	2 m	LO	EGCF-35 (p. 484)	—	
Q40AW3FF600Q1			4-Pin Micro QD				
Q40RW3FF600			2 m	DO			
Q40RW3FF600Q1			4-Pin Micro QD				

* ⇨ Infrared LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **Q40AW3FF200 W/30**). A QD model requires a mating cable (see page 419).

Q40 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple); Supply current (exclusive of load current): **Opposed Emitters:** 25 mA **Opposed Receivers:** 20 mA **Polarized Retroreflective:** 30 mA **Fixed-field:** 35 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models. The Dark Operate (DO) output may be wired as a normally open marginal signal alarm output, depending upon hookup to the power supply.
Output Rating	150 mA max. (each) in standard hookup; When wired for alarm output, the total load may not exceed 150 mA **OFF-state leakage current:** less than 1 µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V at 150 mA dc
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 3 milliseconds ON; 1.5 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 3 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time
Repeatability	**Opposed**: 375 microseconds **Polarized Retroreflective, Non-Polarized Retroreflective, Fixed-field and Diffuse:** 750 microseconds. Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Green flashing:** output overloaded **Yellow ON steady:** Light Operate (LO) output energized **Yellow flashing:** excess gain marginal (1-1.5x) in light condition, LO output energized
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max., double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE UL LISTED CSA®
Hookup Diagrams	**Emitters:** DC02 (p. 520) **NPN Models:** DC05 (p. 521) **PNP Models:** DC06 (p. 521)

Q40 AC Specifications	
Supply Voltage and Current	20 to 250V ac (50/60 Hz) **Average current:** 20 mA **Peak current:** 200 mA at 20V ac, 500 mA at 120V ac, 750 mA at 250V ac
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	Solid-state ac switch; three-wire hookup; choose light operate (LO) or dark operate (DO) models **Light operate:** Output conducts when the sensor sees its own (or the emitter's) modulated light **Dark operate:** Output conducts when sensor sees dark
Output Rating	300 mA max. (continuous) **Fixed-field:** derate 5 mA/° C above +50° C **Inrush capability:** 1 amp for 20 milliseconds, non-repetitive **OFF-state leakage current:** less than 100 µA **ON-state voltage drop:** 3V at 300 mA ac; 2V at 15 mA ac
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Opposed**: 16 milliseconds ON; 8 milliseconds OFF **Polarized Retroreflective and Fixed-field:** 16 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up
Repeatability	**Opposed:** 2 milliseconds **Polarized Retroreflective and Fixed-field:** 4 milliseconds Repeatability and response are independent of signal strength.
Indicators	**Two LEDs:** Green and Yellow **Green ON steady**: power ON **Yellow ON steady:** light sensed **Yellow flashing:** excess gain marginal (1-1.5x) in light condition
Construction	Housings are thermoplastic polyester. Lenses are polycarbonate or acrylic; one jam nut included.
Environmental Rating	Leakproof design rated NEMA 6P; DIN 40050 (IP69K)
Connections	2 m or 9 m attached cable, or 4-pin Micro-style quick-disconnect fitting. QD cables are ordered separately. See page 419.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Vibration and Mechanical Shock	All models meet Mil. Std. 202F requirements. Method 201A (Vibration; frequency 10 to 60 Hz, max, double amplitude 0.06-inch acceleration 10G). Method 213B conditions H&I (Shock: 75G with unit operating; 100G for non-operation)
Certifications	CE UL LISTED CSA®
Hookup Diagrams	**Cabled Emitters:** AC03 (p. 525) **Cabled Models:** AC05 (p. 526) **QD Emitters:** AC07 (p. 526) **QD Models:** AC06 (p. 526)

PicoDot®
Laser Precision Sensors

- Convergent mode laser sensor delivers precise position detection, inspection and counting.
- Powerful retroreflective models offer long-range retroreflective sensing.
- Fixed-field technology in the convergent-mode models ignores objects beyond the maximum sensing distance.
- Convergent models have precise 0.25 mm beam width at the convergent focus point.
- Retroreflective models have a precise, narrow beam to sense small objects at close range or larger objects to 10.6 m.
- All models have a gain sensitivity potentiometer for fine tuning sensor performance.
- Models are available with compact lightweight housing (PD45 models) or with environmentally sealed housing (PD49 models).

LASER POLAR RETRO
LASER CONVERGENT
BRACKETS PAGE 371
QD CABLES 5-Pin Euro PAGE 414
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PicoDot® Sensors

- *Dual-LED multifunction indicator and gain adjustment*
- *2 m or 9 m attached cable, or 150 mm Euro-style pigtail quick-disconnect*
- *PD45 lightweight housings; IP54, NEMA 3*
- *PD49 ruggedized housing; IP67, NEMA 6*
- *Visible red Class 2 lasers*

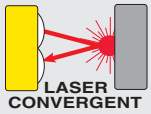
MORE INFO ONLINE Detailed Dimensions

PD45 Models

PD49 Models

PicoDot®, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range or Focus	Cable**	Output Type	Housing Rating	Excess Gain	Beam Pattern	Data Sheet
PD45VN6LLP		0.2 m - 10.6 m†	2 m	NPN	IP54, NEMA 3	EGCR-40, EGCR-41 & EGCR-42 (p. 473)	—	115700
PD45VN6LLPQ			5-pin Euro Pigtail QD					
PD49VN6LLP			2 m	NPN	IP67, NEMA 6			67450
PD49VN6LLPQ			5-pin Euro Pigtail QD					
PD45VP6LLP			2 m	PNP	IP54, NEMA 3			115700
PD45VP6LLPQ			5-pin Euro Pigtail QD					
PD49VP6LLP			2 m	PNP	IP67, NEMA 6			67450
PD49VP6LLPQ			5-pin Euro Pigtail QD					
PD45VN6C50		50 mm	2 m	NPN	IP54, NEMA 3	EGCC-30 (p. 479)	BPC-30 (p. 502)	115700
PD45VN6C50Q			5-pin Euro Pigtail QD					
PD49VN6C50			2 m	NPN	IP67, NEMA 6			67450
PD49VN6C50Q			5-pin Euro Pigtail QD					
PD45VP6C50			2 m	PNP	IP54, NEMA 3			115700
PD45VP6C50Q			5-pin Euro Pigtail QD					
PD49VP6C50			2 m	PNP	IP67, NEMA 6			67450
PD49VP6C50Q			5-pin Euro Pigtail QD					
PD45VN6C100		102 mm	2 m	NPN	IP54, NEMA 3	EGCC-31 (p. 479)	BPC-31 (p. 502)	115700
PD45VN6C100Q			5-pin Euro Pigtail QD					
PD49VN6C100			2 m	NPN	IP67, NEMA 6			67450
PD49VN6C100Q			5-pin Euro Pigtail QD					
PD45VP6C100			2 m	PNP	IP54, NEMA 3			115700
PD45VP6C100Q			5-pin Euro Pigtail QD					
PD49VP6C100			2 m	PNP	IP67, NEMA 6			67450
PD49VP6C100Q			5-pin Euro Pigtail QD					
PD45VN6C200		203 mm	2 m	NPN	IP54, NEMA 3	EGCC-32 (p. 479)	BPC-32 (p. 502)	115700
PD45VN6C200Q			5-pin Euro Pigtail QD					
PD49VN6C200			2 m	NPN	IP67, NEMA 6			67450
PD49VN6C200Q			5-pin Euro Pigtail QD					
PD45VP6C200			2 m	PNP	IP54, NEMA 3			115700
PD45VP6C200Q			5-pin Euro Pigtail QD					
PD49VP6C200			2 m	PNP	IP67, NEMA 6			67450
PD49VP6C200Q			5-pin Euro Pigtail QD					
PD45VN6C300		305 mm	2 m	NPN	IP54, NEMA 3	EGCC-33 (p. 480)	BPC-33 (p. 503)	115700
PD45VN6C300Q			5-pin Euro Pigtail QD					
PD49VN6C300			2 m	NPN	IP67, NEMA 6			67450
PD49VN6C300Q			5-pin Euro Pigtail QD					
PD45VP6C300			2 m	PNP	IP54, NEMA 3			115700
PD45VP6C300Q			5-pin Euro Pigtail QD					
PD49VP6C300			2 m	PNP	IP67, NEMA 6			67450
PD49VP6C300Q			5-pin Euro Pigtail QD					

* Visible Red Laser

** For 9 m cable, add **W/30** to the 2 m model number (example, **PD45VN6LLP W/30**). A QD model requires a mating cable (see page 414).

† Tested using a BRT-36X40BM retro target (included with each sensor). Actual range depends on the efficiency and size of the retroreflective target. Some targets have produced ranges up to 40 m.

PicoDot® Specifications

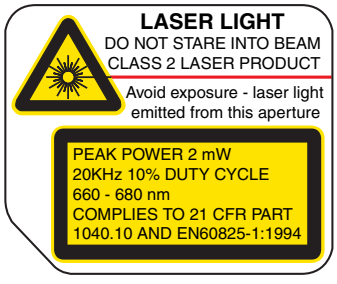
Supply Voltage	10 to 30V dc (10% max ripple) at less than 20 mA, exclusive of load
Beam Size at Aperture	3.75 x 1.85 mm (Retroreflective Models)
Beam Divergence	Approx. 1 milliradian (Retroreflective Models)
Laser Classification	Class 2 safety (CDRH (FDA) 1040.10 and IEC 60875-1)
Supply Protection Circuitry	Protected against reverse polarity, over voltage, and transient voltages
Delay at Power-up	< 1 second
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models
Output Rating	150 mA max. (each output) **OFF-state leakage current:** less than µA at 30V dc **ON-state saturation voltage:** less than 0.3V at 10 mA dc; less than 0.8V at 150 mA dc
Output Protection	Protected against continuous overload or short-circuit of outputs; Overload trip point ≥ 220 milliamps
Output Response Time	0.2 milliseconds (200 microseconds) ON/OFF
Repeatability	50 microseconds; Rep Rate 20 KHz
Spot Size at Focus	0.25 mm
Range	**C50 models:** 25 to 58 mm; focus at 50 mm ± 5 mm **C100 models:** 25 to 115 mm; focus at 102 mm ± 5 mm **C200 models:** 25 to 216 mm; focus at 203 mm ± 5 mm **C300 models:** 25 to 317 mm; focus at 305 mm ± 5 mm **LLP models:** 0.2 to 10.6 m, using supplied retroreflective target
Adjustments	12-turn slotted brass Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel)
Extinguishing Wire	Gray wire held "low" for laser operation; "high" to turn laser OFF; Low ≤ 1.0V dc; High ≥ Vsupply -4.0V dc (< 30V dc) or disconnect wire; 100 milliseconds delay upon enable
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON **Yellow ON steady:** light sensed; light operate (LO) output conducting **Green flashing:** output overloaded **Yellow flashing:** marginal excess gain
Construction	**PD45 models:** Housings are heat-resistant ABS, UL94-VO rated; acrylic lens cover **PD49 models:** Housings are sealed, heat-resistant ABS/polycarbonate alloy, UL94-VO rated, acrylic lens cover
Environmental Rating	**PD45:** IP54; NEMA 3 **PD49:** IP67; NEMA 6
Connections	2 m or 9 m attached cable, or 5-pin Euro-style 150 mm pigtail quick-disconnect fitting; mating cables for QD models are ordered separately. See page 414.
Operating Conditions	**Temperature:** -10° to +45° C **Relative humidity:** 90% at 50° C (non-condensing)
Weight	**PD45 models:** **Sensor only:** 22 g **Sensor plus 2 m cable:** 62 g **PD49 models:** **Sensor only:** 28 g **Sensor plus 2 m cable:** 68 g
Application Notes	False pulse may occur less than 1 second after power-up
Certifications	CE
Hookup Diagrams	DC11 (p. 522)

Class 2 Laser Safety Notes

Low-power lasers are by definition incapable of causing eye injury within the duration of the blink (aversion response) of 0.25 seconds. They also must emit only visible wavelengths (400 - 700 nm). Therefore, an ocular hazard can exist only if an individual overcomes their natural aversion to bright light and stares directly into the laser beam.

For safe laser use:

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- The beam emitted by a Class 2 laser product should be terminated at the end of its useful path. Open laser beam paths should be located above or below eye level where practical.



QM42 and QMT42

Rugged Die-Cast Family of Sensors

- Features compact, low-cost dc sensors in NEMA 6 (IEC IP67) die-cast housings
- Delivers outstanding immunity to electrical noise
- Includes marginal and Power ON gain indicator
- QM42 series: Available in opposed, polarized retroreflective, diffuse, short-range adjustable-field and plastic fiber optic modes
- QMT42 series (slightly larger): Available in fixed-field, diffuse and long-range adjustable-field modes

OPPOSED
POLAR RETRO
DIFFUSE
FIXED-FIELD
ADJUSTABLE-FIELD
PLASTIC FIBER
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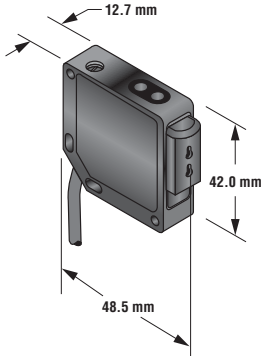
QM42 and QMT42 Sensors

- *Sensitivity adjustment on top of QM42 models; rear panel on QMT42 models*
- *2 m or 9 m attached cable, or Euro-style quick-disconnect*
- *Die-cast, leakproof NEMA 6 (IP67) housing*
- *Dual-LED multifunction indicators*

MORE INFO ONLINE Detailed Dimensions



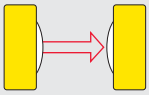
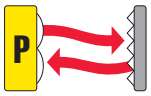
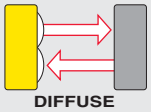
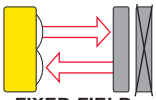
QM42 Plastic Fiber Optic Models Suffix FP

QM42 Opposed, Retroreflective, Short-range Diffuse, and Short-range Adjustable-field Model Suffix E, R, LP, D, AFV150 and FP

QMT42 Long-range Diffuse, Fixed-field and Adjustable-field Model Suffix DX, FF and AFV400

QM42 and QMT42, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QM426E Emitter	 OPPOSED	10 m	2 m	–	EGCO-33 (p. 470)	BPO-32 (p. 493)	44487
QM426EQ Emitter			4-Pin Euro QD				
QM42VN6R			2 m	NPN			
QM42VN6RQ			4-Pin Euro QD				
QM42VP6R			2 m	PNP			
QM42VP6RQ			4-Pin Euro QD				
QM42VN6LP	 POLAR RETRO	3 m†	2 m	NPN	EGCR-43 (p. 473)	BPR-37 (p. 497)	44487
QM42VN6LPQ			4-Pin Euro QD				
QM42VP6LP			2 m	PNP			
QM42VP6LPQ			4-Pin Euro QD				
QM42VN6D	 DIFFUSE	Short-Range 400 mm	2 m	NPN	EGCD-38 (p. 477)	BPD-38 (p. 500)	44487
QM42VN6DQ			4-Pin Euro QD				
QM42VP6D			2 m	PNP			
QM42VP6DQ			4-Pin Euro QD				
QMT42VN6DX		Long-Range 10 mm - 6 m	2 m	NPN	EGCD-39 (p. 477)	BPD-39 (p. 500)	57890
QMT42VN6DXQ			4-Pin Euro QD				
QMT42VP6DX			2 m	PNP			
QMT42VP6DXQ			4-Pin Euro QD				
QMT42VN6FF500	 FIXED-FIELD	50 - 500 mm Cutoff	2 m	NPN	EGCF-36 (p. 484)	—	50756
QMT42VN6FF500Q			4-Pin Euro QD				
QMT42VP6FF500			2 m	PNP			
QMT42VP6FF500Q			4-Pin Euro QD				
QMT42VN6FF750		50 - 750 mm Cutoff	2 m	NPN	EGCF-37 (p. 484)	—	
QMT42VN6FF750Q			4-Pin Euro QD				
QMT42VP6FF750			2 m	PNP			
QMT42VP6FF750Q			4-Pin Euro QD				
QMT42VN6FF1000		50 - 1000 mm Cutoff	2 m	NPN	EGCF-38 (p. 484)	—	
QMT42VN6FF1000Q			4-Pin Euro QD				
QMT42VP6FF1000			2 m	PNP			
QMT42VP6FF1000Q			4-Pin Euro QD				
QMT42VN6FF1500		50 - 1500 mm Cutoff	2 m	NPN	EGCF-39 (p. 484)	—	
QMT42VN6FF1500Q			4-Pin Euro QD				
QMT42VP6FF1500			2 m	PNP			
QMT42VP6FF1500Q			4-Pin Euro QD				
QMT42VN6FF2000		50 - 2000 mm Cutoff	2 m	NPN	EGCF-40 (p. 484)	—	
QMT42VN6FF2000Q			4-Pin Euro QD				
QMT42VP6FF2000			2 m	PNP			
QMT42VP6FF2000Q			4-Pin Euro QD				

* Infrared LED Visible Red LED

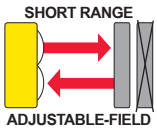
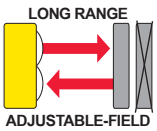
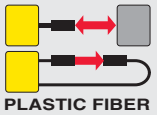
** For 9 m cable, add **W/30** to the 2 m model number (example, **QM42VN6LP W/30**). A QD model requires a mating cable (see page 412).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

More on next page

QM42 and QMT42, 10-30V dc (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
QM42VN6AFV150		5 mm to Cutoff point (adjustable from 50 to 150 mm)	2 m	NPN	EGCA-5 (p. 481) Cutoff Point Deviation Curve CPDC-6 (p. 517)	—	48363
QM42VN6AFV150Q			4-Pin Euro QD				
QM42VP6AFV150			2 m	PNP			
QM42VP6AFV150Q			4-Pin Euro QD				
QMT42VN6AFV400		25 mm to Cutoff point (adjustable from 125 to 400 mm)	2 m	NPN	EGCA-6 (p. 481) Cutoff Point Deviation Curve CPDC-7 (p. 518)	—	49211
QMT42VN6AFV400Q			4-Pin Euro QD				
QMT42VP6AFV400			2 m	PNP			
QMT42VP6AFV400Q			4-Pin Euro QD				
QM42VN6FP		Range varies by sensing mode and fiber optics used	2 m	NPN	EGCP-16 (p. 488) & EGCP-17 (p. 489)	BPP-16 (p. 507) & BPP-17 (p. 508)	44487
QM42VN6FPQ			4-Pin Euro QD				
QM42VP6FP			2 m	PNP			
QM42VP6FPQ			4-Pin Euro QD				

* Visible Red LED

** For 9 m cable, add **W/30** to the 2 m model number (example, **QM42VN6AFV150 W/30**). A QD model requires a mating cable (see page 412).

QM42 and QMT42 Specifications

Sensing Beam	**Opposed, Diffuse, Retroreflective, Fixed-field and Fiber Optic:** Infrared, 880 nm; Visible Red, 660 nm **Adjustable-field:** Visible Red, 680 nm
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than: **Opposed:** 30 mA (emitter), 10 mA (receiver) **Short-range diffuse and retroreflective:** 20 mA **Fiber optic:** 30 mA **Adjustable-field:** 50 mA **Fixed-field and long-range diffuse:** 40 mA
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	Solid-state complementary; choose NPN (current sinking) or PNP (current sourcing) models
Output Rating	100 mA max. (each output) **OFF-state leakage current:** less than µA at 30V dc **ON-state saturation voltage:** less than 1V at 10 mA dc; less than 1.5V 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 ≥ 150 mA, typical at 20° C
Output Response Time	**Opposed:** 1 millisecond ON; 0.5 millisecond OFF **Diffuse, Retroreflective, Adjustable-field and Fixed-field:** 1 millisecond ON/OFF **Plastic Fiber Optic:** 0.25 millisecond ON/OFF NOTE: 100 millisecond delay on power-up; outputs are non-conducting during this time.
Repeatability	**Opposed:** 120 microseconds **Diffuse, Retroreflective, Adjustable-field and Fixed-field:** 250 microseconds **Fiber Optic:** 60 microseconds. Repeatability and response are independent of signal strength
Sensing Hysteresis	**Long-range diffuse:** less than 20% of set sensing distance **Adjustable-field:** less than 7% of set cutoff distance **Fixed-field:** **2000 mm models** – less than 5% of set cutoff distance **1500 mm models** – less than 4% of set cutoff distance **1000 mm models** – less than 3% of set cutoff distance **750 mm models** – less than 2% of set cutoff distance **500 mm models** – less than 1% of set cutoff distance

More on next page

QM42 and QMT42 Specifications (cont'd)	
Cutoff Point Tolerance	**Fixed-field:** ±10% of nominal cutoff distance
Adjustments	All models (except emitters, Adjustable-field, Fixed-field and Long-range Diffuse): 15-turn slotted brass GAIN (sensitivity) adjustment potentiometer (clutched at both ends of travel) **150 mm Adjustable-field:** 12-turn slotted brass cutoff distance adjustment potentiometer (clutched at both ends of travel) **400 mm Adjustable-field:** 15-turn slotted brass cutoff distance adjustment potentiometer (clutched at both ends of travel) **Long-range diffuse:** 4-turn slotted GAIN (sensitivity) adjustment potentiometer (clutched at both ends of travel) **Fixed-field:** No adjustments
Indicators	**Two LEDs:** Green and Yellow **Green ON steady:** power ON; Opposed emitters: Green power ON **Green flashing:** output overloaded **Yellow ON steady:** light sensed; light operate (LO) **Yellow 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	IP67; NEMA 6
Connections	2 m or 9 m attached cable, or 4-pin Euro-style quick-disconnect fitting. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** **Long-range diffuse, Adjustable-field and Fixed-field:** -20° to +55° C **All others:** -20° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	CE c UL us
Hookup Diagrams	**Emitters:** DC02 (p. 520) **All others:** DC03 (p. 520)

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Q45 **page 146**

- Extremely rugged design exceeds NEMA 6P and IEC IP67 standards; sensors withstand 1200 psi washdown.
- Power, Signal and Output indicator LEDs are highly visible.
- Standard models accommodate output timing logic or expansion for a 7-segment LED display of signal strength.
- Available modes include opposed, polarized and non-polarized retroreflective, diffuse, convergent, and glass and plastic fiber optic modes.
- Models are available for dc, ac or ac/dc universal voltage power.
- A laser retroreflective version is available for extended 70 m sensing range.

OMNI-BEAM™ **page 159**

- Advanced modular design for customized configuration at user level
- Sensor heads in opposed, retroreflective, diffuse, convergent, and glass and plastic fiber optic modes
- For use with analog ac or dc power blocks

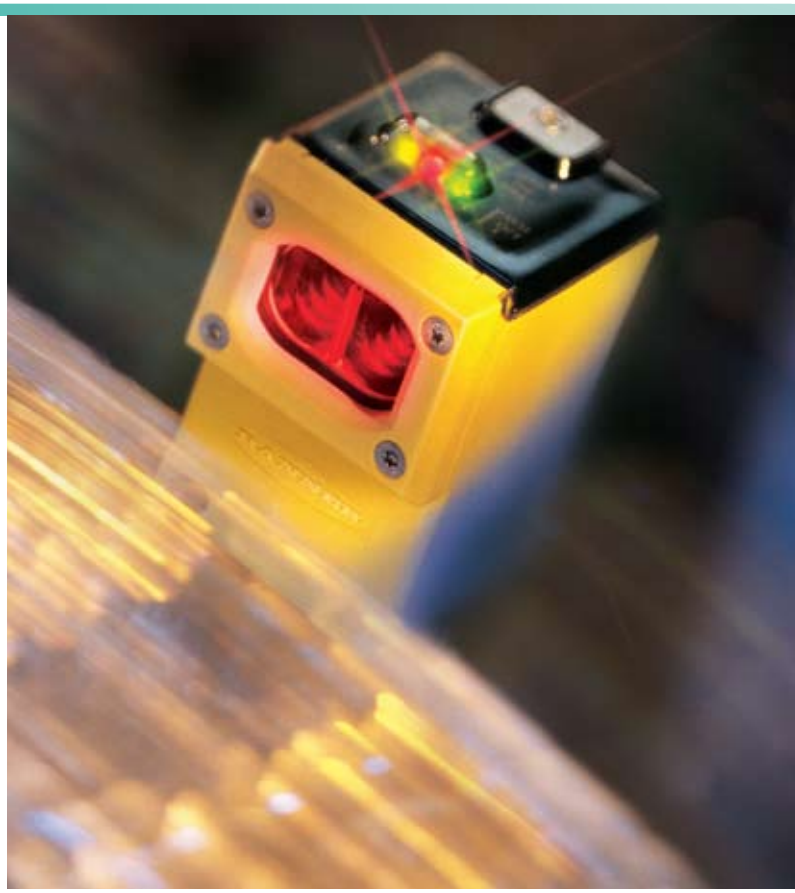
Q60 **page 165**

- Available in both Class 1 or extended-range Class 2 laser and visible red or infrared LED formats
- Adjustable-field setpoints from 200 to 2000 mm
- Advanced background suppression technology to ignore objects beyond the setpoint

Q45

Advanced One-Piece Sensors

- Uses extremely rugged design that exceeds NEMA 6P and IEC IP67 standards and withstands 1200 psi washdown
- Features highly visible Power, Signal and Output indicator LEDs
- Accommodates output timing logic or 7-segment LED signal strength display on standard models
- Available in opposed, polarized and non-polarized retroreflective, diffuse, convergent, and glass and plastic fiber optic modes
- Available in models for dc, ac or ac/dc universal voltage power
- Available in laser diode retroreflective and NAMUR models



Q45

- Models for dc or ac power
- Opposed, retroreflective, diffuse, convergent, laser, and glass and plastic fiber optic modes
- Electromechanical or solid-state outputs

Q45 Universal Voltage

- Models for ac/dc power
- Opposed, retroreflective, diffuse, convergent, and glass and plastic fiber optic modes
- A variety of cable and connector options

Q45 Retroreflective Laser

- Extended 70 m sensing range
- Visible laser beam for easy target alignment
- Precision small object or edge detection

Q45 NAMUR

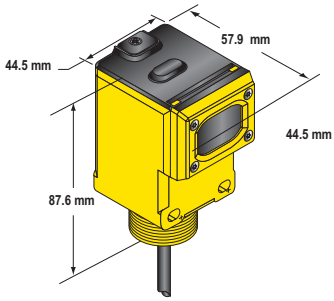
- Intrinsically safe dc models for potentially explosive environments
- 12 mA output or less in dark condition and 21 mA or more in light condition
- For use with approved DIN 19 234 switching amplifiers

OPPOSED
RETRO
POLAR RETRO
RETRO LASER
LASER POLAR RETRO
DIFFUSE
CONVERGENT
GLASS FIBER
PLASTIC FIBER
BRACKETS PAGE 371
QD CABLES 5 & 4-Pin Euro + 4-Pin Micro + 3-, 4- & 5-Pin Mini PAGE 412
REFLECTORS PAGE 425

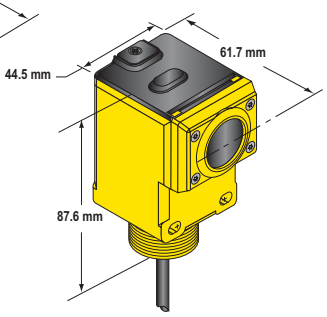
Q45 Sensors

- *Optional 7-element LED signal strength display and/or output switching logic*
- *2 m or 9 m attached cable, or Mini-, Micro- and Euro-style quick-disconnect*
- *Gasketed transparent cover*
- *Triple-LED multi-function indicators*

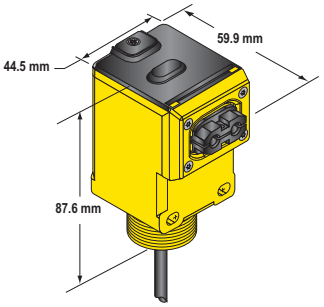
Opposed, Retroreflective and Diffuse Models
Suffix E, R, D, DL, DX, LV and LP



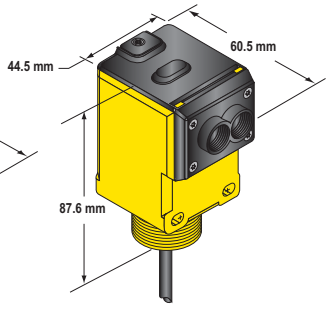
Retroreflective Laser Models
Suffix LL and LLP



Convergent Models
Suffix CV and CV4



Plastic Fiber Model
Suffix FP

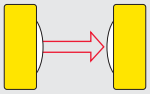
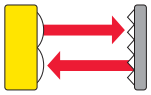
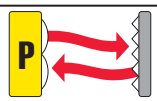
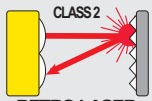


Glass Fiber Models
Suffix F and FV

MORE INFO ONLINE Detailed Dimensions

Q45, 10-30V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q456E Emitter	 OPPOSED	60 m	2 m	—	EGCO-34 (p. 470)	BPO-33 (p. 494)	36578
Q456EQ Emitter			4-Pin Mini QD				
Q456EQ5 Emitter			4-Pin Euro QD				
Q45BB6R			2 m	Bipolar NPN/PNP			
Q45BB6RQ			4-Pin Mini QD				
Q45BB6RQ5			4-Pin Euro QD				
Q45BB6LV	 RETRO	0.08 - 9 m†	2 m		EGCR-44 (p. 473)	BPR-38 (p. 497)	
Q45BB6LVQ			4-Pin Mini QD				
Q45BB6LVQ5			4-Pin Euro QD				
Q45BB6LP	 POLAR RETRO	0.15 - 6 m†	2 m		EGCR-45 (p. 473)	BPR-39 (p. 497)	
Q45BB6LPQ			4-Pin Mini QD				
Q45BB6LPQ5			4-Pin Euro QD				
Q45BB6LL	 CLASS 2 RETRO LASER	0.3 - 70 m†	2 m		EGCR-46 (p. 473)	BPR-40 (p. 497)	38244
Q45BB6LLQ			5-Pin Mini QD				
Q45BB6LLQ6			5-Pin Euro QD				
Q45BB6LLP	 CLASS 2 LASER POLAR RETRO	0.6 - 40 m†	2 m		EGCR-47 (p. 473)	BPR-40 (p. 497)	
Q45BB6LLPQ			5-Pin Mini QD				
Q45BB6LLPQ6			5-Pin Euro QD				

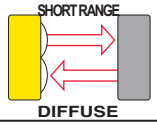
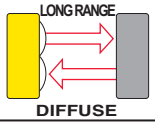
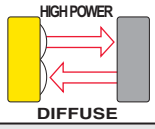
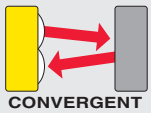
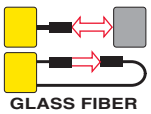
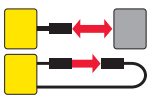
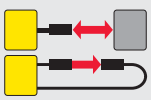
More on next page

* Infrared LED Visible Red LED Visible Red Laser

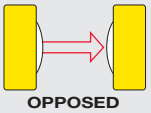
** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45BB6LV W/30**). A model with a QD requires a mating cable (see pages 412, 414 and 420).

† Retroreflective range is specified using one model BRT-3 retroreflector (BRT-2X2 for Q45BB6LL models). Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

Q45, 10-30V dc (cont'd)

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q45BB6D		450 mm	2 m	Bipolar NPN/PNP	EGCD-40 (p. 477)	BPD-40 (p. 500)	36578
Q45BB6DQ			4-Pin Mini QD				
Q45BB6DQ5			4-Pin Euro QD				
Q45BB6DL		1.8 m	2 m		EGCD-41 (p. 477)	BPD-41 (p. 500)	
Q45BB6DLQ			4-Pin Mini QD				
Q45BB6DLQ5			4-Pin Euro QD				
Q45BB6DX		3 m	2 m		EGCD-42 (p. 477)	BPD-42 (p. 500)	
Q45BB6DXQ			4-Pin Mini QD				
Q45BB6DXQ5			4-Pin Euro QD				
Q45BB6CV		38 mm	2 m		EGCC-34 (p. 480)	BPC-34 (p. 503)	36578
Q45BB6CVQ			4-Pin Mini QD				
Q45BB6CVQ5			4-Pin Euro QD				
Q45BB6CV4		100 mm	2 m		EGCC-35 (p. 480)	BPC-35 (p. 503)	
Q45BB6CV4Q			4-Pin Mini QD				
Q45BB6CV4Q5			4-Pin Euro QD				
Q45BB6F		Range varies by sensing mode and fiber optics used	2 m		EGCG-22 & EGCG-23 (p. 486)	BPG-22 & BPG-23 (p. 505)	36578
Q45BB6FQ			4-Pin Mini QD				
Q45BB6FQ5			4-Pin Euro QD				
Q45BB6FV			2 m		EGCG-24 & EGCG-25 (p. 486)	BPG-24 & BPG-25 (p. 505)	36578
Q45BB6FVQ			4-Pin Mini QD				
Q45BB6FVQ5			4-Pin Euro QD				
Q45BB6FP		Range varies by sensing mode and fiber optics used	2 m		EGCP-18 & EGCP-19 (p. 489)	BPP-18 & BPP-19 (p. 508)	36578
Q45BB6FPQ			4-Pin Mini QD				
Q45BB6FPQ5			4-Pin Euro QD				

Q45, 90-250V ac

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q452E Emitter		60 m	2 m	—	EGCO-34 (p. 470)	BPO-33 (p. 494)	36339 & 37209
Q452EQ Emitter			3-Pin Mini QD				
Q452EQ1 Emitter			4-Pin Micro QD				
Q45VR2R			2 m	SPDT e/m Relay			36339
Q45VR2RQ			5-Pin Mini QD				
Q45BW22R			2 m	SPST Solid-state Relay			37209
Q45BW22RQ			3-Pin Mini QD				
Q45BW22RQ1			4-Pin Micro QD				

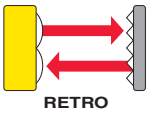
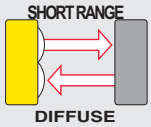
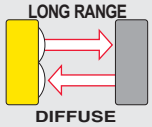
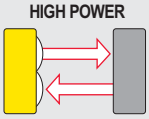
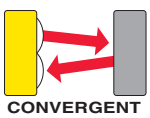
More on next page

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45BB6D W/30**). A model with a QD requires a mating cable (see pages 412, 419 and 420).

Q45, 90-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q45VR2LV	 RETRO	0.08 - 9 m†	2 m	SPDT e/m Relay	EGCR-44 (p. 473)	BPR-38 (p. 497)	36339
Q45VR2LVQ			5-Pin Mini QD				
Q45BW22LV			2 m	SPST Solid-state Relay			37209
Q45BW22LVQ			3-Pin Mini QD				
Q45BW22LVQ1			4-Pin Micro QD				
Q45VR2LP	 POLAR RETRO	0.15 - 6 m†	2 m	SPDT e/m Relay	EGCR-45 (p. 473)	BPR-39 (p. 497)	36339
Q45VR2LPQ			5-Pin Mini QD				
Q45BW22LP			2 m	SPST Solid-state Relay			37209
Q45BW22LPQ			3-Pin Mini QD				
Q45BW22LPQ1			4-Pin Micro QD				
Q45VR2D	 SHORT RANGE DIFFUSE	450 mm	2 m	SPDT e/m Relay	EGCD-40 (p. 477)	BPD-40 (p. 500)	36339
Q45VR2DQ			5-Pin Mini QD				
Q45BW22D			2 m	SPST Solid-state Relay			37209
Q45BW22DQ			3-Pin Mini QD				
Q45BW22DQ1			4-Pin Micro QD				
Q45VR2DL	 LONG RANGE DIFFUSE	1.8 m	2 m	SPDT e/m Relay	EGCD-41 (p. 477)	BPD-41 (p. 500)	36339
Q45VR2DLQ			5-Pin Mini QD				
Q45BW22DL			2 m	SPST Solid-state Relay			37209
Q45BW22DLQ			3-Pin Mini QD				
Q45BW22DLQ1			4-Pin Micro QD				
Q45VR2DX	 HIGH POWER DIFFUSE	3 m	2 m	SPDT e/m Relay	EGCD-42 (p. 477)	BPD-42 (p. 500)	36339
Q45VR2DXQ			5-Pin Mini QD				
Q45BW22DX			2 m	SPST Solid-state Relay			37209
Q45BW22DXQ			3-Pin Mini QD				
Q45BW22DXQ1			4-Pin Micro QD				
Q45VR2CV	 CONVERGENT	38 mm	2 m	SPDT e/m Relay	EGCC-34 (p. 480)	BPC-34 (p. 503)	36339
Q45VR2CVQ			5-Pin Mini QD				
Q45BW22CV			2 m	SPST Solid-state Relay			37209
Q45BW22CVQ			3-Pin Mini QD				
Q45BW22CVQ1			4-Pin Micro QD				
Q45VR2CV4		100 mm	2 m	SPDT e/m Relay	EGCC-35 (p. 480)	BPC-35 (p. 503)	36339
Q45VR2CV4Q			5-Pin Mini QD				
Q45BW22CV4			2 m	SPST Solid-state Relay			37209
Q45BW22CV4Q			3-Pin Mini QD				
Q45BW22CV4Q1			4-Pin Micro QD				

More on next page

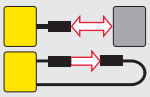
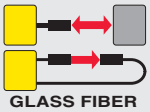
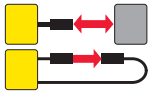
* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45VR2LV W/30**). A model with a QD requires a mating cable (see pages 419 and 420).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

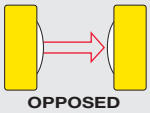
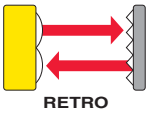
Q45, 90-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q45VR2F	 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	SPDT e/m Relay	EGCG-22 & EGCG-23 (p. 486)	BPG-22 & BPG-23 (p. 505)	36339
Q45VR2FQ			5-Pin Mini QD				
Q45BW22F			2 m	SPST Solid-state Relay			37209
Q45BW22FQ			3-Pin Mini QD				
Q45BW22FQ1			4-Pin Micro QD				
Q45VR2FV	 GLASS FIBER		2 m	SPDT e/m Relay	EGCG-24 & EGCG-25 (p. 486)	BPG-24 & BPG-25 (p. 505)	36339
Q45VR2FVQ			5-Pin Mini QD				
Q45BW22FV			2 m	SPST Solid-state Relay			37209
Q45BW22FVQ			3-Pin Mini QD				
Q45BW22FVQ1			4-Pin Micro QD				
Q45VR2FP	 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m	SPDT e/m Relay	EGCP-18 & EGCP-19 (p. 489)	BPP-18 & BPP-29 (p. 508)	36339
Q45VR2FPQ			5-Pin Mini QD				
Q45BW22FP			2 m	SPST Solid-state Relay			37209
Q45BW22FPQ			3-Pin Mini QD				
Q45BW22FPQ1			4-Pin Micro QD				

Q45 Universal Voltage, 12-250V dc or 24-250V ac

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q453E	 OPPOSED	60 m	2 m	—	EGCO-34 (p. 470)	BPO-33 (p. 494)	53997
Q453EQ			3-Pin Mini QD				
Q45VR3R			2 m	SPDT e/m Relay			
Q45VR3RQ			5-Pin Mini QD				
Q45BW13R			2 m	SPST Solid-state Relay			53999
Q45BW13RQ			4-Pin Mini QD				
Q45VR3LV	 RETRO	0.08 - 9 m†	2 m	SPDT e/m Relay	EGCR-44 (p. 473)	BPR-38 (p. 497)	53997
Q45VR3LVQ			5-Pin Mini QD				
Q45BW13LV			2 m	SPST Solid-state Relay			53999
Q45BW13LVQ			4-Pin Mini QD				
Q45VR3LP	 POLAR RETRO	0.15 - 6 m†	2 m	SPDT e/m Relay	EGCR-45 (p. 473)	BPR-39 (p. 497)	53997
Q45VR3LPQ			5-Pin Mini QD				
Q45BW13LP			2 m	SPST Solid-state Relay			53999
Q45BW13LPQ			4-Pin Mini QD				

More on next page

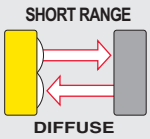
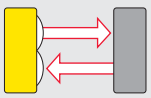
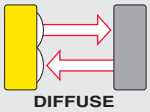
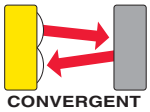
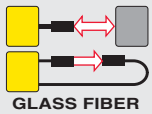
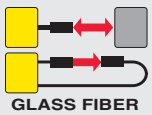
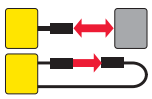
* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45VR2F W/30**). A model with a QD requires a mating cable (see pages 419 and 420).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

Q45 Universal Voltage, 12-250V dc or 24-250V ac (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q45VR3D		450 mm	2 m	SPDT e/m Relay	EGCD-40 (p. 477)	BPD-40 (p. 500)	53997
Q45VR3DQ			5-Pin Mini QD				
Q45BW13D			2 m	SPST Solid-state Relay			53999
Q45BW13DQ			4-Pin Mini QD				
Q45VR3DL		1. 8 m	2 m	SPDT e/m Relay	EGCD-41 (p. 477)	BPD-41 (p. 500)	53997
Q45VR3DLQ			5-Pin Mini QD				
Q45BW13DL			2 m	SPST Solid-state Relay			53999
Q45BW13DLQ			4-Pin Mini QD				
Q45VR3DX		3 m	2 m	SPDT e/m Relay	EGCD-42 (p. 477)	BPD-42 (p. 500)	53997
Q45VR3DXQ			5-Pin Mini QD				
Q45BW13DX			2 m	SPST Solid-state Relay			53999
Q45BW13DXQ			4-Pin Mini QD				
Q45VR3CV		38 mm	2 m	SPDT e/m Relay	EGCC-34 (p. 480)	BPC-35 (p. 503)	53997
Q45VR3CVQ			5-Pin Mini QD				
Q45BW13CV			2 m	SPST Solid-state Relay			53999
Q45BW13CVQ			4-Pin Mini QD				
Q45VR3CV4		100 mm	2 m	SPDT e/m Relay	EGCC-35 (p. 480)	BPC-34 (p. 503)	53997
Q45VR3CV4Q			5-Pin Mini QD				
Q45BW13CV4			2 m	SPST Solid-state Relay			53999
Q45BW13CV4Q			4-Pin Mini QD				
Q45VR3F		Range varies by sensing mode and fiber optics used	2 m	SPDT e/m Relay	EGCG-22 & EGCG-23 (p. 486)	BPG-22 & BPG-23 (p. 505)	53997
Q45VR3FQ			5-Pin Mini QD				
Q45BW13F			2 m	SPST Solid-state Relay			53999
Q45BW13FQ			4-Pin Mini QD				
Q45VR3FV			2 m	SPDT e/m Relay	EGCG-24 & EGCG-25 (p. 486)	BPG-24 & BPG-25 (p. 505)	53997
Q45VR3FVQ			5-Pin Mini QD				
Q45BW13FV			2 m	SPST Solid-state Relay			53999
Q45BW13FVQ			4-Pin Mini QD				
Q45VR3FP		Range varies by sensing mode and fiber optics used	2 m	SPDT e/m Relay	EGCP-18 & EGCP-19 (p. 489)	BPP-18 & BPP-19 (p. 508)	53997
Q45VR3FPQ			5-Pin Mini QD				
Q45BW13FP			2 m	SPST Solid-state Relay			53999
Q45BW13FPQ			4-Pin Mini QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45VR3D W/30).** A model with a QD requires a mating cable (see page 420).

Q45 DC Specifications

Supply Voltage and Current	10 to 30V dc (10% max. ripple), at less than 50 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**Bipolar:** one current sourcing (PNP) and one current sinking (NPN) open-collector transistor
Output Rating	250 mA max. each output up to 50° C, derated to 150 mA at 70° C (derate 5 mA/° C) **OFF-state leakage current:** less than 1 µA **Output saturation voltage (both outputs):** less than 1 volt at 10 mA and less than 2 volts at 250 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short circuit of outputs
Output Response Time	**Opposed:** 2 milliseconds ON and 1 millisecond OFF **Laser Retroreflective:** less than 2 milliseconds **All others:** 2 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up; output does not conduct during this time.
Repeatability	**Opposed:** 0.25 milliseconds **All others:** 0.5 milliseconds Response time and repeatability specifications are independent of signal strength.
Adjustments	**Beneath sensor's transparent cover:** Light Operate (LO) Dark Operate (DO) select switch and multi-turn sensitivity control on top of sensor, beneath a transparent polycarbonate o-ring sealed cover, allows precise sensitivity setting (turn clockwise to increase gain). Optional logic and logic/display modules have adjustable timing functions.
Indicators	Indicator LEDs are highly visible, located beneath a raised transparent polycarbonate dome on top of the sensor. **Power (Green)** LED lights whenever 10 to 30V dc power is applied, and flashes to indicate output overload or output short circuit **Signal (Red)** 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 an output is conducting **Optional 7-element** LED signal strength display module
Construction	Molded reinforced thermoplastic polyester housing, o-ring sealed transparent polycarbonate cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a ½" NPS integral internal conduit thread.
Environmental Rating	IP67; NEMA 6P
Laser Classification **(Laser Retroreflective models only)**	Class II laser product. US Safety Standards 21 CFR 1040.10 and 1040.11; European Standards EN 60825 and IEC 60825
Connections	PVC-jacketed 4-wire (5-wire for Laser Retroreflective) 2 m or 9 m cables. For 4-pin Mini-style QD use "Q" suffix, (5-pin Mini-style QD for Laser Retroreflective use "Q" suffix) or for 4-pin Euro-style use "Q5" suffix (5-pin Euro-style QD for Laser Retroreflective use "Q6" suffix). QD cables are ordered separately. See page 412, 414 and 420.
Operating Conditions	**Temperature:** -40° to +70° C (-10° to +40° C for Retroreflective Laser models) **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	Optional logic timing modules are available. See page 155 for more information.
Certifications	**Retroreflective Laser:** CE, ETL LISTED **All others:** CE, CSA, c UL us
Hookup Diagrams	**Emitters:** DC02 (p. 520) **Other DC Models:** DC04 (p. 520) **Laser Retroreflective Models:** DC12 (p. 522)

Q45 AC Specifications

Supply Voltage and Current	90 to 250V ac (50 - 60 Hz) **Average current:** 20 mA. **Peak current:** 500 mA at 120V ac, 750 mA at 250V ac.
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	**Q45VR2 models:** SPDT (single-pole double-throw) electromechanical relay output (except emitters) **Q45BW22 models:** Short circuit/overload protected FET solid-state relay
Output Rating	**Q45VR2 models:** **Max. switching power (resistive load):** 150W, 600 VA **Max. switching voltage (resistive load):** 250V ac or 30V dc **Max. switching current (resistive load):** 5A @ 250V ac **Min. voltage and current:** 5V dc, 0.1 mA **Mechanical life of relay:** 10,000,000 operations **Electrical life of relay at full resistive load:** 100,000 operations **Q45BW22 models:** **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:** less than 100 µA **Saturation voltage:** less than 3V at 200 mA
Output Protection Circuitry	**Q45VR2 models:** Protected against false pulse on power-up **Q45BW22 models:** 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	**Q45VR2 models:** 15 milliseconds ON/OFF **Q45BW22 models:** **Opposed:** 2 milliseconds ON, 1 millisecond OFF **All others:** 2 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up. Output does not conduct during this time.
Repeatability	**Opposed:** 0.25 milliseconds; **All others:** 0.5 milliseconds Response time and repeatability specifications are independent of signal strength.
Adjustments	**Beneath sensor's transparent cover:** Light Operate (LO), Dark Operate (DO) select switch, and multi-turn sensitivity control on top of sensor, allows precise sensitivity setting (turn clockwise to increase gain). Optional logic and logic/display modules have adjustable timing functions.
Indicators	Indicator LEDs are highly visible, located beneath a raised transparent polycarbonate dome on top of the sensor. **Power (Green)** LED lights whenever 90-250V ac power is applied, and flashes to indicate output overload or output short circuit. **Signal (Red)** 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 an output relay is energized **Optional 7-element** LED signal strength display module
Construction	Molded reinforced thermoplastic polyester housing, o-ring sealed transparent polycarbonate cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a ½" NPS integral internal conduit thread.
Environmental Rating	NEMA 6P; IEC IP67
Connections	**Q45VR2 models:** PVC-jacketed 2-wire emitters or 5-wire (all others) 2 m or 9 m unterminated cables, or 3-pin (emitters) or 5-pin (all others) Mini-style quick-disconnect (QD) fittings are available ("Q"- suffix models). QD cables are ordered separately. See page 420. **Q45BW22 models:** PVC-jacketed 2 m or 9 m 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 pages 420 and 419.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)

More on next page

Q45 AC Specifications (cont'd)

Application Notes	Transient suppression is recommended for contacts switching inductive loads. Optional logic timing modules are available. See page 155 for more information.
Certifications	**Q45VR2 models:** CE, CSA, cULus **Q45BW22 models:** CSA, cULus
Hookup Diagrams	**VR2 Models:** **Emitters:** AC03 (p. 525) **Other AC Models:** AC08 (p. 526) **BW22 Models:** **Cabled & Mini QD:** AC05 (p. 526) **Micro QD:** AC06 (p. 526) **Cabled & Mini QD Emitters:** AC03 (p. 525) **Micro QD Emitters:** AC07 (p. 526)

Q45 Universal Voltage Specifications

Supply Voltage and Current	24 to 250V ac, 50/60 Hz or 12 to 250V dc (1.5 watts max.)
Supply Protection Circuitry	Protected against transient voltages. DC hookup is without regard to polarity.
Output Configuration	**Q45VR3 models:** SPDT (Single-Pole, Double-Throw) electromechanical relay output. All models except emitters. **Q45BW13 models:** Optically isolated SPST solid-state switch. All models except emitters.
Output Rating	**Q45VR3 models:** **Max. switching power (resistive load):** 1250VA, 150W **Max. switching voltage (resistive load):** 250V ac, 125V dc **Max. switching current (resistive load):** 5A @ 250V ac, 5A @ 30V dc derated to 200 mA @ 125V dc **Min. voltage and current:** 5V dc, 10 mA **Mechanical life of relay:** 50,000,000 operations **Electrical life of relay at full resistive load:** 100,000 operations **Q45BW13 models:** 250V ac, 250V dc, 300 mA **Output saturation voltage:** 3V at 300 mA, 2V at 15 mA **OFF-state leakage current:** less than 50 µA **Inrush current:** 1 amp for 20 milliseconds, non-repetitive
Output Protection Circuitry	Protected against false pulse on power-up
Output Response Time	**Q45VR3 models:** 15 milliseconds ON/OFF NOTE: 100 millisecond delay on power-up. Relay is de-energized during this time. **Q45BW13 models: Opposed:** 2 milliseconds ON, 1 millisecond OFF **All others:** 2 milliseconds ON/OFF (NOTE: 100 millisecond delay on power-up. Output does not conduct during this time.)
Repeatability	**Opposed:** 0.25 milliseconds **All others:** 0.5 milliseconds Response time and repeatability specifications are independent of signal strength.
Adjustments	**Beneath sensor's transparent cover:** Light Operate (LO), Dark Operate (DO) select switch, and multi-turn sensitivity control on top of sensor, beneath a transparent polycarbonate o-ring sealed cover, allows precise sensitivity setting (turn clockwise to increase gain). Optional logic and logic/display modules have adjustable timing functions.
Indicators	Indicator LEDs are clearly visible beneath a raised transparent polycarbonate dome on top of the sensor. **Power (Green)** LED lights whenever 24 to 250V ac, or 12 to 250V dc power is applied **Signal (Red)** 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 polycarbonate cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a ½" NPS integral internal conduit thread.

More on next page

Q45 Universal Voltage Specifications (cont'd)	
Environmental Rating	IP67; NEMA 6P
Connections	**Q45VR3 models:** PVC-jacketed 2 m or 9 m unterminated cables, or 5-pin Mini-style quick-disconnect (QD) fittings are available ("Q"- suffix models). QD cables are ordered separately. See page 520. **Q45BW13 models:** PVC-jacketed 2 m or 9 m unterminated cables, or 4-pin Mini-style quick-disconnect (QD) fittings are available ("Q"- suffix models). QD cables are ordered separately. See page 520.
Operating Conditions	**Temperature:** -25° to +55° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	Transient suppression is recommended for contacts switching inductive loads. Optional output timing modules are available. See below for more information.
Certifications	**Q45VR3 models:** **Q45BW13 models:**
Hookup Diagrams	**VR3 Models:** **Emitters:** UN02 (p. 528) **Other AC/DC Models:** UN01 (p. 528) **BW13 Models:** **Emitters:** UN02 (p. 528) **Other AC/DC Models:** UN03 (p. 528)

45LM Series Modules

Q45 sensors easily accept the addition of output timing logic and signal strength display functions. Display models have a 7-element display which gives a "finer" indication of excess gain than does the LED that is standard on most Q45 sensors. The modules listed below may be used with all Q45 sensors except NAMUR models.

MORE INFO ONLINE Download PDF

Model	Function	Timing Logic Functions	Data Sheet
45LM58	Programmable output timing logic	• Models with programmable output timing provide the following timing logic functions: - ON delay - OFF delay - ON/OFF delay - Retriggerable one-shot - Non-retriggerable one-shot - Delayed one-shot - ON delayed one-shot - Repeat cycle timer - Limit timer - Rate sensor - Flip-flop (alternate action) • Selectable timing ranges: 0.01 to 0.15 seconds 0.1 to 1.5 seconds 1 to 15 seconds • Delay and hold time ranges may be individually selected and times precisely set using 15-turn adjustment potentiometers. Delay or hold time may also be displayed (zero seconds). • Module allows sensor output to be programmed for normally-open or normally-closed operation. • Models with signal strength display gives precise indication of excess gain; see page 156 for more information. Valuable for sensor setup and alignment, critical evaluation of alternative sensing schemes and close monitoring of sensing performance over time (example, dirt build-up on lenses or progressive misalignment).	63416
45LM58D	Programmable output timing, plus signal strength display		
45LMD	Signal strength display, only (no programmable functions)		

45LM Series Module Specifications	
Operating Temperature	-40° to +70° C
Timing Adjustments	Two 15-turn clutched potentiometers with brass elements, accessible from outside at the top of the sensor, beneath an o-ring sealed polycarbonate cover.
Timing Repeatability	Plus or minus 2% of the timing range (max.); assumes conditions of constant temperature and power supply.
Useful Time Range	Useful time range is from maximum time down to 5% of maximum. When the timing potentiometer is set fully counterclockwise, time will be approximately 5% of maximum.
Response Time	When the delay time is switched OFF, the card adds no measurable sensing response time.
LED Display	7-element LED display, visible through transparent top sensor cover. The more LEDs that are lit, the stronger is the received light signal; three LEDs lit is equivalent to an excess gain of about 1x.

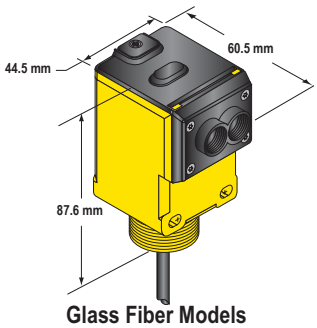
Signal Strength Display

LED Number	Approximate Gain	Display
#1	0.25x	
#2	0.5x	
#3	1.0x	
#4	2.0x	
#5	4.0x	
#6	6.0x	
#7	8.0x	

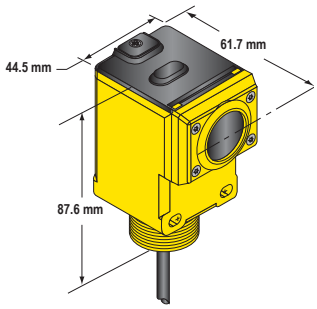
Q45 NAMUR Sensors

- *NAMUR sensor in popular Q45 housing with Q45 proven performance*
- *For use with approved switching amplifiers with intrinsically safe input circuits*
- *Designed in accordance with DIN 19 234*

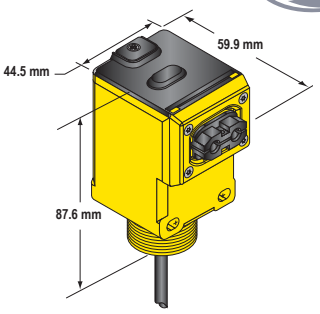
Opposed, Retroreflective and Diffuse Models
Suffix E, R, D, DL, LV and LP



Glass Fiber Models
Suffix F and FV



Convergent Models
Suffix CV and CV4

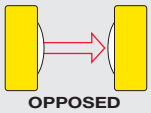
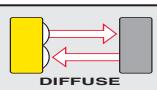
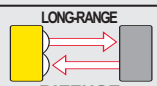
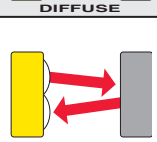


Plastic Fiber Model
Suffix FP

MORE INFO ONLINE Detailed Dimensions

Q45 NAMUR, 5-15V dc

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q459E Emitter	 OPPOSED	6 m	2 m	Constant Current ≤1.2 mA dark ≥2.1 mA light	EGCO-35 (p. 470)	BPO-34 (p. 494)	38343
Q459EQ Emitter			4-Pin Euro QD				
Q45AD9R			2 m				
Q45AD9RQ			4-Pin Euro QD				
Q45AD9LV	 RETRO	9 m†	2 m		EGCR-48 (p. 473)	BPR-41 (p. 497)	
Q45AD9LVQ			4-Pin Euro QD				
Q45AD9LP	 POLAR RETRO	6 m†	2 m		EGCR-49 (p. 474)	BPR-42 (p. 497)	
Q45AD9LPQ			4-Pin Euro QD				
Q45AD9D	 DIFFUSE	300 mm	2 m		EGCD-43 (p. 477)	BPD-43 (p. 500)	
Q45AD9DQ			4-Pin Euro QD				
Q45AD9DL	 LONG-RANGE DIFFUSE	1 m	2 m		EGCD-44 (p. 477)	BPD-44 (p. 500)	
Q45AD9DLQ			4-Pin Euro QD				
Q45AD9CV	 CONVERGENT	38 mm	2 m		EGCC-36 (p. 480)	BPC-36 (p. 503)	
Q45AD9CVQ			4-Pin Euro QD				
Q45AD9CV4		100 mm	2 m		EGCC-37 (p. 480)	BPC-37 (p. 503)	
Q45AD9CV4Q			4-Pin Euro QD				

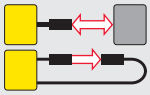
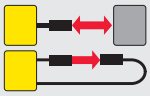
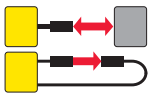
* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45AD9LV W/30**). A model with a QD requires a mating cable (see page 413).

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.

More on next page

Q45 NAMUR, 5-15V dc (cont'd)

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain	Beam Pattern	Data Sheet
Q45AD9F	 GLASS FIBER	Range varies by sensing mode and fiber optics used	2 m	Constant Current ≤1.2 mA dark ≥2.1 mA light	EGCG-26 & EGCG-27 (p. 486)	BPG-26 & BPG-27 (p. 505)	38343
Q45AD9FQ			4-Pin Euro QD				
Q45AD9FV	 GLASS FIBER		2 m		EGCG-28 & EGCG-29 (p. 486)	BPG-28 & BPG-29 (p. 505)	
Q45AD9FVQ			4-Pin Euro QD				
Q45AD9FP	 PLASTIC FIBER	Range varies by sensing mode and fiber optics used	2 m		EGCP-20 & EGCP-21 (p. 489)	BPP-20 & BPP-21 (p. 508)	
Q45AD9FPQ			4-Pin Euro QD				

* ⇨ Infrared LED ➡ Visible Red LED

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q45AD9F W/30**). A model with a QD requires a mating cable (see page 413).

Q45 NAMUR Specifications

Supply Voltage and Current	5 to 15V dc. Supply voltage is provided by the amplifier to which the sensor is connected.
Output	**Constant current output:** ≤ 1.2 mA in the dark condition and ≥ 2.1 mA in the light condition
Output Response Time	**Opposed receiver:** 2 milliseconds ON/0.4 milliseconds OFF **All others:** 5 milliseconds ON/OFF (does not include amplifier response)
Adjustments	Multi-turn sensitivity control on top of sensor, beneath a transparent o-ring sealed Lexan® cover, allows precise sensitivity setting (turn clockwise to increase gain).
Indicators	Indicator LED's are highly visible, located beneath a raised transparent Lexan® dome on top of the sensor. **Power (Red) LED (emitters only)** lights whenever 5 - 15V dc power is applied **Signal (Red) LED** lights whenever the sensor sees its modulated light source
Construction	Molded thermoplastic polyester housing, o-ring sealed transparent Lexan® top cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown. The base of cabled models has a ½" NPS integral internal conduit thread.
Environmental Rating	IP67; NEMA 6P
Connections	PVC-jacketed 2 m or 9 m cables, or 4-pin Euro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately. See page 413.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Design Standards	Q45AD9 Series sensors comply with the following standards: DIN 19234, EN 50 014: 1977, EN 50 020: 2002
Certifications	CE, CSA Exia NRTL/C, KEMA, ETL, FM APPROVED
Hookup Diagrams	SP01 (p. 530)

Lexan® is a registered trademark of General Electric Co.

APPROVALS

CSA: #LR 41887	Instrinsically Safe, with Entity for Class I, Groups A-D Class I, Div. 2, Groups A-D	**KEMA:** #03 ATEX 1441x	II IG EEx ia IICTC
FM: #J.I. 5Y3A4.AX	Intrinsically Safe, with Entity for Class I, II, III, Div. 1, Groups A-G Class I, II, III, Div. 2, Groups A-D and G	**ETL:** #558044	Tested per FM and CSA as shown above

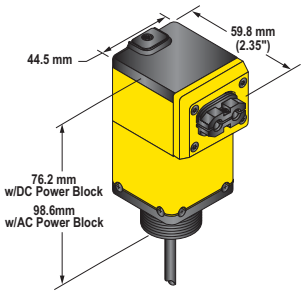
OMNI-BEAM™
Modular Limit-Switch Style Sensors

- Modular self-contained photoelectric sensors that you can customize for a specific application.
- Includes a sensor head and a power block; timing logic module is optional
- Features exclusive multiple-LED system that displays received signal strength, sensing contrast and seven different warnings
- Easily field-programmable for sensing hysteresis, signal strength display scale factor and light/dark operate
- Available in opposed, retroreflective, diffuse, convergent and fiber optic modes
- Available in convergent and fiber optic models with choice of red, blue or green LED for color-differentiation applications

OMNI-BEAM™ Sensors

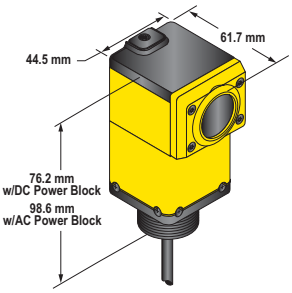
- *Display and Alarm multiple-LED self-diagnostic system*
- *Interchangeable ac or dc power block (dc model shown in photo to right; ac model shown in drawings)*
- *Attached cable, or Mini- or Euro-style quick-disconnect*
- *Interchangeable sensor head*
- *Optional output logic module (inside)*

MORE INFO ONLINE Detailed Dimensions

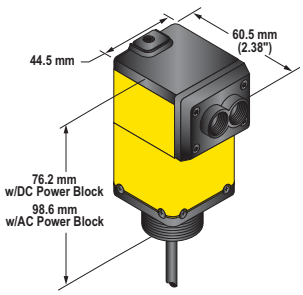


Plastic Fiber Models
Suffx FP, FPB and FPG

AC Model (shown)
Opposed, Retroreflective and Diffuse Models
Suffix E, R, D, DX, LV, LVAG and LVAGC



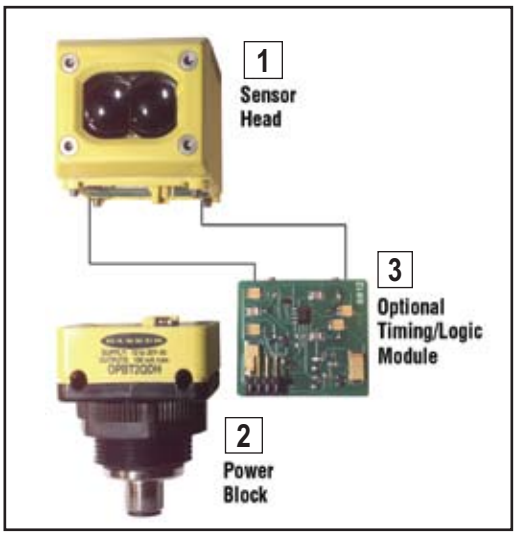
Convergent Models
Suffix CV, CVB and CVG



Glass Fiber Models
Suffix F, FAC, FX, FV, FVB, FVG, EF and RF

Selecting Components for OMNI-BEAM™ Sensors

OMNI-BEAM™ sensors are modular self-contained photoelectric sensors that you can customize for a specific application.



STEP 1:
Choose a sensor head with the required sensing mode.

STEP 2:
Choose a power block for the required sensor power (ac or dc) and interface.

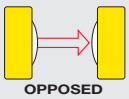
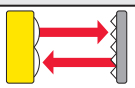
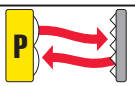
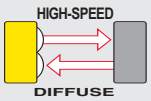
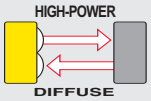
STEP 3:
Choose an optional timing logic module.

STEP 4:
Plug and bolt components together without interwiring.

OMNI-BEAM modular components are sold separately. The three modular components, and the lenses, can be replaced in the field.

OMNI-BEAM™ Sensor Heads

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Supply Voltage	Response & Repeatability	Excess Gain	Beam Pattern	Data Sheet
OSBE Emitter	 OPPOSED	45 m	Provided by Power Block (see page 162)	**Response:** 2 ms **Repeatability:** 0.01 ms	EGCO-36 (p. 470)	BPO-35 (p. 494)	03522
OSBR							
OSBLV	 RETRO	0.15-9 m†		**Response:** 4 ms **Repeatability:** 0.2 ms	EGCR-50 (p. 474)	BPR-42 (p. 497)	03522
OSBLVAG	 POLAR RETRO	0.3-4.5 m†			EGCR-51 (p. 474)	BPR-44 (p. 497)	
OSBLVAGC	 CLEAR OBJECT POLAR RETRO	4 m†			EGCR-52 (p. 474)	—	34151
OSBD	 HIGH-SPEED DIFFUSE	300 mm		**Response:** 2 ms **Repeatability:** 0.1 ms	EGCD-45 (p. 477)	BPD-45 (p. 500)	03522
OSBDX	 HIGH-POWER DIFFUSE	2 m		**Response:** 15 ms **Repeatability:** 1 ms	EGCD-46 (p. 477)	BPD-46 (p. 500)	

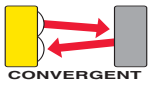
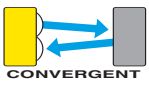
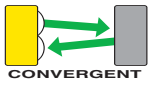
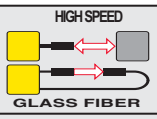
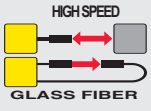
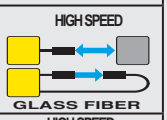
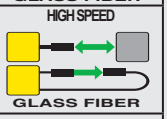
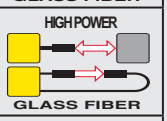
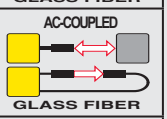
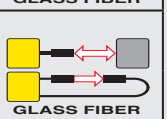
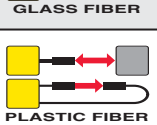
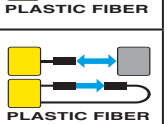
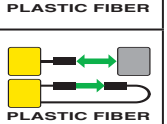
More on next page

* ⇨ Infrared LED ➡ Visible Red LED

† Retroreflective range is specified using one model BRT-3 retroreflector. Actual sensing range may differ, depending on efficiency and reflective area of the retroreflector in use. See Accessories for more information.
NOTE: Sensor heads require a power block. See page 162.

OMNI-BEAM™ Sensor Heads (cont'd)

MORE INFO ONLINE Download PDF

Models	Sensing Mode/LED*	Range	Supply Voltage	Response & Repeatability	Excess Gain	Beam Pattern	Data Sheet
OSBCV		38 mm	Provided by Power Block (see page 162)	**Response:** 4 ms **Repeatability:** 0.2 ms	EGCC-38 (p. 480)	BPC-38 (p. 503)	03522
OSBCVB					EGCC-39 (p. 480)	BPC-39 (p. 503)	
OSBCVG					EGCC-40 (p. 480)	BPC-40 (p. 503)	
OSBF		Range varies by sensing mode and fiber optics used		**Response:** 2 ms **Repeatability:** 0.1 ms	EGCG-30 & EGCG-31 (p. 486)	BPG-30 & BPG-31 (p. 505)	03522
OSBFV					EGCG-32 (p. 486) & EGCG-33 (p. 487)	BPG-32 (p. 505) & BPG-33 (p. 506)	
OSBFVB					EGCG-34 (p. 487)	BPG-34 (p. 506)	
OSBFVG					EGCG-35 (p. 487)	BPG-35 (p. 506)	
OSBFX				**Response:** 15 ms **Repeatability:** 1 ms	EGCG-36 & EGCG-37 (p. 487)	BPG-36 & BPG-37 (p. 506)	
OSBFAC				**Response:** 1 ms **Repeatability:** 0.01 ms	Maximum Range: IT23S fibers, opposed mode: 180 mm		03553
OSBEF OSBRF				**Response:** 2 ms **Repeatability:** 0.01 ms	EGCG-38 & EGCG-39 (p. 487)	BPG-38 & BPG-39 (p. 506)	03522
OSBFP		Range varies by sensing mode and fiber optics used		**Response:** 2 ms **Repeatability:** 0.1 ms	EGCP-22 & EGCP-23 (p. 489)	BPP-22 & BPP-23 (p. 508)	03522
OSBFPB					EGCP-24 (p. 489)	BPP-24 (p. 505)	
OSBFPG					EGCP-25 (p. 489)	BPP-25 (p. 508)	

* Infrared LED Visible Red LED Visible Green LED Visible Blue LED

NOTE: Sensor heads require a power block. See page 162.

OMNI-BEAM™ Timing Logic Modules

Models	Type	Logic Function	Timing Ranges	Timing Diagrams	Data Sheet
OLM5	Delay Timer Logic Module	ON-DELAY or OFF-DELAY or ON/OFF DELAY	**ON-Delay:** 0.01-1 sec., 0.15-15 sec., or none **OFF-Delay:** 0.01-1 sec., 0.15-15 sec., or none	For information on Timing Diagrams, see data sheets	03540 & 03522
OLM8	Pulse Timer Logic Module	ONE-SHOT pulse timer or DELAYED ONE-SHOT logic timer	**Delay:** 0.01-1 sec., 0.15-15 sec., or none **Pulse:** 0.01-1 sec., 0.15-15 sec.		
OLM8M1	Pulse Timer Logic Module	ONE-SHOT pulse timer or DELAYED ONE-SHOT logic timer	**Delay:** 0.002-0.1 sec., 0.03-1.5 sec., or none **Pulse:** 0.002-0.1 sec., 0.03-1.5 sec.		

OMNI-BEAM™ Power Blocks, DC Voltage

Models	Cable**	Supply Voltage	Output Type	Data Sheet
OPBT2	2 m	10-30V dc	**Bi-Modal™ NPN or PNP Two outputs: Load and Alarm**	03522
OPBT2QD	4-Pin Mini QD			
OPBT2QDH	4-Pin Euro QD			
OPBTE	2 m		**No output: for powering emitter-only sensor heads**	
OPBTEQD	4-Pin Mini QD			
OPBTEQDH	4-Pin Euro QD			

OMNI-BEAM™ Power Blocks, AC Voltage

Models	Cable**	Supply Voltage	Output Type	Data Sheet
OPBA2	2 m	105-130V ac	**SPST solid-state ac relay Two outputs: Load and Alarm**	03522
OPBA2QD	5-Pin Mini QD			
OPBB2	2 m	210-250V ac		
OPBB2QD	5-Pin Mini QD			
OPBAE	2 m	105-130V ac	**No output: for powering emitter only sensor heads**	
OPBAEQD	5-Pin Mini QD			
OPBBE	2 m	210-250V ac		
OPBBEQD	5-Pin Mini QD			

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **OPBT2 W/30**). A model with a QD requires a mating cable (see pages 412 and 420).

OMNI-BEAM™ Sensor Head Specifications	
Supply Voltage and Current	Supplied by OMNI-BEAM power block. See page 162.
Output Response Time	See individual sensing heads for response times (see pages 160 and 161). 200 millisecond delay on power-up: outputs are non-conducting during this time.
Adjustments	OMNI-BEAM sensor heads are field-programmable for four operating parameters. A set of four programming DIP switches is located at the base of the sensor head and is accessible with the sensor head removed from the power block **SWITCH #1** selects the amount of sensing hysteresis **SWITCH #2** selects the alarm output configuration **SWITCH #3** selects Light Operate (switch #3 OFF) or Dark Operate (switch #3 ON) **SWITCH #4** selects the STANDARD (switch #4 OFF) or Fine (switch #4 ON) scale factor for the D.A.T.A. light signal strength indicator array **Sensitivity:** 15-turn slotted brass screw Gain (sensitivity) adjustment potentiometer (clutched at both ends of travel).
Indicators	Sense and Load indicator LEDs are located on the top of the sensor head on either side of the D.A.T.A. array. Sense LED indicates when a target has been sensed Load LED lights whenever the load (sensor output) is energized Also, Banner's exclusive, D.A.T.A. sensor self-diagnostic system located on the top of the sensor head warns of marginal sensing conditions usually before a sensing failure occurs (except on model OSBFAC)
Construction	Sensor heads are molded of rugged thermoplastic polyester; top view window is polycarbonate; acrylic lenses; stainless steel hardware.
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 12, and 13; IEC IP66 when assembled to power block.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	

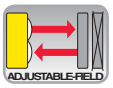
OMNI-BEAM™ Timing Logic Module Specifications	
Response Time	A disabled timing function adds no measurable sensing response time
Timing Adjustments	All logic modules feature 15-turn clutched potentiometers for accurate timing adjustments. The logic module slides into the sensor head housing and interconnects without wires. Timing adjustments are easily accessible at the top of the sensor head and are protected by the sensor's transparent cover.
Timing Repeatability	± 2% of timing range (max.); assumes conditions of constant temperature and power supply
Time Range	Useful range is from maximum time down to 10% of maximum (all models); when timing potentiometer is set fully counterclockwise, time will be approximately 1% of maximum for models OLM5 and OLM8, and 2% of maximum for model OLM8M1
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	

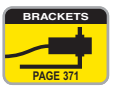
OMNI-BEAM™ DC Power Block Specifications	
Supply Voltage and Current	10 to 30V dc (10% max. ripple) at less than 80 mA (exclusive of load)
Supply Protection Circuitry	Protected against reverse polarity and transient voltages
Output Configuration	**OPBT2, OPBT2QD, OPBT2QDH:** Bi-Modal™ NPN or PNP, depending upon hookup to power supply (see hookup diagrams) **OPBTE, OPBTEQD, OPBTEQDH:** No output - for use with emitters only
Output Rating	100 mA max. **OFF-state leakage current:** less than 100 µA **Output saturation voltage (NPN or PNP outputs):** less than 1 volt at 10 mA and less than 1.5 volts at 100 mA
Output Protection Circuitry	Protected against false pulse on power-up and continuous overload or short-circuit of outputs
Construction	Reinforced thermoplastic polyester housing with totally epoxy-encapsulated circuitry, and 30 mm threaded hub for swivel bracket or through-hole mounting
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 12, and 13; IEC IP66 when assembled to sensor head
Connections	PVC-jacketed 2 m or 9 m cables, or 4-pin Mini- or Euro-style quick-disconnect (QD) fitting are available. QD cables are ordered separately. See page 412.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Application Notes	Interface to TTL logic is not direct (contact factory). When the load and the OMNI-BEAM do not share a common power supply, load voltage must be ≤ the sensor supply voltage
Certifications	
Hookup Diagrams	**Emitters:** DC02 (p. 520) **Other DC Models:** DC13 (p. 523)

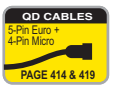
OMNI-BEAM™ AC Power Block Specifications	
Supply Voltage and Current	**120V models:** 105 to 130V ac, 50/60 Hz, 4 watts (excluding load) **220/240V models:** 210 to 250V ac, 50/60 Hz, 4 watts (excluding load)
Supply Protection Circuitry	Protected against transient voltages
Output Configuration	**OPBA2, OPBA2QD, OPBB2 and OPBB2QD:** Isolated SPST solid-state ac relay **OPBAE, OPBAEQD, OPBBE and OPBBEQD:** No output - for use with emitter only
Load Output Rating	500 mA max to 25° C, derated 1% per ° C to 70° C; 7 amps max inrush for 1 second or 20 amps max for one cycle (non-repeating) **OFF-state leakage current:** less than 100 µA max. **ON-state voltage drop:** less than 3V ac at full load
Alarm Output Rating	200 mA max to 25° C, derated 2% per ° C to 70° C; 2 amps max inrush for 1 second or 3 amps max for 1 cycle (non-repeating) **OFF-state leakage current:** less than 100 µA max. **ON-state voltage drop:** less than 2.5V ac at full load
Output Protection Circuitry	Protected against false pulse on power-up
Construction	Reinforced thermoplastic polyester housing with totally epoxy-encapsulated circuitry, and 30 mm threaded hub for swivel bracket or through-hole mounting
Environmental Rating	Meets NEMA standards 1, 2, 3, 3S, 4, 12, and 13; IEC IP66 when assembled with sensor head
Connections	PVC-jacketed 2 m or 9 m cables, or 5-pin Mini-style quick-disconnect (QD) fitting are available. QD cables are ordered separately. See page 420.
Operating Conditions	**Temperature:** -40° to +70° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	
Hookup Diagrams	**Emitters:** AC03 (p. 525) **Other AC Models:** AC09 (p. 527)

Q60
Long-Range Adjustable-Field Sensors

- Detects objects within a defined sensing field, ignoring objects located just beyond the sensing field cutoff
- Features two-turn, logarithmic adjustment of sensing field cutoff point from 0.2 to 2 m, to make it easy to set cutoff point
- Uses rotating pointer to indicate relative cutoff point setting within sensing range
- Features easy push-button or remote programming of light/dark operate and output timing
- Uses continuous status indicators to verify all settings at a glance
- Available in models for dc or ac/dc universal voltage operation
- Models with visible red lasers enable small part detection from long distances







Q60 Sensors

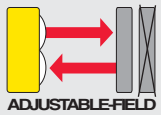
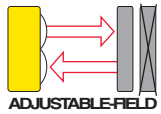
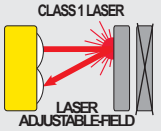
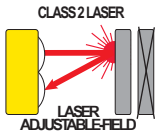
- *Two-turn, logarithmic adjustment of sensing cutoff point from 0.2 to 2 m*
- *Powerful infrared and visible LED, or laser (Class 1 and Class 2) light sources*
- *Integral cable, or rotating quick-disconnect fitting*
- *Output ON and/or OFF delays adjustable from 8 milliseconds to 16 seconds*

QPMA
EURO-STYLE • PIGTAIL • PUR CABLE
CALL FACTORY

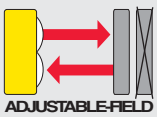
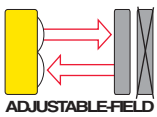
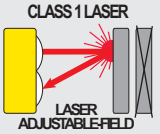
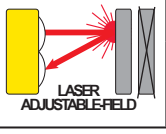
MORE INFO ONLINE Detailed Dimensions

Adjustable-field Models
Suffix AF, AFV and LAF

Q60, 10-30V dc

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain and Cutoff Point Deviation	Data Sheet
Q60BB6AFV1000		**Min.:** 65 - 130 mm† **Cutoff:** 200 - 1000 mm	2 m	Bipolar NPN/ PNP	EGCA-7 (p. 481) Cutoff Point Deviation Curves CPDC-10 & CPDC-11 (p. 518)	69622
Q60BB6AFV1000Q			5-pin Euro QD			
Q60BB6AF2000		**Min.:** 50 - 125 mm† **Cutoff:** 200 - 2000 mm	2 m		EGCA-8 (p. 481) Cutoff Point Deviation Curves CPDC-8 & CPDC-9 (p. 518)	67003
Q60BB6AF2000Q			5-pin Euro QD			
Q60BB6LAF1400		**Min.:** 100 - 260 mm† **Cutoff:** 200 - 1400 mm	2 m		EGCA-9 (p. 481) Cutoff Point Deviation Curves CPDC-12 (p. 518) & CPDC-13 (p. 518)	114348
Q60BB6LAF1400Q			5-pin Euro QD			
Q60BB6LAF2000		**Min.:** 75 - 240 mm† **Cutoff:** 200 - 2000 mm	2 m		EGCA-10 (p. 481) Cutoff Point Deviation Curves CPDC-12 (p. 518) & CPDC-13 (p. 519)	114348
Q60BB6LAF2000Q			5-pin Euro QD			

Q60 Universal Voltage, 12-250V dc or 24-250V ac

Models	Sensing Mode/LED*	Range	Cable**	Output Type	Excess Gain and Cutoff Point Deviation	Data Sheet
Q60VR3AFV1000		**Min.:** 65 - 130 mm† **Cutoff:** 200 - 1000 mm	2 m	SPDT e/m Relay	EGCA-7 (p. 481) Cutoff Point Deviation Curves CPDC-10 & CPDC-11 (p. 518)	69622
Q60VR3AFV1000Q1			4-pin Micro QD	SPST e/m Relay		
Q60VR3AF2000		**Min.:** 50 - 125 mm† **Cutoff:** 200 - 2000 mm	2 m	SPDT e/m Relay	EGCA-8 (p. 481) Cutoff Point Deviation Curves CPDC-8 & CPDC-9 (p. 518)	67003
Q60VR3AF2000Q1			4-pin Micro QD	SPST e/m Relay		
Q60VR3LAF1400		**Min.:** 100 - 260 mm† **Cutoff:** 200 - 1400 mm	2 m	SPDT e/m Relay	EGCA-9 (p. 481) Cutoff Point Deviation Curves CPDC-12 & CPDC-13 (p. 518)	114348
Q60VR3LAF1400Q1			4-pin Micro QD	SPST e/m Relay		
Q60VR3LAF2000		**Min.:** 75 - 240 mm† **Cutoff:** 200 - 2000 mm	2 m	SPDT e/m Relay	EGCA-10 (p. 481) Cutoff Point Deviation Curves CPDC-12 (p. 518) & CPDC-13 (p. 519)	114348
Q60VR3LAF2000Q1			4-pin Micro QD	SPST e/m Relay		

* Infrared LED Visible Red LED Visible Red Laser

** For 9 m cable, add suffix **W/30** to the 2 m model number (example, **Q60BB6AF2000 W/30**). A model with a QD requires a mating cable (see pages 414 and 419).

† Minimum range varies by established cutoff point (see excess gain curves, page 481 and cutoff point devication curves, page 518).

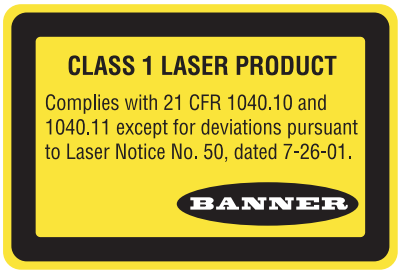
Q60 Specifications

Supply Voltage and Current	**Q60BB6AF and Q60BB6AFV models:** 10 to 30V dc (10% max. ripple) at less than 50 mA exclusive of load **Q60BB6LAF models:** 10 to 30V dc (10% max. ripple) at less than 35 mA exclusive of load **Q60VR3LAF and Q60VR3AFV Universal models:** 12 to 250V dc or 24 to 250V ac, 50/60 Hz Input power 1.5 W max.
Supply Protection Circuitry	Protected against reverse polarity and transient voltages (Q60VR3 models' dc hookup is without regard to polarity)
Output Configuration	**Q60BB6AF, Q60BB6AFV and Q60BB6LAF models:** Bipolar: one NPN (current sinking) and one PNP (current sourcing) open-collector transistor **Q60VR3AF, Q60VR3LAF and Q60VR3AFV cabled models:** E/M Relay (SPDT), normally closed and normally open contacts **Q60VR3AFQ1, Q60VR3AFVQ1 and Q60VR3LAFQ1 (QD) models:** E/M Relay (SPST), normally open contact
Output Rating	**DC models:**150 mA max. each output @ 25C **OFF-state leakage current:** less than 5 µA @ 30V dc **Output saturation NPN:** less than 200 mV @ 10 mA; less than 1V @ 150 mA **Output saturation PNP:** less than 1V at 10 mA; less than 1.5V at 150 mA **Universal Voltage models:** **Min. voltage and current:** 5V dc, 10 mA **Mechanical life of relay:** 50,000,000 operations **Electrical life of relay at full resistive load:** 100,000 operations **Max. switching power (resistive load):Cabled models:** 1250VA, 150 W **QD models:** 750VA, 90W **Max. switching voltage (resistive load):Cabled models:** 250V ac, 125V dc **QD models:** 250V ac, 125V dc **Max. switching current (resistive load):** **Cabled models:** 5 A @ 250V ac, 5 A @ 30V dc derated to 200 mA @ 125V dc **QD models:** 3 A @ 250V ac, 3 A @ 30V dc derated to 200 mA @ 125V dc
Output Protection Circuitry	**Q60BB6AF, Q60BB6LAF and Q60BB6AFV models:** Protected against continuous overload or short circuit of outputs **All models:** Protected against false pulse on power-up
Output Response Time	**Q60BB6AF, Q60BB6LAF and Q60BB6AFV models:** 2 milliseconds ON/OFF **Q60VR3AF, Q60VR3LAF and Q60VR3AFV Universal models:** 15 milliseconds ON/OFF NOTE: 150 millisecond delay on power-up (Q60BB6LAF has 1 second max. delay at power-up); outputs do not conduct during this time.
Repeatability	500 microseconds
Sensing Hysteresis	For Infrared models, see chart HC-3; for Visible Red models, see chart HC-4; and for Laser models, see chart HC-2, all on page 512. 2000 mm cutoff - less than 3% of set cutoff distance 1600 mm cutoff - less than 2.25% of set cutoff distance 1200 mm cutoff - less than 1.30% of set cutoff distance 800 mm cutoff - less than 0.5% of set cutoff distance 400 mm cutoff - less than 0.25% of set cutoff distance
Adjustments	2 momentary push buttons: [ON-delay (+) an OFF-delay (-)] **ON Delay select:** 8 milliseconds to 16 seconds **LO/DO select** **OFF Delay select:** 8 milliseconds to 16 seconds **Push-button lockout** for security Slotted, geared, 2-turn, cutoff range adjustment screw (mechanical stops on both ends of travel)
Indicators Note: outputs are active during on/off timing selection mode.	**Q60AF and Q60AFV models:** **ON-Delay** **Green ON Steady:** Run mode, ON-delay is active **Green Flashing:** ON-delay Selection mode is active **OFF-Delay** **Green ON Steady:** Run mode, OFF-delay is active **Green Flashing:** OFF-delay Selection mode is active **5-Segment Light Bar*:** Indicates relative delay time during ON/OFF-delay Selection modes **Output** **Amber ON Steady:** Outputs are conducting **Green ON Steady:** During ON/OFF-delay Selection modes **Dark Operate** **Green ON Steady:** Dark Operate is selected **Lockout** **Green ON Steady:** Buttons are locked out **Light Operate** **Green ON Steady:** Light Operate is selected **Signal** **Green ON Steady:** Sensor is receiving signal **Green Flashing:** Marginal signal (1.0 to 2.25 excess gain) *Output, Dark Operate, Lockout, Light Operate and Signal indicators function as 5-Segment Light Bar during ON/OFF-delay Selection modes

More on next page

Q60 Specifications (cont'd)

Indicators (cont'd) Note: outputs are active during on/off timing selection mode.	**Q60LAF models:** **ON-Delay** **Green ON Steady:** RUN mode, ON-delay active **Green Flashing:** ON-delay Selection mode **OFF-Delay** **Green ON Steady:** RUN mode, OFF-delay active **Green Flashing:** OFF-delay Selection mode **5-Segment Light Bar*** Indicates relative delay time during ON/OFF-delay Selection modes **Output** **Yellow ON Steady:** Outputs are conducting **Green ON Steady:** ON/OFF-delay Selection **Dark Operate** **Green ON Steady:** Dark Operate selected **Lockout** **Green ON Steady:** Buttons locked out **Light Operate** **Green ON Steady:** Light Operate selected **Signal** **Green ON Steady:** Sensor receiving signal **Green Flashing:** Marginal signal (1.0 to 2.25 excess gain) *Output, Dark Operate, Lockout, Light Operate and Signal indicators function as 5-Segment Light Bar during ON/OFF-delay Selection modes
Laser Characteristics	**Spot Size:** approximately 4 x 2 mm throughout range (collimated beam) **Angle of Divergence:** 5 milliradians NOTE: Contact factory for custom laser spot size.
Construction	**Housing:** ABS polycarbonate blend **Lens:** acrylic **Cover:** Clear ABS
Environmental Rating	IEC IP67; NEMA 6
Connections	2 m or 9 m integral cable. DC models offer a 5-pin Euro-style QD fitting. AC models offer 4-pin Micro-style QD fitting. QD cables are ordered separately. See pages 414 and 419.
Operating Conditions	**Temperature: Q60BB6LAF (DC) models:** -10° to +50° C **Q60VR3LAF Universal models:** -10° to +45° C **All others:** -20° to +55° C **Relative humidity:** 90% at 50° C (non-condensing)
Certifications	CE c UL us
Hookup Diagrams	**DC:** DC08 (p. 521) **Universal Cabled:** UN01 (p. 528) **Universal QD:** UN04 (p. 528)

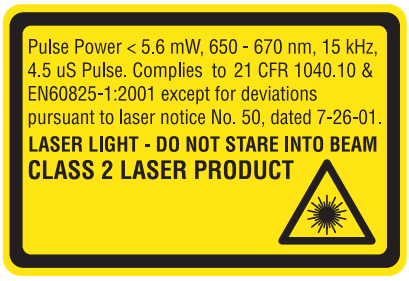


Class 1 Lasers

Lasers that are safe under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

For safe laser use:

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Locate open laser beam paths either above or below eye level, where practical.



Class 2 Lasers

Lasers that emit visible radiation in the wavelength range from 400 nm to 700 nm where eye protection is normally afforded by aversion responses, including the blink reflex. This reaction may be expected to provide adequate protection under reasonably foreseeable conditions of operation, including the use of optical instruments for intrabeam viewing. Reference 60825-1 Amend. 2 © IEC:2001(E), section 8.2.

For safe laser use:

- Do not permit a person to stare at the laser from within the beam.
- Do not point the laser at a person's eye at close range.
- Locate open laser beam paths either above or below eye level, where practical.