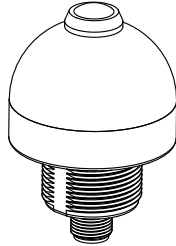
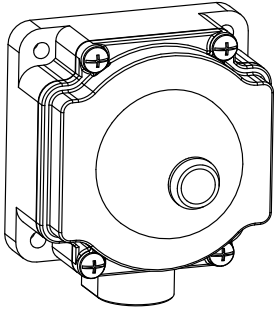


Datasheet

Compact, Single-Point Devices for Error-Proofing of Bin-Picking Operations

To view or download the latest technical information about this product, including specifications, dimensions, accessories, and wiring, see www.bannerengineering.com.



- Rugged, cost-effective, and easy-to-install solutions for error-proofing and parts-verification applications
- Compact devices are completely self-contained, no controller needed
- Illuminated dome provides an easy-to-see green job light; some models also light red for alternate operation
- Push-button and passive-actuation models available
- Choose NPN or PNP output, depending on model
- Fully encapsulated IP67 construction — ideal for use in abusive environments; rated to IP69K depending on installation
- Immune to ambient light, EMI, and RFI interference
- 12 V dc to 30 V dc operation



WARNING: Not To Be Used for Personnel Protection

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

Standard Models — 1 Color

- Green job light is ON at all times while job input is active
- Presence of hand (or pressing push button) activates output

Model ¹	Sensing Mode/LED	Housing	Range	Output ²
K50APLPGXDQ	Polarized retroreflective, visible red, 680 nm	50 mm (1.9 in) dome, 30 mm (1.1 in) mount, polycarbonate	2 m (6 ft)	PNP, N.O.
K50RPLPGXDQ				PNP, N.C.
K50ANLPGXDQ				NPN, N.O.
K50RNLPGXDQ				NPN, N.C.
K50APFF50GXDQ	Fixed field, infrared, 880 nm		50 mm (1.9 in) cutoff	PNP, N.O.
K50RPFF50GXDQ				PNP, N.C.
K50ANFF50GXDQ				NPN, N.O.
K50RNFF50GXDQ				NPN, N.C.
K50APFF100GXDQ			100 mm (3.9 in) cutoff	PNP, N.O.
K50RPFF100GXDQ				PNP, N.C.
K50ANFF100GXDQ				NPN, N.O.
K50RNFF100GXDQ				NPN, N.C.
K50APPBGXDQ	Push button	—	PNP, N.O.	

¹ Integral 4-pin M12/Euro-style quick disconnect models are listed.

- To order the 2 m (6.5 ft) PVC cable model, omit the suffix "Q" in the model number. For example, K50APLPGXD.
- To order the 9 m (30 ft) PVC cable model, replace the suffix "Q" with "W/30" in the model number. For example, K50APLPGXD W/30.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12/Euro-style quick disconnect, replace the suffix "Q" with "QP" in the model number. For example, K50APLPGXDQP.
- Models with a quick disconnect require a mating cordset.

² N.O. = Normally Open; N.C. = Normally Closed



Model ¹	Sensing Mode/LED	Housing	Range	Output ²
K50RPPBGXDQ				PNP, N.C.
K50ANPBGXDQ				NPN, N.O.
K50RNPBGXDQ				NPN, N.C.
K80APPBGXDQ		50 mm (1.9 in) dome, Flat or DIN- mount, polycarbonate		PNP, N.O.
K80RPPBGXDQ				PNP, N.C.
K80ANPBGXDQ				NPN, N.O.
K80RNPBGXDQ				NPN, N.C.

C-Series Models — 2 Colors

- Job light is green at all times while job input is active (unless hand is present)
- Presence of hand (or pressing push button) activates output and overrides job light (turns red) for visual verification that action was sensed
- Retroreflective models: To simplify alignment, sensor provides red signal when retroreflective target is not correctly aligned

Model ¹	Sensing Mode/LED	Housing	Range	Output ²	
K50APLPGRCQ	Polarized retroreflective, visible red, 680 nm	50 mm (1.9 in) dome, 30 mm (1.1 in) mount, polycarbonate	2 m (6 ft)	PNP, N.O.	
K50RPLPGRCQ				PNP, N.C.	
K50ANLPGRCQ				NPN, N.O.	
K50RNLPGRQC				NPN, N.C.	
K50APFF50GRCQ	Fixed field infrared, 880 nm		50 mm (1.9 in) dome, 30 mm (1.1 in) mount, polycarbonate	50 mm (1.9 in) cutoff	PNP, N.O.
K50RPF50GRCQ					PNP, N.C.
K50ANFF50GRCQ					NPN, N.O.
K50RNFF50GRCQ					NPN, N.C.
K50APFF100GRCQ			50 mm (1.9 in) dome, Flat or DIN- mount, polycarbonate	100 mm (3.9 in) cutoff	PNP, N.O.
K50RPF100GRCQ					PNP, N.C.
K50ANFF100GRCQ					NPN, N.O.
K50RNFF100GRCQ					NPN, N.C.
K50APPBGRCQ	Push button		—	PNP, N.O.	
K50RPPBGRCQ				PNP, N.C.	
K50ANPBGRCQ				NPN, N.O.	
K50RNPBGRCQ				NPN, N.C.	
K80APPBGRCQ		50 mm (1.9 in) dome, Flat or DIN- mount, polycarbonate		PNP, N.O.	
K80RPPBGRCQ				PNP, N.C.	
K80ANPBGRCQ				NPN, N.O.	
K80RNPBGRCQ				NPN, N.C.	

¹ Integral 4-pin M12/Euro-style quick disconnect models are listed.

- To order the 2 m (6.5 ft) PVC cable model, omit the suffix "Q" in the model number. For example, K50APLPGXD.
- To order the 9 m (30 ft) PVC cable model, replace the suffix "Q" with "W/30" in the model number. For example, K50APLPGXD W/30.
- To order the 150 mm (6 in) PVC cable model with a 4-pin M12/Euro-style quick disconnect, replace the suffix "Q" with "QP" in the model number. For example, K50APLPGXDQP.
- Models with a quick disconnect require a mating cordset.

² N.O. = Normally Open; N.C. = Normally Closed

E-Series Models — 2 Colors

- Job light is green at all times while job input is active
- Presence of hand (or pressing push button) activates output
- Presence of hand (or pressing push button) while job input is inactive causes unit to light red, providing visual verification that sensor is functioning properly

Model ¹	Sensing Mode / LED	Housing	Range	Output ²		
K50APLPGREQ	Polarized retroreflective, visible red, 680 nm	50 mm (1.9 in) dome, 30 mm (1.1 in) mount, polycarbonate	2 m (6 ft)	PNP, N.O.		
K50RPLPGREQ				PNP, N.C.		
K50ANLPGREQ				NPN, N.O.		
K50RNLPREQ				NPN, N.C.		
K50APFF50GREQ	Fixed field infrared, 880 nm		50 mm (1.9 in) dome, 30 mm (1.1 in) mount, polycarbonate	50 mm (1.9 in) cutoff	PNP, N.O.	
K50RPF50GREQ					PNP, N.C.	
K50ANFF50GREQ					NPN, N.O.	
K50RNFF50GREQ					NPN, N.C.	
K50APFF100GREQ	Fixed field infrared, 880 nm			50 mm (1.9 in) dome, 30 mm (1.1 in) mount, polycarbonate	100 mm (3.9 in) cutoff	PNP, N.O.
K50RPF100GREQ						PNP, N.C.
K50ANFF100GREQ						NPN, N.O.
K50RNFF100GREQ						NPN, N.C.
K50APPBGREQ	Push button	50 mm (1.9 in) dome, 30 mm (1.1 in) mount, polycarbonate	—		PNP, N.O.	
K50RPPBGREQ					PNP, N.C.	
K50ANPBGREQ					NPN, N.O.	
K50RNPBGREQ					NPN, N.C.	
K80APPBGREQ		Push button		50 mm (1.9 in) dome, Flat or DIN- mount, polycarbonate	—	PNP, N.O.
K80RPPBGREQ						PNP, N.C.
K80ANPBGREQ						NPN, N.O.
K80RNPBGREQ						NPN, N.C.

Overview

The K50 & K80 Pick-to-Light Sensors are suited to many part assembly and bin picking (pick-to-light) applications.

The entire translucent dome provides the green job light or other indication (depending on model), for high visibility. The solid-state output easily interfaces to a system controller, which is pre-programmed for a specific sequence of tasks. Mounted in or near each bin in an assembler's work station, the sensor job light signals the assembler:

- Which bins contain items to be picked in a given operation; and
- In what order they should be picked.

As the assembler takes a part in sequence, the K50 or K80 senses a hand in the bin and its output sends a signal to the controller. (For push-button models, the sensing occurs when the button is pushed. For other models, no action other than reaching for the part is required for the sensor to detect when a pick is made.)

The system controller then verifies if the correct part was taken and may respond by turning that job light OFF and activating the job light of the next bin in the sequence. If multiple parts are to be removed from one bin, the job light may remain ON until the appropriate number of signals is returned to the controller. If an incorrect part is selected, the control system may be wired to signal an alarm for the assembler and/or a supervisor, or it may be programmed to interpret the action as a call for parts.

The job light system results in increased efficiency (due to simplified job training), increased quality control (no skipped components), and reduced rework and inspections. It speeds the resumption of work after breaks and other distractions and is ideal for multilingual workplaces where communication is an issue.

The fixed-field and retroreflective-mode models require no interaction to operate, and so eliminate the hand, wrist, and arm stresses associated with mechanical push buttons. All models are immune to EMI, RFI, and ambient light interference. The polycarbonate and nylon housing is capable of absorbing high impact (even at low temperatures) and is resistant to abrasion and to damage by most chemicals. Its domed construction allows most dust and debris to slide easily off the sensor housing, simplifying maintenance. The 30 mm threaded base on all models provides easy mounting. Indicator behavior is shown in the table below.

Indicator and Output Behavior



Note: "D," "C," and "E" Series models as referenced in the table pertain to a part of the product model number, immediately preceding the Q designation.

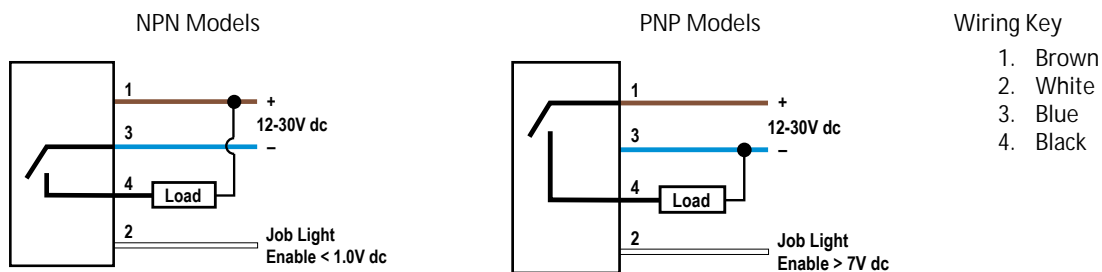
Models	Sensor Conditions		Job Light	Alternate Indicator	Output Signal Status
Standard (D-Series)	Job input active	Hand/pick absent	ON Green	—	OFF
		Hand/pick present	ON Green	—	ON
	No job input	Hand/pick absent	—	—	OFF
		Hand/pick present	—	—	ON
C-Series	Job input active	Hand/pick absent	ON Green	—	OFF
		Hand/pick present	—	ON Red	ON
	No job input	Hand/pick absent	OFF	OFF	OFF
		Hand/pick present	—	ON Red	ON
E-Series	Job input active	Hand/pick absent	ON Green	—	OFF
		Hand/pick present	ON Green	—	ON
	No job input	Hand/pick absent	OFF	—	OFF
		Hand/pick present	—	ON Red	ON

Installation

For push-button models, install the sensor at such a height and in a location that will be easy for the user and/or supervisor to see the indicator and will be comfortable for the user to press the push-button.

For other models, install the sensor in a location that will be comfortable for the user to break the beam when reaching for the required part. When multiple sensors will be located in close proximity, to monitor multiple bins for example, mount all the sensors in a similar sensing position (all mounted at the tops of the bins and pointing down, for example). This may reduce potential optical crosstalk, where one sensor detects another sensor's beam.

Wiring Diagrams



Note: Cabled wiring diagrams are shown. Quick disconnect (QD) wiring diagrams are functionally identical.

Specifications

Supply Voltage and Current

- 12 V dc to 30 V dc (10% max. ripple)
- < 75 mA max current at 12 V dc (exclusive of load)
- < 40 mA max. current at 30 V dc (exclusive of load)

Supply Protection Circuitry

Protected against transient voltages (fast-transient and over-voltage) and reverse polarity

Output Configuration

1 current NPN transistor or 1 current PNP transistor, depending on model

Output Rating

- Max load: 150 mA
- ON-state **saturation** voltage: < 2 V dc at 10 mA dc; < 2.5 V dc at 150 mA
- OFF-state leakage current: < 10 μ A at 30 V dc

Output Protection Circuitry

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

Output Response Time

3 milliseconds ON and OFF

Power-Up Output Delay Time

100 ms

EMI/RFI Immunity

Immune to EMI and RFI noise sources, per IEC 947-5-2

Environmental Rating

- Fully encapsulated; IEC IP67
- Integral QD models: DIN 40050 (IP69K) when using IP679K-rated cables
- Cabled models: IP69K when mounted with conduit
- K50 models only: NEMA/UL Type 4X, 13

Operating Conditions

- 40 °C to +50 °C (-40 °F to +122 °F)
- 90% at +50 °C maximum relative humidity (non-condensing)

Certifications



Construction

- Base: Polycarbonate
- Translucent dome: Polycarbonate
- Push **button**: Thermoplastic
- Lens: Polycarbonate or acrylic

Connections

- Integral 4-pin M12/Euro-style quick disconnect fitting, PVC-jacketed 2 m (6.5 ft) or 9 m (30 ft) cable, or 150 mm (5.9 in) PVC cable with 4-pin M12/Euro-style QD fitting, depending on model
- Mating cable required for models with quick disconnect
- QPMA-style PUR cabled models are also available; contact Banner Engineering for more information

Ambient Light Immunity

Up to 5,000 lux

Indicators

- Entire translucent dome provides indicator light; either Job or Pick Sensed indicator inhibits the other light, depending on model
- Job "Pick" Indicator: Green
- Pick Sensed Indicator: Red or OFF, depending on model

Job Light Enable Input

- Input Impedance: 8000 ohms
- PNP: Input low < 1.0 V
- NPN: Input high > 7 V

Required Overcurrent Protection



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

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

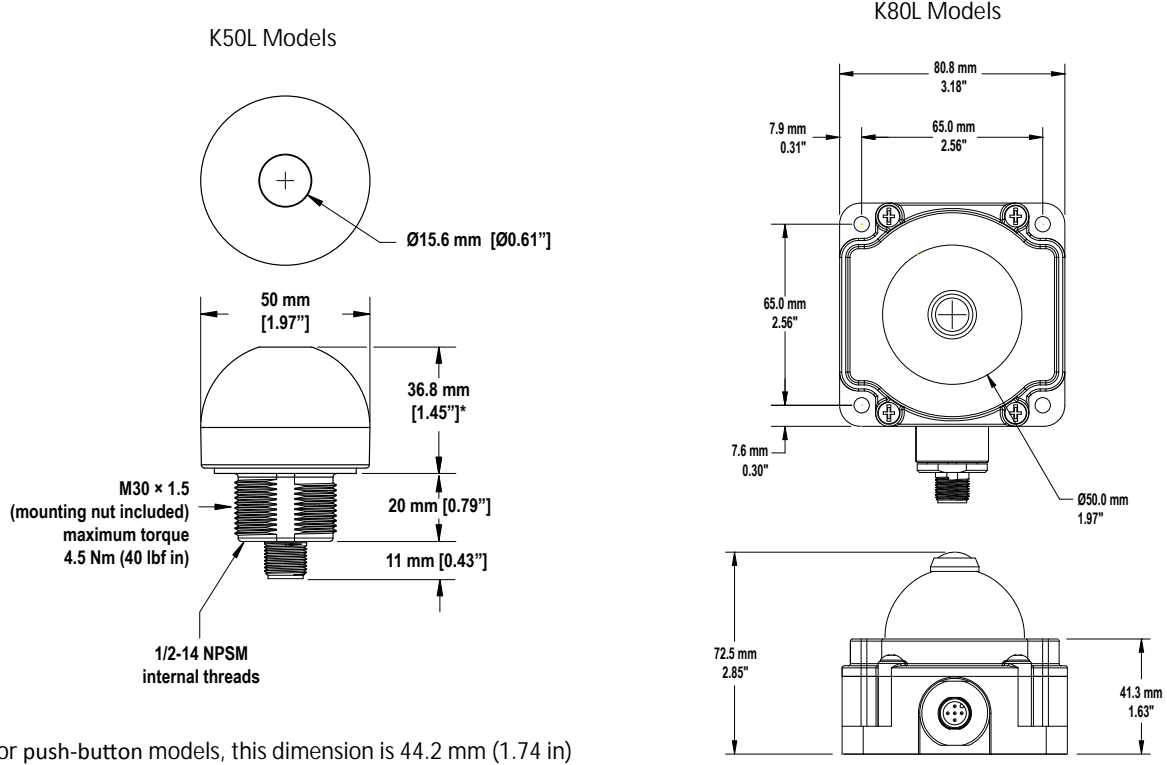
Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to www.bannerengineering.com.

Supply Wiring (AWG)	Required Overcurrent Protection (Amps)
20	5.0
22	3.0
24	2.0
26	1.0
28	0.8
30	0.5

Dimensions



Accessories

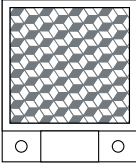
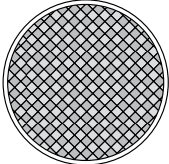
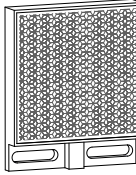

Cordsets

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

Retroreflective Targets



Note: For a complete selection of retroreflective targets, see www.bannerengineering.com.

<p>BRT-35X35B</p> <ul style="list-style-type: none"> • Square, acrylic target • Reflectivity Factor: 1.3 • Temperature: -20 °C to +60 °C (-4 °F to +140 °F) • Approximate size: 35 mm × 35 mm 	<p>BRT-50D</p> <ul style="list-style-type: none"> • Round, acrylic target with mounting stud • Reflectivity factor: 1.0 • Temperature: -20 °C to +60 °C (-4 °F to +140 °F) • Optional brackets are available • Size: 50.8 mm diameter 
<p>BRT-2X2</p> <ul style="list-style-type: none"> • Square, acrylic target • Reflectivity factor: 1.0 • Max. temperature: +50 °C (+122 °F) • Optional brackets are available • Approximate size: 51 mm × 51 mm 	<p>BRT-100X18A</p> <ul style="list-style-type: none"> • Rectangular, acrylic target • Reflectivity factor: 1.4 • Temperature: -20 °C to +60 °C (-4 °F to +140 °F) • Approximate size: 18.5 mm × 120 mm 

Retroreflective Tape

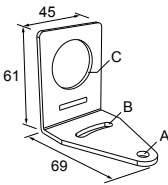
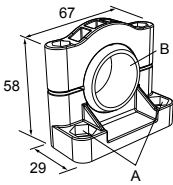


Note: For maximum adhesion of all tape products, surfaces must be clean.

Model	Reflectivity Factor	Maximum Temperature	Size
BRT-THG-1-100	0.7	+60 °C (+140 °F)	25 mm (1 in) wide, 2.5 m (100 in) long
BRT-THG-2-100	0.7	+60 °C (+140 °F)	50 mm (2 in) wide, 2.5 m (100 in) long
BRT-THG-3-100	0.7	+60 °C (+140 °F)	75 mm (3 in) wide, 2.5 m (100 in) long

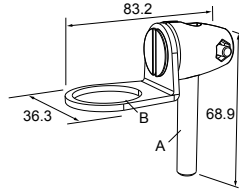
Mounting Brackets

All measurements in mm

<p>SMB30A</p> <ul style="list-style-type: none"> • Right-angle bracket with curved slot for versatile orientation • Clearance for M6 (¼ in) hardware • Mounting hole for 30 mm sensor • 12-ga. stainless steel  <p>Hole center spacing: A to B=40 Hole size: A=ø 6.3, B= 27.1 x 6.3, C=ø 30.5</p>	<p>SMB30SC</p> <ul style="list-style-type: none"> • Swivel bracket with 30 mm mounting hole for sensor • Black reinforced thermoplastic polyester • Stainless steel mounting and swivel locking hardware included  <p>Hole center spacing: A=ø 50.8 Hole size: A=ø 7.0, B=ø 30.0</p>
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SMB30FA

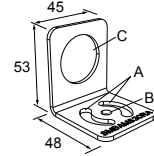
- Swivel bracket with tilt and pan movement for precise adjustment
- Mounting hole for 30 mm sensor
- 12-ga. 304 stainless steel
- Easy sensor mounting to extrude rail T-slot
- Metric and inch size bolt available



Bolt thread: SMB30FA, A= 3/8 - 16 x 2 in; SMB30FAM10, A= M10 - 1.5 x 50
Hole size: B= \varnothing 30.1

SMBAMS30RA

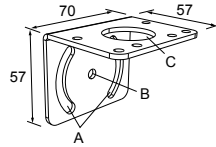
- Right-angle SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-ga. (2.6 mm) cold-rolled steel



Hole center spacing: A=26.0, A to B=13.0
Hole size: A=26.8 x 7.0, B= \varnothing 6.5, C= \varnothing 31.0

SMB30MM

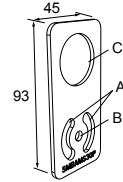
- 12-ga. stainless steel bracket with curved mounting slots for versatile orientation
- Clearance for M6 (1/4 in) hardware
- Mounting hole for 30 mm sensor



Hole center spacing: A = 51, A to B = 25.4
Hole size: A = 42.6 x 7, B = \varnothing 6.4, C = \varnothing 30.1

SMBAMS30P

- Flat SMBAMS series bracket
- 30 mm hole for mounting sensors
- Articulation slots for 90°+ rotation
- 12-ga. 300 series stainless steel



Hole center spacing: A=26.0, A to B=13.0
Hole size: A=26.8 x 7.0, B= \varnothing 6.5, C= \varnothing 31.0

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