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† For information on these products, please visit our web site at www.ab.com/catalogs.




Quick Selection Guide

| Specifications |  42EF RightSight™ |  42KL MiniSight™ |  44R AccuSight™ |  42CA 18 mm Cylindrical |
|-------------------------------------|---|--|--|---|
| Features | <ul style="list-style-type: none"> Patented housing design with 1200 psi washdown rating Universal 18 mm and thru-hole mounting options 360° visible status indicators DC only and universal supply models Variety of sensing modes Variety of output types | <ul style="list-style-type: none"> Industry standard housing design with 1200 psi washdown rating Universal 18 mm and thru-hole mounting options 360° visible status indicators 2- and 3-wire models Variety of sensing modes 2 m cable and micro QD connections | <ul style="list-style-type: none"> Patented status indicators Low profile housing design Universal 18 mm and thru-hole mounting options 360° visible status indicators Low voltage DC operation Variety of sensing modes 2 m cable and micro QD connections | <ul style="list-style-type: none"> Industry standard 18 mm housing design Patented ASIC design offers linear sensitivity adjustment, stability indication, and excellent noise immunity Stability Indication for ease of alignment and forewarning against detection of background Complementary light/dark outputs |
| Applications | <ul style="list-style-type: none"> Medium range, general purpose sensing Washdown applications | <ul style="list-style-type: none"> Medium range, general purpose sensing Washdown applications | <ul style="list-style-type: none"> Medium range, general purpose sensing Conveyors | <ul style="list-style-type: none"> Medium range, general purpose sensing Embedded mounting |
| Sensing Modes and Max. Range | <ul style="list-style-type: none"> Polarized retroreflective 3 m (10 ft) Retroreflective 4.5 m (14.7 ft) Diffuse 500 mm (20 in.) Background suppression 50 mm (2 in.), 100 mm (4 in.) Transmitted beam 20 m (60 ft), 4 m (13 ft), 8 m (26 ft) Large aperture fiber optic Sharp cutoff diffuse 130 mm (5 in.) | <ul style="list-style-type: none"> Retroreflective 5 m (16.4 ft) or 2.5 m (8.2 ft) Polarized retroreflective 2 m (6.6 ft) or 1 m (3.3 ft) Diffuse 380 mm (15 in.) or 190 mm (7.5 in.) Wide angle diffuse 180 mm (7 in.) or 90 mm (3.5 in.) Fixed focus diffuse 43 mm (1.7 in.) or 16 mm (0.63 in.) Transmitted beam 30 m (98 ft) or 10 m (33 ft) Large aperture fiber optic Small aperture fiber optic | <ul style="list-style-type: none"> Polarized retroreflective 3 m (10 ft) Diffuse 300 mm (12 in.) Wide angle diffuse 200 mm (7.8 in.) | <ul style="list-style-type: none"> Retroreflective 4.8 m (15.7 ft) and 7 m (23 ft) Polarized retroreflective 3.8 m (12.5 ft) Diffuse 100, 400 and 1000 mm (3.94, 15.75, and 39.37 in.) Transmitted Beam 16 m (52.5 ft) |
| Operating Voltage | <ul style="list-style-type: none"> 10.8...30V DC 21.6...264V AC/DC | <ul style="list-style-type: none"> 10.8...30V DC 21.6...250V AC/DC | <ul style="list-style-type: none"> 10...30V DC | <ul style="list-style-type: none"> 10...30V DC |
| Output Type | <ul style="list-style-type: none"> NPN or PNP 100 mA Dual NPN/PNP 100 mA MOSFET 100 mA | <ul style="list-style-type: none"> Dual NPN/PNP 100 mA 2-wire AC 100 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA NPN and PNP 100 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA |
| Response Time | <ul style="list-style-type: none"> 1...16 ms | <ul style="list-style-type: none"> DC = 1 ms DC high speed=300 μs AC = 8.3 ms | <ul style="list-style-type: none"> 10 ms | <ul style="list-style-type: none"> 1 ms 0.5 ms (background suppression) |
| Connections | <ul style="list-style-type: none"> 300V PVC cable 2 m Micro and pico QD | <ul style="list-style-type: none"> 300V PVC cable 2 m Micro and pico QD | <ul style="list-style-type: none"> 300V PVC cable 2 m Micro QD (6 in.) pigtail | <ul style="list-style-type: none"> 2 m cable Micro QD |
| Enclosure | <ul style="list-style-type: none"> Mindel, Acrylic NEMA 4X, 6P; IP67, IP69K 1200 psi washdown | <ul style="list-style-type: none"> Noryl®, Acrylic NEMA 4X, 6P; IP67 1200 psi washdown | <ul style="list-style-type: none"> Valox® NEMA 12; IP51 | <ul style="list-style-type: none"> PBT IP67 |
| Additional Info | <ul style="list-style-type: none"> See page 1-31 | <ul style="list-style-type: none"> See page 1-40 | <ul style="list-style-type: none"> See page 1-48 | <ul style="list-style-type: none"> See page 1-52 |





|  <p>42CM 18 mm Metal Cylindrical</p> |  <p>42CF 12 mm Metal Cylindrical</p> |  <p>Series 9000 Standard and Timing</p> |  <p>44B Adjustable Background and Foreground Suppression</p> |  <p>42BT Long Range Background Suppression</p> |
|---|---|--|---|---|
| <ul style="list-style-type: none"> • 18 mm industry standard package • Wide selection of sensing modes • 30V DC operation • NPN or PNP outputs • Fast response time • Variety of connection types | <ul style="list-style-type: none"> • Industry standard 12 mm housing design • Durable metal housing • Low voltage DC operation • Fast response time • Variety of sensing modes • 2 m cable and micro QD connections | <ul style="list-style-type: none"> • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 360° visible status indicators • DC and AC only models • Variety of sensing modes • Variety of output types | <ul style="list-style-type: none"> • Adjustable background and Foreground suppression models • Power, output and stability status indication • Micro QD connection with 90° swivel | <ul style="list-style-type: none"> • Adjustable long range background suppression sensing mode • Industry accepted housing design • 360° visible status indicators • Low voltage DC operation • Dual NPN and PNP outputs • 2 m cable, pico and micro QD connections |
| <ul style="list-style-type: none"> • Short range, general purpose sensing • Embedded mounting | <ul style="list-style-type: none"> • Short range, general purpose sensing • Embedded mounting | <ul style="list-style-type: none"> • Long range, general purpose sensing • Washdown applications | <ul style="list-style-type: none"> • Medium range background suppression, foreground suppression • Material handling and packaging applications | <ul style="list-style-type: none"> • Long range, background suppression sensing • Light duty industrial environments |
| <ul style="list-style-type: none"> • Retroreflective 3 mm...4 m (0.12 in...13.2 ft) • Polarized retroreflective 3 mm...3 m (0.12 in...9.9 ft) • Standard diffuse 0...100 mm (3.9 in.) (Adjustable) and 0...400 mm (13.6 in.) (Adjustable) • Background Suppression 50 mm (1.97 in.) and 100 mm (3.9 in.) • Transmitted beam 3 mm...14 m (0.12 in...45.9 ft) (Adjustable) | <ul style="list-style-type: none"> • Polarized retroreflective 2 m (6.6 ft) • Standard diffuse 100 mm (3.9 in.) and 300 mm (11.8 in.) • Transmitted beam 4 m (13.1 ft) | <ul style="list-style-type: none"> • Retroreflective 9.14 m (30 ft) • Polarized retroreflective 5 m (16 ft) • Standard diffuse 1.5 m (5 ft) • Long range diffuse 3 m (10 ft) • Transmitted beam 61 m (200 ft) • Long range transmitted beam 152 m (500 ft) • Large aperture fiber optic • Small aperture fiber optic | <ul style="list-style-type: none"> • Background suppression 300 mm (11.8 in.) • Foreground suppression 200 mm (7.87 in.) | <ul style="list-style-type: none"> • 1 m or 2 m (3.28 or 6.56 ft) mechanically adjusted background suppression |
| <ul style="list-style-type: none"> • 10...30V DC | <ul style="list-style-type: none"> • 10...30V DC | <ul style="list-style-type: none"> • 10...40V DC • 10...55V DC; 20...40V AC • 70...264V AC/DC • 45...264V AC; 40...264V DC | <ul style="list-style-type: none"> • 20...30V DC | <ul style="list-style-type: none"> • 12...24V DC |
| <ul style="list-style-type: none"> • NPN or PNP 100 mA | <ul style="list-style-type: none"> • NPN or PNP 100 mA | <ul style="list-style-type: none"> • NPN and PNP 250 mA • EM relay 2 A • Isolated NO solid state 300 mA | <ul style="list-style-type: none"> • NPN and PNP 100 mA | <ul style="list-style-type: none"> • NPN or PNP 100 mA |
| <ul style="list-style-type: none"> • 2 ms (0.5 ms for background suppression) | <ul style="list-style-type: none"> • 1.25...2.0 ms | <ul style="list-style-type: none"> • 2...15 ms | <ul style="list-style-type: none"> • 1 ms | <ul style="list-style-type: none"> • 2 ms |
| <ul style="list-style-type: none"> • 2 m cable • 4-pin DC micro QD | <ul style="list-style-type: none"> • 300V PVC cable 2 m • Micro QD | <ul style="list-style-type: none"> • 300V PVC cable 2 m • Mini QD • Micro QD | <ul style="list-style-type: none"> • Micro QD | <ul style="list-style-type: none"> • 300V PVC cable 2 m • Pico QD • Micro QD |
| <ul style="list-style-type: none"> • Nickel-plated brass • IP67 | <ul style="list-style-type: none"> • Nickel-plated brass • IP67 | <ul style="list-style-type: none"> • Valox® • NEMA 3, 4X, 6P, 12 & 13; IP67, IP69K • 1200 psi washdown | <ul style="list-style-type: none"> • Acrylic • NEMA 3, 4X, 6P, 12, 13, IP67 | <ul style="list-style-type: none"> • Polyarylate • IP65 |
| <ul style="list-style-type: none"> • See page 1-57 | <ul style="list-style-type: none"> • See page 1-62 | <ul style="list-style-type: none"> • See page 1-65 | <ul style="list-style-type: none"> • See page 1-72 | <ul style="list-style-type: none"> • See page 1-76 |






Quick Selection Guide

| Specifications |  <p>42BC Long Range Background Suppression</p> |  <p>42BA Short-Range Background Suppression</p> |  <p>42JS VisiSight™</p> |  <p>42KA Subminiature Flat Pack</p> |
|--|--|--|--|--|
| <p>Features</p> | <ul style="list-style-type: none"> Adjustable long range background suppression sensing mode Industry accepted housing design 360° visible status indicators DC and AC only models Transistor or EM-Relay output models Screw terminal connections | <ul style="list-style-type: none"> Adjustable short range background suppression sensing mode Industry accepted housing design 360° visible status indicators Low voltage DC operation Fast response time Diagnostic output 2 m cable connections | <ul style="list-style-type: none"> Visible light source offered on all models for ease of alignment Patented ASIC design offers linear sensitivity adjustment, stability indication and excellent noise immunity Compact sealed housing and cavity-free design to minimize collection of dust and debris while allowing for easy sensor cleanup | <ul style="list-style-type: none"> Subminiature form factor Side and end-view options High visibility LED status indicators Variety of sense modes Low voltage DC operation 2 m cable connection |
| <p>Applications</p> | <ul style="list-style-type: none"> Long range, background suppression sensing Light duty industrial environments | <ul style="list-style-type: none"> Short range, background suppression sensing Small parts assembly | <ul style="list-style-type: none"> Medium range, general purpose sensing Material handling, packaging and assembly | <ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly |
| <p>Sensing Modes and Max. Range</p> | <ul style="list-style-type: none"> Background Suppression 1 m (3.3 ft) and 2 m (6.6 ft) | <ul style="list-style-type: none"> Sharp cutoff diffuse: small sensor 3...5 cm (1.18...1.97 in.); large sensor 10...20 cm (3.94...7.87 in.) | <ul style="list-style-type: none"> Polarized retroreflective 3.5 m (11.5 ft) Diffuse 800 mm (31.5 in.) Transmitted Beam: Red LED source 10 m (32.8 ft) Infrared LED source 10 m (32.8 ft) | <ul style="list-style-type: none"> Standard diffuse 3...5 cm (1.18...1.97 in.) Sharp cutoff diffuse 3 cm (1.18 in.) Transmitted beam 50 cm (19.7 in.) |
| <p>Operating Voltage</p> | <ul style="list-style-type: none"> 12...24V DC ±10% 30 mA 24...240V AC/DC ±10% 30 mA (DC) 15 mA (AC) | <ul style="list-style-type: none"> 11...26V DC | <ul style="list-style-type: none"> 10...30V DC | <ul style="list-style-type: none"> 12...24V DC 24V DC ±10% (transmitted beam) |
| <p>Output Type</p> | <ul style="list-style-type: none"> NPN/PNP Selectable 100 mA S.P.S.T. N.O. Relay 3A (250V AC, 750V A) 3A (30V DC, 90 W) | <ul style="list-style-type: none"> NPN: 100 mA stability - 50 mA PNP: 100 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA | <ul style="list-style-type: none"> NPN or PNP 80 mA |
| <p>Response Time</p> | <ul style="list-style-type: none"> 20 ms 30 ms | <ul style="list-style-type: none"> 0.35 ms | <ul style="list-style-type: none"> 1 ms | <ul style="list-style-type: none"> 0.5 ms |
| <p>Connections</p> | <ul style="list-style-type: none"> Screw terminals accepts up to two 16 AWG (1.3 mm sq.) conductors | <ul style="list-style-type: none"> 300V PVC cable 2 m | <ul style="list-style-type: none"> 2 m cable Micro QD Pico QD | <ul style="list-style-type: none"> 300V PVC cable 2 m |
| <p>Enclosure</p> | <ul style="list-style-type: none"> Polycarbonate NEMA 1, 12, 13 IP65 (IEC529) | <ul style="list-style-type: none"> Polyarylate/ABS NEMA 1, 4, 6P, 12 & 13; IP67 | <ul style="list-style-type: none"> ABS/PMMA IP67 | <ul style="list-style-type: none"> Polyester NEMA 1 & IP40 |
| <p>Additional Info</p> | <ul style="list-style-type: none"> See page 1-78 | <ul style="list-style-type: none"> See page 1-81 | <ul style="list-style-type: none"> See page 1-84 | <ul style="list-style-type: none"> See page 1-88 |





|  42KB Micro Rectangular |  42KC Miniature Rectangular |  Series 7000 Miniature Rectangular |  Series 7000 LTD Miniature Rectangular |  42EF LaserSight™ RightSight™ |
|---|--|--|--|--|
| <ul style="list-style-type: none"> Industry standard form factor Diagnostic output High visibility LED status indicator Variety of sense modes Low voltage DC operation 2 m cable or pico QD connections | <ul style="list-style-type: none"> Industry standard form factor Diagnostic output High visibility LED status indicator Variety of sense modes Low voltage DC operation 2 m cable or pico QD connections | <ul style="list-style-type: none"> Industry standard form factor High visibility LED status indicator Variety of sense modes Complimentary light/dark outputs Low voltage DC operation 2 m cable or micro QD connections | <ul style="list-style-type: none"> Economy with performance Industry standard form factor High visibility LED status indicator Standard sense modes Low voltage DC operation 2 m cable or micro QD connections | <ul style="list-style-type: none"> Universal 18 mm and thru-hole mounting options 360° visible status indicators Class 1 eye-safe visible laser |
| <ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly | <ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly | <ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly | <ul style="list-style-type: none"> Short range general purpose sensing Small parts assembly | <ul style="list-style-type: none"> Medium range, general purpose sensing Material handling, assembly and packaging |
| <ul style="list-style-type: none"> Retroreflective 2 m (6.56 ft) Standard diffuse 70/200/300/400 mm (2.75/7.87/11.81/15.75 in.) Transmitted beam 1/7/10 m (3.3/22.75/32.8 ft) Sharp cutoff diffuse 30/40 mm (0.18/1.57 in.) | <ul style="list-style-type: none"> Polarized retroreflective 1.5 m (5 ft) Standard diffuse 50 cm (19.68 in.) Transmitted beam 7 m (22.96 ft) | <ul style="list-style-type: none"> Retroreflective 3.66 m (12 ft) Polarized retroreflective 1.98 m (6.5 ft) Standard diffuse 0.30 m (12 in.) Wide angle diffuse 0.28 m (11 in.) Fixed focus diffuse 17.8 mm (0.60 in.) Transmitted beam 7.62/9.15 m (25/30 ft) Small aperture fiber optic Transparent object detection | <ul style="list-style-type: none"> Retroreflective 0.76/2.13/3.65 m (2.5/7/12 ft) Standard diffuse 0.30 m (12 in.) Antiglare retroreflective 1/2 m (3.28/6.5 ft) | <ul style="list-style-type: none"> Polarized retroreflective 15 m (49 ft) Diffuse 300 mm (11.8 in.) Transmitted Beam 40 m (131 ft) |
| <ul style="list-style-type: none"> 11...26V DC | <ul style="list-style-type: none"> 11...26V DC | <ul style="list-style-type: none"> 11...28V DC | <ul style="list-style-type: none"> 11...28V DC | <ul style="list-style-type: none"> 10...30V DC |
| <ul style="list-style-type: none"> NPN or PNP 100 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA | <ul style="list-style-type: none"> NPN and PNP 100 mA |
| <ul style="list-style-type: none"> 0.35 ms | <ul style="list-style-type: none"> 0.5 ms | <ul style="list-style-type: none"> 0.5...1 ms | <ul style="list-style-type: none"> 1 ms | <ul style="list-style-type: none"> 1 ms (4 ms for transmitted beam) |
| <ul style="list-style-type: none"> 300V PVC cable 2 m Pico QD | <ul style="list-style-type: none"> 300V PVC cable 2 m | <ul style="list-style-type: none"> PVC cable 3 m Micro QD | <ul style="list-style-type: none"> PVC cable 3 m Micro QD | <ul style="list-style-type: none"> 2 m cable Micro QD |
| <ul style="list-style-type: none"> Polyarylate NEMA 1, 4, 6, 12 & 13; IP67 | <ul style="list-style-type: none"> Polyarylate NEMA 1, 4, 6P, 12 & 13; IP67 | <ul style="list-style-type: none"> Valox® NEMA 3, 4X, 6P, 12 & 13; IP67 | <ul style="list-style-type: none"> Valox® NEMA 12 & 13; IP62 | <ul style="list-style-type: none"> Mindel/Acrylic IP54 |
| <ul style="list-style-type: none"> See page 1-92 | <ul style="list-style-type: none"> See page 1-98 | <ul style="list-style-type: none"> See page 1-102 | <ul style="list-style-type: none"> www.ab.com/catalogs | <ul style="list-style-type: none"> See page 1-108 |






Quick Selection Guide

| Specifications |  Series 9000 LaserSight™ |  42CM 18 mm Cylindrical LaserSight™ |  45MLD Laser Background Suppression |  45CPD Analog and Discrete Output |
|-------------------------------------|---|---|---|--|
| Features | <ul style="list-style-type: none"> • Class 2 visible red laser source • Polarized retroreflective and transmitted beam sensing modes • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 360° visible status indicators • DC and AC only models | <ul style="list-style-type: none"> • Industry standard 18 mm housing design • Metal housing for heavy duty industrial applications • Class 1 eye safe visible laser • Small spot size | <ul style="list-style-type: none"> • Short range laser background suppression sensing mode • Adjustable sensing range and beam focus (0.5 mm (0.02 in.)) • Industry accepted housing design • Low voltage DC operation • Fast response time • Pico QD connections | <ul style="list-style-type: none"> • Multiple programming modes (object detection, object position) • Easy set-up using teach-in buttons • Class 1 eye safe visible laser for operation • Class 2 visible red laser for set-up |
| Applications | <ul style="list-style-type: none"> • Long range, general purpose sensing • Small parts placement | <ul style="list-style-type: none"> • Medium range, general purpose sensing • Embedded mounting | <ul style="list-style-type: none"> • Short range, precise sensing • Small parts assembly | <ul style="list-style-type: none"> • Long range, general purpose analog sensing • Object positioning, analog measuring |
| Sensing Modes and Max. Range | <ul style="list-style-type: none"> • Polarized retroreflective 40 m (130 ft) • Transmitted beam 300 m (1000 ft) | <ul style="list-style-type: none"> • Polarized retroreflective 30 m (98 ft) • Diffuse 300 mm (11.8 in.) • Transmitted Beam 50 m (164 ft) | <ul style="list-style-type: none"> • Background suppression diffuse 50...300 mm (1.9...11.8 in.) | <ul style="list-style-type: none"> • Diffuse 6 m (20 ft) |
| Operating Voltage | <ul style="list-style-type: none"> • 10...40V DC • 70...264V AC/DC | <ul style="list-style-type: none"> • 10...30V DC | <ul style="list-style-type: none"> • 10...30V DC | <ul style="list-style-type: none"> • 18...30V DC |
| Output Type | <ul style="list-style-type: none"> • NPN and PNP 250 mA • Em-Relay 2 A | <ul style="list-style-type: none"> • NPN or PNP 100 mA | <ul style="list-style-type: none"> • NPN or PNP 100 mA | <ul style="list-style-type: none"> • Analog output: 4...20 mA; • Discrete: two PNP outputs |
| Response Time | <ul style="list-style-type: none"> • 500 μsec...15 ms | <ul style="list-style-type: none"> • 0.7 ms | <ul style="list-style-type: none"> • 200 μsec | <ul style="list-style-type: none"> • Fast/slow: 13 ms/30 ms |
| Connections | <ul style="list-style-type: none"> • 300V PVC cable 2 m • Mini QD • Micro QD | <ul style="list-style-type: none"> • 2 m cable • Micro QD | <ul style="list-style-type: none"> • 4-pin pico QD | <ul style="list-style-type: none"> • Micro QD |
| Enclosure | <ul style="list-style-type: none"> • Valox®, Acrylic • NEMA 3, 4X, 6P, 12 & 13; IP67 | <ul style="list-style-type: none"> • Nickel-plated brass/glass • IP67 | <ul style="list-style-type: none"> • Polyamide • IP65 | <ul style="list-style-type: none"> • ABS/PMMA • IP67 |
| Additional Info | <ul style="list-style-type: none"> • See page 1-112 | <ul style="list-style-type: none"> • See page 1-115 | <ul style="list-style-type: none"> • See page 1-119 | <ul style="list-style-type: none"> • See page 1-121 |





|  45BPD Analog and Discrete Output |  45BRD Analog Output |  42CRC Color Registration |  Series 9000 ColorSight™ |  45CLR ColorSight™ |
|--|---|---|--|--|
| <ul style="list-style-type: none"> • Industry accepted 50 mm (1.97 in.) compact enclosure • Self-contained laser measurement solution • Class 2 visible red laser | <ul style="list-style-type: none"> • Industry accepted 50 mm (1.97 in.) compact enclosure • 20 µm resolution • Class 2 visible red laser • 270° rotatable connector | <ul style="list-style-type: none"> • Selectable red or green light sources • Manual or teachable operation • Diagnostic output • Fast response time • Selectable pulse stretcher output • Durable IP66 housing design | <ul style="list-style-type: none"> • Teachable true RGB color sensor • Fiber optic sensing for application flexibility • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 8 color match precision levels • Low voltage DC operation | <ul style="list-style-type: none"> • Three channel color matching (3 outputs) • Wide sensing range tolerance (±6 mm (±0.24 in.)) • Adjustable tolerance for high precision general color matching • External teach capability • Compact size enclosure • RS-485 communication models available |
| <ul style="list-style-type: none"> • Medium range, general purpose analog sensing • Object positioning, analog measuring | <ul style="list-style-type: none"> • Short range, precision general purpose measurement • Object positioning, analog measuring | <ul style="list-style-type: none"> • High speed contrast sensing • Color registration | <ul style="list-style-type: none"> • Precise color match sensing • Part inspection and sortation | <ul style="list-style-type: none"> • Precise color match sensing • Part inspection and sortation |
| <ul style="list-style-type: none"> • Diffuse 300 mm (11.8 in.) | <ul style="list-style-type: none"> • Diffuse 85 mm (3.35 in.) | <ul style="list-style-type: none"> • Color registration mark control 12.7 mm (0.5 in.) | <ul style="list-style-type: none"> • Large aperture fiber optic | <ul style="list-style-type: none"> • Diffuse 12...32 mm (0.47...1.26 in.) |
| <ul style="list-style-type: none"> • 18...30V DC | <ul style="list-style-type: none"> • 18...30V DC | <ul style="list-style-type: none"> • 10...30V DC | <ul style="list-style-type: none"> • 10...30V DC | <ul style="list-style-type: none"> • 18...30V DC |
| <ul style="list-style-type: none"> • Analog output: 4...20 mA; Discrete: PNP (100 mA) | <ul style="list-style-type: none"> • Analog output: 0...10V DC | <ul style="list-style-type: none"> • NPN and PNP 100 mA • Diagnostic alarm NPN 30 mA | <ul style="list-style-type: none"> • Bipolar output | <ul style="list-style-type: none"> • 3 PNP outputs (discrete models) • RS485 models: 1 PNP or 1 NPN output by cat. no. |
| <ul style="list-style-type: none"> • 0.4 ms | <ul style="list-style-type: none"> • 30 ms | <ul style="list-style-type: none"> • 0.25 ms | <ul style="list-style-type: none"> • Selectable 1.5...16 ms | <ul style="list-style-type: none"> • 1 ms |
| <ul style="list-style-type: none"> • Micro QD | <ul style="list-style-type: none"> • Micro QD | <ul style="list-style-type: none"> • Micro QD | <ul style="list-style-type: none"> • 300V PVC cable 2 m • Micro QD | <ul style="list-style-type: none"> • Micro QD |
| <ul style="list-style-type: none"> • ABS/PMMA • IP67 | <ul style="list-style-type: none"> • ABS/PMMA • IP67 | <ul style="list-style-type: none"> • Epoxy-coated aluminum • NEMA 3, 4, 6, 12 & 13; IP66 | <ul style="list-style-type: none"> • Valox®, Acrylic • NEMA 4; IP54 | <ul style="list-style-type: none"> • ABS/PMMA • IP67 |
| <ul style="list-style-type: none"> • See page 1-123 | <ul style="list-style-type: none"> • See page 1-125 | <ul style="list-style-type: none"> • See page 1-127 | <ul style="list-style-type: none"> • See page 1-130 | <ul style="list-style-type: none"> • See page 1-134 |





Quick Selection Guide

| Specifications |  45FVL Digital Fiber Optic |  45FSL Slim DIN-Rail Fiber Optic |  42FT 42FT Visible Red or Green Plastic Fiber Optic |  42FA Slim Fiber Optic |
|-------------------------------------|--|---|---|--|
| Features | <ul style="list-style-type: none"> • Teachable contrast sensor • Accepts all plastic fiber optic cables • Automatic and manual configuration with LCD display • Red, green, blue, and white light source models • "Power bus" feature reduces wiring • DIN Rail mountable housing design | <ul style="list-style-type: none"> • Adjustable plastic fiber optic contrast sensor • Fast response time • Red or white light source models • "Power bus" feature reduces wiring • Crosstalk protection • DIN Rail mountable housing design | <ul style="list-style-type: none"> • Red or green light source • Local and remote self-teach operation • Supports 1.5 mm and 1.25 mm plastic fiber optic cables • Selectable pulse-stretcher • Selectable hysteresis • Dual "RUN" modes to prevent crosstalk with other sensors | <ul style="list-style-type: none"> • In-line fiber optic sensor • Accepts all plastic fiber optic cables • Fast response time • Red light source models • Low voltage DC operation • DIN Rail mount option |
| Applications | <ul style="list-style-type: none"> • General contrast sensing • Color registration, part inspection and sortation | <ul style="list-style-type: none"> • High speed contrast sensing • Color registration, part inspection and sortation | <ul style="list-style-type: none"> • General contrast sensing • Color registration, part inspection and sortation | <ul style="list-style-type: none"> • Short range sensing • Small part assembly |
| Sensing Modes and Max. Range | <ul style="list-style-type: none"> • Retroreflective (bifurcated fiber) • Standard diffuse (bifurcated fiber) • Transmitted beam (individual fiber) | <ul style="list-style-type: none"> • Retroreflective (bifurcated fiber) • Standard diffuse (bifurcated fiber) • Transmitted beam (individual fiber) | <ul style="list-style-type: none"> • Small aperture fiber optic | <ul style="list-style-type: none"> • Small aperture fiber optic |
| Operating Voltage | <ul style="list-style-type: none"> • 12...24V DC | <ul style="list-style-type: none"> • 12...24V DC | <ul style="list-style-type: none"> • 12...24V DC | <ul style="list-style-type: none"> • 12...24V DC ±10% • 12...24V DC ±10% |
| Output Type | <ul style="list-style-type: none"> • NPN or PNP 100 mA | <ul style="list-style-type: none"> • NPN or PNP 100 mA • Stability 100 mA | <ul style="list-style-type: none"> • NPN or PNP by model | <ul style="list-style-type: none"> • NPN 100 mA • PNP 100 mA |
| Response Time | <ul style="list-style-type: none"> • 600 μsec | <ul style="list-style-type: none"> • 30 μsec, 250 μsec | <ul style="list-style-type: none"> • 500 μsec | <ul style="list-style-type: none"> • 500 μsec |
| Connections | <ul style="list-style-type: none"> • 300V PVC cable 2 m • 4 pin pico QD • Power Bus | <ul style="list-style-type: none"> • 300V PVC cable 2 m • 4 pin pico QD • Power Bus | <ul style="list-style-type: none"> • 2 m 500V 5 conductor cable | <ul style="list-style-type: none"> • 3-pin pico QD |
| Enclosure | <ul style="list-style-type: none"> • ABS • NEMA 1 & IP40 | <ul style="list-style-type: none"> • ABS • NEMA 1 & IP40 | <ul style="list-style-type: none"> • ABS resin • NEMA 1, 4X, 12, 13; IP66 (IEC 529) | <ul style="list-style-type: none"> • Noryl® • NEMA 1, 12, 13; IP65 (IEC 529) |
| Additional Info | <ul style="list-style-type: none"> • See page 1-137 | <ul style="list-style-type: none"> • See page 1-139 | <ul style="list-style-type: none"> • See page 1-141 | <ul style="list-style-type: none"> • See page 1-144 |





|  <p>ClearSight™ Series*</p> |  <p>45LPT Optical Label Sensor</p> |  <p>45LFM Capacitive Label Sensor</p> |  <p>45LSP Optical Fork Sensor</p> |  <p>45LST Optical Fork Sensor</p> |
|--|--|---|--|--|
| <ul style="list-style-type: none"> Optimized for clear object detection Three types from high performance (Series 9000, * pictured), to economical (RightSight and Series 7000) Washdown rated models DC and AC only models Variety of output types | <ul style="list-style-type: none"> One-touch local and remote teach operation Industrial aluminum housing design Highly visible LED status indicators Low voltage DC operation Fast response time Pico QD connection | <ul style="list-style-type: none"> Senses wide variety of label colors and material Industrial aluminum housing design Highly visible LED status indicators Low voltage DC operation Fast response time Micro QD connection | <ul style="list-style-type: none"> Teach-in sensitivity adjustment Light or dark operate selectable Remote teach capability (4-pin models) Plastic housing | <ul style="list-style-type: none"> Ideal for small parts detection Manual adjustment with LED status indicators Rugged aluminum construction Seven fork widths to choose from Fast response time Pico QD connections |
| <ul style="list-style-type: none"> Clear object sensing Plastic and glass bottles, films | <ul style="list-style-type: none"> Optical label sensing Translucent labels | <ul style="list-style-type: none"> Capacitive label sensing Translucent, clear, metalized labels | <ul style="list-style-type: none"> Smart parts detection Beam breakage sensing | <ul style="list-style-type: none"> Beam breakage sensing Small parts assembly |
| <ul style="list-style-type: none"> Polarized retroreflective | <ul style="list-style-type: none"> Transmitted beam (3 mm (0.12 in.) gap) | <ul style="list-style-type: none"> Capacitive (0.76 mm (0.03 in.) gap) | <ul style="list-style-type: none"> Transmitted beam gap (30...120 mm (1.18...4.72 in.)) | <ul style="list-style-type: none"> Transmitted beam (2...225 mm (0.08...8.86 in.) gap) |
| <ul style="list-style-type: none"> 10...40V DC 40...264V AC/DC 70...264V AC/DC | <ul style="list-style-type: none"> 10...30V DC | <ul style="list-style-type: none"> 11...30V DC | <ul style="list-style-type: none"> 10...30V DC | <ul style="list-style-type: none"> 10...30V DC |
| <ul style="list-style-type: none"> NPN and PNP 250 mA SPDT EM relay 2 A Isolated NO solid state 300 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA | <ul style="list-style-type: none"> NPN or PNP 150 mA | <ul style="list-style-type: none"> PNP or NPN 100 mA | <ul style="list-style-type: none"> NPN or PNP 100 mA |
| <ul style="list-style-type: none"> 1...10 ms | <ul style="list-style-type: none"> 50 μsec | <ul style="list-style-type: none"> 10 μsec | <ul style="list-style-type: none"> 250 μs | <ul style="list-style-type: none"> 30 μs...1 ms |
| <ul style="list-style-type: none"> 300V PVC cable 2 m Mini QD Micro QD | <ul style="list-style-type: none"> 4-pin pico QD | <ul style="list-style-type: none"> 5-pin micro QD | <ul style="list-style-type: none"> Pico QD | <ul style="list-style-type: none"> 4-pin pico QD |
| <ul style="list-style-type: none"> Valox®, Acrylic NEMA 3, 4X, 6P, 12 & 13; IP67 | <ul style="list-style-type: none"> Aluminum IP65 | <ul style="list-style-type: none"> Anodized aluminum IP54 | <ul style="list-style-type: none"> Polycarbonate IP67 | <ul style="list-style-type: none"> Aluminum IP65 |
| <ul style="list-style-type: none"> See page 1-147 | <ul style="list-style-type: none"> See page 1-151 | <ul style="list-style-type: none"> See page 1-153 | <ul style="list-style-type: none"> See page 1-155 | <ul style="list-style-type: none"> See page 1-157 |

Quick Selection Guide

| Specifications |  45MLA Measuring Arrays & Controllers |  45DLA Discrete Light Arrays |  45AST Area Arrays |  45PVA Verification Array |
|-------------------------------------|--|--|---|--|
| Features | <ul style="list-style-type: none"> • Height measuring capability • Slim profile array housing • Long operating range • Fast reaction time and measurement speed • Controllers available in I/O and serial communications (RS485 and CAN) models | <ul style="list-style-type: none"> • Integrated light array controller • Simple, flexible mounting • Optically synchronized • Wiring selectable range and output state (light/dark operate) • 30mm resolution | <ul style="list-style-type: none"> • Two-dimensional array scanning technology • 11...17 mm resolution • 50, 100, 150 mm scanning height models • Durable aluminum housing • Bracket-free mounting • Low voltage DC operation | <ul style="list-style-type: none"> • 35 mm object resolution • Robust aluminum enclosure • Four heights to choose from • Highly visible JOB and FAULT indicators • Crosstalk immunity • Low voltage DC operation |
| Applications | <ul style="list-style-type: none"> • Height based measurement and sorting • Overheight/overhang detection | <ul style="list-style-type: none"> • Error proofing • Part detection | <ul style="list-style-type: none"> • Small parts assembly • Parts ejection sensing | <ul style="list-style-type: none"> • Error proofing • Bin picking |
| Sensing Modes and Max. Range | <ul style="list-style-type: none"> • Transmitted beam up to 4 m (13 ft) | <ul style="list-style-type: none"> • Transmitted beam upto 8 m (26.2 ft) | <ul style="list-style-type: none"> • Transmitted beam up to 2.5 m (8 ft) | <ul style="list-style-type: none"> • Transmitted Beam 2 m (6.5 ft) |
| Operating Voltage | <ul style="list-style-type: none"> • 12...24V DC | <ul style="list-style-type: none"> • 12...24V DC | <ul style="list-style-type: none"> • 12...24V DC | <ul style="list-style-type: none"> • 12...24V DC |
| Output Type | <ul style="list-style-type: none"> • NPN and PNP or serial communications (selectable by model) | <ul style="list-style-type: none"> • NPN and PNP (single push/pull) | <ul style="list-style-type: none"> • NPN or PNP 100 mA | <ul style="list-style-type: none"> • NPN or PNP 50 mA |
| Response Time | <ul style="list-style-type: none"> • See 45MLA Controller User Manual | <ul style="list-style-type: none"> • 25...165 ms by cat. no. | <ul style="list-style-type: none"> • 4...8 ms | <ul style="list-style-type: none"> • 25...98 ms |
| Connections | <ul style="list-style-type: none"> • PVC cable with 8 pin micro-QD, 500 mm (19.7 in) between array and controller | <ul style="list-style-type: none"> • PVC cable with 4-pin DC micro (M12), 150 mm (6 in.) cable pigtail | <ul style="list-style-type: none"> • 300V PVC cable 2 m | <ul style="list-style-type: none"> • 300V PVC cable with micro QD |
| Enclosure | <ul style="list-style-type: none"> • Arrays: Aluminum housing, polycarbonate lens, IP54 • Controller: ABS housing IP54 • Terminal strip: IP20 | <ul style="list-style-type: none"> • Aluminum housing, polycarbonate lens • IP54 | <ul style="list-style-type: none"> • Aluminum housing, acrylic window • IP67 | <ul style="list-style-type: none"> • Aluminum housing, acrylic window • IP62 |
| Additional Info | <ul style="list-style-type: none"> • See page 1-160 | <ul style="list-style-type: none"> • See page 1-166 | <ul style="list-style-type: none"> • See page 1-169 | <ul style="list-style-type: none"> • See page 1-171 |

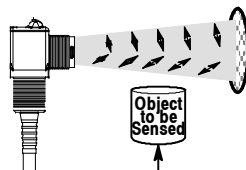
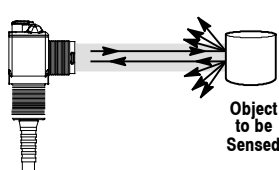
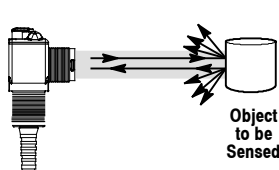
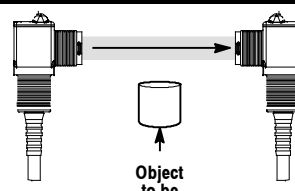
|  44N Zone Control Sensor |  22ZC Zone Controller |  Series 9000 Intrinsically Safe |  Series 5000 Intrinsically Safe |
|--|---|---|--|
| <ul style="list-style-type: none"> • Integral zone control logic • Supports singulation and slug operation • Compatible with variety of valves • Polarized retroreflective sense mode • Durable housing and connections • Low voltage DC operation | <ul style="list-style-type: none"> • Selectable pneumatic or powered roller zone control logic • Selectable advanced zone logic functions • Selectable RUN/STOP delay timers • Accepts mechanical or photoelectric sensor inputs • Drives pneumatic valve or powered roller driver • Proven flat cable IDC technology | <ul style="list-style-type: none"> • FM approved intrinsically safe design • Transmitted beam sensing mode • Compatible with Series 897H IS barriers • Industry standard housing design with 1200 psi washdown rating • Universal 30 mm and thru-hole mounting options • 360° visible status indicators | <ul style="list-style-type: none"> • FM approved intrinsically safe design • Multiple sensing modes • Compatible with Series 897H IS barriers • Modular housing design • Screw terminal connections |
| <ul style="list-style-type: none"> • Zero pressure accumulation conveyors • Pneumatically driven systems | <ul style="list-style-type: none"> • Accumulation conveyors • Pneumatically and powered roller driven systems | <ul style="list-style-type: none"> • Intrinsically safe systems • Hazardous (Classified) locations | <ul style="list-style-type: none"> • Intrinsically safe systems • Hazardous (Classified) locations |
| <ul style="list-style-type: none"> • Polarized Retroreflective 50.8...4.87 m (2...16 ft) | <ul style="list-style-type: none"> • Compatible with a wide variety of photoelectric and mechanical switches | <ul style="list-style-type: none"> • Transmitted Beam • 106 m (350 ft) | <ul style="list-style-type: none"> • Retroreflective 10 m (33 ft) • Polarized retroreflective 6 m (20 ft) • Standard diffuse 2.1 m (7 ft) • Large aperture fiber optic/fixe focus/wide angle diffuse |
| <ul style="list-style-type: none"> • 10...30V DC | <ul style="list-style-type: none"> • 24V DC | <ul style="list-style-type: none"> • 13...30V DC • 25 mA | <ul style="list-style-type: none"> • 13...29.5V DC |
| <ul style="list-style-type: none"> • PNP 100 mA | <ul style="list-style-type: none"> • Output signal for powered roller and drive for pneumatic valve | <ul style="list-style-type: none"> • PNP/8.5 mA • NPN/15 mA | <ul style="list-style-type: none"> • NPN and PNP 20 mA at 29.5V DC |
| <ul style="list-style-type: none"> • Variable 200 ms...10 s | <ul style="list-style-type: none"> • 1 ms | <ul style="list-style-type: none"> • 10 ms max. | <ul style="list-style-type: none"> • 1 ms |
| <ul style="list-style-type: none"> • 838 mm (33 in.) pigtail • 381 mm (15 in.) pigtail • Pico (M8) connector | <ul style="list-style-type: none"> • IDC flat cable | <ul style="list-style-type: none"> • 2 m 300V cable • 4-pin micro QD • 4-pin mini QD | <ul style="list-style-type: none"> • Screw terminals |
| <ul style="list-style-type: none"> • Valox® • NEMA 4, 4X, 6, 12, IP67 | <ul style="list-style-type: none"> • Valox® • NEMA 1, IP20 (IEC 529) | <ul style="list-style-type: none"> • Valox® • NEMA 3, 4X, 6P, 12, 13, IP67, 1200 psi washdown | <ul style="list-style-type: none"> • Valox® • NEMA 3, 4, 12, 13 (IP66) |
| <ul style="list-style-type: none"> • See page 1-177 | <ul style="list-style-type: none"> • See page 1-180 | <ul style="list-style-type: none"> • See page 1-184 | <ul style="list-style-type: none"> • See page 1-187 |

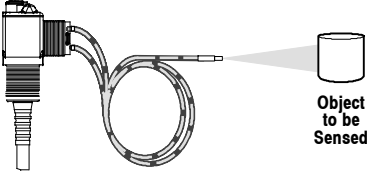
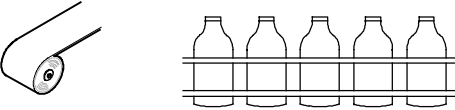
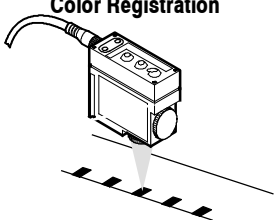
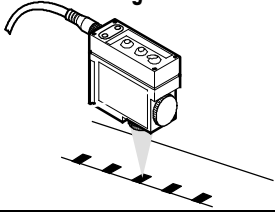
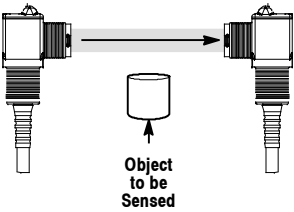

Quick Selection Guide



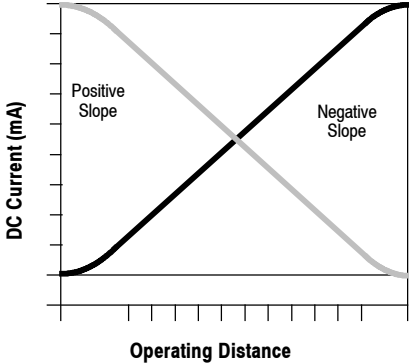
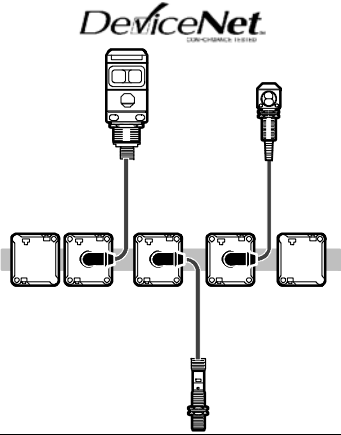
| Specifications |  <p>48MS MultiSight™</p> |  <p>Series 9000 Gate Entry</p> |  <p>Series 9000 Diagnostic</p> |  <p>Series 9000 Darkroom</p> |
|-------------------------------------|---|--|--|---|
| Features | <ul style="list-style-type: none"> Ten or 32 virtual detectors Standalone vision sensor Compact, sturdy industrial housing with IP67 rating Optional EtherNet/IP with RSLogix 5000 Add-On profile for I/O data Multiple evaluation methods: pattern matching, brightness, contrast and contour matching. | <ul style="list-style-type: none"> UL325 and UL508 approved Industry standard housing design with 1200 psi washdown rating Offered as kits or individual components | <ul style="list-style-type: none"> Selectable static or dynamic operation Industry standard housing design with 1200 psi washdown rating Universal 30 mm (1.18 in.) and thru-hole mounting options 360° visible status indicators DC and AC only models Variety of sensing modes | <ul style="list-style-type: none"> 880 nm wavelength for darkroom applications Fast response time Industry standard housing design DC and AC only models Variety of sensing modes Variety of output types |
| Applications | <ul style="list-style-type: none"> Error proofing applications Packaging, assembly | <ul style="list-style-type: none"> Automatic access control Vehicle access systems | <ul style="list-style-type: none"> Long range, general purpose sensing Requirement for diagnostic output | <ul style="list-style-type: none"> Darkroom, general purpose sensing Film processing |
| Sensing Modes and Max. Range | <ul style="list-style-type: none"> Vision sensor (infinite depending on lighting conditions) | <ul style="list-style-type: none"> Retroreflective 9 m (30 ft) Transmitted beam 61 m (200 ft) | <ul style="list-style-type: none"> Retroreflective 9.14 m (30 ft) Polarized retroreflective 5 m (16 ft) Standard diffuse 1.5 m (5 ft) Transmitted beam 61 m (200 ft) | <ul style="list-style-type: none"> Retroreflective 9.14 m (30 ft) Standard diffuse 0.91 m (3 ft) Transmitted beam 30 m (100 ft) |
| Operating Voltage | <ul style="list-style-type: none"> 24V DC | <ul style="list-style-type: none"> 10...55V DC/20...40V AC 70...264V AC/DC | <ul style="list-style-type: none"> 10...30V DC 90...264V AC 95...264V DC | <ul style="list-style-type: none"> 10...40V DC 70...264V AC/DC |
| Output Type | <ul style="list-style-type: none"> 4 x PNP (200 mA per output) | <ul style="list-style-type: none"> SPDT EM Relay | <ul style="list-style-type: none"> Switch selectable NPN and PNP NO—NC 100 mA EM relay: sensor - 2 A diagnostic - 1 A | <ul style="list-style-type: none"> NPN and PNP 250 mA SPDT EM relay, 2 A |
| Response Time | <ul style="list-style-type: none"> 50...250 ms | <ul style="list-style-type: none"> 23 ms | <ul style="list-style-type: none"> 2...15 ms | <ul style="list-style-type: none"> 2...23 ms |
| Connections | <ul style="list-style-type: none"> Power I/O Ethernet | <ul style="list-style-type: none"> 2 m cable AC mini QD | <ul style="list-style-type: none"> Mini quick-disconnect Micro quick-disconnect | <ul style="list-style-type: none"> 300V PVC cable 2 m Mini quick-disconnect Micro quick-disconnect |
| Enclosure | <ul style="list-style-type: none"> Polycarbonate IP67 | <ul style="list-style-type: none"> Valox/Acrylic NEMA 2, 4, 4X, 6P, IP67, 1200 psi (8270 kPa) washdown | <ul style="list-style-type: none"> Valox® NEMA 3, 4X, 6P, 12 & 13; IP67 | <ul style="list-style-type: none"> NEMA 3,4X, 6P, 12 & 13; IP67 |
| Additional Info | <ul style="list-style-type: none"> See page 1-191 | <ul style="list-style-type: none"> See page 1-198 | <ul style="list-style-type: none"> See page 1-201 | <ul style="list-style-type: none"> www.ab.com/catalogs |

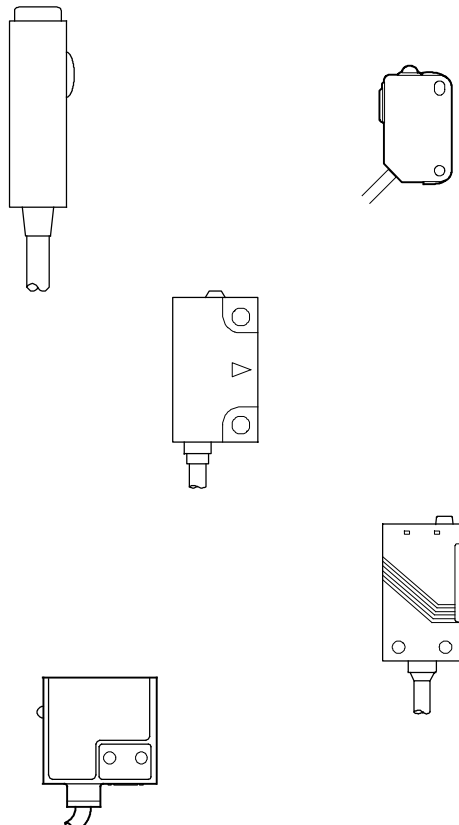
|  <p>Series 6000 Compact</p> |  <p>Series 5000 Modular</p> |  <p>Series 4000B Long Range</p> |  <p>Series 10,000 Teachable</p> |
|---|--|--|---|
| <ul style="list-style-type: none"> • Compact cylindrical housing design • Manual sensitivity adjustment • Dual NPN and PNP outputs • Variety of sense modes • DC and AC only models • 2 m cable and micro QD connections | <ul style="list-style-type: none"> • Multiple connection base and photohead options • Multiple plug-in output modules • Multiple plug-in logic modules • DC and AC only models | <ul style="list-style-type: none"> • Durable housing design • DC and AC only models • Variety of sensing modes • Multiple plug-in output modules • Multiple plug-in logic modules • Screw terminal connections | <ul style="list-style-type: none"> • Manual or teachable operation • LCD display for easy setup • Automatic sensitivity control with diagnostic output • Industry standard housing design with 1200 psi washdown rating • Low voltage DC operation • Variety of sensing modes |
| <ul style="list-style-type: none"> • Medium range, general purpose sensing • Cold temperature environments | <ul style="list-style-type: none"> • Long range, general purpose sensing • Modular approach for maximum flexibility | <ul style="list-style-type: none"> • Long range, general purpose sensing • Harsh duty installations | <ul style="list-style-type: none"> • Precise contrast sensing • Small parts assembly |
| <ul style="list-style-type: none"> • Retroreflective 8.5 m (28 ft) • Polarized retroreflective 3 m (10 ft) • Standard diffuse 0.76 m (30 in.) • Wide angle diffuse 0.46 m (18 in.) • Fixed focus diffuse 27.9 mm (1.1 in.) • Transmitted beam 36.5 m (120 ft) • Large aperture fiber optic • Small aperture fiber optic • Sharp cutoff diffuse 0.25...7.6 cm (0.1...3 in.) | <ul style="list-style-type: none"> • Retroreflective 6...10 m (20...33 ft) • Polarized retroreflective 6 m (20 ft) • Standard diffuse 1.5...3 m (5...10 ft) • Background suppression diffuse 6.3...30.5 cm (2.5...12 in.) • Wide angle diffuse 0.46 m (18 in.) • Fixed focus diffuse 50.8 mm (2.0 in.) • Large aperture fiber optic | <ul style="list-style-type: none"> • Retroreflective 10.6 m (35 ft) • Polarized retroreflective 7 m (23 ft) • Standard diffuse 3.6 m (12 ft) • Transmitted beam 274 m (900 ft) | <ul style="list-style-type: none"> • ClearSight 1.2 m (48 in.) • Retroreflective 9 m (30 ft) • Polarized retroreflective 4.6 m (15 ft) • Standard diffuse 2.7 m (8.9 ft) • Large aperture fiber optic • Small aperture fiber optic • Green fiber optic |
| <ul style="list-style-type: none"> • 10...30V DC • 20...132V AC/DC • 20...264V AC/DC | <ul style="list-style-type: none"> • 102...132V AC • 204...254V AC • 10...30V DC • 40...54V AC/DC • 20...30V AC/DC | <ul style="list-style-type: none"> • 102...132V AC • 195...253V AC • 40...58V AC • 18...28V AC/DC | <ul style="list-style-type: none"> • 10...30V DC |
| <ul style="list-style-type: none"> • NPN and PNP 220 mA • Power MOSFET 150...300 mA | <ul style="list-style-type: none"> • EM relay 2 A • Triac 750 mA • FET 30 mA • NPN and PNP 100 mA | <ul style="list-style-type: none"> • EM relay 5 A • Triac 1 A • FET 30 mA • NPN 250 mA • DCV 30 mA | <ul style="list-style-type: none"> • NPN and PNP • Diagnostic alarm, NPN or PNP |
| <ul style="list-style-type: none"> • 0.2...18 ms | <ul style="list-style-type: none"> • 1...20 ms | <ul style="list-style-type: none"> • 5...20 ms | <ul style="list-style-type: none"> • Selectable 250 μsec...4 ms |
| <ul style="list-style-type: none"> • PVC cable 3 m | <ul style="list-style-type: none"> • Vinyl cable 3 m • Screw terminals • Mini QD | <ul style="list-style-type: none"> • Terminals | <ul style="list-style-type: none"> • 300V PVC cable 2 m • Mini QD • Micro QD |
| <ul style="list-style-type: none"> • Noryl® • NEMA 3, 4X 6, 12 & 13; IP67 | <ul style="list-style-type: none"> • Valox® • NEMA 3, 4, 12 & 13; IP66 | <ul style="list-style-type: none"> • Noryl® • NEMA 3, 4, 12 & 13; IP66 | <ul style="list-style-type: none"> • Valox® • NEMA 3, 4X, 6P, 12 & 13; IP67 |
| <ul style="list-style-type: none"> • See page 1-207 | <ul style="list-style-type: none"> • See page 1-213 | <ul style="list-style-type: none"> • See page 1-227 | <ul style="list-style-type: none"> • www.ab.com/catalogs |

Product Application Selector

| Standard Industrial Application | Sensing Modes | Maximum Sensing Range | Series | Page | |
|---|---|-----------------------|----------------|------------|------|
|  | Retroreflective | 4.8 m (15.7 ft) | 42CA | 1-52 | |
| | | 7.2 m (23.6 ft) | 42CA | 1-52 | |
| | Retroreflective | 4.5 m (14.7 ft) | RightSight | 1-31 | |
| | | 5 m (16.4 ft) | MiniSight | 1-40 | |
| | | 9 m (30 ft) | Series 9000 | 1-68 | |
| | Polarized Retroreflective | 3 m (9.8 ft) | AccuSight | 1-48 | |
| | | 3 m (9.8 ft) | RightSight | 1-31 | |
| | | 3 m (9.8 ft) | 42CA | 1-52 | |
| | | 2 m (6.6 ft) | MiniSight | 1-40 | |
| | | 5 m (16 ft) | Series 9000 | 1-69 | |
|  | Standard Diffuse | 500 mm (20 in.) | RightSight | 1-31 | |
| | | 380 mm (15 in.) | MiniSight | 1-40 | |
| | | 380 mm (1.5 in.) | AccuSight | 1-48 | |
| | | 1.5 m (5 ft) | Series 9000 | 1-69 | |
| | | 400 mm (13.6 in.) | 42CA | 1-52 | |
| | | 100 mm (4 in.) | 42CA | 1-52 | |
| | | 1000 mm (39.4 in.) | 42CA | 1-52 | |
|  | Background Suppression | 50 mm (2 in.) | RightSight | 1-31 | |
| | | 300 mm (11.8 in.) | 44B | 1-72 | |
| | | 100 mm (4 in.) | RightSight | 1-31 | |
| | | 1 m (3.3 ft) | 42BT | 1-76 | |
| | | 2 m (6.5 ft) | 42BC | 1-78 | |
| | | 1 m (3.3 ft) | 42BT | 1-76 | |
| | | 2 m (6.5 ft) | 42BC | 1-78 | |
| | | 30 mm (1.2 in.) | 42BA | 1-81 | |
| | | 50 mm (2 in.) | 42CA | 1-52 | |
| | | 50 mm (2 in.) | 42BA | 1-81 | |
| | | 100 mm (4 in.) | 42CA | 1-52 | |
| | | 100 mm (4 in.) | 42BA | 1-81 | |
| | | 200 mm (8 in.) | 42BA | 1-81 | |
| | Sharp Cutoff Diffuse | 100 mm (4 in.) | AccuSight | 1-48 | |
| | | 130 mm (5 in.) | RightSight | 1-31 | |
| | | 30 mm (1.2 in.) | 42KA | 1-88 | |
| | | 30 mm (1.2 in.) | 42KB | 1-96 | |
| | | 40 mm (1.6 in.) | 42KB | 1-96 | |
| |  | Transmitted Beam | 4 m (15 ft) | RightSight | 1-31 |
| | | | 16 m (52.5 ft) | 42CA | 1-52 |
| 20 m (65 ft) | | | RightSight | 1-31 | |
| 20 m (65 ft) | | | MiniSight | 1-40 | |
| 61 m (200 ft) | | | Series 9000 | 1-65 | |
| 152 m (500 ft) | | | Series 9000 | 1-65 | |

| Standard Industrial Application | Sensing Modes | Maximum Sensing Range | Series | Page |
|---|------------------------------------|-----------------------------|-----------------------|-------|
|  | Fiber Optic, Infrared Glass | Varies with FO cable | MiniSight | 1-40 |
| | | Varies with FO cable | RightSight | 1-31 |
| | | Varies with FO cable | Series 9000 | 1-65 |
| | Fiber Optic, Visible Red Plastic | Varies with FO cable | MiniSight | 1-40 |
| | | Varies with FO cable | Series 9000 | 1-65 |
| | | Varies with FO cable | 45FVL | 1-137 |
| | | Varies with FO cable | 42FA | 1-144 |
| | Fiber Optic, Visible Green Plastic | Varies with FO cable | 45FSL | 1-139 |
| | | Varies with FO cable | 45FVL | 1-137 |
| | Fiber Optic, Visible Blue Plastic | Varies with FO cable | 45FVL | 1-137 |
| Fiber Optic, Visible White Plastic | Varies with FO cable | 45FSL | 1-139 | |
| | Varies with FO cable | 45FVL | 1-137 | |
| Clear Bottles, Films  | Clear Object | 1.4 m (4.5 ft) | ClearSight 9000 | 1-147 |
| | | | ClearSight 10000 | 1-147 |
| | | 1.5 m (5 ft) | ClearSight 7000 | 1-150 |
| | | 1 m (3.28 ft) | ClearSight RightSight | 1-150 |
| Color Registration  | Color Recognition | Up to 25.5 mm (1 in.) | ColorSight | 1-130 |
| | | 12...32 mm (0.4...1.26 in.) | 45CLR ColorSight | 1-134 |
| Color Registration  | Contrast | Up to 12 mm (0.5 in.) | 45FVL | 1-137 |
| | | 12.7 mm (0.5 in.) | 42CRC | 1-127 |
| Long Range Sensing  | Transmitted Beam | 152 m (500 ft) | Series 9000 | 1-65 |
| | Laser | 300 m (1000 ft) | LaserSight | 1-112 |
| High Temperature (70...480°C)  | Fiber Optic | Varies with FO cable | 45FVL | 1-137 |
| | Fiber Optic | Varies with FO cable | 42FT | 1-141 |
| | Fiber Optic | Varies with FO cable | 45FSL | 1-139 |
| | Fiber Optic | Varies with FO cable | RightSight | 1-31 |
| | Fiber Optic | Varies with FO cable | MiniSight | 1-40 |
| | | Varies with FO cable | Series 9000 | 1-65 |

| Standard Industrial Application | Sensing Modes | Maximum Sensing Range | Series | Page |
|---|-------------------------------|-----------------------|-----------------|-------|
| High Speed (250 ms or better)  | Retroreflective | 5 m (16.4 ft) | MiniSight | 1-40 |
| | Polarized Retroreflective | 2 m (6.6 ft) | MiniSight | 1-40 |
| | Standard Diffuse | 380 mm (15 in.) | MiniSight | 1-40 |
| | Wide Angle Diffuse | 180 mm (7 in.) | MiniSight | 1-40 |
| | Transmitted Beam | 30 m (98 ft) | MiniSight | 1-40 |
| | Glass (Infrared) Fiber Optic | Varies with FO cable | MiniSight | 1-40 |
| | Plastic (Visible) Fiber Optic | Varies with FO cable | MiniSight | 1-40 |
| Varies with FO cable | | 45FSL | 1-139 | |
| Hazardous (Classified) Location  | Retroreflective | 10 m (33 ft) | Series 5000 | 1-213 |
| | Polarized Retroreflective | 6 m (20 ft) | Series 5000 | 1-213 |
| | Standard Diffuse | 2 m (7 ft) | Series 5000 | 1-213 |
| | Fixed Focus Diffuse | 50 mm (2 in.) | Series 5000 | 1-213 |
| | Wide Angle Diffuse | 500 mm (20 in.) | Series 5000 | 1-213 |
| | Transmitted Beam | 106 m (350 ft) | Series 9000 | 1-186 |
| | Glass Fiber Optic | Varies with FO cable | Series 5000 | 1-213 |
| Analog Output  | Retroreflective | 4.6 m (15 ft) | Series 5000 | 1-213 |
| | Standard Diffuse | 1.5 m (5 ft) | Series 5000 | 1-213 |
| | Fixed Focus Diffuse | 50 mm (2 in.) | Series 5000 | 1-213 |
| | Wide Angle Diffuse | 500 mm (20 in.) | Series 5000 | 1-213 |
| | Glass (Infrared) Fiber Optic | 500 mm (20 in.) | Series 5000 | 1-213 |
|  | Retroreflective | 9 m (30 ft) | SmartSight 9000 | 10-10 |
| | Polarized Retroreflective | 3 m (9.8 ft) | RightSight | 10-4 |
| | | 5 m (16 ft) | SmartSight 9000 | 10-10 |
| | Standard Diffuse | 500 mm (20 in.) | RightSight | 10-6 |
| | | 1.5 m (5 ft) | SmartSight 9000 | 10-11 |
| | Transmitted Beam | 4 m (15 ft) | RightSight | 10-7 |
| | | 20 m (65 ft) | RightSight | 10-7 |
| | | 61 m (200 ft) | SmartSight 9000 | 10-11 |
| | | 130 m (425 ft) | SmartSight 9000 | 10-11 |
| | Fiber Optic, Infrared Glass | Varies with FO cable | RightSight | 10-7 |
| Varies with FO cable | | SmartSight 9000 | 10-11 | |

| Miniature-UltraMiniature Sensors | Sensing Modes | Maximum Sensing Range | Series | Page | |
|--|---------------------------|-----------------------|-----------------|-------|------|
|  | Retroreflective | 2 m (6.5 ft) | 42KB | 1-95 | |
| | | 3.6 m (12 ft) | Series 7000 | 1-102 | |
| | Polarized Retroreflective | 1.5 m (4.9 ft) | 42KC | 1-98 | |
| | | 2 m (6.5 ft) | Series 7000 | 1-102 | |
| | | 2 m (6.5 ft) | 42CF | 1-62 | |
| | | 3.5 m (11.5 ft) | 42JS | 1-84 | |
| | | Standard Diffuse | 30 mm (1.2 in.) | 42KA | 1-88 |
| | 50 mm (2 in.) | | 42KA | 1-88 | |
| | 70 mm (2.8 in.) | | 42KB | 1-96 | |
| | 200 mm (8 in.) | | 42KB | 1-96 | |
| | 300 mm (11.8 in.) | | 42KB | 1-96 | |
| | 400 mm (15.8 in.) | | 42KB | 1-96 | |
| | 500 mm (20 in.) | | 42KC | 1-98 | |
| | 100 mm (4 in.) | | 42CF | 1-62 | |
| | 300 mm (11.8 in.) | | 42CF | 1-62 | |
| | 300 mm (11.8 in.) | | Series 7000 | 1-102 | |
| | 800 mm (31.5 in.) | | 42JS | 1-84 | |
| | Background Suppression | | 30 mm (1.2 in.) | 42BA | 1-81 |
| | | | 50 mm (2 in.) | 42BA | 1-81 |
| | | 100 mm (4 in.) | 42BA | 1-81 | |
| | | 200 mm (8 in.) | 42BA | 1-81 | |
| | Sharp Cutoff Diffuse | 30 mm (1.2 in.) | 42KA | 1-88 | |
| | | 30 mm (1.2 in.) | 42KB | 1-96 | |
| | | 40 mm (1.6 in.) | 42KB | 1-96 | |
| | Wide Angle Diffuse | 280 mm (11 in.) | Series 7000 | 1-102 | |
| | Transmitted Beam | 500 mm (20 in.) | 42KA | 1-88 | |
| | | 1 m (3.3 ft) | 42KB | 1-97 | |
| | | 7 m (23 ft) | 42KB | 1-97 | |
| 10 m (33 ft) | | 42KB | 1-97 | | |
| 7 m (23 ft) | | 42KC | 1-98 | | |
| 7.6 m (25 ft) | | Series 7000 | 1-102 | | |
| 9.2 m (30 ft) | | Series 7000 | 1-102 | | |
| 533 mm (21 in.) | | Series 7000 | 1-102 | | |
| 4 m (13 ft) | | 42CF | 1-62 | | |
| 10 m (33 ft) | 42JS | 1-84 | | | |

AC Coupled Amplifier: An amplifier in which only pulsed (AC) signals are amplified and direct (DC) signals are ignored. (Direct signals generated by sunlight, heat sources and other.)

Alignment: Positioning of light source and receiver, reflector, or target in which a maximum signal strength is obtained.

Ambient Light: Illumination of a receiver not generated by its light source.

Analog: Electronic circuit with a current or voltage output signal that varies as a function of the light intensity received by the photodetector.

Angstrom: Unit of measurement used to determine the wavelength of light. 10 Angstrom (A) is equal to 1 nanometer (nm)

Attenuation: The reduction of signal strength. An example is when light travels through a fiber optic cable. The degree of attenuation depends on the fiber material and on the total length of the fiber optic cable.

Bifurcated: A fiber optic bundle that divides in two legs, forming a Y.

Complementary Output: Output circuit with a dual output device such that when one output is energized the other output is de-energized (similar to SPDT contact).

Dark Operate: A dark operate sensor energizes an output when the light intensity on the photodetector has sufficiently decreased.

Diagnostic: Advanced warning of loss in signal strength due to misalignment, dust and more, prior to loss of control output signal.

Differential Travel (Hysteresis): The distance between the operating point and the release point (see hysteresis).

Diffuse Reflection (Proximity): A photoelectric sensing method in which the light emitted by the light source hits the target surface and is then diffused from the surface in all directions.

Digital Output: An output circuit with only two operating states that are either "On" or "Off." These operating states often are called "Hi" or "Low."

Dwell-Time: The adjustable or fixed time length of an output pulse, independent of input signal duration.

Excess Gain: See operating margin.

False Pulse: An undesired change in the state of the output of the proximity switch that lasts for more than two milliseconds.

False Pulse Protection: Circuitry designed to avoid false pulses during power on or power down action.

Ferrule: Tip or termination of a fiber optic cable.

Field of View: The region that is illuminated by the light source and that can be seen by the receiver. Field of view is expressed in degrees but is three dimensional.

Gating: The provision to apply an external signal to a sensor in order to prevent undesirable operation.

Hysteresis: The distance between the operating point and the release point.

Infrared: Invisible light radiation starting at a wavelength of 690 nanometer (or 6900 Angstrom) and longer.

Intrinsic Safety: A design technique applied to electrical equipment and wiring for hazardous locations. It is based on limiting electrical and thermal energy to a level below that required to ignite hazardous atmospheric mixtures.

LED (Light Emitting Diode): Semi-conductor that generates monochromatic light when current flows in the conductive direction. An LED is the standard light source for most photoelectric sensors.

Leakage Current: Small current flowing through a solid state output when in the off state.

Light Operate: A light operate sensor energizes an output when the light intensity on the photodetector has sufficiently increased.

Nanometer (nm): 1 Nanometer is equal to 10⁻⁹ meter.

Noise: Presence of undesirable voltage, current, or light that may cause the sensor to malfunction.

Normally Closed: Output opens when an object is detected in the active switching area.

Normally Open: Output closes when an object is detected in the active switching area.

Operating Margin: The ratio of electrical signal available at a given sensing range to the minimum signal required to trigger the amplifier and output.

Operating Mode: See light and dark operate.

Optical Crosstalk: Optical crosstalk occurs when a photoelectric receiver responds to the signal from an adjacent emitter. Crosstalk can usually be resolved by repositioning the sensors.

Photoelectric Sensor: Electronic device recognizing changes in light intensity and converting these changes into a change in output state.

Pulse: A sudden fast change of a normally constant or relatively slow changing value such as voltage, current or light intensity.

Response Time: The sum of the time needed for a string of electronic circuits to translate a change in light into a change of output status.

Reverse Polarity Protection: A circuit that uses a diode to avoid damage to the control in case the polarity of the power supply is accidentally reversed.

Ripple %: The percentage of alternating component left on a DC signal after rectifying. Measured peak to peak of the alternating component and compared to the DC signal value.

Rise Time (10% Levels): The time required for an analog voltage or current output value to rise from 10% of its maximum value to 90% of its maximum value.

Sink (Current): Transistor output that requires the current to flow from positive (+) through the load and then through the output to negative (-). A current sink output uses an NPN transistor.

Source (Current): Transistor output that requires the current to flow from positive (+) through the output and then through the load to negative (-). A current source output uses a PNP transistor.

Transmitted Beam: A sensing mode where the light source and the receiver are opposite each other and where the target breaks the beam.

Wavelength: Distance traveled by light while completing one complete sine-wave. Is expressed in nanometers (nm). Each color has a specific wavelength.

White Paper Response: A calibration procedure performed on retroreflective sensors to eliminate all response to white paper with 90% reflectance.

Basic Concepts and Components

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| Light Source | page 1-19 |
| Light Detector | page 1-20 |
| Lens | page 1-20 |
| Output Device | page 1-20 |
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Photoelectric Sensing Modes

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Aligning a Photoelectric Sensor

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| Motion Detector | page 1-29 |

Photoelectric sensors are used in many applications and industries to provide accurate detection of objects without physical contact.

In its most basic form, a photoelectric sensor can be thought of as a “limit switch-like” device, where the mechanical actuator or lever arm function is replaced by a beam of light.

Photoelectric sensors operate by sensing a change in the amount of light that is either reflected or blocked by an object to be detected (target). The change in light could be the result of the presence or absence of the target, or as the result in a change of the size, shape, reflectivity or color of a target.

A photoelectric sensor can be used in applications to sense targets at distances from less than 5 mm (0.2 in.) to over 250m (820 ft).

Successful sensing with a photoelectric sensor requires that the object to be detected (target) causes a sufficient change of light level detected by the sensor and that the user has a clear understanding of the sensing requirements.

The following must be clearly understood:

- The sensing requirements,
- The sensing environment, and
- The capabilities and limitations of the photoelectric sensor.

Be prepared to answer the following questions:

- What is the size, shape and/or opacity of the object to be detected?
- Does the object to be detected have any reflective properties?
- What response time is required of the sensor?
- What mounting configuration is required for the sensor? Are there position or physical restraints to consider?
- What is the frequency of operation and what requirement does the operating rate impose on the output device?
- What are the load requirements, such as voltage, current, load impedance?

- What voltage and current supply are available to operate the sensor?
- What is the ambient temperature surrounding the photoelectric sensor?
- Are there other environmental conditions such as dirt or high humidity that are unique to the area surrounding the photoelectric sensor?

There are a vast number of photoelectric sensors to choose from. Each offers a unique combination of sensing performance, output characteristics and mounting options. Many sensors also offer unique embedded logic or device networking capabilities.

This introduction will help you select the optimal photoelectric sensor for each application.

Basic Concepts and Components

There are four basic components to any photoelectric sensor:

- Light source
- Light detector
- Lenses
- Output switching device

Light Source

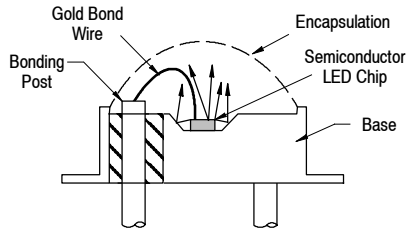
A light emitting diode (LED) is a solid-state semiconductor that emits light when current is applied. *Figure 1* (on page 1-20) shows the construction of an LED. LEDs are made to emit specific wavelengths or colors of light. Infrared, visible red, green, and blue LEDs are used as the light source (emitter) in most photoelectric sensors.

Different LED colors offer different desirable characteristics. Infrared LEDs are the most efficient, they generate the most light and the least heat of any LED color. Infrared LEDs are used in sensors where maximum light output is required for an extended sensing range.

In many applications, a visible beam of light is desirable to aid setup or confirm sensor operation. Visible red is most efficient for this requirement.

Introduction

Figure 1
LED Light-Emitting Diode



Visible red, blue, and yellow LEDs are also used in special applications where specific colors or color contrasts must be detected. These LEDs are also used as status indicators on photoelectric sensors.

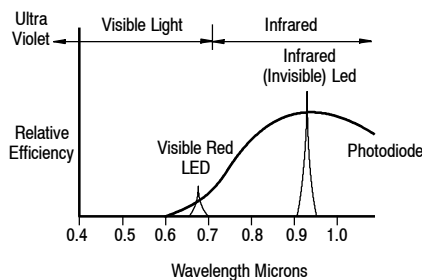
LEDs are rugged and reliable components, making them ideal for use in photoelectric sensors. They operate over a wide temperature range and are very resistant to damage from shock and vibration.

Light Detector

A photodetector is the component used to detect the light source. A photodiode or phototransistor is a robust solid-state component that provides a change in conducted current depending on the amount of light detected.

Photodetectors are more sensitive to certain wavelengths of light. The spectral response of a photodetector determines its sensitivity to different wavelengths in the light spectrum. To improve sensing efficiency, the LED and photodetector are often spectrally matched. An example is shown in Figure 2.

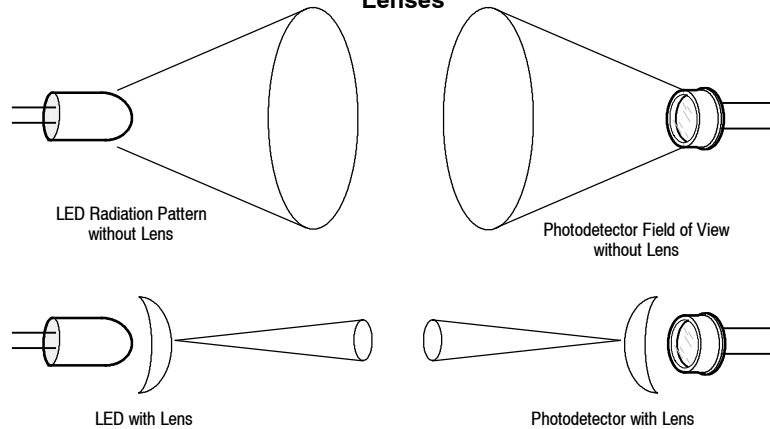
Figure 2
Spectral Response



The invisible (infrared) LED is a spectral match for this silicon phototransistor, and has much greater efficiency than a visible (red) LED.

The photodetector and associated circuitry are referred to as the receiver.

Figure 3
Lenses



Lens

LEDs typically emit light and photodetectors are sensitive to light over a broad area. Lenses are used with LED light sources and photodetectors to narrow this area. As the area is narrowed, the range of the LED or photodetector increases. As a result, lenses also increase the sensing distance of photoelectric sensors (see Figure 3).

The light beam from an LED and lens combination is typically conical in shape. The area of the cone increases with distance.

Some photoelectric sensors are optimized for extra sensing distance. The light beam (or field of view) emitted by these sensors is fairly narrow. However, alignment can be difficult if the field of view is too narrow. Other photoelectric sensors are designed for detection of objects within a broad area. These sensors have a wider field of view, but a shorter overall range.

Output Device

Once a sufficient change of light level is detected, the photoelectric sensor switches an output device to provide an interface to machine logic. Many types of discrete and variable (analog) outputs are available, each with particular strengths and weaknesses.

Margin

Margin (operating margin, excess gain) is an important concept to understand when applying photoelectric sensors. The amount of maintenance required for a photoelectric sensing application can be minimized by obtaining the best margin levels for that application.

Margin is a measurement of the amount of light from the light source that is detected by the receiver. Margin is best explained by example:

- A margin of zero occurs when none of the light emitted by the light source can be detected by the light detector.
- A margin of one is obtained when just enough light is detected to switch the state of the output device (from OFF to ON or from ON to OFF).
- A margin of 20 is reached when 20 times the minimum light level required to switch the state of the output device is detected.

Margin is defined as:

$$\frac{\text{Actual amount of light detected}}{\text{Minimum amount required to change the output device state}}$$

and is usually expressed as a ratio or as a whole number followed by "X." A margin of 6 may be expressed as 6:1 or as 6X.

LED Modulation

The amount of light generated by the LED in the light source is determined by the amount of current it is conducting. To increase the range of a photoelectric sensor, the amount of current must be increased. However, LEDs also generate heat—there is an upper limit of heat that can be generated before an LED is damaged or destroyed.

Photoelectric sensors rapidly switch on and off or modulate the current conducted by the LED. A low duty cycle (typically less than 5%) allows the amount of current, and therefore the amount of emitted light, to far exceed

what would be allowable under continuous operation, see *Figure 4*.

**Figure 4
Modulation**



The modulation rate or frequency is often in excess of 5 kHz, much faster than can be detected by eye.

Synchronous Detection

The receiver is designed to detect a pulsed light source from a modulated light source. To further enhance sensing reliability, the receiver and light source are synchronized. The receiver watches for light pulses that are identical to the pulses generated by the light source.

Synchronous detection helps a photoelectric sensor to ignore light pulses from other photoelectric sensors nearby or from other pulsed light sources such as fluorescent lights.

Synchronous detection is only possible when the light source and receiver are in the same housing, which is true for all sensing modes except transmitted beam as explained below.

Photoelectric Sensing Modes

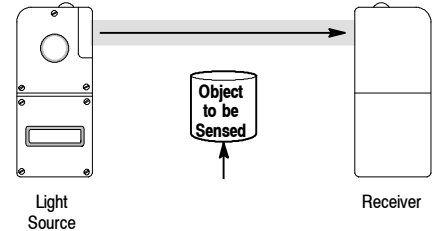
Different methods of sensing are referred to as sensing modes. There are three basic types:

- Transmitted beam (sometimes called through-beam or thru-beam)
- Retroreflective (sometimes referred to as reflex)
- Diffuse (also known as proximity)
- While many applications can be handled by any of these sensing modes, each offers specific strengths and weaknesses to consider. These strengths and weaknesses are summarized in *Table 1*.

Transmitted Beam

In this mode (*Figure 5*) the light source and receiver are contained in separate housings. These two units are positioned opposite each other so that the light from the light source shines directly on the receiver. Targets must break (block) the beam between light source and receiver.

**Figure 5
Transmitted Beam Sensing**



**Table 1
Photoelectric Sensing Modes Advantages and Cautions**

| Sensing Mode | Applications | Advantages | Cautions |
|--------------------------------|--|--|---|
| Transmitted Beam | General purpose sensing Parts counting | <ul style="list-style-type: none"> • High margin for contaminated environments • Longest sensing distances • Not affected by second surface reflections • Probably most reliable when you have highly reflective objects | <ul style="list-style-type: none"> • More expensive because of separate light source and receiver required, more costly wiring • Alignment important • Avoid detecting objects of clear material |
| Retroreflective | General purpose sensing | <ul style="list-style-type: none"> • Moderate sensing distances • Less expensive than transmitted beam because simpler wiring • Ease of alignment | <ul style="list-style-type: none"> • Shorter sensing distance than transmitted beam • Less margin than transmitted beam • May detect reflections from shiny objects (use polarized instead) |
| Polarized Retroreflective | General purpose sensing of shiny objects | <ul style="list-style-type: none"> • Ignores first surface reflections • Uses visible red beam for ease of alignment | <ul style="list-style-type: none"> • Shorter sensing distance than standard retroreflective • May see second surface reflections |
| Standard Diffuse | Applications where both sides of the object cannot be accessed | <ul style="list-style-type: none"> • Access to both sides of the object not required • No reflector needed • Ease of alignment | <ul style="list-style-type: none"> • Can be difficult to apply if the background behind the object is sufficiently reflective and close to the object |
| Sharp Cutoff Diffuse | Short-range detection of objects with the need to ignore backgrounds that are close to the object. | <ul style="list-style-type: none"> • Access to both sides of the object not required • Provides some protection against sensing of close backgrounds • Detects objects regardless of color within specified distance | <ul style="list-style-type: none"> • Only useful for very short distance sensing • Not used with backgrounds close to object |
| Background Suppression Diffuse | General purpose sensing Areas where you need to ignore backgrounds that are close to the object | <ul style="list-style-type: none"> • Access to both sides of the target not required • Ignores backgrounds beyond rated sensing distance regardless of reflectivity • Detect objects regardless of color at specified distance | <ul style="list-style-type: none"> • More expensive than other types of diffuse sensors • Limited maximum sensing distance |
| Fixed Focus Diffuse | Detection of small targets Detects objects at a specific distance from sensor Detection of color marks | <ul style="list-style-type: none"> • Accurate detection of small objects in a specific location | <ul style="list-style-type: none"> • Very short distance sensing • Not suitable for general purpose sensing • Object must be accurately positioned |
| Wide Angle Diffuse | Detection of objects not accurately positioned Detection of very fine threads over a broad area | <ul style="list-style-type: none"> • Good at ignoring background reflections • Detecting objects that are not accurately positioned • No reflector needed | <ul style="list-style-type: none"> • Short distance sensing |
| Fiber Optics | Allows photoelectric sensing in areas where a sensor cannot be mounted because of size or environment considerations | <ul style="list-style-type: none"> • Glass fiber optic cables available for high ambient temperature applications • Shock and vibration resistant • Plastic fiber optic cables can be used in areas where continuous movement is required • Insert in limited space • Noise immunity • Corrosive areas placement | <ul style="list-style-type: none"> • More expensive than lensed sensors • Short distance sensing |

Introduction

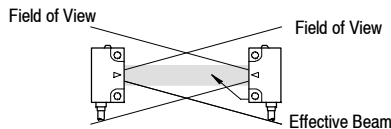
Transmitted beam sensors provide the longest sensing distances and the highest level of operating margin. For example, PHOTOSWITCH® Series 4000B Transmitted Beam sensors are capable of sensing distances of up to 274 m (900 ft).

Transmitted beam application margins at ranges of less than 10 m (3.1 ft) can exceed 10,000X. For this reason, transmitted beam is the best sensing mode when operating in very dusty or dirty industrial environments.

Another example: Series 9000 Transmitted Beam photoelectric sensors offer 300X margin at a sensing distance of 3 m (9.8 ft). At this distance, these sensors will continue to operate even if 99.67% of the combined lens area of the light source and receiver is covered with contamination.

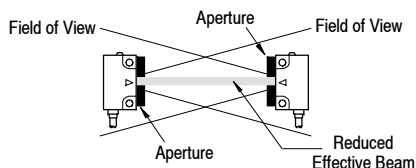
The “effective beam” of a transmitted beam sensor is equivalent to the diameter of the lens on the light source and receiver (*Figure 6*). Reliable detection occurs when the target is opaque and breaks at least 50% of the effective beam.

Figure 6
Effective Beam



Detection of objects smaller than the effective beam can best be achieved by reducing the beam diameter through means of apertures placed in front of the light source and receiver (*Figure 7*). Apertures are available for most 42KL, 42KB and 42EF transmitted beam sensors. Some users have created their own apertures for other sensor families.

Figure 7
Effective Beam with Apertures



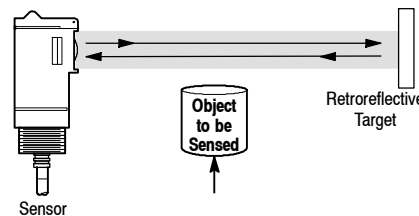
The most reliable transmitted beam applications have a very high margin when the target is absent, and a margin of zero (or close to zero) when the target is present.

Transmitted beam sensing may not be suitable for detection of translucent or transparent targets. The high margin levels allow the sensor to “see through” these targets. While it is often possible to reduce the sensitivity of the receiver, retroreflective or diffuse sensing may provide a better solution.

Retroreflective

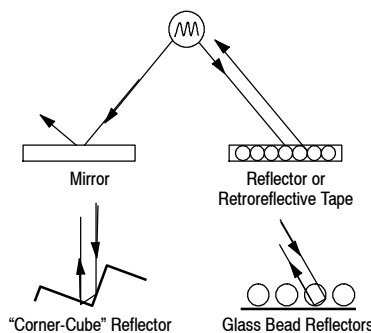
Retroreflective (reflex) is the most popular sensing mode. A retroreflective sensor contains both the light source and receiver in one housing. The light beam emitted by the light source is reflected by a special reflective object and detected by the receiver. The target is detected when it breaks this light beam (*Figure 8*).

Figure 8
Retroreflective Sensing



Special reflectors or reflective tapes are used for retroreflective sensing. Unlike mirrors or other flat reflective surfaces, these reflective objects do not have to be aligned perfectly perpendicular to the sensor. Misalignment of a reflector or reflective tape of up to 15° will typically not significantly reduce the margin of the sensing system (see *Figure 9*).

Figure 9
Retroreflective Materials



A wide selection of reflectors and reflective tapes are available.

The maximum available sensing distance of a sensor and reflector will depend in part upon the efficiency of the reflector or reflective tape. These reflective materials (page 1-306) are rated with a reflective index.

The PHOTOSWITCH standard 78 mm (3 in.) diameter round reflector (catalog number 92-39) is used to determine the maximum sensing distance of most PHOTOSWITCH sensors.

The 92-39 reflector has a reflective index of 100. The 92-99 reflective tape has a reflective index of 77 meaning that it will reflect only 77% as much light as a 92-39 reflector.

Retroreflective sensors are easier to install than transmitted beam sensors. Only one sensor housing must be installed and wired. However, margins when the target is absent are typically 10 to 1000 times lower than transmitted beam sensing, making retroreflective sensing less desirable in highly contaminated environments.

Caution must be used when applying standard retroreflective sensors in applications where shiny or highly reflective targets must be sensed.

Reflections from the target itself may be detected. It may be possible to orient the sensor and reflector or reflective tape so that the shiny target reflects light away from the receiver. However, for most applications with shiny targets, polarized retroreflective sensing offers a better solution.

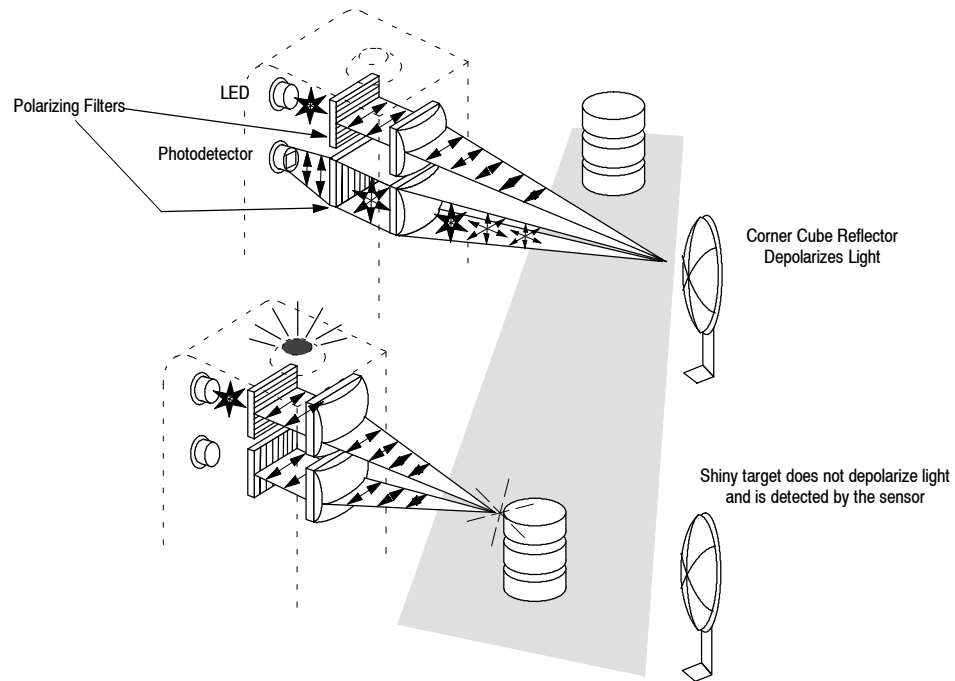
Polarized retroreflective sensors contain polarizing filters in front of the light source and receiver. These filters are perpendicular or 90° out of phase with each other (*Figure 10*, on page 1-23).

The sensor cannot see light reflected by most targets. The reflected polarized light cannot pass through the polarizing filter located in front of the receiver.

Reflectors depolarize reflected light. Some of the reflected depolarized light can pass through the polarizing filter in front of the receiver and can be detected by the sensor.

In summary, the sensor can “see” the reflection from a reflector, and it cannot “see” the reflection from most shiny targets.

Figure 10
Polarized Retroreflective Sensing



Polarized retroreflective sensors offer 30...40% shorter range (and less margin) than standard retroreflective sensors. Instead of infrared LEDs, polarized retroreflective sensors must use a less efficient visible light source (typically a visible red LED). There are additional light losses caused by the polarizing filters.

Polarized sensors will only ignore “first surface” reflections from an exposed reflective surface. Polarized light is depolarized as it passes through most plastic film or stretch wrap. Therefore, a shiny object may create reflections that are detected by the receiver when it is wrapped in clear plastic film. In the latter case, the shiny object becomes the “second surface” behind the plastic wrap. Other sensing modes must be considered for these applications.

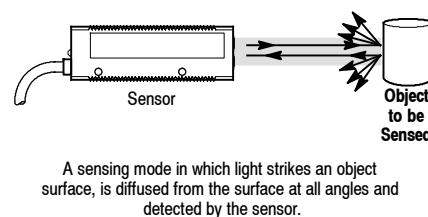
All standard reflectors depolarize light and are suitable for polarized retroreflective sensing. However, most reflective tapes do not depolarize light and are suitable only for use with standard retroreflective sensors. Specially constructed reflective tapes for polarized retroreflective sensing are available. Look for reflective tapes specifically identified as suitable for use with polarized retroreflective sensors.

Diffuse

Transmitted beam and standard or polarized retroreflective sensing creates a beam of light between light source and receiver or between sensor and reflector. Access to opposite sides of the target is required.

Sometimes it is difficult, or even impossible, to obtain access on both sides of a target. In these applications, it is necessary to point the light source directly at the target. Light is scattered by the surface at all angles and a small portion is reflected back to be detected by the receiver contained in the same housing. This mode of sensing is called diffuse or proximity (see Figure 11).

Figure 11
Diffuse Sensing



There are a number of different types of diffuse sensing. The simplest, *standard diffuse*, is discussed here. Other types, sharp cutoff diffuse, fixed focus

diffuse, wide angle diffuse, and background suppression diffuse, are explained in later sections.

The goal of standard diffuse sensing is to obtain a relatively high margin when sensing the target. When the target is absent, reflections from any background behind the target should provide a margin as close to zero as possible.

Target reflectivity can vary widely. Relatively shiny surfaces may reflect most of the light away from the receiver, making detection very difficult. The sensor face must be parallel with these types of target surfaces.

Very dark, matte objects may absorb most of the light and reflect very little for detection. These targets may be hard to detect unless the sensor is positioned very close.

The specified maximum sensing distance of a photoelectric sensor is determined using a calibrated diffuse target. Allen-Bradley uses a 216 x 292 mm (8.5 x 11 in.) sheet of white paper that has been specially formulated to be 90% reflective—meaning that 90% of the light energy from the light source will be reflected by the paper.

Introduction

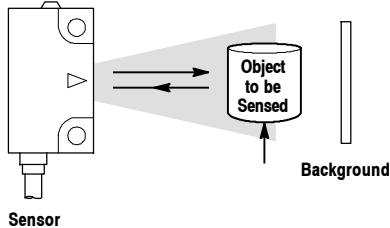
“Real world” diffuse targets are often considerably less reflective, as shown in *Table 2*.

Table 2

| Target | Typical Relative Reflectivity |
|-------------------------|-------------------------------|
| Polished aluminum | 500 |
| White paper (reference) | 100 |
| White typing paper | 90 |
| Cardboard | 40 |
| Cut lumber | 20 |
| Black paper | 10 |
| Neoprene | 5 |
| Tire rubber | 4 |
| Black felt | 2 |

Detecting targets positioned close to reflective backgrounds can be particularly challenging. It may be impossible to adjust the sensor to obtain sufficient margin from the target without detecting, or coming close to detecting, the background (*Figure 12*). Other types of diffuse sensing may be more appropriate.

Figure 12



Sharp Cutoff Diffuse

Sharp cutoff diffuse sensors are designed so that the light beam from the light source and the area of detection of the receiver are angled towards each other. This makes these sensors more sensitive at short range, and less sensitive than a longer range. This can provide more reliable sensing of targets that are positioned close to reflective backgrounds.

Note that this sensing mode provides some degree of improvement over standard diffuse sensing when a reflective background is present. However, a background that is very reflective may still be detected.

An even better solution is provided by background suppression diffuse sensors.

Background Suppression Diffuse

Instead of attempting to ignore the background behind a target, background suppression sensors use sophisticated electronics to actively sense the presence of both the target and the background. The two signals are compared, and the output will change state upon active detection of the target, or active detection of the background.

In simple terms, background suppression sensing can allow the sensor to ignore the presence of a very reflective background almost directly behind a dark, less-reflective target. For many applications, it is the ideal diffuse sensing mode. However, background suppression sensors are more complex, and therefore more expensive than other diffuse sensors.

Fixed Focus Diffuse

In a fixed focus (convergent beam) sensor, the light beam from the light source and the detection area of the receiver are focused to a very narrow point (focal point) at a fixed distance in front of the sensor. The sensor is very sensitive at this point, and much less sensitive before and beyond this focal point.

Fixed focus sensors have three primary applications:

- Reliable detection of small targets. Because the sensor is very sensitive at the focal point, a small target can be readily detected.
- Detection of objects at a fixed distance. As a fixed focus sensor is most sensitive at the focal point, it can be used in some applications to detect a target at the focal point, and ignore it when it is in front of or behind the focal point.
- Detection of color printing marks (color registration mark detection). In some applications, it is important to detect the presence of a printing mark on a continuous web of wrapping material. A fixed focus sensor with a specific visible light source color (typically red, green or blue) may be selected to provide the greatest sensitivity to the mark.

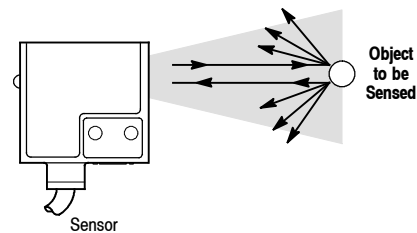
Wide Angle Diffuse

Wide angle diffuse sensors project the light source and detection area of the receiver over a wide area (*Figure 13*).

These sensors are ideal for two applications:

- Thread detection—a wide angle diffuse sensor can detect the presence of extremely thin strands of thread or other material positioned close to the sensor. The presence or absence (thread break) of the thread can be reliably detected even when the thread moves from side to side in front of the sensor.
- Ignoring holes or imperfections in targets—because wide angle diffuse sensors can sense over a broad area, they can ignore small holes or imperfections in diffuse targets.

Figure 13
Wide Angle Diffuse



Fiber Optics

Fiber optic sensors permit the attachment of “light pipes” called fiber optic cables. Emitted light from the light source is transmitted through transparent fibers in the cables and emerges at the end of the fiber. The transmitted or reflected beam is then carried back to the receiver through different fibers.

Fiber optic cables can be mounted in locations that would otherwise be inaccessible to photoelectric sensors. They can be used where there is a high ambient temperature and in applications where extreme shock and vibration or continuous movement of the sensing point is required (as described below).

Both glass and plastic are used as transparent materials to create fiber optic cables.

Glass

Glass fiber optic cables contain multiple strands of very thin glass fiber that are bundled together in a flexible sheath.

Glass fiber optic cables are typically more durable than plastic fiber optic cables. Glass cables will withstand

much higher temperatures. Standard Allen-Bradley glass fiber optic cables with a stainless steel sheath rated up to 260°C (500°F). Special order cables can be obtained with temperature ratings of up to 480°C (900°F).

Most glass cables are available with a choice of PVC or flexible stainless steel sheath. PVC-sheathed cables are typically less expensive. Stainless steel sheathing adds even greater durability and allows the cables to operate at higher temperatures

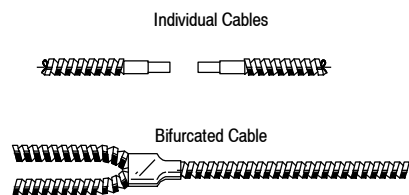
Plastic

Plastic fiber optic cables are typically constructed of a single acrylic monofilament. There is no protective sheathing, making plastic fiber optic cables less durable, but typically less expensive than glass cables.

Plastic cables can be used in applications where continuous flexing of the fiber optic cable is required. Coiled plastic cables are also available for these applications.

Fiber optic cables are available in *individual* or *bifurcated* configurations (Figure 14).

**Figure 14
Fiber Optic Cables**



Two individual cables are used for transmitted beam sensing. Some individual cables are packaged separately, others are sold in packages of two. Order carefully to receive two cables.

Comparison of Fiber Optic Cables

| | Glass | Plastic |
|--------------------|---|--|
| Construction | Thin glass strands bundled in stainless steel or PVC sheath | Single acrylic monofilament |
| Temperature Range | -40...260°C (-40...500°F) with stainless steel sheath. Special order up to 480°C (900°F). | -30...70°C (-20...158°F) |
| Durability | Very durable | Adequate for many applications |
| Continuous Flexing | Will quickly break glass fibers | Will work very well, coiled versions available |
| Light Source | Visible or infrared OK | Must use visible light |
| Range | Can be longer range because of larger diameter | Adequate for many applications |

Bifurcated cables are used for diffuse or retroreflective sensing modes. Standard diffuse sensing with fiber optic cables are similar to sensing with lensed photoelectric sensors.

Retroreflective sensing is possible with either reflectors or reflective tapes. Polarized retroreflective sensing is not possible. In some applications it will be necessary to reduce the sensitivity of the sensor to prevent diffuse detection of the target.

Glass fibers can be used with infrared or visible LEDs. Plastic fibers absorb infrared light and therefore are most efficient when used with visible red LEDs.

A wide selection of fiber optic cables is available and many special configurations can be obtained.

Clear Object Detection

Clear materials present a unique application challenge for photoelectric sensors. Most clear objects and films provide insufficient contrast to be reliably detected using general purpose retroreflective or polarized retroreflective sensors. Various forms of diffuse sensing do not offer a preferred solution because the exact location of the clear target cannot be detected.

Rockwell Automation/Allen-Bradley offers ClearSight™ photoelectric sensors that are specifically designed for clear object and clear film sensing applications. These modified polarized retroreflective sensors contain special optical assemblies designed to optimize the amount of contrast generated by clear objects and films. Special electronics and software features further enhance sensing reliability.

For detailed information about solving the challenges of clear object detection, refer to the white paper "Clear Object Detection Using Photoelectric Sensors."

Introduction

45FVL/FSL Light Source Selector Guide for Color Contrast Sensing

| Background \ Target | Target | | | | | | |
|---------------------|--------|--------|--------|-----|-------|------|-------|
| | White | Yellow | Orange | Red | Green | Blue | Black |
| White | Ⓢ | B | B | B | R | R | R |
| Yellow | B | Ⓢ | G | G | R | R | R |
| Orange | B | G | Ⓢ | G | G | G | R |
| Red | B | G | G | Ⓢ | R | B | R |
| Green | R | R | G | R | Ⓢ | B | G |
| Blue | R | R | G | B | B | Ⓢ | B |
| Black | R | R | R | R | G | B | Ⓢ |

R = Red; B = Blue; G = Green

Ⓢ 42QA ColorSight sensor suggested for shades of same color.

Note: White LED light source can be used selectively in place of red, blue and green.

Photoelectric Sensor Specifications

Light/Dark Operate Output

The terms 'light operate' and 'dark operate' are used to describe the action of a sensor output when a target is present or absent.

A light operate output is ON (energized, logic level one) when the receiver can "see" sufficient light from the light source.

For transmitted beam and retroreflective sensing, a light operate output is ON when the target is absent and light can travel from the light source to the receiver. For diffuse sensing (all types), the output is ON when the target is present and reflecting light from the light source to the receiver.

A dark operate output is ON (energized, logic level one) when the receiver cannot "see" the light from the light source.

For transmitted beam and retroreflective sensing, a dark operate output is ON when the target is present and light from the light source is blocked and cannot reach the receiver. For diffuse sensing (all types), a dark operate output is ON when the target is absent.

Maximum Sensing Distance

This specification refers to the sensing distance from:

- Sensor to reflector in retroreflective and polarized retroreflective sensors,
- From sensor to specified target in all types of diffuse sensors, and,
- Light source to receiver in transmitted beam sensors.

This sensing distance is guaranteed by the manufacturer. PHOTOSWITCH photoelectric sensors are conservatively rated; the actual available sensing distance will typically exceed this specification.

Note that this distance is specified at a margin of 1X, meaning that just enough light from the light source will be detected by the receiver to change the state of the output.

Most industrial environments will create contamination on the sensor lenses and reflectors or targets. Sensors should be applied at shorter distances to increase the margin to an acceptable value and enhance application reliability.

Minimum Sensing Distance

Many retroreflective, polarized retroreflective, and diffuse (most types) sensors have a small "blind" area near the sensor (Figure 15). Reflectors, reflective tapes, or diffuse targets should be located further away from the sensor than this minimum sensing distance for reliable operation.

Typical Response Curve

The catalog pages for most PHOTOSWITCH photoelectric sensors contain a curve that shows what the typical margin will be depending on sensing distance.

A margin of at least 2X is generally recommended for industrial environments.

Figure 16 shows an example curve for a diffuse sensor. The maximum sensing range (margin=1X) of this sensor is 1 m (39.4 in.) to a specified white paper target. A margin of 4X can be achieved at approximately half that distance, or 500 mm (19.7 in.).

Figure 15
Blind Area

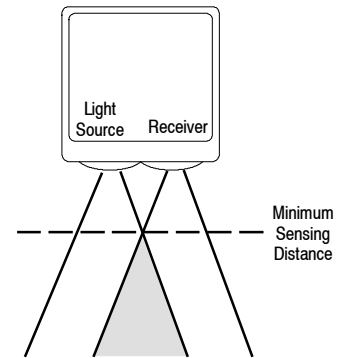
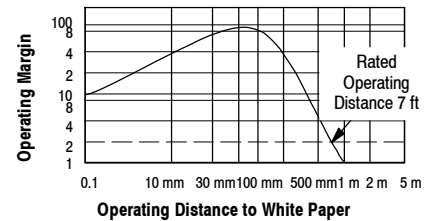


Figure 16
Margin



Response Time

The response time of a sensor is the amount of time that elapses between the detection of a target and the change of state of the output device from ON to OFF or from OFF to ON. It is also the amount of time it takes for the output device to change state once the target is no longer detected by the sensor.

For most sensors, the response time is a single specification for both the ON time and OFF time. For other sensors, two different values may be given.

Response times are dependent on sensor design and choice of output device. Slower sensors usually offer longer sensing ranges. Very fast sensors typically have shorter sensing ranges. PHOTOSWITCH photoelectric sensors response times vary from 30 μs to 30 ms.

Field of View

For most photoelectric sensors, the light beam from the light source and the area of detection in front of the receiver project away from the sensor in a conical shape. Field of view is a measurement (in degrees) of this conical area.

The Field of View is a useful specification to determine the available sensing area at a fixed distance away from a photoelectric sensor.

Refer to *Figure 17* for this example. The 42SRU-6002 retroreflective sensor has a 3° field of view. The figure shows that at a sensing distance of 3.0 m (10 ft) the detection area will be a circle that is approximately 168 mm (6.6 in.) diameter (56 mm (2.2 in.) per degree).

Sensors with a wide field of view typically have shorter sensing distances. However, a wider field of view can make alignment easier.

Beam Patterns

Beam patterns are included for several lines of Allen-Bradley photoelectric sensors to help predict the performance of these sensors in a variety of applications. A beam pattern is defined as the sensing area for a photoelectric sensor. It is the pattern generated by comparing the response of the receiver to the emitted signal over the operating distance of the sensor.

All beam patterns are drawn in two dimensions and are assumed to be symmetrical in all planes about the optical axis of the sensor. The maximum operating margin is located at the optical axis and decreases towards the outer boundary of the beam pattern.

All beam patterns are generated under clean sensing conditions with optimal sensor alignment. The beam pattern represents the largest typical sensing area, and should not be considered exact. Dust, contamination, fog, etc. will decrease the sensing area and operating range of the sensor.

Transmitted Beam Patterns

The beam pattern for a transmitted beam sensor represents the boundary where the receiver effectively receives the signal of the emitter, assuming there is no angular misalignment. Angular misalignment between the emitter and receiver will decrease the size of the sensing area. Beam patterns for transmitted beam sensors are useful for determining the minimum spacing required between adjacent transmitted beam sensor pairs to prevent optical crosstalk from one pair of sensors to the next.

Retroreflective Beam Patterns

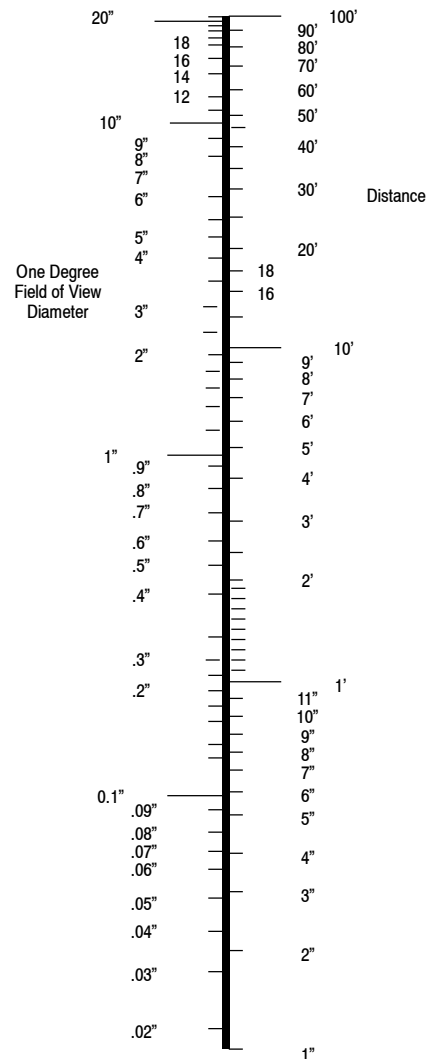
Beam patterns for retroreflective and polarized retroreflective sensors represent the boundary within which the sensor will respond to a retroreflective target as it passes by the sensors optics. The retroreflective target is held perpendicular to the sensor's optical axis while the beam diameter is plotted. The model 92-39 76 mm diameter retroreflective target is used to generate retroreflective beam patterns unless otherwise noted.

For reliable operation, the object to be sensed must be equal to or larger than the beam diameter indicated in the beam pattern. A smaller retroreflective target should be used for accurate detection of smaller objects.

Diffuse, Sharp Cutoff, and Background Suppression Beam Patterns

The beam pattern for a diffuse sensor represents the boundary within which the edge of a white reflective target that will be detected as it passes by the sensor. Diffuse beam patterns are generated using a 90% reflective sheet of 216 x 279 mm (8.5 x 11 in.) white paper held perpendicular to the sensor's optical axis. The sensing area will be smaller for materials that are less reflective, and larger for more reflective materials. Smaller objects may decrease the size of the beam pattern of some diffuse sensors at longer ranges. Diffuse targets with surfaces that are not perpendicular to the sensor's optical axis will also significantly decrease sensor response.

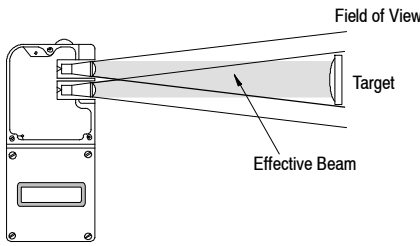
Figure 17
Field of View Diameter vs. Distance



It is important to note that the effective size of the beam of the retroreflective control is equal to the size of the retroreflective target. Additional reflective targets in the field of view will increase the excess gain and operating distance, if the field of view is bigger than the initial target as depicted in (*Figure 18*, on page 1-28).

Introduction

Figure 18
Retroreflective Sensors



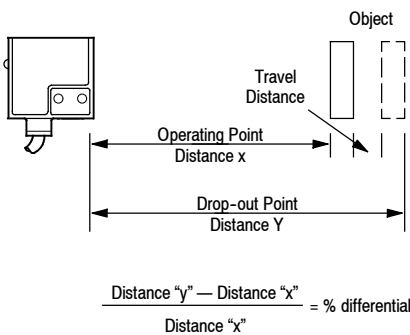
Hysteresis

Photoelectric sensors exhibit hysteresis (or differential).

The hysteresis of a photoelectric sensor is the difference between the distance when a target can be detected as it moves towards the sensor, and the distance it has to move away from the sensor to no longer be detected.

An example is shown in *Figure 19*. As the target moves toward the sensor, it will be detected at distance X. As it then moves away from the sensor, it will still be detected until it gets to distance Y.

Figure 19
Hysteresis



The high hysteresis in most photoelectric sensors is useful for detecting large opaque objects in retroreflective, polarized retroreflective and transmitted beam applications. In diffuse applications a large difference in reflected light from target and background also allows the use of high hysteresis sensors.

Low hysteresis requires smaller changes in light level. The Series 10,000 and 42FT allow selection of low hysteresis for these applications.

Aligning a Photoelectric Sensor

Proper alignment of the sensor will create a more rugged sensing solution that requires less maintenance.

Retroreflective or Polarized Retroreflective

Aim the sensor at the reflector (or reflective tape). Slowly pan the sensor left until the reflector is no longer detected. Note this position, then slowly scan the sensor to the right and note when the reflector is no longer detected. Center the sensor between these two positions, then pan it up and down to center it in the vertical plane.

Diffuse (all types)

Aim the sensor at the target. Pan the sensor up and down, left and right to center the beam on the target.

Reduce the sensitivity just until the target is no longer detected and note the position of the sensitivity adjustment.

Remove the target and increase the sensitivity until the background is detected. Adjust the sensitivity to the mid point between detection of the target and detection of the background.

Transmitted Beam

Aim the receiver at the light source. Slowly pan the receiver left until the light source is no longer detected. Note this position, then slowly scan the receiver to the right and note when the reflector is no longer detected. Center the receiver between these two positions, then pan it up and down to center it in the vertical plane.

Digital Output Devices

Once the sensor has detected the target, an output device switches the electrical power in the user's control circuit. The output is either ON or OFF, making the sensor a digital device.

There are many types of outputs available, each with different benefits and weaknesses. The types available with Allen-Bradley PHOTOSWITCH photoelectric sensors are described below, and summarized in *Table 3*.

Electromechanical Relay

An electromechanical relay (or simply "relay") offers a reliable, positive means of switching electrical energy. Its major advantages are high switching current and electrical isolation from the sensor power source.

Because of the electrical isolation from the power source of the sensor, and due to the absence of leakage current, relays from multiple sensors can readily be connected in series and/or parallel.

Contact ratings will vary from 1...5 A at 120/240V AC 50/60 Hz resistive, depending on the sensor selected.

There are a number of different contact arrangements available:

- SPST—Single pole, single throw
- SPDT—Single pole, double throw
- DPDT—Double pole, double throw

Relays have a finite life span, typically measured in millions of operations. Inductive loads can shorten the life span considerably. Solid-state outputs should be considered for applications that require frequent switching by the sensor.

Table 3

| Output Type | Strengths | Weaknesses |
|--|---|---|
| Electromechanical Relay <i>AC or DC switching</i> | <ul style="list-style-type: none"> • Output is electrically isolated from supply power • Easy series and/or parallel connection of sensor outputs • High switching current | <ul style="list-style-type: none"> • No short circuit protection possible • Finite relay life |
| FET <i>AC or DC switching</i> | <ul style="list-style-type: none"> • Very low leakage current • Fast switching speed | <ul style="list-style-type: none"> • Low output current |
| Power MOSFET <i>AC or DC switching</i> | <ul style="list-style-type: none"> • Very low leakage current • Fast switching speed | <ul style="list-style-type: none"> • Moderately high output current |
| TRIAC <i>AC switching only</i> | <ul style="list-style-type: none"> • High output current | <ul style="list-style-type: none"> • Relatively high leakage current • Slow output switching |
| NPN or PNP Transistor <i>DC switching only</i> | <ul style="list-style-type: none"> • Very low leakage current • Fast switching speed | <ul style="list-style-type: none"> • No AC switching |

Response times of relays are typically 15...25 ms, much slower than most solid-state outputs.

FET

The FET (Field Effect Transistor) is a solid-state device that provides for fast switching of AC or DC power and very low leakage current. Its switching current is limited. The FET output on the Series 4000B switches only 30 mA of current.

FET outputs can be connected in parallel like electromechanical relay contacts.

Power MOSFET

A Power MOSFET (Metal Oxide Semiconductor Field Effect Transistor) provides the very low leakage and fast response time benefits of an FET with high switching current capacity.

The Power MOSFET used in Series 6000 and Series 9000 sensors can switch up to 300 mA of current.

TRIAC

A TRIAC is a solid-state output device designed for AC switching only. TRIACs offer high switching current, making them suitable for connection to large contactors and solenoids.

TRIACs exhibit much higher leakage current than FETs and Power MOSFETs. Leakage current from TRIACs can exceed 1 mA, making them unsuitable as input devices for programmable controllers and other solid-state inputs. A zero crossing of the 50/60 Hz AC power cycle is required to activate a TRIAC, meaning that the minimum response time is 8.3 ms.

For most applications, Power MOSFETs provide better output characteristics.

NPN/PNP Transistor

Transistors are the typical solid-state output device for low voltage DC sensors.

A sensor with an NPN transistor output device has a sinking output. The load must be connected between the sensor output and the (+) power connection.

A sensor with a PNP transistor output device has a sourcing output. The load must be connected between the sensor output and the (-) power connection.

Transistors exhibit very low leakage current (measured in μA) and relatively high switching current (typically 100 mA) for easy interface to most DC loads. Response times of sensors with transistor outputs can vary from 2 ms to as fast as 30 μs .

Analog Output

Analog sensors provide an output that is proportional, or inversely proportional, to the quantity of light seen by the receiver.

Series 5000 analog output sensors provide a selectable voltage or current output that is proportional or inversely proportional to the amount of light detected by the receiver.

Timing and Logic

Photoelectric sensors are somewhat unique among presence sensors because many offer timing or logic functions. These functions may be available in special versions of the sensors, or in plug-in modules.

On Delay and Off Delay

On Delay and Off Delay are the most common timing modes.

An On Delay timer will delay the operation of an output after a target is detected.

An Off Delay timer will delay the operation of an output after the target is no longer detected.

The delay time of most sensors is adjustable from less than a second to 10 seconds or more.

Some high speed sensors (less than 1 ms response time) such as the 42FB and 42FT contain a selectable 50 ms off delay time. This "pulse stretcher" is useful when it is necessary to slow down the OFF response time to allow a slower PLC or other machine logic to respond to the movement of materials in high speed applications.

One-Shot

One-shot logic provides a single pulse output regardless of the speed that a target moves past the sensor. The length of the pulse is adjustable.

One-shot operation can provide different application solutions:

- In high speed operations—provides a pulse each time a target moves past the sensor that is sufficiently long to allow other slower logic to respond.
- In slower speed operations—provides a brief pulse each time a target moves past the sensor to trigger a solenoid or other impulse device.
- Provides a leading edge signal regardless of target length.
- Provides a trailing edge signal regardless of target length.

Delayed One-Shot

Delayed one-shot logic adds an adjustable time delay before the one-shot output pulse occurs.

Motion Detector

Motion detection logic provides the unique capability to detect the continuous movement of targets. The sensor will provide an output if it does not detect the motion of successive targets within the adjustable delay time.

Motion detector logic is useful to detect a jam or void in material handling applications.

Notes



RightSight DC model with short 18 mm base

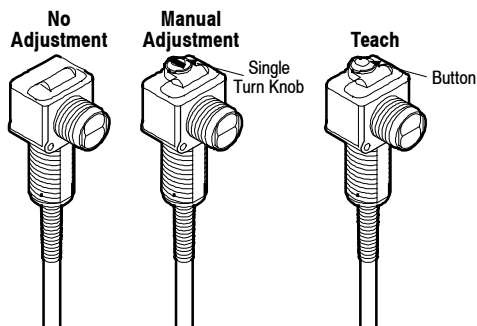
Features

- Compact right angle housing
- Flexible 18 mm mounting options
- 1200 psi washdown rating
- Non-adjustable, adjustable and teach versions
- 360° visible LED indicators
- Reverse polarity protection
- Short-circuit protected outputs
- Fast 1 ms response time (DC)
- False pulse protection
- Variety of output types
- Laser models available (see page 1-108)

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Certified and CE Marked for all applicable directives |
| Operating Environment | NEMA 4X, 6P, IP67 (IEC 529); 1200 psi (8270 kPa) washdown, IP69K |
| Operating Temperature [C (F)] | -25...+70° (-13...+158°) ≤ 132V AC/DC -25...+55° (-13...+131°) ≥ 132V AC/DC |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27 |
| Relative Humidity | 5...95% (noncondensing) |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Retroreflective, polarized retroreflective, diffuse, background suppression, sharp cutoff, fixed focus, fiber optic, transmitted beam |
| Sensing Range | See Product Selection table on page 1-34 |
| Field of View | See Product Selection table on 1-34 |
| Light Source | Visible red LED (660 nm) or infrared LED (880 nm) |
| LED Indicators | See User Interface below |
| Adjustments | Sensitivity potentiometer, teach button, or fixed by cat. no. |
| Electrical | |
| Voltage | 10.8...30V DC, 21.6...264V AC |
| Current Consumption | 35 mA max (DC), 25 mA max (AC) |
| Sensor Protection | False pulse, reverse polarity, overload, short circuit |
| Outputs | |
| Response Time | 1 ms (4 ms for transmitted beam) DC models 8.3 ms (16.6 ms for transmitted beam) AC models |
| Output Type | PNP or NPN by cat. no., PNP and NPN, N-MOSFET |
| Output Mode | Complementary light or dark operate, light or dark operate by cat. no. |
| Output Current | 100 mA |
| Output Leakage Current | 0.1 mA max (DC); 0.4 mA max (AC) |
| Mechanical | |
| Housing Material | Mindel |
| Lens Material | Acrylic |
| Cover Material | Udel |
| Connection Types | 2 m cable, 4-pin DC micro (M12) QD, 4-pin pico (M8) QD |
| Supplied Accessories | 18 mm fastening nuts |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-39 |

User Interface



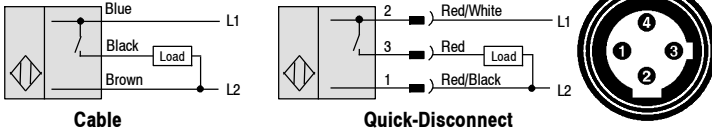
| Color | State | Status—Nonteach Version | Status—Teach Version |
|--------|----------|---|--|
| Yellow | OFF | Output de-energized | Output de-energized |
| | ON | Output energized | Output energized |
| | Flashing | SCP active | NA |
| Orange | OFF | Margin < 2.5 | Normal operation |
| | ON | Margin > 2.5 | Teach mode active |
| | Flashing | Output SCP active (AC models only) | Teach mode active or output SCP active |
| Green | OFF | Sensor not powered, SCP active, output active | Sensor not powered |
| | ON | Sensor powered | Sensor powered |
| | Flashing | NA | Unstable margin condition or output SCP active |

Note: For DC models output and margin LEDs alternate flashing when SCP active.

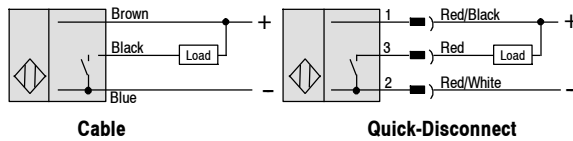
Wiring Diagrams ①②

21.6...264V AC/DC Sensors

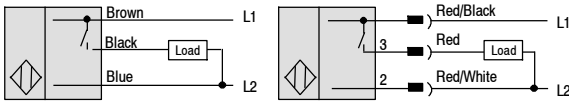
AC Wiring for 42EF- C - Models



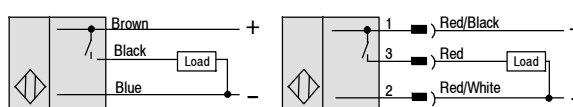
DC Wiring for 42EF- C - Models



AC Wiring for 42EF- F - Models

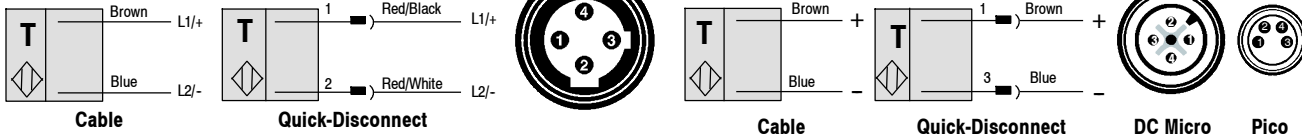


DC Wiring for 42EF- F - Models



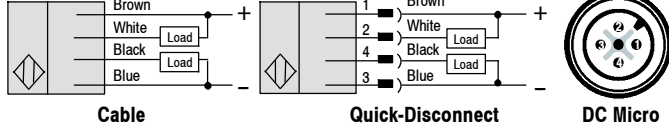
Transmitted Beam Source

21.6...264V AC/DC

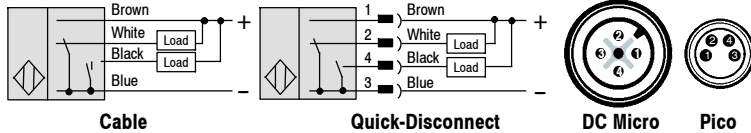


10.8...30V DC Sensors

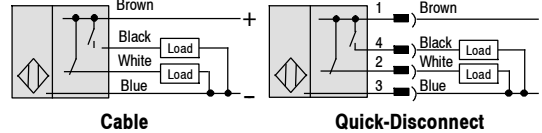
Models with Dual NPN and PNP Outputs



Models with Complementary NPN Outputs



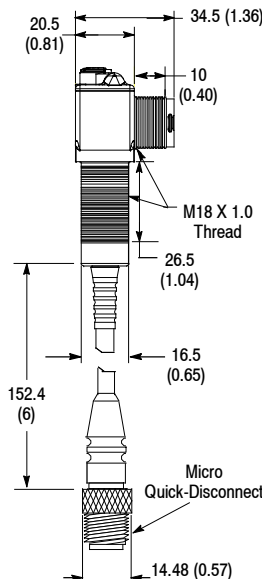
Models with Complementary PNP Outputs



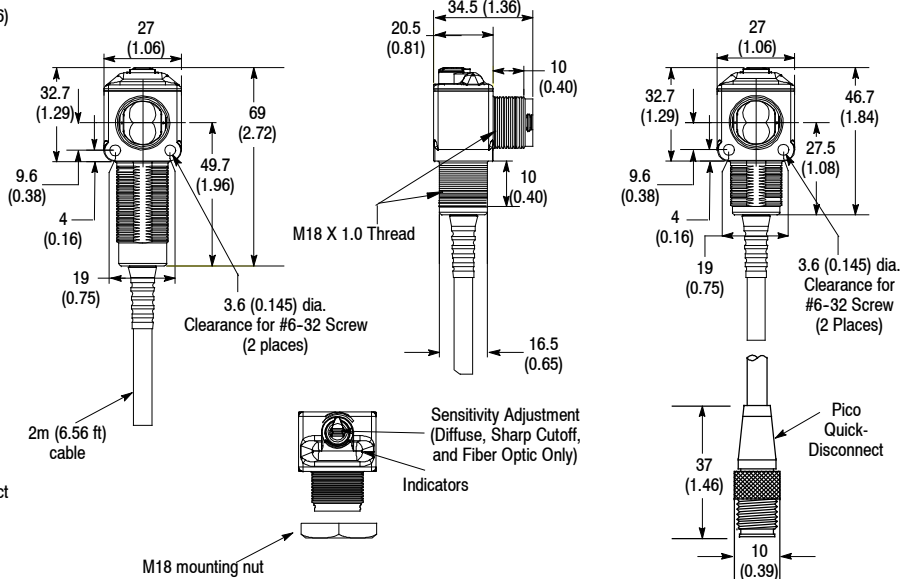
- ① For Rockwell Automation programmable controller compatible interface, refer to publication 42-2.0.
- ② All wire colors on quick-disconnect models refer to Rockwell Automation cordsets.

Approximate Dimensions [mm (in.)]

AC/DC and DeviceNet Models



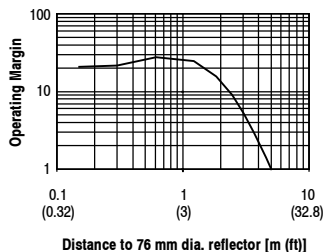
DC Models



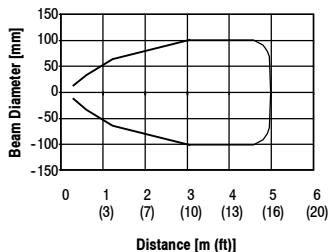
Note: All sensors supplied with one M18 mounting nut (Cat. No. 75012-097-01) except fiber optic models which come with two M18 mounting nuts (Cat. No. 75012-025-01).

Typical Response Curve

Retroreflective

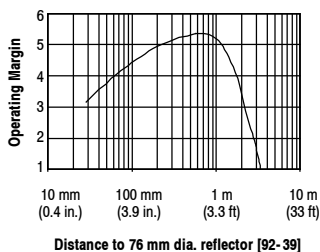


Beam Pattern

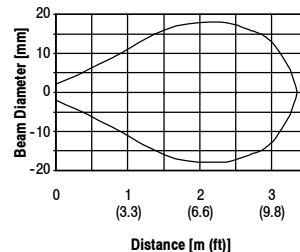


Typical Response Curve

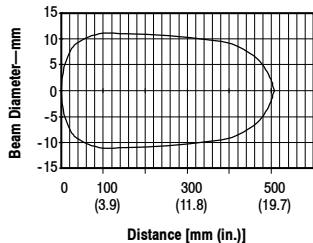
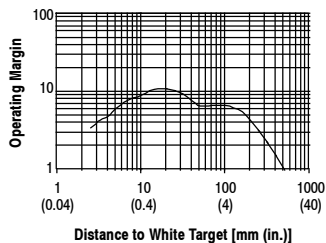
Polarized Retroreflective



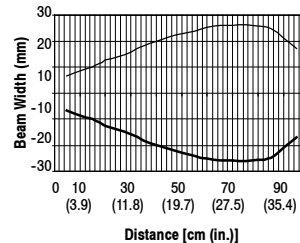
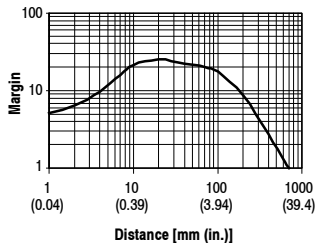
Beam Pattern



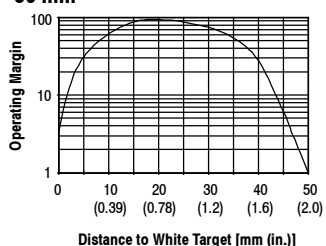
Standard Diffuse—Nonteach



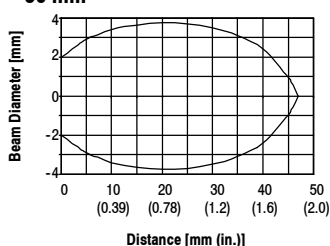
Standard Diffuse—Teach



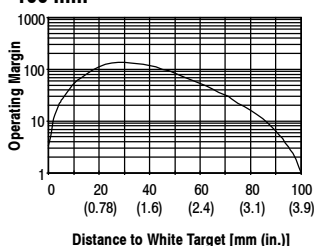
Background Suppression 50 mm



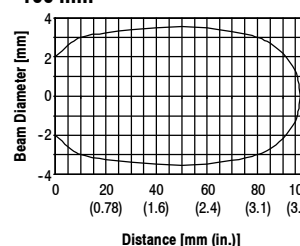
50 mm



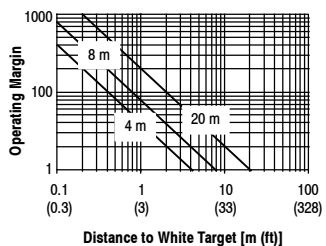
Background Suppression 100 mm



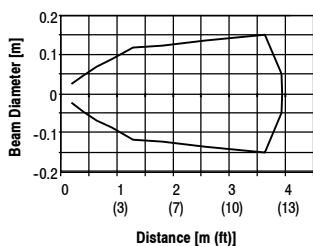
100 mm



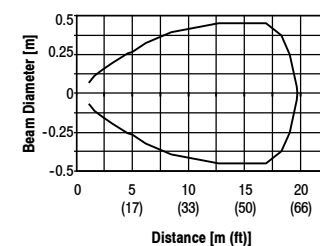
Transmitted Beam



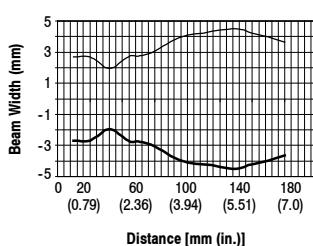
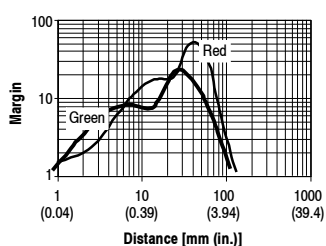
4 m Receiver Models



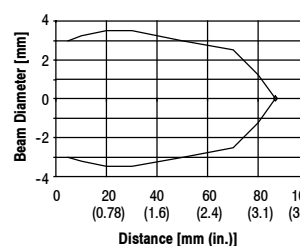
Transmitted Beam 20 m Receiver Models



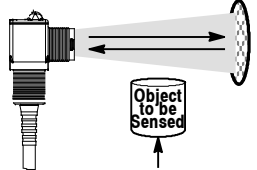
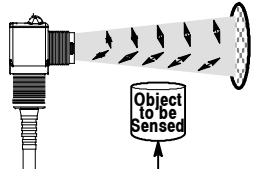
Fixed Focus



Sharp Cutoff Diffuse



Product Selection

| Sensing Mode | Current @ Voltage | Sensing Distance | Adjustment Type | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. | |
|--|---------------------------|--------------------------------|--------------------------------------|--------------------------------------|-------------------------------------|-----------------|----------------|---------------|
|  <p>Retroreflective Field of View: 2.5° Emitter LED: Visible red 660 nm</p> | 35 mA @ 10.8...30V DC | 25 mm...4.5 m (1 in...14.7 ft) | No Adjustment | Dark Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-U2KBB-A2 | |
| | | | | Light Operate | | 4-pin DC micro | 42EF-U2KBB-F4 | |
| | | | | Dark Operate | | 2 m 300V cable | 42EF-U2JBB-A2 | |
| | | | | Light Operate | | 4-pin DC micro | 42EF-U2JBB-F4 | |
| | 15 mA @ 21.6...264V AC/DC | N-MOSFET* 100 mA 8.3 ms | Dark Operate | 2 m 300V cable | 42EF-U2SCB-A2 | | | |
| | | | Light Operate | 4-pin AC micro | 42EF-U2SCB-G4 | | | |
| | | | Dark Operate | 2 m 300V cable | 42EF-U2RCB-A2 | | | |
| | | | Light Operate | 4-pin AC micro | 42EF-U2RCB-G4 | | | |
|  <p>Polarized Retroreflective Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 35 mA @ 10.8...30V DC | 25 mm...3 m (1 in...9.8 ft) | No Adjustment | Dark Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-P2KBB-A2 | |
| | | | | Light Operate | | 4-pin DC micro | 42EF-P2KBB-F4 | |
| | | | | Complementary Light and Dark Operate | | NPN 100 mA 1 ms | 2 m 300V cable | 42EF-P2MNB-A2 |
| | | | | | | | 4-pin DC micro | 42EF-P2MNB-F4 |
| | | | | | PNP 100 mA 1 ms | 4-pin pico QD | 42EF-P2MNB-Y4 | |
| | | | | | | 2 m 300V cable | 42EF-P2MPB-A2 | |
| | | | | 4-pin DC micro | 42EF-P2MPB-F4 | | | |
| | | | | 4-pin pico QD | 42EF-P2MPB-Y4 | | | |
| | 15 mA @ 21.6...264V AC/DC | N-MOSFET 100 mA 8.3 ms | Dark Operate | 2 m 300V cable | 42EF-P2SCB-A2 | | | |
| | | | Light Operate | 4-pin AC micro | 42EF-P2SCB-G4 | | | |
| | | | Complementary Light and Dark Operate | NPN 100 mA 1 ms | 2 m 300V cable | 42EF-P2RCB-A2 | | |
| | | | | | 4-pin AC micro | 42EF-P2RCB-G4 | | |
| | | | | PNP 100 mA 1 ms | 2 m 300V cable | 42EF-P2RCB-A2 | | |
| | | | | | 4-pin AC micro | 42EF-P2RCB-G4 | | |

① P-MOSFET models are available. Refer to www.ab.com/sensors.

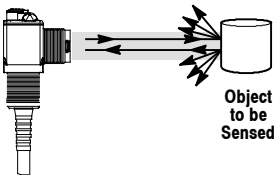
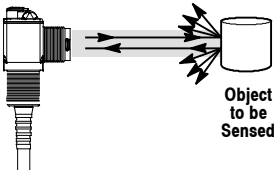
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Current @ Voltage | Sensing Distance | Adjustment Type | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. | |
|--|---------------------------|------------------------------|------------------|--------------------------------------|-------------------------------------|-----------------|-----------------------|---------------|
|  <p>Standard Diffuse Field of View: 5° Emitter LED: Infrared 880 nm</p> | 35 mA @ 10.8...30V DC | 3...500 mm (0.12...20 in.) | Single-Turn Knob | Dark Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-D1KBAK-A2 | |
| | | | | Light Operate | | 4-pin DC micro | 42EF-D1KBAK-F4 | |
| | 30 mA @ 10.8...30V DC | 3...700 mm (0.12...27.6 in.) | Teach Button | Light Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-D1JBCK-A2 | |
| | | | | Dark Operate | | 4-pin DC micro | 42EF-D1JBCK-F4 | |
| | 35 mA @ 10.8...30V DC | 3...500 mm (0.12...20 in.) | Single-Turn Knob | Complementary Light and Dark Operate | NPN 100 mA 1 ms | 2 m 300V cable | 42EF-D1MNAK-A2 | |
| | | | | | | 4-pin DC micro | 42EF-D1MNAK-F4 | |
| | 15 mA @ 21.6...264V AC/DC | | | | PNP 100 mA 1 ms | 4-pin pico QD | 42EF-D1MNAK-Y4 | |
| | | | | | | 2 m 300V cable | 42EF-D1MPAK-A2 | |
| | | | | | N-MOSFET* 100 mA 8.3 ms | 4-pin DC micro | 42EF-D1MPAK-F4 | |
| | | | | | | 4-pin pico QD | 42EF-D1MPAK-Y4 | |
| | | | | | Light Operate | 2 m 300V cable | 42EF-D1RCAK-A2 | |
| | | | | | | 4-pin AC micro | 42EF-D1RCAK-G4 | |
| | | | | Dark Operate | 2 m 300V cable | 42EF-D1SCAK-A2 | | |
| | | | | | 4-pin AC micro | 42EF-D1SCAK-G4 | | |
|  <p>Sharp Cutoff Diffuse Field of View: 7° Emitter LED: Infrared 880 nm</p> | 25 mA @ 10.8...30V DC | 3...130 mm (0.12...5 in.) | Single-Turn Knob | Dark Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-S1KBA-A2 | |
| | | | | Light Operate | | 4-pin DC micro | 42EF-S1KBA-F4 | |
| | | | | Complementary Light and Dark Operate | | PNP 100 mA 1 ms | 2 m 300V cable | 42EF-S1JBA-A2 |
| | | | | | | | 4-pin DC micro | 42EF-S1JBA-F4 |
| | NPN 100 mA 1 ms | 2 m 300V cable | 4-pin DC micro | 42EF-S1MPA-A2 | | | | |
| | | | 4-pin pico QD | 42EF-S1MPA-F4 | | | | |
| | N-MOSFET 100 mA 8.3 ms | 2 m 300V cable | 4-pin DC micro | 42EF-S1MNA-A2 | | | | |
| | | | 4-pin pico QD | 42EF-S1MNA-F4 | | | | |
| | Light Operate | 2 m 300V cable | 4-pin DC micro | 42EF-S1MNA-A2 | | | | |
| | | | 4-pin pico QD | 42EF-S1MNA-F4 | | | | |
| | Dark Operate | 2 m 300V cable | 4-pin DC micro | 42EF-S1MNA-A2 | | | | |
| | | | 4-pin pico QD | 42EF-S1MNA-F4 | | | | |
| Light Operate | 2 m 300V cable | 4-pin DC micro | 42EF-S1MNA-A2 | | | | | |
| | | 4-pin pico QD | 42EF-S1MNA-F4 | | | | | |
| Dark Operate | 2 m 300V cable | 4-pin DC micro | 42EF-S1MNA-A2 | | | | | |
| | | 4-pin pico QD | 42EF-S1MNA-F4 | | | | | |

* P-MOSFET models are available. Refer to www.ab.com/sensors.

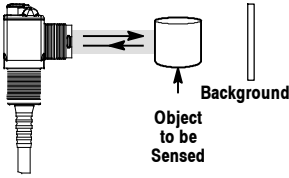
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Current @ Voltage | Sensing Distance | Adjustment Type | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. |
|---|--------------------------------|-----------------------------|-------------------------------|-----------------------------|---|-----------------------|----------------|
|  <p>Background Suppression</p> <p>Field of View: 50 mm (2 in.); 20° 100 mm (3.9 in.); 8° Emitter LED: Infrared 880 nm</p> | 35 mA @ 10.8...30V DC | 50 mm (1.97 in.) | No Adjustment | Dark Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-B1KBBC-A2 |
| | | | | Light Operate | | 4-pin DC micro | 42EF-B1KBBC-F4 |
| | | | | Dark Operate | | 2 m 300V cable | 42EF-B1JBBC-A2 |
| | | | | | | | 4-pin DC micro |
| | | | | Light Operate | | 2 m 300V cable | 42EF-B1JBBE-A2 |
| | | | | | | | 4-pin DC micro |
| | | 3...50 mm (0.12...2 in.) | | NPN 100 mA 1 ms | 2 m 300V cable | 42EF-B1MNBC-A2 | |
| | | | | | 4-pin DC micro | 42EF-B1MNBC-F4 | |
| | | | | | 4-pin pico QD | 42EF-B1MNBC-Y4 | |
| | | | | PNP 100 mA 1 ms | 2 m 300V cable | 42EF-B1MPBC-A2 | |
| | | | | | 4-pin DC micro | 42EF-B1MPBC-F4 | |
| | | | | | 4-pin pico QD | 42EF-B1MPBC-Y4 | |
| | 3...100 mm (0.12...3.9 in.) | NPN 100 mA 1 ms | 2 m 300V cable | 42EF-B1MNBE-A2 | | | |
| | | | 4-pin DC micro | 42EF-B1MNBE-F4 | | | |
| | | | 4-pin pico QD | 42EF-B1MNBE-Y4 | | | |
| | | PNP 100 mA 1 ms | 2 m 300V cable | 42EF-B1MPBE-A2 | | | |
| | | | 4-pin DC micro | 42EF-B1MPBE-F4 | | | |
| | | | 4-pin pico QD | 42EF-B1MPBE-Y4 | | | |
| 15 mA @ 21.6...132V AC/DC | 3...50 mm (0.12...2 in.) | No Adjustment | Light Operate | PNP-FET 100 mA 8.3 ms | 2 m 300V cable | 42EF-B1RFBC-A2 | |
| | | | Dark Operate | | 4-pin AC micro | 42EF-B1RFBC-G4 | |
| | | | Light Operate | | 2 m 300V cable | 42EF-B1SFBC-A2 | |
| | | | | | | 4-pin AC micro | 42EF-B1SFBC-G4 |
| | | | Dark Operate | | 2 m 300V cable | 42EF-B1RFBE-A2 | |
| | | | | | | 4-pin AC micro | 42EF-B1RFBE-G4 |
| | 3...100 mm (0.12...3.9 in.) | | N-MOSFET❶ 100 mA 8.3 ms | Light Operate | 2 m 300V cable | 42EF-B1RCBC-A2 | |
| | | | | Dark Operate | 4-pin AC micro | 42EF-B1RCBC-G4 | |
| | | | | Light Operate | 2 m 300V cable | 42EF-B1SCBC-A2 | |
| | | | 4-pin AC micro | | | 42EF-B1SCBC-G4 | |
| | | | Dark Operate | 2 m 300V cable | 42EF-B1RCBE-A2 | | |
| | | | | | 4-pin AC micro | 42EF-B1RCBE-G4 | |
| Light Operate | 2 m 300V cable | 42EF-B1SCBE-A2 | | | | | |
| | | 4-pin AC micro | 42EF-B1SCBE-G4 | | | | |

❶ P-MOSFET models are available. Refer to www.ab.com/sensors.

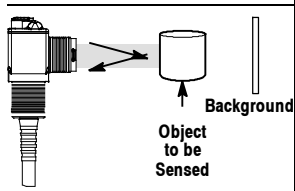
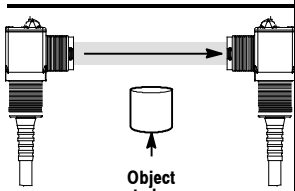
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

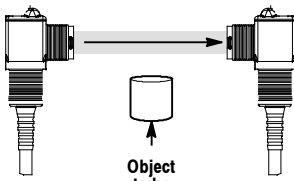
Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Current @ Voltage | Sensing Distance | Adjustment Type | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------|--------------------------------|-----------------|------------------|---|----------------------|----------------------|
|  <p><i>Fixed Focus Diffuse</i> Spot Size: 4 mm Emitter LED: Visible red (660 nm)</p> | 10.8...30V DC @ 30 mA max. | Red LED 43 mm (1.69 in.) | Teach Button | Light Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-F2JBC-A2 |
| | | | | Dark Operate | | 4-pin DC micro | 42EF-F2JBC-F4 |
| | | | | Dark Operate | | 2 m 300V cable | 42EF-F2KBC-A2 |
| | | | | Dark Operate | | 4-pin DC micro | 42EF-F2KBC-F4 |
|  <p><i>Transmitted Beam</i> Field of View: 7° Emitter LED: Infrared 880nm</p> | 10.8...30V DC 25 mA | Depends on Receiver | NA | NA | NA | 2 m 300V cable | 42EF-E1EZB-A2 |
| | 21.6...264V AC/DC 15 mA | | | | | 4-pin DC micro | 42EF-E1EZB-F4 |
| | | | | | | 4-pin pico QD | 42EF-E1EZB-Y4 |
| | | | | | | 2 m 300V cable | 42EF-E1QZB-A2 |
| | 4-pin AC micro | | | | | 42EF-E1QZB-G4 | |

Refer to page 1-39 for cordsets and accessories.

Product Selection for Receivers

| Sensing Mode | Current @ Voltage | Sensing Distance [m (ft)] | Adjustment Type | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. | |
|--|------------------------------|---------------------------|--------------------------------|--------------------------------------|-------------------------------------|--------------------------------|----------------------|----------------------|
|  <p>Object to be Sensed</p> <p>Transmitted Beam</p> <p>Field of View: 7° Emitter LED: Infrared 880nm (See Note 2.)</p> | 25 mA @ 10.8...30V DC | 20 m (65.6 ft) | No Adjustment | Dark Operate | NPN and PNP 100 mA 4 ms | 2 m 300V cable | 42EF-R9KBB-A2 | |
| | | | | Light Operate | | 4-pin DC micro | 42EF-R9KBB-F4 | |
| | | Dark Operate | | 2 m 300V cable | | 42EF-R9JBB-A2 | | |
| | | Light Operate | | 4-pin DC micro | | 42EF-R9JBB-F4 | | |
| | | Dark Operate | | 2 m 300V cable | | 42EF-R9KBBV-A2 | | |
| | | Light Operate | | 4-pin DC micro | | 42EF-R9KBBV-F4 | | |
| | | Dark Operate | | 2 m 300V cable | | 42EF-R9JBBV-A2 | | |
| | | Light Operate | | 4-pin DC micro | | 42EF-R9JBBV-F4 | | |
| | | Dark Operate | | 2 m 300V cable | | 42EF-R9KBBT-A2 | | |
| | | Light Operate | | 4-pin DC micro | | 42EF-R9KBBT-F4 | | |
| | | Dark Operate | | 2 m 300V cable | | 42EF-R9JBBT-A2 | | |
| | | Light Operate | | 4-pin DC micro | | 42EF-R9JBBT-F4 | | |
| | 15 mA @ 21.6...264V AC/DC | 4 m (13 ft) | 8 m (26.25 ft) | Complementary Light and Dark Operate | NPN 100 mA 4 ms | 2 m 300V cable | 42EF-R9MNBV-A2 | |
| | | | | | PNP 100 mA 4 ms | 4-pin DC micro | 42EF-R9MNBV-F4 | |
| | | | | | | 4-pin DC pico | 42EF-R9MNBV-Y4 | |
| | | | | | | 2 m 300V cable | 42EF-R9MPBV-A2 | |
| | | 8 m (26.25 ft) | 20 m (65.6 ft) | | 4-pin DC micro | 42EF-R9MPBV-F4 | | |
| | | | | | 4-pin DC pico | 42EF-R9MPBV-Y4 | | |
| | | | | | 2 m 300V cable | 42EF-R9MNBV-A2 | | |
| | | 4 m (13 ft) | 8 m (26.25 ft) | | 20 m (65.6 ft) | N-MOSFETⓈ 100 mA 16.6 ms | 4-pin DC micro | 42EF-R9MNB-F4 |
| | | | | | | | 4-pin DC pico | 42EF-R9MNB-Y4 |
| | | | | | | | 2 m 300V cable | 42EF-R9MPB-A2 |
| | | 8 m (26.25 ft) | 20 m (65.6 ft) | | 4-pin DC micro | | 42EF-R9MPB-F4 | |
| | | | | | 4-pin DC pico | | 42EF-R9MPB-Y4 | |
| 2 m 300V cable | 42EF-R9SCBV-A2 | | | | | | | |
| 4 m (13 ft) | 8 m (26.25 ft) | 20 m (65.6 ft) | N-MOSFETⓈ 100 mA 16.6 ms | 4-pin AC micro | 42EF-R9SCBV-G4 | | | |
| | | | | 2 m 300V cable | 42EF-R9RCBV-A2 | | | |
| | | | | 4-pin AC micro | 42EF-R9RCBV-G4 | | | |
| 8 m (26.25 ft) | 20 m (65.6 ft) | 4-pin AC micro | | 42EF-R9SCBT-A2 | | | | |
| | | 2 m 300V cable | | 42EF-R9SCBT-G4 | | | | |
| | | 4-pin AC micro | | 42EF-R9RCBT-A2 | | | | |
| 4 m (13 ft) | 8 m (26.25 ft) | 20 m (65.6 ft) | | N-MOSFETⓈ 100 mA 16.6 ms | 4-pin AC micro | 42EF-R9RCBT-G4 | | |
| | | | | | 2 m 300V cable | 42EF-R9SCB-A2 | | |
| | | | | | 4-pin AC micro | 42EF-R9SCB-G4 | | |
| 8 m (26.25 ft) | 20 m (65.6 ft) | 4-pin AC micro | | | 42EF-R9SCB-G4 | | | |
| | | 2 m 300V cable | | | 42EF-R9RCB-A2 | | | |
| | | 4-pin AC micro | | | 42EF-R9RCB-G4 | | | |

Ⓢ P-MOSFET models are available. Refer to www.ab.com/sensors.

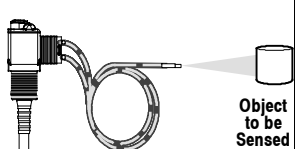
ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Refer to page 1-39 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Current @ Voltage | Sensing Distance | Adjustment Type | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. | |
|--|---------------------------|---|------------------|--------------------------------------|-------------------------------------|------------------------|----------------|---------------|
|  <p>Large Aperture Fiber Optic (See Note 3.)</p> <p>Field of View: Depends on Glass Fiber Optic cable selected</p> <p>Emitter LED: Infrared 880nm</p> | 35 mA @ 10.8...30V DC | Depends on Glass Fiber Optic cable selected | Single-Turn Knob | Dark Operate | NPN and PNP 100 mA 1 ms | 2 m 300V cable | 42EF-G1KBA-A2 | |
| | | | | Light Operate | | 4-pin DC micro | 42EF-G1KBA-F4 | |
| | | | | Complementary Light and Dark Operate | NPN 100 mA 1 ms | 2 m 300V cable | 42EF-G1MNA-A2 | |
| | | | | | | 4-pin DC micro | 42EF-G1MNA-F4 | |
| | | | | | PNP 100 mA 1 ms | 4-pin pico | 42EF-G1MNA-Y4 | |
| | | | | | | 2 m 300V cable | 42EF-G1MPA-A2 | |
| | 15 mA @ 21.6...264V AC/DC | | | | Light Operate | N-MOSFET 100 mA 8.3 ms | 4-pin AC micro | 42EF-G1RCA-G4 |
| | | | | | Dark Operate | | 2 m 300V cable | 42EF-G1SCA-A2 |
| | | | | | 4-pin AC micro | 42EF-G1RCA-A2 | | |
| | | | | | 4-pin AC micro | 42EF-G1SCA-G4 | | |
| | | | | | | | | |
| | | | | | | | | |

ⓘ P-MOSFET models are available. Refer to www.ab.com/sensors.

ATTENTION



P-MOSFET models have a lower in-rush current threshold for short-circuit protection than N-MOSFET. Therefore, they may be susceptible to false trigger of short-circuit protection due to induced noise.

Note 1: For color registration mark applications, refer to light source selection guide at www.ab.com/sensors.

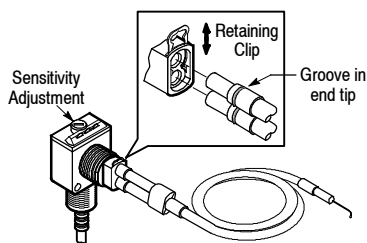
Note 2: For maximum performance, transmitted beam sources should be combined with matched operating voltage receivers, i.e., AC/DC source with AC/DC receiver or DC source with DC receiver. Reduced operating distance and margin will result from mixed operating voltage pairs.

Note 3: For use with glass fiber optic cables. See page 1-231 for more information.

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|--|--------------|--|--------------|----------------------|----------|
| DC Micro QD Cordset, Straight, 4-pin, 2 m | 889D-F4AC-2 | 76 mm (3 in.) Diameter Reflector | 92-39 | Apertures, 1 mm Slot | 60-2660 |
| AC Micro QD Cordset, Straight, 4-pin, 2 m | 889R-F4AEA-2 | 32 mm (1.25 in.) Diameter Reflector | 92-47 | Apertures, 2 mm Slot | 60-2661 |
| Pico QD Cordset, Straight, 4-pin, 2 m | 889P-F4AB-2 | Mounting Bracket Swivel/Tilt | 60-2649 | Apertures, 4 mm Slot | 60-2662 |
| | | | | Aperture Set | 60-2659 |
| Bifurcated Fiber Optic Cable—38 mm (1.5 in.) typical range | 43GR-TBB25SL | Individual Fiber Optic Cable—457 mm (18 in.) typical range | 43GT-FAS25SL | | |
| Bifurcated Fiber Optic Cable—21 mm (0.8 in.) typical range | 43GR-TFS10ML | Individual Fiber Optic Cable—152 mm (6 in.) typical range | 43GT-TFS10ML | | |

Glass Fiber Optic Cables





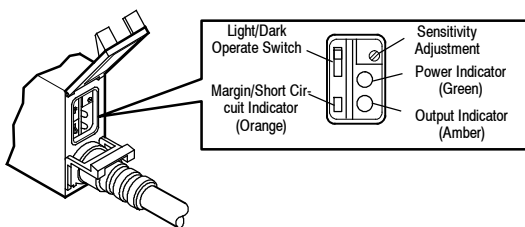
Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | UL, CSA and CE Marked for all applicable directives |
| Operating Environment | NEMA 4X, 6P, IP67, 1200 psi (8270 kPa) washdown |
| Operating Temperature [C (F)] | -20...+70° (-4...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Optical | |
| Sensing Modes | Retrotreflective, polarized retroreflective, diffuse, wide angle diffuse, fixed focus diffuse, transmitted beam, fiber optic |
| Sensing Range | See Product Selection table on page 1-45 |
| Field of View | See Product Selection table on page 1-45 |
| Light Source | Visible red LED (660 nm), infrared LED (880 nm) |
| LED Indicators | See User Interface below |
| Adjustments | Multi-turn potentiometer |
| Electrical | |
| Voltage | 10.8...30V DC, 21.6...250V AC/DC |
| Current Consumption | 30 mA max. (DC) |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | See Product Selection table on page 1-45 |
| Output Type | PNP and NPN (DC), MOSFET (AC/DC) |
| Output Mode | Light operate or dark operate selectable |
| Output Current | 100 mA @ 30V DC max |
| Output Leakage Current | 0.1 mA max (DC), 1.7 mA (AC/DC) |
| Mechanical | |
| Housing Material | Noryl 190X |
| Lens Material | Acrylic |
| Connection Types | 2 m cable (24 AWG), 4-pin DC micro (M12) QD, 3-pin AC micro (M12) |
| Supplied Accessories | 75012-097-01 18 mm locknut |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-47 |

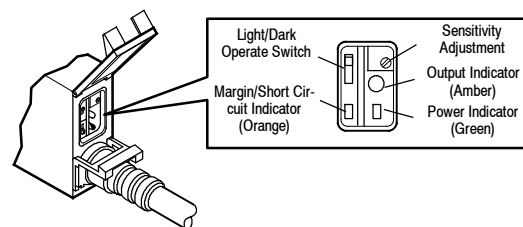
Features

- Compact rectangular size with standard 18 mm mounting nose
- Visible indicators for power, output, and 2.5X margin/short circuit
- Short circuit protection in all versions, including two-wire universal voltage versions
- False pulse protection
- Switch selectable light or dark operation
- Access to sensor adjustments through captive cover that does not require tools for access
- Eight sensing modes available
- Rated to withstand high temperature 1200 psi washdowns
- 300 μs high speed DC versions
- No tools are required to attach fiber optic cables to either glass or plastic fiber optic sensors

User Interface



NOTE: The power indicator will turn off when the output indicator is on. The cat. no. for the Rear Snap Cover is 60-2679.

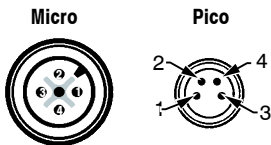
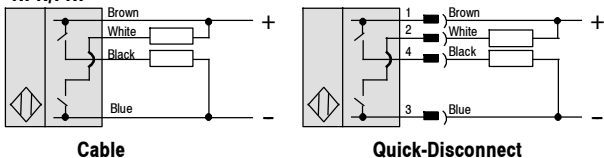


NOTE: The power indicator will turn off when the output indicator is on. The cat. no. for the Rear Snap Cover is 60-2679.

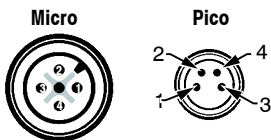
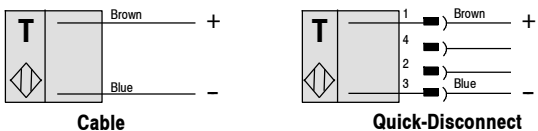
Wiring Diagrams ①②

11...30V DC Sensors

NPN/PNP

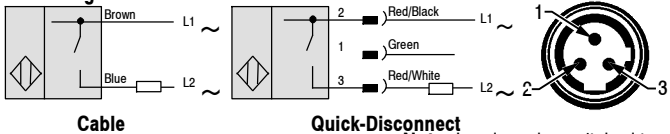


Transmitted Beam Source

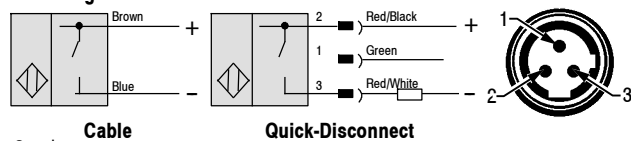


22...250V AC/DC Sensors

AC Wiring

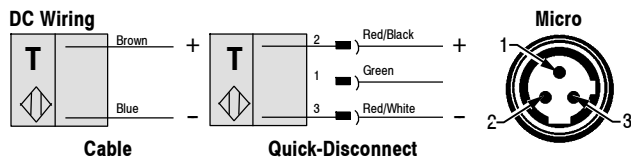
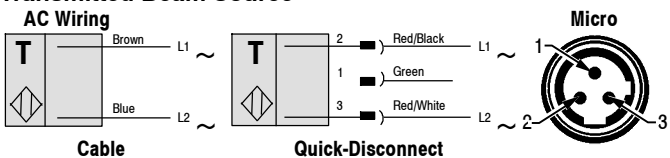


DC Wiring



Note: Load can be switched to pin 2 or brown.

Transmitted Beam Source

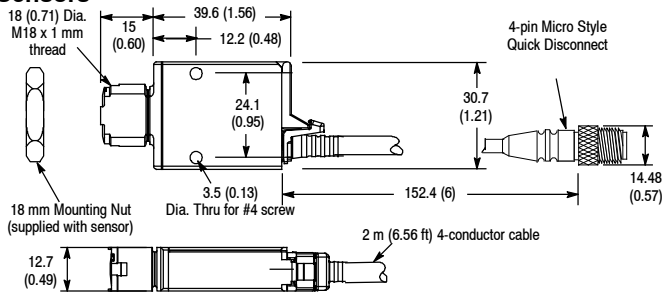


① For Rockwell Automation programmable controller compatible interface, refer to PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual at www.ab.com/literature.

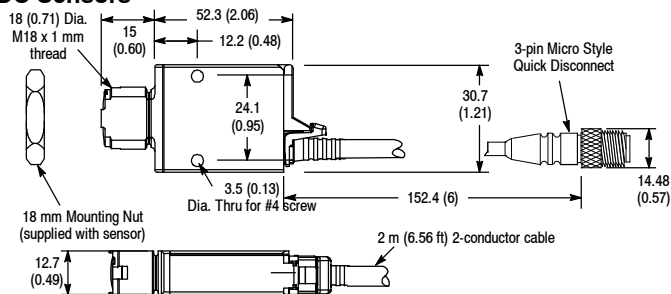
② Quick-disconnect wiring codes shown are valid for Rockwell Automation cables only.

Approximate Dimensions [mm (in.)]

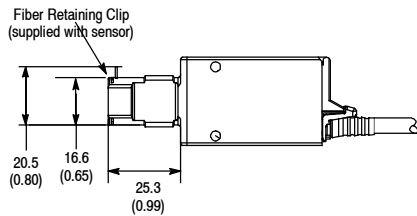
DC Sensors



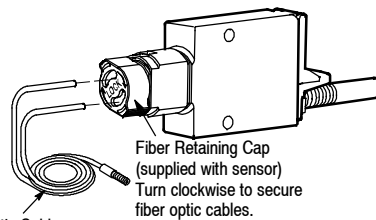
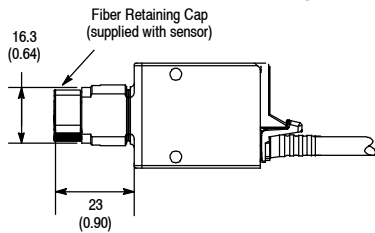
AC/DC Sensors



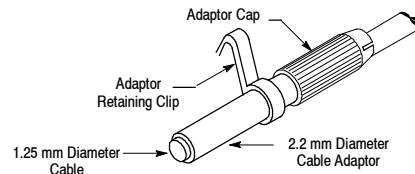
Infrared Glass Fiber Optic Sensors



Visible Red Plastic Fiber Optic Sensors



Plastic Fiber Optic Cable
2.2 mm (0.09 in.) jacket
diameter on control end tip



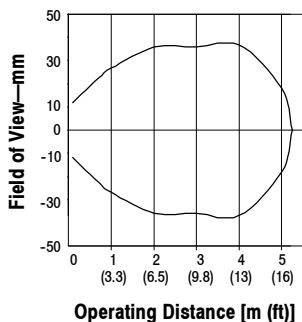
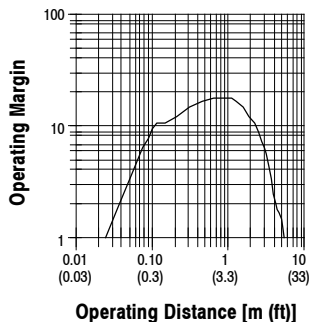
Special Glass Fiber Optic cables are also available with 2.2 mm (0.09 in.) diameter control end tips.

NOTE: Cat. No. 61-6731 adaptors are required for smaller fiber optic cables with jacket diameters of 1.25 mm (0.05 in.).

Typical Response Curve

Beam Pattern

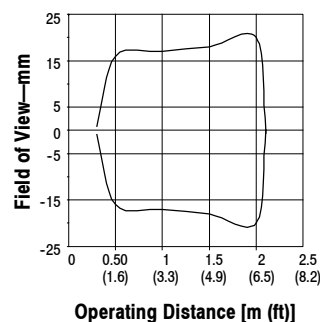
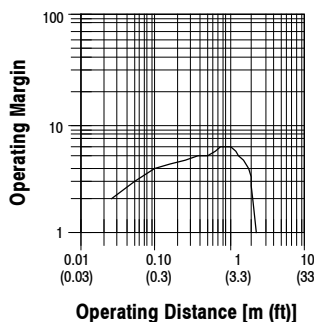
Retroreflective



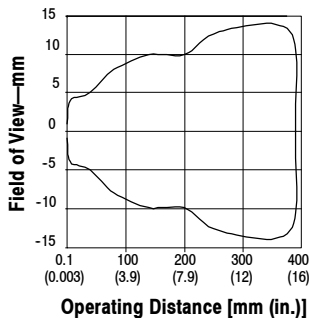
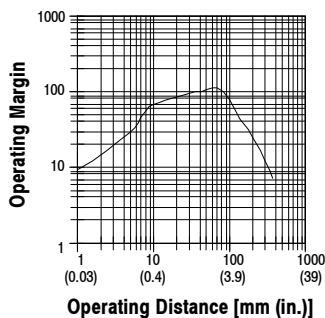
Typical Response Curve

Beam Pattern

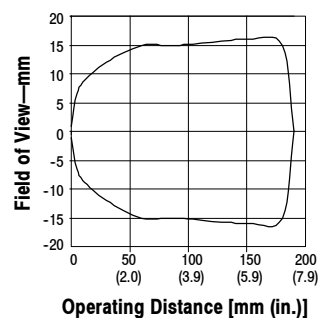
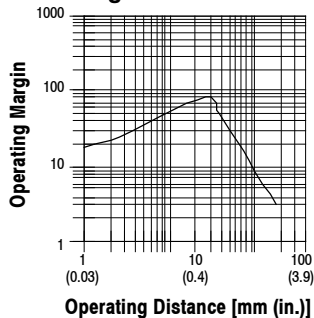
Polarized Retroreflective



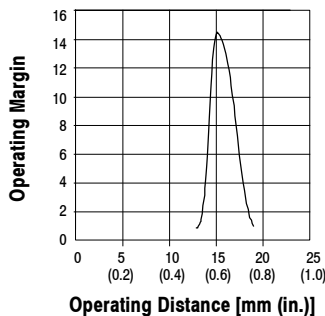
Standard Diffuse



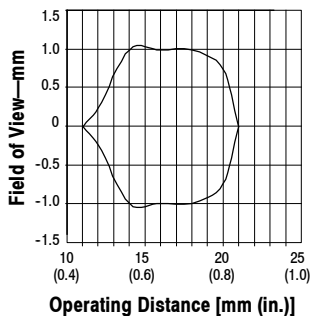
Wide Angle Diffuse



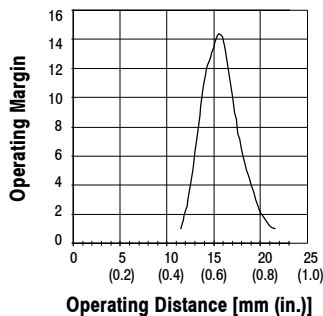
Fixed Focus Diffuse
16 mm Red LED



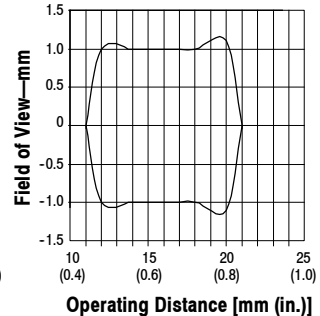
16 mm Red LED



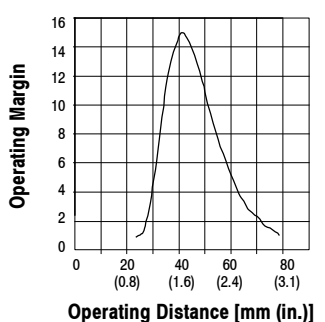
Fixed Focus Diffuse
16 mm Green LED



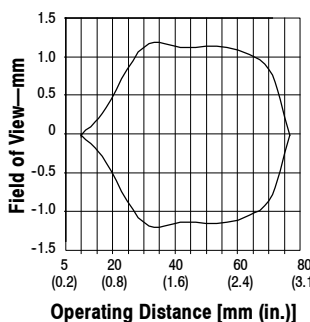
16 mm Green LED



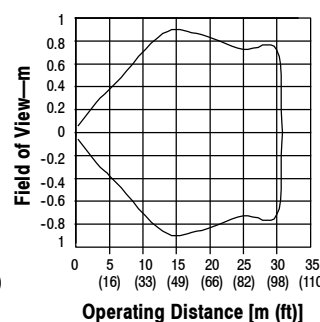
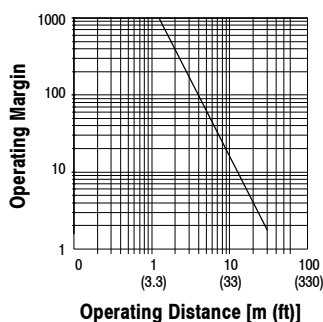
Fixed Focus Diffuse
43 mm Red LED



43 mm Red LED

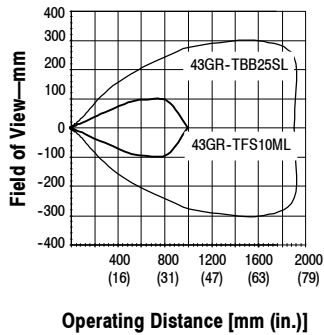
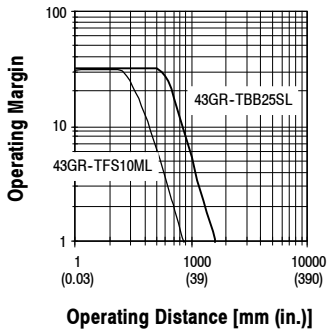


Transmitted Beam



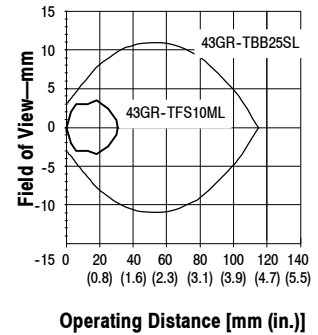
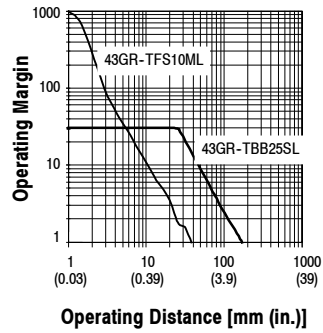
Typical Response Curve Beam Pattern

Large Aperture Fiber Optic
Retroreflective (using 3 in. dia. reflector)

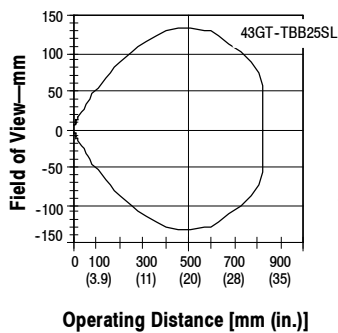
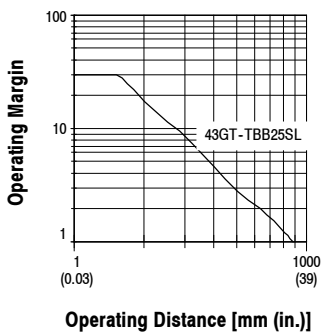


Typical Response Curve Beam Pattern

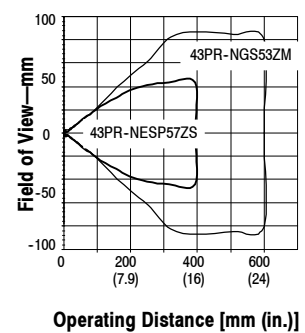
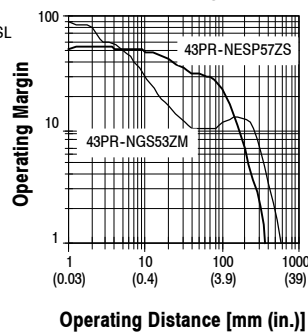
Large Aperture Fiber Optic
Diffuse



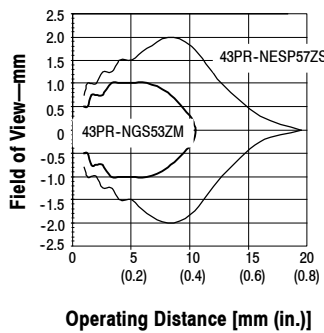
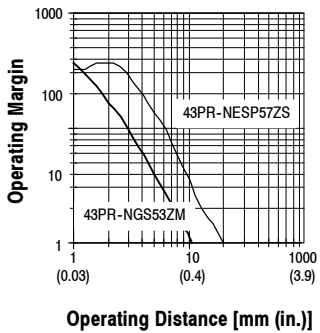
Large Aperture Fiber Optic
Transmitted Beam



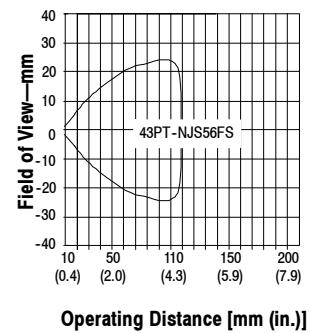
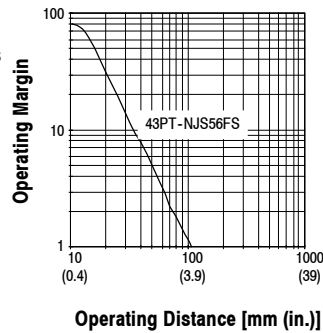
Small Aperture Fiber Optic
Retroreflective (using 3 in. dia. reflector)



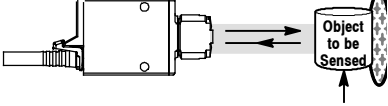
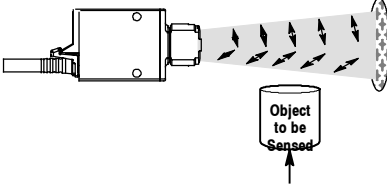
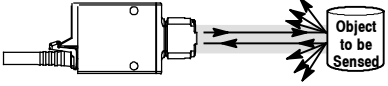
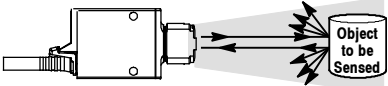
Small Aperture Fiber Optic
Diffuse



Small Aperture Fiber Optic
Transmitted Beam

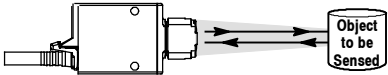

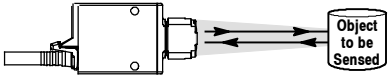

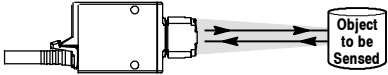
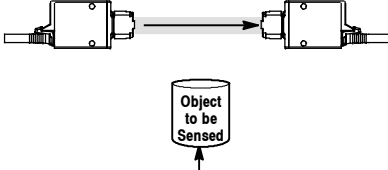



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|--|------------------------------------|--------------------------|--|-------------------------------------|----------------|
|  <p><i>Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10.8...30V DC 35 mA | 25 mm...5 m (0.98 in...16.4 ft) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-U2LB-A2 |
| | | 21.6...250V AC/DC | | | 25 mm...2.5 m (0.98 in...8.2 ft) | 4-pin DC micro |
| | 4-pin pico QD | | | | | 42KL-U2LB-Y4 |
| | Power MOSFET 2-wire 100 mA 8.3 ms | | | 2 m 300V cable | | 42KL-U2LQ-A2 |
| | | 4-pin DC micro | | 42KL-U2LQ-F4 | | |
| | | 4-pin pico QD | | 42KL-U2LQ-Y4 | | |
|  <p><i>Polarized Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10.8...30V DC 35 mA | 25 mm...2 m (0.98 in...6.6 ft) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-P2LB-A2 |
| | | 21.6...250V AC/DC | | | 25 mm...1 m (0.98 in...3.3 ft) | 4-pin DC micro |
| | 4-pin pico QD | | | | | 42KL-P2LB-Y4 |
| | Power MOSFET 2 wire 100 mA 8.3 ms | | | 2 m 300V cable | | 42KL-P2LQ-A2 |
| | | 4-pin DC micro | | 42KL-P2LQ-F4 | | |
| | | 4-pin pico QD | | 42KL-P2LQ-Y4 | | |
|  <p><i>Standard Diffuse</i></p> <p>Field of View: 5° Emitter LED: Infrared 880 nm</p> | 10.8...30V DC 35 mA | 1...380 mm (0.04...15 in.) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-D1LB-A2 |
| | | 21.6...250V AC/DC | | | 1...190 mm (0.04...7.5 in.) | 4-pin DC micro |
| | 4-pin pico QD | | | | | 42KL-D1LB-Y4 |
| | Power MOSFET 2 wire 100 mA 8.3 ms | | | 2 m 300V cable | | 42KL-D1LQ-A2 |
| | | 4-pin DC micro | | 42KL-D1LQ-F4 | | |
| | | 4-pin pico QD | | 42KL-D1LQ-Y4 | | |
|  <p><i>Wide Angle Diffuse</i></p> <p>Field of View: 18° Emitter LED: Infrared 880 nm</p> | 10.8...30V DC 35 mA | 1...180 mm (0.04...7.0 in.) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-W1LB-A2 |
| | | 21.6...250V AC/DC | | | 1...90 mm (0.04...3.5 in.) | 4-pin DC micro |
| | 4-pin pico QD | | | | | 42KL-W1LB-Y4 |
| | Power MOSFET 2 wire 100 mA 8.3 ms | | | 2 m 300V cable | | 42KL-W1LQ-A2 |
| | | 4-pin DC micro | | 42KL-W1LQ-F4 | | |
| | | 4-pin pico QD | | 42KL-W1LQ-Y4 | | |
| | | | | | 2 m 300V cable | 42KL-W1TC-A2 |
| | | | | | 3-pin AC micro | 42KL-W1TC-G3 |

Refer to page 1-47 for cordsets and accessories.

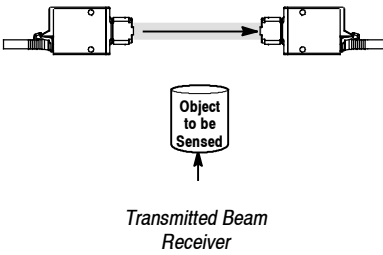
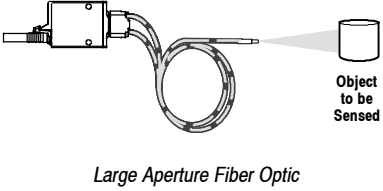
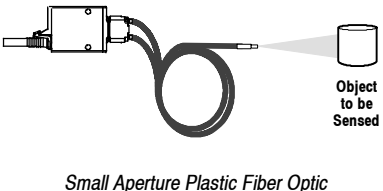
Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|---------------------|--------------------------|--|--------------------|----------------------|
|  <p>Fixed Focus Diffuse</p> <p>Emitter LED: Visible red (660 nm) </p> | 10.8...30V DC 35 mA | 16 mm (0.63 in.) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-F2LBS-A2 |
| | | | | | 4-pin DC micro | 42KL-F2LBS-F4 |
| | | | | | 4-pin pico QD | 42KL-F2LBS-Y4 |
| | 21.6...250V AC/DC | | | NPN/PNP 100 mA 300 μs | 2 m 300V cable | 42KL-F2LBSQ-A2 |
| | | | | | 4-pin DC micro | 42KL-F2LBSQ-F4 |
| | | | | | 4-pin pico QD | 42KL-F2LBSQ-Y4 |
|  <p>Fixed Focus Diffuse</p> <p>Emitter LED: Visible green (525 nm) </p> | 10.8...30V DC 35 mA | 43 mm (1.7 in.) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-F3LBS-A2 |
| | | | | | 4-pin DC micro | 42KL-F3LBS-F4 |
| | | | | | 4-pin pico QD | 42KL-F3LBS-Y4 |
| | 21.6...250V AC/DC | | | NPN/PNP 100 mA 300 μs | 2 m 300V cable | 42KL-F3LBSQ-A2 |
| | | | | | 4-pin DC micro | 42KL-F3LBSQ-F4 |
| | | | | | 4-pin pico QD | 42KL-F3LBSQ-Y4 |
|  <p>Fixed Focus Diffuse</p> <p>Emitter LED: Visible red (660 nm)</p> | 10.8...30V DC 35 mA | 43 mm (1.7 in.) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-F2LBL-A2 |
| | | | | | 4-pin DC micro | 42KL-F2LBL-F4 |
| | | | | | 4-pin pico QD | 42KL-F2LBL-Y4 |
| | 21.6...250V AC/DC | | | NPN/PNP 100 mA 300 μs | 2 m 300V cable | 42KL-F2LBLQ-A2 |
| | | | | | 4-pin DC micro | 42KL-F2LBLQ-F4 |
| | | | | | 4-pin pico QD | 42KL-F2LBLQ-Y4 |
|  <p>Transmitted Beam Light Source</p> <p>Field of View: 7°</p> <p>Emitter LED: Infrared 880 nm</p> | 10.8...30V DC 35 mA | 1...30 m (98 ft) | — | — | 2 m 300V cable | 42KL-E1EZB-A2 |
| | 21.6...250V AC/DC 5 mA | | | | 4-pin DC micro | 42KL-E1EZB-F4 |
| | | | | | 4-pin pico QD | 42KL-E1EZB-Y4 |
| | 10.8...30V DC 35 mA | 1...10 m (33 ft) | — | — | 2 m 300V cable | 42KL-E1QZB-A2 |
| | | | | | 3-pin AC micro | 42KL-E1QZB-G3 |
| | | | | | 4-pin DC micro | 42KL-E1EZBQ-F4 |
| | 10.8...30V DC 35 mA | 1...10 m (33 ft) | — | — | 4-pin pico QD | 42KL-E1EZBQ-Y4 |

 For color registration mark applications, refer to light source selection guide at www.ab.com/sensors.

Refer to page 1-47 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|---------------------------------------|-----------------------|--|-----------------------------|----------------|
|  <p>Transmitted Beam Receiver</p> <p>Field of View: 7° Emitter LED: Infrared 880 nm</p> | 10.8...30V DC 25 mA | 30 m (98 ft) | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-RLB-A2 |
| | 21.6...250V AC/DC | | | | 4-pin DC micro | 42KL-RLB-F4 |
| | | | | | 4-pin pico QD | 42KL-RLB-Y4 |
| | 10.8...30V DC 25 mA | 10 m (33 ft) | Light/Dark Selectable | NPN/PNP 100 mA 900 µs | 2 m 300V cable | 42KL-RLBQ-A2 |
| | 21.6...250V AC/DC | | | | 4-pin DC micro | 42KL-RLBQ-F4 |
| | | | | | 4-pin pico QD | 42KL-RLBQ-Y4 |
|  <p>Large Aperture Fiber Optic</p> <p>Field of View: Depends on Fiber Optic cable selected Emitter LED: Infrared 880 nm</p> | 10.8...30V DC 35 mA | Depends on Fiber Optic cable selected | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-G1LB-A2 |
| | 21.6...250V AC/DC | | | | 4-pin DC micro | 42KL-G1LB-F4 |
| | | | | | 4-pin pico QD | 42KL-G1LB-Y4 |
| | | | | | NPN/PNP 100 mA 300 µs | 2 m 300V cable |
| | 4-pin DC micro | | | | | 42KL-G1LBQ-F4 |
| | 4-pin pico QD | | | | | 42KL-G1LBQ-Y4 |
|  <p>Small Aperture Plastic Fiber Optic</p> <p>Field of View: Depends on Fiber Optic cable selected Emitter LED: Visible red 660nm</p> | 10.8...30V DC 35 mA | Depends on Fiber Optic cable selected | Light/Dark Selectable | NPN/PNP 100 mA 1 ms | 2 m 300V cable | 42KL-L2LB-A2 |
| | 21.6...250V AC/DC 15 mA | | | | 4-pin DC micro | 42KL-L2LB-F4 |
| | | | | | 4-pin pico QD | 42KL-L2LB-Y4 |
| | | | | | NPN/PNP 100 mA 300 µs | 2 m 300V cable |
| | 4-pin DC micro | | | | | 42KL-L2LBQ-F4 |
| | 4-pin pico QD | | | | | 42KL-L2LBQ-Y4 |
| Power MOSFET 2-wire 100 mA 8.3 ms | 2 m 300V cable | 42KL-L2TC-A2 | | | | |
| | 3-pin AC micro | 42KL-L2TC-G3 | | | | |
| | 3-pin AC micro | 42KL-L2TC-G3 | | | | |

⊗ For fiber optic selection guide, see pages 1-231.

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|---|--------------|---------------------------------------|-------------|-------------------------------------|----------|
| DC Micro QD Cordset, Straight, 4-pin, 2 m | 889D-F4AC-2 | Pico QD Cordset, Straight, 4-pin, 2 m | 889P-F4AB-2 | 32 mm (1.25 in.) Diameter Reflector | 92-47 |
| AC Micro QD Cordset, Straight, 3-pin, 2 m | 889R-F3AEA-2 | 76 mm (3 in.) Diameter Reflector | 92-39 | | |

Transmitted Beam—Maximum Operating Distance with Apertures

| Aperture Slot Size | Maximum Range | | Cat. No. |
|--------------------|------------------|-----------------|----------|
| | Standard Speed | High Speed | |
| 1 mm | 2.1 m (6.9 ft) | 0.7 m (2.3 ft) | 60-2673 |
| 2 mm | 10.5 m (34.5 ft) | 3.5 m (11.4 ft) | 60-2674 |
| 4 mm | 18.6 m (61.0 ft) | 6.1 m (20.1 ft) | 60-2675 |
| 1, 2, 4 mm kit | — | — | 60-2676 |



Features

- Narrow 27 mm deep housing
- 18 mm nose and through-hole mounting options
- LED indicators with 360° visibility
- No user adjustments required
- Multiple sensing modes
- Low voltage 24V DC operation
- Variety of connection types

Specifications

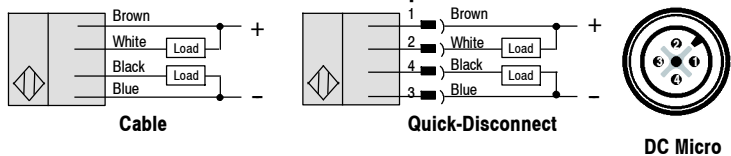
| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | NEMA 12, IP51 |
| Operating Temperature [C (F)] | 0...+50° (32...+122°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Optical | |
| Sensing Modes | Diffuse, polarized retroreflective, wide angle, sharp cutoff |
| Sensing Range | See Product Selection table on page 1-51 |
| Field of View | See Product Selection table on page 1-51 |
| Light Source | Visible red LED (660 nm), infrared LED (880 nm) |
| LED Indicators | See User Interface below |
| Adjustments | None |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 35 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 10 ms |
| Output Type | PNP or NPN by cat. no., both PNP and NPN models |
| Output Mode | Light or dark operate by cat. no. |
| Output Current | 100 mA @ 30V DC max |
| Output Leakage Current | 0.1 mA max |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Connection Types | 2 m cable (24 AWG), 4-pin DC micro (M12) QD |
| Supplied Accessories | 75012-097-01 18 mm locknut |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-51 |

User Interface

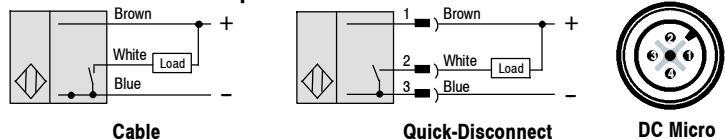
| Label | Color | State | Status |
|--------|--------|-------|----------------------------|
| Output | Yellow | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |
| Margin | Red | OFF | Margin < 1.2 |
| | | ON | Margin > 1.2 |
| Power | Green | OFF | Sensor not powered |
| | | ON | Sensor powered |

Wiring Diagrams①

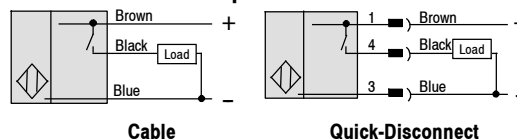
Models with Dual NPN and PNP Outputs



Models with NPN Outputs



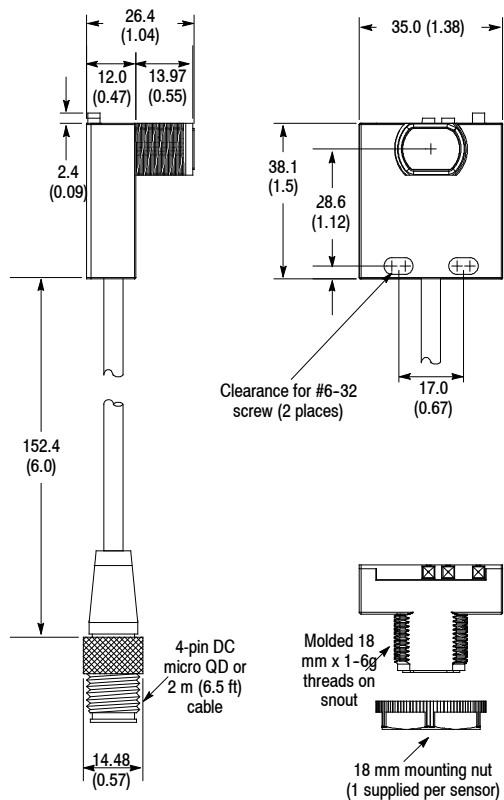
Models with PNP Outputs



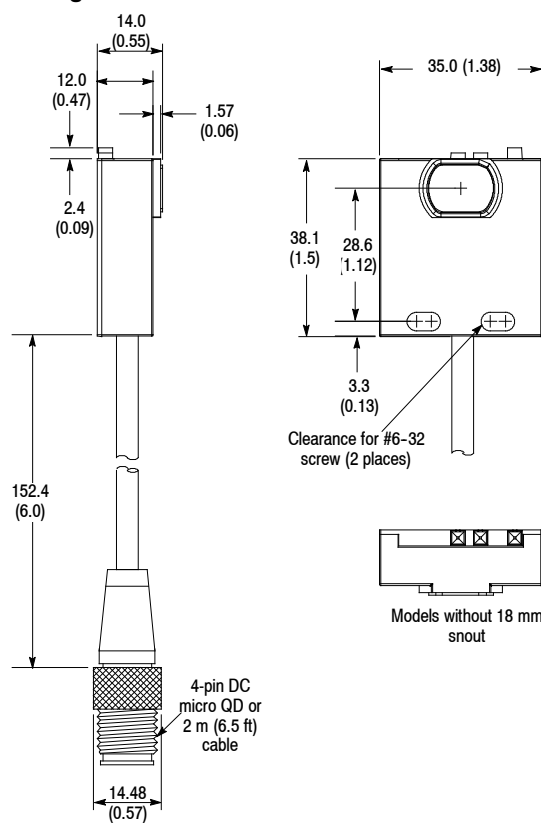
① All wire colors on quick-disconnect models refer to Rockwell Automation 889D cordsets.

Approximate Dimensions [mm (in.)]

Polarized Retroreflective and Standard Diffuse Models



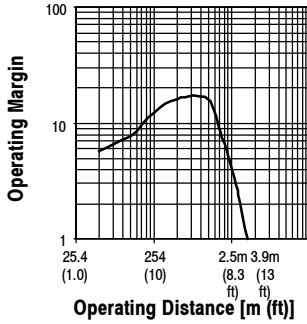
Wide Angle Diffuse Models



Note: All sensors except wide angle diffuse models are supplied with one M18 mounting nut (Cat. No. 75012-097-01).

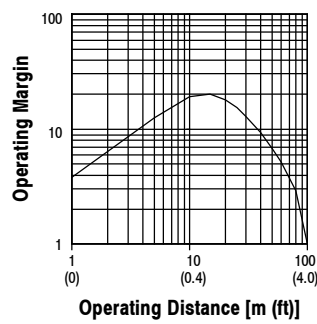
Typical Response Curve

Polarized Retroreflective

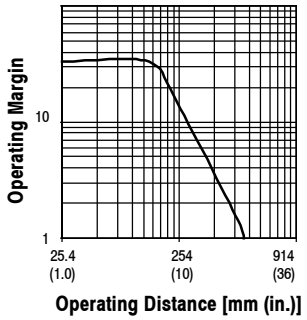


Typical Response Curve

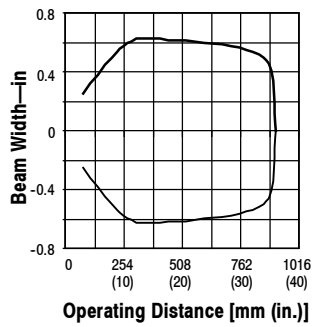
Sharp Cutoff Diffuse



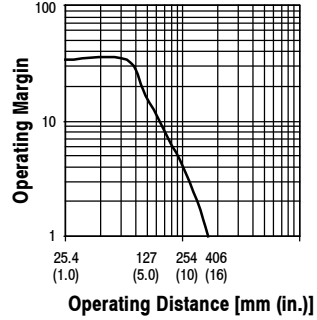
Standard Diffuse



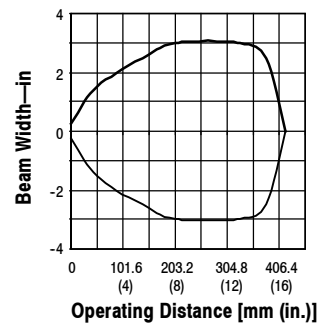
Beam Pattern



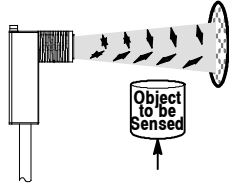
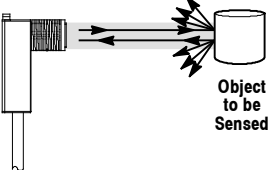
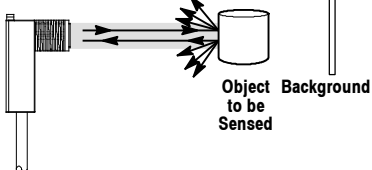
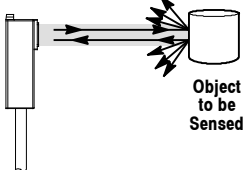
Wide Angle Diffuse



Beam Pattern



Product Selection

| Sensing Mode | Operating Voltage/ Current | Sensing Distance | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. | |
|---|----------------------------|----------------------------------|---------------------|-------------------------------------|-----------------------|-----------------|-----------------|
|  <p><i>Polarized Retroreflective</i> Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10...30V DC 35 mA | 25 mm...1.5 m (1 in...4.9 ft) | Dark Operate | NPN and PNP 100 mA 10 ms | 2 m 300V cable | 44RSP-2KBE1-A2 | |
| | | | | | 4-pin DC micro | 44RSP-2KBE1-F4 | |
| | | | Light Operate | | 2 m 300V cable | 44RSP-2JBE3-A2 | |
| | | | | | 4-pin DC micro | 44RSP-2JBE3-F4 | |
| | | Dark Operate | 2 m 300V cable | 44RSP-2KBE3-A2 | | | |
| | | | 4-pin DC micro | 44RSP-2KBE3-F4 | | | |
| | | 25 mm...3 m (1 in...9.8 ft) | Light Operate | NPN/100 mA 10 ms | 2 m 300V cable | 44RSP-2JNE3-A2 | |
| | | | | | 4-pin DC micro | 44RSP-2JNE3-F4 | |
| | | | | 3-pin Molex | 44RSP-2JNE3-Z6 | | |
| | | | PNP/100 mA 10 ms | 2 m 300V cable | 44RSP-2JPE3-A2 | | |
| 4-pin DC micro | 44RSP-2JPE3-F4 | | | | | | |
|  <p><i>Standard Diffuse</i> Field of View: 5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 35 mA | 3...380 mm (0.12...15 in.) | Light Operate | NPN/100 mA 10 ms | 2 m 300V cable | 44RSD-1JNC38-A2 | |
| | | | | | | 4-pin DC micro | 44RSD-1JNC38-F4 |
| | | | | | PNP/100 mA 10 ms | 2 m 300V cable | 44RSD-1JPC38-A2 |
| | | | | | | 4-pin DC micro | 44RSD-1JPC38-F4 |
|  <p><i>Sharp Cutoff Diffuse</i> Field of View: 5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 35 mA | 3...100 mm (0.12...4 in.) | Light Operate | NPN/100 mA 10 ms | 2 m 300V cable | 44RSS-1JNB1-A2 | |
| | | | | | | 4-pin DC micro | 44RSS-1JNB1-F4 |
|  <p><i>Wide Angle Diffuse</i> Field of View: Approx. 60° Emitter LED: Infrared 880 nm</p> | 10...30V DC 35 mA | 3...200 mm (0.12...7.8 in.) | Light Operate | NPN/100 mA 10 ms | 2 m 300V cable | 44RSW-1JNC20-A2 | |
| | | | | | | 4-pin DC micro | 44RSW-1JNC20-F4 |
| | | | | | PNP/100 mA 10 ms | 2 m 300V cable | 44RSW-1JPC20-A2 |
| | | | | | | 4-pin DC micro | 44RSW-1JPC20-F4 |

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. |
|---|-------------|--------------------------------|-----------|
| DC Micro QD Cordset, Straight, 4-pin, 2 m | 889D-F4AC-2 | Right Angle Mounting Bracket | 60-2657 |
| 76 mm (3 in.) Diameter Reflector | 92-39 | Mounting Screws (not supplied) | 2 x #6-32 |
| 32 mm (1.25 in.) Diameter Reflector | 92-47 | | |

42CA

18 mm Cylindrical



Description

The 42CA 18 mm cylindrical family of general purpose photoelectric sensors is intended for light to medium duty industrial applications.

The 42CA family provides an indication if the sensor operation is unstable. An indicator flashes if the signal level is too close to the detection threshold. This helps for easy alignment of the sensor and forewarns against detection of a background.

Features

- 18 mm industry standard enclosure
- Extended range high-speed models
- Patented ASIC design offers linear sensitivity adjustment, stability indication and excellent noise immunity
- Two LED indicators provide status of power, output, unstable operation and short-circuit protection
- Complementary light and dark

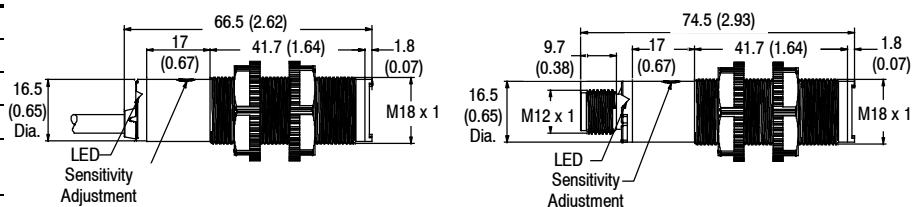
Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -25...+70° (-13...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% (noncondensing) |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Retroreflective, polarized retroreflective, diffuse, background suppression, transmitted beam |
| Sensing Range | See Product Selection table on page 1-55 |
| Light Source | Visible red LED (660 nm) or infrared LED (880 nm) |
| LED Indicators | Green and yellow, see User Interface below |
| Adjustments | Sensitivity potentiometer on select models |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 30 mA max |
| Sensor Protection | Reverse polarity, overload, short circuit |
| Outputs | |
| Response Time | See Product Selection table on page 1-55 |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Complementary light or dark operate, selectable light or dark operate for background suppression models |
| Output Current | 100 mA |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | PBT |
| Lens Material | PMMA |
| Connection Types | 2 m cable, 4-pin DC micro (M12) QD |
| Supplied Accessories | 18 mm fastening nuts |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-56 |

User Interface

| LED Color | State | Status |
|-----------|----------------------|--|
| Yellow | OFF | Output de-energized❶ |
| | ON | Output energized❶ |
| Green | OFF | Power is OFF |
| | ON | Power is ON |
| | Flashing (6 Hertz) | Unstable (0.5 < Margin < 2) |
| | Flashing (1.5 Hertz) | Output short-circuit protection active |

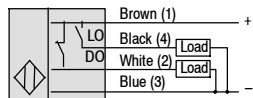
Approximate Dimensions [mm (in.)]



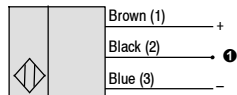
❶ Black wire or pin 4 of connector.

Wiring Diagrams

PNP Models with Complementary Outputs

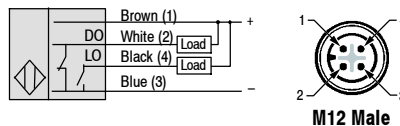


Transmitted Beam Emitter



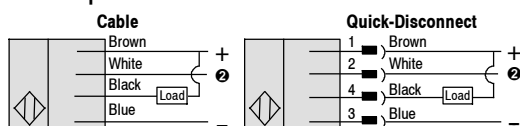
① For normal operation, black wire (pin 2) needs no connection. To disable light source, connect black wire (pin 2) to -V.

NPN Models with Complementary Outputs

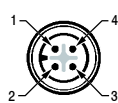


Additional Wiring Options for Background Suppression and Transmitted Beam

NPN Output

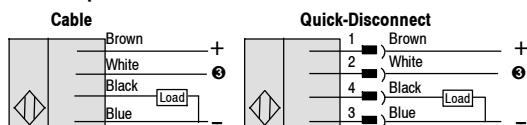


Face View Male Receptacle (Sensor) DC Micro

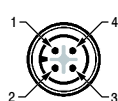


② Open circuit or tie white (2) and brown (1) conductors together for L.O. Tie white (2) and blue (3) conductors together for D.O.

PNP Output



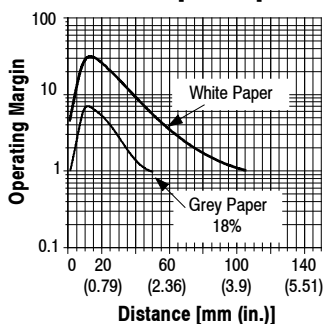
Face View Male Receptacle (Sensor) DC Micro



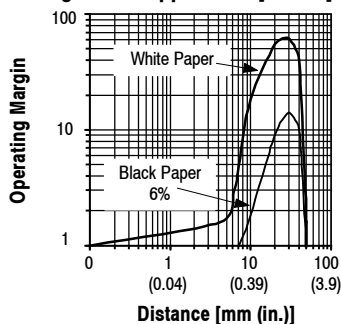
③ Tie white (2) and brown (1) conductors together for L.O. Open circuit or tie white (2) and blue (3) conductors together for D.O.

Typical Response Curves

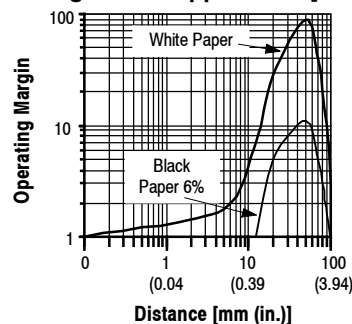
Standard Diffuse [100 mm]



Background Suppression [50 mm]

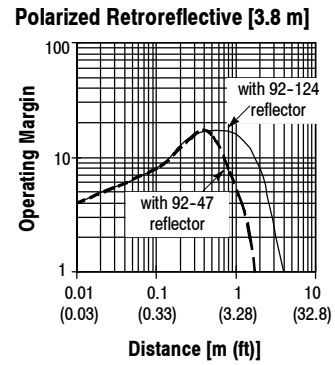
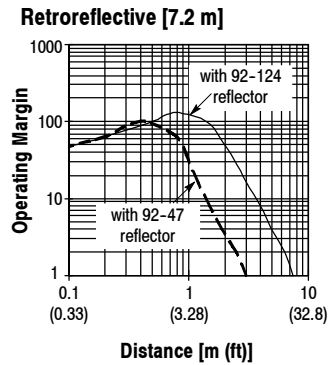
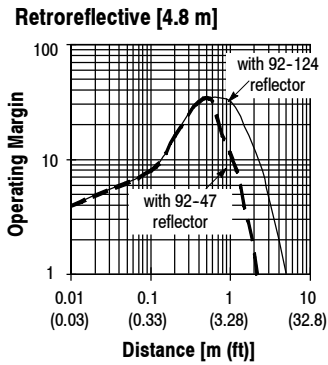


Background Suppression [100 mm]

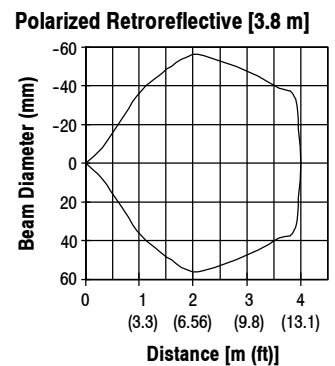
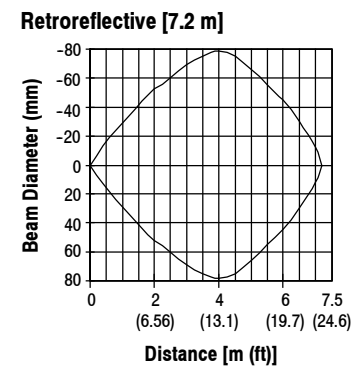
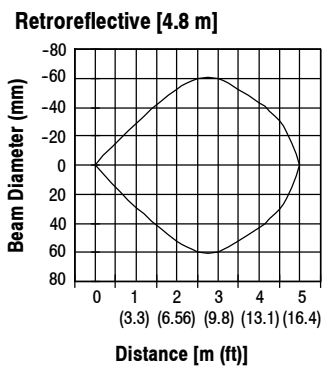


Typical Response Curves (continued)

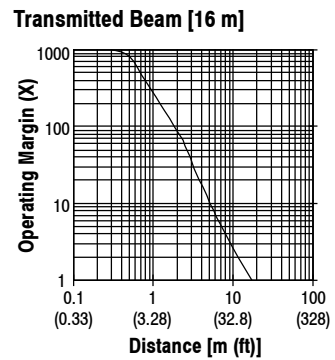
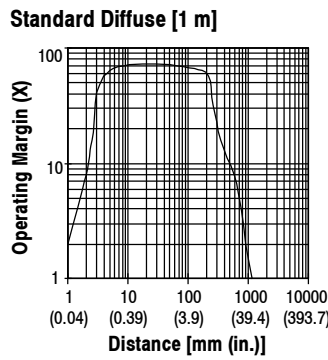
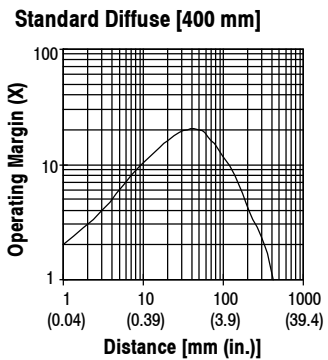
Operating Margin



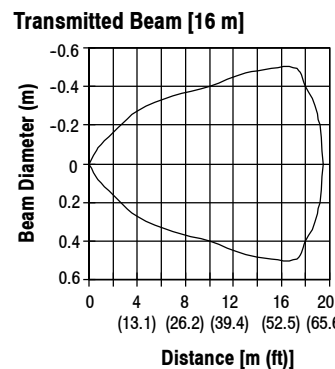
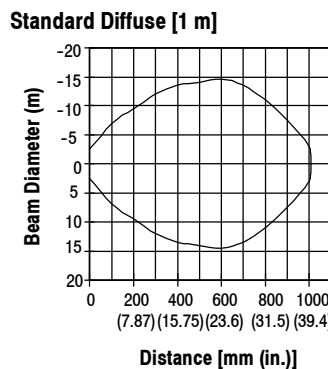
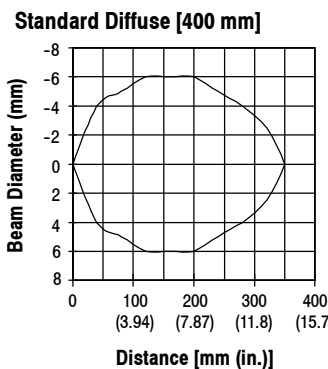
Beam Pattern



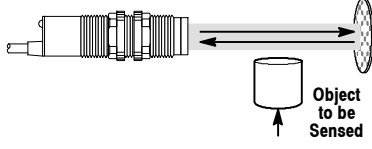
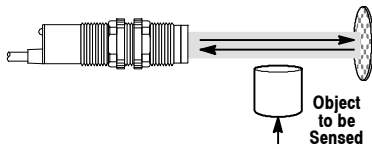
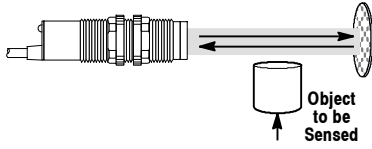
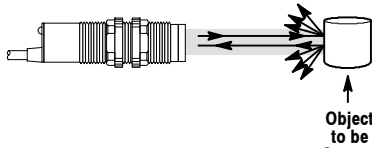
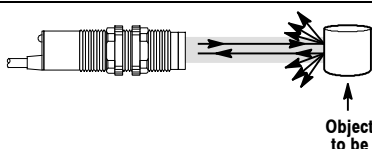
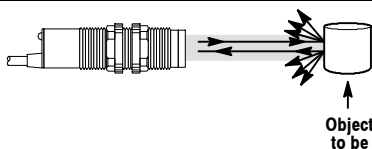
Operating Margin



Beam Pattern



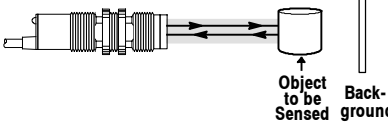
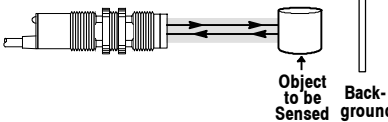
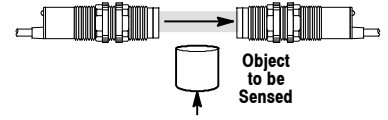
Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type/ Response Time | Sensitivity Adjust | Cat. No.❶ |
|--|-------------------------------------|-------------------------------------|--------------------------------------|-------------------------------|---------------------------|-----------------|
|  <p>Retroreflective</p> <p>Field of View: 1.2°</p> <p>Emitter LED: Visible red 660 nm</p> | 10...30V DC 25 mA max. | 2 mm...4.8 m (0.08 in...15.7 ft) | Complementary light and dark operate | NPN 100 mA 1 ms | No adjustment | 42CA-U2MNB-D4 |
| | | | | PNP 100 mA 1 ms | No adjustment | 42CA-U2MPB-D4 |
|  <p>Retroreflective</p> <p>Field of View: 1.2°</p> <p>Emitter LED: Visible red 660 nm</p> | 10...30V DC 25 mA max. | 2 mm...7.2 m (0.08 in...23.6 ft) | Complementary light and dark operate | NPN 100 mA 0.5 ms | Single turn potentiometer | 42CA-U2MNA-D4 |
| | | | | PNP 100 mA 0.5 ms | Single turn potentiometer | 42CA-U2MPA-D4 |
|  <p>Polarized Retroreflective</p> <p>Field of View: 1.3°</p> <p>Emitter LED: Visible red 660 nm</p> | 10...30V DC 25 mA max. | 2 mm...3.8 m (0.08 in...12.5 ft) | Complementary light and dark operate | NPN 100 mA 1 ms | No adjustment | 42CA-P2MNB-D4 |
| | | | | PNP 100 mA 1 ms | No adjustment | 42CA-P2MPB-D4 |
|  <p>Standard Diffuse</p> <p>Field of View: 3°</p> <p>Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA max. | 0...100 mm (0...3.94 in.) | Complementary light and dark operate | NPN 100 mA 1 ms | Single turn potentiometer | 42CA-D1MNAE-D4❷ |
| | | | | PNP 100 mA 1 ms | Single turn potentiometer | 42CA-D1MPAE-D4❷ |
|  <p>Standard Diffuse</p> <p>Field of View: 7.5°</p> <p>Emitter LED: Infrared 880 nm</p> | 10...30V DC 25 mA max. | 0...400 mm (0...15.7 in.) | Complementary light and dark operate | NPN 100 mA 1 ms | Single turn potentiometer | 42CA-D1MNAJ-D4 |
| | | | | PNP 100 mA 1 ms | Single turn potentiometer | 42CA-D1MPAJ-D4 |
|  <p>Standard Diffuse</p> <p>Field of View: 5°</p> <p>Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA max. | 0...1000 mm (0...39.4 in.) | Complementary light and dark operate | NPN 100 mA 0.5 ms | Single turn potentiometer | 42CA-D1MNAL-D4 |
| | | | | PNP 100 mA 0.5 ms | Single turn potentiometer | 42CA-D1MPAL-D4 |

❶ Suffix -D4 denotes 4-pin DC micro connection type. For 2 m cable without QD replace suffix -D4 with -A2 (e.g. 42CA-P2MPB-A2).

❷ Refer to www.ab.com/sensors for updated information.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type/ Response Time | Sensitivity Adjust | Cat. No.❶ |
|--|-------------------------------------|------------------------------------|----------------------------------|-------------------------------|--------------------|-----------------|
|  <p>Background Suppression</p> <p>Field of View: 5.7°</p> <p>Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA max. | 50 mm (1.97 in.) | Selectable light or dark operate | NPN 100 mA 0.5 ms | No adjustment | 42CA-B2LNBC-D4❷ |
| | | | | PNP 100 mA 0.5 ms | No adjustment | 42CA-B2LPBC-D4❷ |
|  <p>Background Suppression</p> <p>Field of View: 3.4°</p> <p>Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA max. | 100 mm (3.94 in.) | Selectable light or dark operate | NPN 100 mA 0.5 ms | No adjustment | 42CA-B2LNBE-D4❷ |
| | | | | PNP 100 mA 0.5 ms | No adjustment | 42CA-B2LPBE-D4❷ |
|  <p>Transmitted Beam</p> <p>Field of View: 1.5°</p> <p>Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA max. | 3 mm...16 m (0.12 in...52.5 ft) | NA infrared light source | NA | No adjustment | 42CA-E1EZB1-D4 |
| | 10...30V DC 25 mA max. | | NPN 100 mA 1 ms | Single turn potentiometer | 42CA-R1MNA1-D4 | |
| | | | PNP 100 mA 1 ms | Single turn potentiometer | 42CA-R1MPA1-D4 | |

❶ Suffix -D4 denotes 4-pin DC micro connection type. For 2 m cable without QD replace suffix -D4 with -A2 (e.g. 42CA-P2MPB-A2).

❷ Refer to www.ab.com/sensors for updated information.

Cordsets and Accessories

| Cordset | | Accessories | | | |
|---|-------------|------------------------------|-------------|-------------|----------|
| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
| DC Micro QD Cordset, 4-pin, 2 m | 889D-F4AC-2 | Mounting Bracket | 60-2657 | Reflector | 92-124 |
| Right Angle DC Micro QD Cordset, 4-pin, 2 m | 889D-R4AC-2 | Straight Mounting Bracket | 60-2656 | Reflector | 92-47 |
| | | Snap-Clamp Mounting Bracket | 871A-SCBP18 | | |
| | | Right Angle Mounting Bracket | 60-2654 | | |



Description

The 42CS family of sensors offers a wide range of sensing modes in a smooth 316L stainless steel housing, ideal for food, beverage and pharmaceutical applications.

The innovative ferromagnetic teach feature makes the sensor easy to setup by simply placing a ferromagnetic metal object on a section of the sensor's housing to initiate the teach process. Its smooth and clean design minimizes the collection and accumulation of undesired particles allowing for a fast and easy clean up. There are also 18 mm threaded models available.

Features

- Patented ferromagnetic teach for easy sensor programming
- Smooth barrel design minimizes the accumulation of undesired particles and allows for fast and easy clean up.
- Extended temperature operating range
- 18 mm stainless steel 316L enclosure with laser etched markings
- Background suppression models for improved detection of shiny objects
- Two teach modes: standard and precision
- Teach lockout feature prevents unauthorized users from changing the settings
- Input to disable light source on transmitted beam emitter
- IP69K, ECOLAB and Johnson Diversey rated

Specifications

| | | |
|-------------------------------|--|--|
| Certifications | cULus and CE marked for all applicable directives | |
| Environmental | | |
| Operating Environment | IP69K rated, ECOLAB and Johnson Diversey certified | |
| Operating Temperature [C (F)] | -25...+85° (-13...185°) | |
| Vibration | 10...55Hz, 1 mm amplitude; meets or exceeds IEC 60947-5-2 | |
| Shock | 30 g with 11 ms pulse duration, meets or exceeds IEC 60947-5-2 | |
| Relative Humidity | 5...95% (noncondensing) | |
| Ambient Light Immunity | 5000 Lux (Incandescent light) and 100000 Lux (Sunlight) | |
| Optical | | |
| Sensing Modes | Diffuse, background suppression, polarized retroreflective, clear object, and transmitted beam | |
| Sensing Range | See product selection table | |
| Light Source | Visible red (660 nm) or infrared (880 nm) | |
| LED indicators | See user interface | |
| Sensitivity Adjustments | Ferromagnetic teach | |
| Electrical | | |
| Voltage | 10...30V DC | |
| Current Consumption | 35 mA max | |
| Sensor Protection | Short circuit, transient noise, reverse polarity and overload | |
| Outputs | | |
| Response Time | 1 ms (diffuse, polarized retroreflective, clear object), 1.25 ms (background suppression), 2 ms (transmitted beam) | |
| Output Type | PNP or NPN by cat. no. | |
| Output Mode | Complementary light and dark operate | |
| Output Current | 100 mA | |
| Output Leakage Current | 10 µA max. | |
| Mechanical | | |
| Housing Material | Stainless steel 316L | |
| Lens Material | PMMA | |
| Connector Material | PPS (grilamid) | |
| Connection Types | 4-pin DC micro (M12) QD | |
| Supplied Accessories | Stainless steel teach rod, mounting nuts (threaded models only) | |
| Optional Accessories | Mounting brackets, cordsets, reflectors | |

User Interface

| LED Status | | |
|------------|-----------------|---------------------------------|
| Green | OFF | Teach function is locked |
| | ON | Teach function is enabled |
| | Flashing (8 Hz) | Short Circuit |
| Yellow | OFF | Output de-energized |
| | ON | Output energized ❶ |
| | Flashing (3 Hz) | Output energized (Margin < 2) ❶ |

❶ Pin 4 of Micro (M12) QD. L.O for diffuse, background suppression. D.O for polarized retroreflective and transmitted beam

42CS Cylindrical

Food and Beverage

Wiring Diagrams

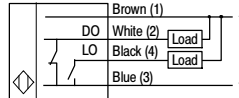
Pin numbers correspond to an M12 male connector on the sensor connected to an 889DS-F4AC-x cordset (featuring a stainless steel coupling nut).

Diffuse and Background Suppression

PNP Models with Complementary Outputs

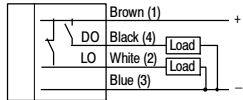


NPN Models with Complementary Outputs

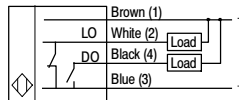


Polarized Retroreflective, Clear Object and Transmitted Beam Receiver

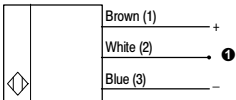
PNP Models with Complementary Outputs



NPN Models with Complementary Outputs



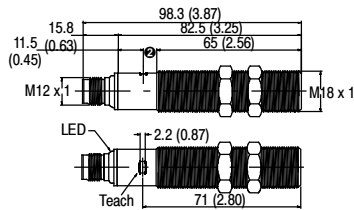
Transmitted Beam Emitter



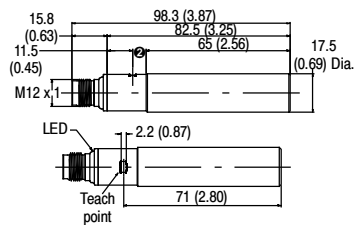
❶ For normal operation, white wire (pin 2) needs no connection. To disable light source, connect white wire (pin 2) to +V.

Approximate Dimensions [mm (in.)]

Threaded Barrel Models



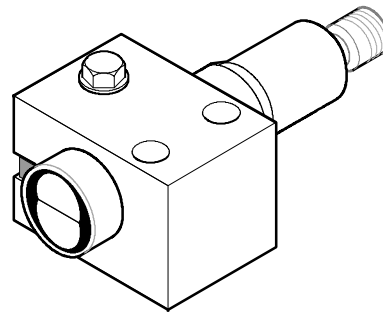
Smooth Barrel Models



❶ 6 (0.24)

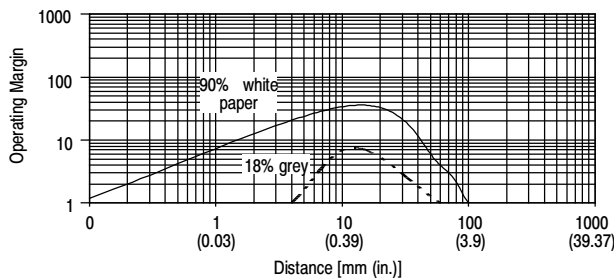
Accessories

60-BCS-18B—Smooth Mounting Bracket

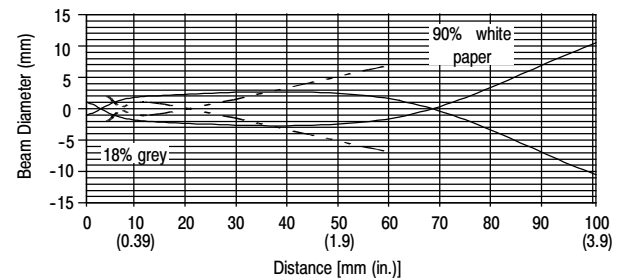


Typical Response Curves

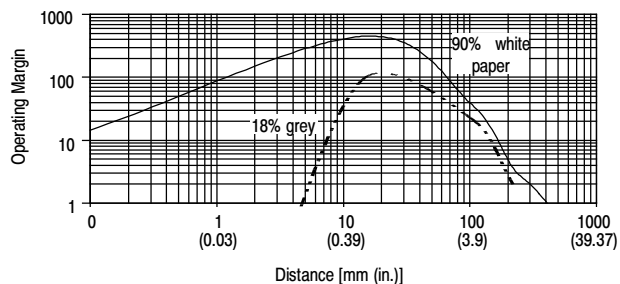
Standard Diffuse (100 mm)



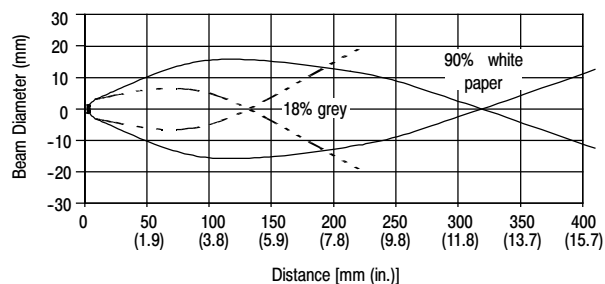
Beam Pattern (100 mm)



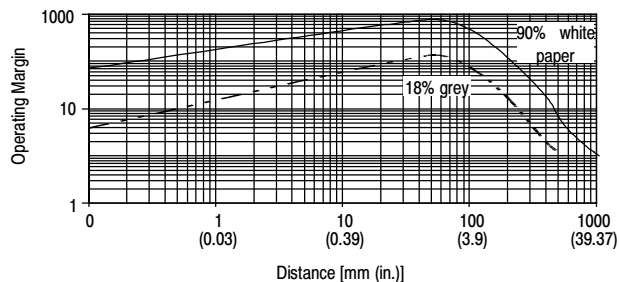
Standard Diffuse (400 mm)



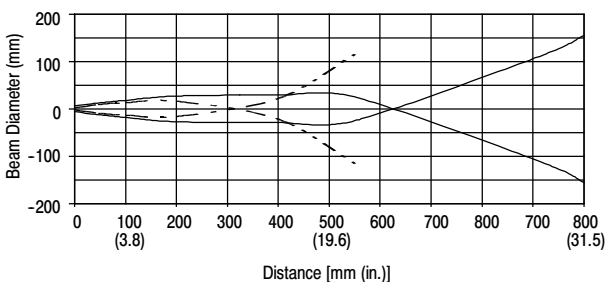
Beam Pattern (400 mm)



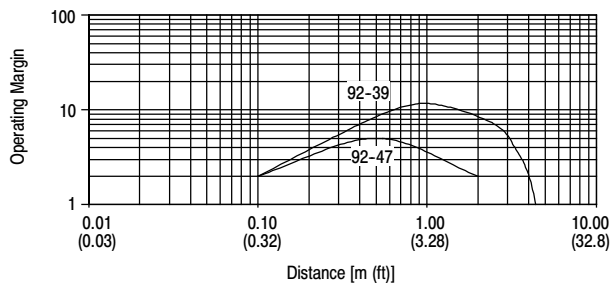
Standard Diffuse (800 mm)



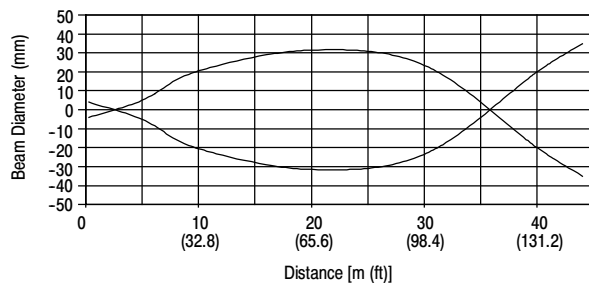
Beam Pattern (800 mm)



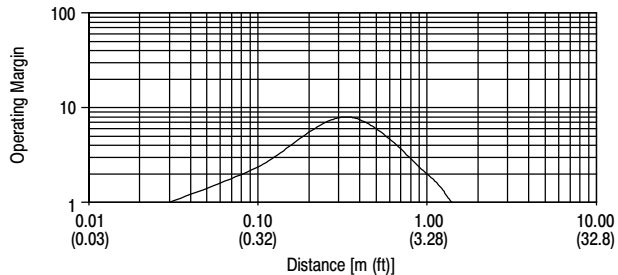
Polarized Retroreflective (4 m)



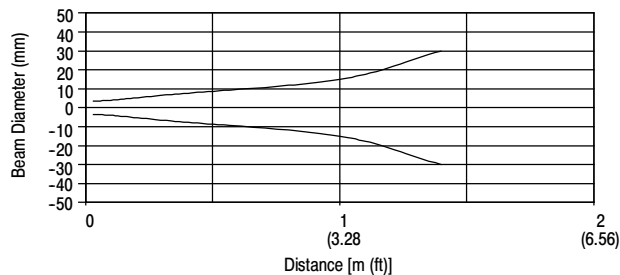
Beam Pattern (4 m)



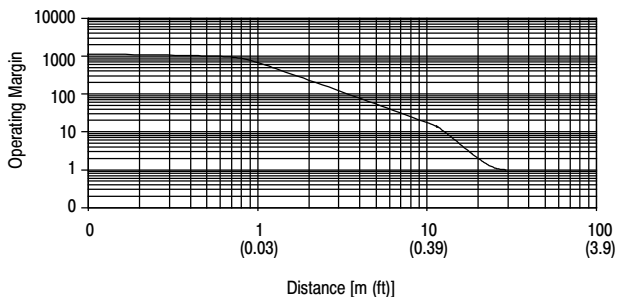
Clear Object (1 m)



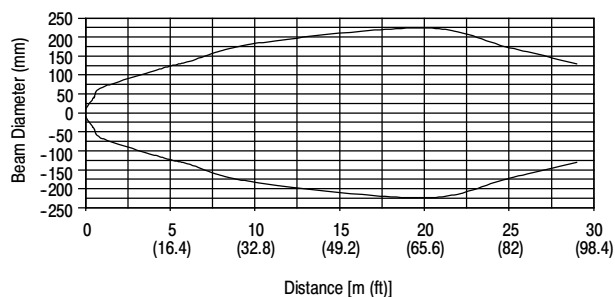
Beam Pattern (1 m)



Transmitted Beam (20 m)



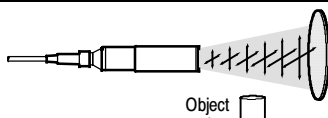
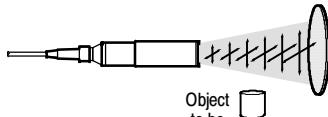
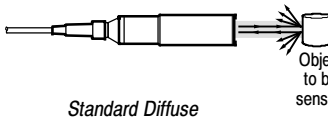
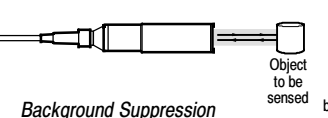
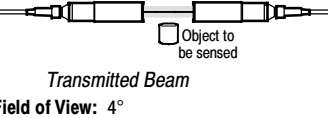
Beam Pattern (20 m)



42CS Cylindrical

Food and Beverage

Product Selection

| Sensing Mode (max. range) | Sensing Distance | Output Energized | Output Type Capacity | Sensitivity Adjustment | Cat. No. ❶ | |
|--|-----------------------------|--------------------------------------|--------------------------------------|------------------------|------------------|-----------------|
|  <p>Object to be sensed ↑</p> <p><i>Polarized Retroreflective</i> Field of View: 3° Emitter LED: Visible red 660 nm</p> | 4 m (13.1 ft) | Complementary light and dark operate | NPN | No adjustment | 42CSS-P2MNB1-D4 | |
| | | | PNP | | 42CSS-P2MPB1-D4 | |
|  <p>Object to be sensed ↑</p> <p><i>Clear Object Detection</i> Field of View: 3° Emitter LED: Visible red 660 nm</p> | 1 m (3.2 ft) | Complementary light and dark operate | NPN | Ferromagnetic Teach | 42CSS-C2MNA1-D4 | |
| | | | PNP | | 42CSS-C2MPA1-D4 | |
|  <p>Object to be sensed</p> <p><i>Standard Diffuse</i> Field of View: 6° for 100 and 400 mm 8° for 800 mm Emitter LED: Visible red 660 nm</p> | 100 mm (3.9 in.) | Complementary light and dark operate | NPN | Ferromagnetic Teach | 42CSS-D2MNA1-D4 | |
| | 400 mm (15.8 in.) | | PNP | | 42CSS-D2MPA1-D4 | |
| | 400 mm (15.8 in.) | Complementary light and dark operate | NPN | Ferromagnetic Teach | 42CSS-D1MNA2-D4 | |
| | | | PNP | | 42CSS-D1MPA2-D4 | |
| | 800 mm (31.5 in.) | Complementary light and dark operate | NPN | Ferromagnetic Teach | 42CSS-D1MPNA3-D4 | |
| | | | PNP | | 42CSS-D1MPA3-D4 | |
|  <p>Object to be sensed</p> <p>background</p> <p><i>Background Suppression</i> Field of View: 9° Emitter LED: Visible red 660 nm</p> | 60...100 mm (2.4...3.9 in.) | Complementary light and dark operate | NPN | Ferromagnetic Teach | 42CSS-B2MNA1-D4 | |
| | | | PNP | | 42CSS-B2MPA1-D4 | |
|  <p>Object to be sensed</p> <p><i>Transmitted Beam</i> Field of View: 4° Emitter LED: Infrared 880 nm</p> | 20 m (65.6 ft) | NA Light Source | NA | No adjustment | 42CSS-E1EZB1-D4 | |
| | | | Complementary light and dark operate | | NPN | 42CSS-R9MNB1-D4 |
| | | | | | PNP | 42CSS-R9MPB1-D4 |

Note: All sensor models are rated for 10...30V DC and can drive loads requiring up to 100 mA.

❶ The prefix 42CSS denotes smooth enclosure. For threaded models replace the 42CSS with 42CST (e.g., 42CST-P2MPB1-D4).

Cordsets and Accessories

| Cordset/Patchcords | | Accessories | | | | | |
|------------------------------------|---------------|--|------------|--|------------|--|----------|
| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
| DC Micro (M12) QD Cordset, 4-pin | 889DS-F4AC-❷ | Block Mounting Bracket for Smooth Barrel Housing | 60-BCS-18B | Right Angle Mounting Bracket for Threaded Models | 60-2657 | Reflector, 76 mm (3 in.) dia. with center mount hole | 92-39 |
| DC Micro (M12) QD Patchcord, 4-pin | 889D-F4ACDM-❸ | Straight Mounting Bracket for Threaded Models | 60-2656 | Stainless Steel Right Angle Mounting Bracket | 871A-BRS18 | Reflector, 32 mm (1.5 in.) dia. | 92-47 |
| | | | | | | Reflector, 76 mm (3 in.) dia. for clear object sensors | 92-90 |

❷ Replace symbol with 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.

❸ Replace symbol with 0M3 (1 ft), 1 (1 m) 2 (2 m), 5 (5 m), or 10 (10 m) for standard cable lengths.





Specifications

Environmental

| | |
|-------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -25...+70° (-13...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27 |
| Relative Humidity | 5...95% |
| Ambient Light Immunity | Incandescent light 3000 lux |

Optical

| | |
|----------------|---|
| Sensing Modes | Retroreflective, polarized retroreflective, diffuse, background suppression, transmitted beam |
| Sensing Range | See Product Selection table on page 1-60 |
| Field of View | See Product Selection table on page 1-60 |
| Light Source | Visible red LED (660 nm) or infrared LED (880 nm) |
| LED Indicators | Yellow LED for output indication |
| Adjustments | Sensitivity potentiometer (diffuse models only) |

Electrical

| | |
|---------------------|---|
| Voltage | 10...30V DC |
| Current Consumption | 30 mA max |
| Sensor Protection | Reverse polarity, overload, short circuit |

Outputs

| | |
|------------------------|---|
| Response Time | 2 ms (0.5 ms for background suppression) |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Complementary light operate or dark operate, selectable light operate or dark operate for background suppression models |
| Output Current | 100 mA |
| Output Leakage Current | 10 μ A max |

Mechanical

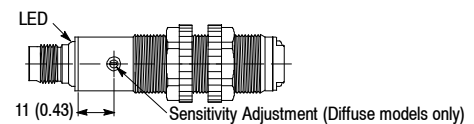
| | |
|----------------------|--|
| Housing Material | Nickel-plated brass |
| Lens Material | PMMA/PC |
| Connection Types | 2 m cable, 4-pin DC micro (M12) QD |
| Supplied Accessories | 18 mm fastening nuts |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-61 |

Features

- 18 mm industry standard package
- Wide selection of sensing modes
- 30V DC operation
- NPN or PNP outputs
- Fast response time
- Variety of connection types
- Laser models available (see page 1-115)

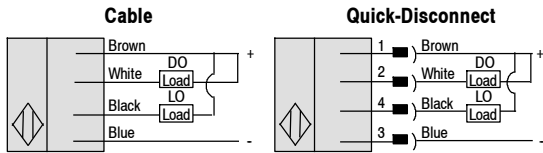
User Interface Panel

| Label | Color | State | Status |
|--------|--------|-------|----------------------------|
| Output | Yellow | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |



Wiring Diagrams

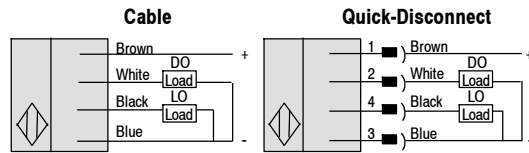
Diffuse
NPN Output



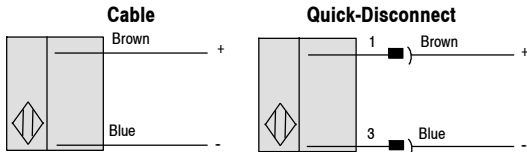
Face View Male
Receptacle (Sensor)
DC Micro



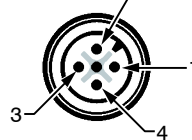
PNP Output



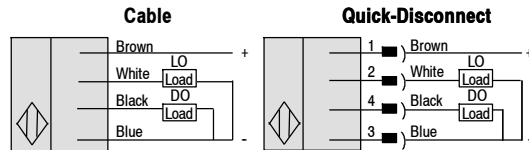
Transmitted Beam, Retroreflective, Polarized Retroreflective



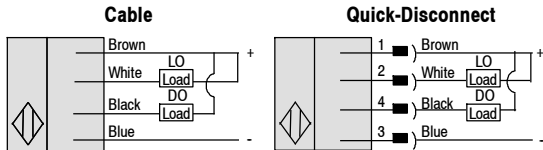
Face View Male
Receptacle (Sensor)
DC Micro



PNP Output

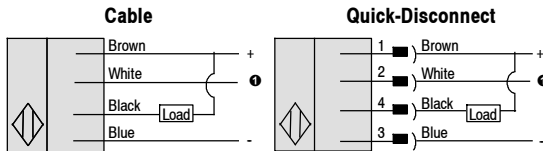


NPN Output

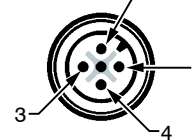


Background Suppression

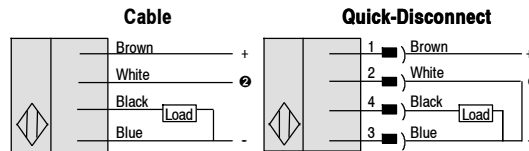
NPN Output



Face View Male
Receptacle (Sensor)
DC Micro

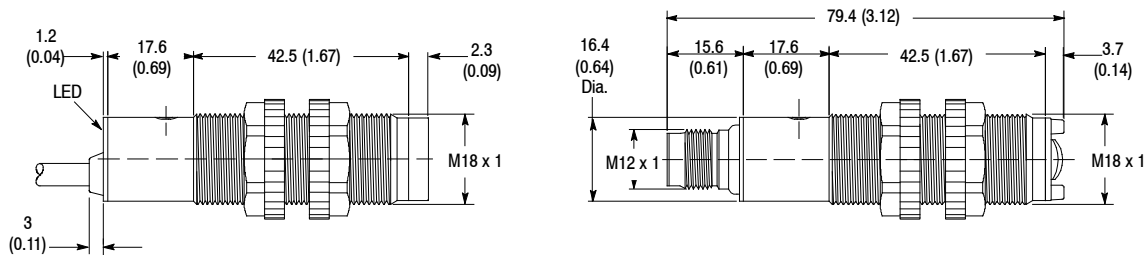


PNP Output



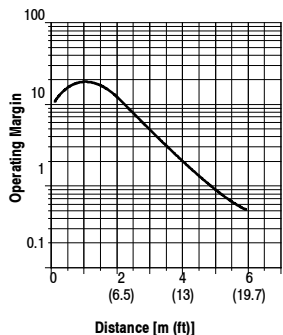
- ① Open circuit or tie white (2) and brown (1) conductors together for L.O. Tie white (2) and blue (3) conductors together for D.O.
- ② Tie white (2) and brown (1) conductors together for L.O. or tie white (2) and blue (3) conductors together for D.O.

Approximate Dimensions [mm (in.)]

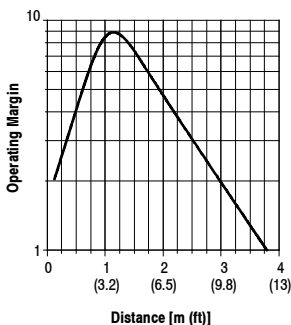


Typical Response Curve

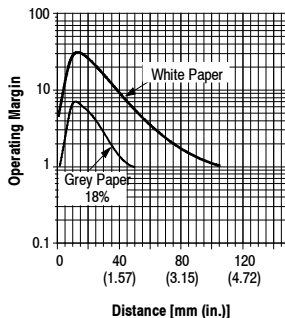
Retroreflective



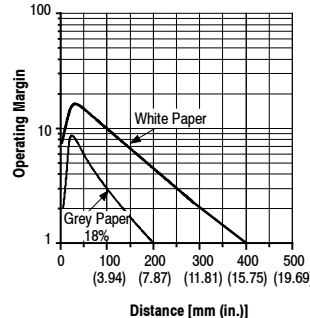
Polarized Retroreflective



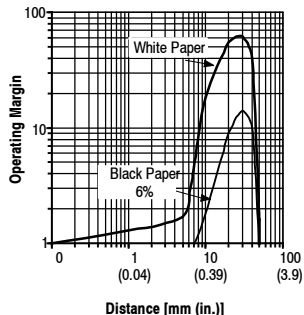
Standard Diffuse 100 mm



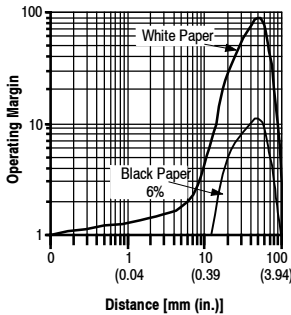
Standard Diffuse 400 mm



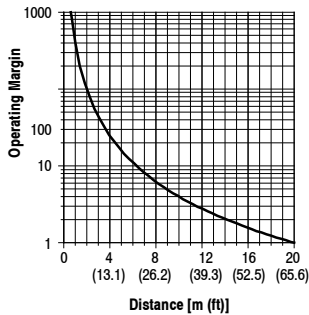
Background Suppression 50 mm



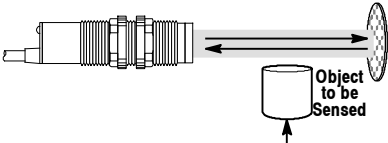
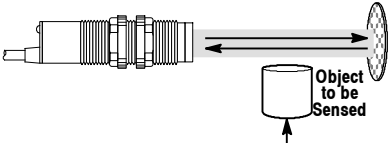
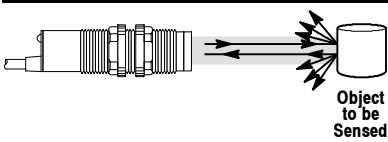
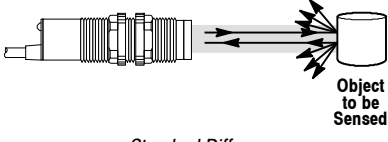
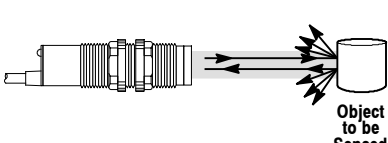
Background Suppression 100 mm



Transmitted Beam

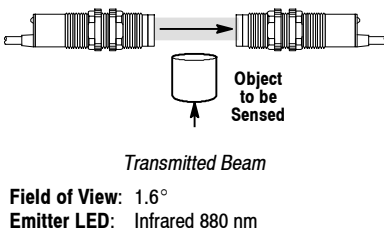


Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance @ 1X Margin | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|---------------------------------------|-------------------------|--|--------------------|-----------------------|
|  <p>Retroreflective</p> <p>Field of View: 1.9° Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA | 3 mm...4 m (0.12 in... 13.2 ft) | LO/DO Complementary | NPN 100 mA 4 ms | 2 m 300V cable | 42CM-U1MNB-A2 |
| | | | | | 4-pin DC micro | 42CM-U1MNB-D4 |
| | | | | PNP 100 mA 4 ms | 2 m 300V cable | 42CM-U1MPB-A2 |
| | | | | | 4-pin DC micro | 42CM-U1MPB-D4 |
|  <p>Polarized Retroreflective</p> <p>Field of View: 1.8° Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA | 3 mm...3 m (0.12 in...9.9 ft) | LO/DO Complementary | NPN 100 mA 4 ms | 2 m 300V cable | 42CM-P2MNB-A2 |
| | | | | | 4-pin DC micro | 42CM-P2MNB-D4 |
| | | | | PNP 100 mA 4 ms | 2 m 300V cable | 42CM-P2MPB-A2 |
| | | | | | 4-pin DC micro | 42CM-P2MPB-D4 |
|  <p>Standard Diffuse</p> <p>Field of View: 6.6° Emitter LED: Visible Red 660 nm</p> | 10...30V DC 30 mA | 100 mm (3.9 in.) (Adjustable) | LO/DO Complementary | NPN 100 mA 2 ms | 2 m 300V cable | 42CM-D2MNAE-A2 |
| | | | | | 4-pin DC micro | 42CM-D2MNAE-D4 |
| | | | | PNP 100 mA 2 ms | 2 m 300V cable | 42CM-D2MPAE-A2 |
| | | | | | 4-pin DC micro | 42CM-D2MPAE-D4 |
|  <p>Standard Diffuse</p> <p>Field of View: 6.6° Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA | 400 mm (13.6 in.) (Adjustable) | LO/DO Complementary | NPN 100 mA 2 ms | 2 m 300V cable | 42CM-D1MNAL-A2 |
| | | | | | 4-pin DC micro | 42CM-D1MNAL-D4 |
| | | | | PNP 100 mA 2 ms | 2 m 300V cable | 42CM-D1MPAL-A2 |
| | | | | | 4-pin DC micro | 42CM-D1MPAL-D4 |
|  <p>Background Suppression</p> <p>Field of View: 50 mm = 5.7° 100 mm = 3.4° Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA | 50 mm (1.97 in.) | L.O./D.O. Selectable | NPN 100 mA 0.5 ms | 2 m 300V cable | 42CM-B2LNBC-A2 |
| | | | | | 4-pin DC micro | 42CM-B2LNBC-D4 |
| | | | | PNP 100 mA 0.5 ms | 2 m 300V cable | 42CM-B2LPBC-A2 |
| | | | | | 4-pin DC micro | 42CM-B2LPBC-D4 |
| | | 100 mm (3.9 in.) | | NPN 100 mA 0.5 ms | 2 m 300V cable | 42CM-B2LNBE-A2 |
| | | | | | 4-pin DC micro | 42CM-B2LNBE-D4 |
| | | | | PNP 100 mA 0.5 ms | 2 m 300V cable | 42CM-B2LPBE-A2 |
| | | | | | 4-pin DC micro | 42CM-B2LPBE-D4 |

Refer to page 1-61 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|--|----------------------------|--|--------------------|----------------------|
|  | 10...30V DC 25 mA | 3 mm...20 m (0.12 in... 65.6 ft) | NA Light Source | | 2 m 300V cable | 42CM-E1EZB-A2 |
| | | | | | 4-pin DC micro | 42CM-E1EZB-D4 |
| | | | L.O./D.O. Complementary | NPN 100 mA 2 ms | 2 m 300V cable | 42CM-R1MNB-A2 |
| | | | | | 4-pin DC micro | 42CM-R1MNB-D4 |
| | | | | PNP 100 mA 2 ms | 2 m 300V cable | 42CM-R1MPB-A2 |
| | | | | | 4-pin DC micro | 42CM-R1MPB-D4 |

Cordsets and Accessories

| Cordset | | Accessories | | | |
|------------------------------------|-------------|---------------------------------|-------------|-------------------|----------|
| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
| DC Micro QD Cordset, 4-pin, 2 m | 889D-F4AC-2 | Mounting Brackets | 60-2657 | Reflectors | 92-39 |
| DC Micro QD Cordset, 4-pin, 2 m | 889D-F4AC-2 | Mounting Brackets | 60-2649 | Mounting Brackets | 60-2664 |
| | | Snap-Clamp Mounting Brackets | 871A-SCBP18 | | |

42CF

12 mm Metal Cylindrical



Features

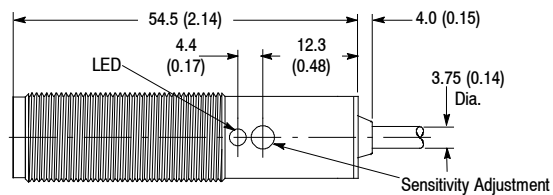
- 12 mm industry standard package
- Wide selection of sensing modes
- 30V DC operation
- NPN or PNP outputs
- Fast response time
- Variety of connection types
- Local teach button
- Accepts remote (diffuse and polarized retroreflective only) teach input

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -25...+70° (-13...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27 |
| Relative Humidity | 5...95% |
| Ambient Light Immunity | Incandescent light 3000 lux |
| Optical | |
| Sensing Modes | Polarized retroreflective, standard diffuse, transmitted beam |
| Sensing Range | See Product Selection table on page 1-64 |
| Field of View | See Product Selection table on page 1-64 |
| Light Source | Visible red LED (660 nm) or infrared LED (880 nm) |
| LED Indicators | Yellow LED for output indication |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 30 mA max |
| Sensor Protection | Reverse polarity, overload, short circuit |
| Outputs | |
| Response Time | 2 ms (transmitted beam), 1.25 ms (diffuse and polarized retroreflective) |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Selectable light operate or dark operate |
| Output Current | 100 mA |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Nickel plated brass |
| Lens Material | Acrylic |
| Connection Types | 2 m cable, 4-pin DC micro (M12) QD |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-64 |

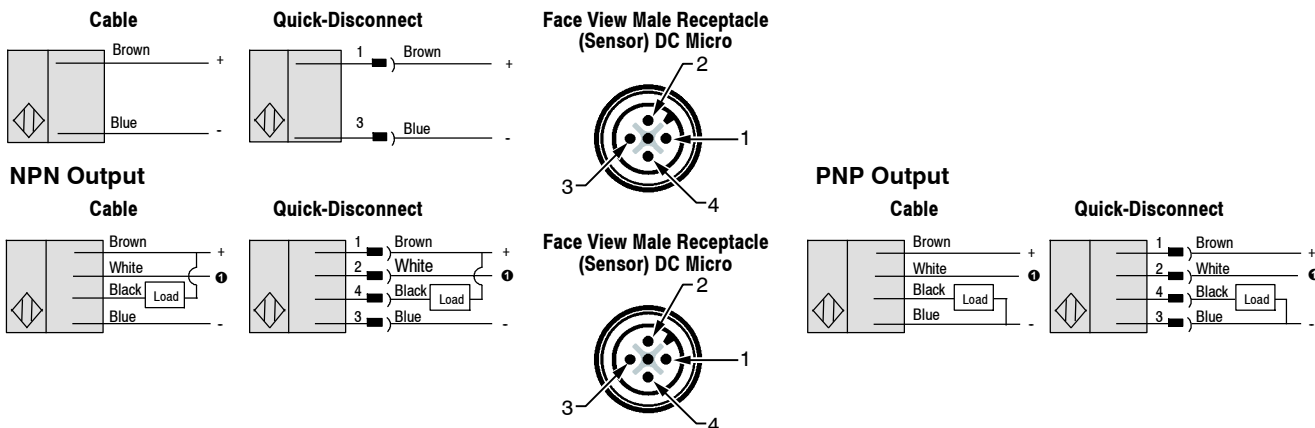
User Interface Panel

| Label | Color | State | Status |
|--------|--------|-------|----------------------------|
| Output | Yellow | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |



Wiring Diagrams

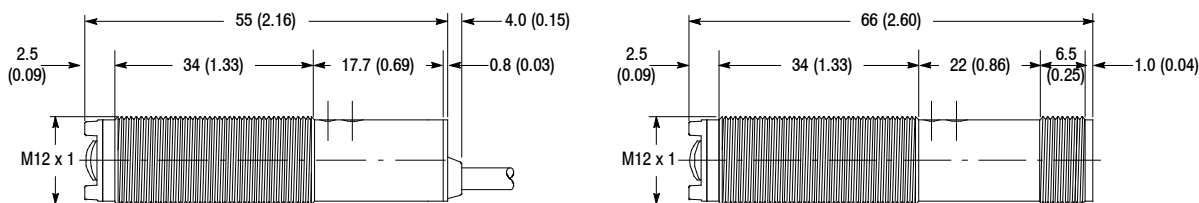
Diffuse, Polarized Retroreflective and Transmitted Beam



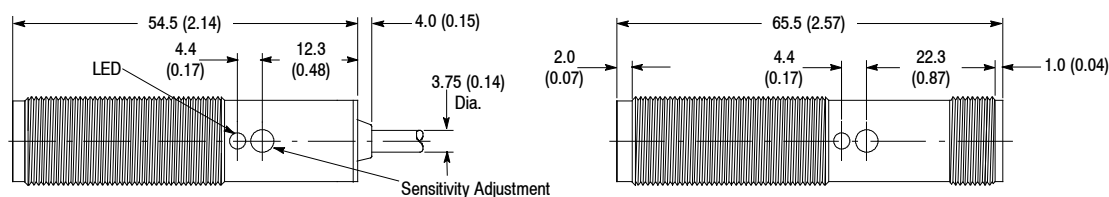
- **Polarized retroreflective:** Open circuit for dark operate. Connect white (2) and brown (1) together for light operate. Connect white (2) and blue (3) together for remote teach.
- **Diffuse:** Open circuit for light operate. Connect white (2) and brown (1) together for dark operate. Connect white (2) and blue (3) together for remote teach.
- **Transmitted beam:** Open circuit for dark operate. Connect white (2) and brown (1) together for light operate. Connect white (2) and blue (3) together for dark operate. This model does not have remote teach.

Approximate Dimensions [mm (in.)]

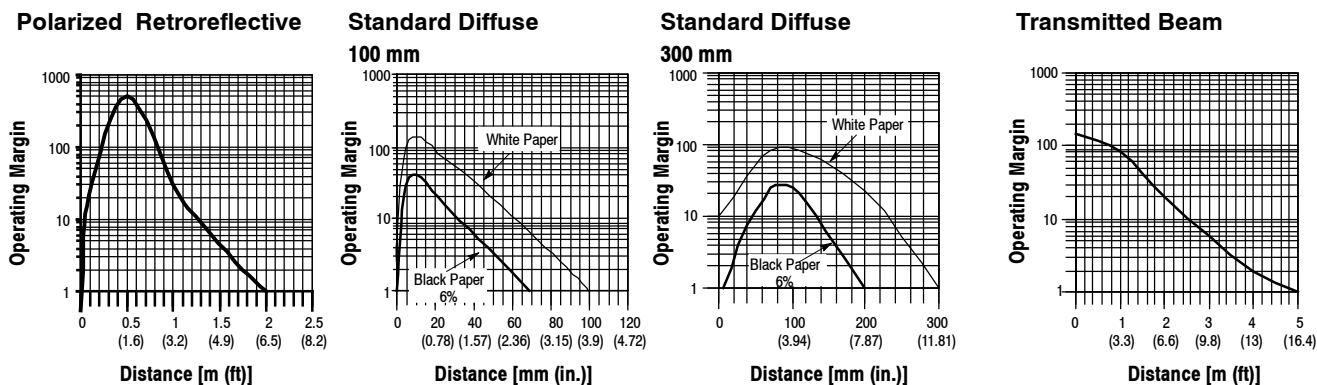
Diffuse and Polarized Retroreflective



Transmitted Beam



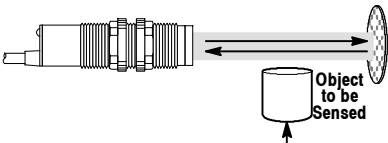
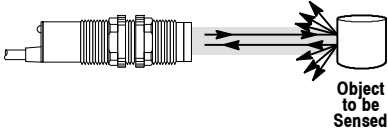
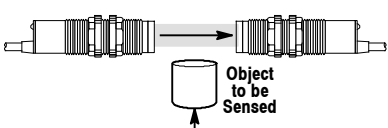
Typical Response Curve



42CF

12 mm Metal Cylindrical

Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance @ 1X Margin | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|---|-------------------------|--|-----------------------|-----------------------|
|  <p><i>Polarized Retroreflective</i></p> <p>Field of View: 2.3° Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA | 3 mm...2 m (0.12 in...6.5 ft) | L.O./D.O. Selectable | NPN 100 mA 1.25 ms | 2 m 300V cable | 42CF-P2LNA1-A2 |
| | | | | | 4-pin DC micro | 42CF-P2LNA1-D4 |
| | | | | PNP 100 mA 1.25 ms | 2 m 300V cable | 42CF-P2LPA1-A2 |
| | | | | | 4-pin DC micro | 42CF-P2LPA1-D4 |
|  <p><i>Standard Diffuse</i></p> <p>Field of View: 11.4° (100 mm) 5.3° (300 mm) Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA | 0...100 mm (0...3.9 in.) (adjustable) | L.O./D.O. Selectable | NPN 100 mA 1.25 ms | 2 m 300V cable | 42CF-D1LNA1-A2 |
| | | | | | 4-pin DC micro | 42CF-D1LNA1-D4 |
| | | PNP 100 mA 1.25 ms | | 2 m 300V cable | 42CF-D1LPA1-A2 | |
| | | | | 4-pin DC micro | 42CF-D1LPA1-D4 | |
| | | NPN 100 mA 1.25 ms | | 0...300 mm (0...12.2 in.) (adjustable) | 2 m 300V cable | 42CF-D1LNA2-A2 |
| | | | | | 4-pin DC micro | 42CF-D1LNA2-D4 |
| PNP 100 mA 1.25 ms | 2 m 300V cable | 42CF-D1LPA2-A2 | | | | |
| 4-pin DC micro | 42CF-D1LPA2-D4 | | | | | |
|  <p><i>Transmitted Beam</i></p> <p>Field of View: 1.4° Emitter LED: Infrared 880 nm</p> | 10...30V DC 25 mA | 3 mm...4 m (0.12 in... 13.2 ft) | L.O./D.O. Selectable | — | 2 m 300V cable | 42CF-E1EZB-A2 |
| | 10...30V DC 20 mA | | | | 4-pin DC micro | 42CF-E1EZB-D4 |
| | | | | NPN 100 mA 2 ms | 2 m 300V cable | 42CF-R1LNB1-A2 |
| | 4-pin DC micro | 42CF-R1LNB1-D4 | | | | |
| | PNP 100 mA 2 ms | | | 2 m 300V cable | 42CF-R1LPB1-A2 | |
| | | | | 4-pin DC micro | 42CF-R1LPB1-D4 | |

Cordsets and Accessories

| Cordset | | Accessories | | | |
|------------------------------------|-------------|--------------------------------|-------------|-------------|----------|
| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
| DC Micro QD Cordset, 4-pin, 2 m | 889D-F4AC-2 | Mounting Bracket | 871A-BRNR | Reflectors | 92-39 |
| | | Snap-Clamp Mounting Bracket | 871A-SCBP12 | | |



Features

- Wide selection of sensing modes
- Wide selection of operating modes
- Both DC and AC/DC operation
- Models with teach function
- Standard ON/OFF and timing versions
- Fast response time
- Variety of connection types
- Laser models available (see page 1-112)

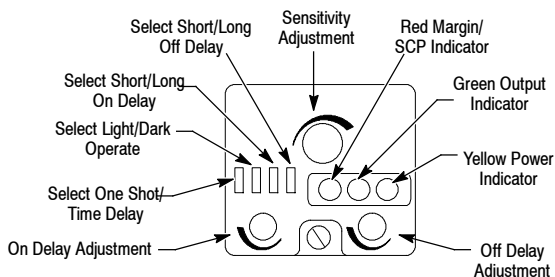
Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Approved, CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13, IP67 (IEC529) 1200 psi (8270 kPa) washdown, IP69K, ECOLAB certification on cable models |
| Operating Temperature [C (F)] | -34...+70° (-29...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Retroreflective, polarized retroreflective, diffuse, long range diffuse, fiber optic, extended range fiber optic, transmitted beam |
| Sensing Range | See Product Selection table on page 1-69 |
| Field of View | See Product Selection table on page 1-69 |
| Light Source | Visible red (660 nm), Infrared (880 nm) |
| LED Indicators | See User Interface table below |
| Adjustments | Single-turn potentiometer for sensitivity |
| Electrical | |
| Voltage | 10...30V DC , 40...264V AC/DC models (see Product Selection table on page 1-69) |
| Current Consumption | 30 mA max (DC models), 15 mA max (AC/DC models) |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 2 ms (DC models), 15 ms (AC/DC models), 2 ms (MOSFET models) |
| Output Type | PNP and NPN (DC models), SPDT relay (AC/DC models), MOSFET (AC/DC models) |
| Output Mode | Light operate or dark operate selectable |
| Output Current | 250 mA @ 30V DC (all models except 42GLP and 42GSP); 2 A @ 132 V AC (SPDT relay models), 1 A @ 264V AC (SPDT relay); 300 mA @ 264V AC (MOSFET models) |
| Output Leakage Current | 10 µA max (DC) , 1 mA (AC) |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Cover Material | Neoprene |
| Connection Types | 2 m (6.5 ft) cable, 4-pin DC micro QD, 4-pin DC mini QD, 5-pin DC micro QD |
| Supplied Accessories | 129-130 mounting kit |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-71 |

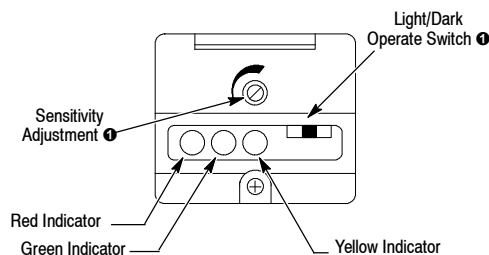
User Interface—Standard Models (Refer to installation instructions for 42GLP and 42GSP versions)

| Label | Color | State | Status |
|------------|--------|----------|----------------------------|
| Output | Green | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |
| Margin/SCP | Red | OFF | Margin < 2.5 |
| | | ON | Margin >2.5 |
| | | Flashing | Output SCP active |
| Power | Yellow | OFF | Sensor not powered |
| | | ON | Sensor powered |

42GTx Versions—Top View Detail



42GRx Versions—Top View Detail

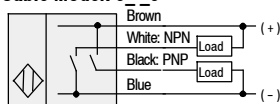


① Push button on 42GSP models.

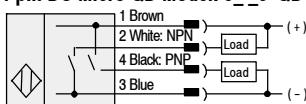
Wiring Diagrams ①②

All Models Except Transmitted Beam Source

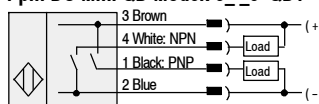
Cable Model: 9__0



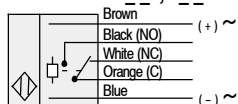
4-pin DC Micro QD Model: 9__0-QD



4-pin DC Mini QD Model: 9__0-QD1



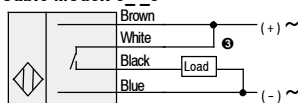
Cable Model: 9__1, 9__2



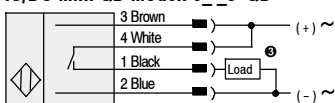
5-pin AC/DC Mini QD Model: 9__1-QD, 9__2-QD



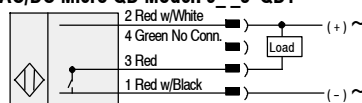
Cable Model: 9__3



AC/DC Mini QD Model: 9__3-QD

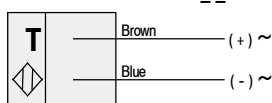


AC/DC Micro QD Model: 9__3-QD1

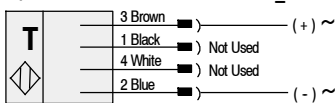


Transmitted Beam Source

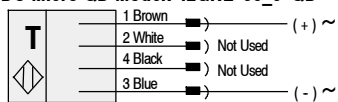
Cable Model: 42GRL-90__



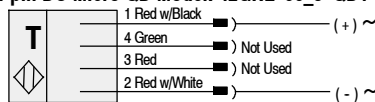
AC/DC Mini QD Model: 42GRL-90__-QD



DC Micro QD Model: 42GRL-90__-QD



4-pin DC Micro QD Model: 42GRL-90__-QD1



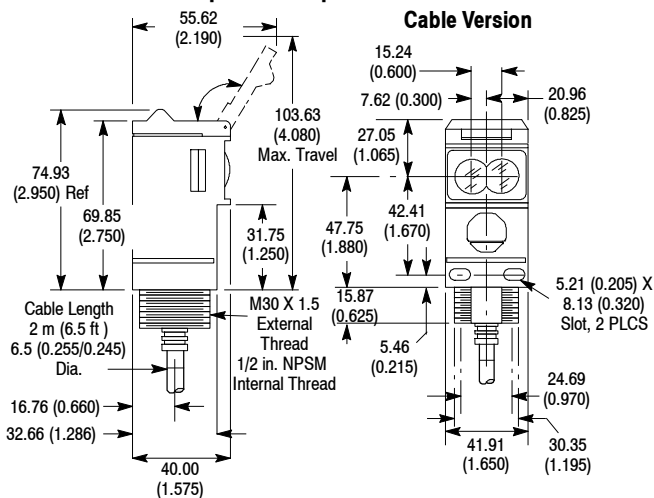
① For Allen-Bradley programmable controller compatible interface, refer to publication 42-2.0.

② Quick-disconnect wiring codes shown are valid for Allen-Bradley cables only.

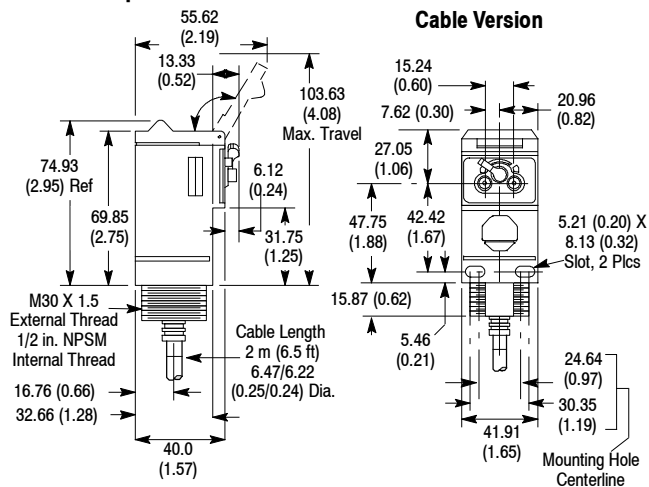
③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Approximate Dimensions [mm (in.)]

All Versions Except Fiber Optic

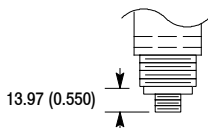


Fiber Optic

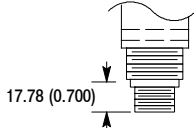


Connector Version

Micro Style



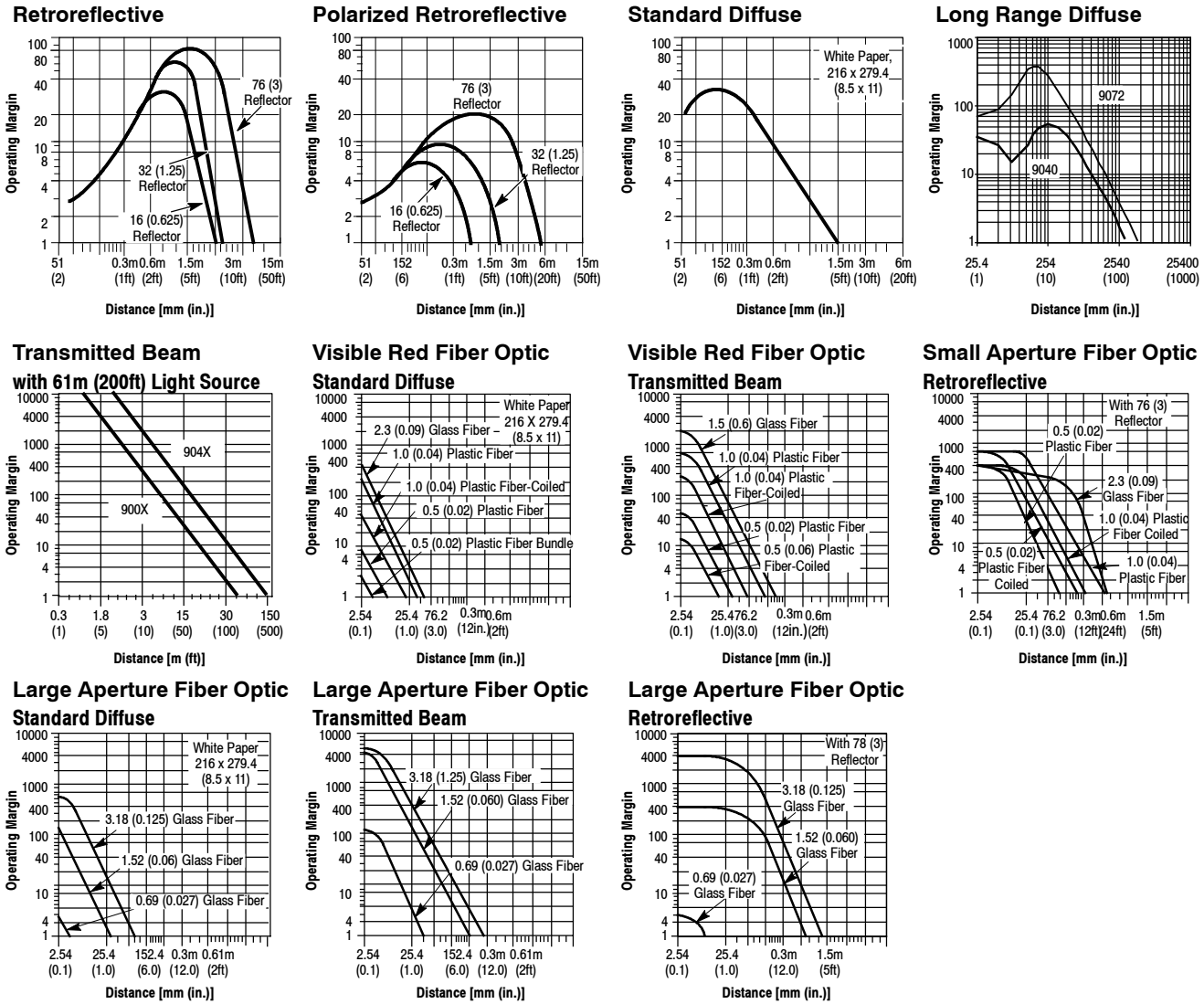
Mini Style



Thread Size

| | AC | DC |
|-------------|-------------------------|---------------------|
| Micro Style | 1/2-20 UNF 2 Keyways | M12 x 1 1 Keyway |
| Mini Style | 7/8-16 UN 1 Keyway | |

Typical Response Curve

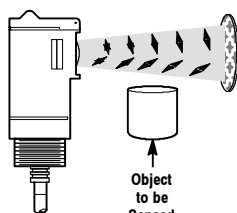
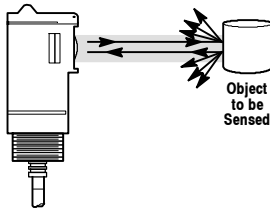
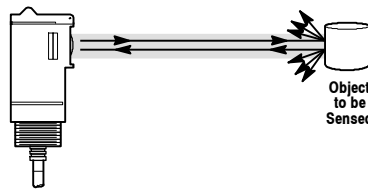


Product Selection for On/Off and Timing Sensors

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|--|--|--------------------------|---|-----------------|----------------|
| <p>Retroreflective</p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA | 50.8 mm... 9.14 m (2 in...30 ft) with 76 mm (3 in.) Reflector | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42GⓈU-9000 |
| | 70...264V AC/DC 50/60 Hz 15 mA | | | | 4-pin DC micro | 42GⓈU-9000-QD |
| | | | | | 4-pin mini | 42GⓈU-9000-QD1 |
| | 70...264V DC/ 40...264V AC 50/60 Hz 15 mA | 2 m 300V cable | | SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms | 42GⓈU-9002 | |
| | | | | 5-pin mini | 42GⓈU-9002-QD | |
| | | 2 m 300V cable | | Solid State Isolated N.O. 300 mA 2 ms | 42GⓈU-9003 | |
| | | | | | 2 m 600V cable | 42GⓈU-9003H |
| | | 4-pin mini | | 42GⓈU-9003-QD | | |
| | | 4-pin AC micro | | 42GⓈU-9003-QD1 | | |

Ⓢ R for standard (i.e. 42GRU-9000); T for timing (i.e. 42GTU-9000)

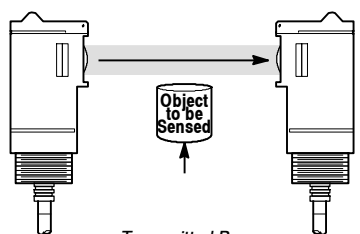
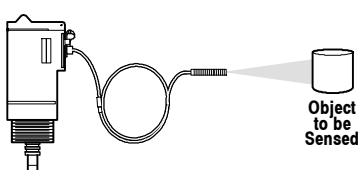
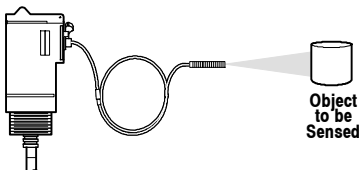
Product Selection for On/Off and Timing Sensors

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. | |
|--|---|---|--|--|--|--------------------------|---------------------------|
|  <p><i>Polared Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA | 50.8 mm... 4.87 m (2 in... 16 ft) with 76 mm (3 in.) Reflector | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42G⊗U-9200 | |
| | 70...264V DC/ 60...264V AC 50/60 Hz 15 mA | | | | 4-pin DC micro | 42G⊗U-9200-QD | |
| | | | | | 4-pin mini | 42G⊗U-9200-QD1 | |
| | 70...264V DC/ 40...264V AC 50/60 Hz 15 mA | | | 2 m 300V cable | SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms | 42G⊗U-9202 | |
| | | | | | 5-pin mini | 42G⊗U-9202-QD | |
| | | | | 2 m 300V cable | Solid State Isolated N.O. 300 mA 2 ms | 2 m 600V cable | 42G⊗U-9203 |
| | 4-pin mini | | | | | | 42G⊗U-9203H |
| | 4-pin AC micro | | | | | | 42G⊗U-9203-QD1 |
| |  <p><i>Standard Diffuse</i></p> <p>Field of View: 3.5° Emitter LED: Infrared 880 nm</p> | | | 10...30V DC 30 mA | 50.8 mm... 1.52 m (2 in...5 ft) to White Paper | Light/Dark Selectable | NPN/PNP 100 mA 2 ms |
| 70...264V DC/ 60...264V AC 50/60 Hz 15 mA | | 4-pin DC micro | 42GLP-9000-QD | | | | |
| | | 4-pin mini | 42GSP-9000 | | | | |
| 70...264V DC/ 40...264V AC 50/60 Hz 15 mA | | 2 m 300V cable | Teach function Light/Dark Selectable | 42GSP-9000-QD | | | |
| | | | 4-pin DC micro | 42G⊗P-9000 | | | |
| | | 2 m 300V cable | NPN/PNP 250 mA 2 ms | Light/Dark Selectable | | | 4-pin DC micro |
| 4-pin mini | | | | | | | 42G⊗P-9000-QD1 |
| 4-pin AC micro | | | | | | | 42G⊗P-9000-QD1 |
| 2 m 300V cable | | SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms | 2 m 300V cable | 42G⊗P-9002 | | | |
| | 5-pin mini | | | 42G⊗P-9002-QD | | | |
| | 4-pin AC micro | | | 42G⊗P-9002-QD1 | | | |
| 2 m 300V cable | Solid State Isolated N.O. 300 mA 2 ms | 2 m 600V cable | 42G⊗P-9003 | | | | |
| | | | 4-pin mini | 42G⊗P-9003H | | | |
| | | | 4-pin AC micro | 42G⊗P-9003-QD1 | | | |
|  <p><i>Long Range Diffuse</i></p> <p>Field of View: 6.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA | 50.8 mm... 3.04 m (2 in...10 ft) | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42GRP-9040 | |
| | 70...264V AC/DC 50/60 Hz 15 mA | | | | 4-pin DC micro | 42GRP-9040-QD | |
| | | | | | 4-pin mini | 42GRP-9040-QD1 | |
| | 70...264V DC/ 40...264V AC 50/60 Hz 15 mA | | | 2 m 300V cable | SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms | 42GRP-9042 | |
| | | | | | 5-pin mini | 42GRP-9042-QD | |
| | | | | 2 m 300V cable | Solid State Isolated N.O. 300 mA 2 ms | 2 m 600V cable | 42GRP-9043 |
| | 4-pin mini | | | | | | 42GRP-9043H |
| | 4-pin AC micro | | | | | | 42GRP-9043-QD1 |
| | 2 m 300V cable | | | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42GRP-9070 | |
| 4-pin DC micro | | 42GRP-9070-QD | | | | | |
| 3 m 300V cable | | 42GRP-9072 | | | | | |
| 70...264V AC/DC 50/60 Hz 15 mA | 50.8 mm...4.2 m (2 in...14ft) | Light/Dark Selectable | 42GRP-9072-3 | | | | |
| | | | 5-pin mini | 42GRP-9072-QD | | | |

⊗ R for standard (i.e. 42GRU-9000); T for timing (i.e. 42GTU-9000)

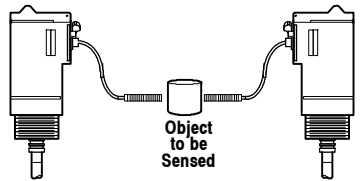
Refer to page 1-71 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. | | | |
|--|--|--|--|--|--------------------------------------|--|--|--|----------------|
|  <p>Transmitted Beam</p> <p>Field of View: 1.5° Emitter LED: Infrared 880 nm</p> | 10...264V AC/DC 50/60 Hz 15 mA | 25.4 mm...61 m (1 in...200 ft) | NA Light Source | | 2 m 300V cable | 42GRL-9000 | | | |
| | | 25.4 mm... 152 m (1 in...500 ft) | | | 2 m 600V cable | 42GRL-9000H | | | |
| | | | | | 4-pin DC micro | 42GRL-9000-QD | | | |
| | | | | | 4-pin mini | 42GRL-9002-QD | | | |
| | | | | | 2 m 300V cable | 42GRL-9040 | | | |
| | | | | | 4-pin DC micro | 42GRL-9040-QD | | | |
| | 4-pin mini | | 42GRL-9042-QD | | | | | | |
| | 10...30V DC 25 mA | Depends on Light Source | Receiver Light or Dark Output Selectable | | NPN and PNP 250 mA 5 ms | 2 m -300V cable | 42G⊗R-9000 | | |
| | | | | | | 4-pin DC micro | 42G⊗R-9000-QD | | |
| | | | | | | 4-pin mini | 42G⊗R-9000-QD1 | | |
| | | | | | | 2 m 300V cable | SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 23 ms | 42G⊗R-9002 | |
| | | | | | | | 5-pin mini | 42G⊗R-9002-QD | |
| 2 m 300V cable | | | | | | | Solid State Isolated N.O. 300 mA 15 ms | 42GRR-9003 | |
| | 2 m 600V cable | 42GRR-9003H | | | | | | | |
| | 4-pin mini | 42GRR-9003-QD | | | | | | | |
| 4-pin AC micro | 42GRR-9003-QD1 | | | | | | | | |
|  <p>Small Aperture Red Fiber Optic</p> <p>Emitter LED: Visible red 660 nm</p> | 10...30V DC 30 mA | Depends on Fiber Optic cable | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42G⊗F-9100 | | | |
| | | | | | 70...264V AC/DC 50/60 Hz 15 mA | 4-pin DC micro | 42G⊗F-9100-QD | | |
| | | | | | | 70...264V DC/ 40...264V AC 50/60 Hz 15 mA | 2 m 300V cable | SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 15 ms | 42G⊗F-9102 |
| | 5-pin mini | | | 42G⊗F-9102-QD | | | | | |
| | 2 m 300V cable | | | Solid State Isolated N.O. 300 mA 2 ms | 42G⊗F-9103 | | | | |
| | | | | | 4-pin mini | 42G⊗F-9103-QD | | | |
| | | | | | 4-pin AC micro | 42G⊗F-9103-QD1 | | | |
| |  <p>Large Aperture Fiber Optic</p> <p>Emitter LED: Infrared 880 nm</p> | | | 10...30V DC 30 mA | Depends on Fiber Optic cable | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42G⊗F-9000 |
| | | | | | | | | 70...264V AC/DC, 50/60 Hz 15 mA | 4-pin DC micro |
| 70...264V DC/ 40...264V AC 50/60 Hz 15 mA | | 2 m 300V cable | SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 15 ms | 42G⊗F-9002 | | | | | |
| | | | 5-pin mini | 42G⊗F-9002-QD | | | | | |
| | | | 2 m 300V cable | Solid State Isolated N.O. 300 mA 2 ms | | | 42G⊗F-9003 | | |
| 2 m 600V cable | | 42G⊗F-9003H | | | | | | | |
| 4-pin mini | | 42G⊗F-9003-QD | | | | | | | |
| 4-pin AC micro | | 42G⊗F-9003-QD1 | | | | | | | |

⊗ R for standard (i.e. 42GRU-9000); T for timing (i.e. 42GTU-9000)

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. | |
|---|---------------------------------------|---------------------|--------------------------|--|--|----------------|----------------|
|  <p>Extended Range Large Aperture Fiber Optic Emitter LED: Infrared 880 nm</p> | 10...264V AC/DC, 56/60 Hz 15 mA | See table below. | NA Light Source | | 2 m 300V cable | 42GRLF-9040 | |
| | | | | | 4-pin DC micro | 42GRLF-9040-QD | |
| | 10...40V DC 30 mA | See table below. | Light/Dark Selectable | | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42GRRF-9000 |
| | | | | | 4-pin DC micro | 42GRRF-9000-QD | |
| | 70...264V AC/DC, 50/60 Hz 15 mA | See table below. | Light/Dark Selectable | | SPDT EM Relay 2 A/132V AC, 1 A/264V AC 1 A/150V DC 15 ms | 2 m 300V cable | 42GRRF-9002 |
| | | | | | | 5-pin mini | 42GRRF-9002-QD |

Typical Sensing Distance—Extended Range Infrared Fiber Optic

| Sensing Mode | Sensor | Fiber Optic Cable | Range Extender | Sensing Distance (1X margin.) |
|---|--|---|-------------------|-------------------------------------|
| Transmitted Beam | 42GRLF-9040 with individual fiber optic cable | 43GT-FAS25SL Individual Fiber Optic Cable, smooth tip | none | 914 mm (36 in.) |
| | | 43GT-TBB25SL Individual Fiber Optic Cable, with 5/16 inch threaded tip | | |
| | | 43GT-FAS25SL Individual Fiber Optic Cable, smooth tip | 60-1844 | 6 m (20 ft) |
| | | 43GT-TBB25SL Individual Fiber Optic Cable, with 5/16 inch threaded tip | 60-2559 | 12 m (40 ft) |
| | | 43GT-TBB25SL Individual Fiber Optic Cable, with 5/16 inch threaded tip | 60-2323 | 6 m (20 ft) |
| | 60-2738 | 12 m (40 ft) | | |
| | 42GRLF-9040 with bifurcated fiber optic cable | 43GR-FAS25SL Bifurcated Fiber Optic Cable, smooth tip | none | 1.2 m (48 in.) |
| | | 43GR-TBB25SL Bifurcated Fiber Optic Cable, with 5/16 inch threaded tip | | |
| | | 43GR-FAS25SL Bifurcated Fiber Optic Cable, with smooth tip | 60-1844 | 7.6 m (25 ft) |
| | | 43GR-TBB25SL Bifurcated Fiber Optic Cable, with 5/16 inch threaded tip | 60-2559 | 15.2 m (50 ft) |
| 43GR-TBB25SL Bifurcated Fiber Optic Cable, with 5/16 inch threaded tip | | 60-2323 | 7.6 m (25 ft) | |
| 60-2738 | 15.2 m (50 ft) | | | |

- Sensing ranges are for fiber optic cables shown. Range will vary with other fiber optic cable types.
- When using individual fiber optic cable, second port must be blocked with the provided plug (60-2744).
- Receiver Sensor (42GRRF) requires only individual fiber optic cable.

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. |
|---|--------------|-------------------------------------|----------|
| 1.8 m (6 ft) 4-pin, Mini QD Cordset | 889N-F4AF-6F | 32 mm (1.25 in.) Diameter Reflector | 92-47 |
| 1.8 m (6 ft) 5-pin, Mini QD Cordset | 889N-F5AF-6F | Range Extender | 60-1844 |
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 | Range Extender | 60-2559 |
| 2 m (6.5 ft) 4-pin, AC Micro QD Cordset | 889R-F4AEA-2 | Range Extender | 60-2738 |
| 76 mm (3 in.) Diameter Reflector | 92-39 | Replacement Plug | 60-2744 |

44B Adjustable Background and Foreground Suppression

50 mm Rectangular



Features

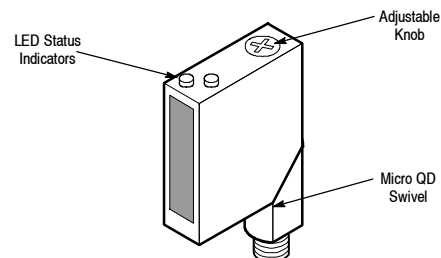
- Adjustable background and foreground suppression models
- Power, output, and stability status indicators
- Micro QD connection with 90° swivel
- Low voltage 24V DC operation
- Protected from miswiring
- Dual NPN and PNP outputs
- Fast 1 ms response time

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13, IP67 |
| Operating Temperature [C (F)] | 0...+70° (32...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 947-5-2 |
| Relative Humidity | 5...95% |
| Optical | |
| Sensing modes | Background suppression or foreground suppression |
| Sensing Range | 20...300 mm (0.78...11.8 in.) adjustable for background suppression 20...200 mm (0.78...7.8 in.) adjustable for foreground suppression |
| Spot Size | See Product Selection table on page 1-74 |
| Light Source | Infrared LED (880 nm) |
| LED Indicators | See User Interface Panel below |
| Adjustments | 6-turn adjustment knob |
| Electrical | |
| Voltage | 20...30V DC |
| Current Consumption | 22 mA max |
| Sensor Protection | False pulse, reverse polarity, overload, output short circuit |
| Outputs | |
| Response Time | 1 ms max |
| Output Type | PNP and NPN |
| Output Mode | Light or dark operate by cat. no. |
| Output Current | 100 mA |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Acrylic |
| Lens Material | Acrylic |
| Connection Types | 4-pin DC micro (M12) QD |
| Supplied Accessories | None |
| Optional Accessories | See mounting brackets and cordsets on page 1-73 |

User Interface Panel

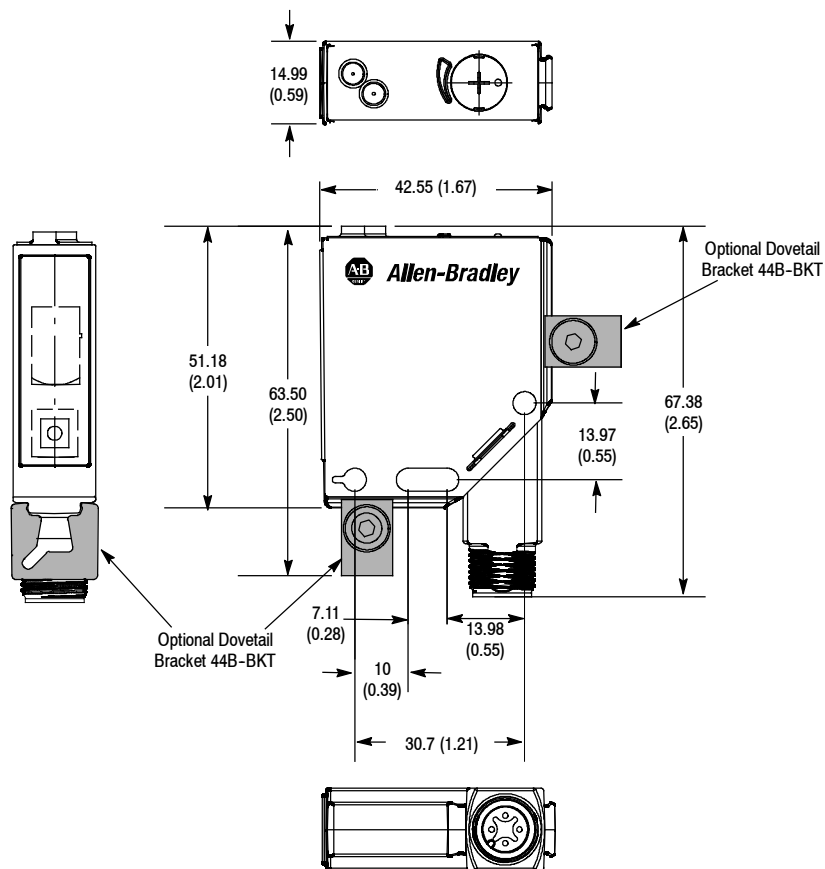
| Color | State | Status |
|--------|----------|--------------------------------|
| Green | OFF | Sensor not powered, SCP active |
| | ON | Sensor powered |
| | Flashing | Unstable margin |
| Orange | OFF | Output not activated |
| | ON | Output activated |



44B Adjustable Background and Foreground Suppression

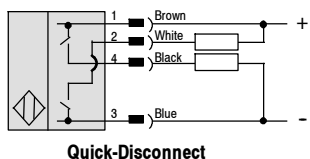
50 mm Rectangular

Approximate Dimensions [mm (in.)]



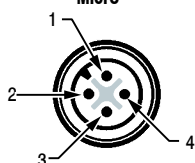
Wiring Diagram

NPN/PNP

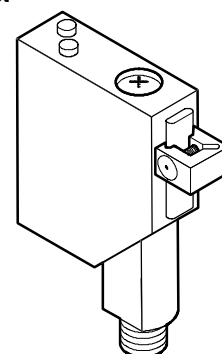


Quick-Disconnect

Micro



Dovetail Bracket
(Optional)
44B-BKT



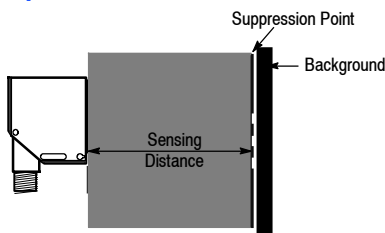
Cordsets & Accessories

| Description | Cat. No. |
|---|-------------|
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 |
| Dovetail Bracket | 44B-BKT |
| Mounting Bracket | 60-BKTL-SS |

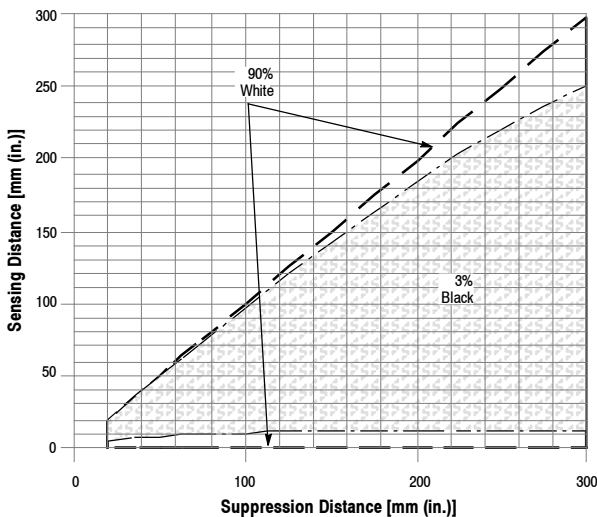
44B Adjustable Background and Foreground Suppression

50 mm Rectangular

Typical Response Curve

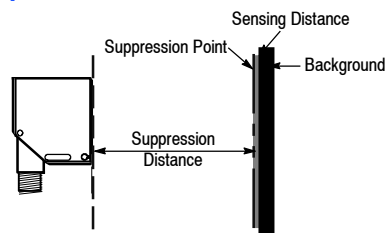


Background Suppression

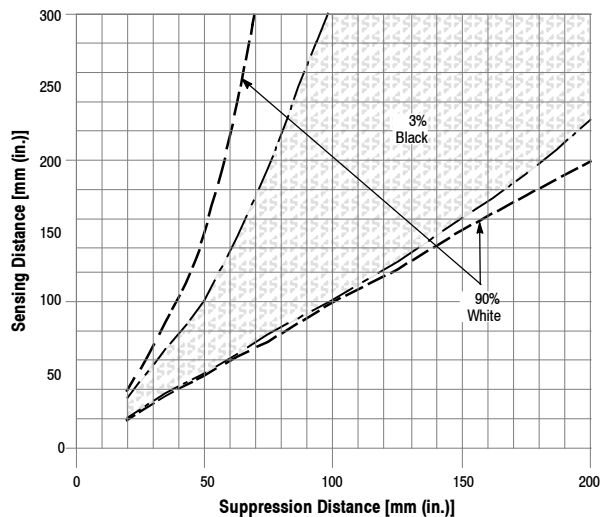


Example: With a suppression point set at 200 mm, the sensing distance will be between the sensor face and just under 200 mm for 90% white reflective targets and between 12 mm and 185mm for 3% black reflective targets.

Typical Response Curve



Foreground Suppression



Example: With a suppression point set at 50 mm, the sensing distance will be between just over 50 mm and 150 mm for 90% white reflective targets and between just over 50 mm and 100 mm for 3% black reflective targets.

Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance (Adjustable) | LED Source | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|----------------------------------|--------------------|-----------------------|---|-----------------|-----------------------|
| <p>Background Suppression ① 20 mm spot size @ 300 mm</p> | 20...30V DC 22 mA | 20...300 mm (0.78...11.8 in) | Infrared 880 nm | Light Operate | PNP and NPN 100 mA 1 ms | 4-pin DC micro | 44BSB-1JBA1-D4 |
| | | | | Dark Operate | | | 44BSB-1KBA1-D4 |
| <p>Foreground Suppression ② 15 mm spot size @ 200 mm</p> | | Dark Operate | | 44BSN-1KBA1-D4 | | | |
| | | Light Operate | | 44BSN-1JBA1-D4 | | | |

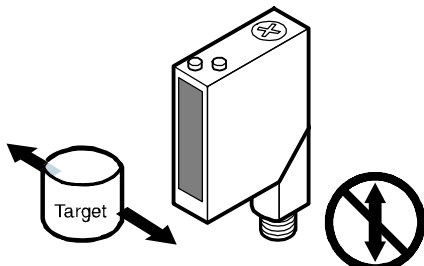
- ① Detection by presence of reflected light from the target.
- ② Detection by absence of reflected light from the background.

44B Adjustable Background and Foreground Suppression

50 mm Rectangular

Application Notes

1. Due to the detection method used by these sensors, it is important that the sensor be mounted in such a way as to ensure that the target passes in an orientation perpendicular to the sensor's lenses.



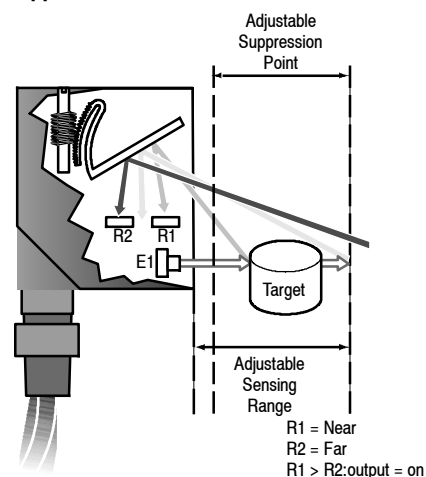
- For installations with a fixed background up to 300 mm from the 44BSB sensor, set the suppression point to just before the background. If no background is present, set the suppression point to just beyond the target to be sensed so that adequate margin is achieved.
- Avoid installing the 44BSB sensor directly perpendicular to a mirror-like background. This can cause a false output. If this occurs, use a nonreflective background or angle the sensor or background to minimize this condition.

4. The performance curves for the 44BSN and 44BSB are based on a 90% white and 3% black reflective paper. Use the table below to compare reflectivity levels of various industrial targets.

| Target | Typical Relative Reflectivity |
|-------------------------|-------------------------------|
| Polished aluminum | 500 |
| White paper (reference) | 100 |
| White typing paper | 90 |
| Cardboard | 40 |
| Cut lumber | 20 |
| Black paper | 10 |
| Neoprene | 5 |
| Tire rubber | 4 |
| Black felt | 2 |

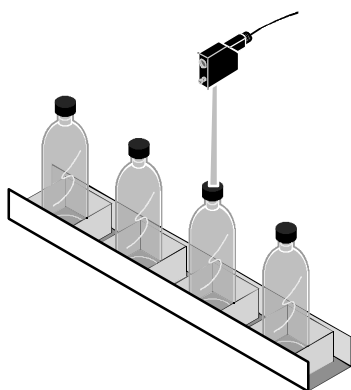
- For foreground suppression dark operate model (44BSN-1KBA1-D4), the output turns on when a target is detected. For light operate model (44BSN-1JBA1-D4), the output turns off when a target is detected.
- For background suppression light operate model (44BSB-1JBA1-D4), the output turns on when a target is detected. For dark operate model (44BSB-1KBA1-D4), the output turns off when the target is detected.

Operation of Adjustable Background Suppression

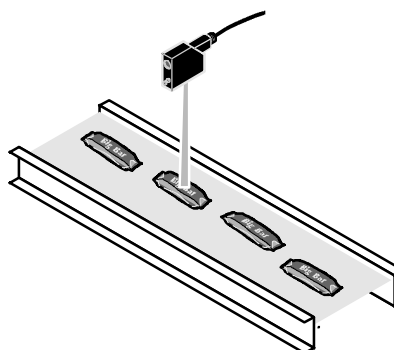


Application Examples

Background Suppression



Foreground Suppression



PHOTOSWITCH® Photoelectric Sensors
42BT Long Range Background Suppression
Slim Flatpack



Features

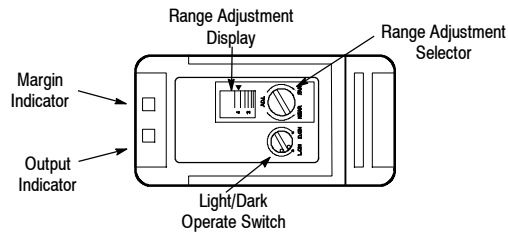
- Long range background suppression diffuse sensing mode
- Adjustable range settings
- Slim flatpack housing design
- Highly visible LED Indicators
- Pico QD and 2 m cable versions
- Both NPN and PNP outputs
- Short-circuit protected outputs
- Fast 2 ms response time

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus Listed and CE Marked for all applicable directives |
| Operating Environment | IP65 |
| Operating Temperature [C (F)] | -5...+55° (+23...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 35...85% |
| Ambient Light Immunity | Incandescent light: 3000 lux, sunlight immunity: 10000 lux |
| Optical | |
| Sensing Modes | Background suppression |
| Sensing Range | 1 m or 2 m by cat. no. |
| Field of View | See Product Selection table on page 1-77 |
| Light Source | Visible red LED (650 nm), infrared LED (880 nm) |
| LED Indicators | See User Interface Panel below |
| Adjustments | 5-turn sensitivity potentiometer |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 30 mA |
| Sensor Protection | Short circuit |
| Outputs | |
| Response Time | 2 ms max |
| Output Type | PNP and NPN |
| Output Mode | Light operate or dark operate selectable |
| Output Current | 100 mA @ 24V DC |
| Output Leakage Current | 0.1 mA max |
| Mechanical | |
| Housing Material | Polyarilate |
| Lens Material | Polyarilate |
| Connection Types | 2 m cable, 4-pin pico (M8) QD on 6-inch pigtail |
| Supplied Accessories | Screwdriver |
| Optional Accessories | See mounting brackets and cordsets on page 1-77 |

User Interface Panel

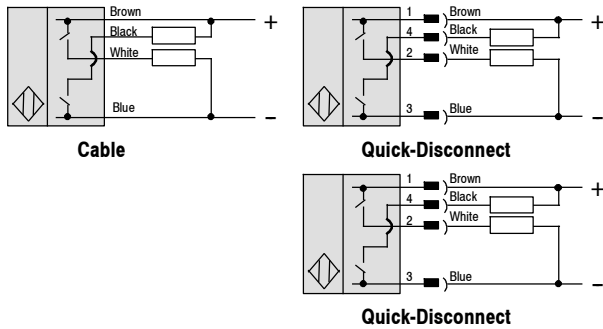
| Label | Color | State | Status |
|--------|-------|-------|----------------------|
| Margin | Green | OFF | Margin < 2.5 |
| | | ON | Margin > 2.5 |
| Status | Red | OFF | Output not activated |
| | | ON | Output activated |



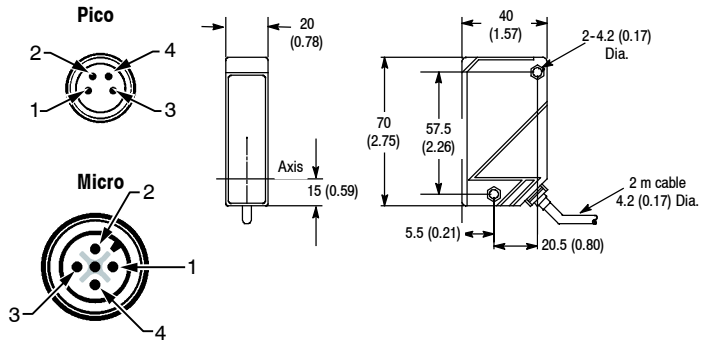
PHOTOSWITCH® Photoelectric Sensors
42BT Long Range Background Suppression
 Slim Flatpack

Wiring Diagrams

NPN/PNP

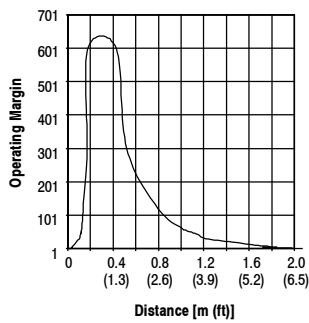


Approximate Dimensions [mm (in.)]

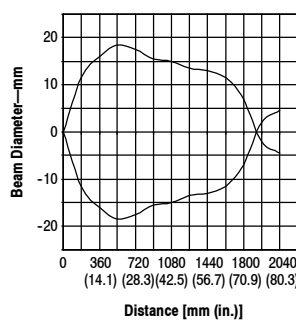


Typical Response Curve

42BT-B1LBSN

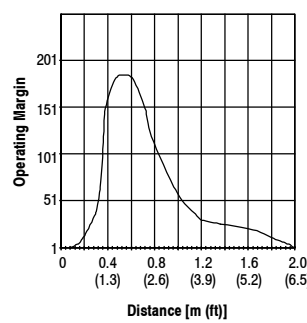


Beam Pattern

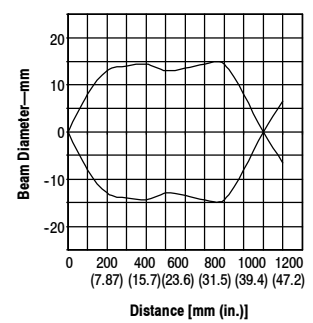


Typical Response Curve

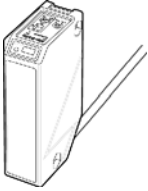

42BT-B2LBSL



Beam Pattern



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | LED Source | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|------------------------------|-----------------------|-------------------------|---|--------------------|----------------|
|  Background Suppression Field of View: 1.7° | 12...24V DC ±10% 30 mA | 0.2...1 m (0.66...3.3 ft) | Visible Red 650 nm | L.O./D.O. selectable | PNP and NPN 2 ms (max) | 2 m 300V cable | 42BT-B2LBSL-A2 |
| | | | | | | 4-pin DC micro | 42BT-B2LBSL-F4 |
| | | | | | | 4-pin DC pico | 42BT-B2LBSL-Y4 |
|  Background Suppression Field of View: 2.8° | 12...24V DC ±10% 30 mA | 0.2...2 m (0.66...6.4 ft) | Infrared 880 nm | L.O./D.O. selectable | PNP and NPN 2 ms (max) | 2 m 300V cable | 42BT-B1LBSN-A2 |
| | | | | | | 4-pin DC micro | 42BT-B1LBSN-F4 |
| | | | | | | 4-pin DC pico | 42BT-B1LBSN-Y4 |

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. |
|---|-------------|-----------------------------|----------|
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 | Vertical Mounting Bracket | 61-6738 |
| 2 m (6.5 ft) 4-pin, Pico QD Cordset | 889P-F4AB-2 | Horizontal Mounting Bracket | 61-6739 |

PHOTOSWITCH® Photoelectric Sensors
42BC Long Range Background Suppression
Slim Housing



Features

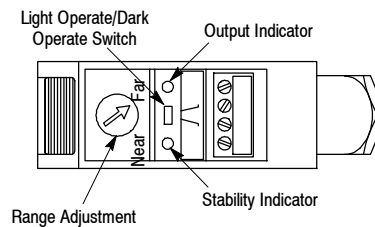
- Long range background suppression diffuse sensing mode
- Adjustable range settings
- Slim housing style
- Highly visible LED Indicators
- Screw terminal connections
- Both NPN and PNP outputs (DC)
- SPST relay output (AC)
- Short-circuit protected outputs

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Certified and CE Marked for all applicable directives |
| Operating Environment | NEMA 1, 12, 13, IP65 |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...85% |
| Ambient Light Immunity | Incandescent light: 3000 lux, sunlight immunity: 10000 lux |
| Optical | |
| Sensing Modes | Background suppression |
| Sensing Range | 1 m or 2 m by cat. no. |
| Field of View | See Product Selection table on page 1-80 |
| Light Source | Infrared LED (880 nm) |
| LED Indicators | See User Interface Panel below |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 12...24V DC, 24...240V DC |
| Current Consumption | 30 mA |
| Sensor Protection | Short circuit for DC models, reverse polarity, false pulse, transient |
| Outputs | |
| Response Time | 20 ms max (DC models), 30 ms max (AC models) |
| Output Type | PNP and NPN, SPDT N.O. relay (AC models) |
| Output Mode | Light operate or dark operate selectable |
| Output Current | 100 mA @ 24V DC, 3 A @ 240V AC |
| Output Leakage Current | 0.5 mA max |
| Mechanical | |
| Housing Material | Polycarbonate |
| Lens Material | Polycarbonate |
| Cover Material | Acrylic |
| Connection Types | Screw terminal, 16 AWG (1.3 mm ²) |
| Supplied Accessories | Right angle mounting bracket |
| Optional Accessories | See mounting brackets and cordsets on page 1-80 |

User Interface Panel

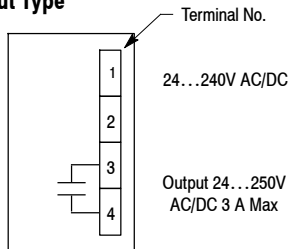
| Label | Color | State | Status |
|--------|-------|-------|----------------------|
| Margin | Green | OFF | 0.8>margin<1.2 |
| | | ON | 0.8<margin>1.2 |
| Output | Red | OFF | Output not activated |
| | | ON | Output activated |



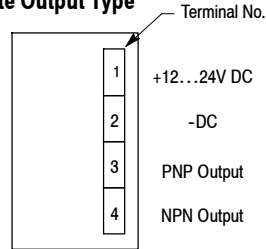
Wiring Diagrams

Terminal Version

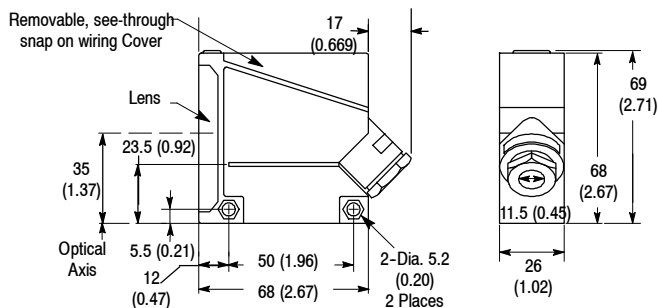
Relay Output Type



Solid-State Output Type

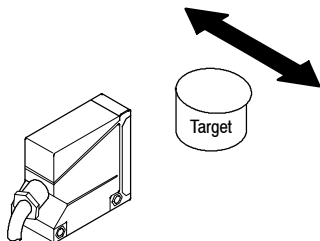


Approximate Dimensions [mm (in.)]



Detection Direction

Due to the detection method, the sensor must be positioned such that the target passes in the direction illustrated. Motion in up/down direction cannot be detected.



Minimum Sensing Distances

Near Setting

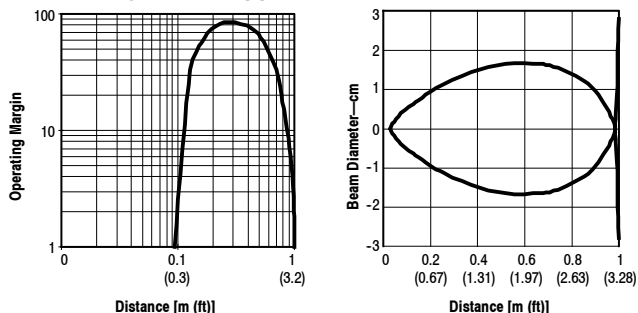
2.5% black 8 cm (3.15 in.) at 2X margin
 100% white 3 cm (1.18 in.) at 2X margin

Far Setting

2.5% black 20 cm (7.9 in.) at 2X margin
 100% white 4 cm (1.57 in.) at 2X margin

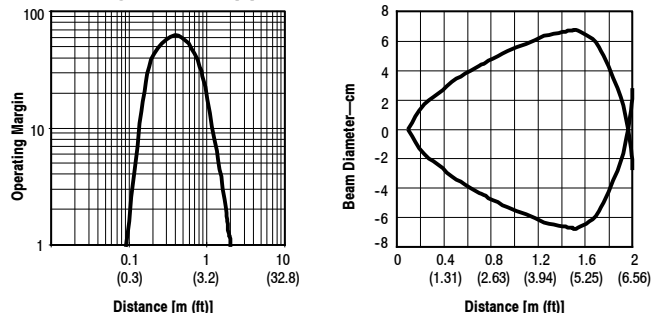
Typical Response Curve Beam Pattern

1 m Background Suppression



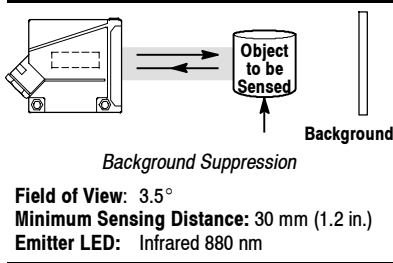
Typical Response Curve Beam Pattern

2 m Background Suppression



PHOTOSWITCH® Photoelectric Sensors
42BC Long Range Background Suppression
Slim Housing

Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|---|---------------------|--------------------------|---|---|----------------|
|  <p><i>Background Suppression</i></p> <p>Field of View: 3.5° Minimum Sensing Distance: 30 mm (1.2 in.) Emitter LED: Infrared 880 nm</p> | 12...24V DC ±10% 30 mA | 1 m (3.3 ft) | Light/Dark Selectable | NPN/PNP 100 mA 20 ms | Screw terminals accepts up to (2) 16 AWG (1.3 mm sq.) conductors | 42BC-B1LBAL-T4 |
| | | 2 m (6.6 ft) | | | | 42BC-B1LBAN-T4 |
| | 24...240V AC/DC ±10% 30 mA (DC) 15 mA (AC) | 1 m (3.3 ft) | | S.P.S.T. N.O. Relay 3 A (250V AC, 750V AC) 3 A (30V DC, 90 W) 30 ms | | 42BC-B1CRAL-T4 |
| | | 2 m (6.6 ft) | | | | 42BC-B1CRAN-T4 |

Cordsets and Accessories

| Description | Cat. No. |
|---|----------------|
| DC Micro QD Cordset, Straight, 4-pin, 2 m | 889D-F4AC-2 |
| Receptacle, 4-pin DC Micro QD | 888D-M4AC1-0M3 |
| Mounting Bracket | 60-2637 |
| Replacement Cover | 60-2669 |
| Receptacle, 4-pin Mini QD | 60-2668 |

PHOTOSWITCH® Photoelectric Sensors
42BA Short Range Background Suppression
Compact Housing



Features

- Short-range background suppression diffuse sensing mode
- Adjustable range settings
- Compact housing style
- Highly visible LED indicators
- NPN or PNP output models
- Diagnostic output
- Short-circuit protected outputs
- 2 m cable connection

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | UL Listed, CSA Certified, and CE Marked for all applicable directives |
| Operating Environment | NEMA 1, 4, 6P, 12, 13, IP67 (IEC 529) |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...85% |
| Optical | |
| Sensing Mode | Background suppression |
| Sensing Range | See Product Selection table on page 1-83 |
| Field of View | See Product Selection table on page 1-83 |
| Light Source | Visible red LED (700 nm), infrared LED (880 nm) |
| LED Indicators | See User Interface Panel below |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 33 mA max |
| Sensor Protection | Short circuit, reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | 350 μs |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light operate or dark operate selectable |
| Output Current | 100 mA max @ 24V DC |
| Output Leakage Current | 1 μA max |
| Mechanical | |
| Housing Material | Polyarylate (30 mm and 50 mm models) ABS resin (100 mm and 200 mm models) |
| Lens Material | Polyarylate (30 mm and 50 mm models) Polysulfone (100 mm and 200 mm models) |
| Connection Types | 2 m cable |
| Supplied Accessories | 60-2636 mounting bracket |

User Interface Panel

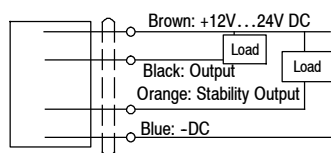
| Label | Color | State | Status |
|-------|-------|-------|----------------------|
| STB | Green | OFF | 0.8 < margin < 1.2 |
| | | ON | 0.8 > margin > 1.2 |
| OUT | Red | OFF | Output not activated |
| | | ON | Output activated |

Sensitivity Potentiometer
Stability Indicator
Output Indicator

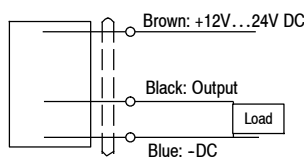
Sensitivity Potentiometer
Stability Indicator
Output Indicator
Light Operate/Dark Operate Switch

Wiring Diagrams

NPN Output



PNP Output

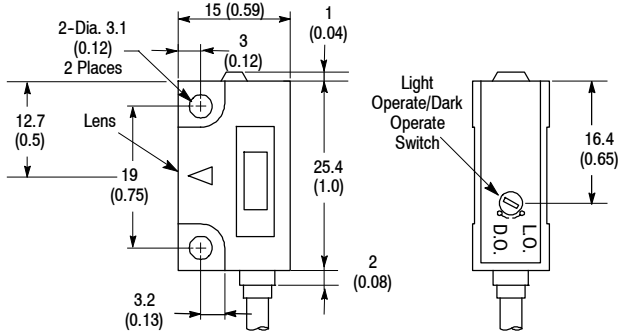


Note: Details regarding connection of Rockwell Automation 42BA photoelectric sensors to Rockwell Automation Programmable Controllers can be found in "PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual" on www.ab.com/Literature.

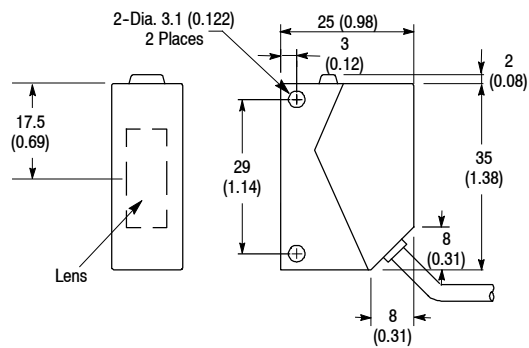
PHOTOSWITCH® Photoelectric Sensors
42BA Short Range Background Suppression
Compact Housing

Approximate Dimensions [mm (in.)]

30 mm and 50 mm Sensing Distance Versions



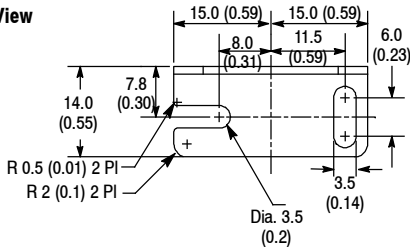
100 mm and 200 mm Sensing Distance Versions



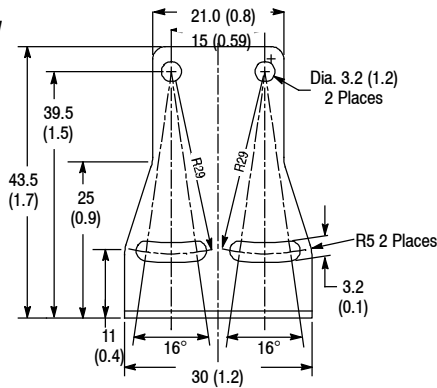
Stainless Steel Mounting Bracket—60-2636

Stainless steel mounting bracket and hardware supplied with all 42BA sensors.

Bottom View



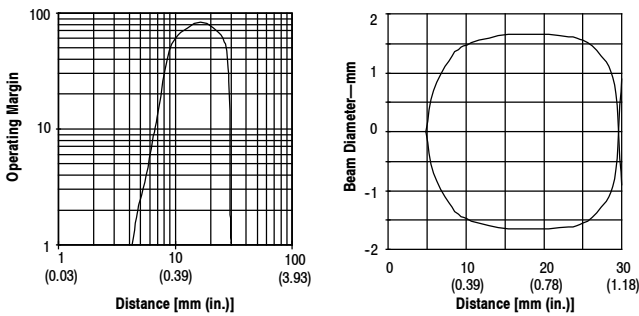
Side View



Note: Replacement mounting assemblies and reflectors available on page 1-293.

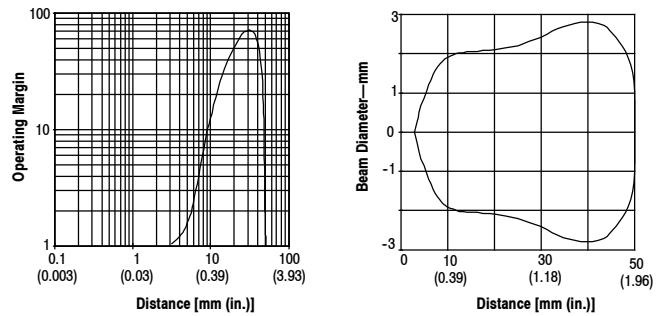
Typical Response Curve Beam Pattern

30 mm

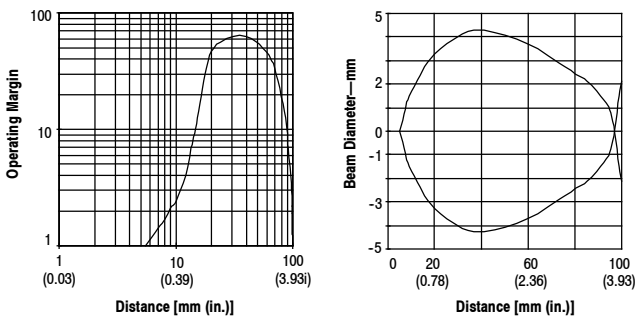


Typical Response Curve Beam Pattern

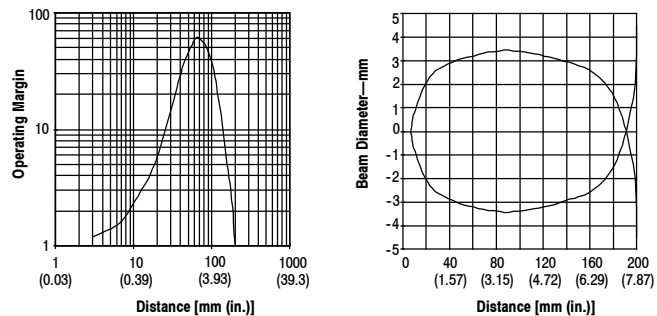
50 mm



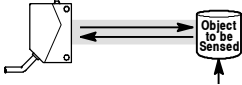
100 mm



200 mm



Product Selection

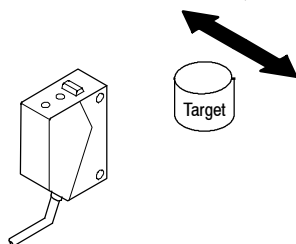
| Sensing Mode | Operating Voltage Supply Current | Sensing Distance [mm (in.)] | Field of View | Output Energized | LED Source | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|--------------------------------|---------------------|--------------------------|---|--|--------------------|-----------------------|
|  | 12...24V DC ±10% 27 mA | 10...30 (0.39...1.2) | 9° | Light/Dark Selectable | Visible red 700 nm | NPN Output: 100 mA, Stability: 50 mA 350 µs | 2 m 500V cable | 42BA-S2LNAA-A2 |
| | 12...24V DC ±10% 30 mA | | | | | PNP Output: 100 mA, 350 µs | | 42BA-S2LPAA-A2 |
| | 12...24V DC ±10% 27 mA | 10...50 (0.39...2.0) | | | | NPN Output: 100 mA, Stability: 50 mA 350 µs | | 42BA-S2LNAC-A2 |
| | 12...24V DC ±10% 30 mA | | | | | PNP Output: 100 mA, 350 µs | | 42BA-S2LPAC-A2 |
| | 12...24V DC ±10% 33 mA | 10...100 (0.39...3.9) | | | | NPN Output: 100 mA Stability: 50 mA 350 µs | | 42BA-S2LNAE-A2 |
| | | | | | | PNP Output: 100 mA 350 µs | | 42BA-S2LP AE-A2 |
| | 12...24V DC ±10% 30 mA | 10...200 (0.39...7.9) | 5° | Infrared 880 nm | NPN Output: 100 mA Stability: 50 mA 350 µs | 42BA-S1LNAG-A2 | | |
| | 12...24V DC ±10% 33 mA | | | | PNP Output: 100 mA 350 µs | 42BA-S1LPAG-A2 | | |

Operating Distance with White Paper

| Min Sensitivity [mm (in.)] | Max Sensitivity [mm (in.)] | Cat. No. |
|----------------------------|----------------------------|--|
| 12...25 (0.47...0.98) | 2...30 (0.078...1.18) | 42BA-S2LNAA-A2 42BA-S2LPAA-A2 |
| 9.5...39 (0.37...1.54) | 2.7...50 (0.106...1.97) | 42BA-S2LNAC-A2 42BA-S2LPAC-A2 |
| 17...75 (0.67...2.95) | 6...100 (0.24...3.94) | 42BA-S2LNAE-A2 42BA-S2LP AE-A2 |
| 25...160 (0.98...6.29) | 1...200 (0.039...7.87) | 42BA-S1LNAG-A2 42BA-S1LPAG-A2 |

Detection Direction

Due to the detection method, the sensor must be positioned such that the target passes in the horizontal direction illustrated.



Motion in the vertical direction cannot be reliably detected.



Description

The 42JS VisiSight family of sensors offers a full range of sensing modes in a miniature rectangular housing. Visible light source is offered in all models for ease of alignment. Additional transmitted beam infrared LED source models are offered for superior crosstalk immunity.

The 42JS VisiSight family provides an indication if the sensor operation is unstable. An indicator flashes if the signal level is too close to the detection threshold. This helps for easy alignment of the sensor and forewarns against detection of a background.

Features

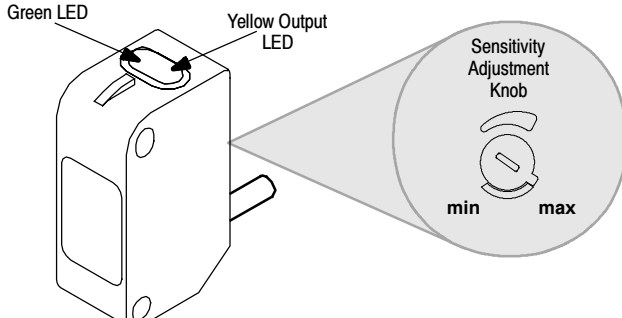
- Visible light source offered on all models for ease of alignment
- Optional snap-on adaptor enables 18 mm mount and makes sensor replacement a snap
- Patented ASIC design offers linear sensitivity adjustment, stability indication, and excellent noise immunity
- Compact sealed housing and cavity free design to minimize collection of dust and debris while allowing for easy sensor cleanup
- Threaded metal M12 or M8 connector on pigtail
- 360° visible LED status indicators
- Additional transmitted beam models available with infrared light source for superior cross talk immunity
- Input to disable light source on transmitted beam emitter

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -20...+60° (-4...+140°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% (noncondensing) |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Polarized retroreflective, diffuse, background suppression, and transmitted beam |
| Light Source | Visible red LED (660 nm) or infrared LED (880 nm) |
| LED Indicators | Green and yellow LED |
| Adjustments | Sensitivity adjustment knob or fixed by cat. no. |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 25 mA max |
| Sensor Protection | Short circuit, overload, false pulse, transient noise, reverse polarity |
| Outputs | |
| Response Time | 1 ms |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Complementary light or dark operate |
| Output Current | 100 mA |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | ABS |
| Lens Material | PMMA |
| Cover Material | PMMA |
| Connection Types | 2 m cable, 4-pin DC micro (M12) QD, 4-pin pico (M8) QD |
| Supplied Accessories | Mounting hardware (M3 x 25) stainless steel screws |
| Optional Accessories | See snap-on adaptor for 18 mm mounting (IP40), mounting brackets, cordsets, and reflectors on page 1-87 |

User Interface

Sensor Indicators



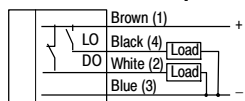
| LED Color | State | Status |
|-----------|-------------------|--|
| Green | OFF | Power is Off |
| Green | ON | Power is On |
| | Flashing (6 Hz) | Unstable (0.5 < Margin < 2) |
| | Flashing (1.5 Hz) | Output short-circuit protection active |
| Yellow | OFF | Output de-energized ❶ |
| | ON | Output energized ❶ |

❶ Black wire or pin 4 of connector.

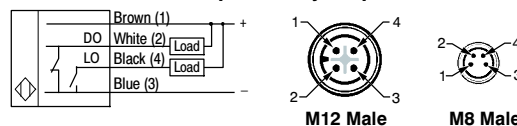
Wiring Diagrams

Cable connection is shown in the following diagrams. Pin numbers correspond to an M12 or M8 male connector on the sensor.

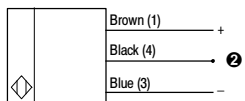
PNP Models with Complementary Outputs



NPN Models with Complementary Outputs

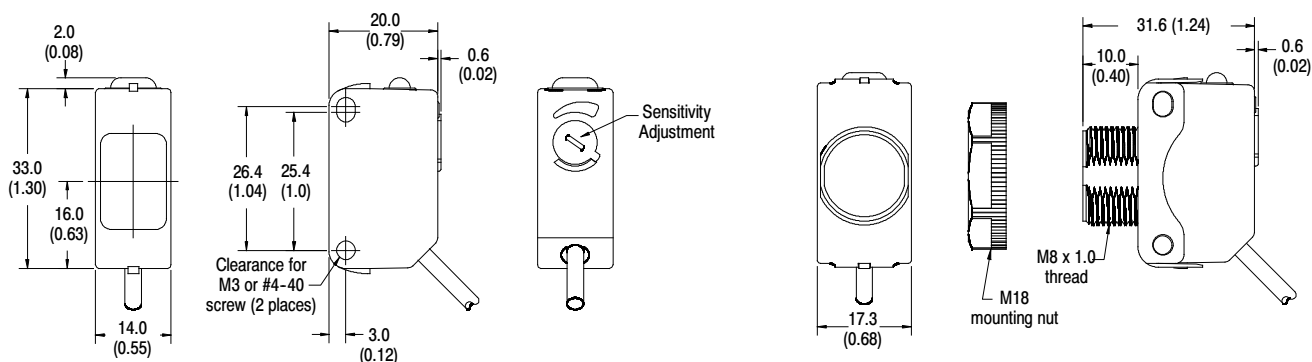


Transmitted Beam Emitter



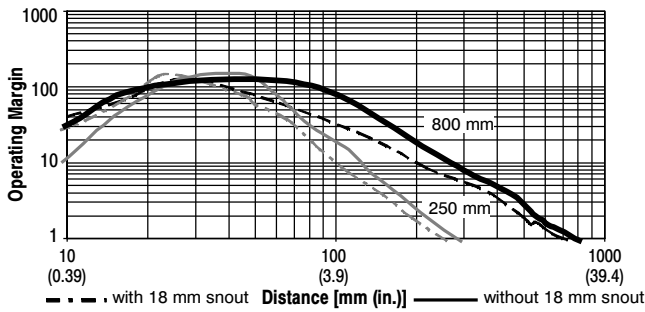
❷ For normal operation, black wire (pin 4) needs no connection. To disable light source, connect black wire (pin 4) to +V.

Approximate Dimensions [mm (in.)]

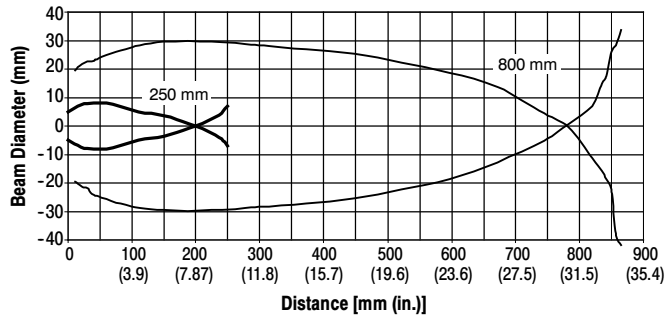


Typical Response Curves

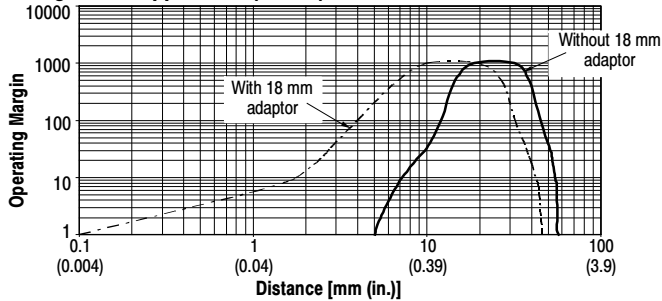
Standard Diffuse



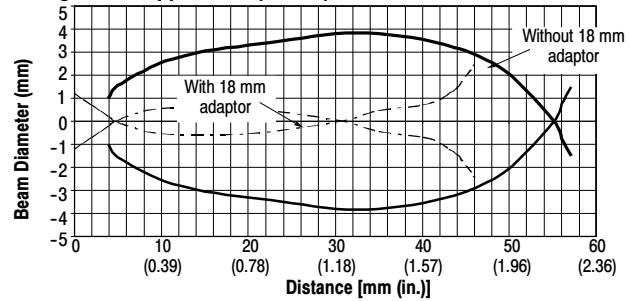
Standard Diffuse—Beam Pattern



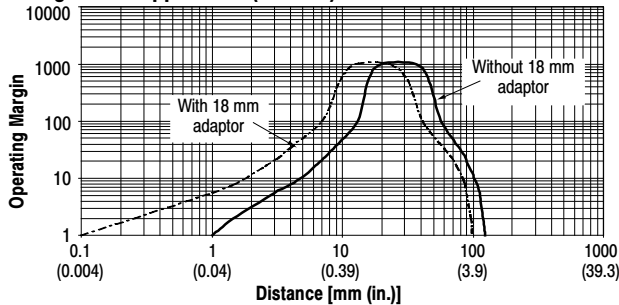
Background Suppression (55 mm)



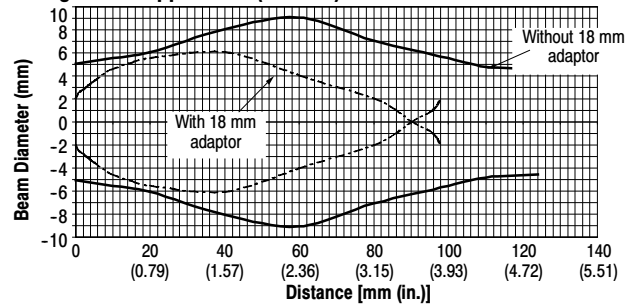
Background Suppression (55 mm)—Beam Pattern



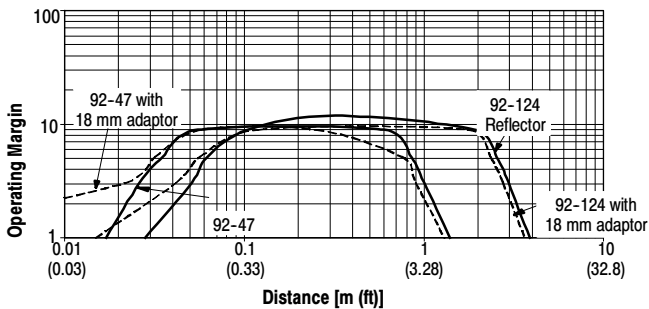
Background Suppression (130 mm)



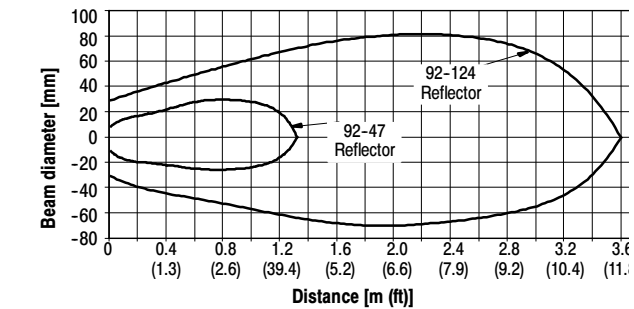
Background Suppression (130 mm)—Beam Pattern



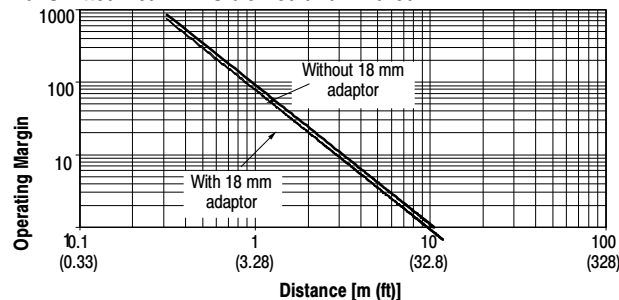
Polarized Retroreflective



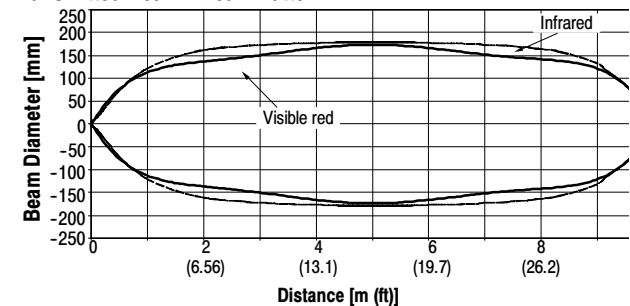
Polarized Retroreflective—Beam Pattern



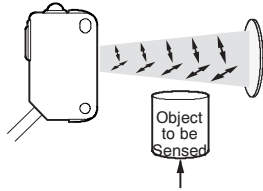
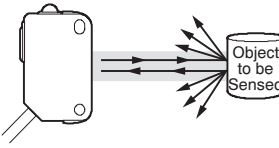
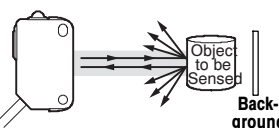
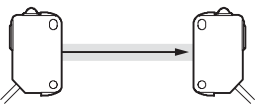
Transmitted Beam—Visible Red and Infrared



Transmitted Beam—Beam Pattern



Product Selection

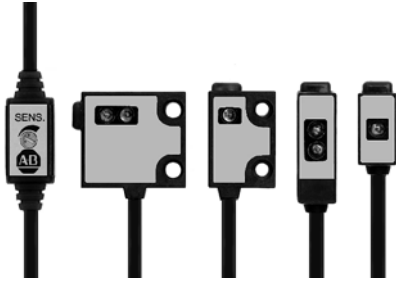
| Sensing Mode (max. range) | Sensing Distance | Spot Size @ Max. Distance | Output Type Output Current | Sensitivity Adjustment | Cat. No. ❶ |
|--|-----------------------------------|---------------------------|----------------------------|-----------------------------|-----------------|
|  <p><i>Polarized Retroreflective</i> Field of View: 2.8° Emitter LED: Visible red 645 nm</p> | 25 mm...3.5 m (0.98 in...11.5 ft) | 175 mm (6.9 in.) | NPN | No adjustment | 42JS-P2MNB1-F4 |
| | | | PNP | | 42JS-P2MPB1-F4 |
| | | | NPN | Single-turn adjustment knob | 42JS-P2MNA2-F4 |
| | | | PNP | | 42JS-P2MPA2-F4 |
|  <p><i>Standard Diffuse</i> Field of View: 4° for 800 mm 5.5° for 250 mm Emitter LED: Visible red 645 nm</p> | 3...800 mm (0.12...31.5 in.) | 60 mm (2.36 in.) | NPN | Single-turn adjustment knob | 42JS-D2MNA1-F4 |
| | 5...250 mm (0.20...9.84 in.) | 40 mm (1.57 in.) | PNP | | 42JS-D2MPA1-F4 |
| | | | NPN | | 42JS-D2MNA2-F4❸ |
| | | | PNP | | 42JS-D2MPA2-F4❸ |
|  <p><i>Background Suppression</i> Field of View: 14° for 55 mm 17° for 130 mm Emitter LED: Visible red 645 nm</p> | 6...55 mm (0.24...2.17 in.) | 7.6 mm (0.30 in.) | NPN | No adjustment | 42JS-B2MNB1-F4 |
| | 2...130 mm (0.07...5.12 in.) | 11.5 mm (0.45 in.) | PNP | | 42JS-B2MPB1-F4 |
| | | | NPN | | 42JS-B2MNB2-F4 |
| | | | PNP | | 42JS-B2MPB2-F4 |
|  <p><i>Transmitted Beam</i> Field of View: 4° Emitter LED: Visible red 645 nm</p> | 10 m (32.8 ft) | 700 mm (27.56 in.) | Visible Red Light Source | No adjustment | 42JS-E2EZB1-F4 |
| | | | NPN | Single-turn adjustment knob | 42JS-R9MNA1-F4❸ |
| | | | PNP | | 42JS-R9MPA1-F4❸ |
| | | | Infrared Light Source | No adjustment | 42JS-E1EZB1-F4 |
| | | | NPN | Single-turn adjustment knob | 42JS-R9MNA2-F4❸ |
| | | | PNP | | 42JS-R9MPA2-F4❸ |

Note: All sensor models are rated for 10...30V DC and can drive loads requiring up to 100 mA.

- ❶ The suffix -F4 denotes 4-pin DC Micro (M12) connection type on a 150 mm (6 in.) length cable. For 4-pin DC Pico (M8) QD on a 150 mm (6 in.) length cable, replace the suffix -F4 with -Y4 (e.g. 42JS-P2MPB1-Y4). For 2 m cable without quick disconnect option replace the suffix -F4 with -A2 (e.g. 42JS-P2MPB1-A2).
- ❷ Use only with visible red light source.
- ❸ Use only with infrared light source.
- ❹ Refer to www.ab.com/e-tools or ProposalWorks to check for product availability.

Cordsets and Accessories

| Cordset | | Accessories | | | |
|---------------------------------|-------------|------------------|------------|---------------------------|-----------|
| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
| DC Micro QD Cordset, 4-pin, 2 m | 889D-F4AC-2 | Mounting Bracket | 60-BJS-L1 | 18 mm Snap-on Adaptor | 60-AJS-18 |
| DC Pico QD Cordset, 4-pin, 2 m | 889P-F4AB-2 | Mounting Bracket | 60-BJS-L2 | 32 mm (1.5 in.) Reflector | 92-47 |
| | | Mounting Bracket | 60-BKTL-SS | 76 mm (3 in.) Reflector | 92-124 |



Features

- Subminiature package style
- Three sensing modes
- Models with and without sensitivity adjustment
- Highly visible LED Indicators
- NPN or PNP output models
- 2 m cable connection

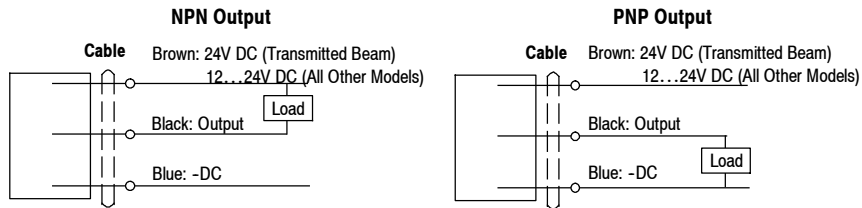
Specifications

| Environmental | |
|------------------------------|---|
| Certifications | UL Listed, CSA Approved, and CE Marked for all applicable directives |
| Operating Environment | NEMA 1, IP40 |
| Operating Temperature [C(F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27 |
| Relative Humidity | 5...85% |
| Optical | |
| Sensing Modes | Diffuse, sharp cutoff, transmitted beam |
| Sensing Range | See Product Selection table on page 1-91 |
| Field of View | See Product Selection table on page 1-91 |
| Light Source | Visible red LED (660 nm) |
| LED Indicators | See User Interface below |
| Adjustments | See Product Selection table on page 1-91 |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 30 mA max |
| Sensor Protection | Reverse polarity for standard diffuse without adjustment, transient noise |
| Outputs | |
| Response Time | 500 μS |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | See Product Selection table on page 1-91 |
| Output Current | 80 mA @ 24V DC |
| Output Leakage Current | 0.5 mA max |
| Mechanical | |
| Housing Material | Polyester |
| Lens Material | Polycarbonate |
| Connection Types | 2 m cable |

User Interface Panel

| Label | Color | State | Status |
|-------|-------|-------|----------------------|
| STB | Green | OFF | 0.8<math><1.2</math> |
| | | ON | 0.8>math>>1.2</math> |
| OUT | Red | OFF | Output not activated |
| | | ON | Output activated |

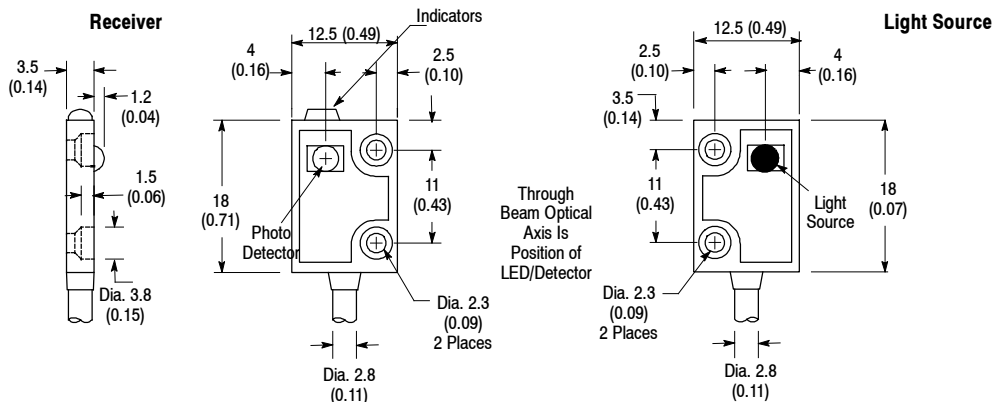
Wiring Diagrams



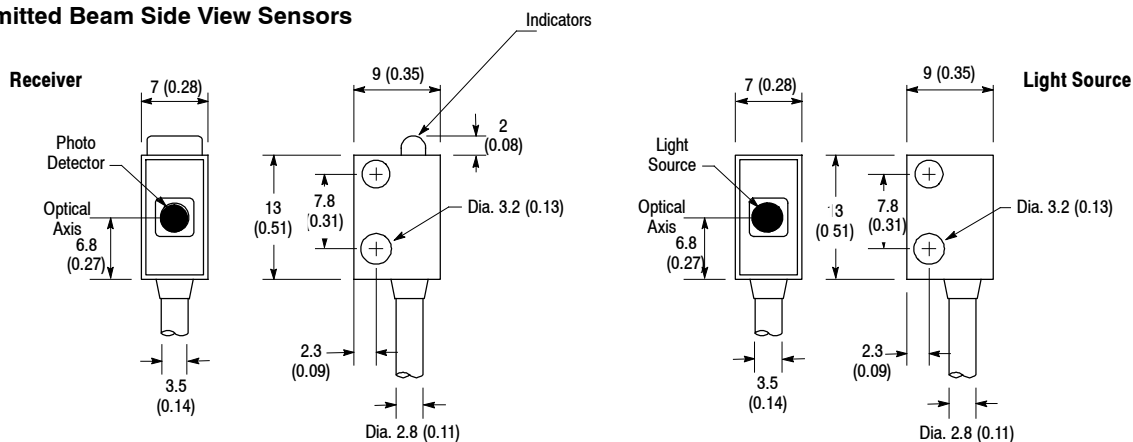
Note: Details regarding connection of Rockwell Automation Bulletin 42KA photoelectric sensors to Rockwell Automation Programmable Controllers can be found in publication 42-2.0.

Approximate Dimensions [mm (in.)]

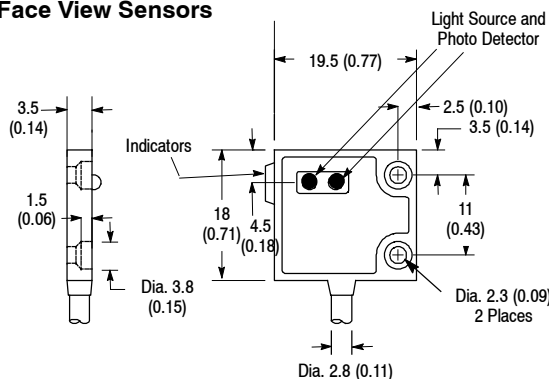
Transmitted Beam Face View Sensors



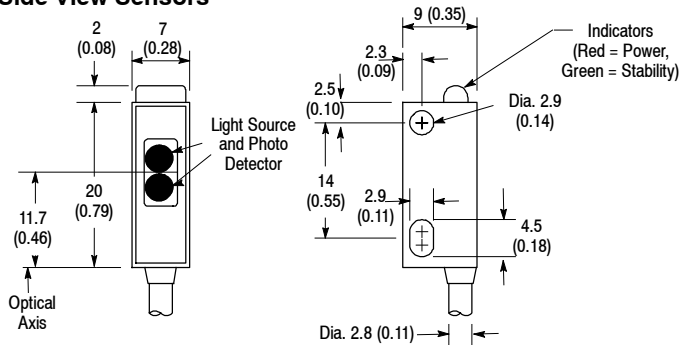
Transmitted Beam Side View Sensors



Face View Sensors

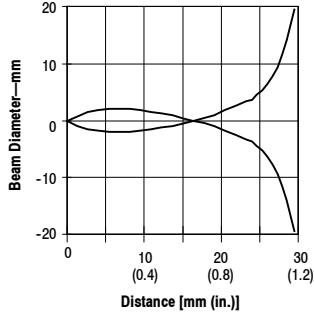
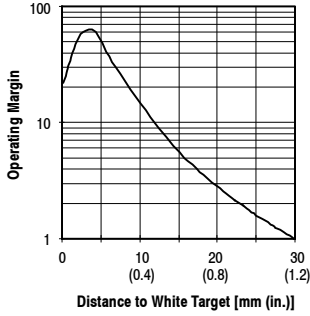


Side View Sensors



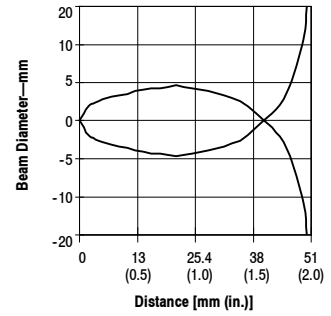
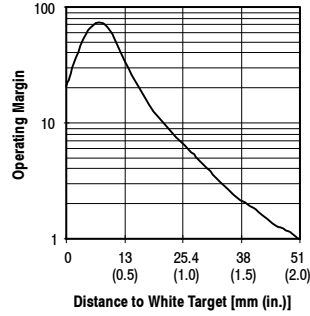
Typical Response Curve Beam Pattern

Standard Diffuse—30 mm

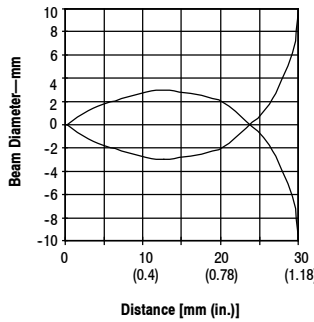
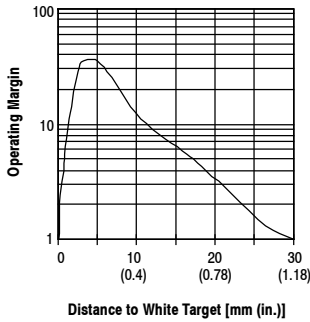


Typical Response Curve Beam Pattern

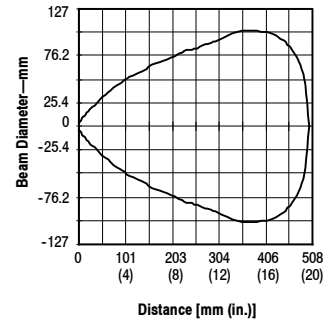
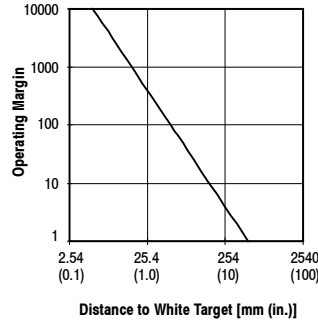
Standard Diffuse—50 mm



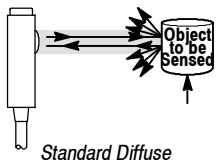
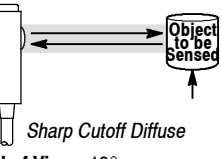
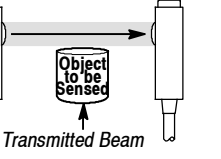
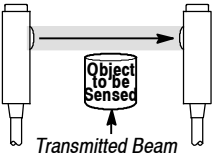
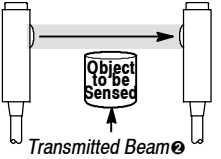
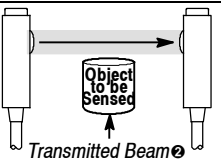
Sharp Cutoff Diffuse



Transmitted Beam



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energ. | Output Type Capacity Response Time | Face or Side View | Sensitiv. Adjust. | Connection Type | Cat. No. |
|--|---|----------------------------------|---------------|--|-------------------|-------------------|-----------------|----------------|
|  <p>Standard Diffuse</p> <p>Field of View: 18° Emitter LED: Visible red 660 nm Face or Side View: Face View</p> | 12...24V DC ±10% 20 mA | 3...50 mm (0.12... 2.0 in.) | Light | NPN 80 mA 0.5 ms | Face | No | 2 m 500V cable | 42KA-D2JNHC-A2 |
| | 12...24V DC ±10% 29 mA | | | PNP 80 mA 0.5 ms | | | | 42KA-D2JPHC-A2 |
| | 12...24V DC ±10% 27 mA | | | NPN 80 mA 0.5 ms | Face | Yes | | 42KA-D2JNFC-A2 |
| | 12...24V DC ±10% 29 mA | | | PNP 80 mA 0.5 ms | | | | 42KA-D2JPFC-A2 |
|  <p>Sharp Cutoff Diffuse</p> <p>Field of View: 18° Emitter LED: Red 660 nm</p> | 12...24V DC ±10% 27 mA | 3...30 mm (0.12... 1.2 in.) | Light Operate | NPN 80 mA 0.5 ms | Side | Yes | 2 m 500V cable | 42KA-S2JNSA-A2 |
| | 12...24V DC ±10% 29 mA | | | PNP 80 mA 0.5 ms | | | | 42KA-S2JPJA-A2 |
|  <p>Transmitted Beam</p> <p>Field of View: 40° Emitter LED: Red 660 nm</p> | 24V DC ±10% Source: 15 mA Receiver: 15 mA | | | NPN 80 mA 0.5 ms | Face | No | | 42KA-T2KNHK-A2 |
| | | | | | Side | | | 42KA-T2KNTK-A2 |
|  <p>Transmitted Beam</p> <p>Field of View: 50° Emitter LED: Red 660 nm</p> | 24V DC ±10% Source: 15 mA Receiver: 22 mA | 3...500 mm (0.12... 19.7 in.) | Dark | | Face | Yes | 2 m 500V cable | 42KA-T2KNFK-A2 |
|  <p>Transmitted Beam</p> <p>Field of View: 40° Emitter LED: Red 660 nm</p> | 24V DC ±10% Source: 15 mA Receiver: 17 mA | | | | Face | No | | 42KA-T2KPHK-A2 |
| | | | | | Side | 42KA-T2KPTK-A2 | | |
|  <p>Transmitted Beam</p> <p>Field of View: 50° Emitter LED: Red 660 nm</p> | 24V DC ±10% Source: 15 mA Receiver: 24 mA | | | | Face | Yes | | 42KA-T2KPFK-A2 |

① See page 1-89 for detailed dimensions.

② Both a light source (emitter) and receiver are included in the package. To identify the light source, replace the "T" in the cat. no. with "E." To identify the receiver, replace the "T" in the cat. no. with "R." Example: 42KA-T2KNHK-A2 contains one 42KA-E2KNHK-A2 light source and one 42KA-R2KNHK-A2 receiver. Light sources and receivers are not available separately.



Features

- Compact rectangular package
- Four sensing modes
- Sensitivity adjustment
- Selectable light/dark operate
- Highly visible LED Indicators
- NPN or PNP output models
- 2 m cable or pico connections

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus Listed and CE Marked for all applicable directives |
| Operating Environment | NEMA 1, 4, 6, 12, 13; IP67 (IEC 60529) |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...85% |
| Optical | |
| Sensing Mode | Retroreflective, diffuse, sharp cutoff diffuse, transmitted beam |
| Sensing Range | See Product Selection table on page 1-95 |
| Field of View | See Product Selection table on page 1-95 |
| Light Source | Visible red LED (660 nm), infrared LED (880 nm) |
| LED Indicators | See User Interface Panel below |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 30 mA max |
| Sensor Protection | Short circuit (NPN models only), reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | 350 μs |
| Output Type | PNP or NPN by cat. no., stability output for NPN models only |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 24V DC |
| Output Leakage Current | 0.5 mA max |
| Mechanical | |
| Housing Material | Polyarylate |
| Lens Material | Acrylic, polycarbonate, polyarylate by cat. no. |
| Connection Types | 2 m cable, 3-pin DC pico (M8) QD |
| Supplied Accessories | Mounting bracket, adhesive apertures (transmitted beam models), screwdriver, reflector (retroreflective models) |
| Optional Accessories | See mounting brackets and cordsets on page 1-97 |

User Interface Panel

| Label | Color | State | Status |
|-------|-------|-------|----------------------|
| STB | Green | OFF | 0.8<math><1.2</math> |
| | | ON | 0.8>math>>1.2</math> |
| OUT | Red | OFF | Output not activated |
| | | ON | Output activated |

Stability Indicator
Output (Green)
Indicator (Red)

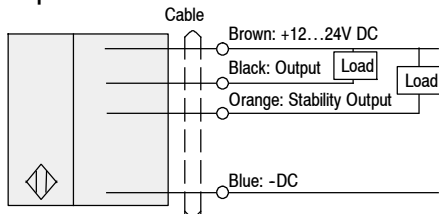
Sensitivity Potentiometer

Stability Indicator (Green)
Output Indicator (Red)

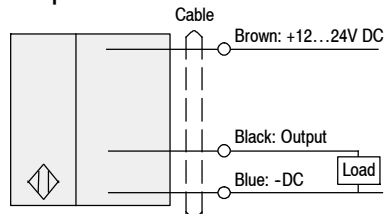
Sensitivity Potentiometer

Wiring Diagrams

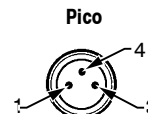
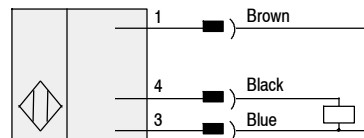
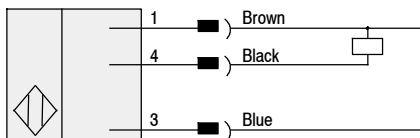
Cable
NPN Output



PNP Output



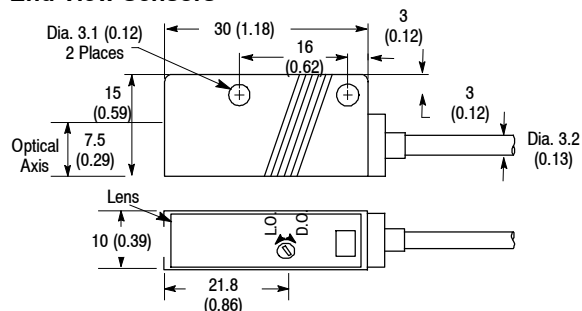
Quick-Disconnect



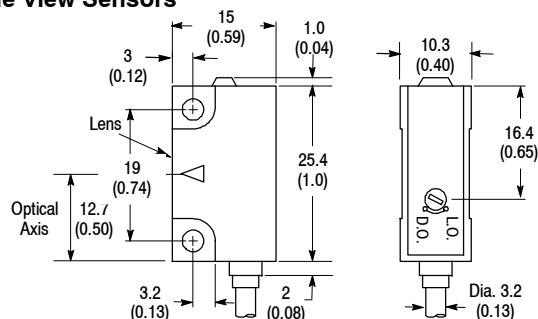
Note: Details regarding connection of Rockwell Automation Bulletin 42KB photoelectric sensors to Rockwell Automation Programmable Controllers can be found in "PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual" on www.ab.com/literature.

Approximate Dimensions [mm (in.)]

End View Sensors

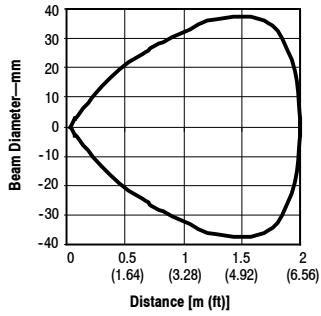
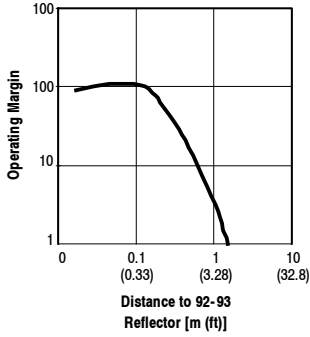


Side View Sensors



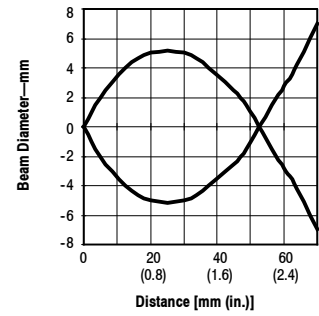
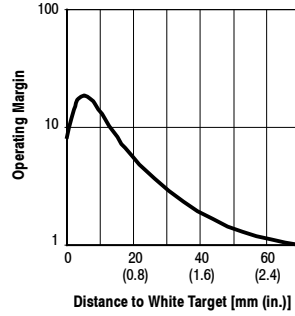
Typical Response Curve Beam Pattern

Retroreflective

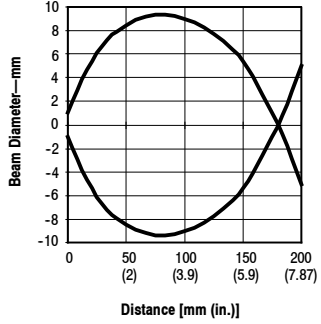
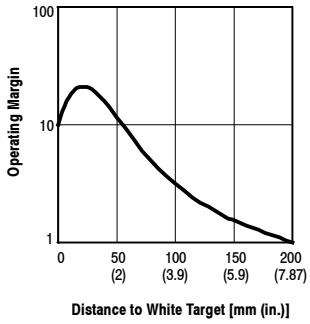


Typical Response Curve Beam Pattern

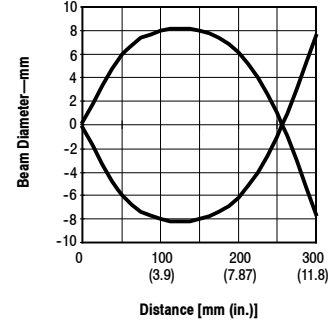
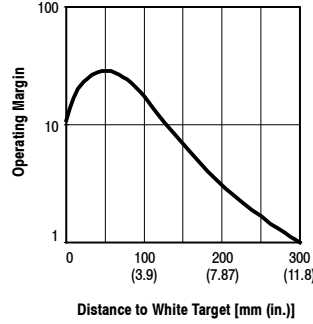
Standard Diffuse—70 mm



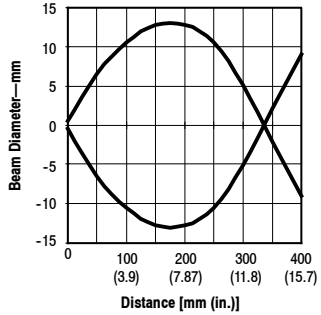
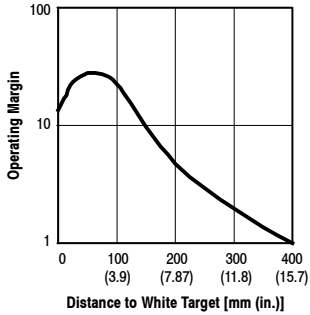
Standard Diffuse—200 mm



Standard Diffuse—300 mm

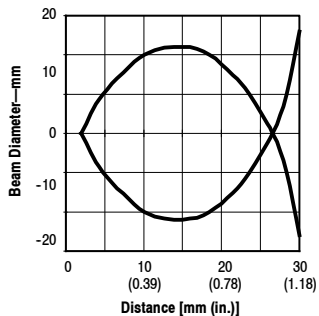
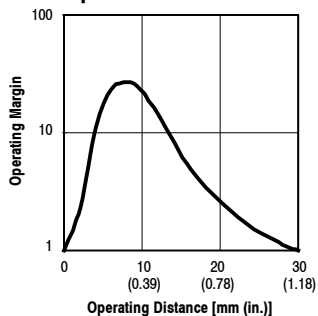


Standard Diffuse—400 mm



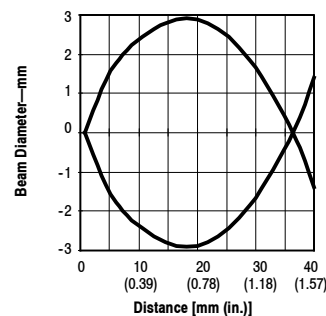
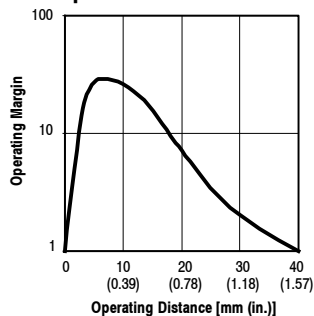
Typical Response Curve Beam Pattern

Sharp Cutoff Diffuse—30 mm

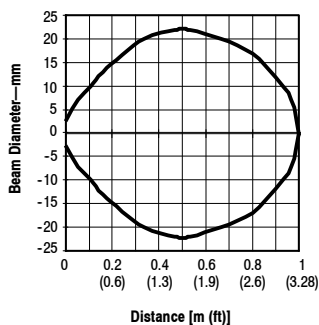
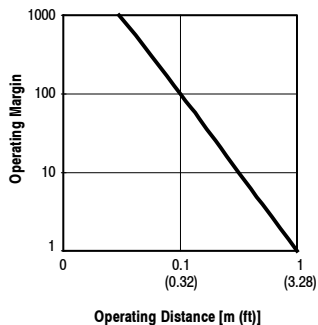


Typical Response Curve Beam Pattern

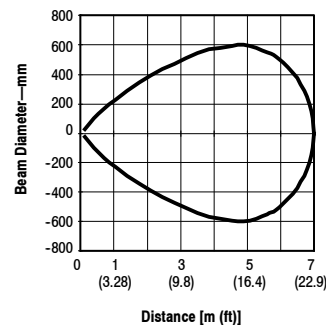
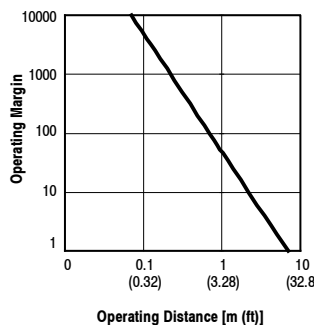
Sharp Cutoff Diffuse—40 mm



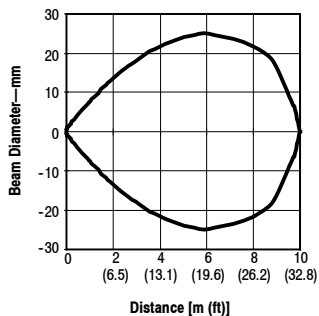
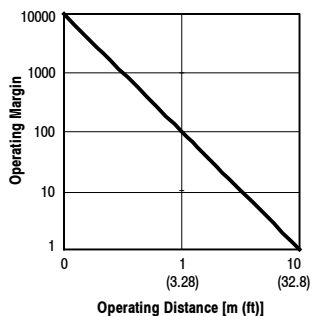
Transmitted Beam—1 m



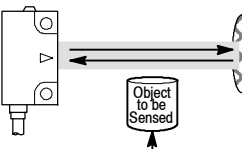
Transmitted Beam—7 m



Transmitted Beam—10 m

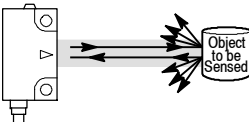
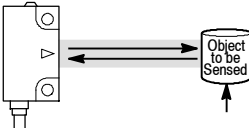


Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | LED Source | Output Type Capacity Response Time | End or Side View | Connection Type | Cat. No. |
|--|-------------------------------------|--|--------------------------|---------------|---|------------------------|--------------------|----------------|
|  <p>Retroreflective</p> <p>Field of View: 5°</p> <p>Emitter LED: Visible red 660 nm</p> | 12...24V DC ±10% 20 mA | 3 mm... 2 m (0.12 in... 6.6 ft) | Light/Dark Selectable | — | NPN Output: 100 mA Stability: 50 mA 350 μs | Side | 2 m 500V cable | 42KB-U2LNSN-A2 |
| | | | | | | | 3-pin pico | 42KB-U2LNSN-Y3 |
| | 12...24V DC ±10% 25 mA | | | | PNP Output: 100 mA 350 μs | | 2 m 500V cable | 42KB-U2LPSN-A2 |
| | | | | | | | 3-pin pico | 42KB-U2LPSN-Y3 |

Refer to page 1-97 for cordsets and accessories.

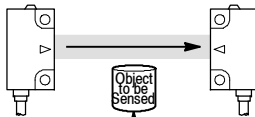
Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance [mm (in.)] | Output Energized | LED Source | Output Type Capacity Response Time | End or Side View | Connection Type | Cat. No. |
|--|-------------------------------------|--------------------------------|--|---------------|--|------------------------|--------------------|-----------------------|
|  <p>Standard Diffuse</p> <p>Field of View: 50 mm Infrared sensors: 20°; All others: 12° Emitter LED: See Product Selection</p> | 12...24V DC ±10% 25 mA | 3...70 (0.12...2.8) | Light/Dark Selectable | IR 950 nm | NPN Output: 100 mA, Stability: 50 mA 350 µs | End | 2 m 500V cable | 42KB-D1LNED-A2 |
| | | | | | | 3-pin pico | 42KB-D1LNED-Y3 | |
| | 12...24V DC ±10% 28 mA | Side | | | 2 m 500V cable | 42KB-D1LNSD-A2 | | |
| | | 3-pin pico | | | 42KB-D1LNSD-Y3 | | | |
| | 12...24V DC ±10% 22 mA | 3...200 (0.12...7.9) | | IR 900 nm | NPN Output: 100 mA, Stability: 50 mA 350 µs | End | 2 m 500V cable | 42KB-D1LPED-A2 |
| | | | | | | 3-pin pico | 42KB-D1LPED-Y3 | |
| | 12...24V DC ±10% 25 mA | 3...300 (0.12...11.8) | | Red 700 nm | PNP Output: 100 mA 350 µs | Side | 2 m 500V cable | 42KB-D1LPSD-A2 |
| | | | | | | 3-pin pico | 42KB-D1LPSD-Y3 | |
| | 12...24V DC ±10% 20 mA | 3...300 (0.12...11.8) | | IR 900 nm | NPN Output: 100 mA, Stability: 50 mA 350 µs | End | 2 m 500V cable | 42KB-D1LNEG-A2 |
| | | | | | | | 3-pin pico | 42KB-D1LNEG-Y3 |
| | 12...24V DC ±10% 25 mA | 3...400 (0.12...15.8) | | Red 700 nm | PNP Output: 100 mA 350 µs | | 2 m 500V cable | 42KB-D2LNEH-A2 |
| | | | | | | | 3-pin pico | 42KB-D2LNEH-Y3 |
| 12...24V DC ±10% 22 mA | 3...300 (0.12...11.8) | IR 900 nm | NPN Output: 100 mA, Stability: 50 mA 350 µs | Side | 2 m 500V cable | 42KB-D2LPEH-A2 | | |
| | | | | | 3-pin pico | 42KB-D2LPEH-Y3 | | |
| 12...24V DC ±10% 25 mA | 3...400 (0.12...15.8) | Red 700 nm | PNP Output: 100 mA 350 µs | Side | 2 m 500V cable | 42KB-D1LNSH-A2 | | |
| | | | | | 3-pin pico | 42KB-D1LNSH-Y3 | | |
| 12...24V DC ±10% 20 mA | 3...300 (0.12...11.8) | IR 900 nm | NPN Output: 100 mA, Stability: 50 mA 350 µs | Side | 2 m 500V cable | 42KB-D1LPSH-A2 | | |
| | | | | | 3-pin pico | 42KB-D1LPSH-Y3 | | |
| 12...24V DC ±10% 25 mA | 3...400 (0.12...15.8) | Red 700 nm | PNP Output: 100 mA 350 µs | Side | 2 m 500V cable | 42KB-D2LNSG-A2 | | |
| | | | | | 3-pin pico | 42KB-D2LNSG-Y3 | | |
| 12...24V DC ±10% 20 mA | 3...400 (0.12...15.8) | Red 700 nm | PNP Output: 100 mA 350 µs | Side | 2 m 500V cable | 42KB-D2LPSG-A2 | | |
| | | | | | 3-pin pico | 42KB-D2LPSG-Y3 | | |
|  <p>Sharp Cutoff Diffuse</p> <p>Field of View: Infrared sensors: 15°; Visible red sensors: 20° Emitter LED: Infrared 900 nm or Visible red 660 nm (See Product Selection)</p> | 12...24V DC ±10% 20 mA | 3...30 (0.12...1.2) | Light/Dark Selectable | Red 660 nm | NPN Output: 100 mA Stability: 50 mA 350 µs | Side | 2 m 500V cable | 42KB-S2LNSA-A2 |
| | | 3-pin pico | | | | | 42KB-S2LNSA-Y3 | |
| | 12...24V DC ±10% 22 mA | 3...40 (0.12...1.6) | | IR 900 nm | NPN Output: 100 mA Stability: 50 mA 350 µs | | 2 m 500V cable | 42KB-S1LNSB-A2 |
| | | | | | | | 3-pin pico | 42KB-S1LNSB-Y3 |
| | 12...24V DC ±10% 25 mA | 3...30 (0.12...1.2) | | Red 660 nm | PNP Output: 100 mA 350 µs | | 2 m 500V cable | 42KB-S2LPSA-A2 |
| | | | | | | | 3-pin pico | 42KB-S2LPSA-Y3 |
| | 12...24V DC ±10% 25 mA | 3...40 (0.12...1.6) | | IR 900 nm | PNP Output: 100 mA 350 µs | | 2 m 500V cable | 42KB-S1LPSB-A2 |
| | | | | | | | 3-pin pico | 42KB-S1LPSB-Y3 |

See page 1-93 for detailed dimensions.

Refer to page 1-97 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | LED Source | Output Type Capacity Response Time | End or Side View ^① | Connection Type | Cat. No. | | |
|--|--|-------------------------------------|-----------------------|-----------------------------|--|-------------------------------|---------------------------------|-----------------------------|----------------|-----------------------------|
|  <p>Transmitted Beam^②</p> <p>Field of View: 1 m sensors: 50°; All others: 24° Emitter LED: Infrared 880 nm or Visible red 700 nm (See Product Selection)</p> | 12...24V DC ±10% Source: 23 mA Receiver: 18 mA | 3 mm...1 m (0.12 in... 3.2 ft) | Light/Dark Selectable | IR 880 nm | NPN Output: 100 mA, Stability: 50 mA 350 μs | End | 2 m 500V cable | 42KB-T1LNEL-A2 ^③ | | |
| | | | | | | | 3-pin pico | 42KB-T1LNEL-Y3 | | |
| | | Side | | | | 2 m 500V cable | 42KB-T1LNLSL-A2 ^③ | | | |
| | | | | | | 3-pin pico | 42KB-T1LNLSL-Y3 | | | |
| | | End | | | | 2 m 500V cable | 42KB-T1LNEQ-A2 | | | |
| | | | | | | 3-pin pico | 42KB-T1LNEQ-Y3 | | | |
| | Side | 2 m 500V cable | | 42KB-T1LNSQ-A2 ^③ | | | | | | |
| | | 3-pin pico | | 42KB-T1LNSQ-Y3 | | | | | | |
| | 12...24V DC ±10% Source: 20 mA Receiver: 18 mA | 3 mm...10 m (0.12 in... 32.8 ft) | | Red 700 nm | Light/Dark Selectable | Red 700 nm | PNP Output: 100 mA 350 μs | Side | 2 m 500V cable | 42KB-T2LNSR-A2 ^③ |
| | | | | | | | | | 3-pin pico | 42KB-T2LNSR-Y3 |
| | | IR 880 nm | | | | | | End | 2 m 500V cable | 42KB-T1LPEL-A2 ^③ |
| | | | | | | | | | 3-pin pico | 42KB-T1LPEL-Y3 |
| Side | | | 2 m 500V cable | | | | | 42KB-T1LPSL-A2 ^③ | | |
| | | | 3-pin pico | | | | | 42KB-T1LPSL-Y3 | | |
| End | 2 m 500V cable | 42KB-T1LPEQ-A2 | | | | | | | | |
| | 3-pin pico | 42KB-T1LPEQ-Y3 | | | | | | | | |
| Side | 2 m 500V cable | 42KB-T1LPSQ-A2 ^③ | | | | | | | | |
| | 3-pin pico | 42KB-T1LPSQ-Y3 | | | | | | | | |
| 12...24V DC ±10% Source: 20 mA Receiver: 21 mA | 3 mm...10 m (0.12 in... 32.8 ft) | Red 700 nm | Light/Dark Selectable | Red 700 nm | PNP Output: 100 mA 350 μs | Side | 2 m 500V cable | 42KB-T2LPSR-A2 ^③ | | |
| | | | | | | | 3-pin pico | 42KB-T2LPSR-Y3 | | |

- ① See page 1-93 for detailed dimensions.
- ② Adhesive 1 mm apertures are included with these sensors.
- ③ Optional metal apertures are available for these sensors under Accessories .
- ④ Both a light source (emitter) and receiver are included in the package. To identify the light source, replace the "T" in the cat. no. with "E." To identify the receiver, replace the "T" in the cat. no. with "R." Example: 42KB-T2KNHK-A2 contains one 42KB-E2KNHK-A2 light source and one 42KB-R2KNHK-A2 receiver. Light sources and receivers are not available separately.

Maximum Operating Distance with Apertures

| Aperture Cat. No. | | | | Sensor Cat. No. | |
|-------------------|-------------------|-------------------|-------------------|-----------------|----------------|
| 61-6726 | 61-6727 | 61-6728 | 61-6729 | | |
| 100 mm (3.93 in.) | 300 mm (11.8 in.) | 400 mm (15.7 in.) | 300 mm (11.8 in.) | 42KB-T1LNLSL-A2 | 42KB-T1LPSL-A2 |
| 400 mm (1.57 in.) | 1 m (39.3 in.) | 3 m (9.8 ft) | 2 m (6.56 ft) | 42KB-T2LNSR-A2 | 42KB-T2LPSR-A2 |
| 300 mm (11.8 in.) | 1 m (39.3 in.) | 2.5 m (8.2 ft) | 1.7 m (5.6 ft) | 42KB-T1LNSQ-A2 | 42KB-T1LPSQ-A2 |

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. |
|------------------------------|-------------|-----------------------------|----------|
| Pico QD Cordset, 3-pin 2 m | 889P-F3AB-2 | Aperture, 2 mm (10 pcs) | 61-6727 |
| End View Bracket (included) | 60-2632 | Aperture, 3 mm (10 pcs) | 61-6728 |
| Side View Bracket (included) | 60-2633 | Aperture, 1 x 5 mm (10 pcs) | 61-6729 |
| Aperture, 1 mm (10 pcs) | 61-6726 | Reflectors (included) | 92-93 |



Features

- Compact rectangular package
- Three sensing modes
- Diagnostic output
- Sensitivity adjustment
- Selectable light/dark operate
- Highly visible LED indicators
- NPN or PNP output models
- 2 m cable or pico connections

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Certified, and CE Marked for all applicable directives |
| Operating Environment | NEMA 1, 4X, 6P, 12, 13; IP67 |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...85% |
| Optical | |
| Sensing Mode | Polarized retroreflective, diffuse, transmitted beam |
| Sensing Range | See Product Selection table on page 1-101 |
| Field of View | See Product Selection table on page 1-101 |
| Light Source | Visible red LED (700 nm) |
| LED Indicators | See User Interface Panel below |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 35 mA max |
| Sensor Protection | Short circuit (NPN models only), reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | 350 μS |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 24V DC |
| Output Leakage Current | 0.5 mA max |
| Mechanical | |
| Housing Material | Polyarylate |
| Lens Material | Acrylic |
| Connection Types | 2 m cable, 4-pin DC pico (M8) QD |
| Supplied Accessories | Mounting bracket, screwdriver, reflector (retroreflective models) |
| Optional Accessories | See mounting brackets and cordsets on page 1-101 |

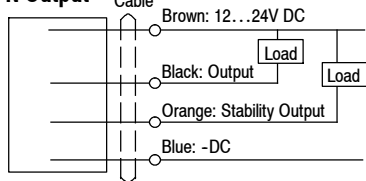
User Interface Panel

| Label | Color | State | Status |
|-------|-------|-------|----------------------|
| STB | Green | OFF | 0.8<math><1.2</math> |
| | | ON | 0.8>math>>1.2</math> |
| OUT | Red | OFF | Output not activated |
| | | ON | Output activated |

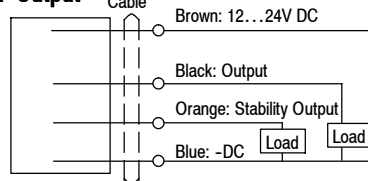
Wiring Diagrams

Cable Version

NPN Output



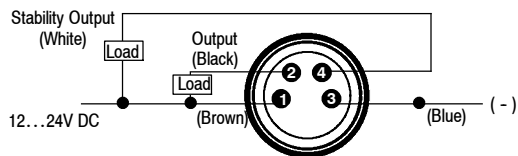
PNP Output



Pico Quick-Disconnect Version

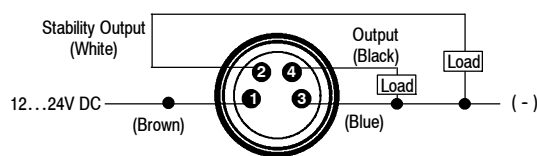
NPN Output

Face View Male Receptacle (Sensor)



PNP Output

Face View Male Receptacle (Sensor)

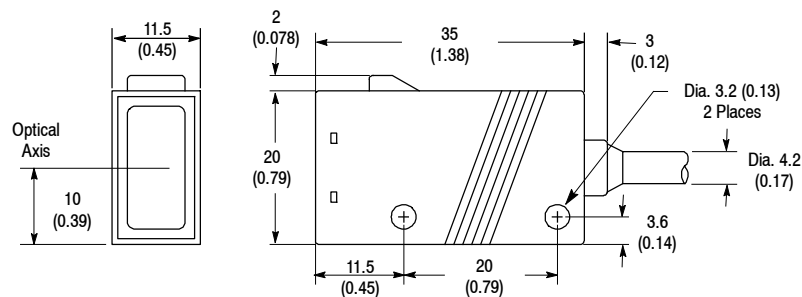


Note: Details regarding connection of Rockwell Automation Bulletin 42KC photoelectric sensors to Rockwell Automation Programmable Controllers can be found in publication 42-2.0.

Approximate Dimensions [mm (in.)]

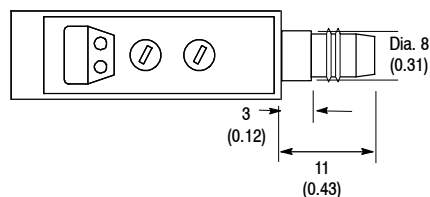
End View Sensors

Cable Version



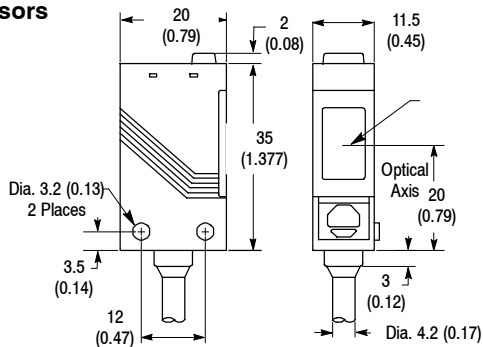
End View Sensors

Pico Quick-Disconnect Version



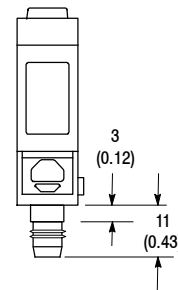
Side View Sensors

Cable Version



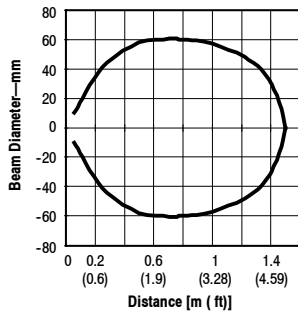
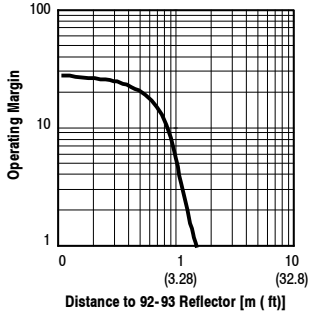
Side View Sensors

Pico Quick-Disconnect Version



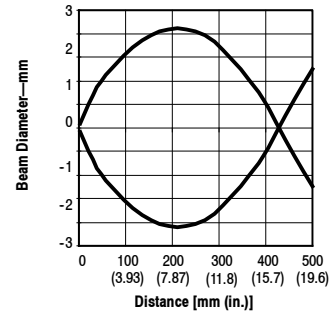
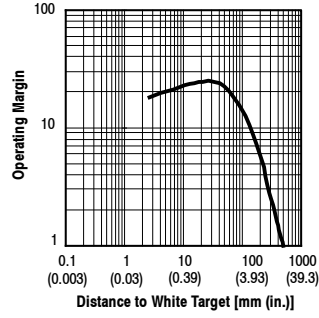
Typical Response Curve Beam Pattern

Polarized Retroreflective

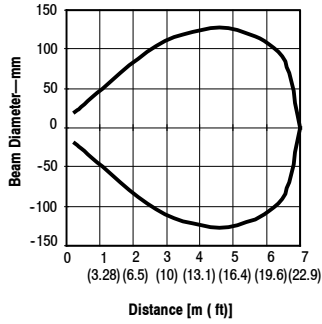
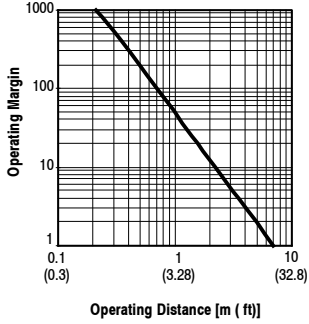


Typical Response Curve Beam Pattern

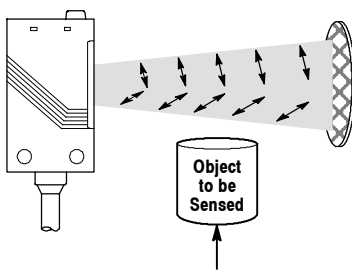
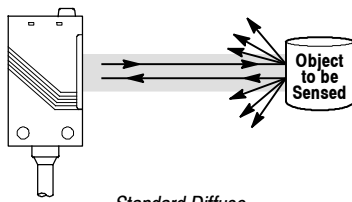
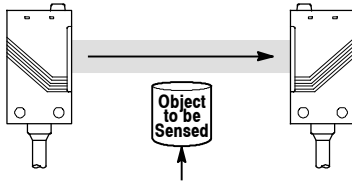
Standard Diffuse



Transmitted Beam



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | End or Side View | Connection Type | Cat. No. |
|--|--|--|--------------------------|---|---------------------|-----------------------|----------------|
|  <p><i>Polarized Retroreflective</i></p> <p>Field of View: 8° Emitter LED: Visible red 700 nm</p> | 12...24V DC ±10% 30 mA | 50 mm... 1.5 m (1.9 in... 4.9 ft) | Light/Dark Selectable | NPN Output: 100 mA Stability: 50 mA 0.5 ms | End | 2 m 500V cable | 42KC-P2LNEM-A2 |
| | 12...24V DC ±10% 35 mA | | | | | 4-pin pico | 42KC-P2LNEM-P4 |
| | | | | | 5V DC ±10% 25 mA | Side | 2 m 500V cable |
| | 4-pin pico | | | | | | 42KC-P2LNSM-P4 |
| | End | | | | 2 m 500V cable | 42KC-P2LPEM-A2 | |
| | | | | | 4-pin pico | 42KC-P2LPEM-P4 | |
| Side | 2 m 500V cable | 42KC-P2LPSM-A2 | | | | | |
| | 4-pin pico | 42KC-P2LPSM-P4 | | | | | |
|  <p><i>Standard Diffuse</i></p> <p>Field of View: 7° Emitter LED: Visible red 700 nm</p> | 12...24V DC ±10% 30 mA | 3...500 mm (0.12... 19.7 in.) | Light/Dark Selectable | NPN Output: 100 mA Stability: 50 mA 0.5 ms | End | 2 m 500V cable | 42KC-D2LNEK-A2 |
| | 12...24V DC ±10% 35 mA | | | | | 4-pin pico | 42KC-D2LNEK-P4 |
| | | | | | Side | 2 m 500V cable | 42KC-D2LNSK-A2 |
| | 4-pin pico | | | | | 42KC-D2LNSK-P4 | |
| | End | | | | 2 m 500V cable | 42KC-D2LPEK-A2 | |
| | | | | | 4-pin pico | 42KC-D2LPEK-P4 | |
| Side | 2 m 500V cable | 42KC-D2LPSK-A2 | | | | | |
| | 4-pin pico | 42KC-D2LPSK-P4 | | | | | |
|  <p><i>Transmitted Beam</i></p> <p>Field of View: 10° Emitter LED: Visible red 700 nm</p> | 12...24V DC ±10% Source: 20 mA Receiver: 20 mA | 50 mm... 7 m (1.9 in... 23.0 ft) | Light/Dark Selectable | NPN Output: 100 mA Stability: 50 mA 0.5 ms | End | 2 m 500V cable | 42KC-T2LNGP-A2 |
| | 12...24V DC ±10% Source: 20 mA Receiver: 25 mA | | | | | 4-pin pico | 42KC-T2LNGP-P4 |
| | | | | | Side | 2 m 500V cable | 42KC-T2LNTP-A2 |
| | 4-pin pico | | | | | 42KC-T2LNTP-P4 | |
| | End | | | | 2 m 500V cable | 42KC-T2LPGP-A2 | |
| | | | | | 4-pin pico | 42KC-T2LPGP-P4 | |
| Side | 2 m 500V cable | 42KC-T2LPTP-A2 | | | | | |
| | 4-pin pico | 42KC-T2LPTP-P4 | | | | | |

① See page 1-99 for detailed dimensions.

② Both a light source (emitter) and receiver are included in the package. To identify the light source, replace the "T" in the cat. no. with "E." To identify the receiver, replace the "T" in the cat. no. with "R." Example: 42KC-T2LNGP-A2 contains one 42KC-E2LNGP-A2 light source and one 42KC-R2LNGP-A2 receiver. Light sources and receivers are not available separately.

Cordsets and Accessories

| Description | Cat. No. |
|----------------------------|-------------|
| Pico QD Cordset, 4-pin 2 m | 889P-F4AB-2 |
| End View Bracket | 60-2634 |
| Side View Bracket | 60-2635 |
| Reflectors (included) | 92-93 |



Description

The Series 7000 is a family of general purpose photoelectric sensors intended for light to medium duty industrial applications. They offer a compact package, wide variety of sensing modes, and high speed response time.

The Series 7000 is available in eight sensing modes thereby ensuring an optimal solution for most applications. Even clear object detection applications can be solved with the use of the ClearSight version.

Features

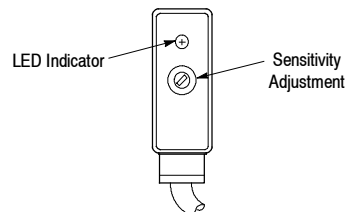
- Compact rectangular package
- Wide selection of sensing modes
- 24V DC operation
- N.O. and N.C. outputs
- Fast response time
- Variety of connection types

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Approved, and CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13; IP67 |
| Operating Temperature [C (F)] | -40...+65° (-40...+150°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Optical | |
| Sensing Modes | Retroreflective, polarized retroreflective, diffuse, wide angle diffuse, transmitted beam, fixed focus diffuse, fiber optic |
| Sensing Range | See Product Selection table on page 1-105 |
| Field of View | See Product Selection table on page 1-105 |
| Light Source | Visible red LED (660 nm) or infrared LED (880 nm) |
| LED Indicators | See User Interface Panel below |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 11...28V DC |
| Current Consumption | 46 mA max |
| Sensor Protection | Reverse polarity |
| Outputs | |
| Response Time | See Product Selection table on page 1-105 |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Complementary light and dark operate |
| Output Current | 100 mA @ 28V DC |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Connection Types | 3 m (9.8 ft) cable, 4-pin DC micro QD on 12-inch pigtail |
| Supplied Accessories | None |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-107 |

User Interface Panel

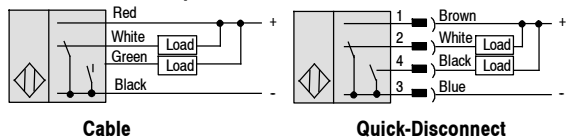
| Label | Color | State | Status |
|--------|-------|-------|----------------------------|
| Output | Red | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |



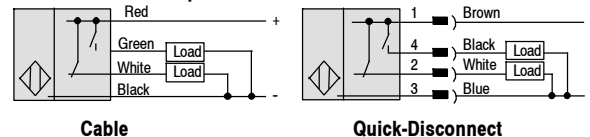
Wiring Diagrams

10.8...30V DC Sensors

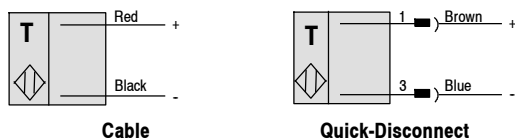
Models with NPN Outputs



Models with PNP Outputs



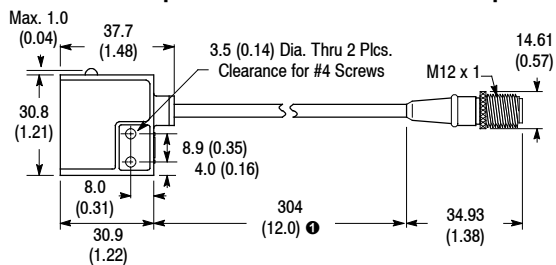
Transmitted Beam Source—All Models



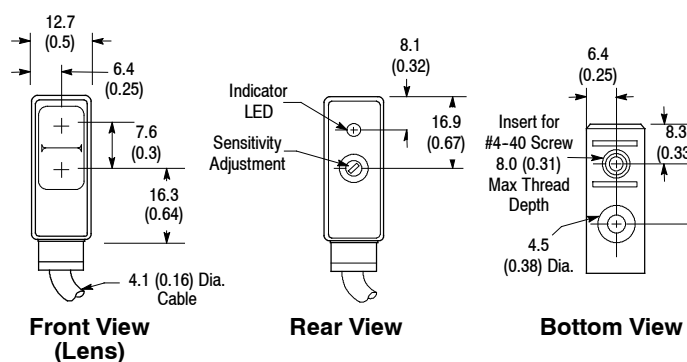
Note: Details regarding connection of Rockwell Automation Bulletin Series 7000 photoelectric sensors to Rockwell Automation Programmable Controllers can be found in the *PHOTOSWITCH® Interface Manual*. Refer to www.ab.com/literature to obtain this publication.

Approximate Dimensions [mm (in.)]

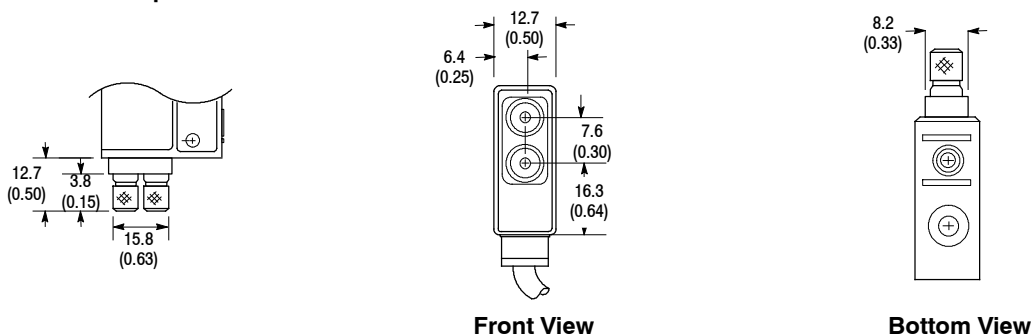
All Models Except Visible Red Plastic Fiber Optic



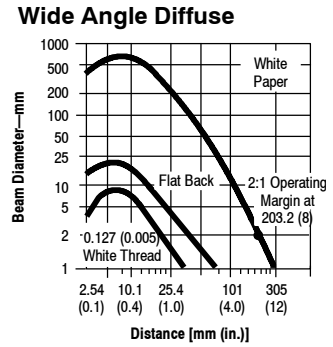
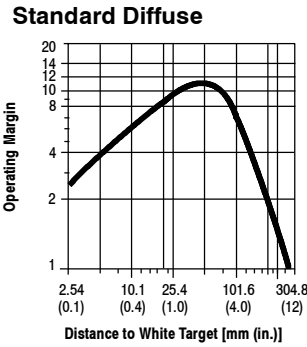
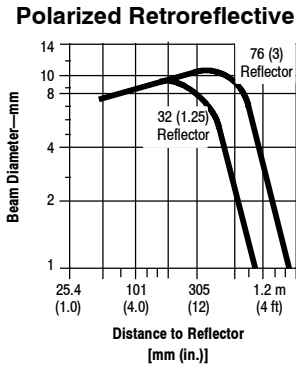
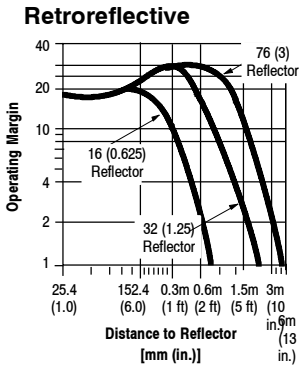
① Quick-disconnect cable length shown. Cable versions length is 3 m (10 ft).



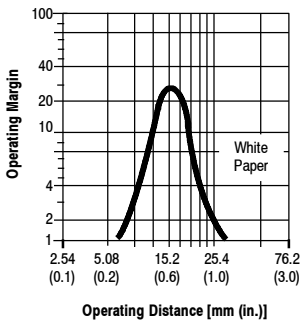
Visible Red Plastic Fiber Optic Models



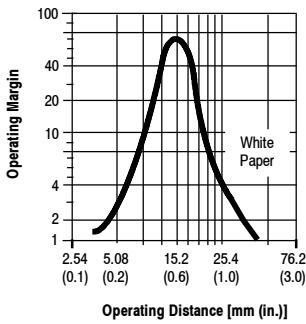
Typical Response Curve



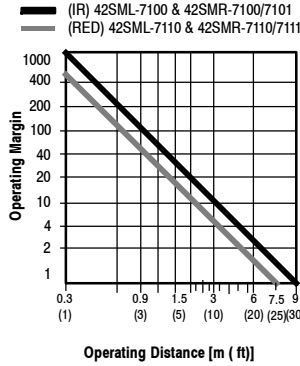
Fixed Focus Diffuse Green LED



Fixed Focus Diffuse Red LED

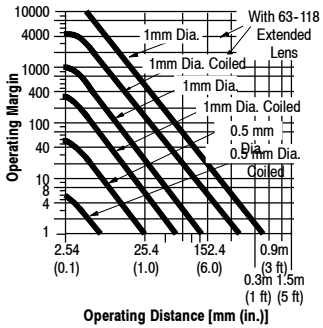


Transmitted Beam

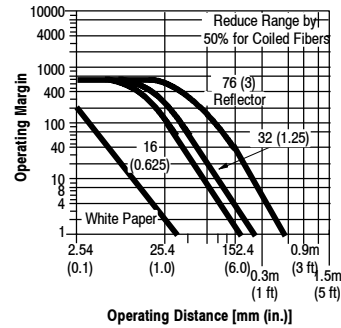


Small Aperture Fiber Optic

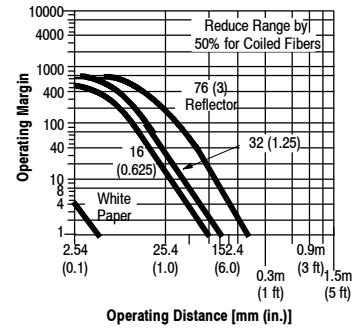
Transmitted Beam for 0.5 (0.02) Dia. and 1 (0.04) Dia. Plastic Fibers



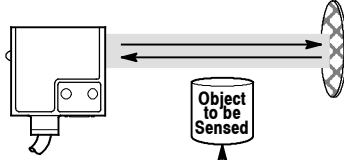
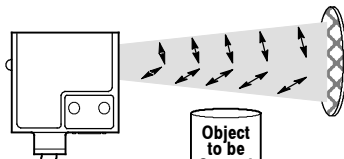
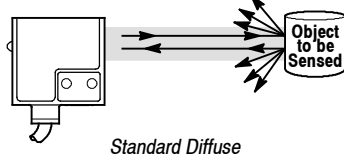
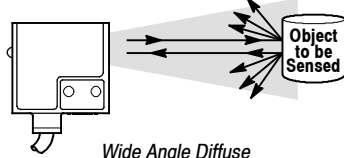
Retroreflective Beam for 1 (0.04) Dia. Plastic Fibers



Reflective Beam for 0.5 (0.02) Dia. Plastic Fibers



Product Selection

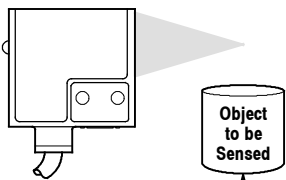
| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|------------------------------------|----------------------------|--|-----------------|----------------------|
|  <p><i>Retroreflective</i></p> <p>Field of View: 3° Emitter LED: Visible red 660 nm</p> | 11...28V DC 46 mA | 25.4 mm...3.7m (1 in...12.0 ft) | Complementary L.O./D.O. | NPN 100 mA 500 μs | 3 m cable | 42SMU-7000 |
| | | | | | 4-pin DC micro | 42SMU-7000-QD |
| | | | | | 3 m cable | 42SMU-7001 |
| | | | | | 4-pin DC micro | 42SMU-7001-QD |
|  <p><i>Polarized Retroreflective</i></p> <p>Field of View: 3° Emitter LED: Visible red 660 nm</p> | 11...28V DC 46 mA | 50.8 mm...2 m (2 in...6.6 ft) | Complementary L.O./D.O. | NPN 100 mA 500 μs | 3 m cable | 42SMU-7200 |
| | | | | | 4-pin DC micro | 42SMU-7200-QD |
| | | | | | 3 m cable | 42SMU-7201 |
| | | | | | 4-pin DC micro | 42SMU-7201-QD |
|  <p><i>Standard Diffuse</i></p> <p>Field of View: 7° Emitter LED: Infrared 880 nm</p> | 11...28V DC 46 mA | 25.4...229 mm (1...9.0 in.) | Complementary L.O./D.O. | NPN 100 mA 500 μs | 3 m cable | 42SMP-7000 |
| | | | | | 4-pin DC micro | 42SMP-7000-QD |
| | | | | | 3 m cable | 42SMP-7001 |
| | | | | | 4-pin DC micro | 42SMP-7001-QD |
|  <p><i>Wide Angle Diffuse</i></p> <p>Field of View: 43° Emitter LED: Infrared 880 nm</p> | 11...28V DC 46 mA | 5...280 mm (0.2...11 in.) | Complementary L.O./D.O. | NPN 100 mA 500 μs | 3 m cable | 42SMP-7010 |
| | | | | | 4-pin DC micro | 42SMP-7010-QD |
| | | | | | 3 m cable | 42SMP-7011 |
| | | | | | 4-pin DC micro | 42SMP-7011-QD |

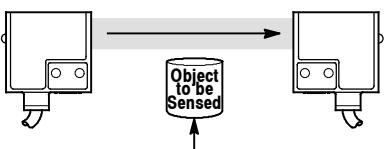
Refer to page 1-107 for cordsets and accessories.

Series 7000

Miniature Rectangular

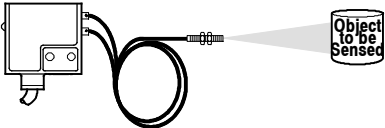
Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Emitter LED | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|--|----------------------------|--|--------------------|----------------------|
|  <p>Fixed Focus Diffuse</p> | 11...28V DC 46 mA | Red 660 nm 15.2 mm sensing range | Complementary L.O./D.O. | NPN 100 mA 500 μs | 3 m cable | 42SMP-7020 |
| | | | | | 4-pin DC micro | 42SMP-7020-QD |
| | | | | PNP 100 mA 500 μs | 3 m cable | 42SMP-7021 |
| | | | | | 4-pin DC micro | 42SMP-7021-QD |
| | | NPN 100 mA 1 ms | | 3 m cable | 42SMP-7320 | |
| | | | | 4-pin DC micro | 42SMP-7320-QD | |
| | | PNP 100 mA 1 ms | | 3 m cable | 42SMP-7321 | |
| | | | | 4-pin DC micro | 42SMP-7321-QD | |

| Sensing Mode | Operating Voltage Supply Current | Sensing Range/Field of View | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|---|-------------------------------------|--|--------------------|-------------------|
|  <p>Transmitted Beam Standard Diffuse</p> <p>Emitter LED (Infrared, 42SML-7100) Emitter LED (Visible Red, 42SML-7110)</p> | 11...28V DC 45 mA | 10 mm...9.2 m (0.39 in...30 ft)/ 3° | NA Light Source | | 3 m cable | 42SML-7100 |
| | 11...28V DC 35 mA | 10 mm...7.6m (0.39 in...25 ft)/ 3° | | | 4-pin DC micro | 42SML-7100-QD |
| | | | | | 3 m cable | 42SML-7110 |
| | 4-pin DC micro | 42SML-7110-QD | | | | |
| | 11...28V DC 25 mA | 8° (For IR Light Source) | Complementary L.O./D.O. | NPN 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7100 |
| | | | | | 4-pin DC micro | 42SMR-7100-QD |
| | | | PNP 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7101 | |
| | | | | 4-pin DC micro | 42SMR-7101-QD | |
| | | | NPN 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7120 | |
| | | | | 4-pin DC micro | 42SMR-7120-QD | |
| | | | PNP 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7121 | |
| | | | | 4-pin DC micro | 42SMR-7121-QD | |
| | | | NPN 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7110 | |
| | | | | 4-pin DC micro | 42SMR-7110-QD | |
| | | | PNP 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7111 | |
| | | | | 4-pin DC micro | 42SMR-7111-QD | |
| NPN 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7130 | | | | |
| | 4-pin DC micro | 42SMR-7130-QD | | | | |
| PNP 100 mA 1 ms ON/1.5 ms OFF | 3 m cable | 42SMR-7131 | | | | |
| | 4-pin DC micro | 42SMR-7131-QD | | | | |

Refer to page 1-107 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|--|------------------------------------|--|--------------------|---------------|
|  <p><i>Small Aperture Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable selected</p> <p>Emitter LED: Visible red 660 nm</p> | <p>11...28V DC 46 mA</p> | <p>Depends on Fiber Optic cable selected</p> | <p>Complementary L.O./D.O.</p> | <p>NPN 100 mA 1 ms</p> | 3 m cable | 42SMF-7100 |
| | | | | | 4-pin DC micro | 42SMF-7100-QD |
| | | | | <p>PNP 100 mA 1 ms</p> | 3 m cable | 42SMF-7101 |
| | | | | | 4-pin DC micro | 42SMF-7101-QD |

Cordsets and Accessories

| Description | Cat./Page No. | Description | Cat./Page No. | Description | Cat./Page No. |
|------------------------------------|--------------------|--|---------------|---|---------------|
| DC Micro QD Cordset, 4-pin, 2 m | 889D-F4AC-2 | 76 mm (3 in.) Diameter Reflector | 92-39 | Bifurcated Fiber Optic Cables, 1 mm Diameter | 43PT-NDS57ZS |
| Tilt/Swivel Bracket | 60-2619 | 32 mm (1.25 in.) Diameter Reflector | 92-47 | Individual Fiber Optic Cables, 1 mm Diameter | 43PT-NBS56FM |

Series 7000 LTD

Miniature Rectangular Style



General Specifications

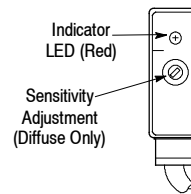
| | |
|-------------------------------|--|
| Light Source | See Product Selection |
| Unit Protection | Reverse polarity |
| Supply Voltage | See Product Selection |
| Current Consumption | 46 mA maximum |
| Output Type | NPN or PNP |
| Output Mode | Light operate |
| Output Rating | 100 mA @ 28V DC |
| Max Leakage Current | 10 µA |
| Response Time | 1 ms |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| LED Indicators | See User Interface below |
| Connection Types | 3m 300V cable; 4-pin DC micro QD on 12-inch pigtail |
| Supplied Accessories | None |
| Optional Accessories | Mounting brackets, reflectors, cordsets |
| Operating Environment | NEMA 12 (IP62) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Operating Temperature [C (F)] | -40...+65° (-40...+150°) |
| Relative Humidity | 5...95% |
| Certifications | UL Listed, CSA Approved, and CE Marked for all applicable directives |

Features

- Low cost sensing solution
- Compact rectangular package
- Wide selection of sensing modes
- 24V DC operation
- NPN or PNP outputs
- Fast response time
- Variety of connection types

User Interface Panel

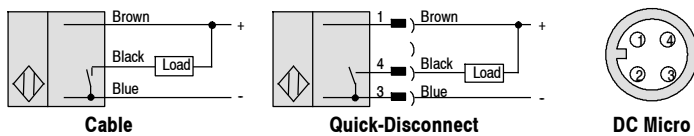
| Label | Color | State | Status |
|--------|-------|-------|----------------------------|
| Output | Red | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |



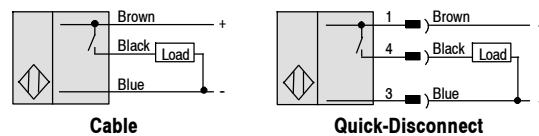
Wiring Diagrams

All Models with Output

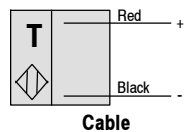
Models with NPN Output



Models with PNP Output



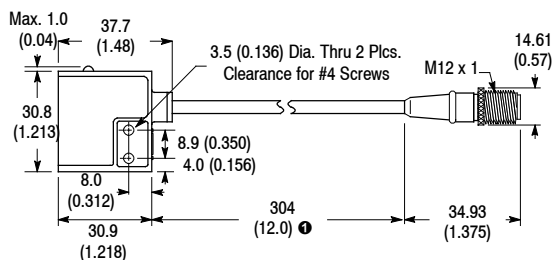
Transmitted Beam Source



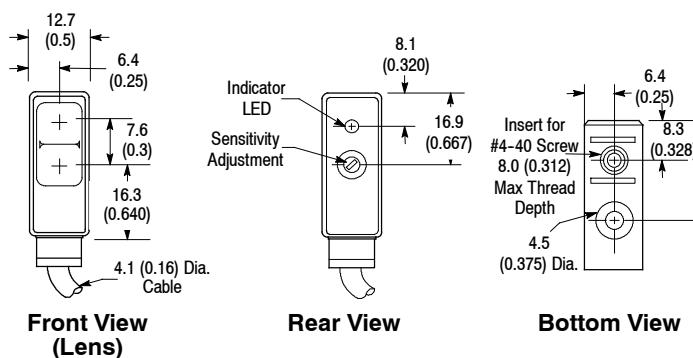
Note: Details regarding connection of Allen-Bradley Series 7000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

All wire colors shown refer to Allen-Bradley quick-disconnect cables.

Approximate Dimensions [mm (in.)]



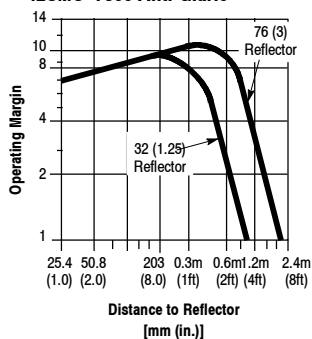
① Quick-disconnect cable length shown. Cable versions length is 3 m (10 ft).



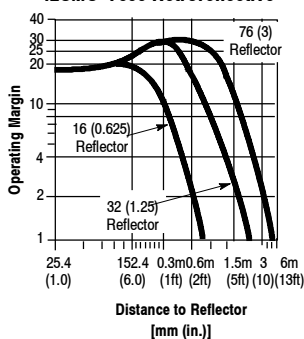
Typical Response Curve

Retroreflective and Anti-Glare Retroreflective

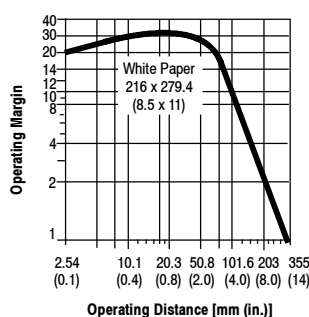
42SMU-7800 Anti-Glarie



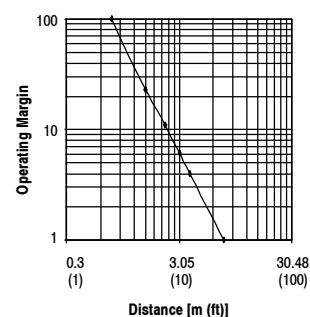
42SMU-7600 Retroreflective



Standard Diffuse



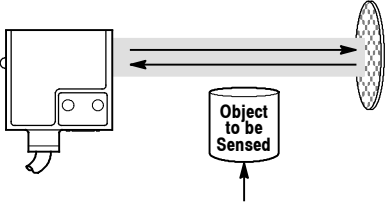
Transmitted Beam



Series 7000 LTD

Miniature Rectangular Style

Product Selection

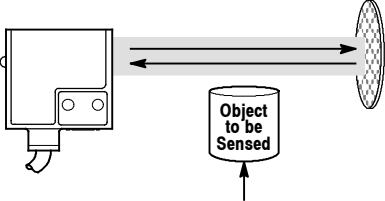
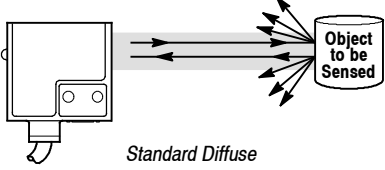
| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|-------------------------------------|---------------------|--|----------------------|---------------|
| Retroreflective Sensors | | | | | | |
|  <p><i>Retroreflective and Anti-Glare Retroreflective</i></p> <p>Field of View: 5° Emitter LED: Visible red 660nm</p> | 10...30V DC 30 mA | 50 mm (2 in.)... 3.6 m (12.0 ft) | Light | NPN 100 mA 1 ms | 3 m cable | 42SMU-7600 |
| | | | | | 4-pin DC micro QD | 42SMU-7600-QD |
| | | | | PNP 100 mA 1 ms | 3 m cable | 42SMU-7601 |
| | | | | | 4-pin DC micro QD | 42SMU-7601-QD |

Refer to the next page for cordsets and accessories.

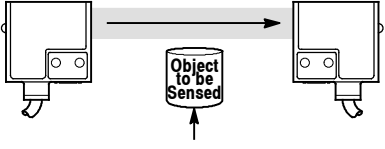
Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Field of View | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--------------|-------------------------------------|---------------------|------------------|--|--------------------|----------|
|--------------|-------------------------------------|---------------------|------------------|--|--------------------|----------|

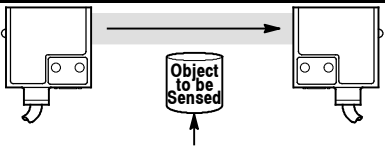
Product Selection for Antiglare Retroreflective Sensors

| | | | | | | |
|--|----------------------|---------------------------------|-------|-----------------------|----------------|---------------|
|  <p>Retroreflective and Anti-Glare Retroreflective</p> <p>Field of View: 5° Emitter LED: Visible red 660 nm</p> | 10...30V DC 20 mA | 50mm (2in) to 2.0m (6.6ft) | Light | NPN 100 mA 1 ms | 3 m cable | 42SMU-7800 |
| | | | | | 4-pin DC micro | 42SMU-7800-QD |
| | | | | PNP 100 mA 1 ms | 3 m cable | 42SMU-7801 |
| | | | | | 4-pin DC micro | 42SMU-7801-QD |
|  <p>Standard Diffuse</p> <p>Field of View: 6° Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA | 5mm (0.2in) to 210mm (8.5in) | Light | NPN 100 mA 1 ms | 3 m cable | 42SMP-7600 |
| | | | | | 4-pin DC micro | 42SMP-7600-QD |
| | | | | PNP 100 mA 1 ms | 3 m cable | 42SMP-7601 |
| | | | | | 4-pin DC micro | 42SMP-7601-QD |

Product Selection for Light Source

| | | | | | | |
|--|----------------------|---|----|----------|-----------|--------------|
|  <p>Transmitted Beam</p> <p>Emitter LED: 950 nm (37.4 in.)</p> | 11...27V DC 25 mA | 10 mm (0.39 in.)... 6.4 m (21 ft) | 3° | Infrared | 3 m cable | 42SML-7600-3 |
|--|----------------------|---|----|----------|-----------|--------------|

Product Selection for Receivers to Use With Infrared Light Sources

| | | | | | | |
|---|----------------------|---------------|----|-----------------------|-----------|--------------|
|  <p>Transmitted Beam</p> <p>Emitter LED: 950 nm (37.4 in.)</p> | 11...27V DC 25 mA | Light Operate | 8° | NPN 100 mA 1 ms | 3 m cable | 42SMR-7600-3 |
|---|----------------------|---------------|----|-----------------------|-----------|--------------|

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. |
|------------------------------------|-------------|--|----------|
| DC Micro QD Cordset, 4-pin, 2 m | 889D-F4AC-2 | 76 mm (3 in.) Diameter with Center Mount Hole | 92-39 |
| Mounting Assemblies | 1-293 | 32 mm (1.25 in.) Diameter | 92-47 |



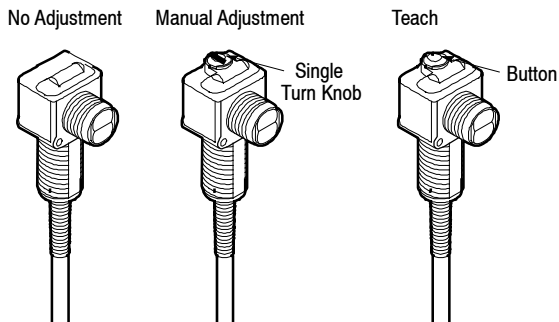
Features

- Class 1 eye safe visible laser
- Models with teach function
- Compact right angle housing
- Flexible 18 mm mounting options
- 360° visible LED indicators
- Reverse polarity protection
- Short-circuit protected outputs
- 1 ms response time
- False pulse protection
- NPN and PNP outputs

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Certified, and CE Marked for all applicable directives |
| Operating Environment | IP54 (IEC 60529) |
| Operating Temperature [C (F)] | -10...+40° (14...+104°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% (noncondensing) |
| Optical | |
| Sensing Modes | Polarized retroreflective, diffuse, transmitted beam |
| Sensing Range | See Product Selection table on page 1-111 |
| Field of View | See Product Selection table on page 1-111 |
| Light Source | Class 1 visible red laser (660 nm) |
| LED Indicators | See User Interface below |
| Electrical | |
| Voltage | 24V DC ± 10% |
| Current Consumption | 30 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 1 ms (4 ms for transmitted beam) |
| Output Type | PNP and NPN |
| Output Mode | Light or dark operate by cat. no. |
| Output Current | 100 mA @ 24V DC max |
| Output Leakage Current | 0.1 mA max |
| Mechanical | |
| Housing Material | Mindel |
| Lens Material | Acrylic |
| Connection Types | 2 m cable (24 AWG), 4-pin DC micro (M12) QD |
| Supplied Accessories | 18 mm mounting nut |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-111 |

User Interface

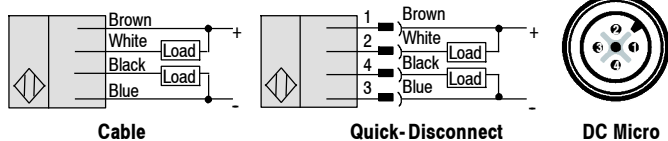


| LED Color | State | Status—Teachable and Adjustable Versions | Status—Transmitted Beam Receiver |
|-----------|----------|--|--|
| Yellow | OFF | Output de-energized | |
| | ON | Output energized | |
| | Flashing | NA | Output SCP active |
| Orange | OFF | Normal operation | Margin < 2.5x |
| | ON | Teach mode active | Margin > 2.5x |
| Green | Flashing | Output SCP active Teach mode active | NA |
| | OFF | Sensor not powered | Sensor not powered, output on, or SCP active |
| | ON | Sensor powered | |
| | Flashing | Unstable margin condition (0.7x...2.0x) or output SCP active | NA |

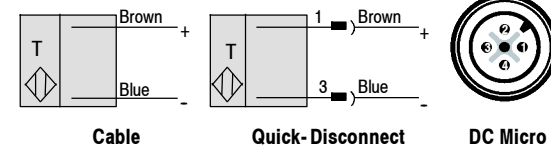
Note: For laser models, output and margin LEDs flash simultaneously when SCP active.

Wiring Diagrams ①②

Output Versions



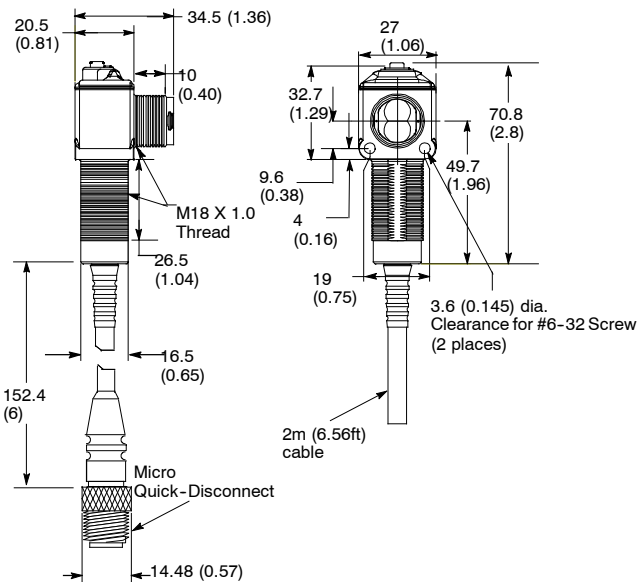
Transmitted Beam Source



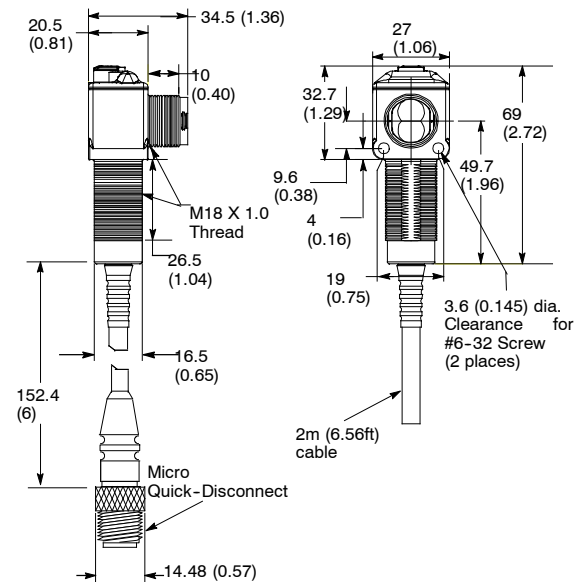
- ① For Rockwell Automation programmable controller compatible interface, refer to publication 42-2.0.
- ② All wire colors on quick-disconnect models refer to Rockwell Automation 889D cordsets.

Approximate Dimensions [mm (in.)]

Teach Function Models



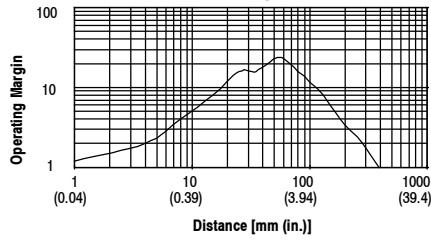
Adjustable Models



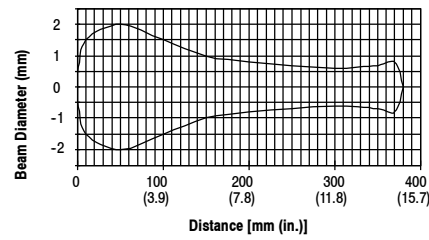
Note: All sensors supplied with one M18 mounting nut (Cat. No. 75012-097-01).

Typical Response Curve

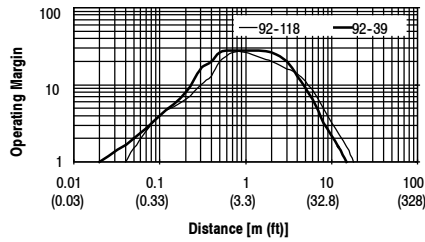
Standard Diffuse—Margin



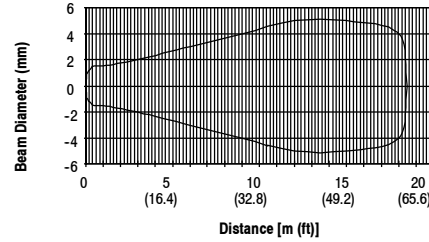
Standard Diffuse—Beam Pattern



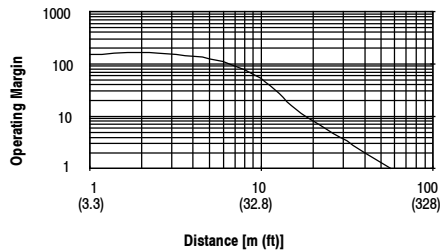
Polarized Retroreflective—Margin



Polarized Retroreflective—Beam Pattern



Transmitted Beam—Margin

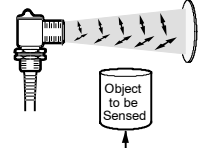
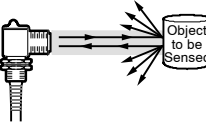
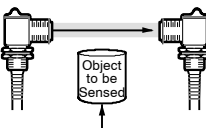


Typical Spot Size

| Model | Distance | 300 mm | 15 m | 40 m |
|-----------------------------|-----------|---------|------------|--------------|
| Polarized Retroreflective ❶ | Spot Size | 2 x 3.5 | 16 x 20 mm | — |
| Diffuse | | 2 x 3.5 | — | — |
| Transmitted Beam ❶ | | 2 x 3.5 | 16 x 20 mm | 50 mm x 70 m |

❶ Actual spot size may be smaller.

Product Selection

| Sensing Mode | Supply Voltage | Sensing Distance [mm (in.)] | Adjustment Type | Output Energized | Output Type/ Rating/ Response Time | Connection Type | Cat. No. | |
|---|----------------|---------------------------------|-----------------------------------|------------------|--------------------------------------|--------------------------------------|----------------------|---------------|
|  Polarized Retroreflective | 24V DC ±10% | 0.05...15 m (0.16...49.2 ft) | Teach Button | Dark Operate | NPN and PNP/ 100 mA/ 1 ms max. | 2 m 300V cable | 42EF-P8KBC-A2 | |
| | | | | | | 4-pin DC micro QD | 42EF-P8KBC-F4 | |
|  Standard Diffuse | | 300 (11.8) | Single-Turn Knob | Light Operate | NPN and PNP/ 100 mA/ 1 ms max. | 2 m 300V cable | 42EF-D8JBA-A2 | |
| | | | | | | 4-pin DC micro QD | 42EF-D8JBA-F4 | |
|  Transmitted Beam | | 300 (11.8) | Teach Button | Light Operate | NPN and PNP/ 100 mA/ 1 ms max. | 2 m 300V cable | 42EF-D8JBC-A2 | |
| | | | | | | 4-pin DC micro QD | 42EF-D8JBC-F4 | |
| | | Light Source | NA | NA | NA | 2 m 300V cable | 42EF-E8EZB-A2 | |
| | | | | | | 4-pin DC micro QD | 42EF-E8EZB-F4 | |
| | | | 0.015...40 m (0.05...131.2 ft) | No Adjustment | Dark Operate | NPN and PNP/ 100 mA/ 4 ms max. | 2 m 300V cable | 42EF-R7KBB-A2 |
| | | | | | | 4-pin DC micro QD | 42EF-R7KBB-F4 | |

Cordsets and Accessories

| Description | Cat. No. |
|---|-------------|
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 |
| Microcube reflector for polarized retroreflective laser sensors | 92-118 |
| Swivel/Tilt bracket allows ±10° vertical and 360° rotation adjustment | 60-2649 |
| Right Angle Bracket | 60-2677 |



Features

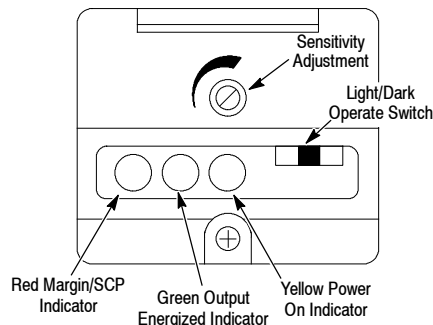
- Class II laser light source
- Long range polarized retroreflective and transmitted beam sensing modes
- Visible red beam for easy alignment
- Robust 30 mm housing
- Both NPN and PNP outputs (DC)
- SPDT relay output (AC)
- Selectable light/dark operate
- Micro, mini QD, 2 m cable connections

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | UL Listed, CSA Approved, CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13; IP67 (IEC529) 1200 psi (8270 kPa) washdown, IP69K |
| Operating Temperature [C (F)] | -10...+40° (14...+104°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Polarized retroreflective and transmitted beam |
| Sensing Range | See Product Selection table on page 1-114 |
| Field of View | See Product Selection table on page 1-114 |
| Light Source | Class 2 laser |
| LED Indicators | See User Interface Panel below |
| Adjustments | Single-turn potentiometer for sensitivity |
| Electrical | |
| Voltage | 10...30V DC , 110...132V AC models, 10...264 V AC/DC models |
| Current Consumption | 45 mA max (DC models), 10 mA max (AC/DC models), 70 mA max AC models |
| Sensor Protection | Overload (DC only), short circuit (DC only), reverse polarity, false pulse |
| Outputs | |
| Response Time | See Product Selection table on page 1-114 |
| Output Type | PNP and NPN (DC only), EM relay |
| Output Mode | Light operate or dark operate selectable |
| Output Current | See Product Selection table on page 1-114 |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Cover Material | Neoprene |
| Connection Types | 2 m 300V AC cable, 4-pin DC micro QD, 4-pin DC mini QD, 5-pin DC micro QD |
| Supplied Accessories | 129- 130 mounting kit |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-114 |

User Interface Panel

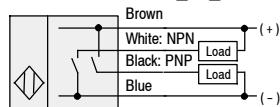
| Label | Color | State | Status |
|------------|--------|----------|----------------------|
| Margin/SCP | Red | OFF | Margin < 2.5 |
| | | ON | Margin > 2.5 |
| | | Flashing | Output SCP active |
| Output | Green | OFF | Output not activated |
| | | ON | Output activated |
| Power | Yellow | OFF | Sensor not powered |
| | | ON | Sensor powered |



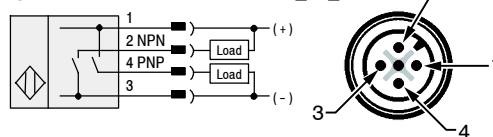
Wiring Diagrams

DC Models

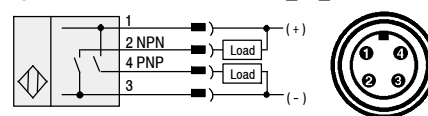
Cable Model: 42GR_-9_L0



4-pin DC Micro QD Model: 42GR_-9_L0-QD

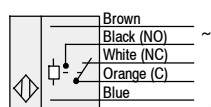


4-pin DC Mini QD Model: 42GR_-9_L0-QD1

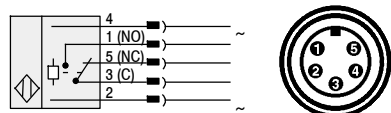


AC Models

Cable Model: 42GR_-9_L2

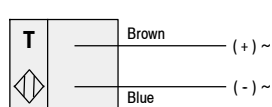


5-pin AC Mini QD Model: 42GR_-9_L2-QD

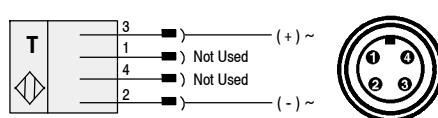


Transmitted Beam Source

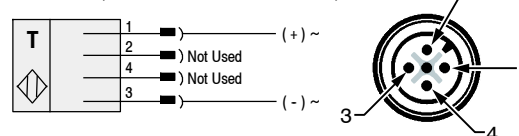
Cable Model: 42GRL-90L0



AC/DC Mini QD Model: 42GRL-90L2-QD

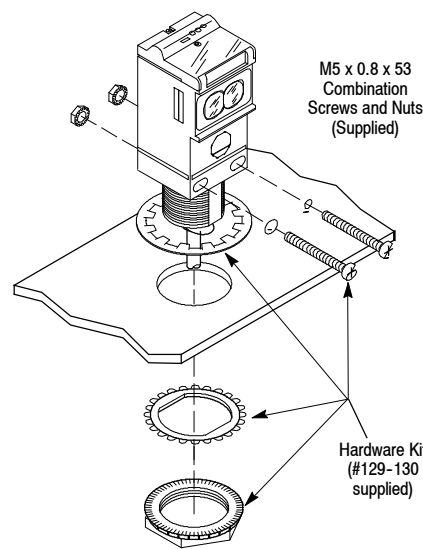
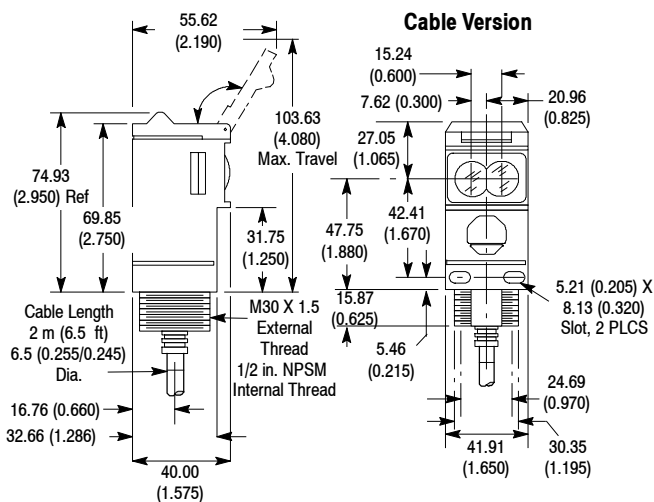


DC Micro QD Model: 42GRL-90L0-QD



Approximate Dimensions [mm (in.)]

All Versions



Connector Version

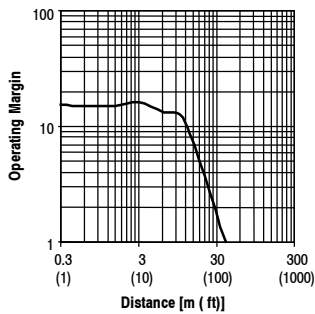


Thread Size

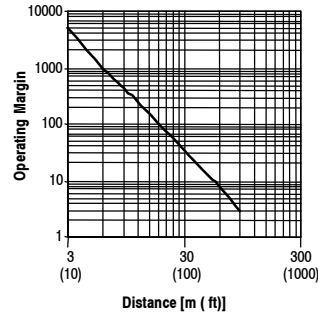
| | |
|-------------|-----------------------|
| Micro Style | M12 x 1 1 Keyway |
| Mini Style | 7/8-16 UN 1 Keyway |

Typical Response Curve

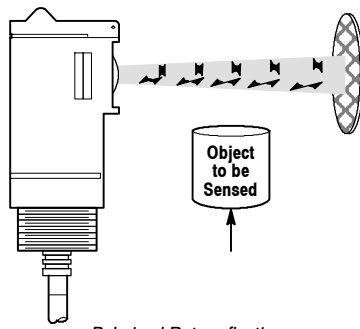
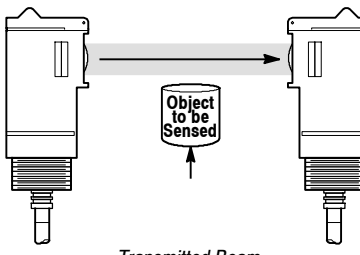
Polarized Retroreflective



Transmitted Beam



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. |
|---|-------------------------------------|-----------------------------|-------------------------------------|---|--------------------|-----------------------|
|  <p><i>Polarized Retroreflective</i></p> <p>Spot Size: 19 mm (3/4 in.) @ 40 m (130 ft) Emitter LED: Visible Laser, 650 nm</p> | 10...30V DC 45 mA | 0.3...40 m (1...130 ft) | Selectable Light/Dark Operate | PNP/250 mA NPN/250 mA 500 ms | 2 m 300V cable | 42GRU-92L0 |
| | | | | | 4-pin DC micro | 42GRU-92L0-QD |
| | 110...132V AC 70 mA | 2 m 300V cable | 4-pin DC mini | 42GRU-92L0-QD1 | | |
| | | | 5-pin mini | 42GRU-92L2-QD | | |
|  <p><i>Transmitted Beam</i></p> <p>Emitter LED: Visible Laser, 650 nm</p> | 10...264V AC/DC 10 mA | 300 m (1000 ft) | NA Light Source | | 2 m 300V cable | 42GRL-90L0 ① |
| | 10...40V DC 25 mA | 5...300 m (16...1000 ft) | Selectable Light/Dark Operate | PNP/250 mA NPN/250 mA 5 ms max. | 4-pin micro | 42GRL-90L0-QD① |
| | | | | | 4-pin mini | 42GRL-90L2-QD① |
| | 70...264V AC/DC 10 mA | 2 m 300V cable | 4-pin micro | 42GRR-90L0-QD | | |
| | | | 5-pin mini | 42GRR-90L2-QD | | |
| | | 2 m 300V cable | 4-pin mini | 42GRR-90L0 | | |
| | 4-pin micro | 42GRR-90L0-QD | | | | |

① Temperature rating -10...+40°C for 24V DC operation. Reduce by 5°C for 120V AC and 10°C for 220V AC operation.

Cordsets and Accessories

| Description | Cat. No. |
|--|--------------|
| 1.8 m (6 ft) 4-pin mini QD cordset | 889N-F4AF-6F |
| 1.8 m (6 ft) 5-pin mini QD cordset | 889N-F5AF-6F |
| 2 m (6.5 ft) 4-pin DC micro QD cordset | 889D-F4AC-2 |
| Tilt/Swivel Bracket | 60-2439 |
| Microcube reflector | 92-118 |



Specifications

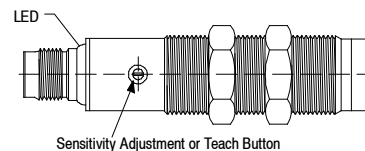
| Environmental | |
|-------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -10...+55° (+14...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60068-2-6 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60068-2-27 |
| Relative Humidity | 15...95% |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Polarized retroreflective, diffuse, and transmitted beam |
| Sensing Range | See Product Selection table on page 1-118 |
| Light Source | Class 1 laser 650 nm |
| LED Indicators | See User Interface Panel below |
| Adjustments | Sensitivity potentiometer or teach button |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 25 mA max |
| Sensor Protection | Reverse polarity, overload, short circuit |
| Outputs | |
| Response Time | 0.5 ms (transmitted beam), 0.7 ms (diffuse, polarized retroreflective) |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Complementary light or dark operate |
| Output Current | 100 mA |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Nickel-plated brass |
| Lens Material | Glass |
| Connection Types | 2 m cable, 4-pin DC micro (M12) QD |
| Supplied Accessories | 18 mm fastening nuts (871C-N3) |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-118 |

Features

- Class 1 laser
- Small spot size—0.1 mm @ 100 mm sensing distance
- Metal housing for heavy duty industrial applications
- 18 mm industry standard package
- Three sensing modes
- 30V DC operation
- NPN or PNP outputs
- Fast response time—less than 0.7 ms
- 2 m cable or micro QD connector

User Interface Panel

| LED Color | State | Status | LO Output | DO Output |
|-----------|----------|-----------------------------------|-----------|-----------|
| Yellow | OFF | Dark condition | OFF | ON |
| | Flashing | Light condition (excess gain < 2) | ON | OFF |
| | ON | Light condition (excess gain > 2) | ON | OFF |
| Green | ON | Power On | — | — |



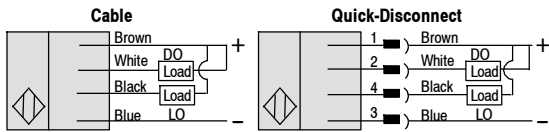
Transmitted beam receivers do not have a "Flashing" (low margin) state.

PHOTOSWITCH® Photoelectric Sensors
42CM LaserSight™
18 mm Metal Cylindrical, Class 1 Laser Sensor

Wiring Diagrams

Diffuse

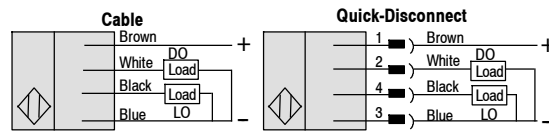
NPN Output



Face View Male Receptacle (Sensor) DC Micro

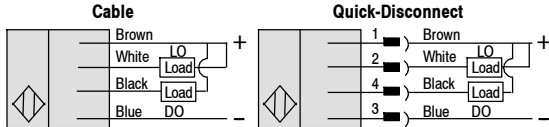


PNP Output

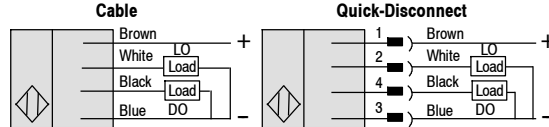


Transmitted Beam, Polarized Retroreflective

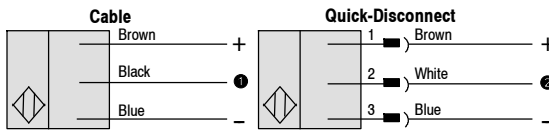
NPN Output



PNP Output



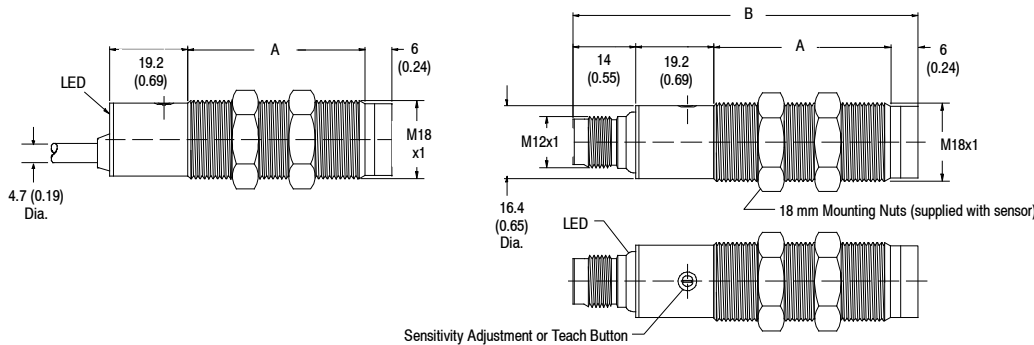
Laser Transmitted Beam Emitter (Standard LED)



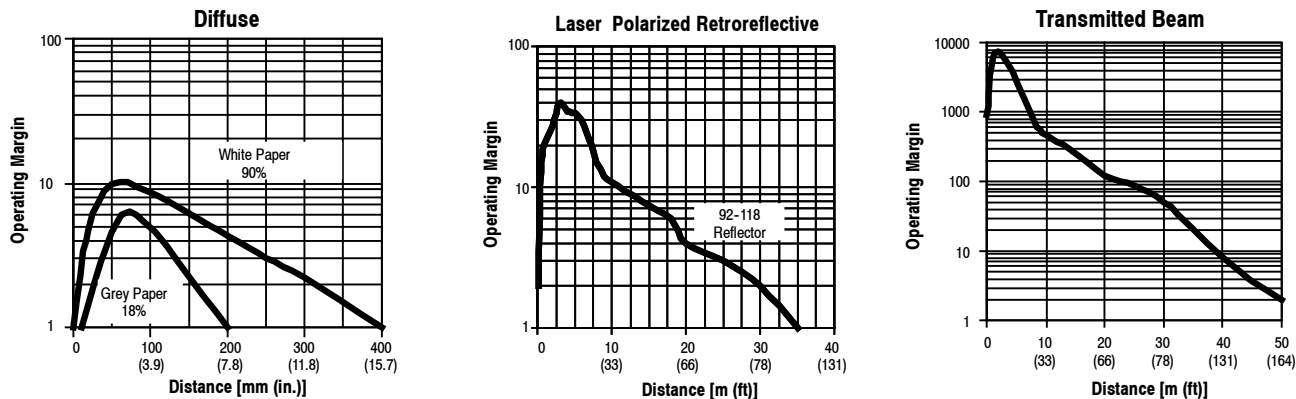
- Black open circuit to enable laser. Tie black to blue/V- to disable laser.
- Pin 2/white open circuit to enable laser. Tie pin 2/white to blue/V- to disable laser.

Approximate Dimensions [mm (in.)]

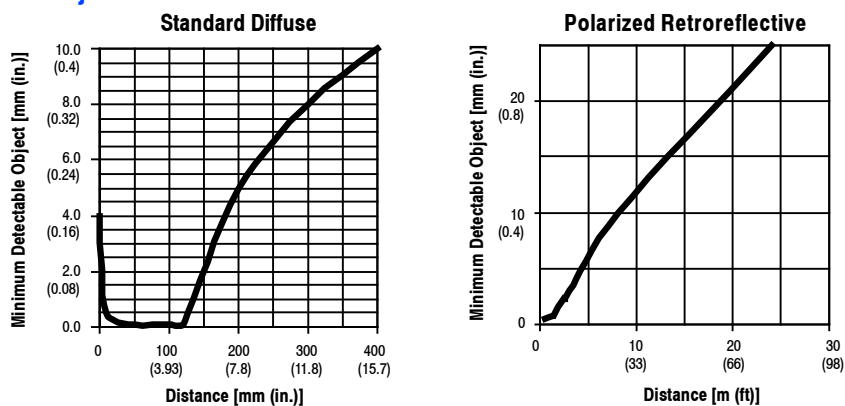
| Dimension | Laser Receiver [mm (in.)] | Other Laser Models [mm (in.)] |
|-----------|---------------------------|-------------------------------|
| A | 42.7 (1.68) | 57.5 (2.26) |
| B | 82.8 (3.26) | 97.7 (3.85) |



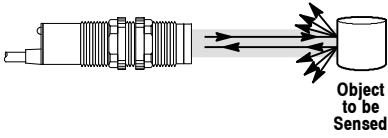
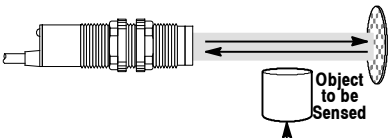
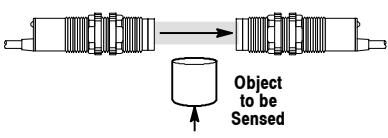
Typical Response Curve



Minimum Detectable Object



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance @ 2X Margin | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. | |
|--|-------------------------------------|---|----------------------------|--|-------------------------|----------------------|----------------------|
|  <p><i>Standard Diffuse</i> Emitter: Class 1—Visible laser 650 nm</p> | 10...30V DC 25 mA | 3...300 mm (0.12...11.8 in.) (Teachable) | L.O./D.O. Complementary | NPN 100 mA 0.7 ms | 2 m 300V cable | 42CM-D8MNA-A2 | |
| | | | | | 4-pin DC micro | 42CM-D8MNA-D4 | |
| | | | | PNP 100 mA 0.7 ms | 2 m 300V cable | 42CM-D8MPA-A2 | |
| | | | | | 4-pin DC micro | 42CM-D8MPA-D4 | |
|  <p><i>Polarized Retroreflective</i> Emitter: Class 1—Visible laser 650 nm</p> | 10...30V DC 25 mA | 3 mm...30 m (0.12 in...78 ft) (Teachable) | L.O./D.O. Complementary | NPN 100 mA 0.7 ms | 2 m 300V cable | 42CM-P8MNB-A2 | |
| | | | | | 4-pin DC micro | 42CM-P8MNB-D4 | |
| | | | | PNP 100 mA 0.7 ms | 2 m 300V cable | 42CM-P8MPB-A2 | |
| | | | | | 4-pin DC micro | 42CM-P8MPB-D4 | |
|  <p><i>Transmitted Beam</i> Emitter: Class 1—Visible laser 650 nm</p> | 10...30V DC 25 mA | 3 mm...50 m (0.12 in...164 ft) (Adjustable) | NA Light Source | | 2 m 300V cable | 42CM-E8EZB-A2 | |
| | | | L.O./D.O. Complementary | | NPN 100 mA 0.5 ms | 4-pin DC micro | 42CM-E8EZB-D4 |
| | | | PNP 100 mA 0.5 ms | 2 m 300V cable | | 42CM-R8MNB-A2 | |
| | | | | L.O./D.O. Complementary | NPN 100 mA 0.5 ms | 4-pin DC micro | 42CM-R8MNB-D4 |
| | | | PNP 100 mA 0.5 ms | | | 2 m 300V cable | 42CM-R8MPB-A2 |
| | | | | L.O./D.O. Complementary | PNP 100 mA 0.5 ms | 4-pin DC micro | 42CM-R8MPB-D4 |

Cordsets and Accessories

| Cordset | | Accessories | | | |
|------------------------------------|-------------|---------------------|----------|----------------------|----------|
| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
| DC micro QD cordset, 4-pin, 2 m | 889D-F4AC-2 | Mounting bracket | 60-2657 | Micro cube reflector | 92-118 |
| 18 mm fastening nuts | 871C-N3 | Swivel/tilt bracket | 60-2649 | | |



Description

The 45MLD is a Class 2 laser sensor designed for packaging, material handling and semiconductor industries. Offering a 300 mm (11.8 in.) adjustable sensing range, the 45MLD provides background suppression by triangulation, establishing a fixed focal point and suppressing anything beyond the focal point. The rotatable lens also allows the user to adjust the laser beam spot size at the focal point down to 0.5 mm (0.02 in.) for accurate sensing of small targets such as gap, chip and crack detection in semiconductor and packaging applications. Target presence status is provided through a discrete NPN or PNP output.

Features

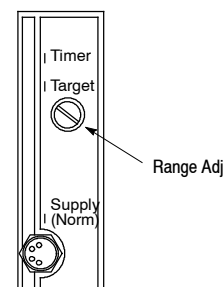
- Class 2 laser
- Fast response time
- Rotatable focus lens allows adjustment of laser spot to 0.5 mm (0.01 in.)
- 50...300 mm (1.96...11.8 in.) sensing distance
- Background suppression
- IP65

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP65 |
| Operating Temperature [C (F)] | 0...+50° (32...+122°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Laser background suppression |
| Sensing Range | 50...300 mm (1.96...11.8 in.) |
| Light Source | Class 2 laser |
| LED Indicators | See User Interface Panel below |
| Adjustments | Optical spot size adjustment knob, 30-turn range adjustment screw |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 35 mA max |
| Sensor Protection | Overload, short circuit |
| Outputs | |
| Response Time | 200 μS |
| Output Type | PNP or NPN selectable |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA @ 30V DC max |
| Mechanical | |
| Housing Material | Polyamide |
| Lens Material | PMMA |
| Connection Types | 4-pin pico (M8) QD |
| Optional Accessories | See mounting brackets and cordsets on page 1-120 |

User Interface Panel

| Label | Color | State | Status |
|---------------|-------|-------|--------------------------------------|
| Target | Green | OFF | No target present |
| | | ON | Target present |
| Timer | Red | OFF | 40 ms pulse OFF |
| | | ON | 40 ms pulse ON |
| Supply (Norm) | Red | ON | Normal wiring Brn = (+), Blu = (-) |
| | | OFF | Reverse wiring Brn = (-), Blue = (+) |

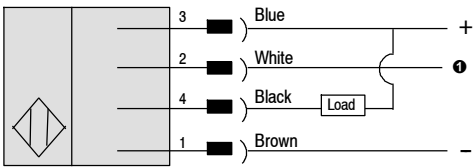


45MLD

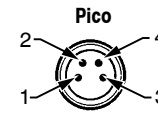
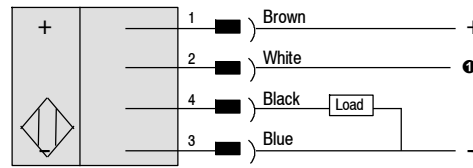
Laser Diffuse Sensor

Wiring Diagrams

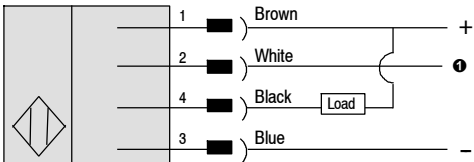
NPN (Light Operate)



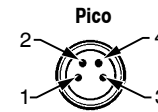
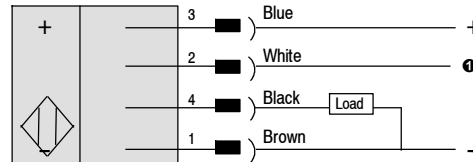
PNP (Light Operate)



NPN (Dark Operate)

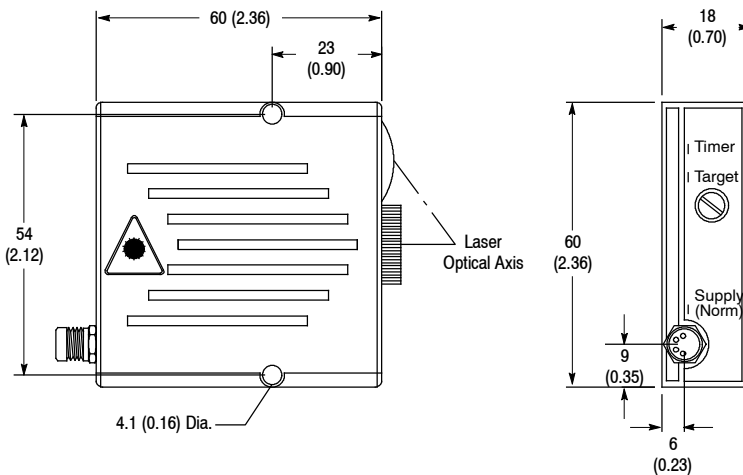


PNP (Dark Operate)



① 40 ms pulse stretcher ON = Connect **white wire** to (+) positive terminal.
 40 ms pulse stretcher OFF = Open circuit or connect **white wire** to (-) negative terminal.

Approximate Dimensions [mm (in.)]



Product Selection

| Operating Voltage Supply Current | Sensing Distance [mm (in.)] | Output Energized | Output Type Response Time | Connection Type | Cat. No. |
|-------------------------------------|--------------------------------|-------------------------|------------------------------|------------------|-----------------------|
| 10...30V DC 35 mA | 50...300 (1.9...11.8) | L.O./D.O. Selectable | NPN or PNP 200 μs | 4-pin DC Pico QD | 45MLD-8LEA1-P4 |

Cordsets and Accessories

| Description | Cat. No. |
|--|-------------|
| 2 m (6.5 ft) 4-pin, DC Pico QD Cordset | 889P-F4AB-2 |
| Mounting Bracket | 60-2677 |



Description

The 45CPD sensor is a Class 1 infrared laser sensor that provides long distance sensing with both analog and discrete outputs. It is set up using the Teach-In buttons on the top of the sensor and can be programmed for several modes depending on the application: object detection (single or dual output), object position (analog output), object detection (background suppression), or object detection (reflector mode).

This sensor utilizes the time of flight principle and has a relatively small beam spot for applications typical for this sensing range (up to 6 m). The sensor is completely self contained in an IP67 enclosure and does not require any external control devices which add cost and require additional mounting space.

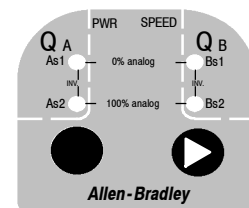
For convenience purposes, the 45CPD utilizes a visible red Class 2 laser for alignment purposes during the set up of the sensor in an application. The Class 2 laser is automatically shut down when the sensor is placed in normal operation and the Class 1 “eye safe” laser is used.

The 45CPD can be easily set up by mounting the sensor such that the target is within the operating range of the sensor, and teaching in the appropriate set points required for the application. The sensor can be set with any combination of one or two discrete PNP outputs and 4...20 mA analog output. The discrete outputs can be set for Light Operate (L.O.) or Dark Operate (D.O.) and the analog output is automatically scaled between the taught set points with either a positive or negative slope.

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -20...+50° (-4...+122°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Optical | |
| Sensing Range | 0.2...6 m (0.7...19.7 ft) |
| Spot Size | 4 x 7 mm @ 2 m (0.16 x 0.28 in. @ 6.5 ft) 4x 12 mm @ 6 m (0.16 x 0.47 in. @19.7 ft) |
| Linearity Tolerance | ±40 mm (1.57 in.) |
| Repeatability | Fast/slow: ±15/±10 mm (±0.6/±0.4 in.) |
| Hysteresis | 30 mm (1.2 in.) fixed |
| Temperature Drift | 1.3mm/°C |
| Light Source | Sensing beam: Class 1 laser (905 nm) Alignment beam: Class 2 visible red laser (650 nm) |
| LED Indicators | See Features on page 1-122 |
| Electrical | |
| Voltage | 18...30V DC |
| Current Consumption | 125 mA max @ 24V DC |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | Fast/slow: 13 ms/30 ms |
| Output Type | Discrete: Two PNP outputs, analog output: 4...20 mA current |
| Output Mode | Light or dark operate for discrete outputs |
| Output Current | 100 mA max for discrete output, 500W max impedance for analog |
| Mechanical | |
| Housing Material | Plastic—ABS |
| Lens Material | PMMA |
| Connection Types | 5-pin DC micro (M12) QD |
| Supplied Accessories | None |
| Optional Accessories | See mounting brackets and cordsets on page 1-122 |

The 45CPD is an excellent solution for long range detection and measurement applications including: distance measurement, verifying material position, stack level, thickness measurement, roll diameter, web winding/unwinding, positioning fixtures, error proofing, inspection, long standoff distance (hot or limited space), level monitoring, and box width measurement.

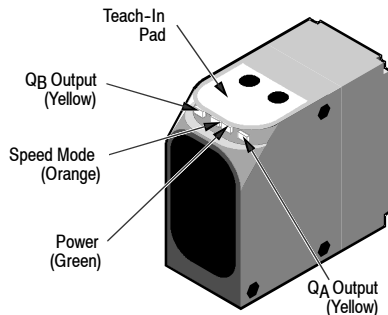


45CPD

Analog and Discrete Output

Features

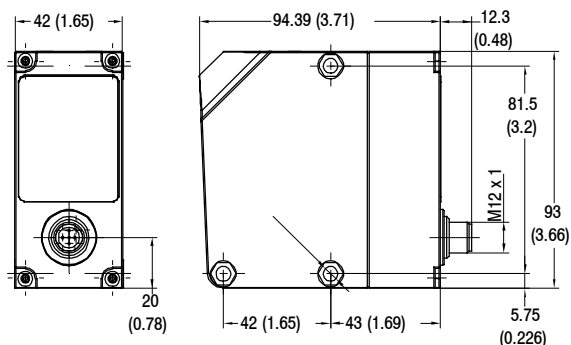
- Eye Safe Class 1 laser for operation
- Visible red Class 2 laser for set-up
- Six meter sensing range
- Two discrete outputs (PNP) and analog output (4...20 mA)
- Easy set-up using teach-in buttons IP67 enclosure
- Self-contained sensor



Product Selection

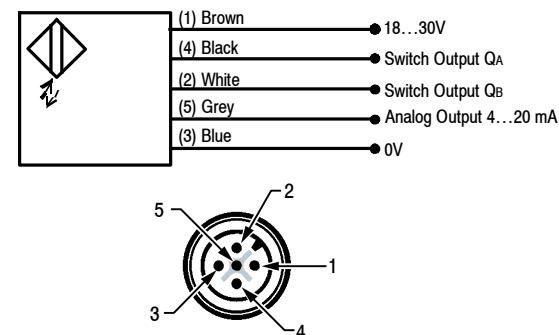
| Sensing Range [mm (in.)] | Measuring Range [mm (in.)] | Spot Size | Cat. No. |
|----------------------------|----------------------------|--|-----------------------|
| 200...6000 (7.87...236.22) | 5800 (228.35) | 4 x 7 mm @ 2 m (0.16 x 0.28 in. @ 6.5 ft) | 45CPD-8LTB1-D5 |

Approximate Dimensions [mm (in.)]



Wiring Diagrams

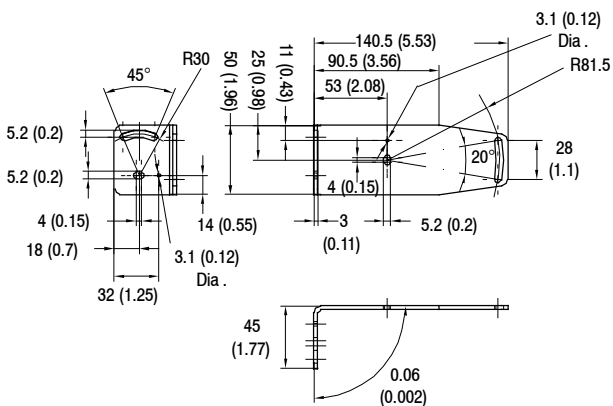
45CPD-8LTB1-D5



Cordsets and Accessories

| Description | Cat. No. |
|---|-------------|
| 2 m (6.5 ft) 5-pin, DC Micro QD Cordset | 889D-F5AC-2 |
| Mounting Bracket | 45CPD-BKT1 |

Mounting Bracket 45CPD-BKT1





Description

The 45BPD analog output sensor is a Class 2 visible red laser sensor that provides sensing with both an analog and discrete output. It is set up using the Teach-In buttons and LED indicators on the top of the sensor.

This sensor utilizes the triangulation principle for precise measurement and the visible red beam spot is useful for alignment in small part detection and measurement applications. The sensor is completely self contained in an IP67 enclosure and does not require any external control devices which add cost and require additional mounting space.

The 45BPD can be easily set up by mounting the sensor such that the target is within the operating range of the sensor and teaching in the appropriate set points required for the application. The sensor can be set with both a discrete PNP output and a 4...20 mA analog output. The discrete output can be set for normally open (N.O.) or normally closed (N.C.) operation and the analog output is automatically scaled between the taught set points with either a positive or negative slope.

The 45BPD is an excellent solution for several noncontact measurement applications including: distance measurement, part profiling, thickness measurement, error proofing, inspection, verifying material position, hole depth, warpage, and positioning.

Features

- Noncontact measurement
- Visible red Class 2 laser
- Analog and discrete outputs
- Scalable analog output (4...20 mA)

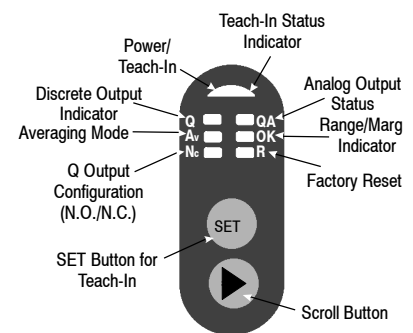
Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -10...+45° (14...+140°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Optical | |
| Sensing Range | See Product Selection table on page 1-124 |
| Linearity | < 0.25 % of measuring range |
| Resolution | < 0.1% of measuring range |
| Temperature Drift | < 0.02%/°C |
| Light Source | Class 2 visible red laser (650 nm) |
| LED Indicators | See User Interface below |
| Electrical | |
| Voltage | 18...28V DC |
| Current Consumption | 40 mA max @ 24V DC |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | Speed mode: 0.4 ms (applicable with synchronously switched laser and target) |
| Output Type | Discrete: PNP, analog output: 4...20 mA current |
| Output Mode | Normally open or normally close for discrete output |
| Output Current | 100 mA max for discrete output, 500Ω max impedance for analog |
| Mechanical | |
| Housing Material | Plastic — ABS |
| Lens Material | PMMA |
| Connection Types | 4-pin DC micro (M12) QD, 270° rotatable connector |
| Supplied Accessories | None |
| Optional Accessories | See mounting brackets and cordsets on page 1-124 |

Features (cont.)

- Configurable discrete output (N.O./N.C.)
- IP67 enclosure
- 270° rotatable connector
- Set point adjustment via push buttons
- Self-contained sensor
- Laser-disable control
- Teach-in lock out
- Averaging and speed mode

User Interface



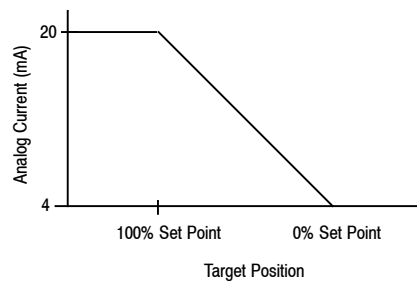
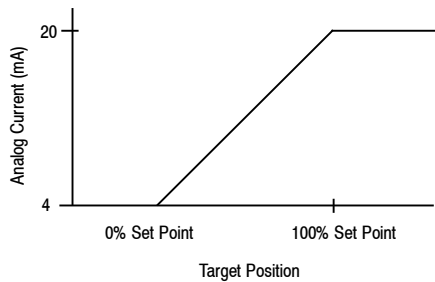
45BPD Laser Sensor

Analog and Discrete Output

Product Selection

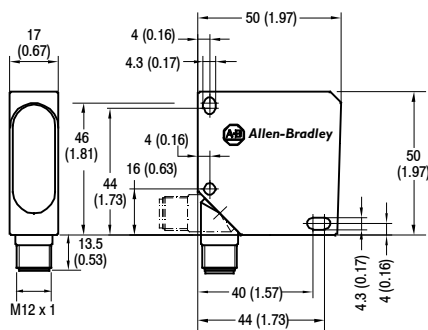
| Sensing Range [mm (in.)] | Measuring Range [mm (in.)] | Spot Size | Cat. No. |
|--------------------------|----------------------------|--|----------------|
| 30...100 (1.18...3.93) | 70 (2.75) | 1.5 x 3 mm/1.5 x 3.25 mm (0.06 x 0.12 in./0.06 x 0.13) | 45BPD-8LTB1-D5 |
| 80...300 (3.14...11.8) | 220 (8.66) | 1.5 x .53 mm/2.0 x 4.5 mm (0.06 x 0.14 in./0.08 x 0.18) | 45BPD-8LTB2-D5 |

Analog Output

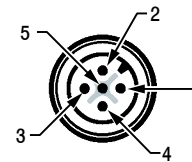


Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.



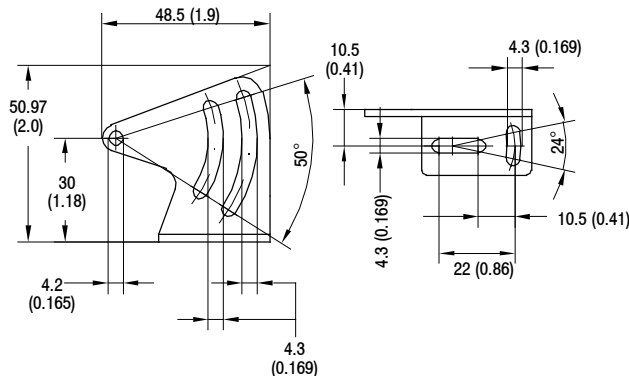
Wiring Diagrams



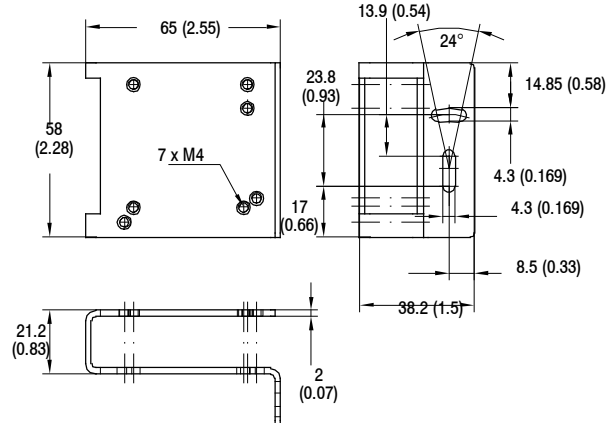
Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|-------------------------------|-------------|-------------------|------------|-----------------------------|------------|
| 2 m (6.5 ft) micro QD cordset | 889D-F5AC-2 | Mounting brackets | 45BPD-BKT1 | Protective mounting bracket | 45BPD-BKT2 |

Mounting Bracket 45BPD-BKT1



Protective Mounting Bracket 45BPD-BKT2





Description

The 45BRD analog output sensor is a Class 2 visible red laser sensor that provides exceptional resolution at an economical cost. This sensor utilizes the triangulation principle for precise measurement and has a small beam spot for small part detection and measurement. The sensor is completely self-contained in an IP67 enclosure and does not require any external control devices which add cost and require additional mounting space.

The 45BRD can be easily set up by mounting the sensor such that the target is within the operating range of the sensor. There are no additional adjustments for the sensor and the 0...10V output is scaled linearly over the range of the sensor [45...85 mm (1.77...3.35 in.)].

The 45BRD is an excellent solution for precision noncontact measurement applications including: distance measurement, part profiling, thickness measurement, hole depth, warpage, and positioning.

Features

- Visible red Class 2 laser
- 20 µm resolution
- 40 mm measuring range
- 0...10V DC analog output
- IP67 enclosure
- 270° rotatable connector
- No user adjustments
- Contamination indicator
- Self-contained sensor

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | 0...+45° (32...+113°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Optical | |
| Sensing Range | 45...85 mm (1.77...3.35 in.) |
| Spot Size | < 0.8 mm (0.03 in.) beam spot @ 65 mm (2.56 in.) |
| Measuring Range | 40 mm (1.57 in.) |
| Linearity | < 1 % |
| Resolution | 20 µm |
| Temperature Drift | 18 µm/°C |
| Light Source | Class 2 visible red laser (670 nm) |
| LED Indicators | Green: power, red : lens contamination |
| Electrical | |
| Voltage | 18...28V DC |
| Current Consumption | 35 mA max @ 24V DC |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | 30 ms |
| Output Type | Analog output 0...10V DC |
| Output Current | 3 mA max |
| Mechanical | |
| Housing Material | Plastic — ABS |
| Lens Material | PMMA |
| Connection Types | 4-pin DC micro (M12) QD, 270° rotatable connector |
| Supplied Accessories | None |
| Optional Accessories | See mounting brackets and cordsets on page 1-126 |

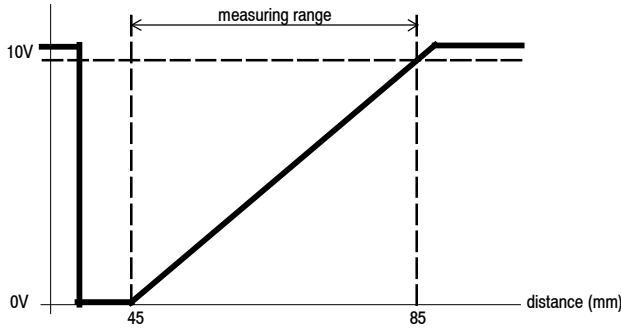
45BRD Laser Sensor

Analog Output

Product Selection

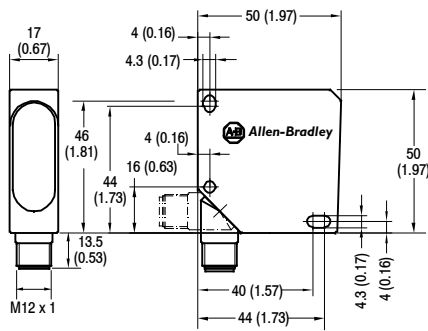
| Sensing Range [mm (in.)] | Measuring Range [mm (in.)] | Spot Size | Cat. No. |
|--------------------------|----------------------------|-----------------|----------------|
| 45...85 (1.77...3.35) | 40 (1.57) | <0.8 mm @ 65 mm | 45BRD-8JKB1-D4 |

Analog Output

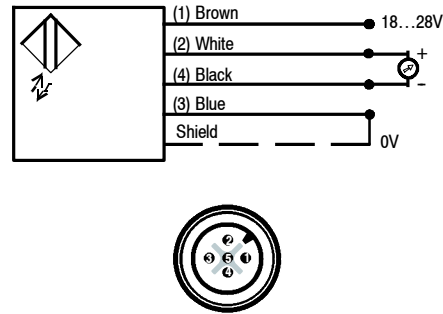


Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.



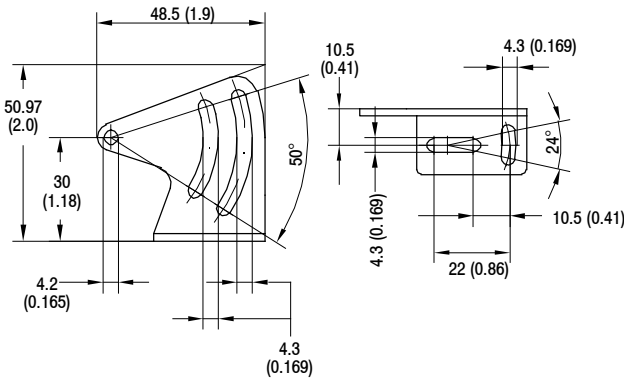
Wiring Diagrams



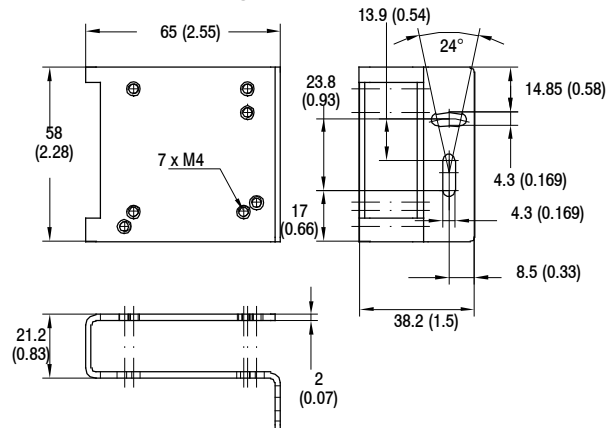
Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|-------------------------------|--------------------|-------------------|------------|-----------------------------|------------|
| 2 m (6.5 ft) Micro QD Cordset | 889D-F4EC-2 | Mounting brackets | 45BPD-BKT1 | Protective mounting bracket | 45BPD-BKT2 |

Mounting Bracket 45BPD-BKT1



Protective Mounting Bracket 45BPD-BKT2





Specifications

| Environmental | |
|------------------------------|---|
| Certifications | UL Listed, CSA Certified, and CE Marked for all applicable directives |
| Operating Environment | NEMA 3,4,12,13; IP66 (IEC 529) |
| Operating Temperature [C(F)] | 0...+70° (32...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Optical | |
| Sensing Modes | Fixed focus color registration |
| Sensing Range | 12.7 mm |
| Field Depth | ± 2 mm |
| Light Source | Visible red LED (630 nm) or visible green (570 nm) selectable |
| LED Indicators | See User Interface Panel below |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 70 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 250 μs |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Leading edge or trailing edge of a light or dark mark |
| Output Current | 100 mA @ 30V DC |
| Output Leakage Current | 1 μA max |
| Mechanical | |
| Housing Material | Anodized and epoxy coated aluminum |
| Lens Material | Glass |
| Connection Types | 5-pin DC micro (M12) QD |
| Optional Accessories | See mounting brackets and cordsets on page 1-129 |

Description

The 42CRC Color Registration Control is a specialized photoelectric sensor designed to detect registration marks by sensing the difference in greyscale response between the mark and background.

The sensor automatically adjusts the sensitivity, compensating for variations in background colors and lens contamination.

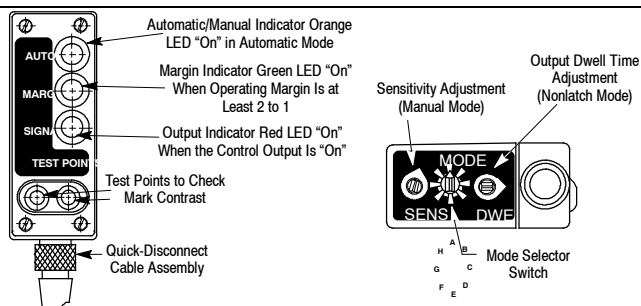
Switch selectable red or green light sources provide capability to sense a wide range of marks and background colors, including difficult pastels.

Features

- Automatic or manual sensitivity adjustment
- Selectable red or green light source
- Selectable lens position
- Fast 250 μs response time
- Separate diagnostic output
- Adjustable pulse-stretcher
- Selectable latching output with reset
- Selectable gated input operation
- Selectable NPN or PNP output
- 5-pin micro QD connection

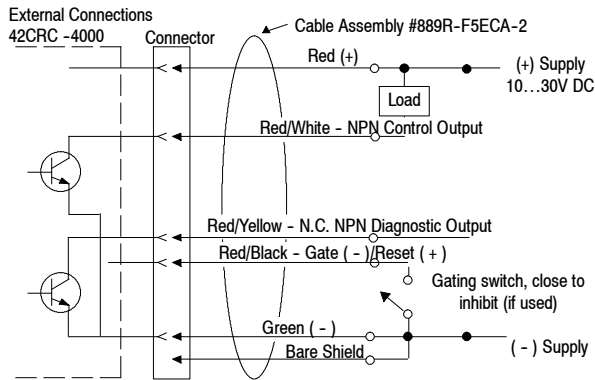
User Interface Panel

| Label | Color | State | Status |
|--------|--------|-------|--|
| Margin | Green | OFF | Margin < 2X |
| | | ON | Margin > 2X |
| Auto | Orange | OFF | Sensor in manual configuration mode |
| | | ON | Sensor in automatic configuration mode |
| Signal | Red | OFF | Sensor output activated |
| | | ON | Sensor output de-activated |

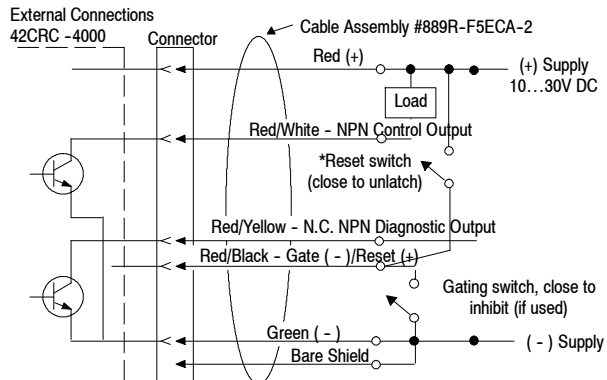


Wiring Diagrams

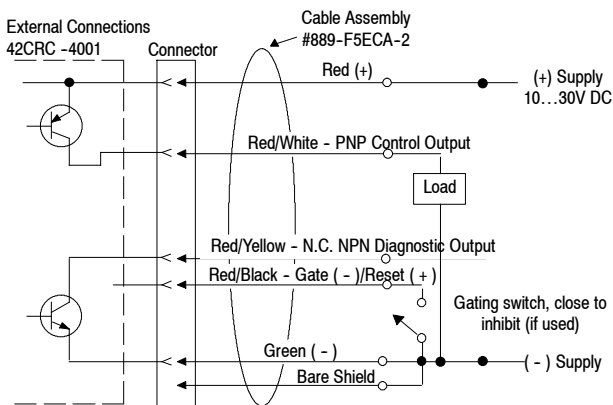
NPN Output 42CRC-4000
Non-Latched Output—Function Switch Positions
“E” Through “H” with or without External Gating



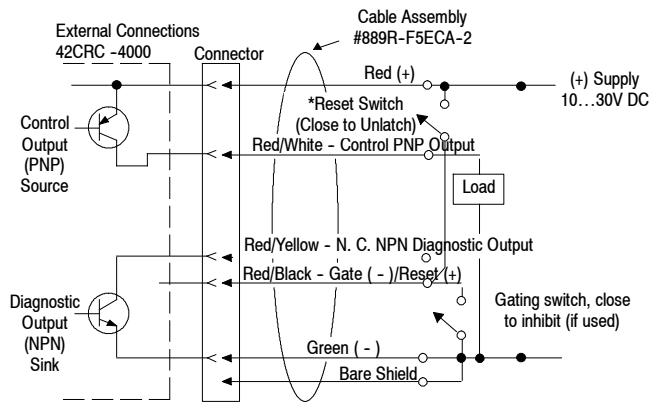
NPN Output 42CRC-4000
Latched Output—Function Switch Positions
“A” Through “D” with or without External Gating



PNP Output 42CRC-4001
Non-Latched Output—Function Switch Positions
“E” Through “H” with or without External Gating



PNP Output 42CRC-4001
Latched Output—Function Switch Positions
“A” Through “D” with or without External Gating

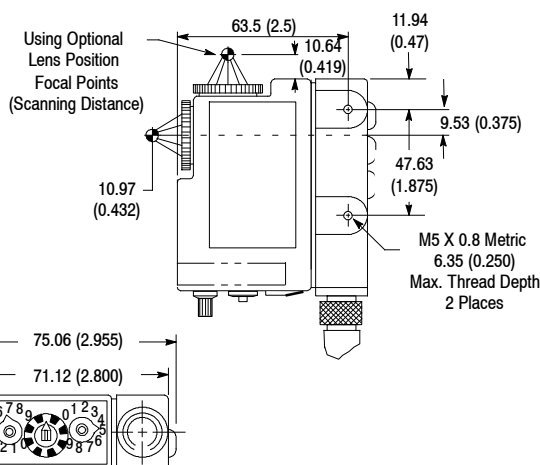
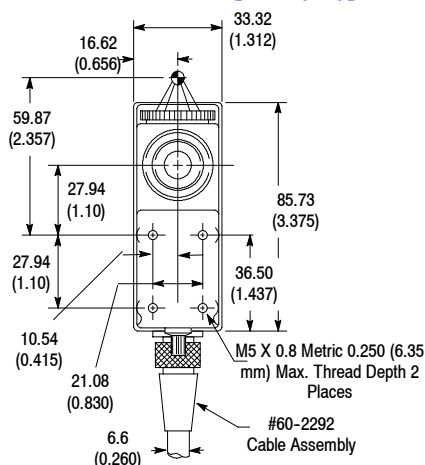


ATTENTION

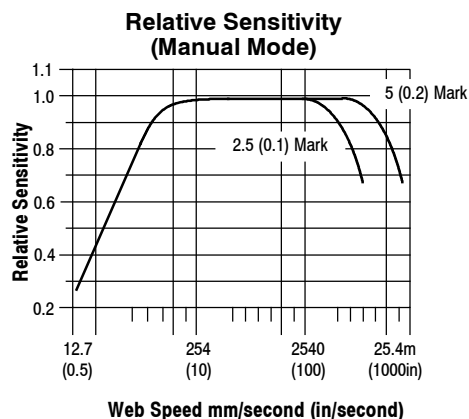
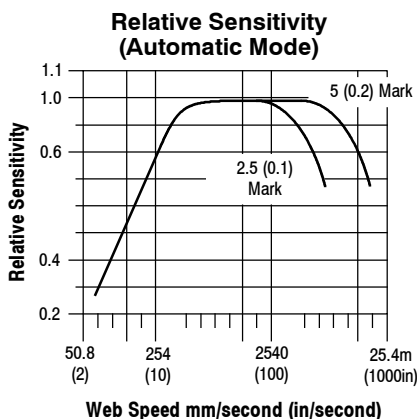


Do not close the reset and gating switches simultaneously.

Approximate Dimensions [mm (in.)]



Typical Response Curve



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Output Energized | Output Type Capacity Response Time | Diagnostic Output | Focal Point | Depth of Field | Min Web Velocity | Cat. No. |
|---|-------------------------------------|---|--|---------------------------|-------------------------|---------------------------|-----------------------------|------------|
| <p>Emitter LED: Visible red 630 nm or visible green 570 nm (selectable)</p> | 10...30V DC 70 mA max | Leading Edge or Trailing Edge of a Light or Dark Mark | NPN 100 mA at 30V DC 250 μs | NPN 30 mA at 30V DC | 12.7 mm (0.5 in.) | ±2 mm (0.08 in.) | 51 mm/sec (2 in./sec) | 42CRC-4000 |
| | | | PNP 100 mA at 30V DC 250 μs | | | | | 42CRC-4001 |

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|---------------------------|--------------|-------------|----------|-------------|----------|
| 5-pin AC Micro QD Cordset | 889R-F5ECA-2 | Lens | 61-6312 | Cover | 61-6333 |



Description

The ColorSight photoelectric sensor is a true RGB color recognition sensor designed for industrial use. Unlike sensors which measure only greyscale contrast between the target and background, ColorSight provides true color measurement capabilities.

Features

- Fiber optic sensing design
- True RGB color discrimination
- Color only (C) and color plus intensity (C+I) operating modes
- Eight precision settings
- Local and remote self-teach
- Adjustable sampling rates
- Selectable gated input
- Selectable 50 ms pulse stretcher

Specifications

| Environmental | |
|-------------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | Sensor enclosure: NEMA 4 (IP54), optics assembly: IP40 |
| Operating Temperature [C (F)] | 0...+55° (32...+131°) |
| Temperature Drift [C (F)] | ±10° (+50°) from learned temperature |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| HF Ambient Light Rejection | 7.62 m (25 ft) candles |
| Incandescent Light Rejection | 152.4 m (500 ft) candles |
| Optical | |
| Sensing Mode | Fixed focus fiber optic color sensor |
| Color Discrimination Operating Mode | Color only, color plus intensity (DIP switch selectable) |
| Color Sampling Operating Mode | Single, average (DIP switch selectable) |
| Sensing Range | 27 mm with 60-2694 fiber optic cable, 114 mm using 60-2738 range extender |
| Spot Size | 5 mm using 60-2694 fiber optic cable nominal |
| Light Source | Red, green, blue LED |
| LED Indicators | See User Interface Panel below |
| Adjustments | 8-position rotary switch |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 50 mA nominal |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse, transient |
| Outputs | |
| Response Time | 1.3 ms (single mode), 10 ms (C+I average mode) 2.6 ms (single mode), 10 ms (C only average mode) |
| Output Type | Selectable PNP or NPN |
| Output Mode | Match or no match selectable |
| Output Current | 100 mA max @ 30V DC |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Cover Material | Radel |
| Connection Types | 2 m cable, 5-pin DC micro QD |
| Supplied Accessories | 129-130 mounting kit |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-133 |

User Interface Panel

| | Switch | Label | Function | Switch Up | Switch Down |
|--|--------|--------|---|---------------------------------|-----------------------------------|
| | S1 | None | Not used | — | — |
| | S2 | ≠ / = | Select target match/no match | Output inactive (no match) | Output active (match) ❶ |
| | S3 | TD/0 | Enable/disable time delay | 50 ms time delay active | No time delay ❶ |
| | S4 | CI/C | Select color + intensity mode/color only mode | Color + intensity mode active ❶ | Color only mode active |
| | S5 | SG/AV | Select single/average mode | Single sample mode active | Average sample mode active ❶ |
| | S6 | GT/LRN | Select gate/remote learn mode | Input functions as gating input | Input functions as remote learn ❶ |

Indicators

| Label | Color | State | Condition |
|--------------|--------|--------|--------------------------------|
| PWR | Green | OFF | Sensor power not present |
| | | Steady | Sensor power present |
| OUTPUT/LEARN | Yellow | OFF | Output inactive |
| | | Steady | Output active |
| | | Flash | Learn mode activated |
| FAULT/SCP | Red | OFF | Sensor operating normally ❷ |
| | | Steady | Marginal detection of target ❸ |
| | | Flash | Output SCP active |

- ❶ Factory default
- ❷ LED also OFF when LEARN push button depressed.
- ❸ Includes failure to learn color during LEARN process.

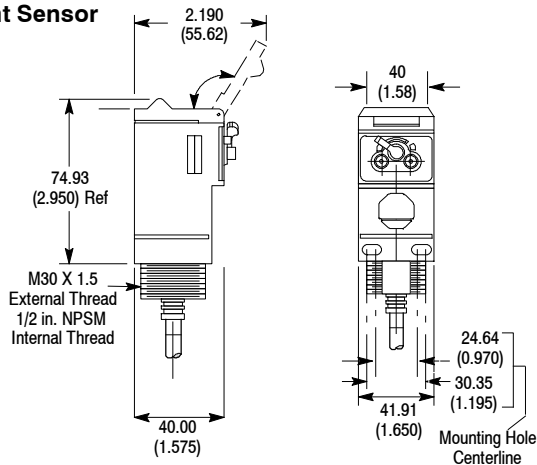
Wiring Diagrams

| Designation | Lead Color | Pin Assignment | Cable version wired with PNP outputs | | Cable version wired with NPN outputs | |
|------------------|------------|----------------|--------------------------------------|--|--------------------------------------|--|
| | 2 m Cable | 5-pin Micro QD | | | | |
| V+ or V- ❹ | Brown | 1 | | | | |
| V- or V+ ❹ | Blue | 3 | | | | |
| Signal output ❺ | Black | 4 | | | | |
| Fault output ❻ | Orange | 5 | | | | |
| Learn/Gate input | White | 2 | | | | |

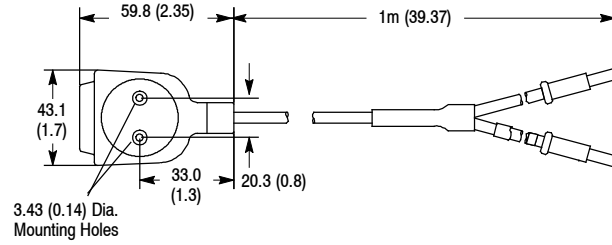
- ❹ Polarity of supply voltage defines sensor output type –i.e. PNP or NPN
- ❺ PNP when brown lead connected to V+ and blue lead connected to V-
NPN when brown lead connected to V- and blue lead connected to V+

Approximate Dimensions [mm (in.)]

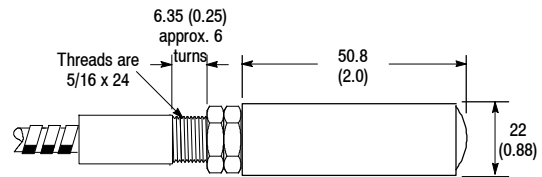
ColorSight Sensor



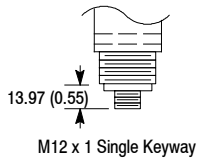
#60-2694 Fiber Optic Cable



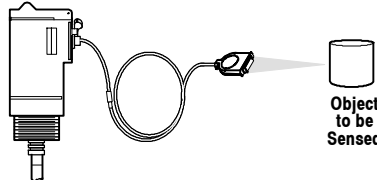
#60-2738 Range Extender
(shown fitted to a 43GR fiber optic cable)



Connector Version
Micro Style



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type/ Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|--|---------------------------------|--|--------------------|--------------|
|  <p>Spot Size: 5 mm (0.20 in.) with A-B #60-2694 FO cable Emitter LED: Tri-color red, green, blue Indicators: Yellow: Output/Learn Green: Power Red: Fault/SCP</p> | 10...30V DC 50 mA | 27 mm (1 1/16 in.) with A-B #60-2694 FO cable | Selectable match/no match | PNP or NPN 30V DC @ 100 mA 1.3...10 ms | 2 m 300V cable | 42QA-G5LE-A2 |
| | | | | | 5-pin DC micro | 42QA-G5LE-D5 |

Recommended Fiber Optic Cables

| Type | Sensing Tip Material | Fiber Diameter [mm (in.)] | Sheathing Material | Nominal Sensing Range [mm (in.)] | Cat. No. |
|------------|----------------------|------------------------------|--------------------|-------------------------------------|--------------|
| Bifurcated | Brass | 3.2 (0.125) | Stainless Steel | 10 (0.4) ❶ | 43GR-TBB25SL |
| | | | PVC | | 43GR-TBB25ML |
| | Plastic (Lensed) | | | 27 (1.06) | 60-2694 |

❶ Sensing distance may be increased between approximately 38 mm (1.5 in.) and 114 mm (4.5 in.) when used with 60-2738 range extender.

Cordsets and Accessories

| Description | Cat. No. |
|---|-------------|
| 2 m (6.5 ft) 5-pin Micro QD Cordset | 889D-F5AC-2 |
| Tilt/Swivel Bracket | 60-2439 |
| Lensed Fiber Optic Cable | 60-2694 |
| Range Extender | 60-2738 |
| Universal Mounting Assembly (for #60-2694 fiber optic cable) | 60-2008 |



Description

The 45CLR ColorSight is a self-contained color detection sensor with three output channels, allowing for the concurrent sensing of three different colors. The colors to be sensed are taught quickly and easily with the touch of a button on the sensor or through remote teach.

Models are also available with RS-485 communications with the capability of matching up to five colors and communicate true RGB values for remote processing of additional colors.

The 45CLR ColorSight can be set up to detect:

- A single color per channel with adjustable tolerance
- Scan an area of various colors on the same surface
- Detect multiple individual colors per channel

This sensor offers a wide sensing range tolerance for reliable sensing when target distance varies from the taught settings.

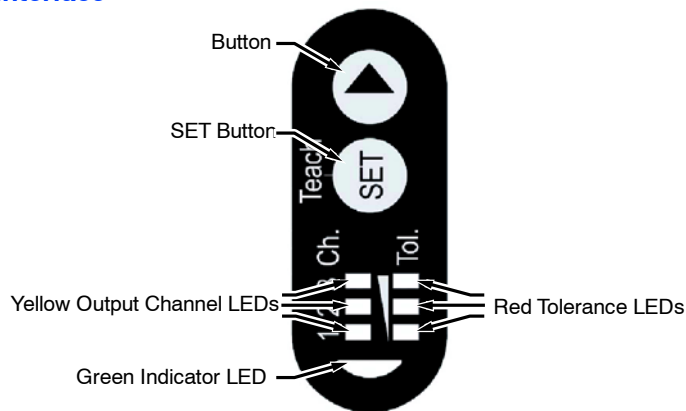
Features

- Wide sensing range tolerance
- Three channel color matching (3 outputs)
- Gating input (also known as inhibiting input)
- Adjustable tolerance for high precision to general color matching
- Pulse stretching capability (50 ms off delay)
- Teach colors via push buttons
- External teach capability (1 output)
- Teach button lockout
- 270° rotatable connector
- Compact size IP67 enclosure

Specifications

| Environmental | |
|------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C(F)] | -10...+55° (14...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Optical | |
| Sensing Mode | True color (diffuse) |
| Sensing Range | See Product Selection table on page 1-135 |
| Light Source | White LED |
| LED Indicators | See User Interface below |
| Adjustments | Push buttons |
| Electrical | |
| Voltage | 18...28V DC |
| Current Consumption | 40 mA max @ 24V DC |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | 1 ms on each channel, 2 ms for channel 3 in remote teach |
| Output Type | Discrete: 3 PNP outputs RS485 models: 1 PNP or 1 NPN output by cat. no. |
| Output Mode | Light operate |
| Output Current | 100 mA @ 30V DC max |
| Output Leakage Current | 0.1 mA max |
| Mechanical | |
| Housing Material | ABS |
| Lens Material | PMMA |
| Connection Types | 8-pin DC micro (M12) QD |
| Supplied Accessories | None |
| Optional Accessories | See mounting brackets and cordsets on page 1-136 |

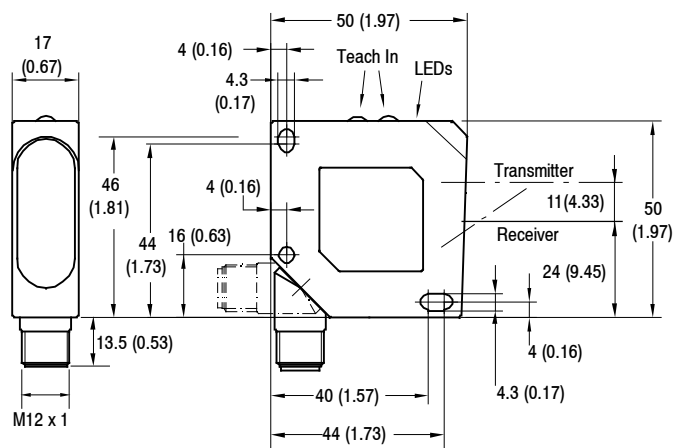
User Interface



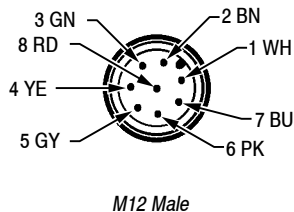
Product Selection

| Sensing Range [mm (in.)] | Sensing Range Tolerance | Spot Size [mm (in.)] | Output Type | Cat. No. |
|--------------------------|-------------------------|---------------------------------|---------------|----------------|
| 12...32 (0.47...1.26) | ±6 mm (0.24 in.) | 4 (0.16) @ 22 (0.86) | 3 PNP | 45CLR-5JPC1-D8 |
| 15...30 (0.59...1.18) | ±5 mm (0.20 in.) | 2 x 2 (0.07 x 0.07) @ 22 (0.86) | 3 PNP | 45CLR-5JPC2-D8 |
| 18...22 (0.70...0.86) | ±2 mm (0.08 in.) | 5 x 1 (0.19) @ 22 (0.86) | 3 PNP | 45CLR-5JPC3-D8 |
| 12...32 (0.47...1.26) | ±6 mm (0.24 in.) | 4 (0.16) @ 22 (0.86) | RS-485, 1 PNP | 45CLR-5LPS1-D8 |
| 12...32 (0.47...1.26) | ±6 mm (0.24 in.) | 4 (0.16) @ 22 (0.86) | RS-485, 1 NPN | 45CLR-5LNS1-D8 |
| 15...30 (0.59...1.18) | ±5 mm (0.20 in.) | 2 x 2 (0.07 x 0.07) @ 22 (0.86) | RS-485, 1 PNP | 45CLR-5LPS2-D8 |
| 15...30 (0.59...1.18) | ±5 mm (0.20 in.) | 2 x 2 (0.07 x 0.07) @ 22 (0.86) | RS-485, 1 NPN | 45CLR-5LNS2-D8 |
| 18...22 (0.70...0.86) | ±2 mm (0.08 in.) | 5 x 1 (0.19) @ 22 (0.86) | RS-485, 1 PNP | 45CLR-5LPS3-D8 |
| 18...22 (0.70...0.86) | ±2 mm (0.08 in.) | 5 x 1 (0.19) @ 22 (0.86) | RS-485, 1 NPN | 45CLR-5LNS3-D8 |

Approximate Dimensions [mm (in.)]

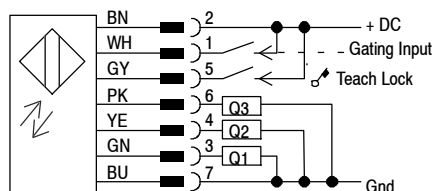


Pinout and Color Codes

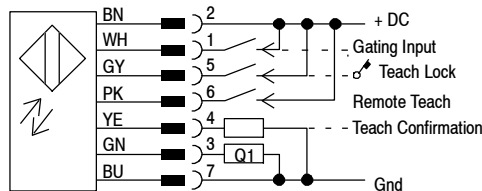


| Pin | Color | Connection |
|-----|--------|--------------------------|
| 1 | White | Gate Input |
| 2 | Brown | V+ 12...28V DC |
| 3 | Green | OUT 1 |
| 4 | Yellow | OUT 2/Teach Confirmation |
| 5 | Grey | Teach Button Lock |
| 6 | Pink | OUT 3/Remote Teach |
| 7 | Blue | V- 0V DC |
| 8 | Red | Not Connected |

Wiring Diagrams

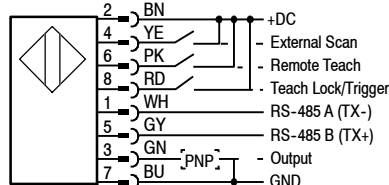


Remote Teach



The control input (pin 5) can be used to lock the ColorSight push buttons by connecting it to the +DC (18...28V DC). When working with the sensor in remote teach, we recommend the use of push button lockout to prevent accidental tampering of the configuration.

RS-485 Models



Note: For NPN output models one terminal of the load should be connected to Pin 3 (output) and the other terminal of the load should be connected to +DC.

ATTENTION



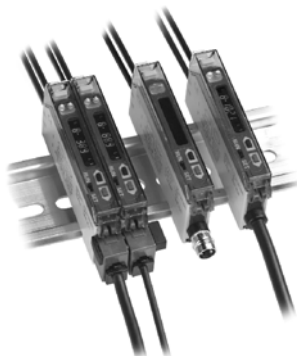
Pin 1 and pin 5 are the RS 485 interface connections and must not be connected to the power supply. This can permanently damage the sensor.

Cordsets and Accessories

| Description | Cat. No. |
|--|-------------|
| DC Micro Style QD Cordset, 8-Pin | 889D-F8AB-2 |
| Mounting Bracket | 45BPD-BKT1 |
| Mounting Bracket | 45BPD-BKT2 |
| Communications Cable (RS-485) for MicroLogix | 1763-NC01 |

PHOTOSWITCH® Photoelectric Sensors
45FVL Visible Red, Blue, Green or White Plastic Fiber Optic

Self-Teach with Digital Display



Features

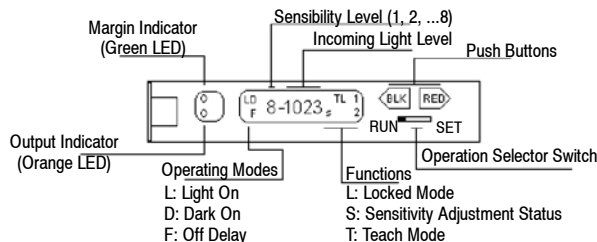
- Choose from, red, green, blue, white light source
- Self-teach capability
- Manual or automatic sensitivity adjustment
- Back-lit LCD display
- Selectable 40 ms off delay output timer
- DIN Rail mountable
- "Power-Bus" option
- Dual channel interference protection
- Reverse polarity, false pulse and transient noise protection (500V)

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | CE Marked for all applicable directives |
| Operating Environment | NEMA 1; IP40 |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 50 g , 3 directions, 3 times |
| Relative Humidity | 35...85% |
| Ambient Light Immunity | Incandescent light 10,000 lux max |
| Optical | |
| Sensing Mode | Diffuse or transmitted beam depends on fiber optic cable selected |
| Light Source | Red LED (660 nm), green LED (525 nm), blue LED (470 nm), white LED |
| LED Indicators | See User Interface Panel below |
| Adjustments | Push buttons |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 50 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | Channel 1 = 600 μs, channel 2 = 700 μs |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 30V DC max |
| Output Leakage Current | 0.5 mA max |
| Mechanical | |
| Housing Material | ABS resin |
| Connection Types | 4-pin DC pico (M8) QD, power bus cables |
| Supplied Accessories | 60-2638 mounting assembly |
| Optional Accessories | See mounting bracket and cordsets on page 1-138 |

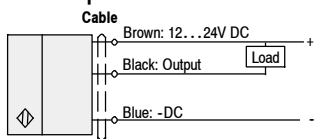
User Interface Panel

| LED | State | Condition |
|--------|-------|-----------------------|
| Green | OFF | Unstable light signal |
| | ON | Stable light signal |
| Orange | OFF | Output OFF |
| | ON | Output ON |

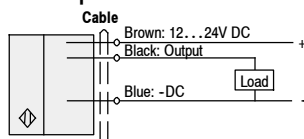


Wiring Diagrams

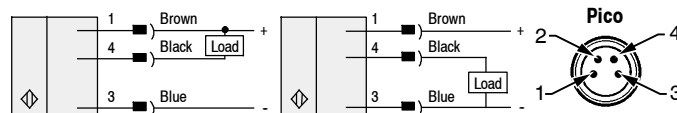
Cable NPN Output



Cable PNP Output



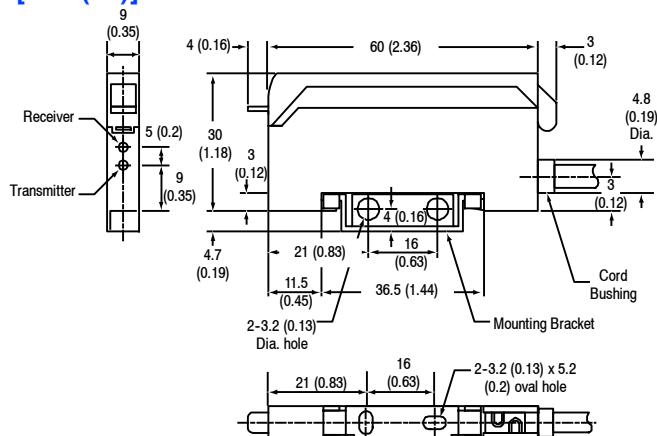
Quick-Disconnect



45FVL Visible Red, Blue, Green or White Plastic Fiber Optic

Self-Teach with Digital Display

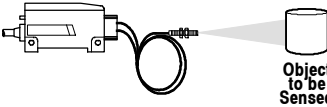
Approximate Dimensions [mm (in.)]



Typical Plastic Fiber Optic Cable Selection

| LED | Sensing Mode | Plastic Fiber Diameter [mm (in.)] | Typical Fiber Model | Typical Range |
|-------|-------------------------------------|-----------------------------------|---------------------|---|
| Red | Diffuse (Bifurcated Fiber) | 1 (0.040) | 43PR-NES57ZS | Refer to the Fiber Optic section on page 1-231. |
| | | 0.5 (0.020) | 43PR-NJS53ZM | |
| | Transmitted Beam (Individual Fiber) | 1 (0.040) | 43PT-NJS56FS | |
| | | 0.5 (0.020) | 43PT-NBS52FM | |
| Green | Diffuse (Bifurcated Fiber) | 1 (0.040) | 43PR-NES57ZS | |
| | Transmitted Beam (Individual Fiber) | | 43PT-NJS56FS | |
| Blue | Diffuse (Bifurcated Fiber) | | 43PR-NES57ZS | |
| | Transmitted Beam (Individual Fiber) | | 43PT-NJS56FS | |
| White | Diffuse (Bifurcated Fiber) | | 43PR-NES57ZS | |
| | Transmitted Beam (Individual Fiber) | | 43PT-NJS56FS | |

Product Selection

| Sensing Mode | Operating Voltage | Response Time | Output Characteristics | | LED | Cat. No. | | |
|---|-------------------|---------------|------------------------|------------------|-------|---------------|---------------|-------------------------|
| | | | Type | Max Load Current | | Cable | Pico | Power Bus (QD required) |
|  <p>Field of View: Refer to Plastic Fiber Optic section page 1-270</p> <p>Emitter LED: Visible red 660 nm, Visible green 565 nm or Visible blue 470 nm Visible white</p> <p>Indicators: Orange: Output Green: Stability</p> | 12...24V DC ±10% | 600 μs | PNP | Output: 100 ma | Red | 45FVL-2LHE-A2 | 45FVL-2LHE-P4 | 45FVL-2LHE-C4 ① |
| | | | | | Green | 45FVL-3LHE-A2 | 45FVL-3LHE-P4 | 45FVL-3LHE-C4 ① |
| | | | | | Blue | 45FVL-6LHE-A2 | 45FVL-6LHE-P4 | 45FVL-6LHE-C4 ① |
| | | | | | White | 45FVL-5LHE-A2 | 45FVL-5LHE-P4 | 45FVL-5LHE-C4 ① |
| | | | | | Red | 45FVL-2LGE-A2 | 45FVL-2LGE-P4 | 45FVL-2LGE-C4 ① |
| | | | NPN | | Green | 45FVL-3LGE-A2 | 45FVL-3LGE-P4 | 45FVL-3LGE-C4 ① |
| | | | | | Blue | 45FVL-6LGE-A2 | 45FVL-6LGE-P4 | 45FVL-6LGE-C4 ① |
| | | | | | White | 45FVL-5LGE-A2 | 45FVL-5LGE-P4 | 45FVL-5LGE-C4 ① |

① PowerBus master/3 conductor QD = 45F-A3C-A2. PowerBus slave/1 conductor QD = 45F-A1C-A2

Cordsets and Accessories

| Description | Cat./Page No. | Description | Cat./Page No. |
|---|---------------|--------------------------------|---------------|
| Pico QD Cordset, Straight, 4-pin, 2 m | 889P-F4AB-2 | PowerBus master/3 conductor QD | 45F-A3C-A2 |
| Fiber Optic Cables | 1-231 | PowerBus slave/1 conductor QD | 45F-A1C-A2 |
| Fiber Optic Adaptor Replacements | | PowerBus caps | |
| 1.25...2.2 mm O.D. | 61-6731 | Male | 45F-AMC |
| 1.00...2.2 mm O.D. | 61-6742 | Female | 45F-AFC |
| Mounting Assembly | 60-2638 | | |

PHOTOSWITCH® Photoelectric Sensors

45FSL Visible Red or White Plastic Fiber Optic

General Purpose DIN Style



Features

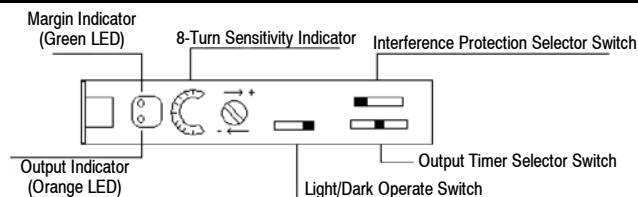
- Choose from red or white light source
- Dual LED indicators
- Manual sensitivity adjustment
- Selectable 40 ms on/off delay output timer
- DIN Rail mountable
- “Power-Bus” option
- A 4/8 sensor cross-talk protection
- Reverse polarity, false pulse and transient noise protection (500V)

Specifications

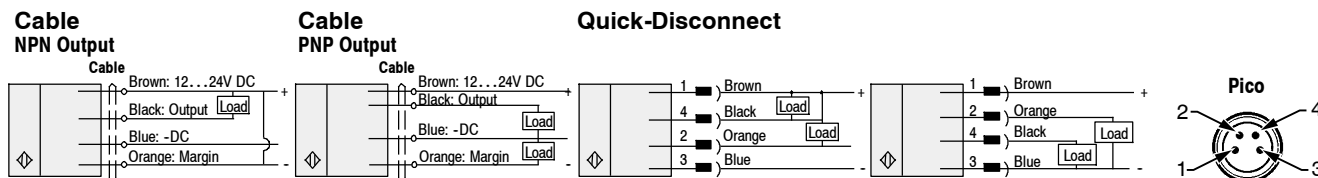
| Environmental | |
|-------------------------------|---|
| Certifications | CE Marked for all applicable directives |
| Operating Environment | NEMA 1; IP40 |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 10 g , 3 directions, 3 times |
| Relative Humidity | 35...85% |
| Ambient Light Immunity | Incandescent light 10,000 lux max |
| Optical | |
| Sensing Mode | Diffuse or transmitted beam depends on fiber optic cable selected |
| Light Source | Visible red LED (660 nm), visible white LED |
| LED Indicators | See User Interface Panel below |
| Adjustments | 8-turn sensitivity potentiometer |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 40 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 30 μs, 250 μs, 500 μs |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 30V DC max 50 mA stability output @ 30V DC max |
| Output Leakage Current | 0.5 mA max |
| Mechanical | |
| Housing Material | ABS resin |
| Connection Types | 2 m conductor cable (24 AWG), 4-pin DC pico QD, power bus cables |
| Supplied Accessories | 60-2638 mounting assembly |
| Optional Accessories | See mounting bracket and cordsets on page 1-140 |

User Interface Panel

| LED | State | Condition |
|--------|-------|--|
| Green | OFF | Unstable light signal Stable light signal |
| | ON | |
| Orange | OFF | Output OFF Output ON |
| | ON | |



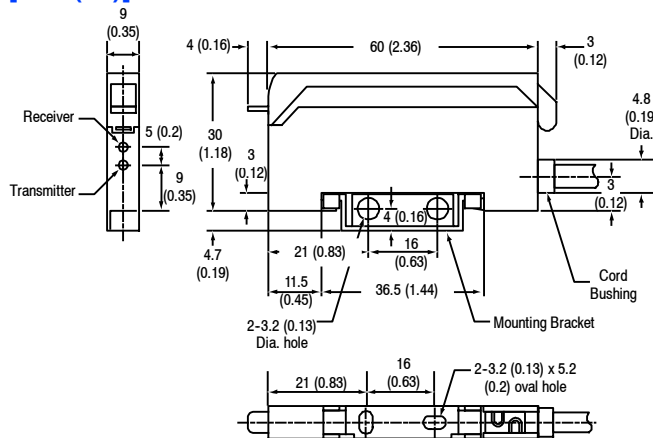
Wiring Diagrams



Note: Details regarding connection of Rockwell Automation 45FSL photoelectric sensors to Rockwell Automation Programmable Controllers can be found in “PHOTOSWITCH® Photoelectric Sensors and Programmable Controller Interface Manual” on www.ab.com/literature.

PHOTOSWITCH® Photoelectric Sensors
45FSL Visible Red or White Plastic Fiber Optic
General Purpose DIN Style

Approximate Dimensions [mm (in.)]



Typical Plastic Fiber Optic Cable Selection

| LED | Sensing Mode | Plastic Fiber Diameter [mm (in.)] | Typical Fiber Model | Typical Range |
|-------|-------------------------------------|-----------------------------------|---------------------|---|
| Red | Diffuse (Bifurcated Fiber) | 1 (0.040) | 43PR-NES57ZS | Refer to the Fiber Optic section on page 1-231. |
| | | 0.5 (0.020) | 43PR-NJS53ZM | |
| | Transmitted Beam (Individual Fiber) | 1 (0.040) | 43PT-NJS56FS | |
| | | 0.5 (0.020) | 43PT-NBS52FM | |
| White | Diffuse (Bifurcated Fiber) | 1 (0.040) | 43PR-NES57ZS | |
| | Transmitted Beam (Individual Fiber) | | 43PT-NJS56FS | |

Product Selection

| Sensing Mode | Operating Voltage | Response Time | Output Characteristics | | LED | Cat. No. | | | |
|--|-------------------|-----------------------------------|------------------------|------------------------------------|---------------|---------------|-----------------|-------------------------|-----------------|
| | | | Type | Max Load Current | | Cable | Pico | Power Bus (QD required) | |
| <p>Field of View: Refer to Plastic Fiber Optic section page 1-270</p> <p>Emitter LED: Visible red 660 nm, Visible white</p> <p>Indicators: Orange: Output, Green: Stability</p> | 12...24V DC ±10% | Selectable 250 μs or 500 μs | PNP | Output: 100 ma Stability: 50 ma | Red | 45FSL-2LHE-A2 | 45FSL-2LHE-P4 | 45FSL-2LHE-C4 ① | |
| | | | | | White | 45FSL-5LHE-A2 | 45FSL-5LHE-P4 | 45FSL-5LHE-C4 ① | |
| | | | NPN | | Red | 45FSL-2LGE-A2 | 45FSL-2LGE-P4 | 45FSL-2LGE-C4 ① | |
| | | | | | White | 45FSL-5LGE-A2 | 45FSL-5LGE-P4 | 45FSL-5LGE-C4 ① | |
| | | | 30 μs | | PNP | Red | 45FSL-2LWE-A2 | 45FSL-2LWE-P4 | 45FSL-2LWE-C4 ① |
| | | | | | | White | 45FSL-5LWE-A2 | 45FSL-5LWE-P4 | 45FSL-5LWE-C4 ① |
| | | NPN | | Red | 45FSL-2LVE-A2 | 45FSL-2LVE-P4 | 45FSL-2LVE-C4 ① | | |
| | | | | White | 45FSL-5LVE-A2 | 45FSL-5LVE-P4 | 45FSL-5LVE-C4 ① | | |

① PowerBus master/4 conductor QD = 45F-A4C-A2
 PowerBus slave/2 conductor QD = 45F-A2C-A2

Cordsets and Accessories

| Description | Cat./Page No. | Description | Cat./Page No. |
|---|--------------------|--|--------------------|
| Pico QD Cordset, Straight, 4-pin, 2 m | 889P-F4AB-2 | PowerBus master/4 conductor QD | 45F-A4C-A2 |
| Fiber Optic Cables | 1-231 | PowerBus slave/2 conductor QD | 45F-A2C-A2 |
| Fiber Optic Adaptor Replacements 1.25...2.2 mm O.D. 1.00...2.2 mm O.D. | 61-6731 61-6742 | PowerBus caps Male Female | 45F-AMC 45F-AFC |
| Mounting Assembly | 60-2638 | | |



Description

The 42FT is a compact, DIN Rail mount fiber optic photoelectric sensor with sophisticated part detection, diagnostic, and self-teach capabilities.

Five LED indicators provide diagnostic and alignment information. A dynamic diagnostic output signals when margin levels are below a predetermined threshold for seven successive detections.

The self-teach capability allows the Bulletin 42FT to determine an optimum sensitivity and hysteresis setting for a specific application. The remote lockout feature can be used to help prevent unauthorized changes to these adjustments. A switch selectable 50 ms off-delay (“pulse stretcher”) is useful in high speed applications where the output pulse must be lengthened to allow time for the machine logic to respond.

Features

- Choose from red or green light source
- Local and remote self-teach operation
- Supports 1.5 mm and 1.25 mm plastic fiber optic cables
- Fast 500 μs response time
- Selectable pulse-stretcher
- Selectable hysteresis
- Selectable light/dark operate
- Dual “RUN” modes to prevent crosstalk with other sensors
- Both NPN and PNP outputs

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Certified, and CE Marked for all applicable directives |
| Operating Environment | NEMA 1, 4X, 12, 13; IP66 (IEC 529) |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...85% |
| Optical | |
| Sensing Mode | Fiber optic |
| Light Source | Red or green |
| LED Indicators | See User Interface Panel on page 1-142 |
| Adjustments | Local teach and remote self teach |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 60 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 500 μs |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 24V DC max |
| Mechanical | |
| Housing Material | ABS resin |
| Connection Types | 2 m conductor cable |
| Supplied Accessories | 60-2638 mounting assembly, fiber optic adaptor |
| Optional Accessories | See mounting bracket and cordsets on page 1-143 |

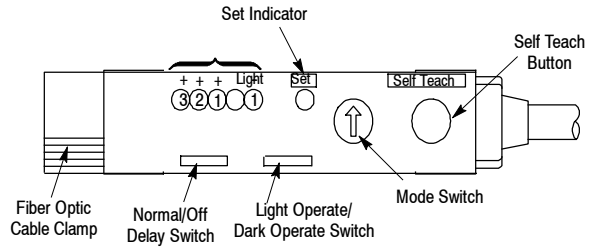
PHOTOSWITCH® Photoelectric Sensors

42FT Visible Red or Green Plastic Fiber Optic

Self-Teach

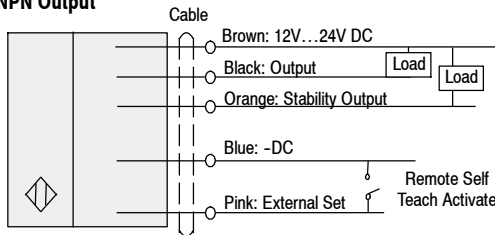
User Interface Panel

| Label | Color | State | Status |
|----------|-------|----------|--|
| Set | Green | OFF | Sensor not powered |
| | | ON | Sensor powered, configuration verified |
| | | Flashing | Self-teach mode active |
| -1... +3 | | ON | 0.8X...1.6X margin |
| Light | Red | OFF | 1X margin, output not activated |
| | | ON | 1X margin, output activated |

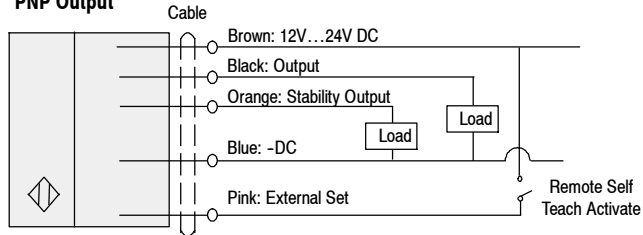


Wiring Diagrams

Cable NPN Output



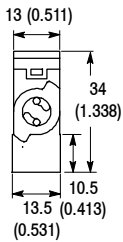
PNP Output



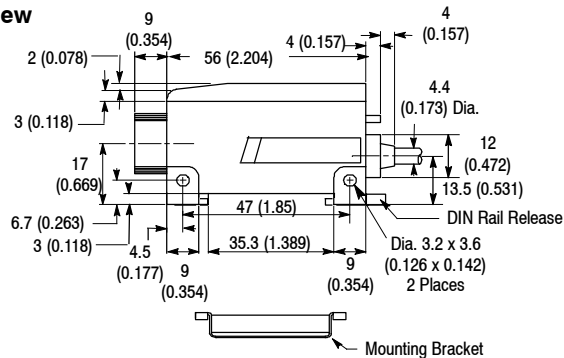
Note: Details regarding connection of Allen-Bradley Bulletin 42FT photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0. Refer to www.ab.com/literature for more information.

Approximate Dimensions [mm (in.)]

End View



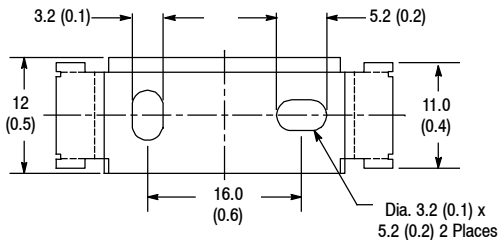
Side View



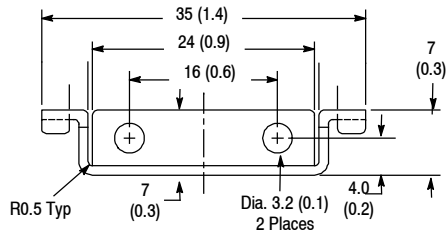
Mounting Assembly—60-2638

Stainless steel mounting bracket for installing the 42FT without a DIN Rail.

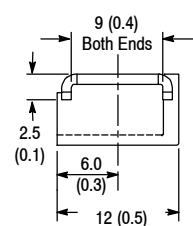
Top View



Side View

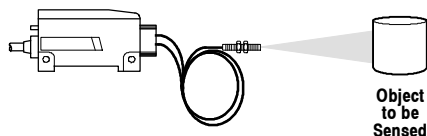


End View



42FT Visible Red or Green Plastic Fiber Optic

Self-Teach

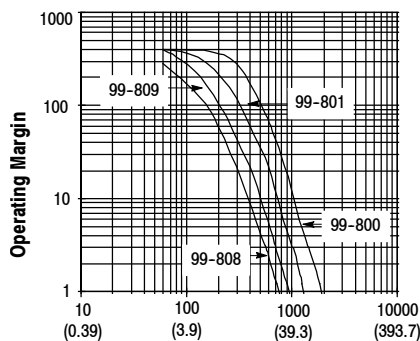


QD Cordsets and Accessories

| Description | Cat./Page No. |
|--|---------------|
| Fiber Optic Cables | 1-231 |
| Mounting Assemblies | 1-293 |
| Fiber Optic Cable Adaptors | 61-6731 |
| 76 mm (3 in.) Diameter with Center Mount Hole | 92-39 |
| 32 mm (1.25 in.) Diameter with Center Mount Hole | 92-47 |

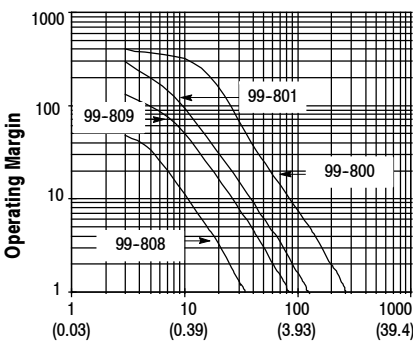
Typical Response Curves for Visible Red LED

Retroreflective



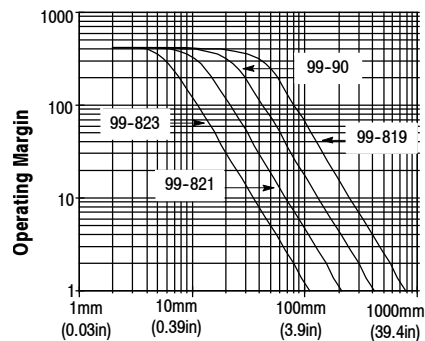
Distance to 76 mm Reflector Model 92-39 [mm (in.)]

Diffuse



Distance to White Target [mm (in.)]

Transmitted Beam



Operating Distance [mm (in.)]

Product Selection

| Operating Voltage Supply Current | Max Sensing Distance @ 1X Margin | Output Energized | Emitter LED | Output Type Capacity Response Time | Max Leakage Current | Connection Type | Cat. No. |
|-------------------------------------|---|--------------------------|----------------|---|------------------------|--------------------|----------------------|
| 12...24V DC ±10% 60 mA | Depends on Fiber Optic Cable Selected | Light/Dark Selectable | Red 660 nm | PNP Output: 100 mA Stability: 50 mA 500 μs | 0.5 mA | 2 m 500V cable | 42FT-F2LPA-A2 |
| | | | Green 565 nm | | | 2 m 500V cable | 42FT-F3LPA-A2 |
| 12...24V DC ±10% 50 mA | | | Red 660 nm | NPN Output: 100 mA Stability: 50 mA 500 μs | | 2 m 500V cable | 42FT-F2LNA-A2 |
| | | | Green 565 nm | | | 2 m 500V cable | 42FT-F3LNA-A2 |

PHOTOSWITCH® Photoelectric Sensors
42FA Visible Red Plastic Fiber Optic
Slim Housing



Features

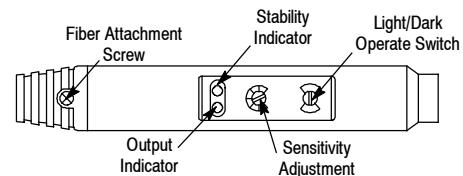
- Compact 8 x 10 mm size
- Dual LED indicators: output (red), stability (green)
- Fast 500 μs response time
- Visible red light source
- Selectable light or dark operate
- Can be DIN Rail mounted or mounted separately

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Certified, and CE Marked for all applicable directives |
| Operating Environment | NEMA 1, 12, 13; IP65 (IEC 529) |
| Operating Temperature [C (F)] | -25...+55° (-13...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...85% |
| Optical | |
| Sensing Mode | Fiber optic |
| Sensing Range | Depends on fiber optic selected |
| Field of View | Depends on fiber optic selected |
| Light Source | Visible red LED (660 nm) |
| LED Indicators | See User Interface Panel below |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 12...24V DC |
| Current Consumption | 30 mA max |
| Sensor Protection | Reverse polarity, false pulse, transient noise |
| Outputs | |
| Response Time | 500 μs |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 24V DC |
| Mechanical | |
| Housing Material | Noryl® |
| Lens Material | Not applicable |
| Connection Types | 3-pin DC pico (M8) QD |
| Supplied Accessories | Mounting bracket, adhesive apertures (transmitted beam models), screwdriver, reflector (retroreflective models) |
| Optional Accessories | See cordsets and 35 mm DIN Rail on page 1-146 |

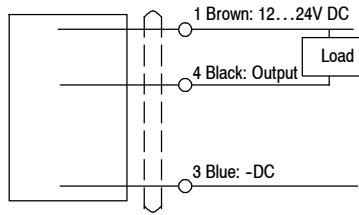
User Interface Panel

| Label | Color | State | Status |
|-------|-------|-------|----------------------|
| STB | Green | OFF | 0.8X < Margin < 1X |
| | | ON | 0.8X > Margin > 1X |
| OUT | Red | OFF | Output not activated |
| | | ON | Output activated |

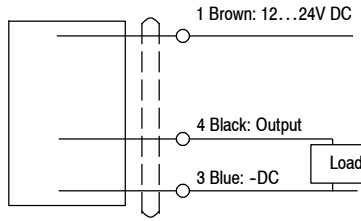


Wiring Diagrams

NPN Output



PNP Output



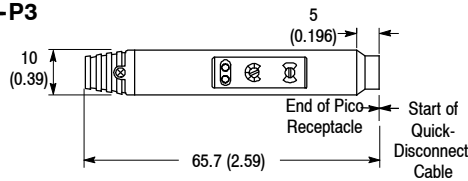
Face View Male Receptacle (Sensor)



Note: Details regarding connection of Rockwell Automation Bulletin 42FA photoelectric sensors to Rockwell Automation Programmable Controllers can be found in the *PHOTOSWITCH® Interface Manual*. Refer to www.ab.com/literature for more information.

Approximate Dimensions [mm (in.)]

Pico Quick-Disconnect Versions
 42FA-F2LPA-P3
 42FA-F2LNA-P3

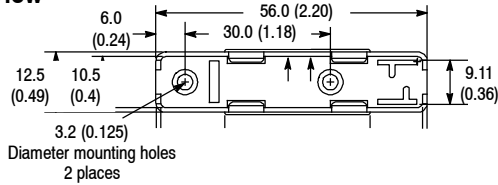


DIN Rail Mounting Assembly—60-2639 (included with sensor)

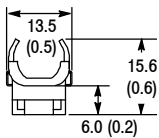
Mounting bracket and hardware for DIN rail mounting.

Approximate Dimensions [mm (in.)]

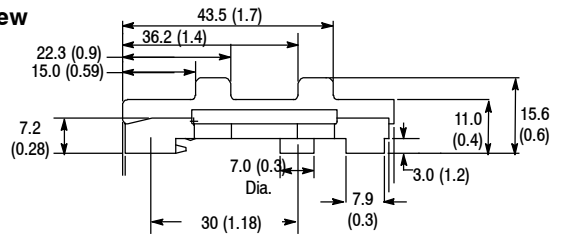
Top View



End View



Side View

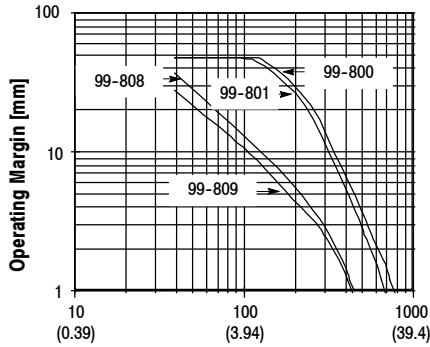


Note: Replacement mounting assembly and fiber optic cable adaptors are available on page 1-293.

PHOTOSWITCH® Photoelectric Sensors
42FA Visible Red Plastic Fiber Optic
Slim Housing

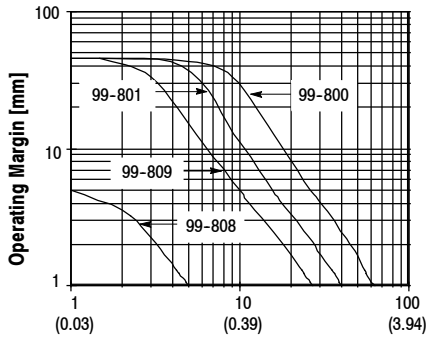
Typical Response Curves

Retroreflective



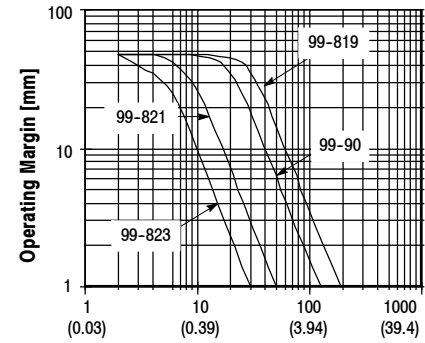
Distance to 76 mm Reflector Model 92-39 [mm (in.)]

Diffuse



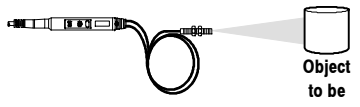
Distance to White Target [mm (in.)]

Transmitted Beam



Operating Distance [mm (in.)]

Product Selection

| | | | | | |
|--|--|--|-----------------------------------|-------------------------------|-----------------------------|
|  <p>Field of View: Refer to Fiber Optic section Emitter LED: Visible red 660 nm</p> | <p>Operating Voltage Supply Current</p> | <p>Output Type Capacity Response Time</p> | <p>Max Leakage Current</p> | <p>Connection Type</p> | <p>Cat. No.</p> |
| | <p>12...24V DC ±10% 25 mA</p> | <p>NPN 100 mA 500 μs</p> | | | |
| | <p>12...24V DC ±10% 30 mA</p> | <p>PNP 100 mA 500 μs</p> | | <p>3-pin pico</p> | <p>42FA-F2LPA-P3</p> |

Cordsets and Accessories

| Description | Cat./Page No. |
|--|--------------------|
| 2 m (6.5 ft) 3-pin Pico QD Cordset | 889P-S3AB-2 |
| Plastic Fiber Optic Cables | 1-270 |
| Adaptor for 1.25 mm Fiber Optic Cables | 61-6731 |
| DIN Rail Mounting Bracket | 60-2639 |



ClearSight 9000



ClearSight RightSight



ClearSight 7000

Features

Three product families for application flexibility

- Configurable ClearSight 9000 for harsh duty glass and PET bottle detection
- ClearSight RightSight and 7000 for general purpose plastic film and stretch-wrap detection

Specifications

| | 9000 | RightSight | 7000 |
|-------------------------------|---|-----------------------------|-----------------------------|
| Environmental | | | |
| Certifications | cULus Listed and CE Marked for all applicable directives | | |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13, IP67 (IEC529); 1200 psi (8270 kpa) washdown for RightSight and Series 9000 models | | |
| Operating Temperature [C (F)] | -34...+70° (-29...+158°) | -25...+55° (-13...+131°) | -40...+65° (+13...+150°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 | | |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 | | |
| Relative Humidity | 35...85% | | |
| Ambient Light Immunity | Incandescent light: 5000 lux | | |
| Optical | | | |
| Sensing Modes | Clear object | | |
| Sensing Range | 1.2 m max | 1 m max | 1.5 m max |
| Field of View | See Product Selection table on page 1-149 | | |
| Light Source | Visible red LED (660 nm) | | |
| Electrical | | | |
| Voltage | 10...40V DC; 70...264V AC/DC | 10.8...30V DC | 11.8...28V DC |
| Current Consumption | 30 mA max | 35 mA max | 46 mA max |
| Sensor Protection | Short circuit, false pulse, reverse polarity, overload | | |
| Outputs | | | |
| Response Time | See Product Selection table on page 1-149 | | |
| Output Type | PNP and NPN, SDPT, SS relay, diagnostic output, see Product Selection table on page 1-149 | | |
| Output Mode | Light or dark operate selectable, light or dark operate by cat. no. (see Product Selection table on page 1-149) | | |
| Output Current | Refer to Product Selection table on page 1-149 | | |
| Mechanical | | | |
| Housing Material | Valox® | Mindel® | Valox |
| Lens Material | Acrylic | | |
| Connection Types | See Product Selection table on page 1-149 | | |
| Supplied Accessories | 92-90 Reflector | | |
| Optional Accessories | See mounting brackets and cordsets on page 1-150 | | |

Wiring Diagrams

For Wiring Diagrams, please refer to base product specifications:

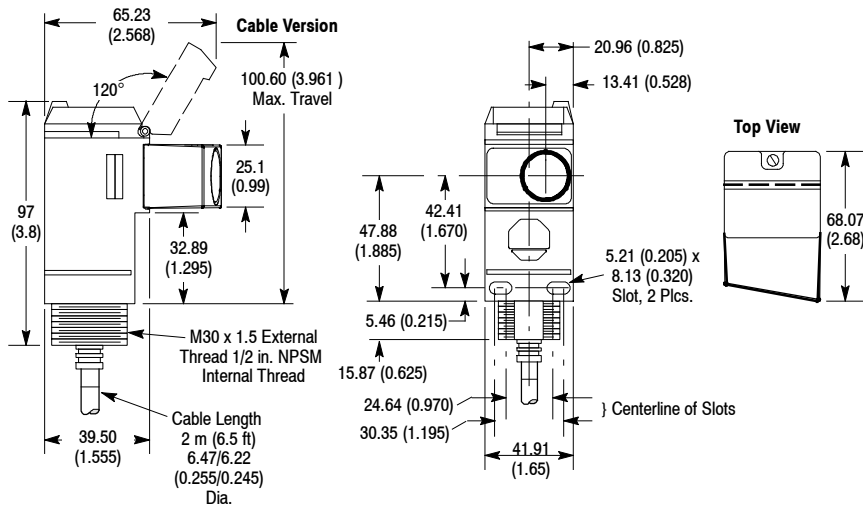
ClearSight RightSight see page 1-32

ClearSight 9000 see page 1-66

ClearSight 7000 see page 1-103

Approximate Dimensions [mm (in.)]

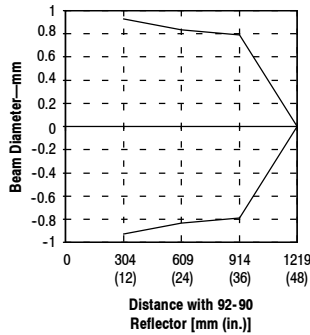
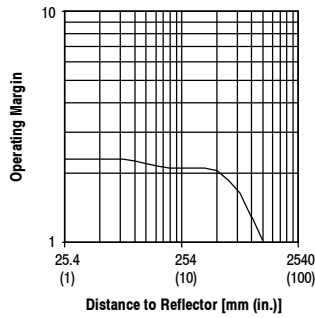
ClearSight 9000



Dimensions for ClearSight RightSight and ClearSight 7000 are located on page 1-32 and 1-103, respectively.

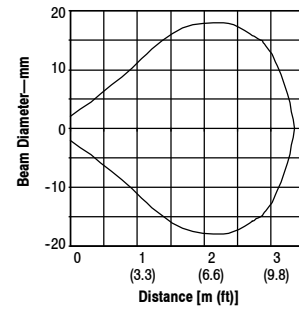
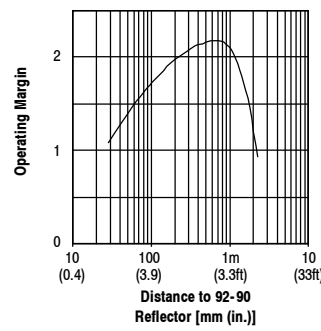
Typical Response Curve Beam Pattern

9000

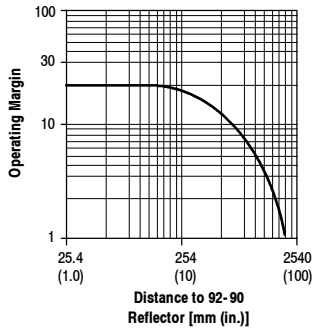


Typical Response Curve Beam Pattern

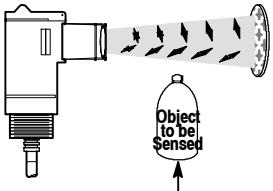
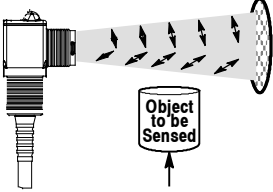
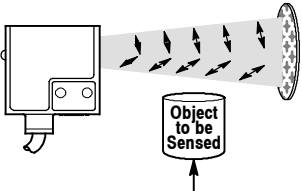
RightSight



7000



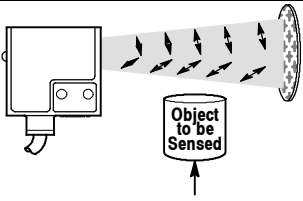
Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. | | | | |
|--|--|---------------------------------|--------------------------|--|--|----------------------------------|---------------------------------|-----------------------|-----------|------------|
| On/Off Sensors and Timing | | | | | | | | | | |
|  <p>9000</p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10...40V DC 30 mA | 0.025...1.2 m (0.08...4 ft) | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 2 m 300V cable | 42G⊗C-9200 | | | | |
| | 70...264V AC/DC 50/60 Hz 15 mA | | | | 4-pin DC micro | 42G⊗C-9200-QD | | | | |
| | | | | | 4-pin mini | 42G⊗C-9200-QD1 | | | | |
| | 45...264V DC/ 40...264V AC 50/60 Hz 15 mA | | | | 2 m 300V cable | 42G⊗C-9202 | | | | |
| | | | | | 5-pin mini | 42G⊗C-9202-QD | | | | |
| | | | | | 2 m 300V cable | 42G⊗C-9203 | | | | |
| 4-pin mini | 42G⊗C-9203-QD | | | | | | | | | |
| | 4-pin AC micro | 42G⊗C-9203-QD1 | | | | | | | | |
|  <p>RightSight</p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 21.6...264V AC/DC 15 mA | 25 mm...1 m (1 in...3.28 ft) | Dark Operate | N-MOSFET/100 mA 8.3 ms | 2 m 300V cable | 42EF-C2SCA-A2 | | | | |
| | 10.8...30V DC 35 mA | | | | 4-pin AC micro | 42EF-C2SCA-G4 | | | | |
| | | | | | 2 m 300V cable | 42EF-C2KBA-A2 | | | | |
| | 4-pin DC micro | | | | | 42EF-C2KBA-F4 | | | | |
| | | | | | Linear Polarized Sensors for Detection of Clear Films | | | | | |
| |  <p>7000</p> <p>Field of View: 3° Emitter LED: Visible red 660 nm</p> | | | | 11...28V DC 46 mA | 50 mm...1.5 m (2 in...4.9 ft) | Comple- mentary L.O./D.O. | NPN 100 mA 1 ms | 3 m cable | 42SMU-7250 |
| 4-pin DC micro | | 42SMU-7250-QD | | | | | | | | |
| | | 3 m cable | 42SMU-7251 | | | | | | | |
| 4-pin DC micro | | | 42SMU-7251-QD | | | | | | | |

⊗ R for standard (i.e. 42GRC-9200)
T for timing (i.e. 42GTC-9200)

Refer to page 1-150 for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|----------------------------------|----------------------------|--|--------------------|---------------|
| Circular Polarized Sensors for Detection of Clear Objects (Bottles, Clear Packages) | | | | | | |
|  <p>7000</p> <p>Field of View: 3° Emitter LED: Visible red 660 nm</p> | 11...28V DC 46 mA | 50 mm...1.5 m (2 in...4.9 ft) | Complementary L.O./D.O. | NPN 100 mA 1 ms | 3 m cable | 42SMU-7260 |
| | | | | | 4-pin DC micro | 42SMU-7260-QD |
| | | | | PNP 100 mA 1 ms | 3 m cable | 42SMU-7261 |
| | | | | | 4-pin DC micro | 42SMU-7261-QD |

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. |
|---|--------------|---|------------------|
| 2 m (6.5 ft), 4-pin DC Micro QD Cordset | 889D-F4AC-2 | Mounting Bracket Swivel/Tilt for ClearSight 7000 | 60-2619 |
| 2 m (6.5 ft) 5-pin DC Micro QD Cordset | 889D-F5AC-2 | Mounting Bracket Swivel/Tilt for ClearSight RightSight | 60-2649 |
| 2 m (6.5 ft), 4-pin AC Micro QD Cordset, Straight | 889R-F4AEA-2 | Mounting Bracket Swivel/Tilt for ClearSight 9000 and 10,000 | 60-2681 |
| 1.8 m (6 ft) 4-pin, Mini QD Cordset | 889N-F4AF-6F | Reflector | 92-90 (included) |
| 1.8 m (6 ft) 5-pin Mini QD Cordset | 889N-F5AF-6F | | |



Description

The 45LPT is an optical label sensor designed exclusively for the detection of standard or opaque labels on a high speed web. The 45LPT provides a solution for packaging industry applications such as label counting and web, “double sheet” and mark detection on a translucent film.



Features

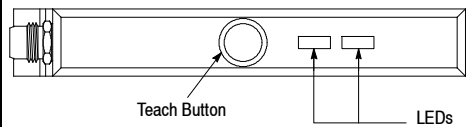
- “One Touch” local and remote teach capability
- 10...30V DC operation
- Fast 50 µsec response time
- User interface lockout feature
- IP65 housing
- Industrial anodized aluminum housing

Specifications


| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP65 |
| Operating Temperature [C (F)] | -20...+60° (-4...+140°) |
| Vibration/Shock | 10...55 Hz, 1.5 mm amplitude; meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% (noncondensing) |
| Ambient Light Immunity | Incandescent light 3000 lux |
| Optical | |
| Sensing Mode | Transmitted beam |
| Sensing Gap | 3 mm (0.12 in.) |
| Light Source | Nonpulsed infrared |
| Adjustments | Push button for sensitivity adjustment, local and remote teach |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 40 mA max |
| Sensor Protection | Short circuit, overload, transient noise, reverse polarity |
| Power ON Delay | 350 ms |
| Outputs | |
| Response Time | 50 µs |
| Output Type | PNP or NPN selectable |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 30 V DC |
| Output Leakage Current | 12V Supply: 0.78 mA @ 10 mA load, 6.9 mA @100 mA load 24V Supply: 0.30 mA @ 10 mA load, 3 mA @ 100 mA load |
| Mechanical | |
| Housing Material | Aluminum |
| Connection Types | 4-pin pico (M8) QD |
| Supplied Accessories | None |
| Optional Accessories | Cordsets |

User Interface

| Label | Color | State | Condition |
|-------|---|--------|------------------------------------|
| — | Green  | OFF | Sensor power not present |
| | | Steady | Sensor power present |
| | | Flash | Fine teach—translucent label teach |
| — | Red  | OFF | Output inactive |
| | | Steady | Interface lockout |
| | | Flash | Standard label teach |



Teach Button LEDs

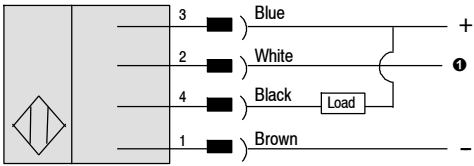
 Red and green LED flash: SCP active or label too translucent or web too opaque.

45LPT

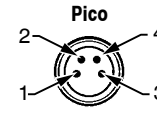
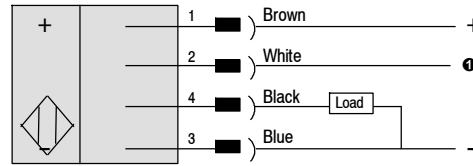
Optical Label Sensor

Wiring Diagrams

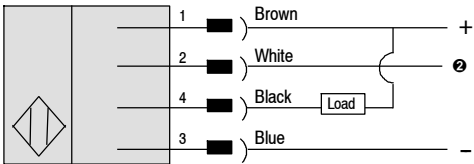
NPN (Light Operate)



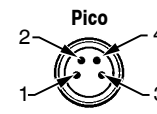
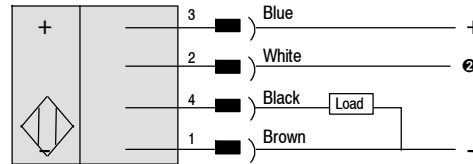
PNP (Light Operate)



NPN (Dark Operate)



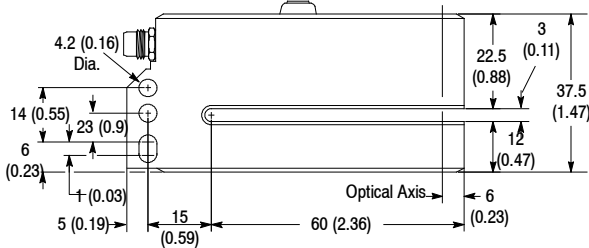
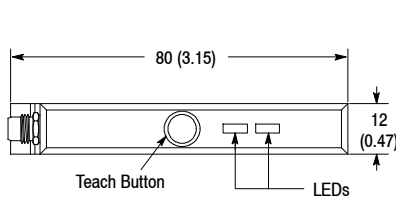
PNP (Dark Operate)



- Ⓛ Remote teach = Connect **white wire** to (+) positive terminal.
- Ⓜ Remote teach = Connect **white wire** to (-) negative terminal.
- Note:** If remote teach (white wire) is not used, connect it to (-) negative terminal.
- Note:** In the event of power failure, the sensor remembers the last threshold taught-in.

IMPORTANT For Label detection use Dark operate. For Web detection use Light operate.

Approximate Dimensions [mm (in.)]



Product Selection

| Operating Voltage | Sensing Gap [mm (in.)] | Output Energized | Output Type | Response Time | Connection Type | Cat. No. |
|------------------------------|------------------------|----------------------|-----------------------|---------------|-----------------|-----------------------|
| 10...30V DC | 3 (0.12) | L.O./D.O. Selectable | NPN or PNP Selectable | 50 μsec | 4-pin Pico | 45LPT-1LEB1-P4 |
| 2 m (6.5 ft) pico QD Cordset | | | | | | 889P-F4AB-2 |



Description

The Allen-Bradley 45LFM capacitive label sensor uses an innovative electronic design to sense and/or count labels. Its unique technology enables it to sense the leading or trailing edges of labels that are not detectable by other similar sensors. The 45LFM provides an auto-teach function and a display to aid in initial setup and operational efficiency.

Features

- Consistently senses the presence of most labels on a web
 - Clear labels on clear backing
 - Clear labels on opaque backing
 - Metallic labels on clear backing
 - Opaque labels on clear backing
 - Metallic labels on opaque backing
 - Opaque labels on opaque backing
- Count 50,000 labels per minute with registration error less than 0.01 inch
- Heavy-duty metal housing
- Ideal for label counting and label registering applications

Specifications

Environmental

| | |
|-------------------------------|--|
| Certifications | 45LFM-CMBA1-D5 meets CE Marked for all applicable directives |
| Operating Environment | IP54 |
| Operating Temperature [C (F)] | 4...+50° (40...+120°) |

Target Detection

| | |
|-----------------------|--|
| Sensing Modes | Capacitive |
| Registration Accuracy | 0.025 mm (0.01 in.) |
| Minimum Sensing Gap | 0.76 mm (0.03 in.) |
| LED Indicators | Edge, zero |
| Adjustments | Multi-turn potentiometer, selectable output polarity by wire |

Electrical

| | |
|---------------------|---|
| Voltage | 11...28V DC |
| Current Consumption | 50 mA |
| Sensor Protection | Short circuit, overload, reverse polarity |
| Power On delay | 10 μs |

Outputs

| | |
|------------------------|------------------------------------|
| Response Time | 10 μs |
| Output Type | PNP and NPN |
| Output Mode | Selectable output polarity by wire |
| Output Current | 150 mA max |
| Output Leakage Current | 5 μA max |

Mechanical

| | |
|------------------|-------------------------|
| Housing Material | Anodized aluminum |
| Connection Types | 5-pin DC micro (M12) QD |

User Interface—45LFM-CMBA1-D5

| Label | Function |
|-------|------------------------|
| Gain | Sensitivity Adjustment |
| Zero | Gap Adjustment |

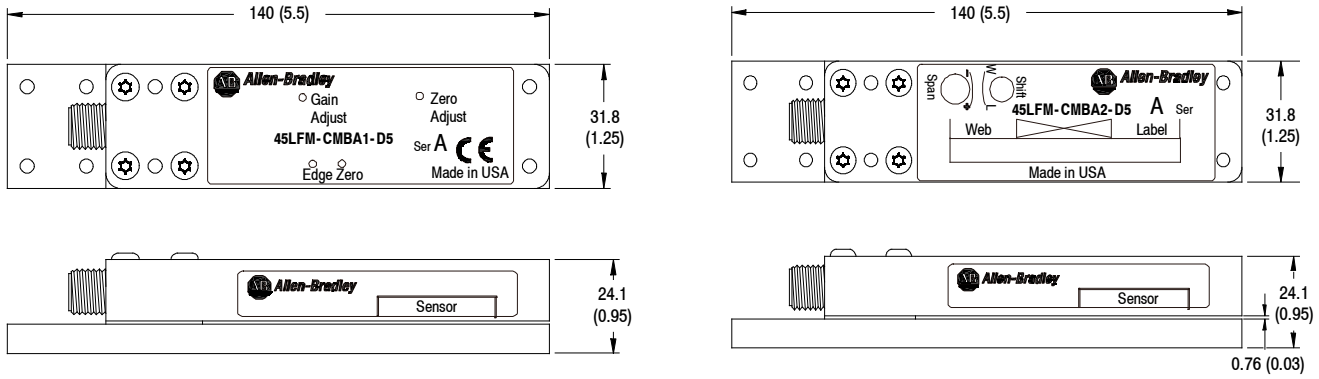
User Interface—45LFM-CMBA2-D5

| Label | Function |
|-------|--|
| Shift | Adjusts position of illuminated LED on display |
| Span | Sensitivity Adjustment |

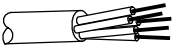

45LFM

Capacitive Label Sensor

Approximate Dimensions [mm (in.)]



Wiring

| Designation | Lead Color (Cordset) | 5-Pin Micro QD Pin Assignment |
|-----------------|---|---|
| Termination |  |  |
| V+ | Brown | 1 |
| -V | Blue | 2 |
| PNP Output | Black | 3 |
| NPN Output | White | 4 |
| Output Polarity | Grey | 5 |

Product Selection

| Operating Voltage | Labels Sensed | Output Type | Response Time | Connection Type | Cat. No. |
|-------------------------------|-----------------------------|-------------|---------------|-----------------|----------------|
| 11...28V DC | Opaque Clear | NPN and PNP | 10 μs | 5-pin DC micro | 45LFM-CMBA1-D5 |
| | Opaque Clear Metallic | | | | 45LFM-CMBA2-D5 |
| 2 m (6.5 ft) Micro QD Cordset | | | | | 889D-F5AC-2 |

Note: Pin 5 must be connected to +V or ground for reliable detection.



Description

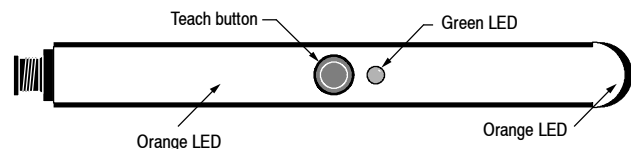
The 45LSP is family of optical fork sensors housed in a plastic enclosure. Fork sensors offer self-contained transmitted beam sensing, ideal for applications that require reliable parts detection. The simple push button teach-in sensitivity adjustment, several connection options and multiple mounting features (via side thru-holes, rear threaded inserts, or optional dovetail brackets) make the 45LSP an economical, easy to use solution for typical applications such as small parts detection, edge detection, parts counting, gear tooth detection, dimension verifications, etc.

Features

- Detection of objects as small as 0.2 mm (0.008 in.)
- Highly visible power and output LED indicators with output indication along both sides of the fork
- Remote teach and teach button lock on 4-pin models
- Light or dark operate selectable
- Multiple mounting options: thru-holes, threaded holes and dovetail
- Easy installation with no alignment required
- 3- and 4-pin pico (M8) QD models

User Interface

| LED Color | State | Status |
|-----------|----------|---|
| Orange | OFF | Output de-energized |
| | ON | Output energized |
| | Flashing | Teach mode or short circuit protection active |
| Green | OFF | Power is OFF |
| | ON | Power is ON |
| | Flashing | Teach mode |



Specifications

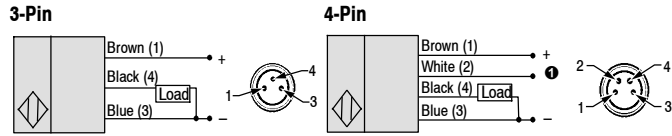
| Environmental | |
|-------------------------------|--|
| Certifications | cULus Listed and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -20...+60° (-4...+140°) |
| Optical | |
| Sensing Modes | Transmitted beam |
| Sensing Gap | 30, 50, 80, and 120 mm |
| Light Source | Visible red LED (640 nm) |
| LED Indicators | See User Interface below |
| Adjustments | Teach button |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 30 mA max |
| Sensor Protection | Short circuit, reverse polarity |
| Outputs | |
| Response Time | 250 μS |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light or dark operate selectable (via teach button or remote) |
| Output Current | 100 mA max |
| Mechanical | |
| Housing Material | Polycarbonate |
| Connection Types | 4-pin DC pico (M8) QD connector, 3-pin DC pico (M8) QD connector |
| Optional Accessories | Cordsets and dovetail mounting brackets |

45LSP

Optical Fork Sensor

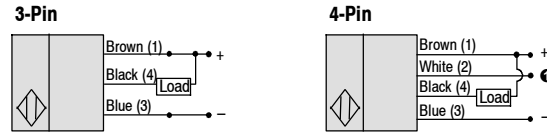
Wiring Diagrams

PNP Models

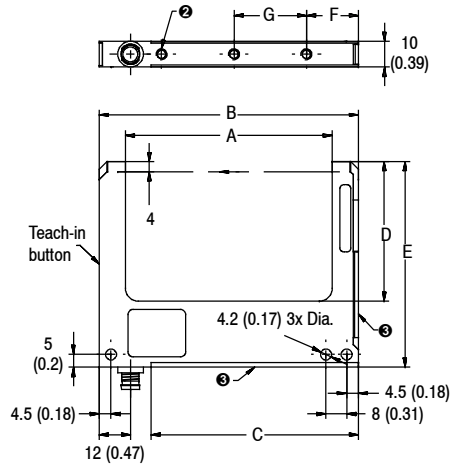


① Remote teach.

NPN Models



Approximate Dimensions [mm (in.)]



Cordsets and Accessories

| Description | Cat. No. |
|-------------------------------|-------------|
| 2 m (6.5 ft) 3-pin DC pico QD | 889P-F3AB-2 |
| 2 m (6.5 ft) 4-pin DC pico QD | 889P-F4AB-2 |
| Dovetail mounting bracket | 44B-BKT |

- ② M4 threaded inserts, 6 mm maximum depth.
- ③ Dovetail mounting

| Gap Size | A | B | C | D | E | F | G |
|----------|------------|------------|------------|-----------|-------------|-----------|-----------|
| 30 mm | 30 (1.18) | 50 (1.97) | 30 (1.18) | 34 (1.34) | 59.5 (2.34) | 20 (0.79) | — |
| 50 mm | 50 (1.97) | 70 (2.76) | 50 (1.97) | 54 (2.13) | 79.5 (3.13) | 20 (0.79) | 28 (1.10) |
| 80 mm | 80 (3.15) | 100 (3.93) | 80 (3.15) | 54 (2.13) | 79.5 (3.13) | 20 (0.79) | 2 x 28 |
| 120 mm | 120 (4.72) | 140 (5.51) | 120 (4.72) | 54 (2.13) | 79.5 (3.13) | 20 (0.79) | 3 x 28 |

Product Selection

| Sensing Gap | Resolution [mm (in.)]Ⓞ | Operating Voltage | Output Mode | Connection Type | Output Type | Cat. No. |
|-------------|------------------------|-------------------|----------------------------------|-----------------------|-------------|-----------------------|
| 30 mm | 0.2 (0.008)Ⓞ | 10...30 V DC | Light or dark operate selectable | 3-pin pico | PNP | 45LSP-2LPA1-P3 |
| | | | | | NPN | 45LSP-2LNA1-P3 |
| 4-pin pico | PNP | | | 45LSP-2LPA1-P4 | | |
| | NPN | | | 45LSP-2LNA1-P4 | | |
| 50 mm | 0.2 (0.008) | | | 3-pin pico | PNP | 45LSP-2LPA2-P3 |
| | | | | | NPN | 45LSP-2LNA2-P3 |
| 4-pin pico | PNP | | | 45LSP-2LPA2-P4 | | |
| | NPN | | | 45LSP-2LNA2-P4 | | |
| 80 mm | 0.2 (0.008) | 3-pin pico | PNP | 45LSP-2LPA3-P3 | | |
| | | | NPN | 45LSP-2LNA3-P3 | | |
| 4-pin pico | PNP | 45LSP-2LPA3-P4 | | | | |
| | NPN | 45LSP-2LNA3-P4 | | | | |
| 120 mm | 0.4 (0.016) | 3-pin pico | PNP | 45LSP-2LPA4-P3 | | |
| | | | NPN | 45LSP-2LNA4-P3 | | |
| 4-pin pico | PNP | 45LSP-2LPA4-P4 | | | | |
| | NPN | 45LSP-2LNA4-P4 | | | | |

Ⓞ Not over the entire temperature range. For maximum precision, allow for a heating period of approximately 15 minutes.
 Ⓞ For detection of objects less than 0.9 mm (0.035 in.), the object should be placed ≥10 mm away from the LED light source.



Description

The 45LST optical fork sensor is designed for small part detection on machines and conveyors. With available slot widths from 2...225 mm (0.08...8.86 in.), these sensors feature adjustable sensitivity and selectable NPN/PNP with L.O./D.O. energized output in a heavy-duty IP65 aluminum housing. Applications include label detection on clear substrates, cap detection on bottles, and part sensing on conveyors for the packaging and material handling industries. The 45LST sensors are also ideal for the automotive, paper, and food industries.

Features

- 10...30V DC operation
- Fast 30 μ sec response time for selected models
- NPN/PNP output
- IP65 housing
- Industrial aluminum housing
- cULus Listed and CE Marked for all applicable directives

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | cULus Listed and CE Marked for all applicable directives |
| Operating Environment | IP65 |
| Operating Temperature [C (F)] | -20...+60° (-4...+10°) |
| Ambient Light Immunity | Incandescent light 3000 lux |
| Optical | |
| Sensing Modes | Transmitted beam |
| Sensing Gap | 2...225 mm (0.08...8.86 in.) |
| Light Source | Nonmodulated infrared, infrared LED (880 nm) |
| LED Indicators | See User Interface below |
| Adjustments | 25 turn potentiometer |
| Electrical | |
| Voltage | 10...30V DC |
| Current Consumption | 40 mA max |
| Sensor Protection | Short circuit, reverse polarity, transient, overload |
| Power On Delay | 129 ms |
| Outputs | |
| Response Time | 1 ms , 30 μ S (45LST-1LEA1-P4 only) |
| Output Type | PNP or NPN selectable |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max |
| Output Leakage Current | 12V DC supply : 0.78 mA @ 10 mA load, 6.9 mA @ 100 mA load 24V DC supply : 0.30 mA @ 10 mA load, 3.0 mA @ 100 mA load |
| Mechanical | |
| Housing Material | Anodized aluminum |
| Connection Types | 4-pin DC pico (M8) QD connector |
| Optional Accessories | Cordsets |

User Interface

| Label | Color | State | Condition |
|-------|-------|--------|--------------------------|
| — | Green | OFF | Sensor power not present |
| | | Steady | Sensor power present |
| — | Red | OFF | Output inactive |
| | | Steady | Output active |

Sensitivity Adjustment

LEDs

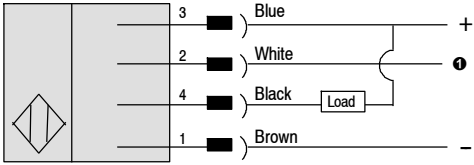
Red and green LED flash: SCP active

45LST

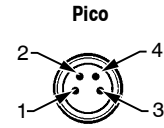
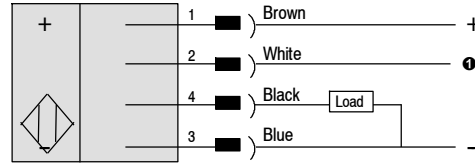
Optical Fork Sensor

Wiring Diagrams

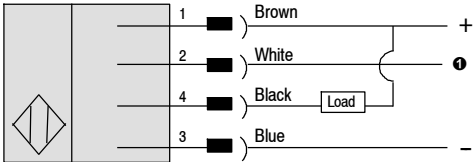
NPN (Light Operate)



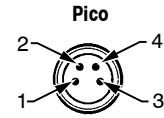
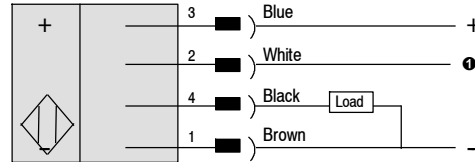
PNP (Light Operate)



NPN (Dark Operate)

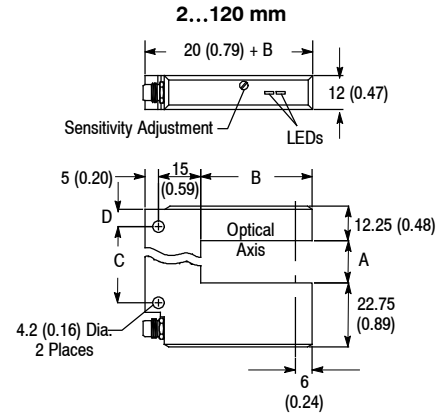
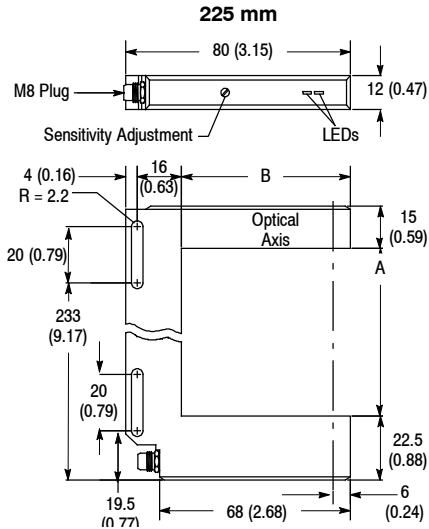


PNP (Dark Operate)



① White wire not used.

Approximate Dimensions [mm (in.)]



Dimensions [mm (in.)]

| Fork Size | A | B | C | D |
|--------------------------|------------|-----------|------------|--------------|
| 2...120 (0.08...4.72) | 2 (0.08) | 40 (1.57) | 14 (0.55) | 6.25 (0.25) |
| | 15 (0.59) | 40 (1.57) | 27 (1.06) | 6.25 (0.25) |
| | 30 (1.18) | 40 (1.57) | 42 (1.65) | 6.25 (0.25) |
| | 50 (1.97) | 57 (2.24) | 40 (1.57) | 17.25 (0.68) |
| | 80 (3.15) | 57 (2.24) | 70 (2.75) | 17.25 (0.68) |
| | 120 (4.72) | 57 (2.24) | 110 (4.33) | 17.25 (0.68) |
| 225 (8.86) | 225 (8.86) | 60 (2.36) | — | — |

Product Selection

| Operating Voltage | Sensing Gap [mm (in.)] | Output Energized | Output Type | Light Source Emission | Response Time | Connection Type | Cat. No. |
|------------------------------|------------------------|------------------|-----------------------|-----------------------|---------------|-----------------|----------------|
| 10...30V DC | 2 (0.08) | LO/DO Selectable | NPN or PNP Selectable | Continuous | 30 μ sec | 4-pin pico | 45LST-1LEA1-P4 |
| | 15 (0.59) | | | Modulated | 1 ms | | 45LST-1LEA2-P4 |
| | 30 (1.18) | | | | | | 45LST-1LEA3-P4 |
| | 50 (1.96) | | | | | | 45LST-1LEA4-P4 |
| | 80 (3.15) | | | | | | 45LST-1LEA5-P4 |
| | 120 (4.72) | | | | | | 45LST-1LEA6-P4 |
| | 225 (8.86) | | | | | | 45LST-1LEA7-P4 |
| 2 m (6.5 ft) pico QD Cordset | | | | | | | 889P-F4AB-2 |

45MLA**Measuring Arrays and Controllers****Description**

The Allen-Bradley 45MLA is a measurement sensor that utilizes an array of transmitted beam photoelectric sensor pairs to detect and measure objects. The array housing is extremely compact, allowing for easy installation in a range of applications.

The 45MLA are packaged as transmitted beam pairs—the emitter and receiver arrays are both included. The system requires an Allen-Bradley 45MLA controller, which must be ordered separately. Three versions of the controller (I/O, RS485, CAN) are available, each offering a different communications platform that can be selected to function with a range of PLCs.

The controller drives the photoelectric elements in the emitter and reads out the receiver beam information. Use of this external controller allows the flexibility to configure up to four separate sensing zones with independent outputs or the communication of individual beam status via serial protocols. Additionally, the 45MLA can also be customized for application specific overhang and over-height detection.

Features

- Height measuring capability
- Slim profile array housing
- Long operating range—4 m (13 ft)
- Fast reaction time and measurement speed
- Individual beam status available via controller (serial communication models only)

Specifications

| Environmental | 45MLA Arrays | 45MLA Controller |
|-------------------------------|---|---|
| Certifications | CE Marked for all applicable directives | |
| Operating Environment | IP54 | Housing IP54, terminal strip IP20 |
| Operating Temperature [C (F)] | 0...55° (32...131°) | |
| Storage Temperature [C (F)] | -20...70° (-4...158°) | -25...70° (-13...158°) |
| Vibration | 10...55 Hz; amplitude 0.35 mm (0.01 in.); meets or exceeds IEC 60068-2-6 | |
| Shock | Acceleration 10 g, pulse duration 16 ms, 10...55 Hz; amplitude 0.35 mm (0.01 in.); meets or exceeds IEC 60068-2-29 | |
| Relative Humidity | 15...95% | 15...95% |
| Optical | | |
| Sensing modes | Transmitted beam pair | — |
| Sensing Range | 0...4 m (0...13 ft) | — |
| Field of View | 3.2° | — |
| Light Source | 940 nm | — |
| Beam Spacing | 10 mm (0.4 in.) or 25 mm (1.0 in.) | — |
| Resolution | 18 mm (0.7 in.) or 33 mm (1.3 in.) | — |
| LED Indicators | Red: Status Green: Alignment | Alignment, target present, outputs, inputs, power |
| Electrical | | |
| Voltage | Provided by controller | 20.4...27.6V DC ±5% max. ripple |
| Current Consumption | — | <300 mA with max. no. of beams to controller, outputs not connected |
| Sensor Protection | EN61000-4-2, EN 61000-4-4 and EN 61000-4-5; short circuit (SCP), reverse polarity, and overload | |
| Outputs | | |
| Response Time | See <i>45MLA Controller User Manual</i> | |
| Output Type | — | NPN and PNP (push/pull output) |
| Output Mode | — | Dark operate (when connected as PNP) |
| Output Current | — | 150 mA max. each |
| Mechanical | | |
| Housing Material | Aluminum | ABS(FR) UL94-V0 |
| Lens Material | Polycarbonate | — |
| Cover Material | Aluminum | Polycarbonate |
| Connection Types | 8-pin DC micro (M12) female QD on 500 mm (20 in.) cable pigtail—controller connection only | Spring loaded terminal connections |
| Supplied Accessories | Adjustable mounting kit (445L-AF6143) | |
| Required Accessories | Controller 45MLA controller I/O model Cat. No. 45MLA-CTRL 45MLA controller RS45 Cat. No.: 45MLA-CTRL-485 45MLA controller CAN Cat. No. 45MLA-CTRL-CAN Light array to controller connecting cable 3 m (9.8 ft) M12—RJ45 Cat. No. 445L-AC8RJ3 5 m (16.4 ft) M12—RJ45 Cat. No. 445L-AC8RJ5 8 m (26.2 ft) M12—RJ45 Cat. No. 445L-AC8RJ8 Max. system length cannot exceed 10 m (32.8 ft) | |
| Optional Accessories | Flat mounting kit Cat. No. 445L-AF6145 | |

User Interface

The following table indicates LED status and descriptions for LEDs on the emitter and receiver light arrays.

| Location | LED | Description | Status | Meaning |
|-----------------------------|-------|-----------------------|----------|---|
| Emitter and Receiver Arrays | Green | Light array alignment | Off | Arrays not aligned (or target present) |
| | | | On | Arrays aligned (and target not present) |
| | | | Flashing | Low margin/light intensity inadequate |
| | Red | Light array status | Off | Target not present (and arrays aligned) |
| | | | On | Target present (or arrays not aligned) |

The following table indicates the status and description for each LED on the controller's main PCB.

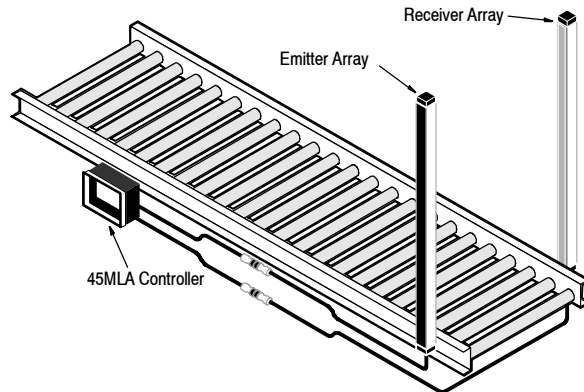
| LED | Description | Color | Meaning |
|-----|--------------------|----------------|---|
| D1 | Light Array OK | Off | Target present or light arrays not aligned |
| | | Green | Target not present and light arrays aligned |
| | | Green flashing | Low margin/light intensity inadequate |
| D2 | Light array status | Off | Target not present |
| | | Red | Target present |
| | | Red Flashing | Height Measurement Error |
| D3 | Out1 | Off | Output 1 inactive |
| | | Green | Output 1 active |
| D4 | Out2 | Off | Output 2 inactive |
| | | Green | Output 2 active |
| D5 | In1 | Off | Input 1 inactive |
| | | Green | Input 1 active |
| D6 | In2 | Off | Input 2 inactive |
| | | Green | Input 2 active |
| D7 | Power | Off | Power off |
| | | Green | Power on |

45MLA

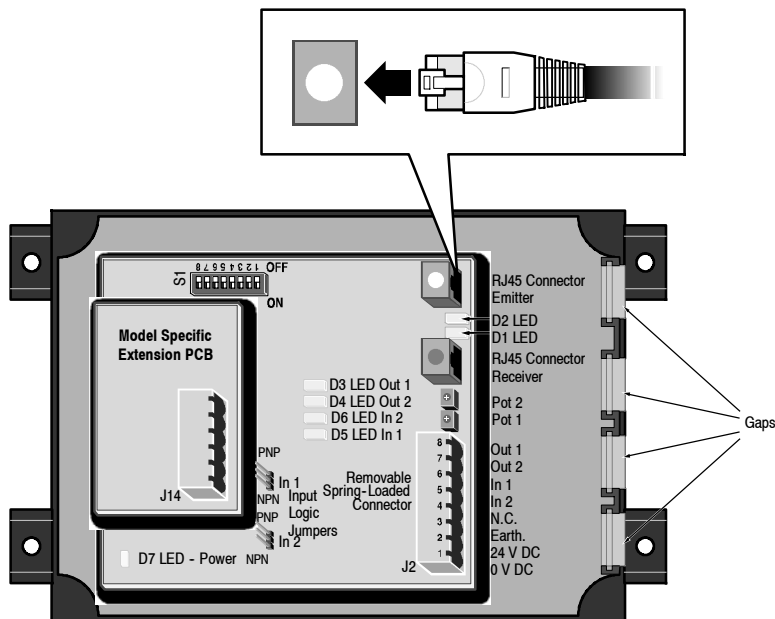
Measuring Arrays and Controllers

Wiring Diagrams

The 45MLA is a "Three Box System." Every setup consists of an emitter array, a receiver array, and an external controller.



Each controller has the same base PCB and a pre-installed extension PCB with model-specific functionality and additional connections.



Connector J2 on the base PCB has the following pinout for all controller models.

| Pin | Signal | Description |
|-------|--------------------------------------|---------------|
| 1 | 0V DC | Power |
| 2 | +24V DC | Power |
| 3 | Ground | Ground |
| 4 | Not connected | Not connected |
| 5...8 | Model specific functions (see below) | |

Pins 5...8 on connector J2 (on the base PCB) have different functionality with each controller model. The following tables show the pin connections for each specific model.

I/O Model

| Pin | Signal | Description | Remarks |
|-----|--------|--------------------------|---|
| 5 | In 2 | Trigger and hold | DIP switch S1 (7) = 0 |
| | | Overhang back sensor | DIP switch S1 (7) = 1 |
| 6 | In 1 | Not used | DIP switch S1 (7) = 0 |
| | | Overhang front sensor | DIP switch S1 (7) = 1 |
| 7 | Out 2 | Light array interrupted❶ | 0 V DC = interrupted 24 V DC = not interrupted |
| 8 | Out 1 | Overhang | 0 V DC = overhang 24 V DC = no overhang |

RS485 and CAN models

| Pin | Signal | Description | Remarks |
|-----|--------|--------------------|------------------|
| 5 | In 2 | Trigger and hold | Special function |
| 6 | In 1 | Not used | Not used |
| 7 | Out 2 | Light interrupted❶ | 0V = interrupted |
| 8 | Out 1 | Overhang | 0V = overhang |

❶ Or over-height (special function)

The extension PCB has connections specific to the functionality of each individual model. Here are the pin connections for each model. The connectors are labeled on the PCB.

**I/O Model
Connector J14**

| Pin | Signal | 0V DC | +24V DC |
|-----|--------|---------------------|-------------------------|
| 1 | Out 3 | Zone Z1 interrupted | Zone Z1 not interrupted |
| 2 | Out 4 | Zone Z2 interrupted | Zone Z2 not interrupted |
| 3 | Out 5 | Zone Z3 interrupted | Zone Z3 not interrupted |
| 4 | Out 6 | Zone Z4 interrupted | Zone Z4 not interrupted |

**RS485 Model
Connector J16**

| Pin | 2 Wire | 4 Wire |
|-----|-----------|-----------|
| 1 | 0V DC | 0V DC |
| 2 | — | Rx+ |
| 3 | Shielding | Shielding |
| 4 | — | Rx- |
| 5 | B | Tx+ |
| 6 | A | Tx- |

**CAN Model
Connectors J12 and J13 (RJ45)**

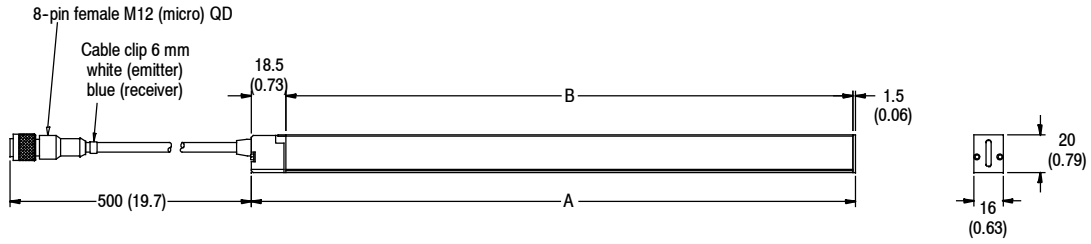
| Pin | Signal |
|-----|---------------|
| 1 | CAN H |
| 2 | CAN L |
| 3 | 0V DC |
| 4 | Not connected |
| 5 | Not connected |
| 6 | Shield |
| 7 | 0V DC |
| 8 | CAN V+ |

45MLA

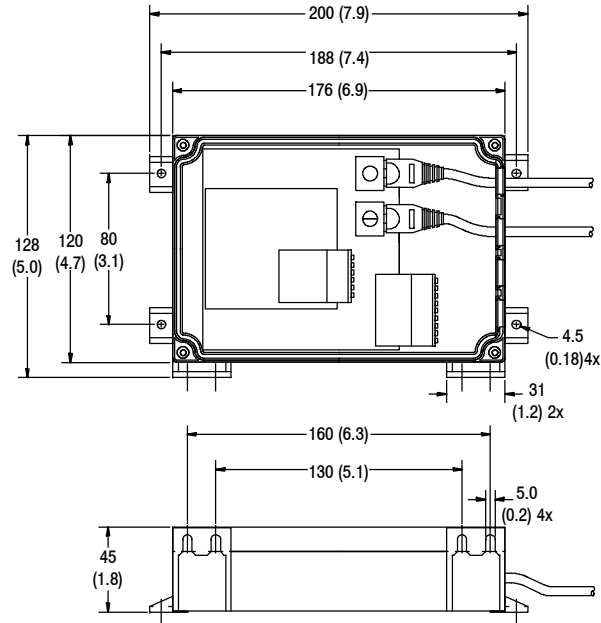
Measuring Arrays and Controllers

Approximate Dimensions [mm (in.)]

Arrays



Controller



Note: The controller can be mounted either on a DIN Rail using the mounting brackets on the back or with four screws through the holes on the tabs extending from the corners of the housing.

Product Selection

Arrays

| No. of Beams | A Housing Height [mm (in.)] | B Sensing Height [mm (in.)] | Beam Spacing [mm (in.)] | Length x Width [mm (in.)] | Cat. No. |
|--------------|-----------------------------------|-----------------------------------|----------------------------|------------------------------|-----------------|
| 30 | 320 (12.6) | 300 (11.8) | 10 (0.39) | 20 x 16 (0.79 x 0.62) | 45MLA-AT0300P10 |
| 60 | 630 (24.4) | 600 (23.6) | 10 (0.39) | 20 x 16 (0.79 x 0.62) | 45MLA-AT0600P10 |
| 90 | 920 (36.2) | 900 (35.4) | 10 (0.39) | 20 x 16 (0.79 x 0.62) | 45MLA-AT0900P10 |
| 120 | 1220 (48.0) | 1200 (47.2) | 10 (0.39) | 20 x 16 (0.79 x 0.62) | 45MLA-AT1200P10 |
| 36 | 920 (36.2) | 900 (35.4) | 25 (0.98) | 20 x 16 (0.79 x 0.62) | 45MLA-AT0900P25 |
| 48 | 1220 (48.0) | 1200 (47.2) | 25 (0.98) | 20 x 16 (0.79 x 0.62) | 45MLA-AT1200P25 |

Controllers

| Description | Cat. No. |
|-------------|----------------|
| I/O Model | 45MLA-CTRL |
| RS485 | 45MLA-CTRL-485 |
| CAN | 45MLA-CTRL-CAN |

Accessories

| Description | Cat. No. |
|--|-------------|
| Flat mounting kit (four pieces/set) | 445L-AF6145 |
| 180° adjustable mounting kit (four pieces/set, included with arrays) | 445L-AF6143 |
| Cable—Light array to controller | |
| 3 m M12—RJ45 | 445L-AC8RJ3 |
| 5 m M12—RJ45 | 445L-AC8RJ5 |
| 8 m M12—RJ45 | 445L-AC8RJ8 |

45DLA**Discrete Light Arrays****Description**

The Allen-Bradley 45DLA discrete light array is an ON/OFF sensor that utilizes an array of transmitted beam photoelectric sensor pairs to detect objects over a much wider span than traditional sensors. The 45DLA are packaged as transmitted beam pairs (the emitter and receiver arrays are both included). The controls are integrated into the array housing and no separate controller is required. The emitter and receiver are optically synchronized and therefore do not need to be wired together.

Features

- Integrated light array controller
- IP54
- Simple, flexible mounting
- Optically synchronized (no electrical connection between emitter and receiver required)
- Push/pull (PNP/NPN) outputs (connect to sinking or sourcing inputs)
- Wiring selectable range and output state (light/dark operate)
- 30 mm resolution
- Sensing height of 118...734 mm (4.6...28.9 in.)

Specifications

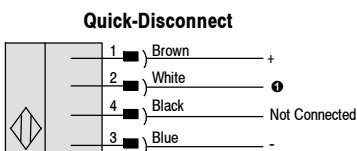
| Environmental | |
|-------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP54 |
| Operating Temperature [C (F)] | -20°...+55° (-4°...+131°) |
| Vibration | 2 g, 10...200 Hz; 20 sweeps each axis; meets or exceeds EN 60068-2-6 |
| Shock | 15 g, 11 ms, 3 x each axis; 10 g, 16 ms, 100 x each axis; meets or exceeds EN 60068-2-27 and EN 60068-2-29 |
| Relative Humidity | 5...95% (noncondensing) |
| Ambient Light Immunity | 75,000 Lux |
| Optical | |
| Sensing Modes | Transmitted beam pair |
| Sensing Range | 200...1500 mm (7.9...59 in.) or 1.0...8.0 m (3.3...26.2 ft) |
| Field of View | Emitter (long range selected): 15° @ 3.0 m (9.8 ft) Receiver (when emitter has long range selected): 35° @ 3.0 m (9.8 ft) |
| Light Source | Infrared LED (880 nm) |
| LED Indicators | Green (transmitter only) = power, orange (receiver only) = target present |
| Adjustments | Selectable range (by wiring input) |
| Resolution | 30 mm (1.2 in.) |
| Beam Pitch | 22 mm (0.87 in.) |
| Number of Beams | 4...32 by Cat. No. |
| Sensing Height | 118...734 mm (4.65...28.9 in.) by cat. no. |
| Electrical | |
| Voltage | 14...30V DC |
| Current Consumption | 50 mA @ 24V DC without load connected |
| Sensor Protection | Short circuit (SCP), reverse polarity |
| Outputs | |
| Response Time | 25...165 ms by cat. no. |
| Power-On Time | 100 ms + response time |
| Output Type | PNP/NPN (single push/pull output) |
| Output Mode | Dark or light operate selectable (by wiring) |
| Output Current | 120 mA max. |
| Mechanical | |
| Housing Material | Aluminum |
| Housing Height | 266...882 mm (10.5...34.7 in.) by cat. no. |
| Lens Material | Polycarbonate |
| Cable Material | PVC |
| Connection Type | 4-pin DC micro (M12) on 150 mm (6 in.) cable pigtail |

User Interface Panel

| LED | Description | Status | Meaning |
|----------------|-----------------|--------|---|
| Emitter Array | Emitter Status | Off | No Power |
| | | Green | Power OK |
| Receiver Array | Receiver Status | Off | No power OR target not present |
| | | Orange | Power OK and target present (or arrays not aligned) |

Wiring Diagrams

Emitter



⓪ Pin 2 (white wire): Connect to 0V or not connected for 1.0...8.0 m (3.3...26.2 ft) range; connect to V+ (24V) for 0.2...1.5 m (0.6...4.9 ft) range.

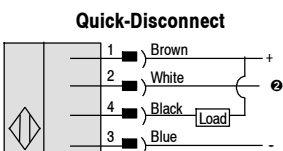
Note: In applications with multiple 45DLA pairs in one area, it is recommended to use the shorter range option (by connecting Pin 2/white wire to 24V) to reduce the potential for interference between separate pairs.

Note: For applications with a range of less than 1 m (3.3 ft) it is recommended to use the shorter range option to improve the response time.

Receiver:

The 45DLA uses a push/pull transistor output that can be wired as either a PNP or NPN style output.

Wired as NPN output:



⓪ Pin 2 (white wire): Connect to V+ (24V) or not connected for D.O.; connect to 0V for L.O.

Wired as PNP output:

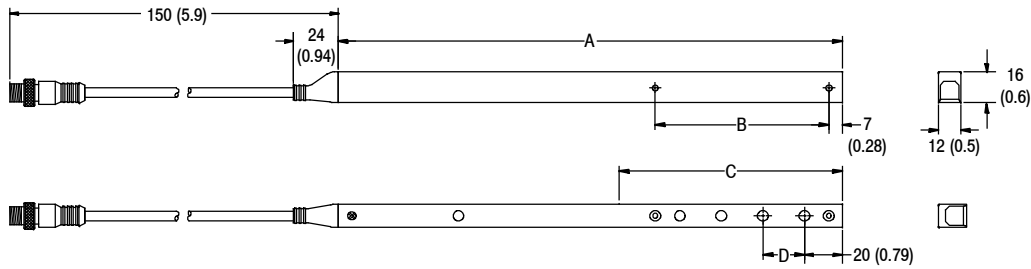


⓪ Pin 2 (white wire): Connect to V+ (24V) or not connected for L.O.; connect to 0V for D.O.

45DLA

Discrete Light Arrays

Approximate Dimensions [mm (in.)]



Note: Mounting from the front of the array (lens side) requires M4 flat head (countersunk) screws (included). Mounting from the side of the array requires M4 pan head screws (not included).

| No. of Beams | Approximate Dimensions [mm (in.)] | | | | Cat. No. |
|--------------|-----------------------------------|-------------------|-------------------|-----------|-----------------|
| | A: Housing Height | B: Mounting Holes | C: Sensing Height | D: Pitch | |
| 4 | 266 (10.5) | 92 (3.6) | 118 (4.65) | 22 (0.87) | 45DLA-1LEB1T-F4 |
| 8 | 354 (13.9) | 180 (7.1) | 206 (8.11) | 22 (0.87) | 45DLA-1LEB2T-F4 |
| 16 | 530 (20.9) | 356 (14.0) | 382 (15.04) | 22 (0.87) | 45DLA-1LEB4T-F4 |
| 24 | 706 (27.8) | 532 (20.9) | 558 (21.97) | 22 (0.87) | 45DLA-1LEB6T-F4 |
| 32 | 882 (34.7) | 708 (27.9) | 734 (28.9) | 22 (0.87) | 45DLA-1LEB8T-F4 |

Product Selection

| Sensing Height [mm (in.)] | Response Time | Cat. No. |
|---------------------------|---------------|-----------------|
| 118 (4.65) | 25 ms | 45DLA-1LEB1T-F4 |
| 206 (8.11) | 45 ms | 45DLA-1LEB2T-F4 |
| 382 (15.04) | 85 ms | 45DLA-1LEB4T-F4 |
| 558 (21.97) | 125 ms | 45DLA-1LEB6T-F4 |
| 734 (28.9) | 165 ms | 45DLA-1LEB8T-F4 |

Note: Both emitter (light source) and receiver arrays are included in the package. To identify the emitter, replace the "T" in the cat. no. with "E." To identify the receiver, replace the "T" in the cat. no. with "R." Example: 45DLA-1LEB2T-F4 contains one 45DLA-1LEB2E-F4 emitter array and one 45DLA-1LEB2R-F4 receiver array. Emitter and receiver arrays are not sold separately.

Cordsets and Accessories

| Cordset | | Accessories | |
|--|---------------|-------------------|-----------|
| Description | Cat. No. | Description | Cat. No. |
| DC Micro QD Cordset, 4-pin, 2 m (6.5 ft) | 889D-F4AC-2 | DC Micro Splitter | 879D-F4DM |
| DC Micro QD Patchcord, 4-pin, 2 m (6.5 ft) | 889D-F4ACDM-2 | | |



Features

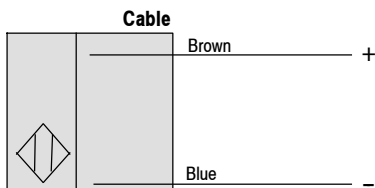
- Introduces Two-Dimensional Array Scanning Technology
- PNP or NPN Output
- Minimum object resolution from 11...17 mm (0.43...0.66 in.)
- Sensing ranges up to 2.5 m (8.2 ft)
- IP67 rated housing
- CE Marked for all applicable directives
- Easy bracket-free mounting
- Highly visible alignment LEDs

Specifications

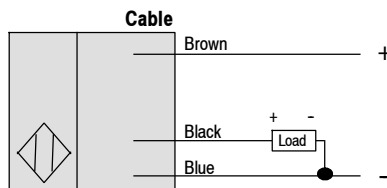
| Environmental | |
|-------------------------------|--|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | IP67 |
| Operating Temperature [C (F)] | -5...+55° (23...+131°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 35...85% |
| Ambient Light Immunity | 500 lux max. |
| Optical | |
| Sensing Modes | Transmitted beam |
| Sensing Range | See Product Selection table on page 1-170 |
| Number of Optical Axis | See Product Selection table on page 1-170 |
| Light Source | Infrared LED (860 nm) |
| LED Indicators | Green LED for transmitted, green LED for alignment on receiver, and three orange LEDs for output |
| Electrical | |
| Voltage | 12...24V DC ±10% ripple |
| Current Consumption | See Product Selection table on page 1-170 |
| Sensor Protection | Reverse polarity, short circuit protection |
| Outputs | |
| Response Time | 4 ms or 8 ms max by cat. no. |
| Output Type | PNP or NPN by cat. no. |
| Output Mode | Light operate |
| Output Current | 100 mA @ 24V DC |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Aluminum |
| Lens Material | Acrylic |
| Connection Types | 2 m cable, 4-pin DC micro (M12) pigtail |
| Supplied Accessories | None |
| Optional Accessories | Mounting brackets, reflectors, cordsets |

Wiring Diagrams

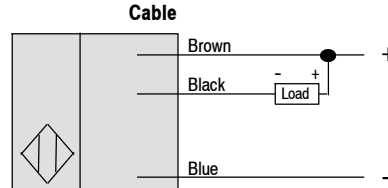
Emitter



PNP Output

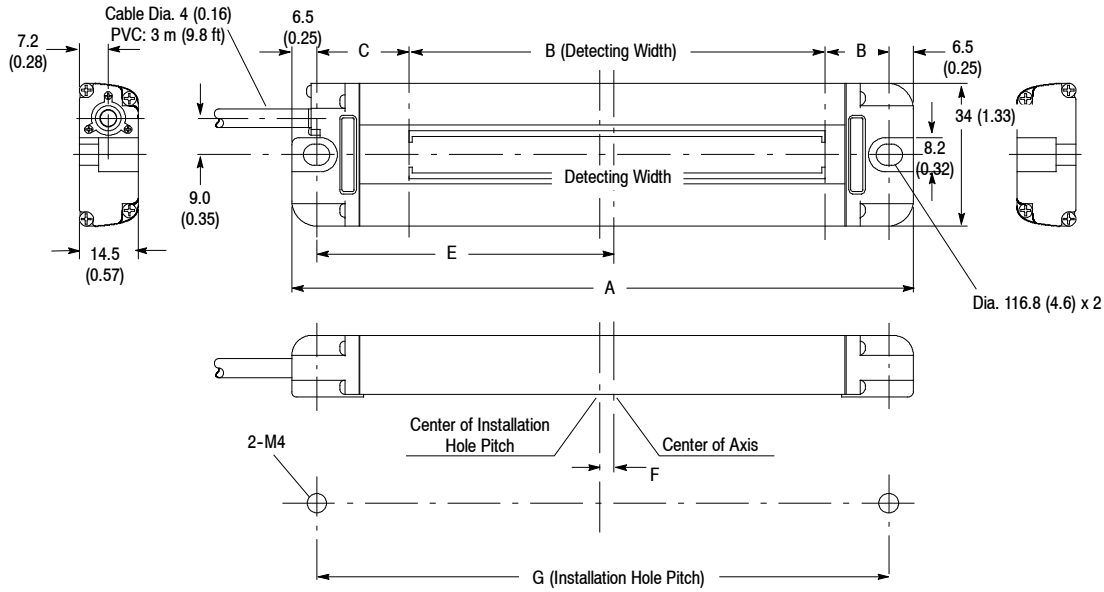


NPN Output



PHOTOSWITCH® Photoelectric Sensors
45AST Area Array

Approximate Dimensions [mm (in.)]



| Model | [mm (in.)] | | | | | | |
|-------------------------|------------|------------|-------------|-------------|-------------|------------|------------|
| | A | B | C | D | E | F | G |
| 45AST-1J Ⓢ B1-A2 | 100 (3.93) | 50 (1.96) | 22.5 (0.88) | 14.5 (0.57) | 47.5 (1.87) | 4 (0.15) | 87 (3.42) |
| 45AST-1J Ⓢ B2-A2 | 150 (5.9) | 100 (3.93) | 22 (0.86) | 15 (0.59) | 72 (2.83) | 3.5 (0.13) | 137 (5.39) |
| 45AST-1J Ⓢ B3-A2 | | | | | | | 137 (5.39) |
| 45AST-1J Ⓢ B4-A2 | 200 (7.87) | 150 (5.9) | 22 (0.86) | 15 (0.59) | 97 (3.81) | 3.5 (0.13) | 187 (7.36) |

① N = NPN and P = PNP.

Product Selection

| Current Consumption (max.) | | Range | Number of Optical Axis | Response Time (max) | Resolution Diameter [mm (in.)] | Sensing Height [mm (in.)] | Output Type | Cat. No. ② |
|----------------------------|----------|----------------------------------|------------------------|---------------------|--------------------------------|---------------------------|-------------|-----------------------|
| Transmitter | Receiver | | | | | | | |
| 70 mA | 65 mA | 0.5...2 m (1.6...6.5 ft) | 5 | 4 ms | 15 (0.59) | 50 (1.96) | PNP | 45AST-1JPB1-A2 |
| | | | | | | | NPN | 45AST-1JNB1-A2 ② |
| 80 mA | 110 mA | 0.15...0.8 m (0.49...2.62 ft) | 10 | 8 ms | 11 (0.43) | 100 (3.93) | PNP | 45AST-1JPB2-A2 |
| | | | | | | | NPN | 45AST-1JNB2-A2 ② |
| 80 mA | 110 mA | 0.5...2.5 m (1.6...8.2 ft) | 10 | 8 ms | 13 (0.51) | 100 (3.93) | PNP | 45AST-1JPB3-A2 |
| | | | | | | | NPN | 45AST-1JNB3-A2 ② |
| 80 mA | 110 mA | 0.15...0.8 m (0.49...2.62 ft) | 10 | 8 ms | 17 (0.66) | 150 (5.9) | PNP | 45AST-1JPB4-A2 |
| | | | | | | | NPN | 45AST-1JNB4-A2 ② |

② NPN versions available with longer lead times.

③ Micro QD (M12) connector on pigtail models available. Refer to www.ab.com/sensors for more information.



Description

The Allen-Bradley 45PVA is a photoelectric Parts Verification Array designed for bin picking applications and object detection in the parts assembly industry. When used as part of a suitably configured bin-picking system, the 45PVA effectively prevents mispicks to enhance efficiency and minimize down time. It is also the ideal solution to address the “error proofing” initiatives prevalent in the automotive industry.

The 45PVA uses an array of LEDs to create a light screen that can be spanned across bins at an assembly station. By mounting the sensors on parts bins and wiring them into a controller programmed with the necessary logic, a virtually error-free bin-picking process can be achieved. “Job lights” on the 45PVA will not only show the assembler the bins required to complete the current process, but will also indicate the correct picking sequence. In the event the assembler attempts to pick an incorrect part, a selectable warning light on the 45PVA will illuminate to indicate the error; additional fault enunciation can be achieved via controller logic in conjunction with a tower light or

In addition to increasing efficiency and quality control by preventing faults in the bin-picking process, the 45PVA is instrumental in personnel stress reduction and the simplification of personnel training—especially in multi-lingual facilities.

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | cULus and CE Marked for all applicable directives |
| Operating Environment | NEMA 12; IP62 |
| Operating Temperature [C (F)] | Transmitted beam: 0...+50° (32...+122°) Retroreflective/diffuse: -10...+50° (14...+122°) |
| Vibration | 10...55 Hz, 1.5 mm amplitude, 2 hours, X, Y, and Z direction |
| Shock | 500 m/s, 3 times X, Y, and Z direction |
| Ambient Light Immunity | 10,000 lux max |
| Optical | |
| Sensing Modes | Transmitted beam or retroreflective/diffuse selectable |
| Sensing Range | Transmitted beam or retroreflective: 2 m (6.5 ft), Diffuse: 400 mm (15.7 in.) |
| Field of View | |
| Light Source | Infrared LED (880 nm) or visible red (640 nm) |
| LED Indicators | See Approximate Dimensions on page 1-173 |
| Adjustments | DIP switches |
| Electrical | |
| Voltage | 12...264V DC |
| Current Consumption | 46 mA max |
| Sensor Protection | Short circuit protection |
| Outputs | |
| Response Time | See Product Selection table on page 1-174 |
| Output Type | PNP or NPN output selectable |
| Output Mode | Light or dark operate selectable |
| Output Current | 50 mA @ 30V DC max |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Aluminum |
| Lens Material | Polycarbonate |
| End Plate Material | Resin |
| Connection Types | 4-pin DC micro (M12) QD on 2 m pigtail |
| Supplied Accessories | Basic mounting brackets, reflective tape (retro/diffuse models) |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-174 |

Features

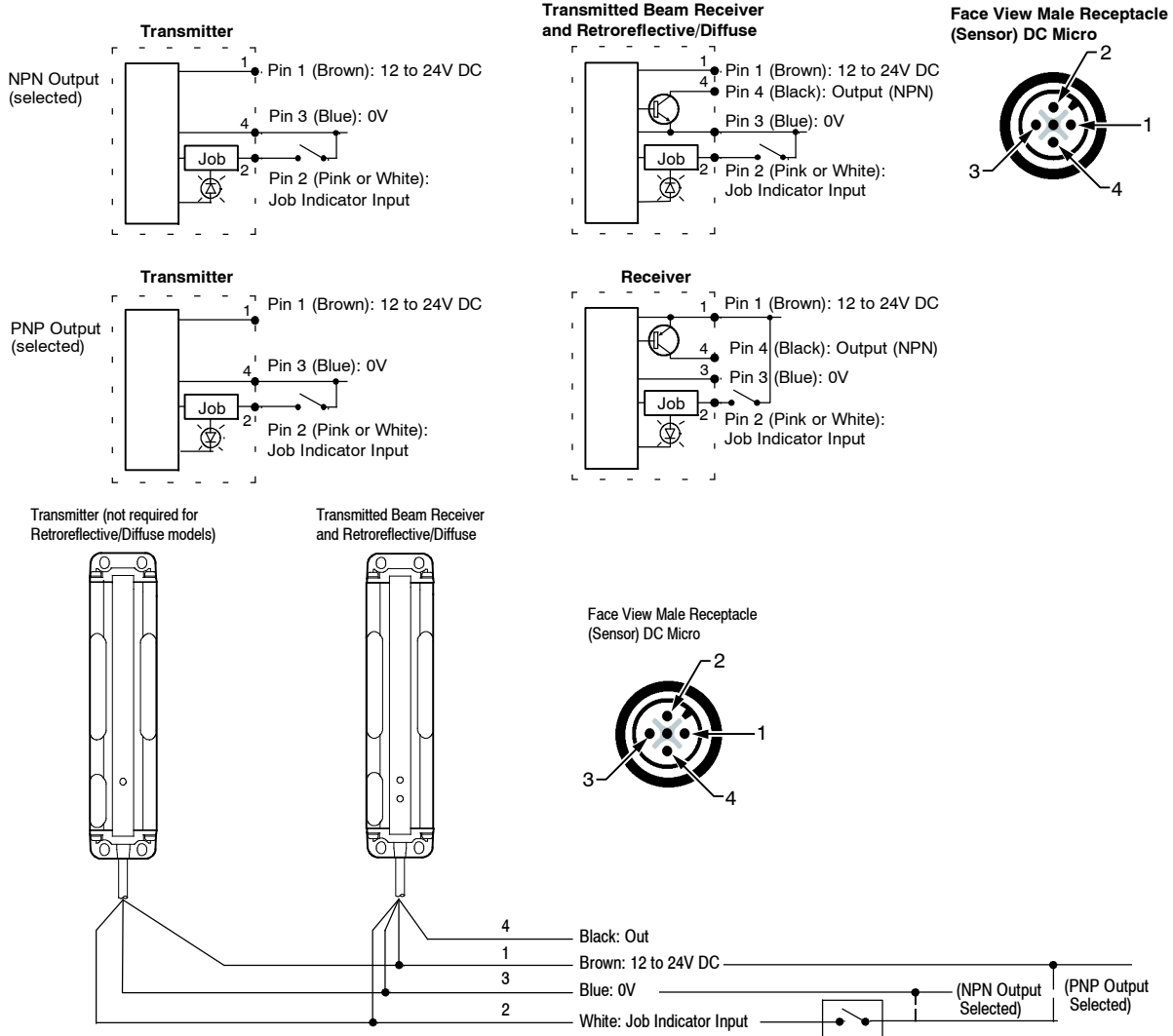
- Robust metal enclosure with super slim 13 mm profile
- Large highly-visible job indicator lights
- Optional red fault light indicator to notify operator of incorrect component selection
- Dip switch selectable lighting operation for job lights
- NPN or PNP dip switch selectable output reduces inventory
- Two frequency dip switch selectable crosstalk protection
- Different sizes are available for different component racks. Transmitted beam models are available in four sizes (100 mm (4 in.), 225 mm (9 in.), 300 mm (12 in.), and 375 mm (15 in.)). Retroreflective/diffuse models are available in two sizes (100 mm (4 in.) and 225 mm (9 in.)).

45PVA Verification Array

Slim Type Picking Sensor

Input/Output Circuit and Wiring Diagrams

The NPN/PNP input of the job indicator and the NPN/PNP output are selected by mode switch.

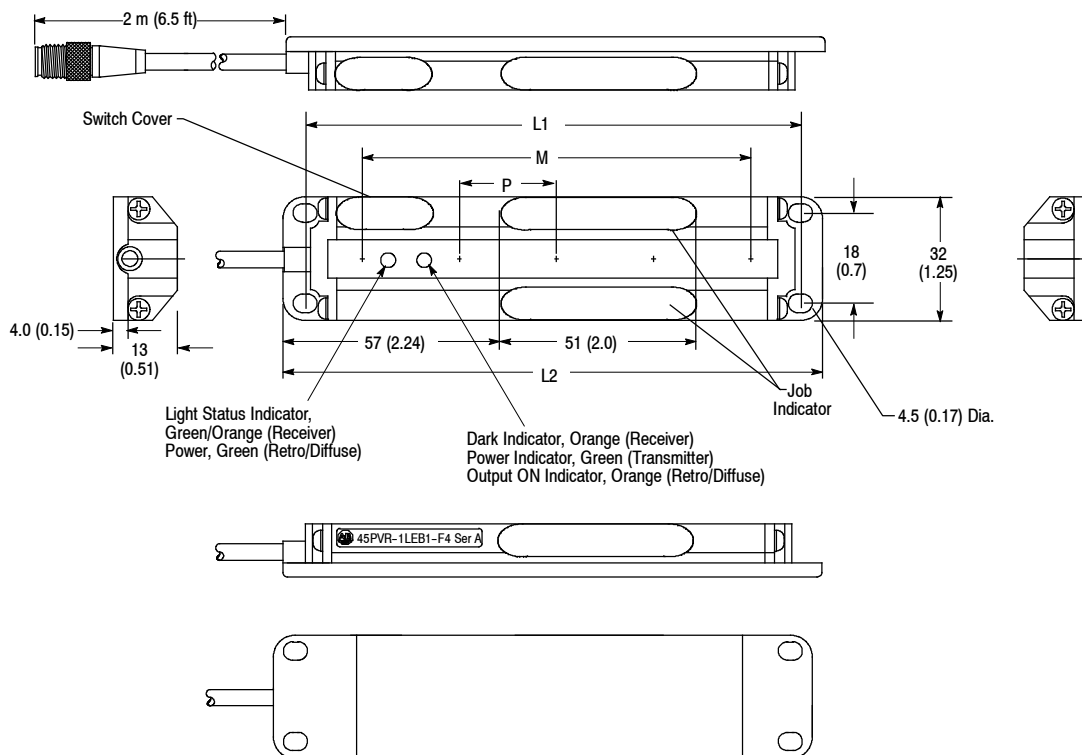


45PVA Verification Array

Slim Type Picking Sensor

Approximate Dimensions [mm (in.)]

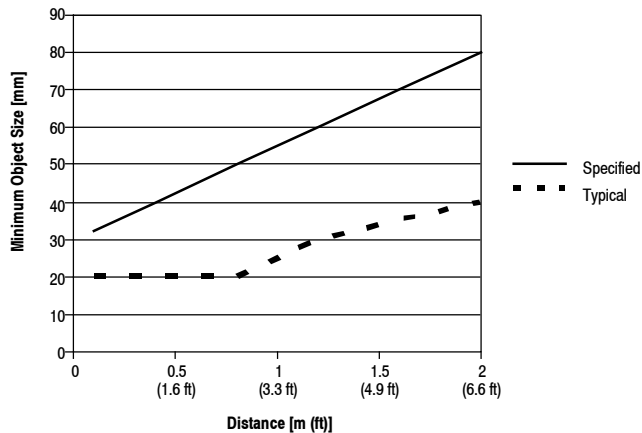
Dimensions are not intended to be used for installation purposes.



| Approximate Dimensions [mm (in.)] | | | | | Cat. No. |
|-----------------------------------|------------|------------|------------|----------|----------------|
| N | M | L1 | L2 | P | |
| 5 | 100 (3.9) | 130 (5.1) | 140 (5.5) | 25 (1.0) | 45PVA-1LEB1-F4 |
| 10 | 225 (8.9) | 255 (10.0) | 265 (10.4) | 25 (1.0) | 45PVA-1LEB2-F4 |
| 13 | 300 (11.8) | 330 (13.0) | 340 (13.4) | 25 (1.0) | 45PVA-1LEB3-F4 |
| 16 | 375 (14.8) | 405 (16.0) | 415 (16.3) | 25 (1.0) | 45PVA-1LEB4-F4 |
| 4 | 87 (3.4) | 130 (5.1) | 140 (5.5) | 29 (1.1) | 45PVA-2LEA1-F4 |
| 8 | 203 (8.0) | 255 (10.0) | 265 (10.4) | 29 (1.1) | 45PVA-2LEA2-F4 |

Minimum Detectable Object Size

Retroreflective Mode



45PVA Verification Array

Slim Type Picking Sensor

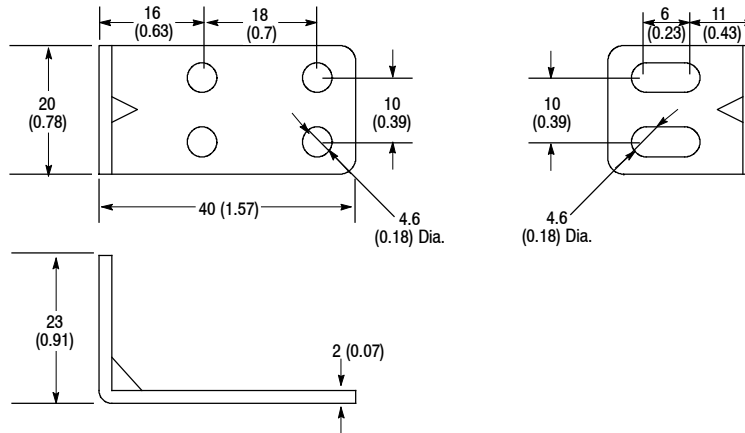
Product Selection

| Sensing Mode | Light Source | Number of Optical Axis [mm (in.)] | Detection Width [mm (in.)] | Current Consumption | Response Time | Cat. No. |
|-----------------------------|----------------------------------|-----------------------------------|----------------------------|---------------------|---|----------------|
| Transmitted Beam | Infrared LED, Wave-length 880 nm | 5 | 100 (3.93) | 130 mA | Standard: Standard: Light on: 35 ms/Dark on: 25 ms Interference Protection: Light on: 45 ms/Dark on: 28 ms | 45PVA-1LEB1-F4 |
| | | 10 | 225 (8.85) | 140 mA | Standard: Light on: 68 ms/Dark on: 42 ms Interference Protection: Light on: 84 ms/Dark on: 52 ms | 45PVA-1LEB2-F4 |
| | | 13 | 300 (11.8) | 150 mA | Standard: Light on: 70 ms/Dark on: 42 ms Interference Protection: Light on: 88 ms/Dark on: 54 ms | 45PVA-1LEB3-F4 |
| | | 16 | 375 (14.7) | 155 mA | Standard: Light on: 94 ms/Dark on: 58 ms Interference Protection: Light on: 116 ms/Dark on: 72 ms | 45PVA-1LEB4-F4 |
| Retroreflective/ Diffuse | Visible Red LED, 640 nm | 4 | 100 (3.93) | 68 mA | 120 ms | 45PVA-2LEA1-F4 |
| | | 8 | 225 (8.85) | 78 mA | | 45PVA-2LEA2-F4 |

Accessories

Mounting Brackets

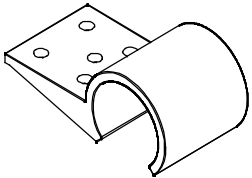
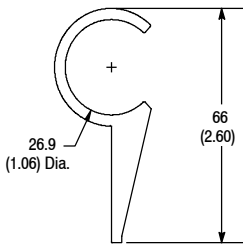
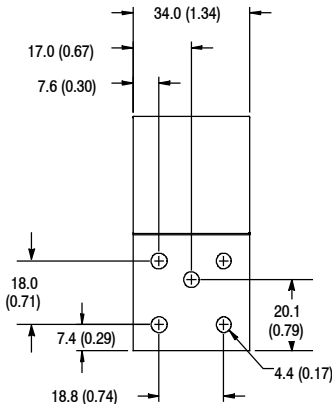
#60-2773 (2 brackets)
(included)



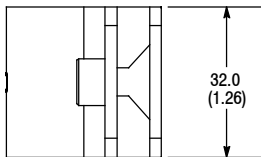
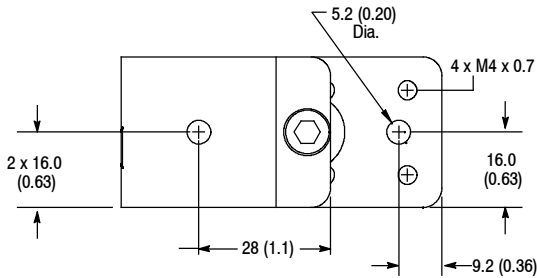
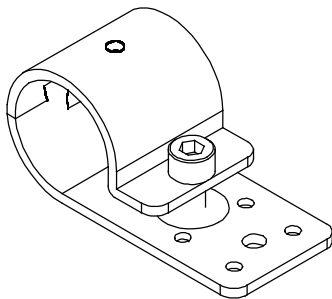
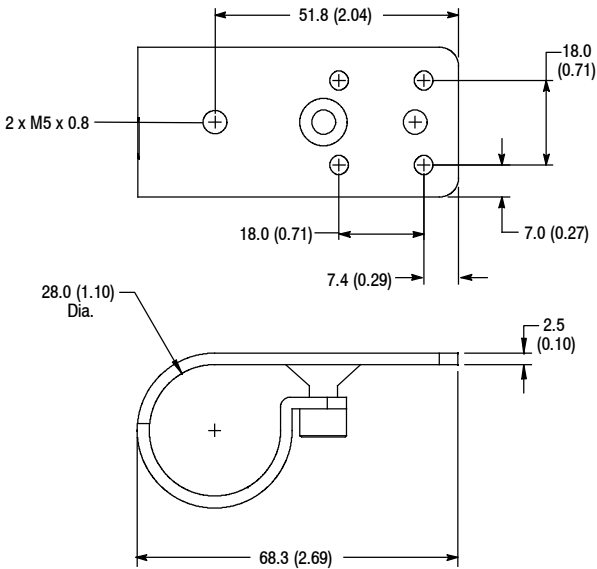
Optional Mounting Brackets

Mounting brackets available as an option (not included with sensor).

**Plastic Bracket
#60-2779 (2 brackets)**



**Metal Bracket
#60-2772 (2 brackets)**



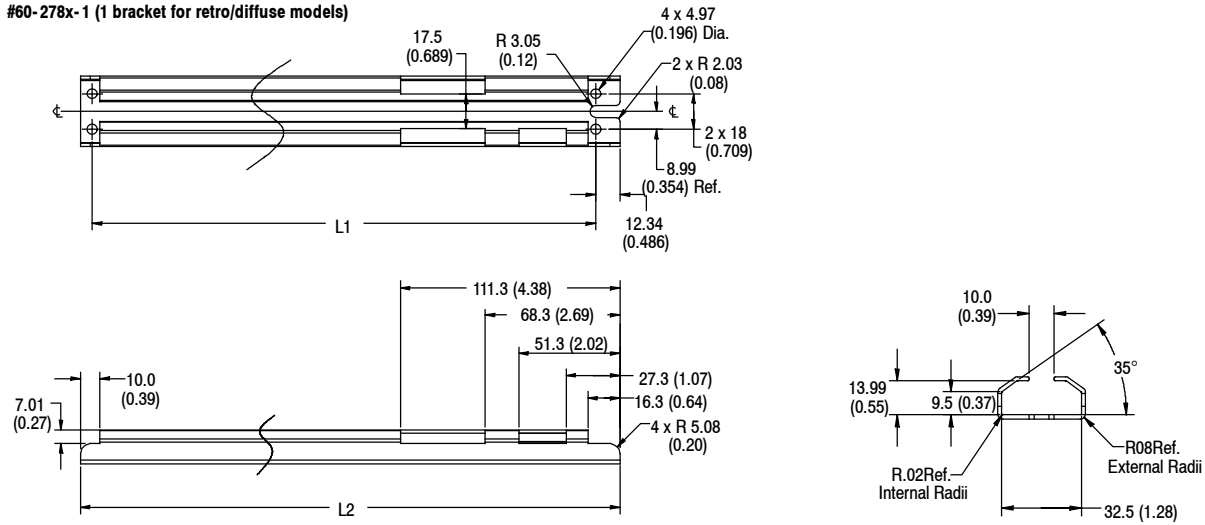
45PVA Verification Array

Slim Type Picking Sensor

Protective Metal Bracket

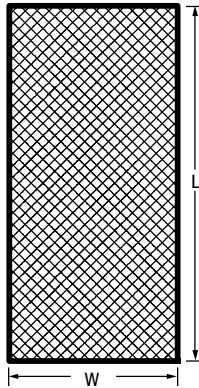
#60-277x-1 (2 brackets for transmitted beam models)

#60-278x-1 (1 bracket for retro/diffuse models)



| L1 [mm (in.)] | L2 [mm (in.)] | Material | Cat. No. (1 Bracket) | Cat. No. (2 Brackets) |
|------------------|------------------|------------------|-------------------------|--------------------------|
| 130 (5.11) | 148.36 (5.84) | Galvanized Steel | 60-2785-1 | 60-2775-1 |
| 254 (10.03) | 273.35 (10.76) | | 60-2786-1 | 60-2776-1 |
| 330 (12.99) | 348.36 (13.71) | | NA | 60-2777-1 |
| 405 (15.94) | 423.34 (196.6) | | NA | 60-2778-1 |

Reflective Tape (included with retroreflective/diffuse models)



| Dimensions | | Reflective Tape Cat. No. | Included with Cat. No. |
|------------------|-------------------|-----------------------------|---------------------------|
| Width [mm (in.)] | Length [mm (in.)] | | |
| 50 (2) | 120 (4.7) | — | 45PVA-2LEA1-F4 |
| 50 (2) | 245 (9.6) | — | 45PVA-2LEA2-F4 |
| 25 (1) | 2540 (100) | 92-100 | — |



Specifications

| Environmental | |
|------------------------------|---|
| Certifications | cULus Listed and CE Marked for all applicable directives |
| Operating Environment | NEMA 4, 4X, 6, 12; IP67 |
| Operating Temperature [C(F)] | -20...+70° (-4...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% (noncondensing) |

| Optical | |
|----------------|--|
| Sensing Modes | Polarized retroreflective |
| Sensing Range | 50.8 mm...4.8 m (50.8 in...16 ft) with 92-39 reflector |
| Field of View | 1.5° |
| Light Source | Visible red (660 nm) |
| Adjustments | On delay (200 ms...10 s), DIP switch |
| LED Indicators | Green output LED indicator |

| Electrical | |
|---------------------|--|
| Voltage | 10...30V DC |
| Current Consumption | 20 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |

| Outputs | |
|----------------|---|
| Response Time | 2 ms |
| Output Type | PNP |
| Output Mode | Light or dark operate selectable by dip switch (1 L.O., 0 D.O.) |
| Output Current | 100 mA @ 30V DC max |

| Mechanical | |
|----------------------|--|
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Connection Types | 838 mm (33 in.) pigtail with 4-pin DC male micro QD (downstream) 838 mm (33 in.) pigtail with 4-pin DC female micro QD (upstream) Cable connector for load (see Product Selection table) |
| Supplied Accessories | 129-130 mounting nut |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-179 |

Description

The 44N provides an economical, noncontact, solution to zero pressure accumulation conveyor systems by combining built-in zone control with a photoelectric sensor. This simple approach replaces the conventional mechanical switch sensing device, central PLC, and large quantities of interconnecting wiring.

The use of a photoelectric sensor eliminates the need for minimum weight restrictions required by mechanically actuated switches. The polarized retroreflective sensing mode ensures reliable detection of even shiny packages over a 4.8 m (16 ft) range.

The 44N comes complete with micro QD connections to both an upstream and downstream 44N along with a variety of connection options for common pneumatic valves. Power for the 44N and the valve is distributed through these connections.

The zone logic of the 44N ensures that product being loaded on the conveyor will be separated into zone length gaps thus providing zero pressure accumulation throughout the conveyor system. Once product has accumulated, it may be released individually (singulate) or simultaneously as a train (slug). This release is activated through an external contact closure.

Features

- Singulation release
- Slug release
- Adjustable 200 ms...10 secs ON (run) delay
- NEMA 4X rated

System Overview, Installation, and Operation

Install one 44N at the downstream side of each zone and make both upstream and downstream connections using the micro QD connectors. Connect the actuator lead of the 44N to the valve within its zone. Using an **889D-F4BC-2** cordset, connect 24V DC to a suitable power supply. A 4A supply will provide power for up to 25 zones when using a 1W pneumatic valve. Connect the black lead to the singulation release push button and the white lead to the slug release push button. Both push buttons should be normally open and maintained.

Loading Product Onto the Conveyor

With power applied to the system, all zones will immediately drive feeding product onto the conveyor. As product passes the 44N mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the system. Once the first product reaches the discharge zone (1), it will stop and await release from the conveyor.

Release of Product from the Conveyor:

Once product has been transported and accumulated at the discharge end of the conveyor (Zone 1), it may be released in one of two manners.

Singulation Release

With the singulation release signal active, only product in the discharge zone (1) will release. As the product clears the sensor, the adjacent upstream zones will advance into the discharge zone. Product will continue to discharge as long as the zone release push button remains closed.

Slug Release

With the slug release push button closed and maintained, all accumulated product on the conveyor will release simultaneously. When the slug release push button is released, the remaining product will resume normal accumulation. This function overrides the 44N logic and can be used to load and unload product as a slug.

Figure 1. System Overview

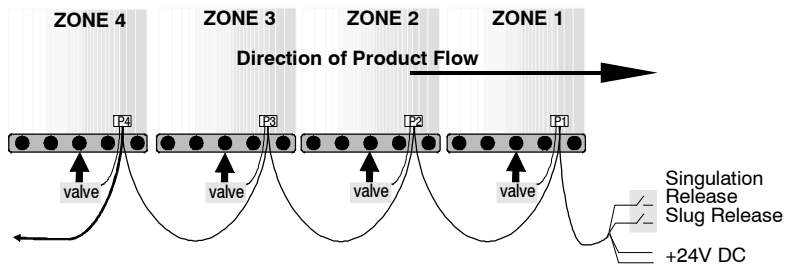


Figure 2. Loading the Conveyor

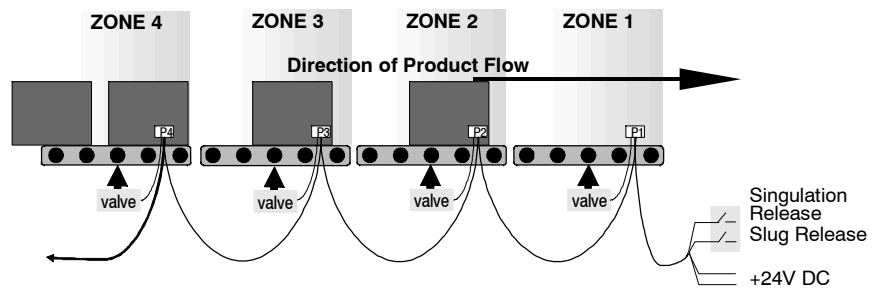


Figure 3. Singulation Release of Accumulated Product

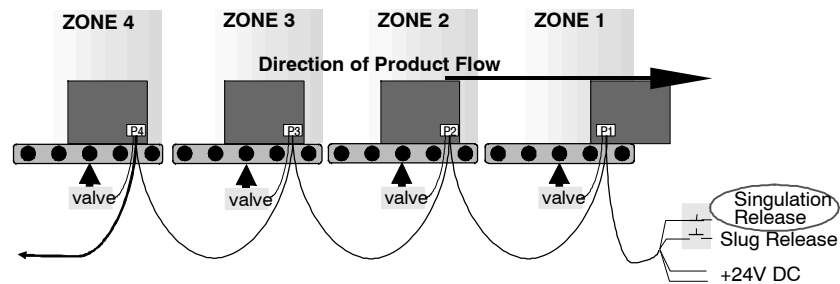
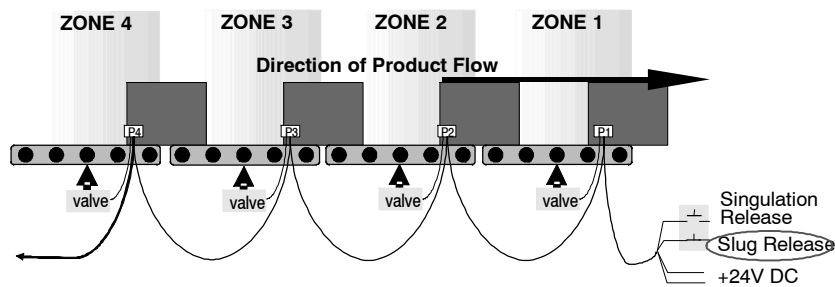
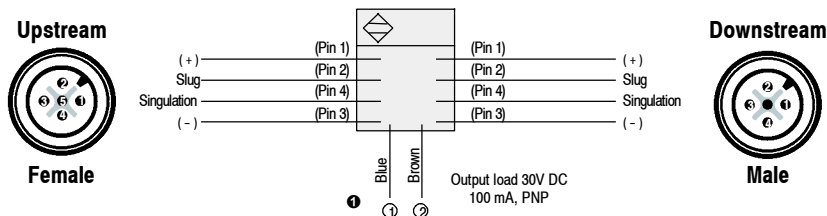


Figure 4. Slug Release of Accumulated Product



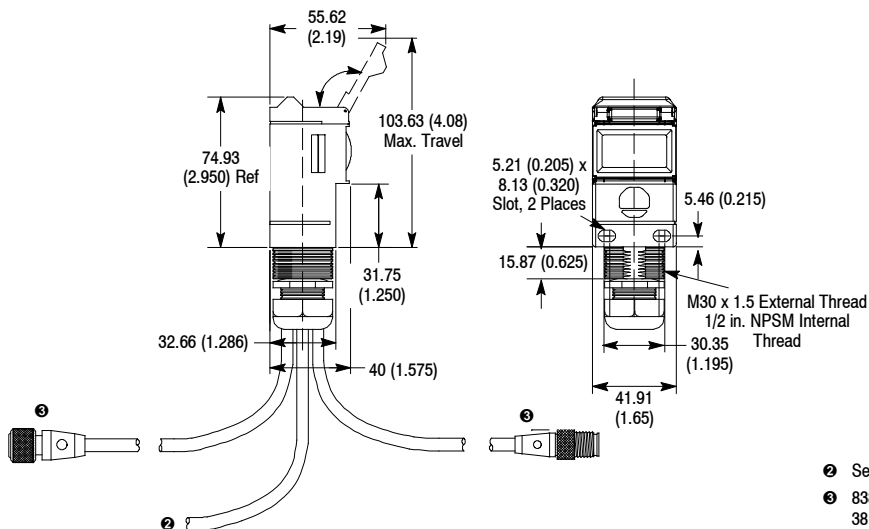
Refer to www.ab.com/sensors for more information.

Wiring Diagrams

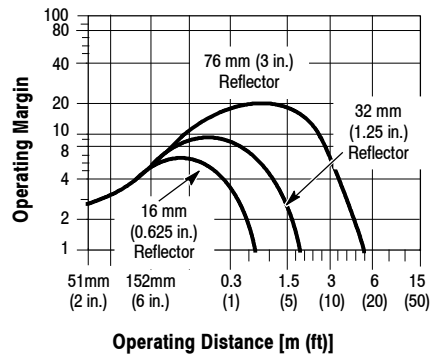


① Product comes with 22 AWG cable. Contact Rockwell Automation for DIN valve connection options.

Approximate Dimensions [mm (in.)]



Typical Response Curve



② See Product Selection table below for connection information.
③ 838 (33) pigtail for 44NSP-2JPBD5-Z01 and 44NSP-2JPBD5-Z02.
381 (15) pigtail for 44NSP-2JPBD5-Z03.

Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Load Connection Type | Cat. No.④ |
|---|-------------------------------------|--|------------------|---|--|------------------|
| <p>Polarized Retroreflective</p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10...30V DC 40 mA | 50.8 mm... 4.87 m (2 in...16 ft) | Light Operate | PNP 100 mA Variable 200 ms to 10 seconds | 304.8 mm (12 in.) cable | 44NSP-2JPBD5-Z01 |
| | | | | | 533.4 mm (21 in.) right angle pico (M8) female QD | 44NSP-2JPBD5-Z02 |
| | | | | | | 44NSP-2JPBD5-Z03 |

④ See Approximate Dimensions.

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|---------------------------|-------------|-------------------------------|---------------|------------------|----------|
| Male cordset, 2 m cable | 889D-M4BC-2 | Patchcord, 3.3 ft | 889F-F4BCDM-1 | Torx screw | 129-135 |
| Reflector, 3 in. diameter | 92-39 | Cordset, for external release | 889D-F4BC-2 | Torx screwdriver | 57-144 |
| Mounting Bracket, for 44N | 60-2439 | Power Supply (24V DC/4 A) | 1606-XLP100E | | |

PHOTOSWITCH® Photoelectric Sensors
22ZC Zone Controller



Description

The 22ZC Zone Controller bridges the gap between the 44N Zone Control Sensor and the 1799 embedded I/O module solutions. It offers the simplicity of a smart sensor, yet provides many of the advanced zone logic functions found in a networked, programmable device.

By placing the zone logic in a single zone controller, the user is given the flexibility to choose from a variety of both sensor input types (mechanical, optical) and actuator types (pneumatic, powered roller, DC motor).

The 22ZC uses a proven, industrial, IDC displacement flat media scheme for a high power transfer to maximize the number of zones connected to a single power supply.

The 22ZC offers two basic, switch selectable operating modes. First, is the single zone operation which is a run-on-demand system ideally suited for powered roller and DC motor applications. The second is a basic mode which provides a constant drive for both zero and low pressure accumulation.

Other advanced logic functions include selectable ON (RUN) and OFF (STOP) time delays, power conservation, jam detection, along with air-to-drive and air-to-brake operation.

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | cULus Listed and CE Marked for all applicable directives |
| Operating Environment | NEMA 1; IP50 |
| Operating Temperature [C (F)] | 0...+50° (32...+122°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...85% (noncondensing) |
| Zone Control | |
| Zone Logic | Switch selectable single or basic operating modes for zero and low pressure accumulation with singulation and slug release |
| Advanced Zone Logic | JAM respond function, sleep function, air-to-drive or air-to-brake operation, ON/OFF time delays |
| Adjustments | Rotary switches, DIP switches |
| LED Indicators | Orange (zone status, fault) |
| Electrical | |
| Voltage | 24V DC |
| Current Consumption | 16 mA max |
| Sensor Protection | Over-voltage, reverse polarity, short-circuit (SCP) |
| Outputs/Inputs | |
| Response Time | 1 ms |
| Sensor Input | NPN |
| Actuator Output | NPN |
| Output Mode | Light or dark operate selectable by dip switch (1 L.O., 0 D.O.) |
| Actuator Output Current | 100 mA @ 24V DC max |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Connection Types | Input: 3-pin MOLEX; Output: 4-pin MOLEX; Power/Signal: IDC Cable |
| Required Accessories | Sensing device, actuating device, flat media |
| Optional Accessories | Mounting brackets, reflectors, cordsets |

System Overview for Pneumatically Driven Conveyor Systems

Install one 22ZC in each zone of the conveyor and attach a suitable sensing and actuating device. Note that the infeed module (22ZC-343) must be installed at the beginning of your zone control system (zone 4 on Figure 1 on page 1-182) and the master module (22ZC-413) at the discharge end of your system (zone 1 on Figure 1). Size, cut and install the flat media between each controller. Connect a suitable 24V DC power supply to any controller within the system. It is recommended to make this connection to the center controller for balanced power distribution. A 4 A power supply will provide power for up to 25 zones when using a 1 W pneumatic valve. Wire the infeed and discharge zone external connection as required using the wiring diagram shown on Figure 1.

Loading Product Onto the Conveyor (Figure 2 on page 1-182)

With power applied to the system, all zones will immediately drive feeding product onto the conveyor. As product passes the sensor mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the whole system. Once the first product reaches the discharge zone (zone 1), it will stop and await release from the conveyor.

Release of Product

Once the product has been transported and accumulated at the discharge end of the conveyor (zone 1) it may be release in one of two manners:

Singulation Release (Figure 3 on page 1-182)

With the singulation release signal activate, only product in the discharge end of the conveyor (zone 1) will release. As the product clears the sensors, the adjacent upstream zones

will advance into the discharge zone. Product will continue to discharge as long as the singulation release signal remains active.

Slug Release (Figure 4 on page 1-182)

With the slug release signal active, all accumulated product on the conveyor will release simultaneously. When the slug release signal is deactivated, the remaining product will resume normal accumulation. Predetermined slug lengths can be configured through the use of the slug respond switch on each controller.

For more information on these and other features refer to the 22ZC installation instructions or visit our website at www.ab.com/sensors.

System Overview for Powered Roller Driven Conveyor Systems

Install one 22ZC in each zone of the conveyor and attach a suitable sensing and actuating device. Note that the infeed module (22ZC-343) must be installed at the beginning of your zone control system (zone 4 on Figure 1) and the master module (22ZC-413) at the discharge end of your system (zone 1 on Figure 1). Size, cut and install the flat media between each controller.

Connect a suitable 24V DC power supply to any controller within the system. It is recommended to make this connection to the center controller for balanced power distribution. Note that the power for the powered roller and amplifier are not provided by the 22ZC, only the RUN signal. Wire the infeed and discharge zone external connection as required using the wiring diagram shown on Figure 1.

Loading Product onto the Conveyor (Figure 2 on page 1-182)

With power applied to the system, all zones will be OFF until either the infeed

sensor is blocked or the zone feed input is closed and maintained. As product passes the sensor mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the whole system. Once the first product reaches the discharge zone (zone 1), it will stop and await release from the conveyor. If a low pressure accumulation is desired, a system wide OFF time delay can be configured to minimize product spacing on the conveyor.

Release of Product

Once the product has been transported and accumulated at the discharge end of the conveyor (zone 1) it may be release in one of two manners:

Singulation Release (Figure 3 on page 1-182)

With the singulation release signal activate, only product in the discharge end of the conveyor (zone 1) will release. As the product clears the sensors, the adjacent upstream zones will advance into the discharge zone. Product will continue to discharge as long as the singulation release signal remains active.

Slug Release (Figure 4 on page 1-182)

With the slug release signal active, all accumulated product on the conveyor will release simultaneously. When the slug release signal is deactivated, the remaining product will resume normal accumulation. Predetermined slug lengths can be configured through the use of the slug respond switch on each controller.

For more information on these and other features refer to the 22ZC installation instructions or visit our website at www.ab.com/sensors.

Figure 1. System Overview

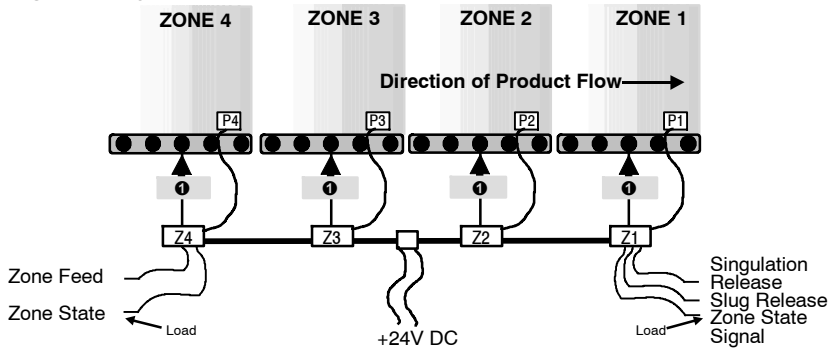


Figure 2. Loading the Conveyor

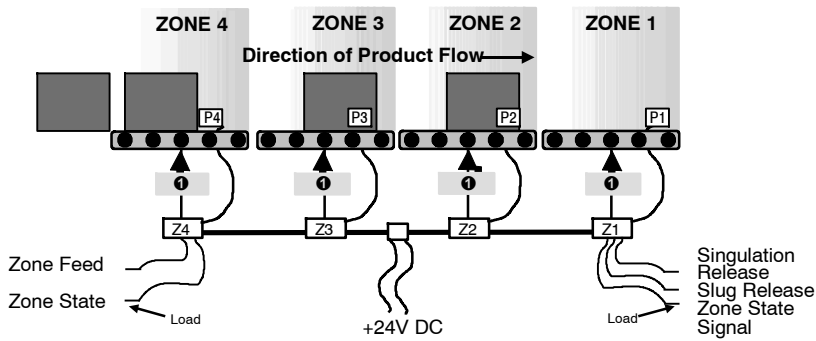


Figure 3. Singulation Release of Accumulated Product

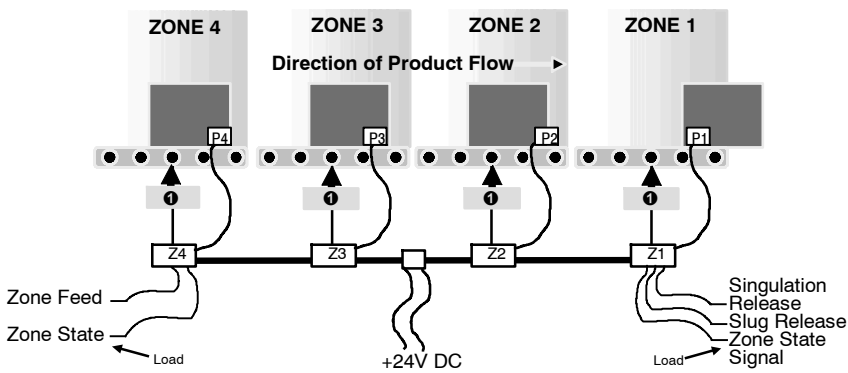
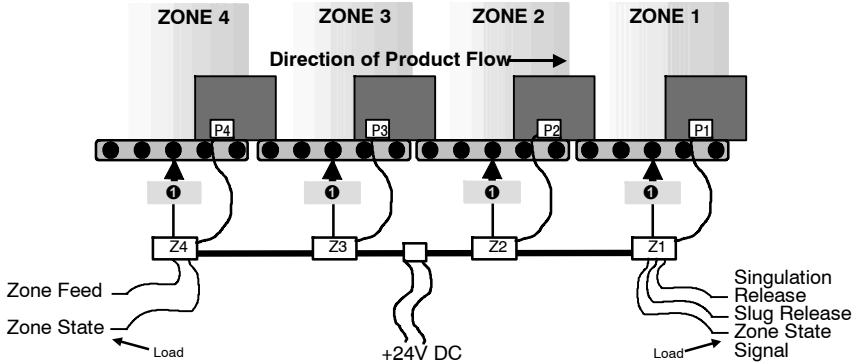


Figure 4. Slug Release of Accumulated Product



● Amplifier or Valve

System Overview for Powered Roller Driven Conveyor Systems

Install one 22ZC in each zone of the conveyor and attach a suitable sensing and actuating device. Size, cut and install the flat media between each controller. Using a 22ZC-PWR cordset, connect to a suitable 24V DC power supply to any controller within the system. It is recommended to make this connection to the center controller for maximum power distribution. A 4A supply will provide power for up to 50 zones. Note that the power for the powered roller and amplifier are not provided by the 22ZC, only the RUN signal. Wire the infeed and discharge zone external connections as required using the wiring diagram to the right. Note that the zone and slug release,

and the zone feed push buttons should be normally open and maintained.

Loading Product onto the Conveyor

With power applied to the system, all zones will be OFF until either the infeed sensor is blocked or the zone feed contact is closed and maintained. As product passes the sensor mounted at the infeed zone, a gap will be formed equal to the zone length. This will ensure zero pressure throughout the system. Once the first product reaches the discharge zone (1), it will stop and await release from the conveyor. If a low pressure accumulation is desired, a system-wide, 1 second OFF time delay can be configured to minimize product spacing on the conveyor.

Release of Product

Once product has been transported and accumulated at the discharge end of

the conveyor (Zone 1), it may be released in one of two manners.

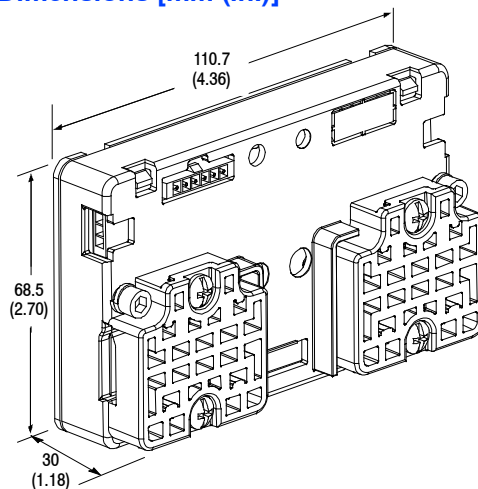
Singulation Release

With the zone release push button closed and maintained, only product in the discharge zone (1) will release. As the product clears the sensor, the adjacent upstream zones will advance into the discharge zone. Product will continue to discharge as long as the zone release push button remains closed.

Slug Release

With the slug release push button closed and maintained, all accumulated product on the conveyor will release simultaneously. When the slug release push button is released, the remaining product will resume normal accumulation. Predetermined slug lengths can be configured through the use of the SLUG RESPOND switch on each controller.

Approximate Dimensions [mm (in.)]



| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|----------------------|-------------------|--------------------------|---------------|---------------------------|----------|
| Zone Controllers | 22ZC-413 (master) | Flat Media, 75 m spool | 1485C-P1L75 | Reflector, 3 in. diameter | 92-39 |
| | 22ZC-223 (basic) | Power Supply, 24V DC/4 A | 1606-XLP100E | Mounting Bracket, sensor | 60-2657 |
| | 22ZC-343 (infeed) | Power Tap | 22ZC-PWR | | |
| Photoelectric Sensor | 44RSP-2JNE3-Z6 | Power Tap, IDC | 1485T-P1H4-R5 | | |

Refer to www.ab.com/sensors for more information.

Series 9000

Intrinsically Safe



Description

The Series 9000 transmitted beam photoelectric sensors are designed and approved as an intrinsically safe device under the FM and CSA entity concept. It may be installed into a Class I, II, III; Division 1 hazardous location when connected to an appropriate safety barrier. The sensor is also approved as non-incendive for installation into Class I; Division 2 hazardous locations without the need for a safety barrier.

Typical applications

- Automotive
- Petrochemical
- Grain processing

Information on the Series 897H intrinsic safety barriers may be found on page 12-2.

Features

- Intrinsically safe to North American standards
- Transmitted beam sensing mode
- Compatible with Series 897H intrinsic safety barriers
- 30 mm harsh duty package
- Fast response time
- Variety of connection types

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, FM Approved, and CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13; IP67, 1200 psi washdown, IP69K |
| Operating Temperature [C (F)] | -40...+65° (-40...+150°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% max |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Transmitted Beam |
| Light Source | Infrared LED (880 nm) |
| LED Indicators | Red LED for output indication |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 13...30V DC |
| Current Consumption | 25 mA max |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 10 ms max |
| Output Type | PNP and NPN |
| Output Mode | Light operate and dark operate selectable |
| Output Current | 8.5 mA for PNP, 15 mA for NPN |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Connection Types | 2 m cable, 4-pin DC micro (M12) QD, 4-pin DC mini QD |
| Supplied Accessories | 129-130 mounting kit |
| Optional Accessories | Series 897H intrinsic safety barriers, cordsets, mounting brackets |

Selection Guide for Intrinsic Safety Barriers

The 42GRx-95x0 is approved as an intrinsically safe apparatus under the entity concept by FM and CSA. Therefore, any safety barrier which meets both the stated operational and safety requirements (see Table 1) of the

sensor may be used. Note that the sensor is also approved as non-incendive (FM) for installation into Class I; Division 2 hazardous locations without the need for a safety barrier.

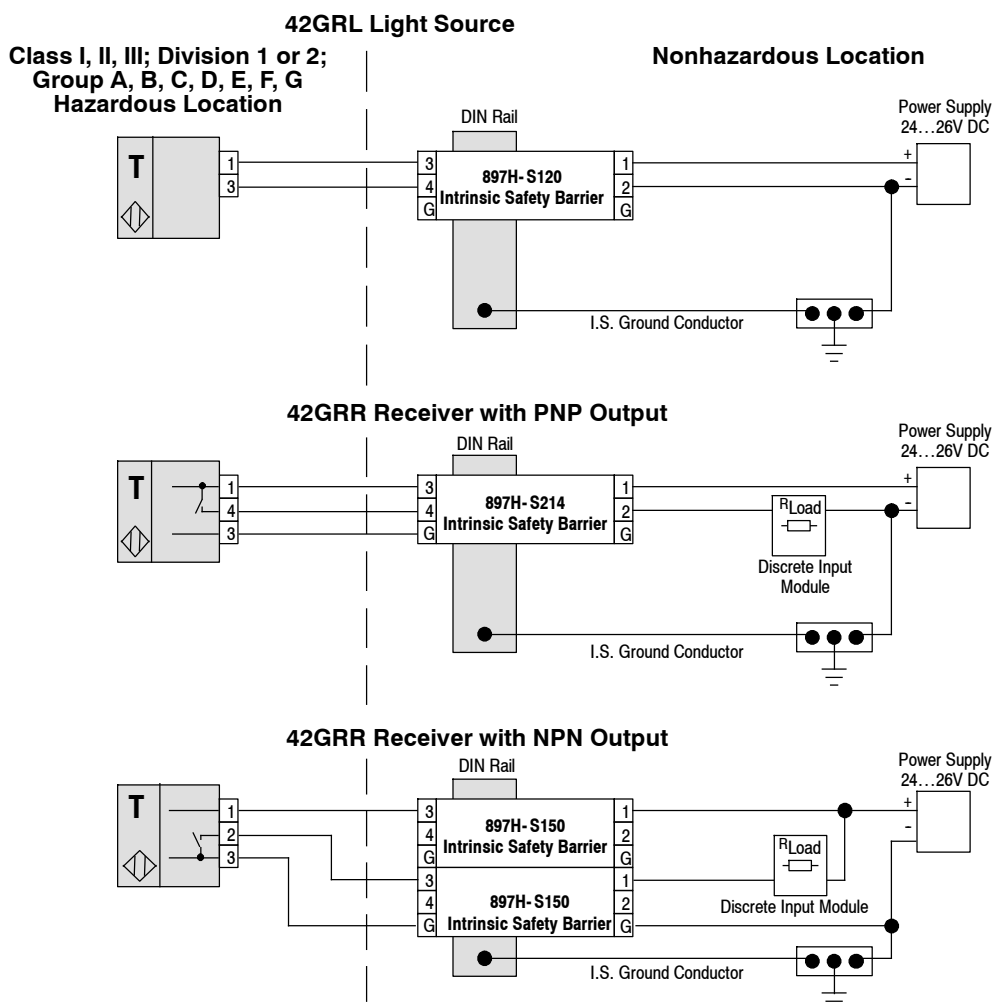
Table 1 Entity Parameters

| | Sensor | | Barrier |
|-------------------|--------|---|---------|
| V_{max} | 31.5V | ≥ | V_t |
| I_{max} | 150 mA | ≥ | I_t |
| P_{max} | 0.95 W | ≥ | P_t |
| $C_i + C_{leads}$ | 0 µF | ≤ | C_a |
| $L_i + L_{leads}$ | 0 mH | ≤ | L_a |

User Interface

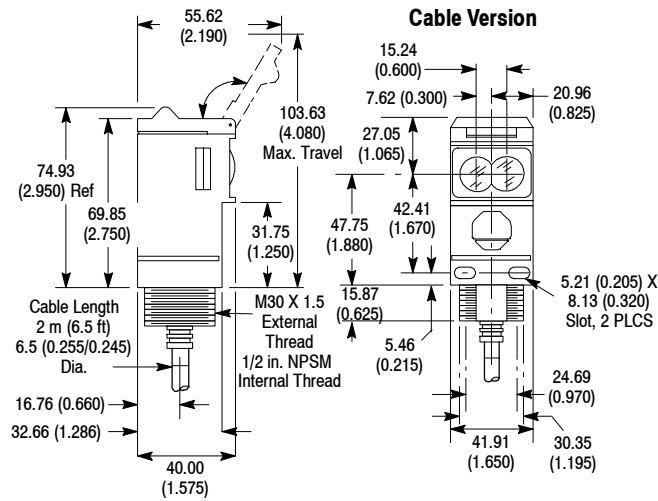
| Label | Color | State | Status |
|------------|--------|----------|----------------------------|
| Output | Green | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |
| Margin/SCP | Red | OFF | Margin <2.5 |
| | | ON | Margin >2.5 |
| | | Flashing | Output SCP active |
| Power | Yellow | OFF | Sensor not powered |
| | | ON | Sensor powered |

Wiring Diagrams

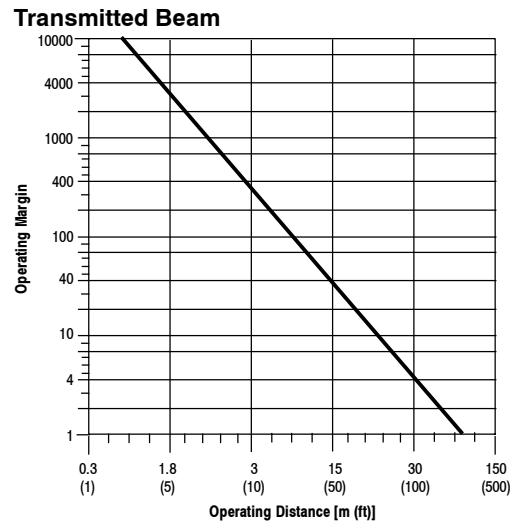


IMPORTANT See Control Drawing #75002-200.

Approximate Dimensions [mm (in.)]



Typical Response Curve



Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Connection Type | Cat. No. |
|--|-------------------------------------|------------------------------------|--------------------|--|-----------------|----------------|
| Light Sources | 14...30V DC 16 mA | 25.4 mm...106 m (2 in...350 ft) | — | — | 2 m 300V cable | 42GRL-9540 |
| | | | | | 4-pin micro | 42GRL-9540-QD |
| | | | | | 4-pin mini | 42GRL-9540-QD1 |
| Receivers | | | | | | |
| Field of View: 1.5° Receiver Emitter LED: Infrared 880 nm | 13...30V DC 25 mA | 25.4 mm...106 m (2 in...350 ft) | Light/Dark Operate | NPN/15 mA PNP/8.5 mA 10 ms max. | 2 m 300V cable | 42GRR-9500 |
| | | | | | 4-pin micro | 42GRR-9500-QD |
| | | | | | 4-pin mini | 42GRR-9500-QD1 |

Cordsets and Accessories

| Description | Cat. No. |
|--|----------------|
| 1.8 m (6 ft) 4-pin, Mini QD Cordset | 889N-F4AF-6F ❶ |
| 2 m (6.5 ft) 4-pin, DC Micro QD Blue Cordset | 889D-F4LC-2 ❷ |
| Mounting Bracket | 60-2439 |

❶ Intrinsically Safe wiring labels 897H-L1 or 897H-L2 must be applied every 7.6 m (25 ft).

❷ Blue cable does not require labels to denote intrinsically safe wiring.



Description

The Series 5000 intrinsically safe sensors are designed for the installation in hazardous locations. They can be used in Class I, II, III; Division 1, 2; groups A, B, C, D, E, F, and G locations with intrinsic Safety Zener Diode Barriers. They can also be used in Class I, II, II; Division 2 only without intrinsic safety zener diode barriers.

Features

- Intrinsically Safe to North American standards
- Nonincendive for Division 2 hazardous (classified) locations
- Modular package for increased flexibility
- Wide variety of sensing modes
- Selectable light/dark operation
- Both NPN and PNP outputs
- Screw terminal connections

Specifications

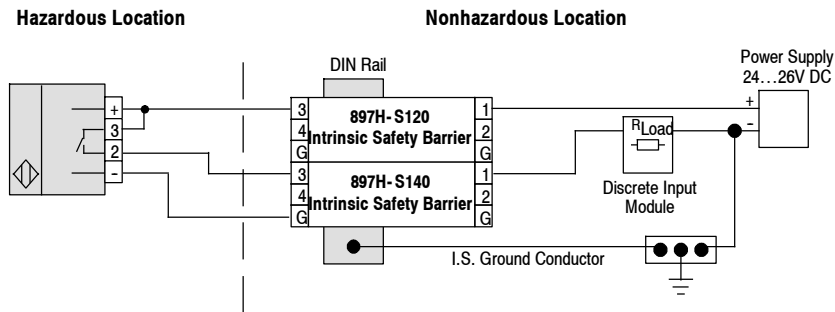
| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, FM Approved, and CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4, 12, 13; IP66 |
| Operating Temperature [C (F)] | -40...+65° (-40...+150°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 90% max |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Retroreflective, diffuse, polarized retroreflective, fiber optic |
| Sensing Range | See Product Selection table on page 1-189 |
| Field of View | See Product Selection table on page 1-189 |
| Light Source | Infrared LED (880 nm) |
| LED Indicators | Red LED for output indication |
| Adjustments | Sensitivity potentiometer |
| Electrical | |
| Voltage | 24V DC with suitable intrinsically safe barrier |
| Current Consumption | 30 mA max |
| Sensor Protection | False pulse |
| Outputs | |
| Response Time | 1 ms |
| Output Type | PNP and NPN |
| Output Mode | Light and dark operate selectable |
| Output Current | 20 mA @ 28V DC |
| Output Leakage Current | 1 μA |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic (glass on polarized lens) |
| Connection Types | 2 m (6.5 ft) cable, screw terminal |
| Supplied Accessories | None |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-190 |

User Interface

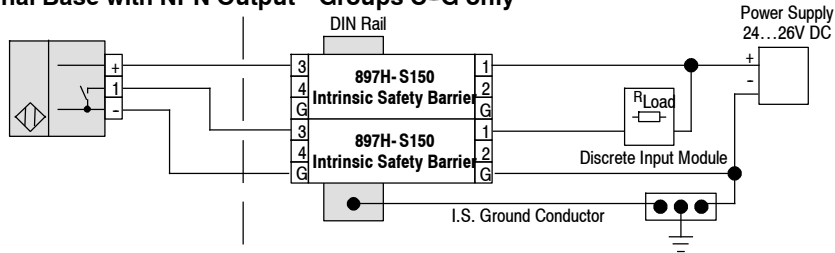
| Label | Color | State | Status |
|--------|-------|-------|----------------------------|
| Output | Red | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |

Wiring Diagrams

Photohead and Terminal Base with PNP Output



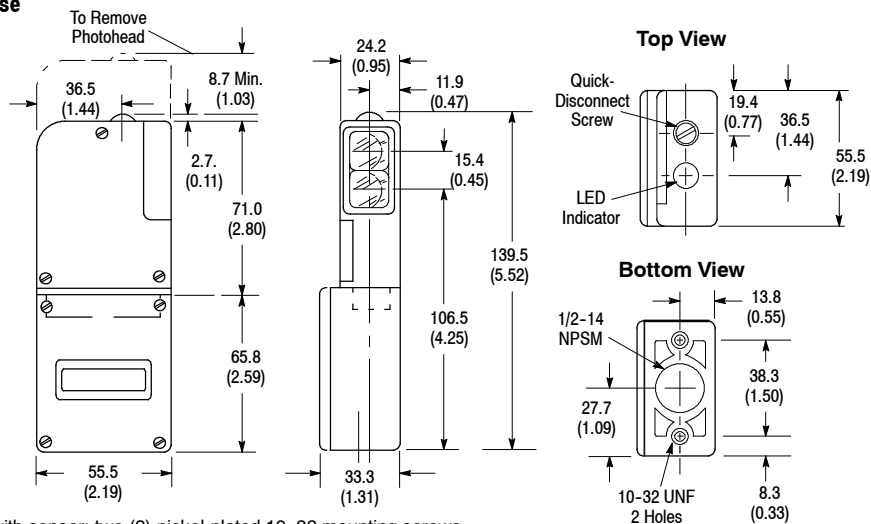
Photohead and Terminal Base with NPN Output—Groups C-G only



IMPORTANT See Control Drawing #133-451.

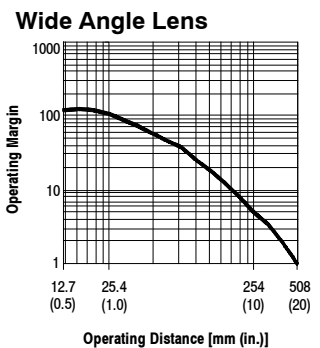
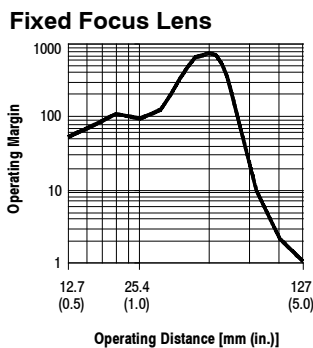
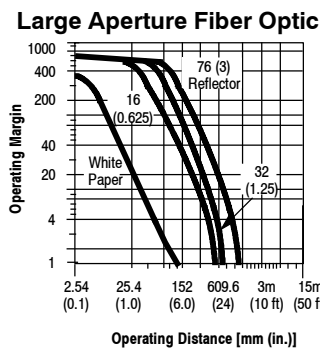
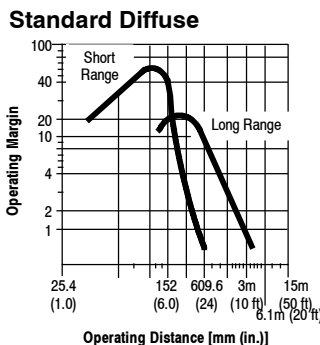
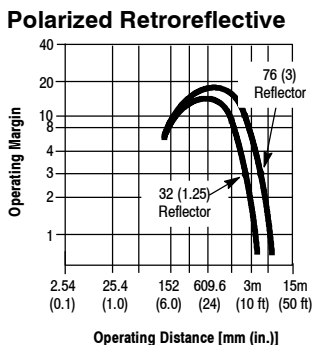
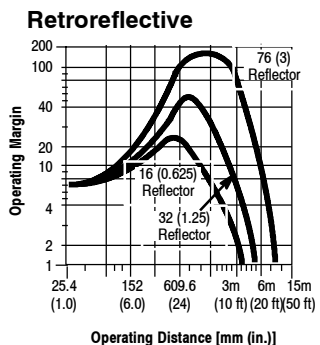
Approximate Dimensions (Applies to all versions) [mm (in.)]

Terminal Style Power Base



Note: Hardware included with sensor: two (2) nickel-plated 10-32 mounting screws.

Typical Response Curve



Fibers #43GR-FAS25SSL through #43GR-BAA72ML
See Fiber Optic section in this catalog for additional information.

Product Selection

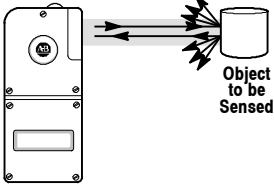
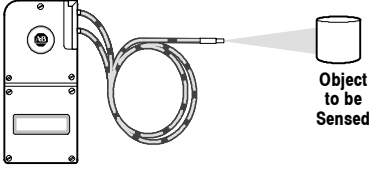
Photohead

| Sensing Mode | Sensing Distance | Output Energized | Output Type Capacity | Response Time | Cat. No. |
|---|---|--------------------------|-------------------------------------|---------------|------------|
| <p><i>Retroreflective</i> Field of View: 2.5° Emitter LED: Infrared 880 nm</p> | 50.8 mm... 10 m (2 in... 33 ft) with 76 mm (3 in.) Reflector | Light/Dark Selectable | NPN and PNP 20 mA at 29.5V DC | 1 ms | 42DRU-5500 |
| <p><i>Polarized Retroreflective</i> Field of View: 2.5° Emitter LED: Visible 660 nm</p> | 50.8 mm... 6 m (2 in... 20 ft) with 76 mm (3 in.) Reflector | Light/Dark Selectable | NPN and PNP 20 mA at 29.5V DC | 1 ms | 42DRU-5700 |

Refer to page 1-190 for cordsets and accessories.

Product Selection (continued)

Photohead

| Sensing Mode | Sensing Distance | Output Energized | Output Type Capacity | Response Time | Cat. No. |
|--|--|-----------------------|-------------------------------------|---------------|--------------|
|  <p>Standard Diffuse</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p> | 50.8 mm (2 in.)...Short Range: 0.4 m (16 in.) Long Range: 2.1 m (7 ft) with White Paper | Light/Dark Selectable | NPN and PNP 20 mA at 29.5V DC | 1 ms | 42DRP-5500 |
|  <p>Large Aperture Fiber Optic</p> <p>Field of View: Depends on the glass fiber optics and lens type Emitter LED: Infrared 880 nm</p> | — | Light/Dark Selectable | NPN & PNP 20 mA at 29.5V DC | 1 ms | 42DRA-5500 ① |

① Lens assembly required, see below.

Power Base

| Style | Operating Voltage | Supply Current | Cat. No. |
|----------|-------------------|--|------------|
| Terminal | 13...29.5V DC | 26 mA max at 13V DC 30 mA max at 29.5V DC | 42DTB-5500 |

Lens Assembly

| Lens Type | Cat. No. |
|-------------|----------|
| Fiber Optic | 61-5550 |
| Fixed Focus | 61-5551 |
| Wide Angle | 61-5611 |

Cordsets and Accessories

| Description | Page No. |
|-------------------------------------|----------|
| Mounting Assemblies | 1-293 |
| Intrinsic Safety Barriers | 12-2 |
| 76 mm (3 in.) Diameter Reflector | 92-39 |
| 32 mm (1.25 in.) Diameter Reflector | 92-47 |



Description

The MultiSight is an optical multi-pixel sensor with a pass/fail PNP output. The MultiSight uses several different methods of evaluation (pattern matching, contrast, brightness, and contour matching) to detect or differentiate objects by means of previously defined optical characteristics, e.g. for separating “good” and “bad” parts. The main applications are in the field of industrial automation for quality assurance purposes. The MultiSight is an easy-to-use economical alternative to conventional vision systems for detecting presence or absence, completeness, position, markings, labeling, packaging, and components.

Features

- Standalone vision sensor
- Easy handling and setup
- Compact, sturdy industrial housing with IP67 rating
- Integrated lighting
- Optional EtherNet/IP™ connection with RSLogix™ 5000 Add-On Profile for I/O data
- Adjustable focus from 20 mm to infinity
- Short evaluation time (50...250 ms)
- Multiple evaluation methods: pattern matching, brightness, contrast, and contour matching
- Ten or 32 virtual detectors
- Individual virtual detectors can be logically linked or grouped for evaluation of different objects with several characteristics for inspection
- Ethernet connection for setup

Specifications

| | Standard Models | EtherNet/IP Models |
|-------------------------------|---|---|
| Certifications | cULus Certified and CE Marked for all applicable directives | |
| Lighting and Optics | | |
| Imager | 640 x 480 pixels, CCD-monochrome; 256 level (8-bit) greyscale | |
| Lighting | Integrated LEDs; 6 x white, 2 x red | |
| Lens Type | 6 mm or 12 mm integrated lens, adjustable focus | |
| Field of View | 12 mm Lens: @ 200 mm; X = 60 mm, Y = 40 mm 6 mm Lens: @ 200 mm; X = 150 mm Y = 100 mm (see Field of View table for details) | |
| Sensing Range | Min. range: 20 mm; max. range: infinite but dependent on illumination | |
| Depth of Field | ±5% of focusing distance | |
| Electrical | | |
| Operating Voltage | 24V DC ±10% | |
| Current Consumption | ≤200 mA | |
| Open Circuit Protection | Short circuit, overload, false pulse, transient noise, reverse polarity | |
| Outputs | OUT1 (pass/fail), OUT2 (position), OUT3 (illumination), OUT4 (ready) | |
| Output Type | 4 x PNP type (sourcing MOSFET) | |
| Output Rating | 200 mA per output; max. 9.6 W | |
| Input Type | IN1 (trigger) and IN2 (control); high 10...30V DC, low 0...3V DC | |
| Ethernet Interface | Configuration only | Configuration (TCP/IP) and I/O (EtherNet/IP) |
| Mechanical | | |
| Housing Material | Aluminum and ABS Plastic | |
| Lens Material | Plastic (PMMA) | |
| LED Indicators | Green: Power; Red: Error; Yellow (2): Q1, Q2 output | |
| Connection Type | Power-I/O: 8-pin micro QD (M12); Ethernet: 8-pin micro QD (M12) | Power-I/O: 8-pin micro QD (M12); Ethernet: 4-pin d-code micro QD (M12) |
| Enclosure Type Rating | IP67 | |
| Vibration | 10...55 Hz, 1.5 mm amplitude; 3 planes; meets or exceeds IEC 60947-5-2 | |
| Shock | 30 g; 11 ms; meets or exceeds IEC 60947-5-2 | |
| Operating Temperature [C (F)] | 0...50° (32...122°) | |
| Accessories | | |
| Supplied Accessory | Dovetail bracket (48MS-BKTD), focus adjustment screwdriver, 3 mounting screws, Allen-wrench, software CD | |
| Additional Required Accessory | PWR and I/O cordset, ethernet cable | |
| Optional Accessory | Mounting brackets, cordsets, external lighting, trigger sensors | |
| Detectors | | |
| Detector Types | Pattern matching, brightness, contrast | Pattern matching, brightness, contrast, contour matching |
| Number of Detectors | Up to 10 detectors | Up to 32 detectors |
| Angular Displacement | ±5° (for pattern matching); 360° (for contour matching) | |
| Typical Cycle Time | Pattern 50...100 ms; brightness 40...50 ms; contrast 40...50 ms; contour 120...500 ms | |
| Number of Job Selects | Combination of 10 detectors and job selections | Combination of 32 detectors and job selections |

Benefits

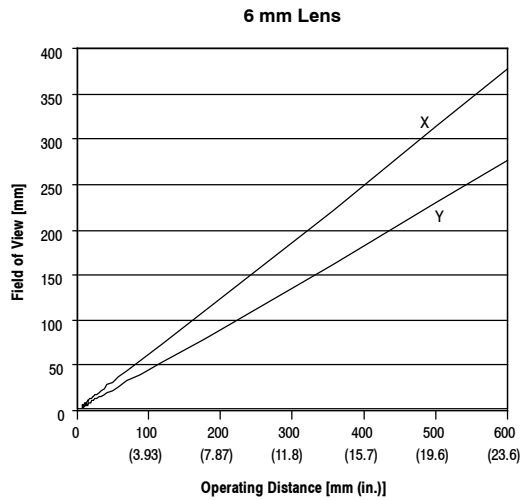
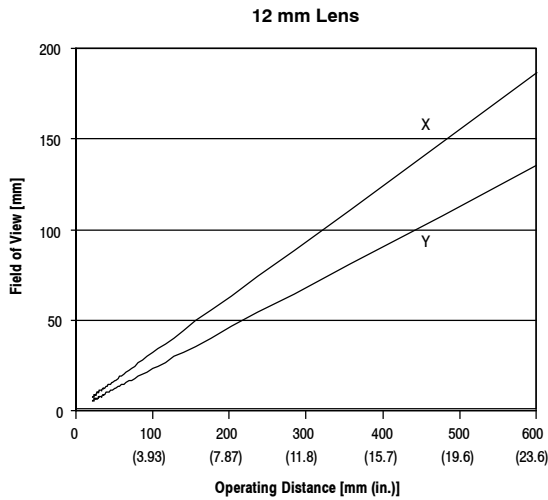
- Perform multiple inspections with one sensor
- Simple setup using PC and configuration software
- Multiple job storage to facilitate flexible product changeovers
- Simple inspection tools for detecting presence or absence, completeness, position, markings, labeling, packaging, and components
- Economical alternative to conventional vision system

Product Selection

| Focal Length of Lens | Field of View | EtherNet/IP | Cat. No. |
|----------------------|---------------------------------------|-------------|-------------------------|
| 12 mm | 12 mm @ 200 mm; X = 60 mm, Y = 40 mm | No | 48MS-SE1PF2-M2 |
| 6 mm | 6 mm @ 200 mm; X = 150 mm, Y = 100 mm | No | 48MS-SE1PF1-M2 ❶ |
| 12 mm | 12 mm @ 200 mm; X = 60 mm, Y = 40 mm | Yes | 48MS-SN1PF2-M2 |
| 6 mm | 6 mm @ 200 mm; X = 150 mm, Y = 100 mm | Yes | 48MS-SN1PF1-M2 ❶ |

❶ The 6 mm lens models typically require external lighting because the integrated lighting does not illuminate the entire field of view, i.e., the edges of the image are dark.

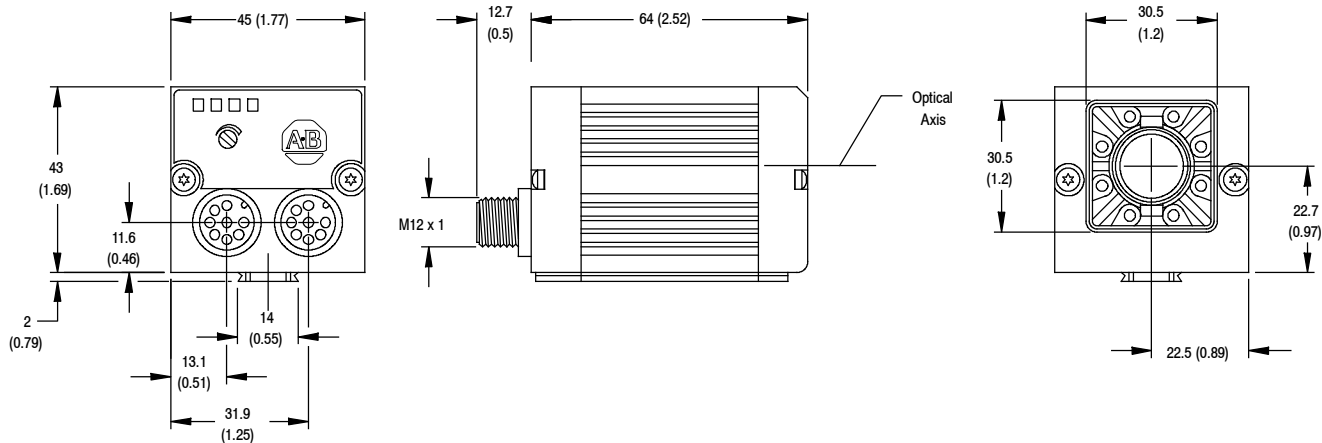
Field of View



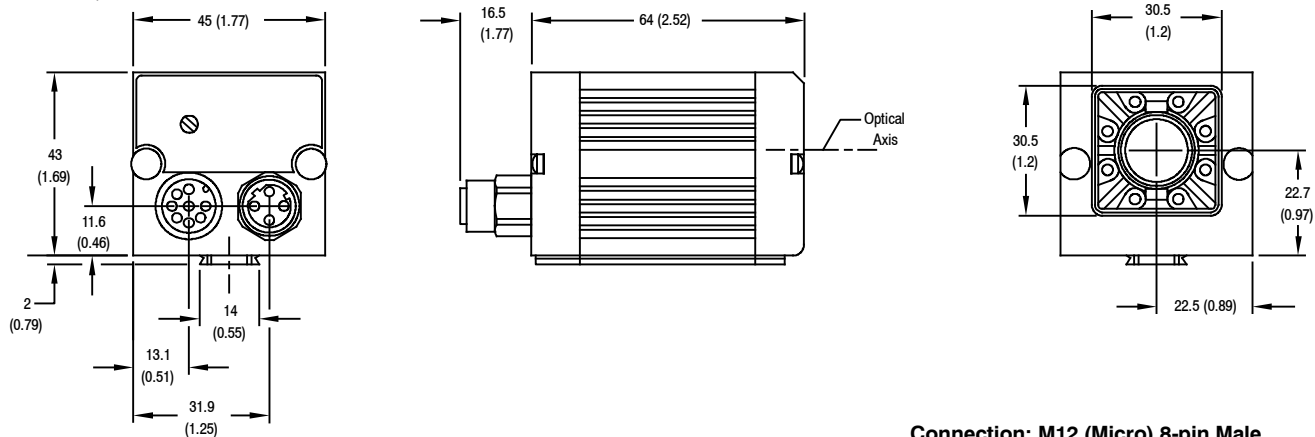
Approximate Dimensions [mm (in.)]

Dimensions are not intended to be used for installation purposes.

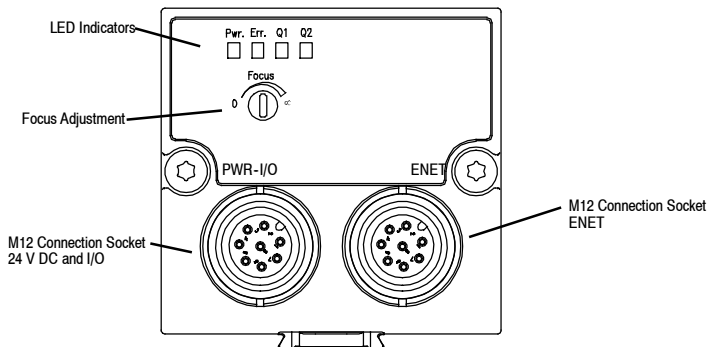
Standard Models



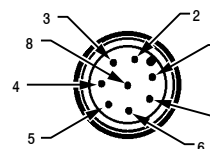
EtherNet/IP Models



Rear View of the MultiSight



Connection: M12 (Micro) 8-pin Male QD (PWR and I/O; Ethernet on standard models)



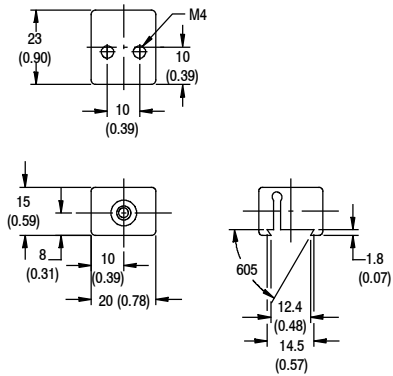
Connection: 4-pin D Code Female QD (Ethernet connection for EtherNet/IP models)



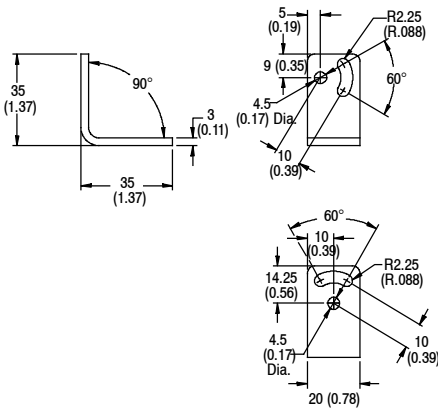
Approximate Dimensions [mm (in.)] (continued)

Dimensions are not intended to be used for installation purposes.

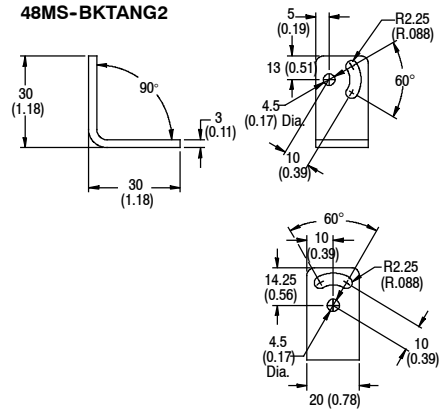
Dovetail Bracket—48MS-BKTD
(included with MultiSight)



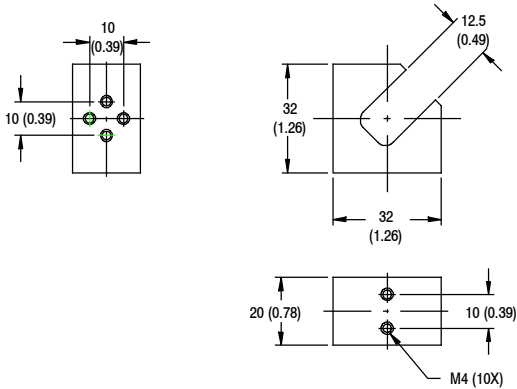
Angle Bracket—48MS-BKTANG



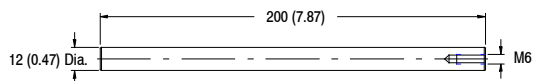
Angle Bracket for Ring Light—
48MS-BKTANG2



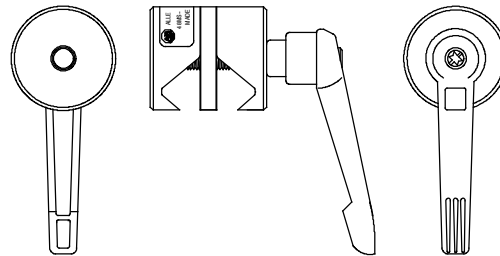
Rod Bracket—48MS-BKTROD



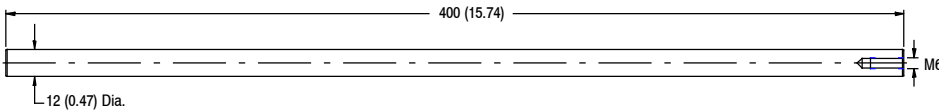
Mounting Rod 200—48MS-ROD200



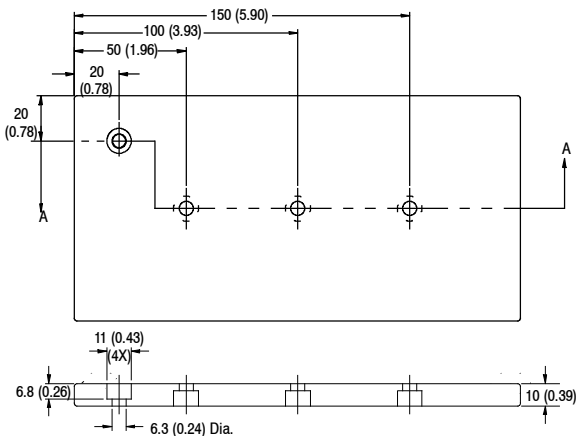
Rod Clamp—48MS-CLAMP



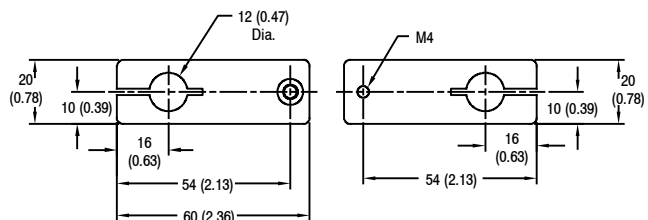
Mounting Rod 400—48MS-ROD400



Mounting Plate—48MS-MTPLATE



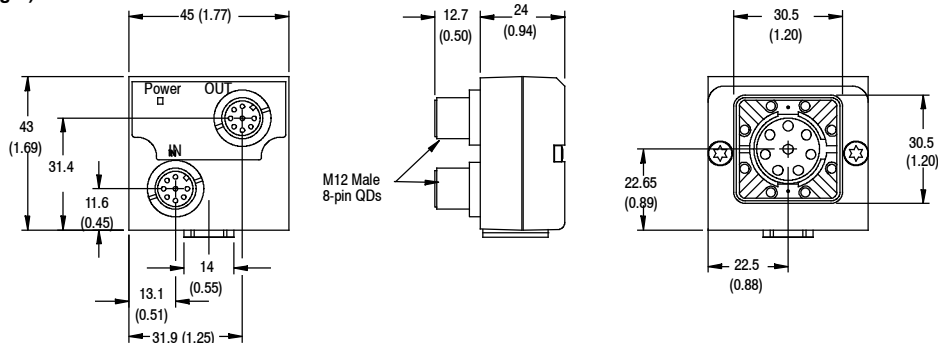
Rod Link—48MS-RODLINK



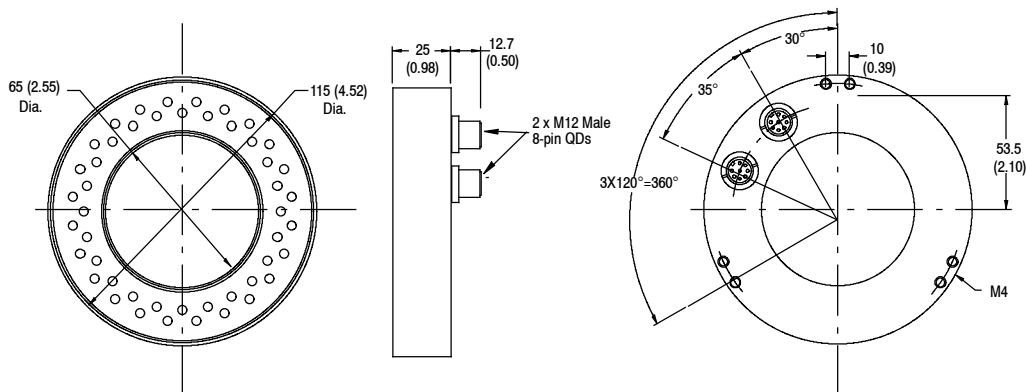
Approximate Dimensions [mm (in.)] (continued)

Dimensions are not intended to be used for installation purposes.

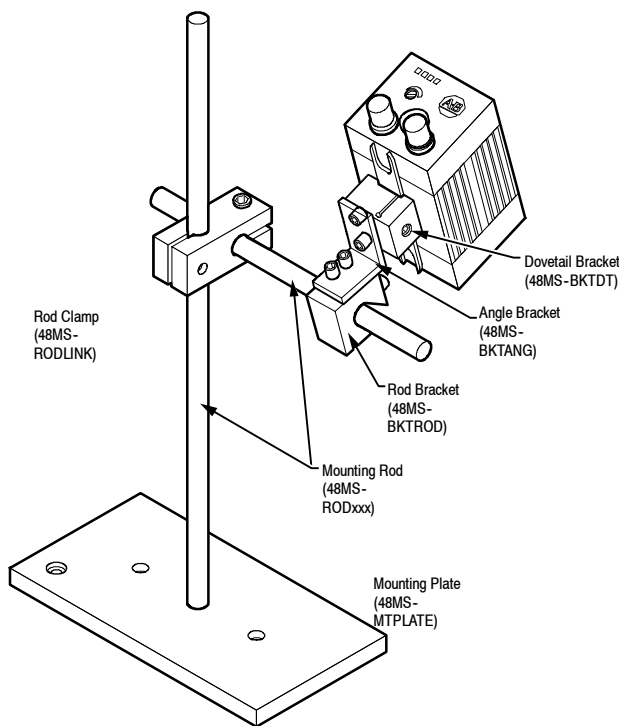
Area Light (White Light)—48MS-ALWH



Ring Light (White Light)—48MS-RLWH



Mounting Setup



Wiring

Power I/O Connection

| Pin (M12) | Color | Use |
|-----------|--------|-------------------------------------|
| 1 | White | IN1 (external trigger) |
| 2 | Brown | 24V DC (V+) |
| 3 | Green | OUT1 (pass/fail); display LED = Q1 |
| 4 | Yellow | OUT4 (ready) ❶ |
| 5 | Grey | IN2 (control input) |
| 6 | Pink | OUT3 (external illuminated trigger) |
| 7 | Blue | GND (V+) |
| 8 | Red | OUT2 (position); display LED = Q2 |

❶ Indicates sensor evaluation is valid for OUT1 and OUT2, except in special cases as noted in the *MultiSight User Manual*.

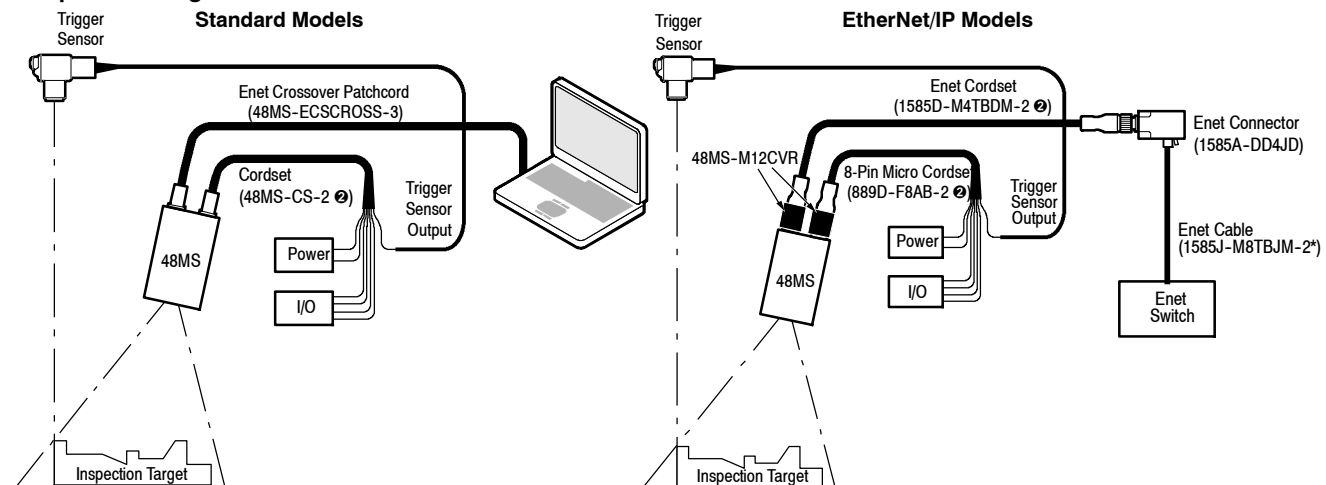
Ethernet (Standard Models)

| Pin (M12) | Use |
|-----------|------|
| 1 | — |
| 2 | — |
| 3 | — |
| 4 | TxD- |
| 5 | RxD+ |
| 6 | TxD+ |
| 7 | RxD- |
| 8 | — |

Ethernet (EtherNet/IP Models)

| Pin (M12 D-Code) | Use |
|------------------|-----|
| 1 | Tx+ |
| 2 | Rx+ |
| 3 | Tx- |
| 4 | Rx- |

Setup and Wiring



❷ Other lengths available: replace 2 with length in meters (5 m and 10 m are standard lengths).

Accessories

| Product Descriptor | Cat. No. |
|--|---------------|
| Dovetail Bracket | 48MS-BKTDT ❶ |
| Angle Bracket | 48MS-BKTANG |
| Rod Bracket | 48MS-BKTROD |
| Mounting Rod 200 mm | 48MS-ROD200 |
| Mounting Rod 400 mm | 48MS-ROD400 |
| Rod Link | 48MS-RODLINK |
| Rod Clamp | 48MS-CLAMP |
| Mount Plate | 48MS-MTPLATE |
| RJ45 Connector | 48MS-RJ45CONN |
| Ethernet Crossover Cable, RJ45 to RJ45 | 48MS-ECROSS |
| Area Light—White Light | 48MS-ALWH |
| Ring Light—White Light | 48MS-RLWH |
| Angle Bracket for Ring Light | 48MS-BKTANG2 |
| Lighting Cable | 48MS-LCS |
| Lighting Cable Right Angle | 48MS-LCRT |
| MultiSight Test Box | 48MS-TESTBOX |

Standard Model

| Product Descriptor | Cat. No. |
|--------------------------------|-----------------|
| Cordset 2 m | 48MS-CS-2 |
| Cordset 5 m | 48MS-CS-5 |
| Cordset 10 m | 48MS-CS-10 |
| Cordset Right Angle 2 m | 48MS-CSRT-2 |
| Cordset Right Angle 5 m | 48MS-CSRT-5 |
| ENET Cordset Crossover 3 m | 48MS-ECSCROSS-3 |
| ENET Cordset 3 m | 48MS-ECS-3 |
| Sealing Cap—M12 Male Connector | 889A-DCAP |

EtherNet/IP Model

| Product Descriptor | Cat. No. |
|---|------------------|
| Power and I/O cordset—M12 8-pin female, 2 m | 889D-F8AB-2 ❷ |
| Cable Connector Cover (nonconducting)—M12 | 48MS-M12CVR ❶ |
| Sealing Cap—M12 Female Connector | 1485A-M12 |
| Ethernet Patchcord M12 D-code to RJ45—2 m | 1585D-M4TBJM-2 ❷ |
| Ethernet Patchcord M12 D-code to M12 D-code—2 m | 1585D-M4TBDM-2 ❷ |
| Ethernet M12 D-code to RJ45 converter | 1585A-DD4JD |
| Ethernet Cable RJ45 to RJ45—2 m | 1585J-M8PBJM-2 ❷ |
| Ethernet Patchcord Crossover M12 D-code to RJ45—3 m | 48MS-EPC-3 |

❶ Included with MultiSight Sensor.

❷ Other lengths available: replace 2 with length in meters (5 m and 10 m are standard lengths).

Note: Additional accessories (longer cordsets and additional LED colors for external lighting) available with longer lead times. Consult your local Rockwell Automation sales office or Allen-Bradley distributor for additional information.



Description

These UL 325 Recognized and UL 508 Listed photoelectric sensing solutions are based on the industry proven Series 9000 and are specifically designed for noncontact detection of vehicles in automatic access control (gate entry) applications. These sensors are available individually or as bundled kits.

Features

- Complete sensing solutions based on the industry proven Series 9000 photoelectric sensors
- SPDT electro-mechanical relay output
- 24V AC/DC and 120/220V AC/DC models
- -34...+70°C (-29...+158°F) operating temperature range
- NEMA 3, 4X, 6P, 12, 14 (IP 67) environmental rating
- 1200 psi washdown rating
- Offered as kits or individual components

Specifications

| Environmental | |
|-------------------------------|---|
| Operating Temperature [C (F)] | -34...+70° (-29...+158°) |
| Relative Humidity | 5...95% noncondensing |
| Operating Environment | NEMA 2, 4, 4X, 6P, 13; IP67 (IEC 602529), 1200 psi (8270 kPa) washdown |
| Certifications | UL 325 Recognized component for US and Canada and CE Marked for all applicable directives |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |

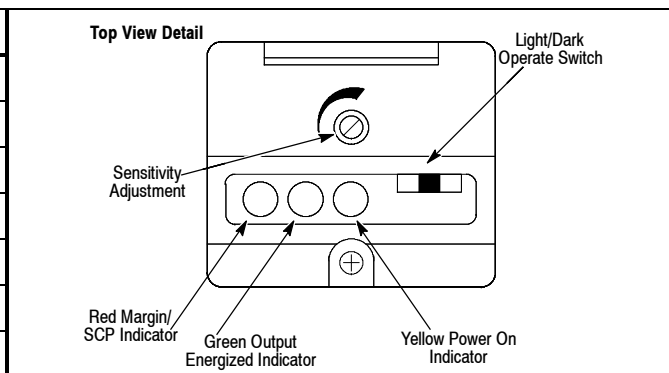
| Optical | |
|------------------------|---|
| Sensing Mode | Retroreflective, transmitted beam |
| Sensing Distance | 25.4 mm...9.15 m (1 in...30 ft) with AB #92-39 reflector, 25.4 mm...6 m (1 in...20 ft) transmitted beam |
| Transmitting LED | Visible red 660 nm, infrared (880 nm) |
| Field of View | 1.5° |
| Operating Mode | Light or dark operate selectable |
| Sensitivity Adjustment | See User Interface on page 1-199 |

| Electrical | |
|-----------------------------|--|
| Supply Current | 40 mA |
| Power Consumption | 2.2 W/1.6V A |
| Protection | False pulse, reverse polarity, overload, short circuit |
| Output Type | SPDT EM Relay |
| Output Load Current/Voltage | 1 A @ 264V AC, 2 A @ 132V AC, 1 A @ 150V DC |
| Response Time | 23 ms max. |
| Leakage Current | Not applicable |

| Mechanical | |
|------------------|-----------------------------------|
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Mounting Bracket | #12 steel impact bracket |
| Connection Type | 2 m 300V cable, 5-pin, AC mini QD |

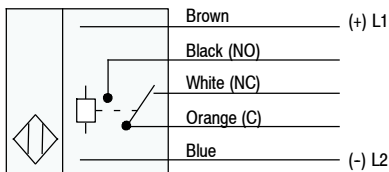
User Interface

| Label | Color | State | Status |
|------------|--------|----------|----------------------------|
| Output | Green | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |
| Margin/SCP | Red | OFF | Margin < 2.5 |
| | | ON | Margin > 2.5 |
| | | Flashing | Output SCP active |
| Power | Yellow | OFF | Sensor not powered |
| | | ON | Sensor powered |



Wiring Diagrams

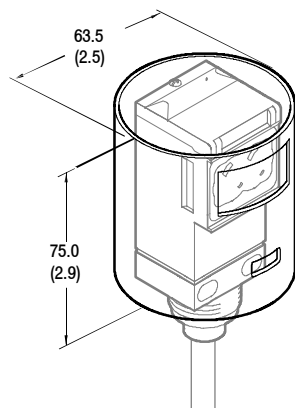
Cable Models



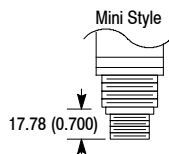
5-Pin AC/DC Mini QD Models



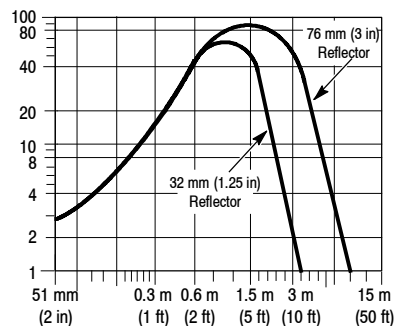
Approximate Dimensions [mm (in.)]



Mini Connector



Typical Response Curve



Series 9000

Gate Entry

Product Selection—UL 325 Rated Retroreflective Sensor Kits

| Description | Contents | Sensor Operating Voltage | Cat. No. |
|---------------------|---|--------------------------|-----------------|
| 24V UL 325 Kit | Sensor: 60-2728 Mounting Bracket: 60-2421 Reflector: 92-39 Impact Bracket: 60-2725 | 10...55V DC/20...40V AC | 60-GR1-24UL325 |
| 120/220V UL 325 Kit | Sensor: 60-2730 Mounting Bracket: 60-2421 Reflector: 92-39 Impact Bracket: 60-2725 | 70...264V AC/DC | 60-GR1-120UL325 |

Product Selection—UL 508 Rated Sensor Kits (General Purpose)

| Description | Contents of Kit | Cat. No. |
|-------------------------------------|--|-------------|
| 24V AC/DC Retroreflective Kit | 42GRU-9001, 60-2421 Bracket, 92-39 Reflector | 60-GR1-24 |
| 120/220V AC/DC Retroreflective Kit | 42GRU-9002, 60-2421 Bracket, 92-39 Reflector | 60-GR1-120 |
| 24V AC/DC Transmitted Beam Kit | 42GRL-9000, 42GRR-9001, 60-2421 Bracket (2 pcs.) | 60-GRR1-24 |
| 120/220V AC/DC Transmitted Beam Kit | 42GRL-9000, 42GRR-9002, 60-2421 Bracket (2 pcs.) | 60-GRR1-120 |

Refer to Series 9000 in the *Sensors* catalog for detailed specifications for sensor models included in above kits.

Replacement Sensors Product Selection

| Description | Details | Cat. No. |
|---------------------------------|------------------------------------|----------|
| 24V UL 325 Retroreflective | Retroreflective with 2 m Cable | 60-2728 |
| | Retroreflective with 5-pin Mini QD | 60-2729 |
| 120/220V UL 325 Retroreflective | Retroreflective with 2 m Cable | 60-2730 |
| | Retroreflective with 5-pin Mini QD | 60-2731 |

Cordsets and Accessories

| Description | Cat. No. |
|---|--------------|
| Spare impact bracket for Series 9000 photoelectric sensor | 60-2725 |
| Spare mounting bracket for Series 9000 photoelectric sensor | 60-2421 |
| Spare reflector, 76 mm (3 in.) diameter with mounting hole | 92-39 |
| Spare reflector, 32 mm (1.25 in.) diameter with mounting hole | 92-47 |
| 1.8 m (6 ft) 5-pin, mini QD cordset | 889N-F5AF-6F |



Description

The Series 9000 photoelectric sensors with diagnostic output are designed to provide both a visual and electrical indication of a “dirty lens” condition. This is useful in applications where dirt and dust build-up on the optic lens are expected. This action will reduce the return light signal to the sensor thereby reducing its capability to reliably detect passing targets.

Features

- Both visual and electrical indication of “dirty lens” condition
- Supports both static and diagnostic modes of operation
- Harsh duty 30 mm package
- Wide selection of sensing modes
- Both DC and AC/DC operation
- Fast response time
- Variety of connection types

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | UL Listed, CSA Approved, CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13; IP67 (IEC 529) 1200 psi (8270 kPa) washdown, IP69K |
| Operating Temperature [C (F)] | 0...+70° (32...+158°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Retroreflective, polarized retroreflective, diffuse, transmitted beam |
| Sensing Range | See Product Selection table on page 1-205 |
| Field of View | See Product Selection table on page 1-205 |
| Light Source | Visible red (660 nm), Infrared (880 nm) |
| LED Indicators | See User Interface on page 1-202 |
| Adjustments | Single-turn potentiometer for sensitivity |
| Electrical | |
| Voltage | 10...30V DC, 95...264V AC/DC models |
| Current Consumption | 30 mA max (DC models), 15 mA max (AC/DC models) |
| Sensor Protection | Overload, short circuit, reverse polarity, false pulse |
| Outputs | |
| Response Time | 2 ms (DC models), 15 ms (AC/DC models) |
| Output Type | PNP and NPN both sensor and diagnostic output (DC models) |
| | SPST relay (sensor) with SPDT relay for diagnostic (AC/DC models) |
| Output Mode | Light or dark operate selectable |
| Output Current | 100 mA max @ 30V DC, 2 A @ 132V (AC/DC sensor and diagnostic), 11 A @ 264V (AC/DC sensor and diagnostic) |
| Output Leakage Current | 10 µA max |
| Mechanical | |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| Cover Material | Neoprene |
| Connection Types | 4-pin DC micro QD, 4-pin DC mini QD, 5-pin DC micro QD |
| Supplied Accessories | 129-130 mounting kit |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-206 |

User Interface

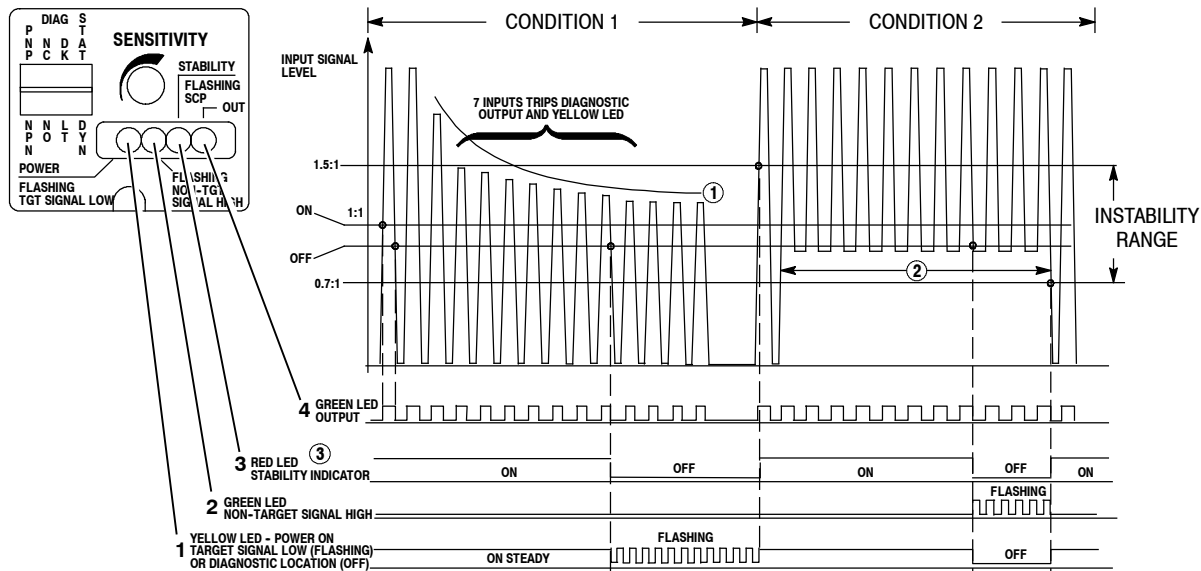
| Label | Color | State | Diagnostic Operating Mode | |
|----------------------------------|--------|------------|---|---|
| | | | Static | Dynamic |
| POWER FLASHING TGT SIGNAL LOW | Yellow | On Steady | Sensor Power On | |
| | | Flashing | Unstable operation (0.7 < Margin < 1.5) | 1.0 < Margin > 1.5 for seven successive operations Diffuse: Target margin too low Retro/Polarized Retro: Reflector margin too low Transmitted Beam unbroken beam margin too low |
| FLASHING NON-TGT SIGNAL HIGH | Green | Flashing | Unstable operation (0.7 < Margin < 1.5) | 0.7 < Margin > 1.0 for seven successive operations Diffuse: Background margin too high Retro / Polarized Retro: Target margin too high Transmitted Beam broken beam margin to high |
| STABILITY ❶ FLASHING SCP | Red | On Steady | Stable operation (Margin < 0.7 or Margin > 1.5) | |
| | | Off | Unstable operation (0.7 < Margin < 1.5) | |
| | | Flashing ❷ | Overload or short circuit at sensor output | |
| OUTPUT | Green | On | Output energized | |

❶ To prevent potentially confusing indications during rapid signal transitions, the red STABILITY indicator has a typical delay of 100 ms before it turns **off**. As a result, the indicator will not turn **off** for quick, brief events. (The Diagnostic Output has no delay.)

❷ 10...30V DC sensors only.

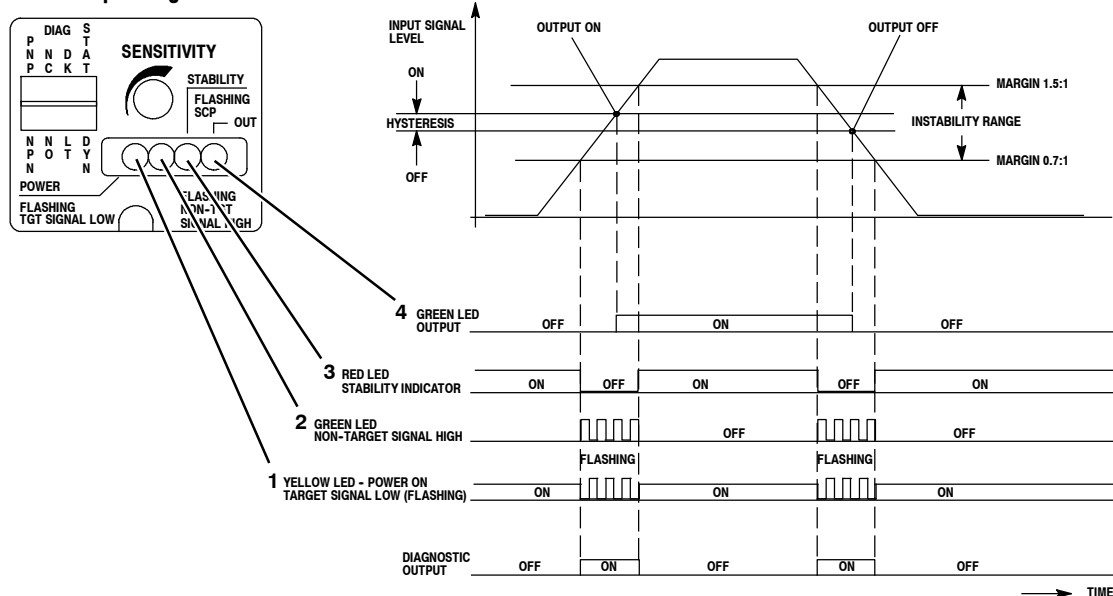
User Interface Panel—DC model shown

DYNAMIC Operating Mode



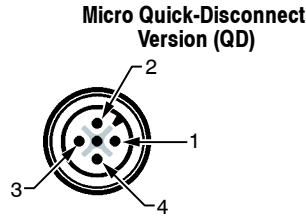
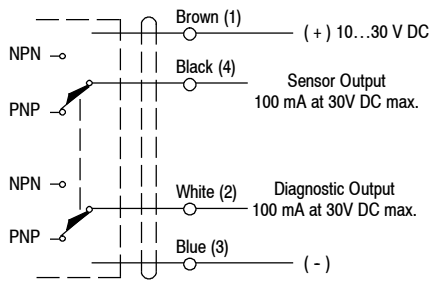
User Interface Panel—DC model shown (continued)

STATIC Operating Mode



Wiring Diagrams

DC Sensors



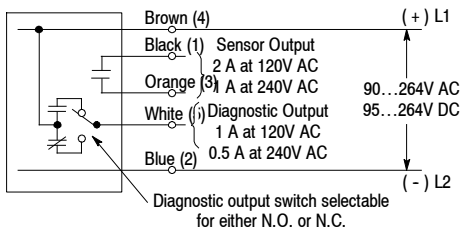
ATTENTION



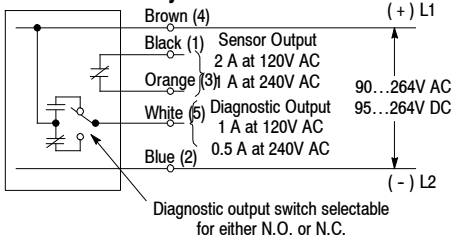
DO NOT connect both an NPN and PNP load at the same time!

AC Sensors

Normally Open



Normally Closed

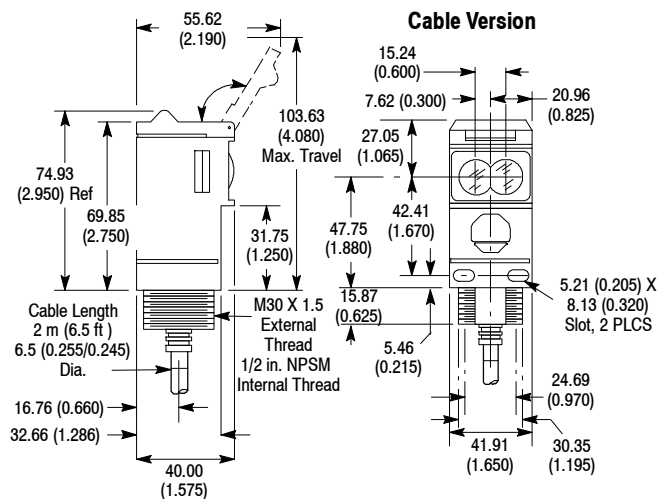


Mini Quick-Disconnect Version (QD)

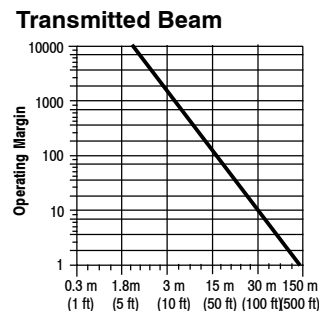
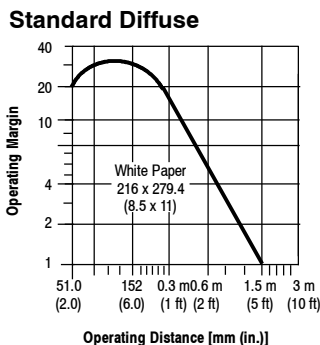
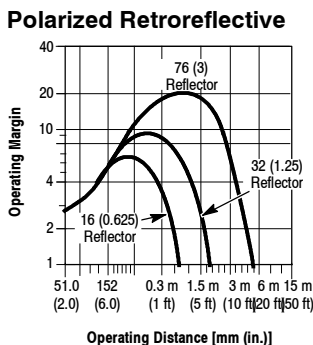
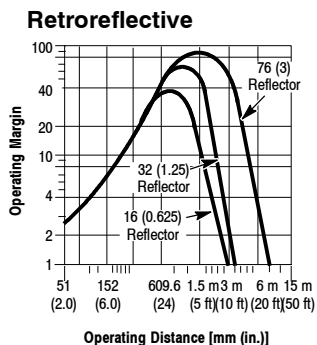


Approximate Dimensions [mm (in.)]

All Versions



Typical Response Curve

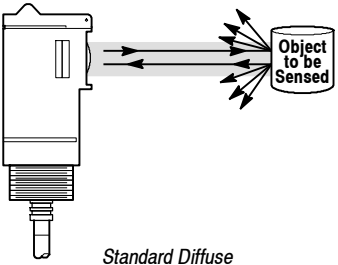


Product Selection

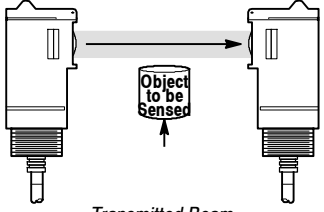
| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Response Time | Connection Type | Cat. No. |
|---|---|--|--------------------------|--|-----------------|----------------|
| <p>Retroreflective Field of View: 1.5° Emitter LED: Visible Red 660 nm</p> | 10...30V DC 30 mA 90...264V AC 95...264V DC 15 mA | 50.8 mm ...9.14 m (2 in...30 ft) with 76 mm (3 in.) Reflector | Light/Dark Selectable | NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC 2 ms | 4-pin DC micro | 42GDU-9000-QD |
| | | | | | 4-pin mini | 42GDU-9000-QD1 |
| | | | | SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms | 5-pin mini | 42GDU-9004-QD |
| | | | | SPST Relay N.C. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms | 5-pin mini | 42GDU-9005-QD |
| <p>Polarized Retroreflective Field of View: 1.5° Emitter LED: Visible Red 660 nm</p> | 10...30V DC 30 mA 90...264V AC 95...264V DC 15 mA | 50.8 mm... 4.87 m (2 in...16 ft) with 76 mm (3 ft) Reflector | Light/Dark Selectable | NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC 2 ms | 4-pin DC micro | 42GDU-9200-QD |
| | | | | | 4-pin mini | 42GDU-9200-QD1 |
| | | | | SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms | 5-pin mini | 42GDU-9204-QD |
| | | | | SPST Relay N.C. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic) 15 ms | 5-pin mini | 42GDU-9205-QD |

Refer to page 1-206 for cordsets and accessories.

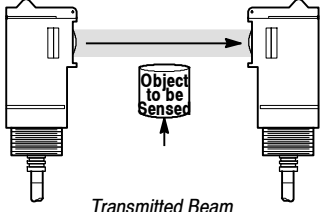
Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type/ Response Time | Connection Type | Cat. No. |
|--|---------------------------------------|---|--------------------------|--|-----------------|---------------|
|  <p>Standard Diffuse</p> <p>Field of View: 3.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA | 50.8 mm... 1.52 m (2 in...5 ft) to White Paper | Light/Dark Selectable | NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC/2 ms | 4-pin DC micro | 42GDP-9000-QD |
| | 90...264V AC 95...264V DC 15 mA | | | SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic)/15 ms | 5-pin mini | 42GDP-9004-QD |
| | | | | SPST Relay N.C. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic)/15 ms | 5-pin mini | 42GDP-9005-QD |

For Light Sources

| | | | | | | |
|---|--------------------------|--|---|---|----------------|---------------|
|  <p>Transmitted Beam</p> <p>Field of View: 1.5° Emitter LED: Infrared 880 nm</p> | 10...264V AC/DC 15 mA | 25.4 mm... 61 m (1 in...200 ft) | — | — | 4-pin DC micro | 42GRL-9000-QD |
| | | | | | 4-pin mini | 42GRL-9002-QD |
| | 10...264V AC/DC 15 mA | 25.4 mm... 152 m (1 in...500 ft) | — | — | 4-pin DC micro | 42GRL-9040-QD |
| | | | | | 4-pin mini | 42GRL-9042-QD |

For Receivers

| | | | | | | |
|---|---------------------------------------|---|--------------------------------------|--|----------------|----------------|
|  <p>Transmitted Beam</p> <p>Field of View: 1.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 30 mA | — | Receiver Light/Dark Selectable | NPN and PNP (Sensor and Diagnostic) 100 mA @ 30V DC/2 ms | 4-pin DC micro | 42GDR-9000-QD |
| | | | | | 4-pin mini | 42GDR-9000-QD1 |
| | 90...264V AC 95...264V DC 15 mA | — | Light/Dark Selectable | SPST Relay N.O. (Sensor) 15 ms SPDT Relay, N.O. and N.C. (Diagnostic)/15 ms | 5-pin mini | 42GDR-9004-QD |
| | | | | | 5-pin mini | 42GDR-9005-QD |

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|--|--------------|--|-------------|--|----------|
| 1.8 m (6 ft) 4-pin, Mini QD Cordset | 889N-F4AF-6F | 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 | 76 mm (3 in.) Diameter with Center Mount Hole | 92-39 |
| 1.8 m (6 ft) 5-pin, Mini QD Cordset | 889N-F5AF-6F | Mounting Bracket | 60-2439 | 32 mm (1.25 in.) Diameter | 92-47 |

Description

Series 9000 darkroom sensors are designed for use in areas where the emission of visible light must be sharply reduced, such as in the manufacture of photographic films and papers. These On/Off sensors have been specifically designed and constructed to reduce visible light emission to less than 0.003 millilux measured 25 mm (1 in.) from the sensor.

Series 9000 darkroom sensors use an LED light source with very little visible light emission. Visible light radiation from the sensor is further controlled through the use of special construction techniques and lens and housing materials.

Like standard Series 9000 On/Off sensors, these sensors contain Power, Output, and Margin/Short Circuit indicators. Using these indicators can speed setup and maintenance. During normal "lights out" operation, the opaque sensor cover must be closed and the cover screw tightened with a torque equal to 0.226 to 0.452 Newton-meter (2 to 4 inch-pounds) to prevent visible light emission from these indicators.

Series 9000 darkroom version sensors are available in several versions that operate from supply voltages of 10...40V DC or 70...264V AC/DC. DC models are available with NPN and PNP outputs. The AC/DC models are available with SPDT electro-mechanical relay outputs, allowing the sensor and output to be supplied with different AC and/or DC voltage levels.

General Specifications

| | |
|--------------------------------------|---|
| Light Source | Infrared LED (940 nm) |
| Unit Protection | Overload, short circuit, reverse polarity, false pulse |
| Supply Voltage | 24V DC, 120V AC, 220V AC (see Product Selection tables) |
| Current Consumption | See Product Selection tables |
| Output Type | NPN and PNP (DC models); SPDT relay (AC/DC models) |
| Output Mode | Light/Dark operate selectable |
| Output Rating | 100 mA @ 30V DC (DC models); 2 A @ 132V AC (AC/DC sensor); 1 A @ 264V AC (AC/DC sensor) |
| Response Time | 2 ms (DC models); 15 ms (AC/DC models) |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| LED Indicators | See User Interface on next page |
| Connection Types | 2 m 300V cable, 4-pin DC micro QD, 5-pin AC mini QD |
| Supplied Accessories | #129-130 mounting kit |
| Optional Accessories | Mounting brackets, reflectors, cordsets |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13 (IP67) 1200 psi washdown |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Operating Temperature [C (F)] | -34...+70° (-29...+158°) |
| Relative Humidity | 5...95% |
| Certifications | UL Listed, CSA Approved, CE Marked for all applicable directives |

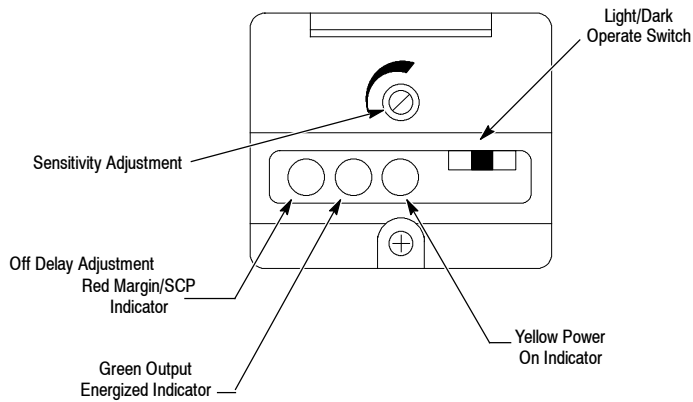
Features

- Reduced light emission for darkroom applications
- Harsh duty 30 mm package
- Wide selection of sensing modes
- Both DC and AC/DC operation
- Fast response time
- Variety of connection types

User Interface

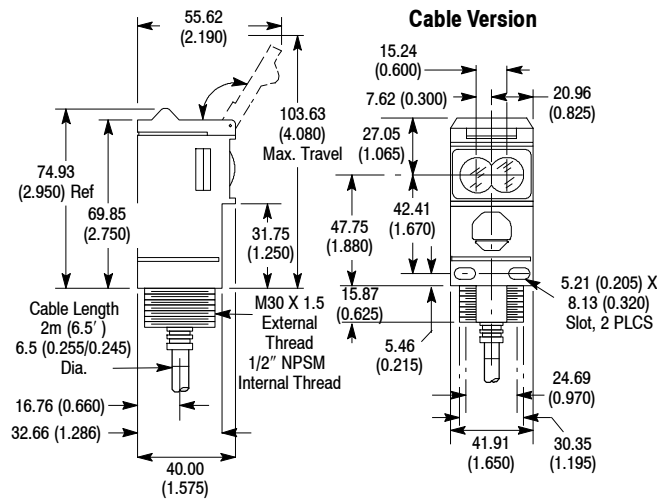
| Label | Color | State | Status |
|------------|--------|----------|----------------------------|
| Output | Green | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |
| Margin/SCP | Red | OFF | Margin < 2.5 |
| | | ON | Margin > 2.5 |
| | | Flashing | Output SCP active |
| Power | Yellow | OFF | Sensor not powered |
| | | ON | Sensor powered |

On/Off Sensors—Top View Detail

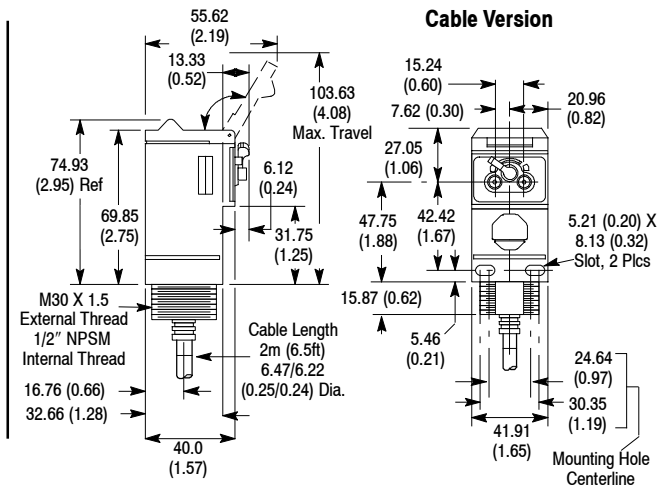


Approximate Dimensions [mm (in.)]

All Versions Except Fiber Optic



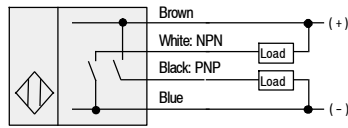
Fiber Optic



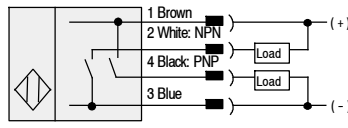
Wiring Diagrams①②

All Models Except Transmitted Beam Source

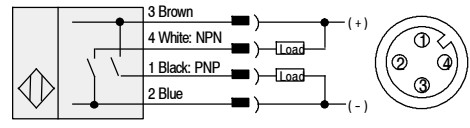
Cable Model: 9__0



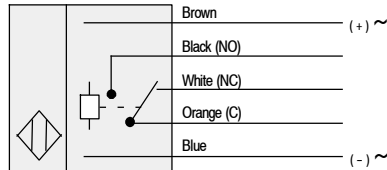
4-pin DC Micro QD Model: 9__0-QD



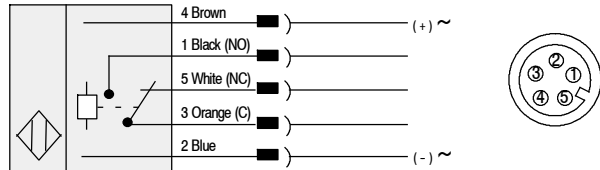
4-pin DC Mini QD Model: 9__0-QD1



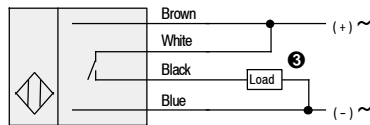
Cable Model: 9__1, 9__2



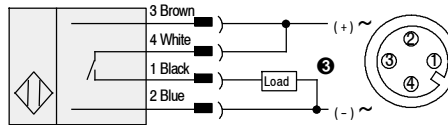
5-pin AC/DC Mini QD Model: 9__1-QD, 9__2-QD



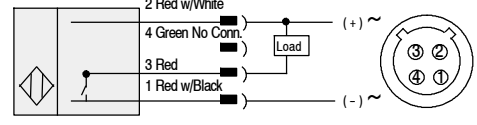
Cable Model: 9__3



AC/DC Mini QD Model: 9__3-QD



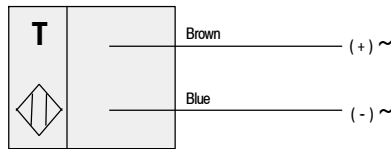
AC/DC Micro QD Model: 9__3-QD1



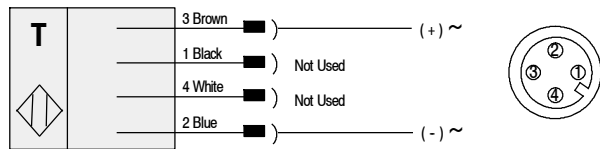
③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Transmitted Beam Source

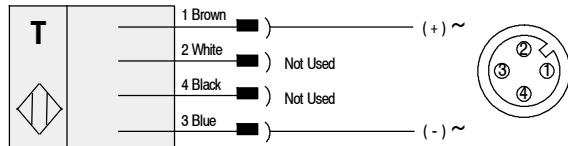
Cable Model: 42GRL-90__



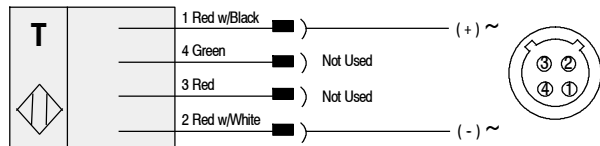
AC/DC Mini QD Model: 42GRL-90_2-QD



DC Micro QD Model: 42GRL-90_0-QD



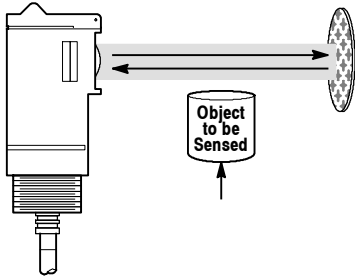
4-pin DC Micro QD Model: 42GRL-90_3-QD1



- ① For Allen-Bradley programmable controller compatible interface, refer to publication 42-2.0.
- ② Quick-disconnect wiring codes shown are valid for Allen-Bradley cables only.
- ③ Load can be placed on either black or white wire to create sourcing or sinking respectively.

Series 9000 Retroreflective

Darkroom



QD Cordsets and Accessories

| Description | Cat. No. |
|---|--------------|
| 1.8 m (6 ft) 5-pin, Mini QD Cordset | 889N-F5AF-6F |
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 |
| 76 mm (3 in.) Diameter with Center Mount Hole | 92-39 |
| 32 mm (1.25 in.) Diameter | 92-47 |

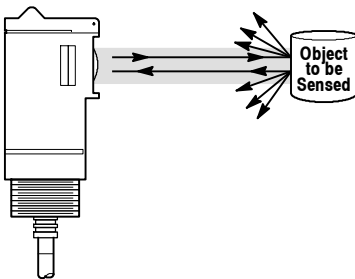
Specifications

| | |
|---------------|-----------------|
| Field of View | 1.5° |
| Emitter LED | Infrared 940 nm |

Product Selection for Sensors

| Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Max Leakage Current | Connection Type | Cat. No. |
|--------------------------------------|---|-----------------------|---|---------------------|-------------------|---------------|
| 10...40V DC 30 mA | 50.8 mm (2 in.) to 4.5 m (15 ft) with 78 mm (3 in.) Reflector | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 10 µA | 2 m 300V cable | 42KRU-9000 |
| | | | | | 4-pin DC micro QD | 42KRU-9000-QD |
| 70...264V AC/DC 50/60 Hz 15 mA | 50.8 mm (2 in.) to 4.5 m (15 ft) with 78 mm (3 in.) Reflector | Light/Dark Selectable | SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms | — | 2 m 300V cable | 42KRU-9002 |
| | | | | | 5-pin mini QD | 42KRU-9002-QD |

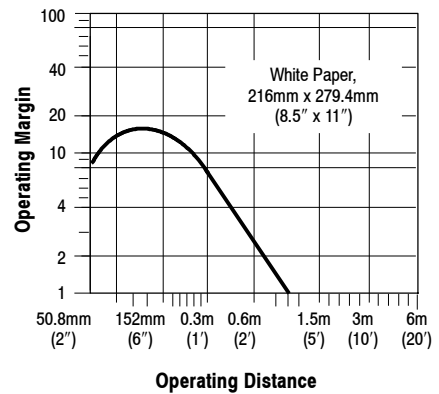
Series 9000 Standard Diffuse



QD Cordsets and Accessories

| Description | Cat. No. |
|---|--------------|
| 1.8 m (6 ft) 5-pin, Mini QD Cordset | 889N-F5AF-6F |
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 |

Typical Response Curve

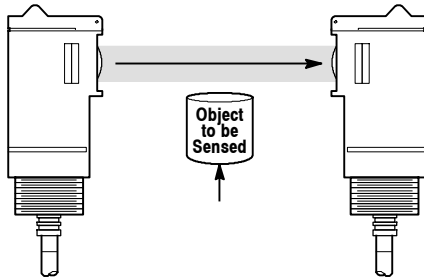


Specifications

| | |
|---------------|-----------------|
| Field of View | 3.5° |
| Emitter LED | Infrared 940 nm |

Product Selection for Sensors

| Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Max Leakage Current | Connection Type | Cat. No. |
|--------------------------------------|--|-----------------------|---|---------------------|-------------------|---------------|
| 10...40V DC 30 mA | 50.8 mm (2 in.)...0.91 m (3 ft) to White Paper | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 10 µA | 2 m 300V cable | 42KRP-9000 |
| | | | | | 4-pin DC micro QD | 42KRP-9000-QD |
| 70...264V AC/DC 50/60 Hz 15 mA | 50.8 mm (2 in.)...0.91 m (3 ft) to White Paper | Light/Dark Selectable | SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 15 ms | — | 2 m 300V cable | 42KRP-9002 |
| | | | | | 5-pin mini QD | 42KRP-9002-QD |

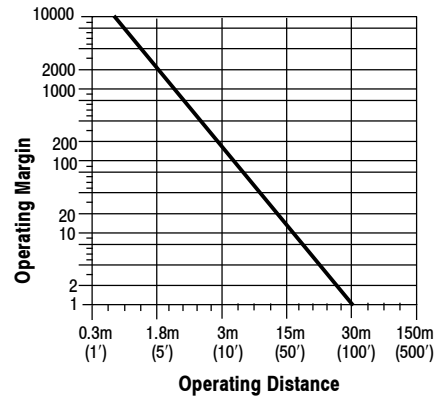


Light Sources and Receivers must be ordered separately. Any Light Source is compatible with any Receiver.

QD Cordsets and Accessories

| Description | Cat. No. |
|---|--------------|
| 1.8 m (6 ft) 4-pin, DC Mini QD Cordset | 889N-F4AF-6F |
| 1.8 m (6 ft) 5-pin, AC/DC Mini QD Cordset | 889N-F5AF-6F |
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 |

Typical Response Curve



Specifications

| | |
|---------------|-----------------|
| Field of View | 1.5° |
| Emitter LED | Infrared 940 nm |

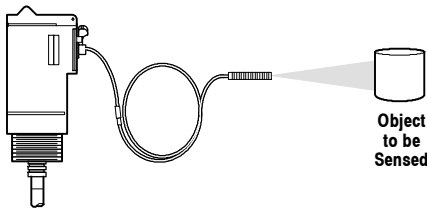
Product Selection for Light Source

| Operating Voltage Supply Current | Sensing Distance | Connection Type | Cat. No. |
|--------------------------------------|-------------------------------------|-------------------|---------------|
| 10...264V AC/DC 50/60 Hz 15 mA | 25.4 mm (1 in.)... 30 m (100 ft) | 2 m 300V cable | 42KRL-9000 |
| | | 4-pin DC micro QD | 42KRL-9000-QD |
| | | 4-pin mini QD | 42KRL-9002-QD |

Product Selection for Receivers

| Operating Voltage Supply Current | Output Energized | Output Type Capacity Response Time | Max Leakage Current | Connection Type | Cat. No. |
|--------------------------------------|---------------------------------------|---|---------------------|-------------------|---------------|
| 10...40V DC 25 mA | Receiver: Light/Dark Selectable | NPN/PNP 250 mA 5 ms | 10 μ A | 2 m 300V cable | 42KRR-9000 |
| | | | | 4-pin DC micro QD | 42KRR-9000-QD |
| 70...264V AC/DC 50/60 Hz 10 mA | Receiver: Light/Dark Selectable | SPDT EM Relay 2 A/132V AC 1 A/264V AC 1 A/150V DC 23 ms | — | 2 m 300V cable | 42KRR-9002 |
| | | | | 5-pin mini QD | 42KRR-9002-QD |

QD Cordsets and Accessories



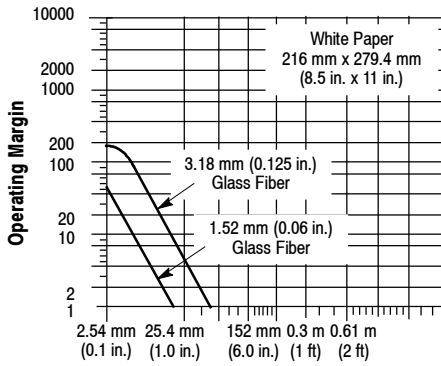
| Description | Cat. No. |
|---|--------------|
| 1.8 m (6 ft) 5-pin, Mini QD Cordset | 889N-F5AF-6F |
| 2 m (6.5 ft) 4-pin, DC Micro QD Cordset | 889D-F4AC-2 |
| Bifurcated Glass Fiber Optic Cable | 99-32-1 |
| Individual Glass Fiber Optic Cable | 99-52-1 |

Specifications

| | |
|-------------|-----------------|
| Emitter LED | Infrared 940 nm |
|-------------|-----------------|

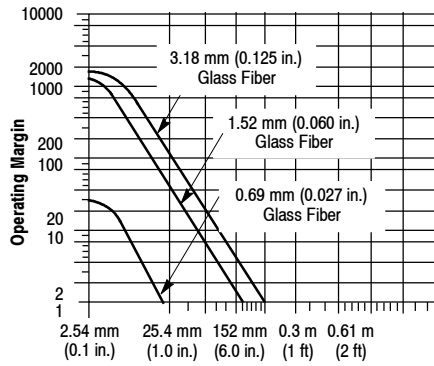
Typical Response Curve

Standard Diffuse



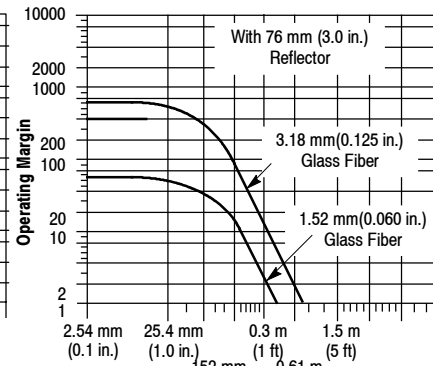
Operating Distance

Transmitted Beam



Operating Distance

Retroreflective



Operating Distance

Product Selection for Sensors

| Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Max Leakage Current | Connection Type | Cat. No. |
|--------------------------------------|------------------------------------|--------------------------|--|---------------------------|-------------------|---------------|
| 10...40V DC 30 mA | Depends on Fiber Optic cable | Light/Dark Selectable | NPN/PNP 250 mA 2 ms | 10 μ A | 2 m 300V cable | 42KRF-9000 |
| | | | | | 4-pin DC micro QD | 42KRF-9000-QD |
| 70...264V AC/DC 50/60 Hz 15 mA | | | 2 m 300V cable | 42KRF-9002 | | |
| | | | | 5-pin mini QD | 42KRF-9002-QD | |



Features

- Compact cylindrical package
- Wide selection of sensing modes
- Universal supply voltage models
- Both NPN or PNP outputs (DC)
- Fast response time
- Variety of connection types

Specifications

| Environmental | |
|-------------------------------|--|
| Certifications | UL Listed, CSA Approved, and CE Marked for all applicable directives |
| Operating Environment | NEMA 3, 4X, 6, 12, 13; IP67 |
| Operating Temperature [C (F)] | -40...+56° (-40...+150°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...95% |
| Ambient Light Immunity | Incandescent light 5000 lux |
| Optical | |
| Sensing Modes | Retroreflective, polarized retro, diffuse, fixed focus, sharp cutoff, wide angle, transmitted beam |
| Sensing Range | See Product Selection table on page 1-210 |
| Field of View | See Product Selection table on page 1-210 |
| Light Source | Visible red LED (660 nm), infrared LED (880 nm) |
| LED Indicators | Red LED for output indication |
| Adjustments | 4-turn sensitivity potentiometer |
| Electrical | |
| Voltage | 10...30V DC, 20...264V AC/DC |
| Current Consumption | 35 mA max |
| Sensor Protection | Reverse polarity, false pulse |
| Outputs | |
| Response Time | See Product Selection table on page 1-210 |
| Output Type | PNP and NPN (DC models); MOSFET (AC/DC models) |
| Output Mode | Light or dark operate by cat. no. |
| Output Current | See Product Selection table on page 1-210 |
| Output Leakage Current | 1 µA max |
| Mechanical | |
| Housing Material | Noryl |
| Lens Material | Acrylic |
| Cover Material | Neoprene |
| Connection Types | 3 m (9.8 ft) cable, 4-pin DC micro (M12) QD, 4-pin AC micro (M12) QD |
| Supplied Accessories | Mounting kit # 129-106-1 and 129-106-2 |
| Optional Accessories | See mounting brackets on page 1-212 |

User Interface Panel

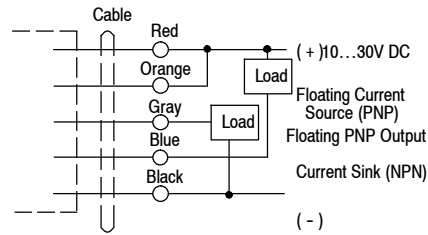
| Label | Color | State | Status |
|--------|-------|-------|----------------------------|
| Output | Red | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |

Wiring Diagrams

DC All Models Except Transmitted Beam Source and High Speed Diffuse

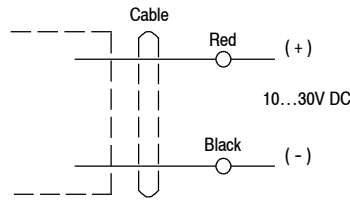
Cable Version

Models: 42SR_-6__2 and 6__3



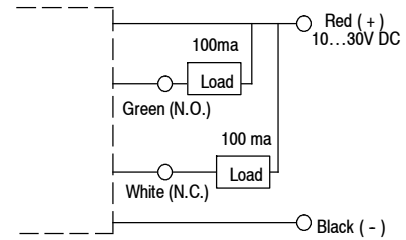
Transmitted Beam Source (42SRL-6000)

Cable Version



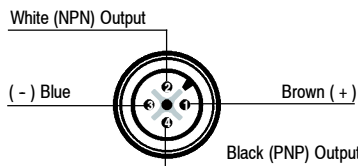
High Speed Diffuse (42SRP-6302)

Cable Version—NPN Outputs

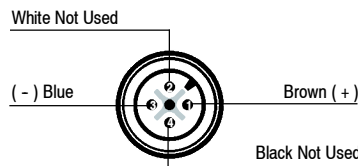


Quick-Disconnect Versions

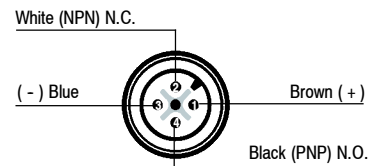
Models: 42SR_-6__2-QD and 6__3-QD



Quick-Disconnect Version



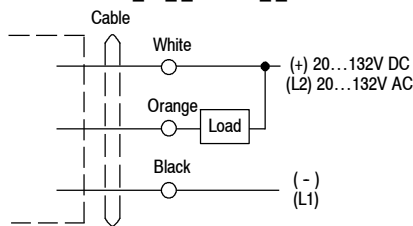
Quick-Disconnect Version



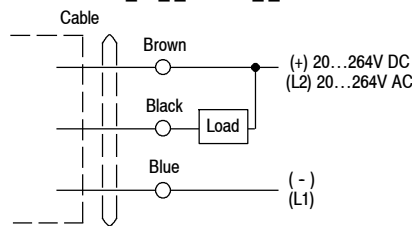
AC/DC All Models Except Transmitted Beam Source

Cable Versions

Models: 42SR_-6__4 and 6__5

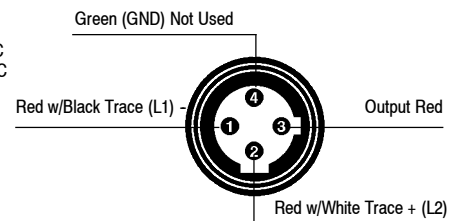


Models: 42SR_-6__6 and 6__7



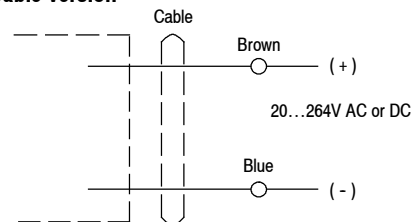
Quick-Disconnect Versions

Models: 42SR_-6__4-QD thru 6__7-QD

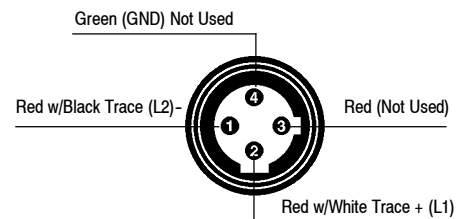


Transmitted Beam Source (42SRL-6006)

Cable Version



Quick-Disconnect Version



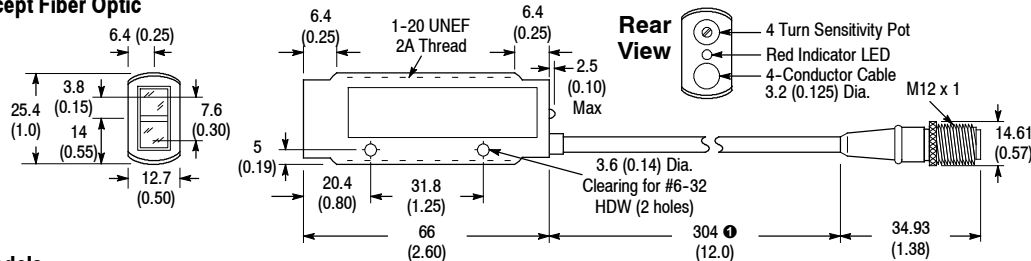
Note: Details regarding connection of Allen-Bradley Series 6000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

All wire colors shown refer to Allen-Bradley quick-disconnect cables.

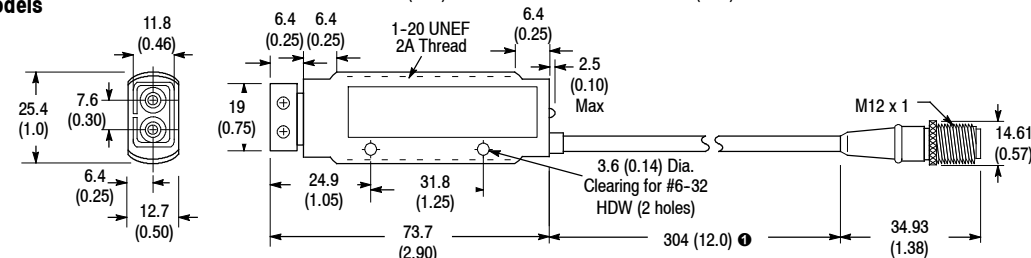
Approximate Dimensions [mm (in.)]

DC Models

All Models Except Fiber Optic

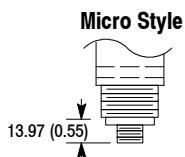


Fiber Optic Models



① Quick-disconnect cable length shown. Cable versions length is 3 m (10 ft).

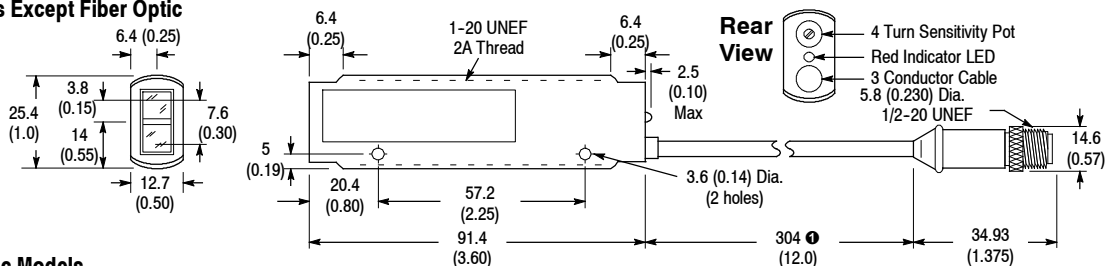
Connector Version



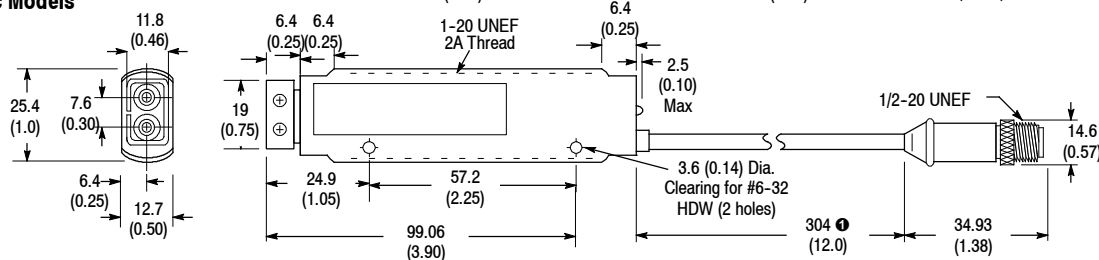
Thread Size

| | AC | DC |
|-------|-------------------------|---------------------|
| Micro | 1/2-20 UNF 2 Keyways | M12 x 1 1 Keyway |

All Models Except Fiber Optic



Fiber Optic Models

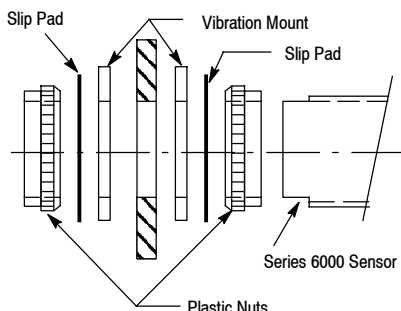


① Quick-disconnect cable length shown. Cable versions length is 3 m (10 ft).

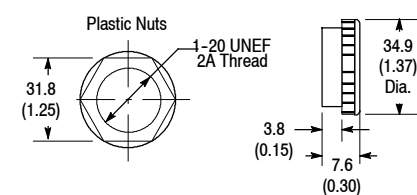
Supplied Accessories

Mounting Kit #129-106-1 contains two plastic nuts, anti-vibration mount, and slip pads.

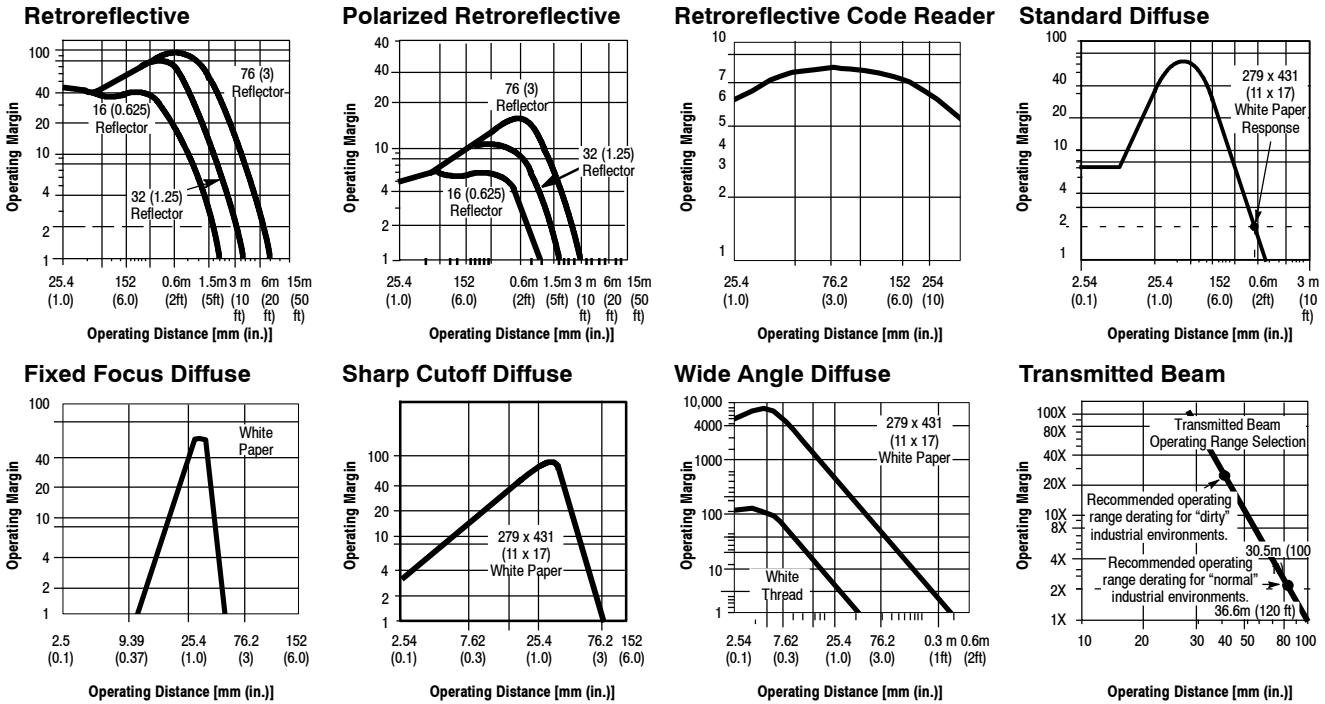
Mounting Kit #129-106-2 contains two plastic nuts, anti-vibration mount, slip pads, and fiber optic mounting hardware.



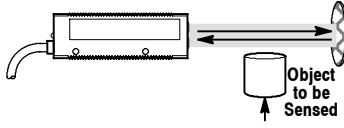
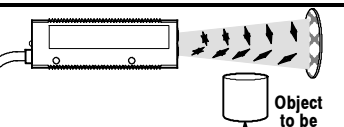
Plastic Nuts



Typical Response Curve

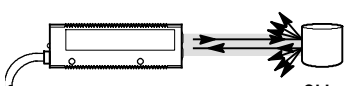
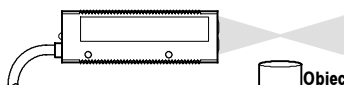
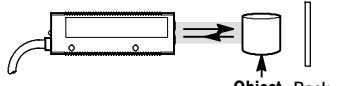
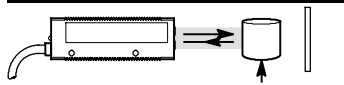
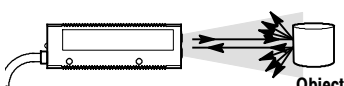


Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance @ 1X Margin | Output Energized | Output Type Response Time | Connection Type | Cat. No. |
|---|---|---|------------------|---|-----------------|---------------|
|  <p><i>Retroreflective</i></p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p> | 10...30V DC 35 mA | 25.4 mm... 9 m (1 in...30 ft) with 76 mm (3 in.) Reflector | Light | NPN and PNP 200 mA 1 ms | 3 m cable | 42SRU-6002 |
| | | | Dark | | 4-pin DC micro | 42SRU-6002-QD |
| | 20...132V AC/DC 50...60 Hz 1.2V A | | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRU-6003 |
| | | | Dark | | 4-pin DC micro | 42SRU-6003-QD |
| | | | Light | | 3 m cable | 42SRU-6004 |
| | | | Dark | | 4-pin AC micro | 42SRU-6004-QD |
|  <p><i>Polarized Retroreflective</i></p> <p>Field of View: 3° Minimum Sensing Distance: 50.8 mm (2 in.) Emitter LED: Visible Red 660 nm Indicator LED: Red: Output</p> | 10...30V DC 35 mA | 50.8 mm... 3 m (2 in...10 ft) with 76 mm (3 in.) Reflector | Light | NPN and PNP 200 mA 1 ms | 3 m cable | 42SRU-6202 |
| | | | Dark | | 4-pin DC micro | 42SRU-6202-QD |
| | 20...132V AC/DC 50...60 Hz 1.2V A | | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRU-6203 |
| | | | Dark | | 4-pin DC micro | 42SRU-6203-QD |
| | | | Light | | 3 m cable | 42SRU-6204 |
| | | | Dark | | 4-pin AC micro | 42SRU-6204-QD |
| Light | 3 m cable | 42SRU-6205 | | | | |
| Dark | 4-pin AC micro | 42SRU-6205-QD | | | | |

Refer to page 1-212 for cordsets and accessories.

Product Selection

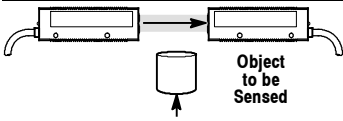
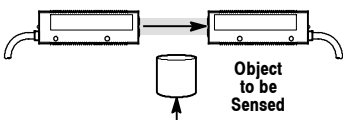
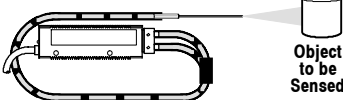
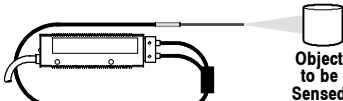
| Sensing Mode | Operating Voltage Supply Current | Sensing Distance @ 1X Margin | Output Energized | Output Type Response Time | Connection Type | Cat. No. |
|--|---|--|---------------------|--|--------------------|----------------------|
|  <p><i>Standard Diffuse</i> Field of View: 7.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 35 mA | 2.54...760 mm (0.1...30 in.) to White Paper | Light | NPN and PNP 200 mA 1 ms | 3 m cable | 42SRP-6002 |
| | | | Dark | | 4-pin DC micro | 42SRP-6002-QD |
| | | | Light | | 3 m cable | 42SRP-6003 |
| | | | Dark | | 4-pin DC micro | 42SRP-6003-QD |
| | 20...132V AC/DC 50...60 Hz 1.2V A | 2.54...760 mm (0.1...30 in.) to White Paper | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRP-6004 |
| | | | Dark | | 4-pin AC micro | 42SRP-6004-QD |
| | | | Light | | 3 m cable | 42SRP-6005 |
| | | | Dark | | 4-pin AC micro | 42SRP-6005-QD |
|  <p><i>Fixed Focus Diffuse</i> Field of View: 1.52 mm (0.06 in.) square Emitter LED: Visible Red 660 nm</p> | 10...30V DC 35 mA | 27.9...28 mm (1.098...1.10 in.) to White Paper | Light | NPN and PNP 200 mA 1 ms | 3 m cable | 42SRP-6022 |
| | | | Dark | | 4-pin DC micro | 42SRP-6022-QD |
| | | | Light | | 3 m cable | 42SRP-6023 |
| | | | Dark | | 4-pin DC micro | 42SRP-6023-QD |
| | 20...132V AC/DC 50...60 Hz 1.2V A | 27.9...28 mm (1.098...1.10 in.) to White Paper | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRP-6024 |
| | | | Dark | | 4-pin AC micro | 42SRP-6024-QD |
| | | | Light | | 3 m cable | 42SRP-6025 |
| | | | Dark | | 4-pin AC micro | 42SRP-6025-QD |
|  <p><i>Sharp Cutoff Diffuse</i> Field of View: 7.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 35 mA | 5...76 mm (0.2...3 in.) to White Paper | Light | NPN and PNP 200 mA 1 ms | 3 m cable | 42SRP-6032 |
| | | | Dark | | 4-pin DC micro | 42SRP-6032-QD |
| | | | Light | | 3 m cable | 42SRP-6033 |
| | | | Dark | | 4-pin DC micro | 42SRP-6033-QD |
| | 20...132V AC/DC 50...60 Hz 1.2V A | 5...76 mm (0.2...3 in.) to White Paper | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRP-6034 |
| | | | Dark | | 4-pin AC micro | 42SRP-6034-QD |
| | | | Light | | 3 m cable | 42SRP-6035 |
| | | | Dark | | 4-pin AC micro | 42SRP-6035-QD |
|  <p><i>Sharp Cutoff Diffuse</i> Field of View: 7.5° Emitter LED: Infrared 880 nm</p> | 20...264V AC/DC 50...60 Hz 1.2V A | 5...76 mm (0.2...3 in.) to White Paper | Dark | Power MOSFET 150 mA AC/DC 18 ms AC, 10 ms DC | 4-pin AC micro | 42SRP-6037-QD |
| | | | | | | |
|  <p><i>Wide Angle Diffuse</i> Field of View: 62° Emitter LED: Infrared 660 nm</p> | 10...30V DC 35 mA | 2.54...380 mm (0.1...15 in.) to White Paper | Light | NPN and PNP 200 mA 1 ms | 3 m cable | 42SRP-6012 |
| | | | Dark | | 4-pin DC micro | 42SRP-6012-QD |
| | | | Light | | 3 m cable | 42SRP-6013 |
| | | | Dark | | 4-pin DC micro | 42SRP-6013-QD |
| | 20...132V AC/DC 50...60 Hz 1.2V A | 2.54...380 mm (0.1...15 in.) to White Paper | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRP-6014 |
| | | | Dark | | 4-pin AC micro | 42SRP-6014-QD |
| | | | Light | | 3 m cable | 42SRP-6015 |
| | | | Dark | | 4-pin AC micro | 42SRP-6015-QD |

Refer to page 1-212 for cordsets and accessories.

Series 6000

Compact

Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance @ 1X Margin | Output Energized | Output Type Response Time | Connection Type | Cat. No. |
|---|---|---|---------------------|--|--------------------|----------------------|
| For Light Source | | | | | | |
|  <p>Transmitted Beam</p> <p>Object to be Sensed</p> <p>Field of View: 7.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 15 mA | 2.54 mm...36.6 m (0.1 in...120 ft) | — | — | 3 m cable | 42SRL-6000 |
| | 10...30V DC 15 mA | 2.54 mm...36.6 m (0.1 in...120 ft) | — | — | 4-pin DC micro | 42SRL-6000-QD |
| | 20...264V AC/DC 50...60 Hz 1V A | | — | | 3 m cable | 42SRL-6006 |
| — | — | — | — | 4-pin AC micro | 42SRL-6006-QD | |
| For Receiver | | | | | | |
|  <p>Transmitted Beam</p> <p>Object to be Sensed</p> <p>Field of View: 7.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 15 mA | — | Light | NPN and PNP 200 mA 5 ms | 3 m cable | 42SRR-6002 |
| | | | Dark | | 4-pin DC micro | 42SRR-6002-QD |
| | 20...264V AC/DC 50...60 Hz 1V A | — | Light | Power MOSFET 300 mA AC/DC 18 ms AC, 10 ms DC | 3 m cable | 42SRR-6003 |
| | | | Dark | | 4-pin DC micro | 42SRR-6003-QD |
| 3 m cable | 4-pin AC micro | 42SRR-6006 | 4-pin AC micro | 42SRR-6006-QD | | |
| | | | | 3 m cable | 42SRR-6007 | |
| 4-pin AC micro | 42SRR-6007-QD | | | | | |
|  <p>Large Aperture Fiber Optic</p> <p>Object to be Sensed</p> <p>Field of View: Depends on Glass Fiber Optics selected. See Glass Fiber Optic section, page 1-234. Emitter LED: Infrared 880 nm</p> | 10...30V DC 35 mA | Depends on Fiber Optic cable selected | Light | NPN and PNP 200 mA 1 ms | 4-pin DC micro | 42SRF-6002-QD |
| | | | Dark | | 3 m cable | 42SRF-6003 |
| | 20...132V AC/DC 50...60 Hz 1.2V A | | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRF-6004 |
| | | | | | 4-pin AC micro | 42SRF-6004-QD |
| | 3 m cable | | 4-pin AC micro | 42SRF-6005 | | |
| | | | | 4-pin AC micro | 42SRF-6005-QD | |
|  <p>Small Aperture Fiber Optic</p> <p>Object to be Sensed</p> <p>Field of View: Depends on Plastic or Glass Fiber Optics selected. See Plastic Fiber optic section, page 1-270 and Glass Fiber Optic section, page 1-234. Emitter LED: Visible 660 nm</p> | 10...30V DC 35 mA | Depends on Glass or Plastic Fiber Optics selected | Light | NPN and PNP 200 mA 1 ms | 3 m cable | 42SRF-6102 |
| | | | Dark | | 4-pin DC micro | 42SRF-6102-QD |
| | 20...132V AC/DC 50...60 Hz 1.2V A | | Light | Power MOSFET 300 mA AC/DC 12 ms AC, 5 ms DC | 3 m cable | 42SRF-6103 |
| | | | | | 4-pin DC micro | 42SRF-6103-QD |
| | 3 m cable | | 4-pin AC micro | 42SRF-6104 | | |
| | | | | 4-pin AC micro | 42SRF-6104-QD | |
| 3 m cable | 42SRF-6105 | | | | | |
| 4-pin AC micro | 42SRF-6105-QD | | | | | |

See below for cordsets and accessories.

Cordsets and Accessories

| Description | Cat. No. | Description | Cat. No. | Description | Cat. No. |
|--|--------------|-----------------------|----------|-------------------------------------|----------|
| 2 m (6.5 ft) 4-pin DC Micro QD Cordset | 889D-F4AC-2 | Mounting Brackets | 60-2618 | 76 mm (3 in.) Diameter Reflector | 92-39 |
| 2 m (6.5 ft) 4-pin AC Micro QD Cordset | 889R-F4AEA-2 | Right Angle Reflector | 60-2052 | 32 mm (1.25 in.) Diameter Reflector | 92-47 |



Features

- Wide selection for increased application flexibility
- Quick-disconnect design reduces down time
 - No disruption of alignment or wiring
- Three power base styles:
 - Terminal base can eliminate need for separate junction box
 - 3 m (10 ft) cable base for lower profile (red and blue line only)
 - Pre-wired mini-style quick-disconnect (green line only)
- False turn-on pulse protection
- Switch selectable light or dark operating mode
- Adjustable sensitivity
- Choice of relay or solid-state outputs
- Highly visible LED output indicator

Specifications

| | Red Line | Blue Line | Green Line | Analog Output |
|-------------------------------|---|----------------------------------|---|-----------------------------|
| Environmental | | | | |
| Certifications | UL Listed, CSA Approved, and CE Marked for all applicable directives | | | |
| Operating Environment | NEMA 3, 4, 12, 13; IP66 | | | |
| Operating Temperature [C (F)] | -40...+52° (-40...+125°) for TRIAC output -40...+65° (-40...+150°) for all others | -40...+65° (-40...+150°) | -40...+65° (-40...+150°) for EM relay -40...+52° (-40...+125°) for solid state | -40...+65° (-40...+150°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 | | | |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 | | | |
| Relative Humidity | 90% max | | | |
| Ambient Light Immunity | Incandescent light: 5000 lux | | | |
| Optical | | | | |
| Sensing Modes | Retroreflective, diffuse, long range diffuse, fiber optic, background suppression, transmitted beam (see Product Selection table on page 1-220) | | | |
| Sensing Range | See Product Selection table on page 1-220 | | | |
| Field of View | See Product Selection table on page 1-220 | | | |
| Light Source | Visible red LED (660 nm), infrared LED (880 nm) | | | |
| Electrical | | | | |
| Voltage | 12...30V DC, 120V AC (see Product Selection table on page 1-220) | | | |
| Current Consumption | Depends on power base (see Product Selection table on page 1-220) | | | |
| Sensor Protection | False pulse | Reverse polarity and false pulse | False pulse | False pulse, short circuit |
| Outputs | | | | |
| Response Time | 1...8 ms | 1 ms | Determined by plug-in module | 100 ms |
| Output Type | PNP and NPN, FET,SPDT relay,TRIAC, analog output (see Product Selection table on page 1-220) | | | |
| Output Mode | Light or dark operate selectable, selectable positive or negative slope for analog models (see Product Selection table on page 1-220) | | | |
| Output Current | 30 mA...2A max | 100 mA | Determined by plug-in module | See Product Selection table |
| Output Leakage Current | 1mA max | 1 µA | — | 10 µA |
| Mechanical | | | | |
| Housing Material | Valox® | | | |
| Lens Material | Acrylic (glass on polarized models) | | | |
| Connection Types | See Product Selection table on page 1-220 | | | |
| Supplied Accessories | None | | | |
| Optional Accessories | See mounting brackets, reflectors, and cordsets on page 1-226 | | | |

User Interface Panel

| Label | Color | State | Status |
|--------|-------|-------|----------------------------|
| Output | Red | OFF | Sensor output de-activated |
| | | ON | Sensor output activated |

Series 5000

Modular

Plug-In Output Module (required for green line only)

| Output Type Capacity | Max Leakage Current | Output Response Time① | Cat. No. |
|--|---------------------|-----------------------|----------|
| SPDT EM-Relay 2 A, 120V AC/1 A, 240V AC | — | 10 ms On 15 ms Off | 8-590 |
| | | | 8-594② |
| SP-N.O. FET SS Relay 30 mA Cont./0...120V AC/DC | 10 mA | 1 ms | 8-591 |
| SP-N.O. AC Power TRIAC SS Relay 0.75 A Cont. 10 A Inrush/24...240V AC | 1 mA | 8 ms | 8-592 |
| NPN and PNP 100 mA 30V DC | 1 µA | 1 ms | 8-593② |

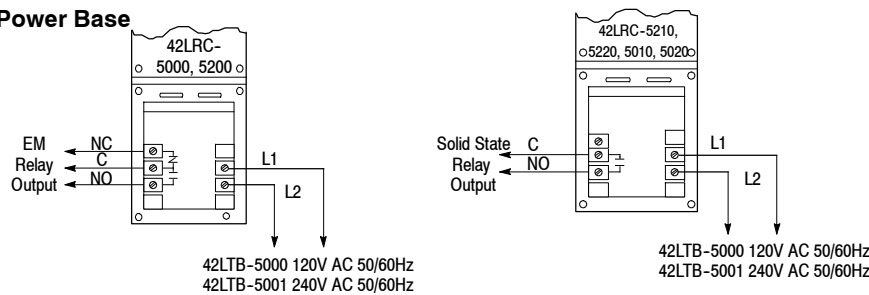
Plug-In Control Function Module (optional for green line only)

| Function | Adjustable Time Delay (s) | | Adjustable Dwell (s) | Cat. No. |
|---------------------|---------------------------|------------|----------------------|----------|
| | On | Off | | |
| On and/or Off Delay | 0.05...1.0 | 0.05...1.5 | — | 60-1790 |
| | 0.5...10 | 0.5...15 | | 60-1791 |
| | 2...4.0 | 2...6.0 | | 60-1798 |
| One-Shot | — | — | 0.005...0.5 | 60-1792 |
| | — | — | 0.5...15 | 60-1793 |
| Motion Detector | — | 0.05...1.5 | — | 60-1796 |
| | — | 0.5...15 | — | 60-1797 |

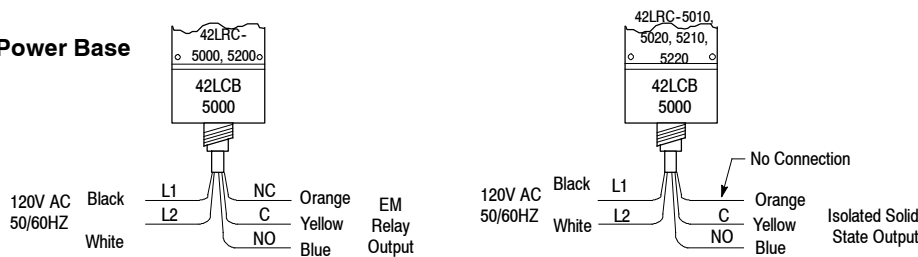
- ① Add sensor and output response time for total response time.
- ② Use with 42MTB-5004 base ONLY. Other output modules will not function with 5004 base.

Red Line Wiring Diagrams

With Terminal Style Power Base



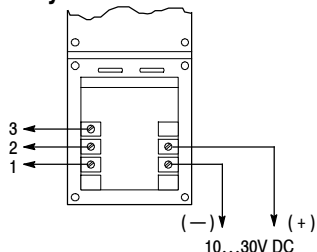
With Cable Style Power Base



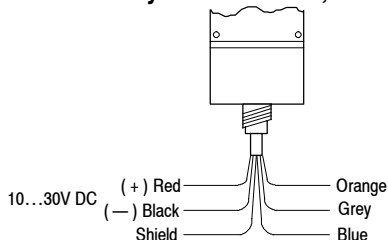
Note: Details of connection of Allen-Bradley Series 5000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0. Refer to www.ab.com/literature for more information.

Blue Line Wiring Diagrams

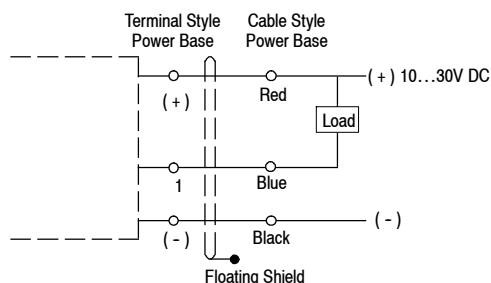
Terminal Style Power Base, DTB-5000



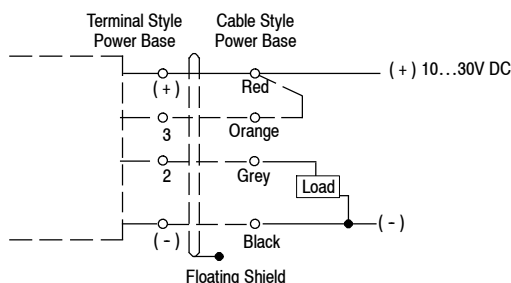
Cable Style Power Base, DCB-5000



NPN Output Connection (Sinking)

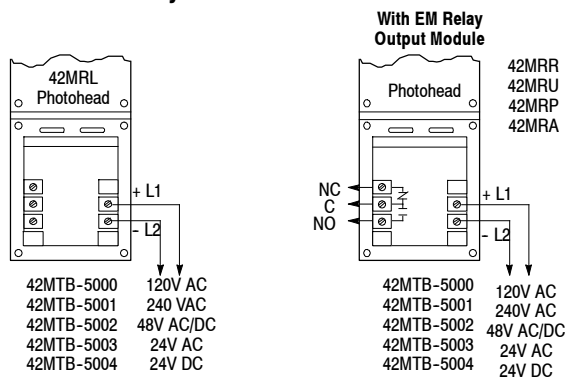


PNP Output Connection (Sourcing)

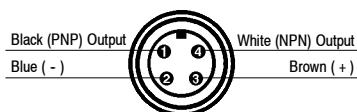


Green Line Wiring Diagrams

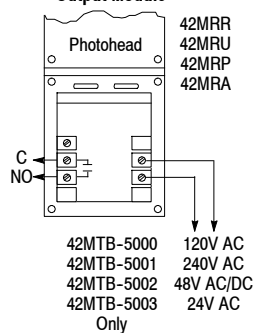
With Terminal Style Power Base



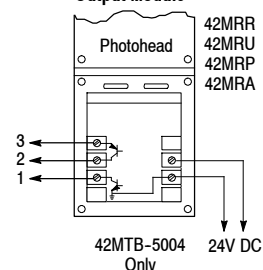
With Mini Quick-Disconnect Style Power Base
42MTB-5004QD4-1



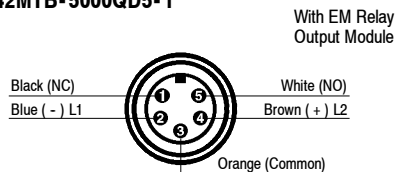
With Solid State Output Module



With NPN and PNP Output Module



42MTB-5000QD5-1

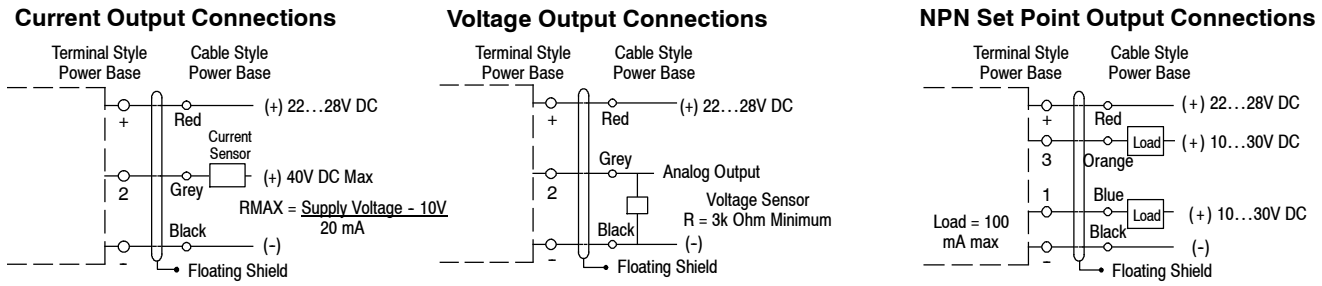


Note: Details of connection of Allen-Bradley Series 5000 photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0. Wire colors shown refer to Allen-Bradley quick-disconnect cables.

Series 5000

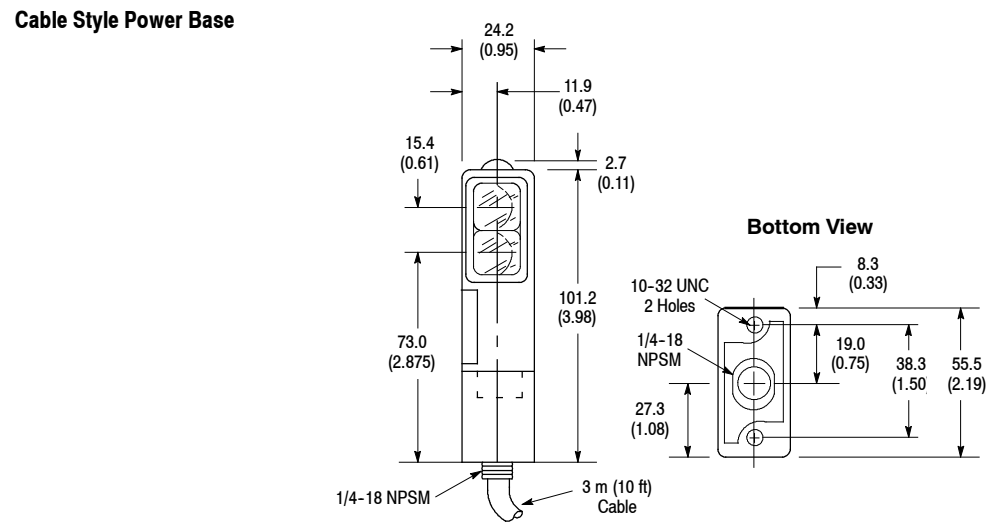
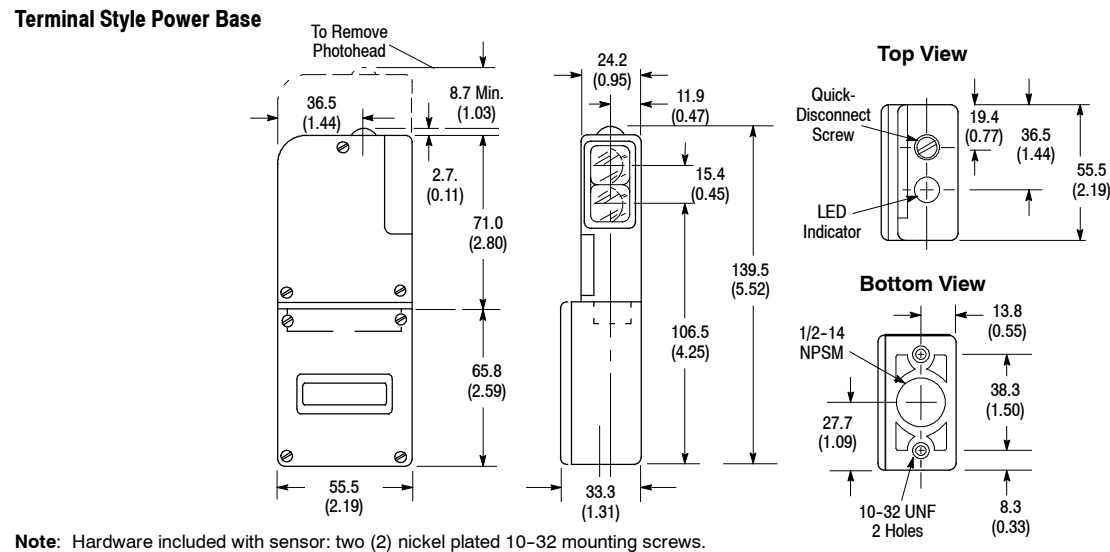
Modular

Analog Output Wiring Diagrams



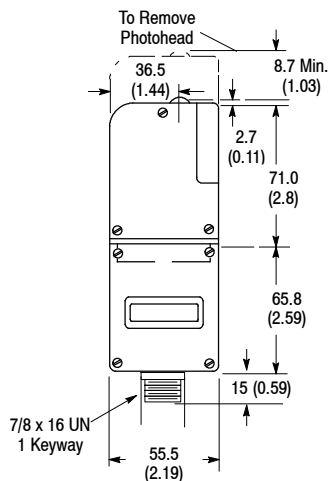
Note: Details of connection of Allen-Bradley Series 5000 Photoelectric sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

Approximate Dimensions (Applies to all versions) [mm (in.)]



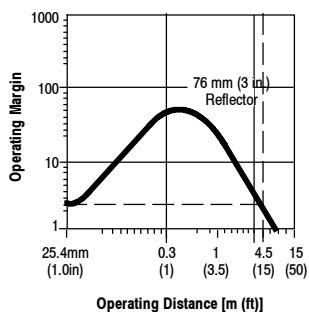
Approximate Dimensions (Applies to all versions) [mm (in.)] (continued)

Quick-Disconnect Style Power Base

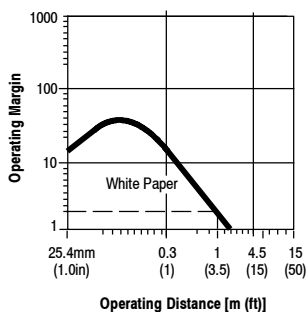


Red Line Typical Response Curve

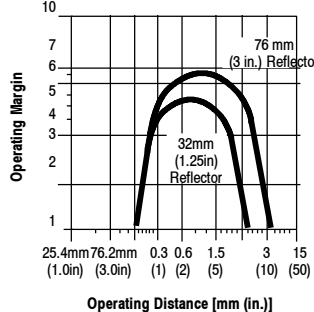
Retroreflective



Standard Diffuse

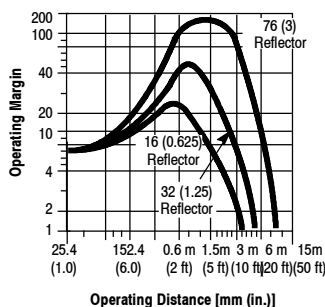


Polarized Retroreflective

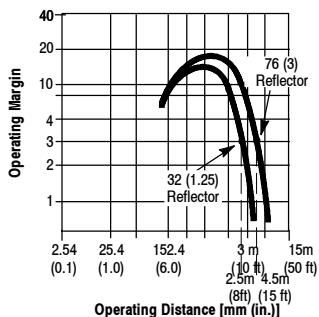


Blue Line Typical Response Curve

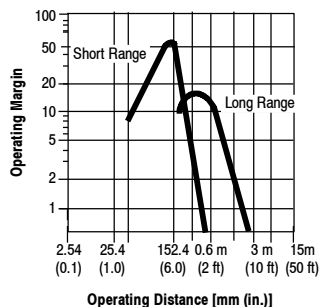
Retroreflective



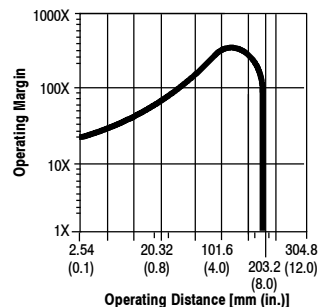
Polarized Retroreflective



Standard Diffuse

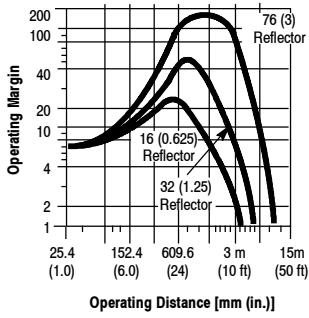


Background Suppression①

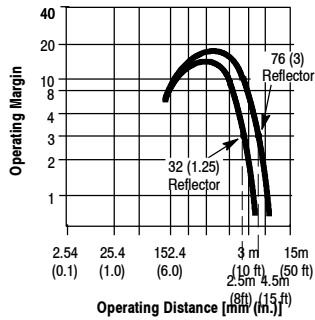


Green Line Typical Response Curve

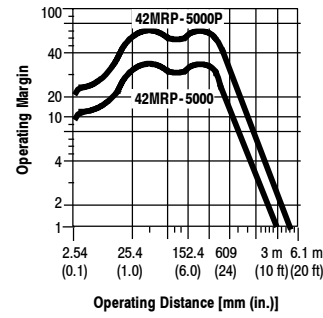
Retroreflective



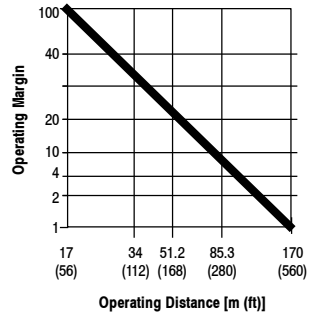
Polarized Retroreflective



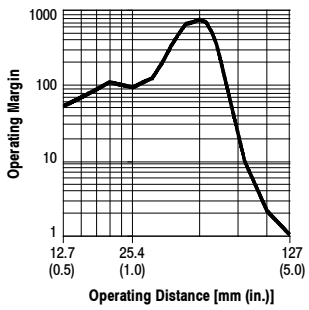
Standard Diffuse



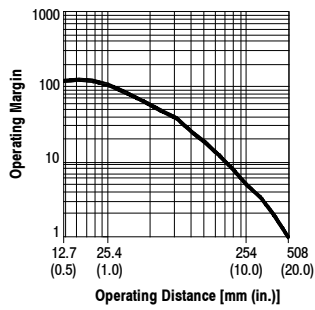
Transmitted Beam



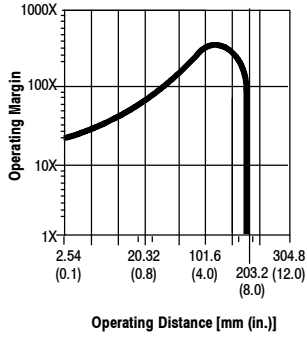
Fixed Focus Lens



Wide Angle Lens



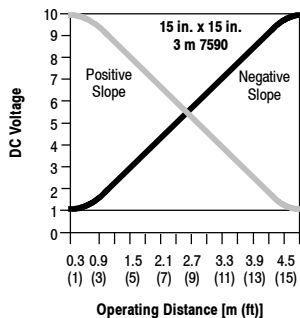
Background Suppression



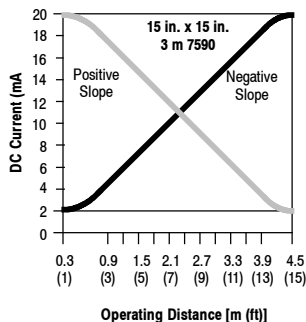
① Example: Operating distance set at 203.2 mm (8 in.).

Analog Output Typical Response Curve

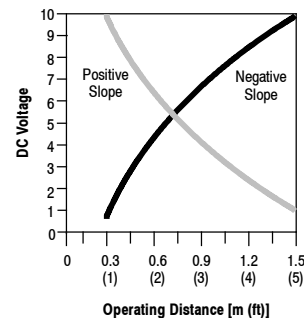
Retroreflective
Voltage Output Slope



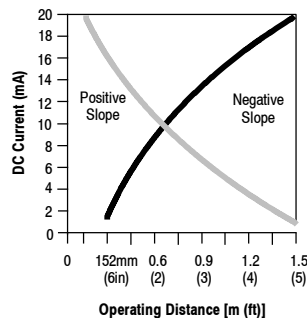
Current Output Slope



Standard Diffuse
Voltage Output

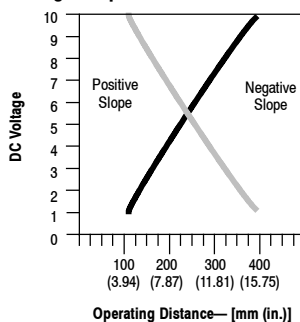


Current Output

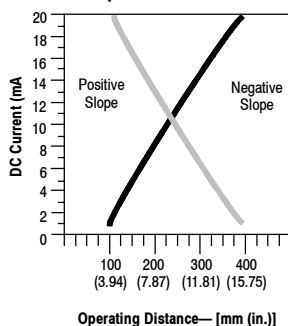


Infrared Glass FO/Fixed Focus/Wide Angle Diffuse

Voltage Output



Current Output



Product Selection Guidelines

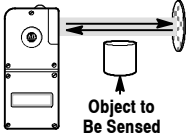
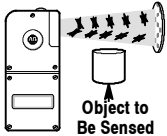
1. Select photohead (see pages 1-220 to 1-225).
2. Select power base (see page 1-226).
3. Select output module for green line models only (see page 1-226).
4. Select plug-in control function optional module on page 1-226 (green models only).

Series 5000

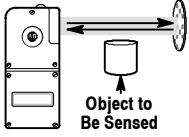
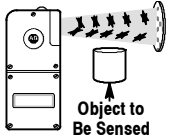
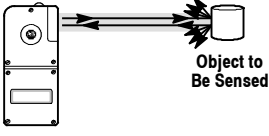
Red Line/Blue Line

Red Line Product Selection [mm (in.)]

1. Select Photohead.

| Sensing Mode | Sensing Distance [mm (in.)] | Output Energized | Output Type Capacity | Response Time ^① | | Cat. No. |
|--|--|--------------------------|---|----------------------------|-----------------------|------------|
| | | | | Sensor | Output | |
|  <p>Red Line—Retroreflective/Standard Diffuse</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p> | 50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector 50.8 mm...1.5 m (2 in...5 ft) with White Paper | Light/Dark Selectable | EM Relay (SPDT) 2.0 A-120V AC 1.0 A-240V AC | 5 ms | On 10 ms Off 15 ms | 42LRC-5000 |
| | | | AC/DC Solid State FET (SP-N.O.) 30 mA 0...120V AC/DC | | 1 ms | 42LRC-5010 |
| | | | AC Solid State TRIAC (SP-N.O.) 0.75 A 240V AC cont. | | 8 ms | 42LRC-5020 |
|  <p>Red Line—Polarized Retroreflective</p> <p>Field of View: 3° Emitter LED: Visible Red 660 nm</p> | 50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector | Light/Dark Selectable | EM-Relay (SPDT) 2.0 A-120V AC 1.0 A-240V AC | 5 ms | On 10 ms Off 15 ms | 42LRC-5200 |
| | | | AC/DC Solid State FET (SP-N.O.) 30 mA 0...120V AC/DC | | 1 ms | 42LRC-5210 |
| | | | AC Solid State TRIAC (SP-N.O.) 0.75 A 240V AC cont. | | 8 ms | 42LRC-5220 |

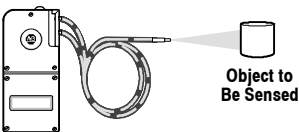
Blue Line Product Selection [mm (in.)]

| | | | | | |
|---|---|--------------------------|-----------------------|------|------------|
|  <p>Blue Line—Retroreflective</p> <p>Field of View: 2.5° Emitter LED: Infrared 880 nm</p> | 50.8 mm...10 m (2 in...33 ft) with 76 (3) Reflector | Light/Dark Selectable | NPN and PNP 100 mA | 1 ms | 42DRU-5000 |
|  <p>Blue Line—Polarized Retroreflective</p> <p>Field of View: 2.5° Emitter LED: Visible Red 660 nm</p> | 50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector | Light/Dark Selectable | NPN and PNP 100 mA | 1 ms | 42DRU-5200 |
|  <p>Blue Line—Standard Diffuse</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p> | Long Range: 50.8 mm...2.1 m (2 in...7 ft) with White Paper | Light/Dark Selectable | NPN and PNP 100 mA | 1 ms | 42DRP-5000 |

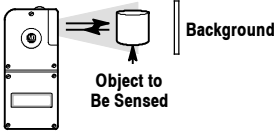
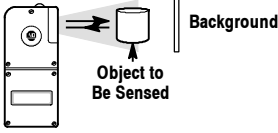
① Add Sensor and Output for total response time.

Refer to page 1-226 for cordsets and accessories.

Blue Line Product Selection [mm (in.)] (continued)

| Sensing Mode | Sensing Distance | Output Energized | Output Type Capacity | Response Time | Cat. No. |
|--|----------------------------------|-----------------------|-----------------------|---------------|--------------|
|  <p><i>Blue Line—Large Aperture Fiber Optic</i> Field of View: Depends on fiber optics or lens selected or lens type Emitter LED: Infrared 880 nm</p> | Depends on Fiber Optic selected. | Light/Dark Selectable | NPN and PNP 100 mA | 1 ms | 42DRA-5000FO |

Blue Line Product Selection [mm (in.)] (continued)

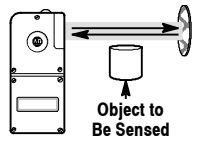
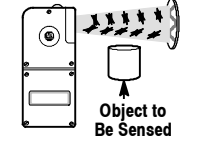
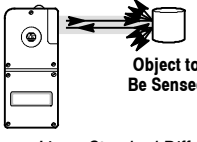
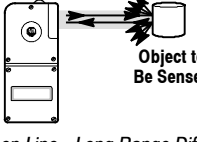
| Sensing Mode | Sensing Distance [mm (in.)] | Output Energized | Output | Timing | | Response Time | Cat. No. |
|--|--|-----------------------|-----------|---|-------------------------------------|---------------|------------|
| | | | | Function | Range | | |
|  <p><i>Blue Line—Background Suppression without Timing</i> Field of View: 3° Emitter LED: Infrared 880 nm</p> | Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12) | Light/Dark Selectable | NPN & PNP | — | — | 5 ms | 42DBS-5000 |
|  <p><i>Blue Line—Background Suppression with Timing</i> Field of View: 3° Emitter LED: Infrared 880 nm</p> | Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12) | Light/Dark Selectable | NPN & PNP | Selectable On Delay Off Delay On & Off Delay Delayed One-shot One-shot | 0...1.5 s 0...15 s Selectable | | 42DBS-5100 |

Refer to page 1-226 for cordsets and accessories.

Series 5000

Green Line

Green Line Product Selection [mm (in.)]

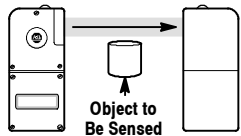
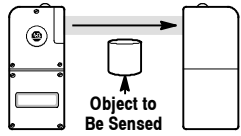
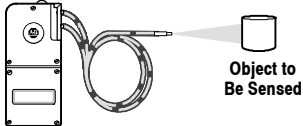
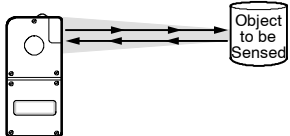
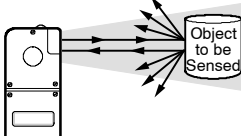
| Sensing Mode | Sensing Distance [mm (in.)] | Output Energized | Sensor Response Time ^① | Cat. No. |
|--|--|-----------------------|-----------------------------------|--------------------|
|  <p><i>Green Line—Retroreflective</i> Field of View: 2.5° Emitter LED: Infrared 880 nm</p> | 50.8 mm...10 m (2 in...33 ft) with 76 (3) Reflector | Light/Dark Selectable | 1 ms | 42MRU-5000 |
|  <p><i>Green Line—Polarized Retroreflective</i> Field of View: 2.5° Emitter LED: Visible Red 660 nm</p> | 50.8 mm...6 m (2 in...20 ft) with 76 (3) Reflector | Light/Dark Selectable | 2.5 ms | 42MRU-5200 |
|  <p><i>Green Line—Standard Diffuse</i> Field of View: 3° Emitter LED: Infrared 880 nm</p> | Short Range: 50.8 mm... 3 m (2 in...10 ft) with White Paper | Light/Dark Selectable | 2.5 ms | 42MRP-5000 |
|  <p><i>Green Line—Long Range Diffuse</i> Field of View: 3° Emitter LED: Infrared 880 nm</p> | Long Range: 50.8 mm... 4.8 m (2 in...16 ft) with White Paper | Light/Dark Selectable | 2.5 ms | 42MRP-5000P |

① Add Sensor and Output for total response time.

Refer to page 1-226 for cordsets and accessories.

Green Line Product Selection [mm (in.)] (continued)

1. Select Photohead (continued).

| Sensing Mode | Sensing Distance [mm (in.)] | Output Energized | Sensor Response Time [Ⓢ] | Cat. No. |
|--|--------------------------------------|-----------------------|-----------------------------------|--|
|  <p>Green Line—Transmitted Beam Receiver Field of View: 3° Emitter LED: Infrared 880 nm</p> | 25.4 mm...171 m (1 in...560 ft) | Light/Dark Selectable | 5 ms | 42MRR-5000 Order one receiver and one light source |
|  <p>Green Line—Transmitted Beam Light Source Field of View: 3° Emitter LED: Infrared 880 nm</p> | 25.4 mm...171 m (1 in...560 ft) | — | N/A | 42MRL-5000 Order one receiver and one light source |
|  <p>Green Line—Large Aperture Fiber Optic Field of View: Determined by fiber optics or lens type Emitter LED: Infrared 880 nm</p> | Depends on Fiber Optic selected. | Light/Dark Selectable | 2.5 ms | 42MRA-5000FO |
|  <p>Green Line—Fixed Focus Emitter LED: Infrared 880 nm</p> | 5.08 mm...172 m (0.2 in...564 ft) | Light/Dark Selectable | 2.5 ms | 42MRA-5000FF |
|  <p>Green Line—Wide Angle Diffuse Emitter LED: Infrared 880 nm</p> | 5.08 (0.2)...508 (20) | Light/Dark Selectable | 2.5 ms | 42MRA-5000WA |

[Ⓢ] Prewired for use with output 8-593 only.

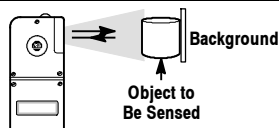
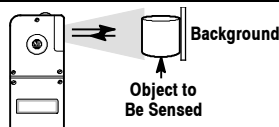
Refer to page 1-226 for cordsets and accessories.

Series 5000

Green Line/Analog Output

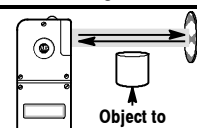
Green Line Product Selection [mm (in.)] (continued)

1. Select Photohead (continued).

| Sensing Mode | Sensing Distance [mm (in.)] | Output Energized | Timing | | Sensor Response Time [Ⓜ] | Cat. No. |
|---|---|-----------------------|--|-------------------------------------|-----------------------------------|------------|
| | | | Function | Range | | |
|  <p>Green Line—Background Suppression without Timing</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p> | Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12) | Light/Dark Selectable | — | — | 5 ms | 42MBS-5000 |
|  <p>Green Line—Background Suppression with Timing</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p> | Suppression Point Adjustment Range 50.8 (2) to 63.5...304.8 (2.5...12) | Light/Dark Selectable | Selectable On Delay Off Delay On & Off Delay One-shot Delayed One-shot | 0...1.5 s 0...15 s Selectable | 5 ms | 42MBS-5100 |

Analog Output Product Selection [mm (in.)]

1. Select Photohead.

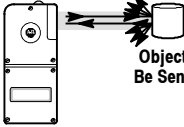
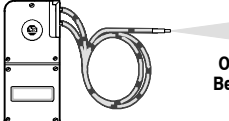
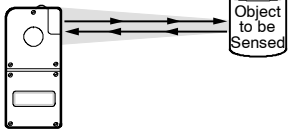
| Sensing Mode | Supply Current | Sensing Distance | Analog Output | Output Type Capacity | Response Time [Ⓜ] | Slope | Cat. No. |
|--|----------------|--|--|---|----------------------------|---------------------------------|------------|
|  <p>Analog Output—Retroreflective</p> <p>Field of View: 3° Emitter LED: Infrared 880 nm</p> | 70 mA | 600 mm (2 ft)... Total: 4.6 m (15 ft) Linear 4.0 m (13 ft) | Voltage 1...10V DC Current 1...20 mA | Two Adjustable Set Points NPN 100 mA (30V Max) | 100 ms | Selectable Positive or Negative | 42DRU-5400 |

Ⓜ Prewired for use with output 8-593 only.

Ⓜ Time needed for full analog swing.

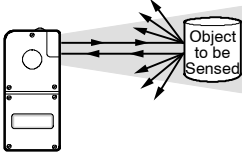
Refer to page 1-226 for cordsets and accessories.

Analog Output Product Selection [mm (in.)] (continued)

| Sensing Mode | Sensing Distance [mm (in.)] | Analog Output | Output Type Capacity | Response Time [ⓐ] | Slope | Cat. No. |
|--|--|--|--|----------------------------|--|---------------------|
|  <p>Object to Be Sensed</p> <p><i>Analog Output—Standard Diffuse</i> Field of View: 3° Emitter LED: Infrared 880 nm</p> | <p>150 (6)... Total: 1.5 m (5 ft) Linear: 1.2 m (4 ft)</p> | <p>Voltage 1...10V DC Current 1...20 mA</p> | <p>Two Adjustable Set Points NPN 100 mA (30V max)</p> | <p>100 ms</p> | <p>Selectable Positive or Negative</p> | <p>42DRP-5400</p> |
|  <p>Object to Be Sensed</p> <p><i>Analog Output—Large Aperture Fiber Optic</i> Field of View: Depends on fiber optics (refer to fiber optic section) or lens type Emitter LED: Infrared 880 nm</p> | <p>Depends on Fiber Optic selected.</p> | <p>Voltage 1...10V DC Current 1...20 mA</p> | <p>Two Adjustable Set Points NPN 100 mA (30V max)</p> | <p>100 ms</p> | <p>Selectable Positive or Negative</p> | <p>42DRA-5400FO</p> |
|  <p>Object to be Sensed</p> <p><i>Analog Output—Fixed Focus</i> Emitter LED: Infrared 880 nm</p> | <p>5.08...101 (0.2...4)</p> | <p>Voltage 1...10V DC Current 1...20 mA</p> | <p>Two Adjustable Set Points NPN 100 mA (30V max)</p> | <p>100 ms</p> | <p>Selectable Positive or Negative</p> | <p>42DRA-5400FF</p> |

Analog Output Product Selection [mm (in.)] (continued)

1. Select Photohead.

| Sensing Mode | Sensing Distance | Analog Output | Output Type Capacity | Response Time | Slope | Cat. No. |
|---|--|--|--|---------------|--|---------------------|
|  <p>Object to be Sensed</p> <p><i>Analog Output—Wide Angle Diffuse</i> Emitter LED: Infrared 880 nm</p> | <p>5.08 (0.2 in.)... 152 mm (6 in.)</p> | <p>Voltage 1...10V DC Current 1...20 mA</p> | <p>Two Adjustable Set Points NPN 100 mA (30V max)</p> | <p>100 ms</p> | <p>Selectable Positive or Negative</p> | <p>42DRA-5400WA</p> |

[ⓐ] Time needed for full analog swing.

Refer to page 1-226 for cordsets and accessories.

Series 5000

Power Base

Power Base Product Selection [mm (in.)]

2. Select Power Base.

| Style | Operating Voltage | Supply Current | Cat. No. |
|------------------|-------------------|----------------|------------|
| Red Line | | | |
| Terminal | 120V AC, 50/60 Hz | 2V A | 42LTB-5000 |
| | 240V AC, 50/60 Hz | 4V A | 42LTB-5001 |
| Cable | 120V AC, 50/60 Hz | 2V A | 42LCB-5000 |
| Blue Line | | | |
| Terminal | 10...30V DC | 35 mA | 42DTB-5000 |
| Cable | | | 42DCB-5000 |

| Operating Voltage | Supply Current | Cat. No. | |
|--------------------------|----------------|----------------|--------------------------|
| | | Terminal Style | Mini QD Style |
| Green Line | | | |
| 102...132V AC, 50/60 Hz | 2V A | 42MTB-5000 | 42MTB-5000QD5-1 |
| 204...254V AC, 50/60 Hz | 4V A | 42MTB-5001 | — |
| 40...54V AC/DC, 50/60 Hz | 1V A | 42MTB-5002 | — |
| 20...30V AC, 50/60 Hz | | 42MTB-5003 | — |
| 20...30V DC | | 42MTB-5004 | 42MTB-5004QD4-1 ① |

| | Operating Voltage | Supply Current | Connection Type | Cat. No. |
|---------------------------|-------------------|----------------|-----------------|------------|
| Analog Output Line | | | | |
| All sensing modes | 22...28V DC | 70 mA maximum | Screw Terminal | 42DTB-5000 |
| | | 70 mA maximum | 3 m 300V Cable | 42DCB-5000 |

3. Select Output module (green line models only) (required).

4. Select plug-in control function optional module (green line models only).

Cordsets and Accessories

| Description | Cat./Page No. | Description | Cat. No. | Description | Cat. No. |
|-------------------------------|------------------|-------------------------------------|----------|-------------------------------------|----------|
| Terminal Chambers | 8-1 | Right Angle Bracket | 60-1785 | 76 mm (3 in.) Diameter Reflector | 92-39 |
| Screw Terminal | 42MTB-5000 | Conduit Adaptor 1/2 inch NPT | 60-2213 | 32 mm (1.25 in.) Diameter Reflector | 92-47 |
| 5-pin DC Mini QD | 42MTB-5000-QD5-1 | Armored Cable Adaptor | 60-1577 | Heavy Duty Protective Guard | 60-2083 |
| Flexi-mount Mounting Assembly | 60-2014 | Limit Switch Type Mounting Assembly | 60-2230 | Heavy Duty Mounting Assembly | 60-1748 |

① Rewired for use with output 8-593 only.



Features

- Harsh duty package
- Screw terminal connections
- Long-range sensing modes
- Plug-in logic and output modules
- Both DC and AC/DC operation
- Selectable light/dark operation

Specifications

| Environmental | |
|-------------------------------|---|
| Certifications | UL Listed, CSA Approved |
| Operating Environment | NEMA 3, 4, 12, 13; IP66 |
| Operating Temperature [C (F)] | -40...+57° (-40...+135°) |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Relative Humidity | 5...90% |
| Optical | |
| Sensing Modes | Retroreflective, polarized retroreflective, diffuse, transmitted beam |
| Sensing Range | See Product Selection table on page 1-230 |
| Field of View | See Product Selection table on page 1-230 |
| Light Source | Visible red LED (660 nm), infrared LED (880 nm) |
| LED Indicators | See User Interface below |
| Adjustments | Sensitivity adjustment potentiometer |
| Electrical | |
| Voltage | See Product Selection table on page 1-230 |
| Current Consumption | See Product Selection table on page 1-230 |
| Sensor Protection | False pulse |
| Outputs | |
| Response Time | 5 ms plus plug-in module delay |
| Output Type | EM relay, TRIAC, FET, PNP/NPN |
| Output Mode | Light or dark operate selectable |
| Output Current | Determined by plug-in module, see Product Selection table on page 1-230 |
| Output Leakage Current | 1 µA max |
| Mechanical | |
| Housing Material | Noryl® |
| Lens Material | Acrylic, glass for polarized sensor |
| Connection Types | Nickel-plated screw terminal |
| Supplied Accessories | 8-670 DPDT relay module |
| Optional Accessories | Mounting brackets, reflectors, cordsets |

User Interface Panel

| Label | Color | State | Status |
|-------|--------|-------|--------------------|
| Power | Yellow | OFF | Sensor not powered |
| | | ON | Sensor powered |

PHOTOSWITCH® Photoelectric Sensors

Series 4000B

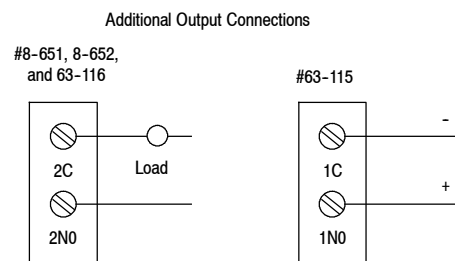
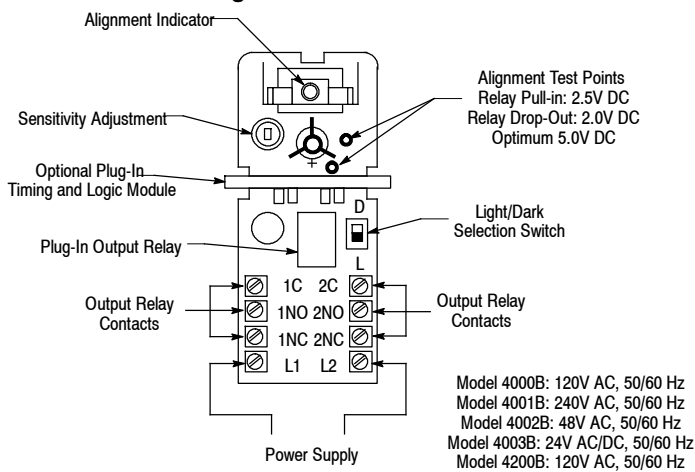
Optional Timing and Logic Modules

These plug-in modules can be added to any series 4000B Photoelectric sensor.

| Function | Adjustable Time Delay(s) | | Adjustable Dwell (s) | Cat. No. |
|---------------------|--------------------------|------------|----------------------|-----------|
| | On | Off | | |
| One-shot | — | — | 0.040...0.250 | 60-1612-1 |
| | — | — | 0.5...15 | 60-1612-2 |
| On and/or Off Delay | 0.05...1.0 | 0.05...1.5 | — | 60-1613 |
| | 0.5...10 | 0.5...15 | | 60-1614 |
| Delayed One-shot | 0.10...1.5 | — | 0.040...0.250 | 60-1625 |
| | 1.0...15 | | 0.040...0.250 | 60-1626 |
| Motion Detector | — | 0.05...1.5 | — | 60-1660 |
| | | 0.5...15 | | 60-1661 |
| Preset Counter | 2...999 Counts | | 0.040...0.250 | 60-1716 |

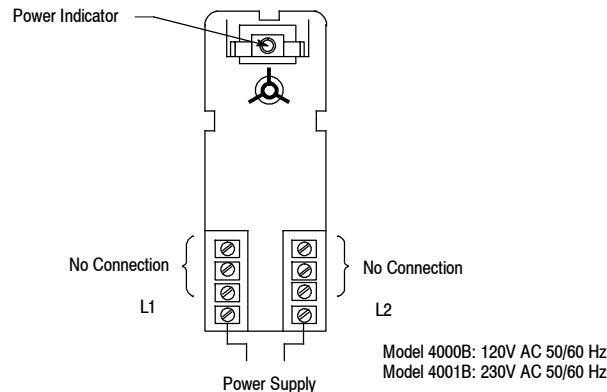
Wiring Diagrams

All Sensing Modes Except Transmitted Beam Light Source

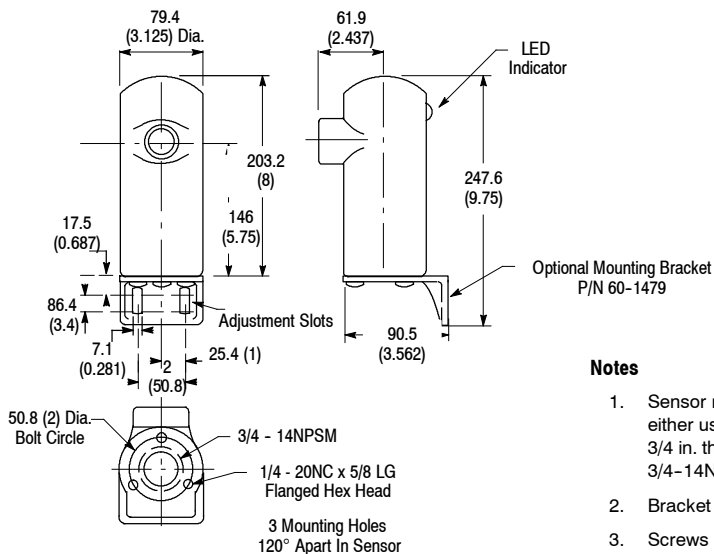


Note: Details regarding connection of Allen-Bradley Series 4000B sensors to Allen-Bradley Programmable Controllers can be found in publication 42-2.0.

Transmitted Beam Light Source



Approximate Dimensions [mm (in.)]



Notes

1. Sensor may be mounted without bracket, either using 3, 1/4-20NC mtg. holes or on a 3/4 in. threaded pipe, thread pitch 3/4-14NPSM.
2. Bracket allows 360° adjustment.
3. Screws included with mounting bracket.

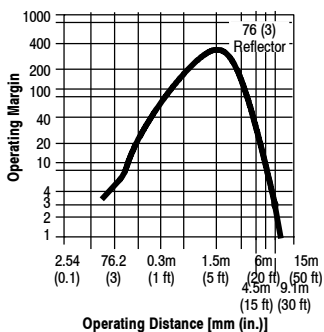
ATTENTION



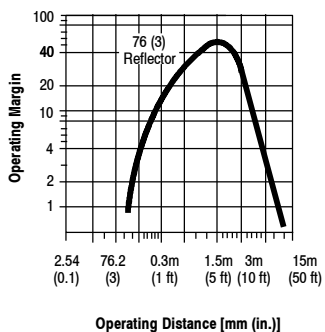
DO NOT use lockwashers with supplied whiz-lock mounting screws.

Typical Response Curve

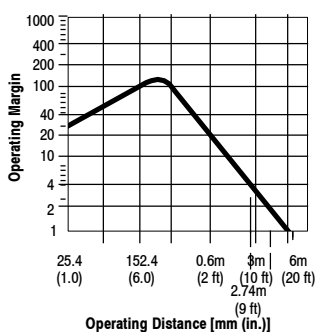
Retroreflective



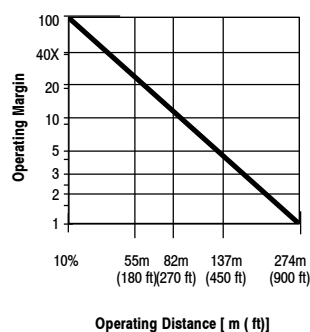
Polarized Retroreflective



Standard Diffuse



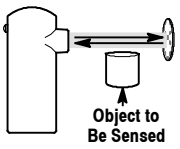
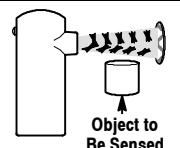
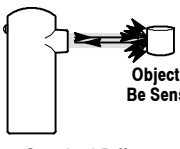
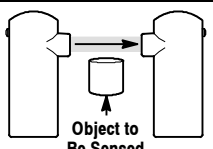
Transmitted Beam



PHOTOSWITCH® Photoelectric Sensors
Series 4000B

Product Selection

1. Select sensor.

| Sensing Mode | Operating Voltage/ Power Consumption | Sensing Range [mm (in.)] | Output Energized | Sensor Response Time ① | Cat. No. |
|--|---|------------------------------------|--------------------------|---------------------------|-------------|
|  <p>Retroreflective Field of View: 1.5° Emitter LED: Infrared 940 nm</p> | 102...132V AC/ 2V A | 50.8 mm...10.6 m (2 in...35 ft) | Light/Dark Selectable | 5 ms | 42RLU-4000B |
| | 195...253V AC/ 2V A | | | | 42RLU-4001B |
| | 40...58V AC/ 2V A | | | | 42RLU-4002B |
| | 18...28V AC/DC/2V A 20...32V DC | | | | 42RLU-4003B |
|  <p>Series 4000B Polarized Retroreflective Field of View: 2° Emitter LED: Visible Red 660 nm</p> | 102...132V AC/ 2 A | 50.8 mm...7 m (2 in...23 ft) | Light/Dark Selectable | 5 ms | 42RLU-4200B |
|  <p>Standard Diffuse Field of View: 4° Emitter LED: Infrared 940 nm</p> | 102...132V AC/ 2V A | 50.8 mm...3.6 m (2 in...12 ft) | Light/Dark Selectable | 5 ms | 42RLP-4000B |
|  <p>Transmitted Beam Field of View: 3° Emitter LED: Infrared 940 nm Light sources and receivers must be ordered separately. Any light source is compatible with any receiver.</p> | 102...132V AC, 50/60 Hz/ 2V A | 50.8 mm...274 m (2 in...900 ft) | Light/Dark Selectable | 5 ms | 42RLR-4000B |

2. Select optional plug-in timing and logic module, page 1-227.

3. Select optional plug-in output module.

| Sensing Mode | Type | Max Load Current | Output Response Time① | Cat. No. |
|-------------------|------------------------------|--------------------------------|-----------------------|----------|
| All sensing modes | DPDT EM-Relay (included) | 5 A, 120V AC 2.5 A, 240V AC | 10 ms On 15 ms Off | 8-670② |
| | SP-N.O. AC TRIAC | 1 A, 265V AC, 20 mA min | 8 ms | 8-651 |
| | SP-N.O. AC/DC FET | 30 mA, 0...120V AC/DC | 1 ms | 8-652 |
| | Open Collector NPN | 250 mA, 30V DC | 1 ms | 63-115 |
| | DC Voltage Output Adaptor | 30 mA, 17V DC | | 63-116 |

① Add sensor response time and output response time for total response time.

② 8-670 relay output module supplied with sensor.



General Specifications

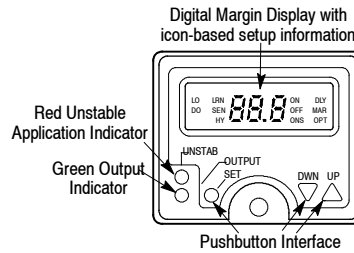
| | |
|--------------------------------------|---|
| Unit Protection | Overload, short circuit, reverse polarity, false pulse |
| Supply Voltage | 10...30V DC |
| Current Consumption | 70 mA maximum |
| Output Type | NPN and PNP |
| Output Mode | Light/dark operate selectable |
| Output Rating | 250 mA @ 30V DC |
| Max Leakage Current | 10 µA |
| Response Time | 250 µs...4 ms selectable |
| Housing Material | Valox® |
| Lens Material | Acrylic |
| LED Indicators | See User Interface below |
| Connection Types | 5-pin micro QD, 5-pin mini QD, 2 m PVC 22 AWG cable |
| Supplied Accessories | #129-130 mounting kit |
| Optional Accessories | Cordsets, mounting brackets |
| Operating Environment | NEMA 3, 4X, 6P, 12, 13; IP67 (IEC 529) 1200 psi washdown |
| Vibration | 10...55 Hz, 1 mm amplitude, meets or exceeds IEC 60947-5-2 |
| Shock | 30 g with 1 ms pulse duration, meets or exceeds IEC 60947-5-2 |
| Operating Temperature [C (F)] | -25...+60° (-13...+140°) |
| Relative Humidity | 5...95% |
| Certifications | UL Listed, CSA Certified, and CE Marked for all applicable directives |

Features

- Self-teach operation
- Automatic sensitivity control
- LCD display for easy status indication
- Selectable hysteresis, pulse rates
- Selectable response times
- Selectable ON/OFF, ONE-SHOT timer
- Automatic crosstalk immunity
- Optical program transfer
- Both NPN and PNP outputs

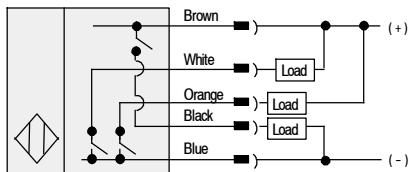
User Interface Panel

| Label | Color | State | Status |
|----------|-------|-------|----------------------|
| Unstable | Red | OFF | Margin < 2.5 |
| | | ON | Margin > 2.5 |
| Output | Green | OFF | Output not activated |
| | | ON | Output activated |

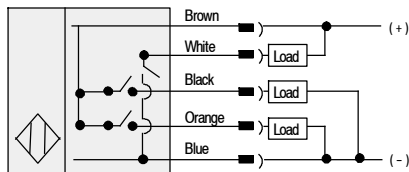


Wiring Diagrams

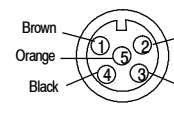
Sensors with NPN Diagnostic Output



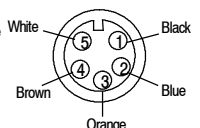
Sensors with PNP Diagnostic Output



Micro QD

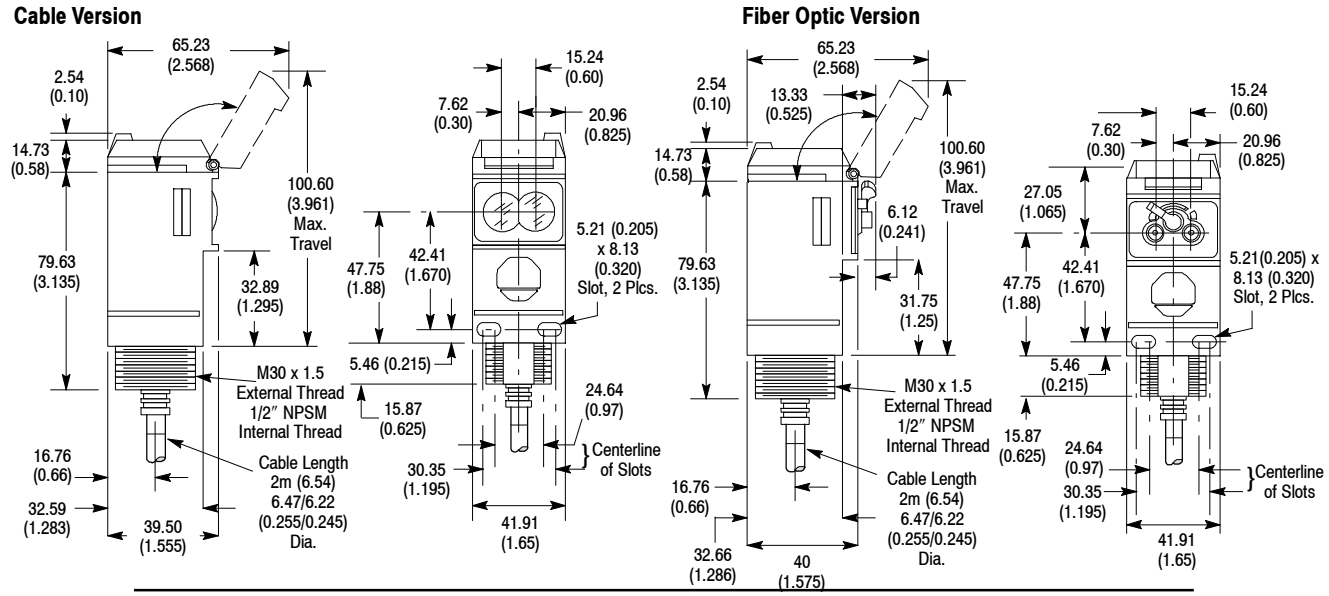


Mini QD

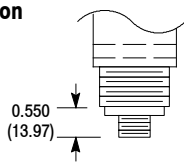


Note: Orange lead is diagnostic output.

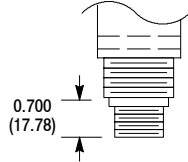
Approximate Dimensions [mm (in.)]



Connector Version



Micro Style

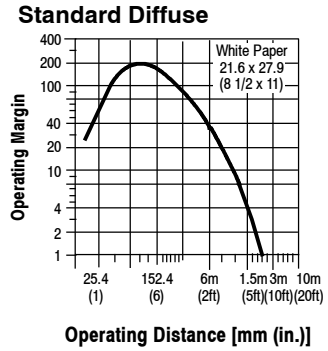
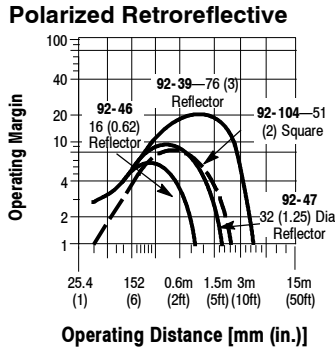
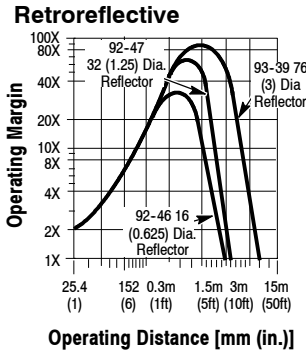


Mini Style

Thread Size

| | |
|----------|---------------------------|
| DC Micro | M12 x 1 1 Keyway |
| Mini | 1/2 x 14 NPSM 1 Keyway |

Typical Response Curve

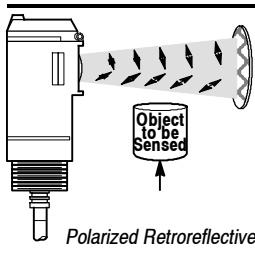
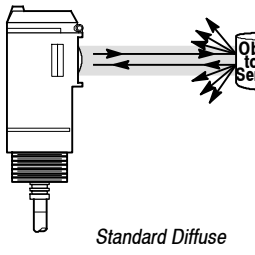
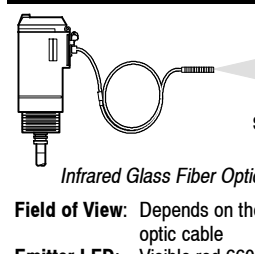
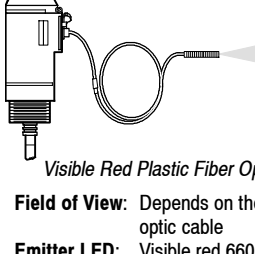
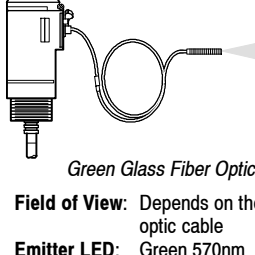


Product Selection

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Diagnostic Output/ Rating | Connection Type | Cat. No. | |
|---|-------------------------------------|--------------------------------|-----------------------|---|------------------------------|------------------------|-----------------|-----------------|
| Retroreflective Field of View: 1.5° Emitter LED: Visible red 660 nm | 10...30V DC 70 mA | 51 mm (2 in.)...9.14 m (30 ft) | Light/Dark Selectable | NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable | NPN 20 mA at 30V DC | 2 m 300V cable | 42GTGU-10000-02 | |
| | | | | | | 5-pin DC micro | 42GTGU-10000-QD | |
| | | | | | | 5-pin mini QD | 42GTGU-10000-Q1 | |
| | | | | | | PNP 20 mA at 30V DC | 2 m 300V cable | 42GTGU-10010-02 |
| | | | | | | | 5-pin DC micro | 42GTGU-10010-QD |
| | | | | | | | 5-pin mini QD | 42GTGU-10010-Q1 |

Refer to last page for cordsets and accessories.

Product Selection (continued)

| Sensing Mode | Operating Voltage Supply Current | Sensing Distance | Output Energized | Output Type Capacity Response Time | Diagnostic Output/ Rating | Connection Type | Cat. No. | |
|---|-------------------------------------|--|-----------------------|---|------------------------------|------------------------|------------------|------------------|
|  <p><i>Polarized Retroreflective</i></p> <p>Field of View: 1.5° Emitter LED: Visible red 660 nm</p> | 10...30V DC 70 mA | 51 mm (2 in.)...4.6 m (15 ft) | Light/Dark Selectable | NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable | NPN 20 mA at 30V DC | 2 m 300V cable | 42GTGU-10200-02 | |
| | | | | | | 5-pin DC micro | 42GTGU-10200-QD | |
| | | | | | | 5-pin mini | 42GTGU-10200-Q1 | |
| | | | | | | PNP 20 mA at 30V DC | 2 m 300V cable | 42GTGU-10210-02 |
| | | | | | | | 5-pin DC micro | 42GTGU-10210-QD |
| | | | | | | | 5-pin mini | 42GTGU-10210-Q1 |
|  <p><i>Standard Diffuse</i></p> <p>Field of View: 3.5° Emitter LED: Infrared 880 nm</p> | 10...30V DC 70 mA | 51 mm (2 in.)...2.7 m (8.86 ft) | Light/Dark Selectable | NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable | NPN 20 mA at 30V DC | 2 m 300V cable | 42GTGP-10000-02 | |
| | | | | | | 5-pin DC micro | 42GTGP-10000-QD | |
| | | | | | | 5-pin mini | 42GTGP-10000-Q1 | |
| | | | | | | PNP 20 mA at 30V DC | 2 m 300V cable | 42GTGP-10010-02 |
| | | | | | | | 5-pin DC micro | 42GTGP-10010-QD |
| | | | | | | | 5-pin mini | 42GTGP-10010-Q1 |
|  <p><i>Infrared Glass Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable Emitter LED: Visible red 660nm</p> | 10...30V DC 70 mA | 5.08 mm (0.2 in.) to Depends on Fiber Optic selected | Light/Dark Selectable | NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable | NPN 20 mA at 30V DC | 2 m 300V cable | 42GTGF-10000-02 | |
| | | | | | | 5-pin DC micro | 42GTGF-10000-QD | |
| | | | | | | 5-pin mini | 42GTGF-10000-QD1 | |
| | | | | | | PNP 20 mA at 30V DC | 2 m 300V cable | 42GTGF-10010-02 |
| | | | | | | | 5-pin DC micro | 42GTGF-10010-QD |
| | | | | | | | 5-pin mini | 42GTGF-10010-QD1 |
|  <p><i>Visible Red Plastic Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable Emitter LED: Visible red 660nm</p> | 10...30V DC 70 mA | 5.08 mm (0.2 in.) to Depends on Fiber Optic selected | Light/Dark Selectable | NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable | NPN 20 mA at 30V DC | 2 m 300V cable | 42GTGF-10100-02 | |
| | | | | | | 5-pin DC micro | 42GTGF-10100-QD | |
| | | | | | | 5-pin mini | 42GTGF-10100-QD1 | |
| | | | | | | PNP 20 mA at 30V DC | 2 m 300V cable | 42GTGF-10110-02 |
| | | | | | | | 5-pin DC micro | 42GTGF-10110-QD |
| | | | | | | | 5-pin mini | 42GTGF-10110-QD1 |
|  <p><i>Green Glass Fiber Optic</i></p> <p>Field of View: Depends on the fiber optic cable Emitter LED: Green 570nm</p> | 10...30V DC 70 mA | 5.08 mm (0.2 in.)...8 ft (2.7 m) | Light/Dark Selectable | NPN & PNP 250 mA at 30V DC 250 μs...4 ms Selectable | NPN 20 mA at 30V DC | 2 m 300V cable | 42GTGF-10300-02 | |
| | | | | | | 5-pin DC micro | 42GTGF-10300-QD | |
| | | | | | | 5-pin mini | 42GTGF-10300-QD1 | |
| | | | | | | PNP 20 mA at 30V DC | 2 m 300V cable | 42GTGF-10310-02 |
| | | | | | | | 5-pin DC micro | 42GTGF-10310-QD |
| | | | | | | | 5-pin mini | 42GTGF-10310-QD1 |

Refer to the next page for cordsets and accessories.

Series 10,000

Teachable

Infrared Glass Fiber Optic Range (Typical)

| Fiber/Core Diameter | Sensing Mode | 1.0 ms | 500 μ s | 250 μ s | 100 μ s |
|----------------------------------|------------------|----------|-----------------|-----------------|-------------|
| 43GR-MKS00ML/0.69 mm (0.027 in.) | Diffuse | 0.3 in. | 0.2 in. | Not Recommended | |
| | Retroreflective | 0.4 in. | Not Recommended | | |
| 43GR-FAS25SL/3.18 mm (0.125 in.) | Diffuse | 4.0 in. | 2.4 in. | 0.9 in. | 0.9 in. |
| | Retroreflective | 50.0 in. | 37.0 in. | 21.0 in. | 21.0 in. |
| 43GT-FAS25SL/3.18 mm (0.125 in.) | Transmitted Beam | 20.0 in. | 13.0 in. | 5.4 in. | 5.4 in. |
| 43GT-MKS00ML/0.69 mm (0.027 in.) | Transmitted Beam | 1.5 in. | 1.3 in. | 0.45 in. | 0.40 in. |

Visible Red Fiber Optic Range (Typical)

| Fiber/Core Diameter | Sensing Mode | 1.0 ms | 500 μ s | 250 μ s | 100 μ s |
|---------------------------------|------------------|----------|-------------|-----------------|-------------|
| 43PR-PJS53VS/0.5 mm (0.02 in.) | Diffuse | 0.45 in. | 0.22 in. | Not Recommended | |
| | Retroreflective | 12.0 in. | 10.0 in. | Not Recommended | |
| 43PR-NESP57ZS/1.0 mm (0.04 in.) | Diffuse | 1.75 in. | 1.1 in. | 0.45 in. | 0.45 in. |
| | Retroreflective | 26.0 in. | 18.0 in. | 10.0 in. | 10.0 in. |
| 43PT-PLS2GS/0.5 mm (0.02 in.) | Transmitted Beam | 2.6 in. | 1.5 in. | 0.6 in. | 0.45 in. |
| 43PT-NJS56FS/1.0 mm (0.04 in.) | Transmitted Beam | 5.0 in. | 3.0 in. | 1.3 in. | 1.3 in. |

Visible Green Fiber Optic Range (Typical)

| Fiber/Core Diameter | Sensing Mode | 1.0ms | 500 μ s | 250 μ s | 100 μ s |
|----------------------------------|------------------|----------|-----------------|-----------------|-------------|
| 43GR-MKS00ML/0.69 mm (0.027 in.) | Diffuse | 0.1 in. | Not Recommended | | |
| | Retroreflective | | Not Recommended | | |
| 43GR-FAS25SL/3.18 mm (0.125 in.) | Diffuse | 0.6 in. | 0.4 in. | 0.1 in. | 0.1 in. |
| | Retroreflective | 6.5 in. | 5.0 in. | 3.0 in. | 3.0 in. |
| 43GT-FAS25SL/3.18 mm (0.125 in.) | Transmitted Beam | 2.5 in. | 1.6 in. | 0.7 in. | 0.7 in. |
| 43GT-MKS00ML/0.69 mm (0.027 in.) | | 0.25 in. | 0.2 in. | Not Recommended | |

Cordsets and Accessories

| Description | Cat. No. |
|--|--------------|
| 2 m (6.5 ft) 5-pin DC Micro QD Cordset | 889D-F5AC-2 |
| 1.8 m (6 ft) 5-pin Mini QD Cordset | 889N-F5AF-6F |
| Swivel/Tilt Mounting Bracket | 60-2439 |



Fiber optic sensors permit the attachment of “light pipes” called fiber optic cables. Light emitted from the source is sent through transparent fibers in the cables and emerges at the end of the fiber. The transmitted or reflected beam is then carried back to the receiver through different fibers. Ideal for sensing small objects, fiber optic cables can be mounted in locations that would otherwise be inaccessible to photoelectric sensors. Other characteristics/advantages of fiber optic sensors include:

- Some glass fiber optic tips have the ability to withstand high temperatures (up to 482°C (900°F))
- Withstand extreme shock and vibration
- Often have the fastest response times
- Immunity to electrical interference (EMI, RFI).

Fiber Optic Cables—Types

Fiber optic cables can be made of glass or plastic and categorized as either individual (transmitted beam) or bifurcated (diffuse).

Glass fiber optic cables contain multiple strands of very thin glass fiber that are bundled together in a flexible sheath. Typically more durable than their plastic counterparts, glass fiber optic cables will withstand much higher

temperatures; glass fiber optic cables with a stainless steel sheath are rated up to 260°C (500°F). Special glass cables can be obtained with temperature ratings of up to 482°C (900°F). Most glass cables are available with a choice of PVC or flexible stainless steel sheath. While PVC-sheathed cables are typically less expensive, stainless steel sheathing offers greater durability and allows the cables to operate in higher temperatures. Glass fibers can be used with infrared or visible LED light sources.

Light transmission is maximized with a thicker bundle diameter. It is also important to note that attenuation increases as fiber optic cable length increases. For further details, see the Application Recommendations section on page 1-234 .

Plastic fiber optic cables are constructed of a single acrylic monofilament and, since plastic fibers absorb infrared light, they are most efficient when used with visible red LED sources. It is recommended that plastic fiber optic cables are used with visible light sources. Considered less durable than glass cables, plastic fibers are generally less expensive and can be used in applications where continuous flexing of the cable is required. For that reason, coiled plastic cables are also available for such applications.

General Information

Sensor and Sensing Tip Selection page 1-232 and 1-233

Glass Fiber Optic Cables

Application Recommendations page 1-234
 Large Aperture Fibers page 1-235
 Small Aperture Fibers page 1-251
 Custom Fiber Configurator page 1-258
 Sensing Tip Drawings page 1-260
 Standard Bundle Sizes page 1-268
 Accessories page 1-269

Plastic Fiber Optic Cables

Application Recommendations page 1-270
 Small Aperture Fibers page 1-271
 Miniature Aperture Fibers page 1-277
 Special Purpose Fibers page 1-280
 Custom Fiber Configurator page 1-281
 Sensing Tip Drawings page 1-283
 Standard Bundle Sizes page 1-286
 Accessories page 1-287
 Cross Reference page 1-292

Fiber Optic Cables

Introduction

Selection Process

1. Determine the sensing mode

- Transmitted beam (two separate cables required)
 - Greater distance from sensing tip to the object
 - Reflectivity of the object is low
 - Generally darker colors reflect less light.
- Diffuse (one bifurcated cable)
 - Distance from sensing tip to the object is small
 - Reflectivity of the object is high
 - Generally lighter colors reflect more light.

2. Choose between glass or plastic fiber optic cables

- Glass
 - Higher temperature rating (up to 482°C (900°F) possible)
 - Used with infrared or visible red light sources
 - More expensive.
- Plastic
 - Typically used for visible light sources
 - Lower temperature applications (lower than 70°C (158°F))

3. Mechanical considerations

- Glass has a more restrictive bending radius.
- Select sensing tip configuration based on mounting space availability
 - Threaded tip versus ferruled
 - Straight tip versus 45° or 90° bend
 - Straight tip with light exiting at 90°.

4. Select fiber bundle size for the application.

- The smaller the bundle size, the smaller the light spot size for seeing smaller objects.
- The larger the bundle size, the greater the sensing distance

5. Cable length

- Determine distance from sensor to object including required bending radii
- Longer (custom length) cables have shorter sensing distances due to light loss

- Light loss is approximately 6% per foot for glass and 3% for plastic

- Use of extended range lens assemblies significantly increases sensing distance.

Custom Fiber Optic Cables

Rockwell Automation/Allen-Bradley can provide custom glass fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths up to 15.2 m (50 ft)
- Custom temperature ratings up to 482°C (900°F) applies to glass fiber optic cables
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible
- Reference pages 1-258...1-259 for glass and 1-281...1-282 for plastic.

Note: For more information contact product support at 1.440.646.5800.

ATTENTION



Fiber optic cables are not recommended for explosion-proof applications in hazardous environments. The fiber optic cable can provide a path for explosive fumes to travel from the hazardous area to the safe area.

Sensing Modes

The standard photoelectric sensors, fiber optic sensors are offered in two sensing modes: transmitted beam and diffuse. Reflective sensing can be accomplished in a diffuse mode or retroreflective mode.

Standard **diffuse** sensing with fiber optic cables is similar to sensing with lensed photoelectrics. When adjusted to maximum sensitivity these sensors, using bifurcated fiber optic cables, can detect extremely small targets.

Individual fiber optic cables may be used for more specialized diffuse mode applications. For instance, aiming the two separate sensing tips of the cables at the target can create sharp cutoff, fixed focus and mechanically convergent sensing modes.

Bifurcated Cable (Diffuse/Retroreflective)



Standard **retroreflective** sensing is possible with fiber optics, but polarized retroreflective sensing is not. In some applications, it will be necessary to

reduce the sensitivity of the sensor to prevent diffuse detection of the target.

Transmitted beam sensing, the most reliable sensing mode, requires two

individual fiber optic cables. Targets are detected when they break the light path established between the emitter and receiver cables.

Individual Cable (Transmitted Beam)



Sensing End Tip Selection

One of the most important decisions to be made when selecting fiber optic cables is the sensing end tip configuration. Among the many considerations:

- Size of the object to be sensed
- Rate of travel of the target object

- Distance to the object
- Mounting options
- Environmental conditions
- Moving parts surrounding the object
- Sensing mode

Based on these factors, there are many sensing tips to select from offering

various fiber diameters and arrays, bending radii, threaded and smooth body configurations, etc. The following pages are designed to assist in the selection of the proper sensing end tip for the application. Once a selection has been made, proceed to the fiber optic cables section to select the appropriate fiber optic cable part number.

45FVL/45FSL Light Source Selector Guide for Color Contrast Sensing

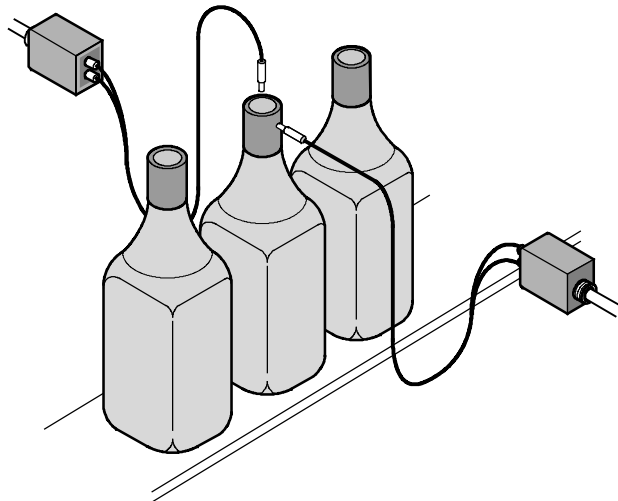
| Background | Target | | | | | | |
|------------|----------|----------|----------|----------|----------|----------|----------|
| | White | Yellow | Orange | Red | Green | Blue | Black |
| White | 1 | B | B | B | R | R | R |
| Yellow | B | 1 | G | G | R | R | R |
| Orange | B | G | 1 | G | G | G | R |
| Red | B | G | G | 1 | R | B | R |
| Green | R | R | G | R | 1 | B | G |
| Blue | R | R | G | B | B | 1 | B |
| Black | R | R | R | R | G | B | 1 |

R = Red; B = Blue; G = Green

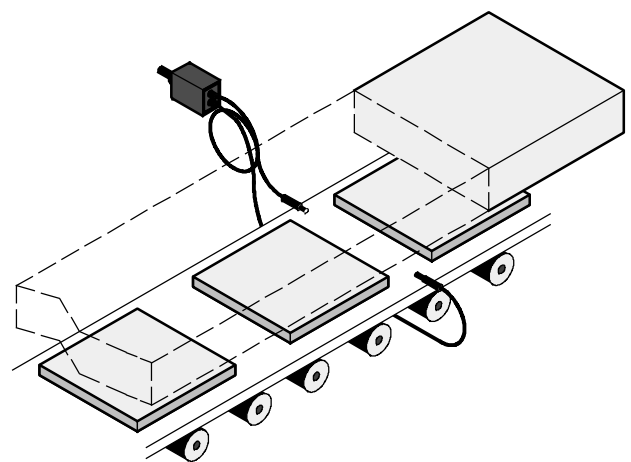
1 45CLR ColorSight sensor suggested for shades of same color.

Note: White LED light source can be used selectively in place of red, blue and green.

Cork Detection with Bifurcated Fiber Optic Cables

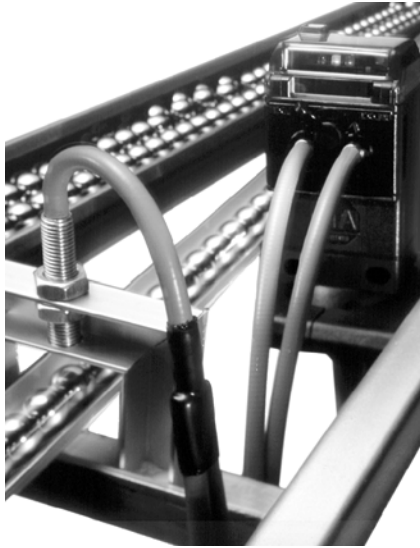


Work Piece Detection with Individual Fiber Optic Cables



Glass Fiber Optic Cables

Introduction



Application Recommendations

1. Many glass fiber optic cables are available with different glass fiber bundle diameters.
Larger diameter bundles contain more fibers to carry light between the sensor and application. These cables will generally offer **longer sensing ranges**.
Smaller diameter bundles provide greater resolution and the ability to detect smaller targets.
2. Glass fiber optic cables can be applied in high shock and vibration applications, but secure the cables to prevent excess flexing. Do not use glass cables in applications where they are constantly flexing. **They will break.** Plastic fiber optic cables provide better performance in these applications.
3. Avoid sharp bends. The individual glass fibers in the cable can be broken. Don't exceed the following bend tolerances with PVC sheathed cables:

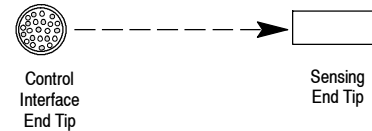
Minimum Cable Bend Radius

| Bundle Diameter [mm (in.)] | Minimum Bend Radius [mm (in.)] |
|----------------------------|--------------------------------|
| 0.68 (0.027) | 12.7 (0.50) |
| 1.16 (0.046) | 12.7 (0.50) |
| 1.6 (0.063) | 15.8 (0.625) |
| 2.28 (0.090) | 15.8 (0.625) |
| 3.17 (0.125) | 19.0 (0.75) |
| 3.96 (0.156) | 25.4 (1.0) |
| 4.57 (0.180) | 31.7 (1.25) |

4. Glass fiber optic cables cannot be cut, spliced or repaired.
5. Glass fiber optic cables tip cannot be bent. Only special plastic fiber optic cable sensing end tips can be bent as specified in the Selection Guide. When using bendable end tips, bend should not be attempted closer than 19 mm (0.75 in.) to the sensing end of the cable.
6. Some applications call for glass fiber optic cables to be used to isolate the sensor from **high voltage**. Custom cables with special nonconductive components must be ordered for these applications.
7. X-RAY or GAMMA radiation will cause glass fibers to eventually become opaque. Custom cables constructed with special optical quartz fibers must be ordered for use in areas with **high radiation**.
8. Use Transmitted Beam sensing in **submerged applications** when possible. Spiral-wound stainless steel sheathing is generally not suitable for wet applications. Fiber optic cables with PVC sheathing should be used for these applications.
9. A glass fiber optic sensor with a **bifurcated** cable can provide **retroreflective** or **diffuse sensing** depending upon the distance to the target and the sensitivity adjustment on the sensor. If the sensor and

cable are to be used for retroreflective sensing, the sensitivity of the sensor must be adjusted low enough to avoid unwanted diffuse response from the targets to be sensed.

10. Glass fiber optic cables have a wide **field of view**, typically 82°. A smaller field of view can be achieved by attaching an Extended Range Lens Assembly to the sensing end of the fiber. These lens assemblies will also increase the available sensing distance. Refer to the Accessories section for more information.
11. Most glass fiber optic cables have round sensing tips with the glass fibers arranged in a circular configuration. Other cables such as 43GT-FIS40SL offer sensing tips with a **rectangular shaped opening** for the glass fibers, referred to as "slotted" cables (see illustration below).



Use these equivalent diameters to determine the approximate performance of slotted cables.

| Slot Dimensions [mm (in.)] | Round Sensing Tip Equivalent Diameter [mm (in.)] |
|----------------------------|--|
| 2.5 x 0.5 (0.1 x 0.02) | 1.2 (0.046) |
| 0.5 x 2.5 (0.02 x 0.1) | 1.2 (0.046) |
| 5.1 x 0.25 (2.0 x 0.01) | 1.2 (0.046) |
| 9.7 x 0.8 (0.382 x 0.032) | 3.1 (0.125) |

Formula:
Approximate diameter = 1.128 x $\sqrt{\text{Length} \times \text{Width}}$

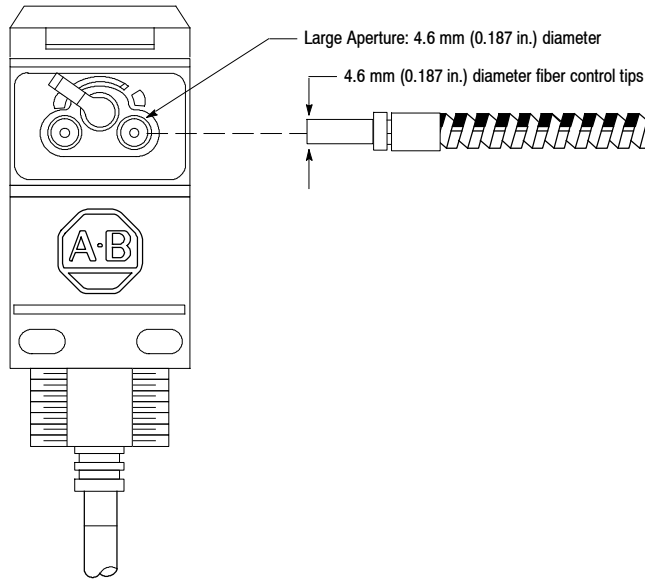
ATTENTION



Fiber optic cables are not recommended for explosion-proof applications in hazardous environments. The fiber optic cable can provide a path for explosive fumes to travel from the hazardous area to the safe area.

Glass Fiber Optic Cables**Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]****Glass Fiber Optic Cables for use with Large Aperture Sensors**

The fiber optic cables on pages 1-236...1-250 are for use with the large aperture sensors shown below.

42GxF-900x**Large Aperture Sensors:**

42SRF-60xx
42SRF-65xx



42GTGF-100x0
42GTGF-103x0



42xRx-5x00FO



42GxF-900x



42EF-G1xxA



42KL-G1xxx

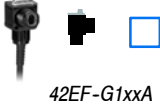
Note: Nominal Sensing Distance

- Due to the variation between fiber optic cables, sensing distance can vary widely
- The sensing distance of bifurcated cables is measured with white paper (90% reflectivity). Other surfaces may be less reflective and therefore would have shorter sensing distances.
- The published numbers are based on extensive testing and are conservative
- The sensing distance of transmitted beam cables is measured from tip to tip
- Application considerations that effect distance
 - Sensor selected
 - Reflectivity of target
 - Environment
 - Accessories such as range extending lenses
 - Length of the cable
- Consult with product support for additional information.

All dimensions indicated are typical. The fiber optic cables on pages 1-236...1-250 are for use with large aperture sensors as seen on the following pages:

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]



Approximate Metric / Standard Distances

| | | | | | | | |
|---|----|-----|-----|-----|-----|-----|-----|
| 0 | 50 | 100 | 150 | 200 | 250 | 300 | mm |
| 0 | 2 | 4 | 6 | 8 | 10 | 12 | in. |

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. | |
|-----------------------------------|---------------------------------|----------------------------------|--------------------|-----------------------|--------------|--------------|
| | Brass | 3.2 (0.125) | Stainless Steel | | 43GR-TBB25SL | |
| | | | PVC | | 43GR-TBB25ML | |
| | | 1.6 (0.062) | Stainless Steel | | 43GR-TBB15SL | |
| | | | PVC | | 43GR-TBB15ML | |
| | | 4.0 (0.156) | Stainless Steel | | 43GR-TBB30SL | |
| | | | PVC | | 43GR-TBB30ML | |
| | 2.5 x 0.5 (0.1 x 0.02) E-W Slot | Stainless Steel | | 43GR-TBB40SL | | |
| | | PVC | | 43GR-TBB40ML | | |
| | | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GR-TBS15SL |
| | | | | PVC | | 43GR-TBS15ML |
| | | 3.2 (0.125) | Stainless Steel | | 43GR-TBS25SL | |
| | | | PVC | | 43GR-TBS25ML | |
| | Stainless Steel | 2.3 (0.09) | Stainless Steel | | 43GR-TAS20SL | |
| | | | PVC | | 43GR-TAS20ML | |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-TFS10SL | |
| | | | PVC | | 43GR-TFS10ML | |
| | Brass | 4.6 (0.180) | Stainless Steel | | 43GR-TGB33SL | |
| | | | PVC | | 43GR-TGB33ML | |
| | Brass | 3.2 (0.125) | Stainless Steel | | 43GR-XDB25SL | |
| | | | PVC | | 43GR-XDB25ML | |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-TCS10SL | |
| | | | PVC | | 43GR-TCS10ML | |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|---------------------------|---------------------------------------|--------------------|-----------------------|---------------------|
| | Brass/ Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-TMC25SL |
| | | | PVC | | 43GR-TMC25ML |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GR-TMC15SL |
| | | | PVC | | 43GR-TMC15ML |
| | Brass/ Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-TQC25SL |
| | | | PVC | | 43GR-TQC25ML |
| | Stainless Steel | 2.5 x 0.5 (0.1 x 0.02) E-W Slot | Stainless Steel | | 43GR-TQC40SL |
| | | | PVC | | 43GR-TQC40ML |
| | Stainless Steel | 4.0 (0.156) | Stainless Steel | | 43GR-TRC30SL |
| | | | PVC | | 43GR-TRC30ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-TXC25SL |
| | | | PVC | | 43GR-TXC25ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-THC25SL |
| | | | PVC | | 43GR-THC25ML |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. | |
|-----------------------------------|------------------------------|------------------------------------|--------------------|--|--------------|--------------|
| | Brass/ Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-TKC25SL | |
| | | | PVC | | 43GR-TKC25ML | |
| | Stainless Steel | 2.3 (0.09) | Stainless Steel | | 43GR-TTS20SL | |
| | | | PVC | | 43GR-TTS20ML | |
| | | | Stainless Steel | | | 43GR-TTS10SL |
| | | | | | | PVC |
| | Stainless Steel | 51 x 0.25 (2.0 x 0.01) (N-S) | Stainless Steel | Characterization not available at time of publication | 43GR-TUS46SL | |
| | | | PVC | | 43GR-TUS46ML | |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Ferrule Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-FAS25SL |
| | | | PVC | | 43GR-FAS25ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-FBS25SL |
| | | | PVC | | 43GR-FBS25ML |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GR-MAS00SL |
| | | | PVC | | 43GR-MAS00ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MDS10SL |
| | | | PVC | | 43GR-MDS10ML |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GR-MHS15SL |
| | | | PVC | | 43GR-MHS15ML |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GR-MVS00SL |
| | | | PVC | | 43GR-MVS00ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-FIS25SL |
| | | | PVC | | 43GR-FIS25ML |
| | Stainless Steel | 4.0 (0.156) | Stainless Steel | | 43GR-FJS30SL |
| | | | PVC | | 43GR-FJS30ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MOS10SL |
| | | | PVC | | 43GR-MOS10ML |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Ferrule Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GR-MQS15SL |
| | | | PVC | | 43GR-MQS15ML |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GR-MKS00SL |
| | | | PVC | | 43GR-MKS00ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GR-FGS25SL |
| | | | PVC | | 43GR-FGS25ML |
| | Stainless Steel | 2.3 (0.09) | Stainless Steel | | 43GR-FOS20SL |
| | | | PVC | | 43GR-FOS20ML |
| | Stainless Steel | 2.3 (0.09) | Stainless Steel | | 43GR-FPS20SL |
| | | | PVC | | 43GR-FPS20ML |
| | Stainless Steel | 2.5 x 0.5 (0.1 x 0.02) (E-W) | Stainless Steel | | 43GR-FRS40SL |
| | | | PVC | | 43GR-FRS40ML |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Block Bifurcated Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheath. Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|---------------------------------------|------------------|---|--------------|
| | Aluminum | 9.7 x 0.8 (0.382 x 0.032) (E-W) | Stainless Steel | 120 mm Nominal | 43GR-BAA72SL |
| | | | PVC | | 43GR-BAA72ML |
| | Aluminum | 38.1 x 0.3 (1.5 x 0.01) | Stainless Steel | Characterization not available at time of publication | 43GR-BCA73SL |
| | | | PVC | | 43GR-BCA73ML |
| | Aluminum | 25.4 x 0.4 (1.0 x 0.015) | Stainless Steel | Characterization not available at time of publication | 43GR-BRA79SL |
| | | | PVC | | 43GR-BRA79ML |
| | Aluminum | 3.9 x 0.5 (0.154 x 0.02) | Stainless Steel | Characterization not available at time of publication | 43GR-BTA70SL |
| | | | PVC | | 43GR-BTA70ML |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|---------------------------|----------------------------------|--------------------|-----------------------|---------------------|
| | Brass | 3.2 (0.125) | Stainless Steel | | 43GT-TBB25SL |
| | | | PVC | | 43GT-TBB25ML |
| | | 1.6 (0.062) | Stainless Steel | | 43GT-TBB15SL |
| | | | PVC | | 43GT-TBB15ML |
| | | 4.0 (0.156) | Stainless Steel | | 43GT-TBB30SL |
| | | | PVC | | 43GT-TBB30ML |
| | | 2.5 x 0.5 (0.1 x 0.02) E-W Slot | Stainless Steel | | 43GT-TBB40SL |
| | | | PVC | | 43GT-TBB40ML |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GT-TFS00SL |
| | | | PVC | | 43GT-TFS00ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-TFS10SL |
| | | | PVC | | 43GT-TFS10ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-TYS25SL |
| | | | PVC | | 43GT-TYS25ML |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GT-MRS00SL |
| | | | PVC | | 43GT-MRS00ML |
| | | 1.2 (0.046) | Stainless Steel | | 43GT-MRS10SL |
| | | | PVC | | 43GT-MRS10ML |
| | Brass/ Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GT-TMC15SL |
| | | | PVC | | 43GT-TMC15ML |
| | | 3.2 (0.125) | Stainless Steel | | 43GT-TMC25SL |
| | | | PVC | | 43GT-TMC25ML |

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|---------------------------|----------------------------------|--------------------|-----------------------|---------------------|
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-TMS25SL |
| | | | PVC | | 43GT-TMS25ML |
| | Stainless Steel | 4.0 (0.156) | Stainless Steel | | 43GT-TOC30SL |
| | | | PVC | | 43GT-TOC30ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-TQC25SL |
| | | | PVC | | 43GT-TQC25ML |
| | | 1.6 (0.062) | Stainless Steel | | 43GT-TQC15SL |
| | | | PVC | | 43GT-TQC15ML |
| | | 2.5 x 0.5 (0.1 x 0.02) E-W Slot | Stainless Steel | | 43GT-TQC40SL |
| | | | PVC | | 43GT-TQC40ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-TQS25SL |
| | | | PVC | | 43GT-TQS25ML |
| | Brass/ Stainless Steel | 4.0 (0.156) | Stainless Steel | | 43GT-TRC30SL |
| | | | PVC | | 43GT-TRC30ML |

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|---------------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 4.0 (0.156) | Stainless Steel | | 43GT-TRS30SL |
| | | | PVC | | 43GT-TRS30ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-TWC25SL |
| | | | PVC | | 43GT-TWC25ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MUS10SL |
| | | | PVC | | 43GT-MUS10ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-TXC25SL |
| | | | PVC | | 43GT-TXC25ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-THC25SL |
| | | | PVC | | 43GT-THC25ML |
| | Brass/ Stainless Steel | 4.0 (0.156) | Stainless Steel | | 43GT-TJC30SL |
| | | | PVC | | 43GT-TJC30ML |
| | Brass/ Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-TKC25SL |
| | | | PVC | | 43GT-TKC25ML |

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|------------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 4.0 (0.156) | Stainless Steel | | 43GT-TLC30SL |
| | | | PVC | | 43GT-TLC30ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MSS10SL |
| | | | PVC | | 43GT-MSS10ML |
| | Stainless Steel | 2.3 (0.090) | Stainless Steel | | 43GT-TTC20SL |
| | | | PVC | | 43GT-TTC20ML |
| | Stainless Steel/ Brass | 2.5 x 0.5 (0.1 x 0.02) (E-W) | Stainless Steel | | 43GT-TZC40SL |
| | | | PVC | | 43GT-TZC40ML |
| | Stainless Steel | 51 x 0.25 (2.0 x 0.01) (N-S) | Stainless Steel | 130 mm Nominal | 43GT-TUS46SL |
| | | | PVC | | 43GT-TUS46ML |

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Ferrule Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-FAS25SL |
| | | | PVC | | 43GT-FAS25ML |
| | | 4.0 (0.156) | Stainless Steel | | 43GT-FAS30SL |
| | | | PVC | | 43GT-FAS30ML |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GT-MBS00SL |
| | | | PVC | | 43GT-MBS00ML |
| | | 1.2 (0.046) | Stainless Steel | | 43GT-MBS10SL |
| | | | PVC | | 43GT-MBS10ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MCS10SL |
| | | | PVC | | 43GT-MCS10ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MDS10SL |
| | | | PVC | | 43GT-MDS10ML |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GT-MHS15SL |
| | | | PVC | | 43GT-MHS15ML |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GT-MIS15SL |
| | | | PVC | | 43GT-MIS15ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-FIS25SL |
| | | | PVC | | 43GT-FIS25ML |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | | 43GT-FSS25SL |
| | | | PVC | | 43GT-FSS25ML |

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Ferrule Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MMS10SL |
| | | | PVC | | 43GT-MMS10ML |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MOS10SL |
| | | | PVC | | 43GT-MOS10ML |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GT-MKS00SL |
| | | | PVC | | 43GT-MKS00ML |
| <p>Side View Sensing</p> | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-FOS10SL |
| | | | PVC | | 43GT-FOS10ML |
| | | 2.3 (0.09) | Stainless Steel | | 43GT-FOS20SL |
| | | | PVC | | 43GT-FOS20ML |
| <p>Side View Sensing</p> | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-FPS10SL |
| | | | PVC | | 43GT-FPS10ML |
| | | 2.3 (0.09) | Stainless Steel | | 43GT-FPS20SL |
| | | | PVC | | 43GT-FPS20ML |
| | Stainless Steel | 51 x 0.25 (2.0 x 0.01) (N-S) | Stainless Steel | 130 mm Nominal | 43GT-FQS46SL |
| | | | PVC | | 43GT-FQS46ML |
| <p>Side View Sensing</p> | Stainless Steel | 2.5 x 0.5 (0.1 x 0.02) | Stainless Steel | | 43GT-FRS40SL |
| | | | PVC | | 43GT-FRS40ML |

43GT Glass Fiber Optic Cables

Block Transmitted Beam Cables for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|---------------------------------------|--------------------|---|--------------|
| | Aluminum | 9.7 x 0.8 (0.382 x 0.032) (E-W) | Stainless Steel | 500 mm Nominal | 43GT-BAA72SL |
| | | | PVC | | 43GT-BAA72ML |
| | Aluminum | 38 x 0.25 (1.5 x 0.01) (E-W) | Stainless Steel | Characterization not available at time of publication | 43GT-BCA73SL |
| | | | PVC | | 43GT-BCA73ML |
| | Aluminum | 9.7 x 0.8 (0.382 x 0.032) (E-W) | Stainless Steel | Characterization not available at time of publication | 43GT-BEA72SL |
| | | | PVC | | 43GT-BEA72ML |

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Bifurcated Specialty Cable for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|----------------------------------|--------------------|---|---------------|
| | Brass | 2.8 (0.11) | Stainless Steel | Characterization not available at time of publication | 43GR-4TBB22SL |
| | Stainless Steel | 3.2 (0.125) | Stainless Steel | Characterization not available at time of publication | 43GR-2FAS25SL |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Transmitted Beam Specialty for Large Aperture Sensors [4.6 mm (0.187 in.)]

| Approximate Dimensions [mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheath Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|----------------------|----------------------------------|-----------------|---|---------------|
| | Brass | 1.6 (0.062) (x6) | Stainless Steel | Characterization not available at time of publication | 43GT-6TBB15SL |
| | Stainless Steel | 2.3 (0.090) (x2) | Stainless Steel | 200 mm Nominal | 43GT-2FAS20SL |

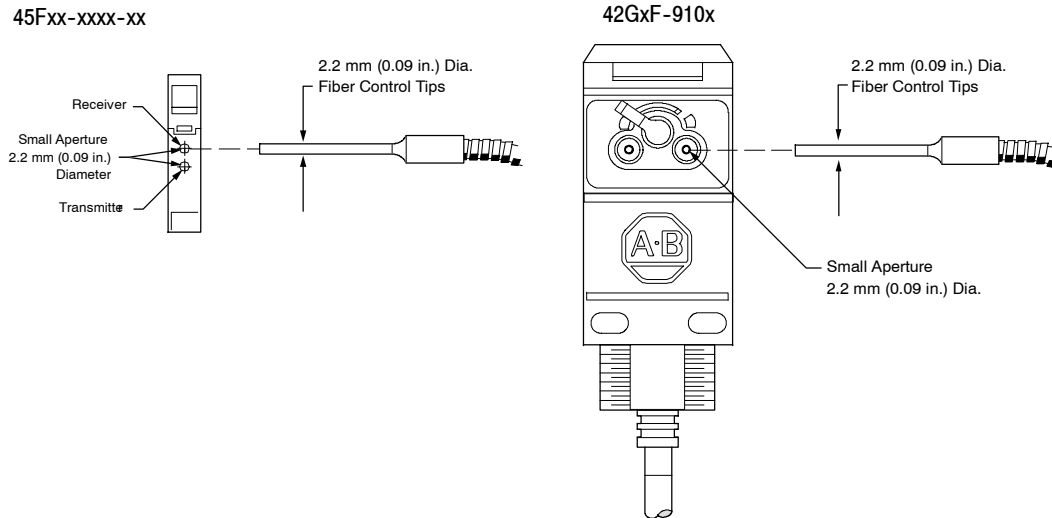
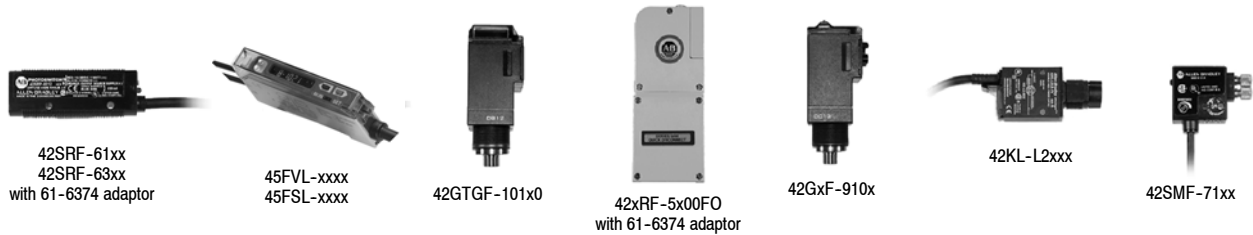
Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Glass Fiber Optic Cables

Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

Glass Fiber Optic Cables for use with Small Aperture Sensors

The glass fiber optic cables on pages 1-252...1-257 are for use with small aperture sensors.

**Small Aperture Sensors:****Note: Nominal Sensing Distance**

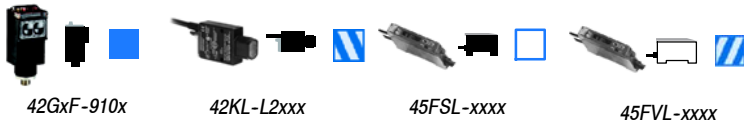
- Due to the variation between fiber optic cables, sensing distance can vary widely
- The published numbers are based on extensive testing and are conservative
- The sensing distance of bifurcated cables is measured with white paper (90% reflectivity). Other surfaces may be less reflective and therefore would have shorter sensing distances.
- The sensing distance of transmitted beam cables is measured from tip to tip
- Application considerations that effect distance
 - Sensor selected
 - Reflectivity of target
 - Environment
 - Accessories such as range extending lenses
- Consult with product support for additional information.

All dimensions indicated are typical.

43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

The fiber optic cables on pages 1-252...1-257 are for use with small aperture sensors including the following:



Approximate Metric / Standard Distances

| | | | | | | | |
|---|----|-----|-----|-----|-----|-----|-----|
| 0 | 50 | 100 | 150 | 200 | 250 | 300 | mm |
| 0 | 2 | 4 | 6 | 8 | 10 | 12 | in. |

| Dimensions—[mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Brass | 2.2 (0.09) | Stainless Steel | | 43GR-TAB20SS |
| | | | PVC | | 43GR-TAB20MS |
| | Stainless Steel | 2.2 (0.09) | Stainless Steel | | 43GR-TAS20SS |
| | | | PVC | | 43GR-TAS20MS |
| | Stainless Steel | 2.2 (0.09) | Stainless Steel | | 43GR-TBS20SS |
| | | | PVC | | 43GR-TBS20MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-XAS10SS |
| | | | PVC | | 43GR-XAS10MS |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GR-MRS00SS |
| | | | PVC | | 43GR-MRS00MS |
| | Stainless Steel | 2.2 (0.09) | Stainless Steel | | 43GR-TMS20SS |
| | | | PVC | | 43GR-TMS20MS |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

PHOTOSWITCH® Photoelectric Sensors
43GR Glass Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Dimensions—[mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-TIS10SS |
| | | | PVC | | 43GR-TIS10MS |
| | Stainless Steel | 2.2 (0.09) | Stainless Steel | | 43GR-TQS20SS |
| | | | PVC | | 43GR-TQS20MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-TDS10SS |
| | | | PVC | | 43GR-TDS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MUS10SS |
| | | | PVC | | 43GR-MUS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MSS10SS |
| | | | PVC | | 43GR-MSS10MS |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GR Glass Fiber Optic Cables

Ferrule Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Dimensions—[mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GR-MAS00SS |
| | | | PVC | | 43GR-MAS00MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MDS10SS |
| | | | PVC | | 43GR-MDS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-FTS10SS |
| | | | PVC | | 43GR-FTS10MS |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GR-MKS00SS |
| | | | PVC | | 43GR-MKS00MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MOS10SS |
| | | | PVC | | 43GR-MOS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MYS10SS |
| | | | PVC | | 43GR-MYS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GR-MJS10SS |
| | | | PVC | | 43GR-MJS10MS |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Threaded Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Dimensions—[mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Brass | 1.6 (0.062) | Stainless Steel | | 43GT-TAB15SS |
| | | | PVC | | 43GT-TAB15MS |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GT-TAS15SS |
| | | | PVC | | 43GT-TAS15MS |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GT-TBS15SS |
| | | | PVC | | 43GT-TBS15MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-XAS10SS |
| | | | PVC | | 43GT-XAS10MS |
| | Stainless Steel | 0.7 (0.027) | Stainless Steel | | 43GT-MRS00SS |
| | | | PVC | | 43GT-MRS00MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-TIS10SS |
| | | | PVC | | 43GT-TIS10MS |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GT-TMS15SS |
| | | | PVC | | 43GT-TMS15MS |
| | Stainless Steel | 1.6 (0.062) | Stainless Steel | | 43GT-TQS15SS |
| | | | PVC | | 43GT-TQS15MS |

Note: Two transmitted beam fiber cables required for each sensor.
 Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

43GT Glass Fiber Optic Cables

Threaded Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Dimensions—[mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-TDS10SS |
| | | | PVC | | 43GT-TDS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MUS10SS |
| | | | PVC | | 43GT-MUS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MSS10SS |
| | | | PVC | | 43GT-MSS10MS |

Note: Two transmitted beam fiber cables required for each sensor.
Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

PHOTOSWITCH® Photoelectric Sensors
43GT Glass Fiber Optic Cables

Ferrule Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Dimensions—[mm (in.)] | Sensing Tip Material | Fiber Bundle Diameter [mm (in.)] | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------|----------------------|----------------------------------|--------------------|-----------------------|--------------|
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MAS10SS |
| | | | PVC | | 43GT-MAS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MDS10SS |
| | | | PVC | | 43GT-MDS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-FTS10SS |
| | | | PVC | | 43GT-FTS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MJS10SS |
| | | | PVC | | 43GT-MJS10MS |
| | Stainless Steel | 1.2 (0.046) | Stainless Steel | | 43GT-MYS10SS |
| | | | PVC | | 43GT-MYS10MS |
| | Aluminum | 6.35 x 0.3 (0.25 x 0.012) | Stainless Steel | 215 mm Nominal | 43GT-BSA80SS |
| | | | PVC | | 43GT-BSA80MS |
| | | | | | |

Note: Standard length for glass fiber optic cables is 0.91 m (36 in.) tip to tip.

Glass Fiber Optic Cables

Additional Cables for Large Aperture Sensors [4.6 mm (0.187 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

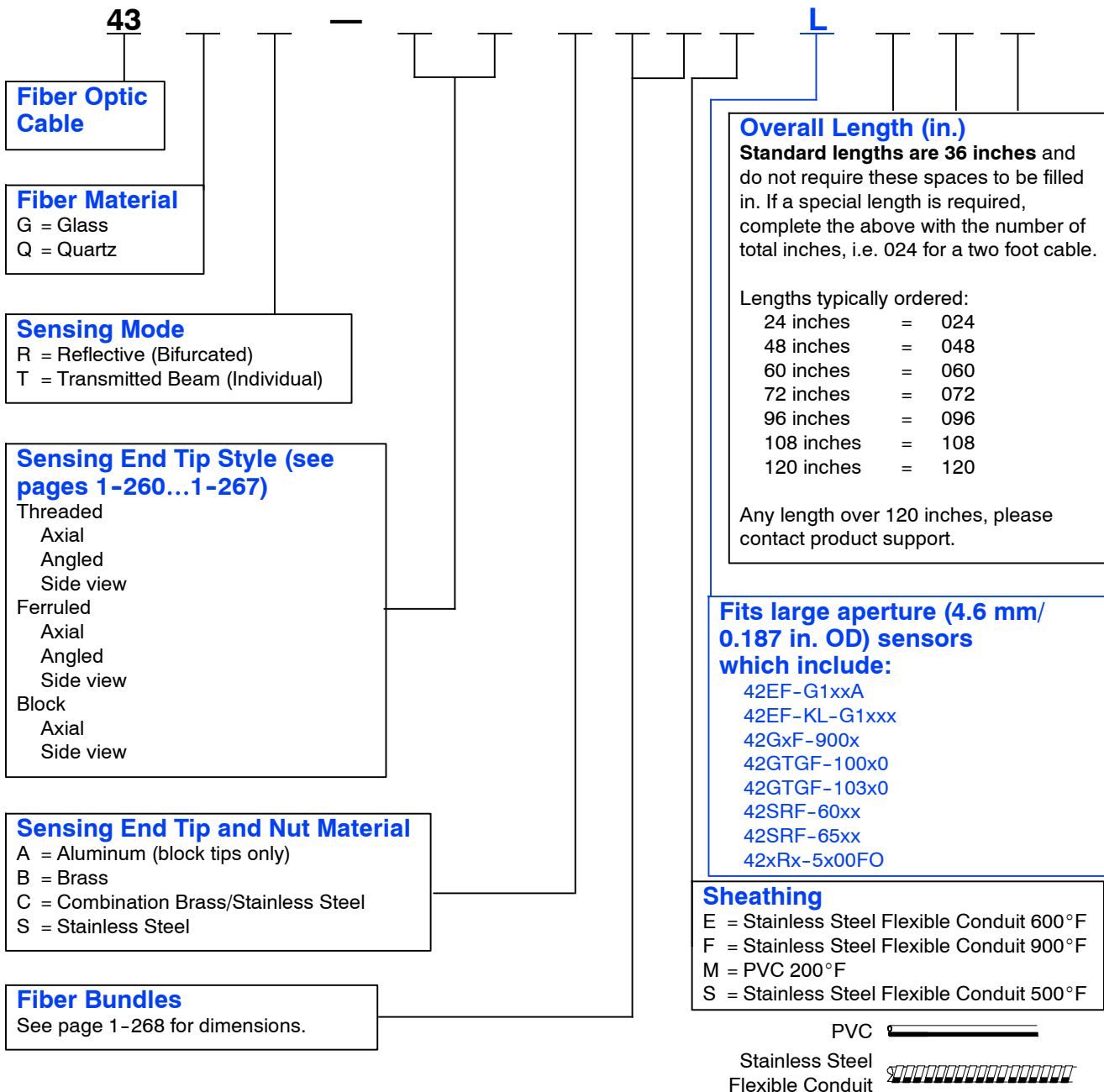
Rockwell Automation/Allen-Bradley can provide custom glass fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths up to 15.2 m (50 ft)
- Custom temperature ratings up to 482°C (900°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

To Build a Custom Fiber Optic for a Large Aperture Sensor:



Glass Fiber Optic Cables

Additional Cables for Small Aperture Sensors [2.2 mm (0.09 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

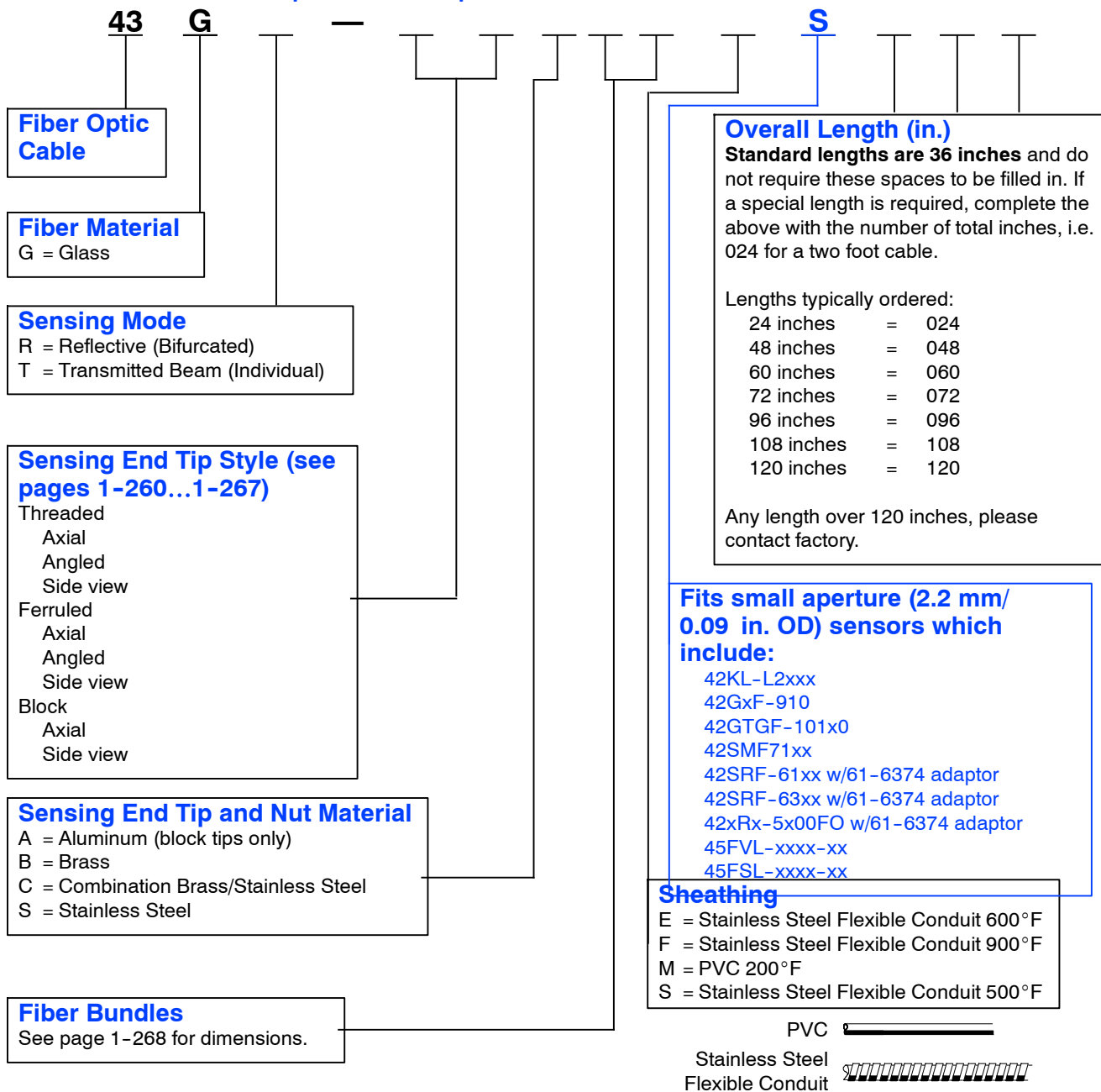
Rockwell Automation/Allen-Bradley can provide custom glass fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths up to 15.2 m (50 ft)
- Custom temperature ratings up to 482°C (900°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

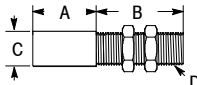
For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

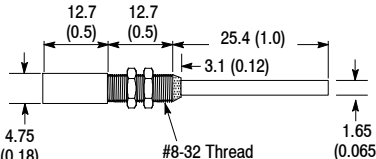
To Build a Custom Fiber Optic for Small Aperture Sensor:

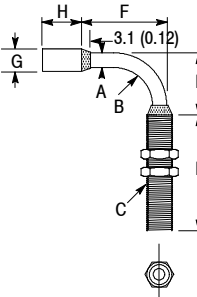


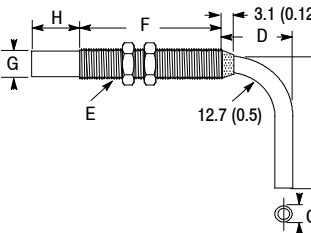
Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | [mm (in.)] | Approximate Dimensions [mm (in.)] | | | |
|---|------|-------------|-----------------------------------|--------------|--------------|-----------------|
| | | | A | B | C | D |
|  | TA | 2.29 (0.09) | 10.16 (0.40) | 11.18 (0.44) | 5.84 (0.23) | M6 x 1 class 6g |
| | TB | 3.2 (0.125) | 13.46 (0.53) | 38.1 (1.5) | 7.92 (0.312) | 5/16 x 24 UNF |
| | TF | 3.2 (0.125) | 13.46 (0.53) | 12.7 (0.5) | 4.45 (0.175) | #8-32 |
| | TG | 1.2 (0.046) | 13.46 (0.53) | 38.1 (1.5) | 9.53 (0.375) | 3/8 x 24 UNF |
| | TV | 4.0 (0.156) | 13.46 (0.53) | 139.7 (5.5) | 7.92 (0.312) | 5/16 x 24 UNF |
| | TY | 3.2 (0.125) | 13.46 (0.53) | 101.6 (4.0) | 7.62 (0.3) | 5/16 x 24 UNF |
| | XA | 1.2 (0.046) | 10.16 (0.40) | 12.7 (0.5) | 4.75 (0.187) | M4 x 0.7 |
| | XB | 1.2 (0.046) | 10.16 (0.40) | 12.7 (0.5) | 4.75 (0.187) | M6 x 0.75 |
| | XD | 3.2 (0.125) | 13.46 (0.53) | 15.24 (0.6) | 7.92 (0.312) | 5/16 x 24 UNF |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|---|------|----------------------------|
|  | MR | 1.2 (0.046) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Approximate Dimensions [mm (in.)] | | | | | | | |
|--|------|----------------------------|-----------------------------------|-------------|-----------|------------|-------------|------------|--------------|--------------|
| | | | A | B | C | D | E | F | G | H |
|  | TM | 3.2 (0.125) | 4.75 (0.187) | 12.7 (0.5) | 5/16 x 24 | 38.1 (1.5) | 20.3 (0.8) | 27.9 (1.1) | 7.49 (0.295) | 15.8 (0.625) |
| | TO | 4.0 (0.156) | 5.54 (0.218) | 12.7 (0.5) | 5/16 x 24 | 38.1 (1.5) | 20.3 (0.8) | 27.9 (1.1) | 7.49 (0.295) | 15.8 (0.625) |
| | TC | 1.2 (0.046) | 2.36 (0.093) | 6.35 (0.25) | 8 - 32 | 12.7 (0.5) | 9.65 (0.38) | 15.2 (0.6) | 4.45 (0.175) | 15.8 (0.625) |
| | TI | 1.2 (0.046) | 2.36 (0.093) | 3.81 (0.15) | M6 x 0.75 | 15.2 (0.6) | 8.89 (0.35) | 12.7 (0.5) | 4.75 (0.187) | 10.1 (0.40) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Approximate Dimensions [mm (in.)] | | | | | | | |
|--|------|----------------------------|-----------------------------------|--------------|--------------|-----------|------------|--------------|--------------|--|
| | | | B | C | D | E | F | G | H | |
|  | TQ | 3.2 (0.125) | 27.9 (1.1) | 4.75 (0.187) | 15.75 (0.62) | 5/16 x 24 | 38.1 (1.5) | 7.92 (0.312) | 13.97 (0.55) | |
| | TR | 3.98 (0.156) | 27.9 (1.1) | 5.54 (0.218) | 18.29 (0.72) | 5/16 x 24 | 38.1 (1.5) | 7.92 (0.312) | 13.97 (0.55) | |
| | TW | 3.2 (0.125) | 40.6 (1.6) | 4.75 (0.187) | 15.75 (0.62) | 5/16 x 24 | 38.1 (1.5) | 7.92 (0.312) | 13.97 (0.55) | |
| | TX | 3.2 (0.125) | 20.6 (0.81) | 4.75 (0.187) | 26.9 (1.06) | 5/16 x 24 | 38.1 (1.5) | 7.92 (0.312) | 13.97 (0.55) | |
| | TD | 1.2 (0.046) | 12.7 (0.5) | 2.36 (0.093) | 8.89 (0.35) | M4 x 0.7 | 12.7 (0.5) | 4.75 (0.187) | 10.16 (0.40) | |

PHOTOSWITCH® Photoelectric Sensors
Glass Fiber Optic Cable Tips
 Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimensions [mm (in.)] | | |
|-----------------------------------|------|----------------------------|-----------------------|-------------|-------------|
| | | | A | B | C |
| | MT | 0.70 (0.027) | 1.09 (0.043) | 2.29 (0.09) | 4.83 (0.19) |
| | MU | 1.2 (0.046) | 1.65 (0.065) | 3.05 (0.12) | 6.35 (0.25) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle—[mm (in.)] | Dimension A [mm (in.)] |
|-----------------------------------|------|----------------------------|------------------------|
| | TH | 3.2 (0.125) | 4.75 (0.187) |
| | TJ | 4.0 (0.156) | 5.54 (0.218) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimension A [mm (in.)] |
|-----------------------------------|------|----------------------------|------------------------|
| | TK | 3.2 (0.125) | 4.75 (0.187) |
| | TL | 4.0 (0.156) | 5.54 (0.218) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|----------------------------|
| | MS | 1.2 (0.046) |

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimension A [mm (in.)] |
|-----------------------------------|------|----------------------------|------------------------|
| | TT | 2.29 (0.09) | 3.2 (0.125) |
| | TZ | 2.5 x 0.5 (0.1 x 0.02) | 3.94 (0.155) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|----------------------------|
| | TU | 51 x 0.3 (2.0 x 0.01) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimensions [mm (in.)] | |
|-----------------------------------|------|----------------------------|-----------------------|-------------|
| | | | A | B |
| | FA | 3.2 (0.125) | 12.7 (0.5) | 12.7 (0.5) |
| | FB | | 12.7 (0.5) | 26.9 (1.06) |
| | FC | | 12.7 (0.5) | 31.7 (1.25) |
| | FD | | 12.7 (0.5) | 50.8 (2.0) |
| | FE | | 35.5 (1.4) | 76.2 (3.0) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimension A [mm (in.)] |
|-----------------------------------|------|----------------------------|------------------------|
| | MA | 0.70 (0.027) | 1.09 (0.043) |
| | MC | 1.2 (0.046) | 1.65 (0.065) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimensions [mm (in.)] | | | |
|-----------------------------------|------|----------------------------|-----------------------|------------|-------------|------------|
| | | | A | B | C | D |
| | MD | 1.2 (0.046) | 1.65 (0.065) | 12.7 (0.5) | 4.06 (0.16) | 25.4 (1.0) |
| | MG | 1.2 (0.046) | | 35.5 (1.4) | 7.87 (0.31) | |
| | MH | 1.6 (0.062) | 2.36 (0.093) | 35.5 (1.4) | 7.87 (0.31) | 76.2 (3.0) |
| | MI | 1.6 (0.062) | | 12.7 (0.5) | 7.87 (0.31) | 25.4 (1.0) |

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | [mm (in.)] | Dimensions [mm (in.)] | |
|-----------------------------------|-----------|--------------|-----------------------|------------|
| | | | A | B |
| | MB | 1.2 (0.046) | 1.65 (0.065) | 25.4 (1.0) |
| | MF | 1.2 (0.046) | 1.65 (0.065) | 50.8 (2.0) |
| | MV | 0.70 (0.027) | 1.09 (0.043) | 12.7 (0.5) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimensions [mm (in.)] | | | | |
|-----------------------------------|-----------|----------------------------|-----------------------|--------------|--------------|--------------|--------------|
| | | | A | B | C | D | E |
| | FI | 3.2 (0.125) | 27.9 (1.1) | 20.3 (0.8) | 4.75 (0.187) | 7.49 (0.295) | 15.8 (0.625) |
| | FJ | 4.0 (0.156) | 27.9 (1.1) | 25.4 (1.0) | 5.54 (0.218) | 7.49 (0.295) | 15.8 (0.625) |
| | FK | 3.2 (0.125) | 27.9 (1.1) | 27.9 (1.1) | 4.75 (0.187) | 7.49 (0.295) | 15.8 (0.625) |
| | FL | 3.2 (0.125) | 27.9 (1.1) | 35.0 (1.38) | 4.75 (0.187) | 7.49 (0.295) | 15.8 (0.625) |
| | FM | 3.2 (0.125) | 47.7 (1.88) | 47.7 (1.88) | 4.75 (0.187) | 7.49 (0.295) | 15.8 (0.625) |
| | FT | 2.2 (0.09) | 12.7 (0.5) | 10.16 (0.40) | 2.36 (0.093) | 4.75 (0.187) | 10.4 (0.4) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimensions [mm (in.)] | | |
|-----------------------------------|-----------|----------------------------|-----------------------|------------|--------------|
| | | | A | B | C |
| | FS | 3.2 (0.125) | 27.9 (1.1) | 20.3 (0.8) | 4.75 (0.187) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|-----------|----------------------------|
| | ML | 1.2 (0.046) |

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimensions [mm (in.)] | | | | | |
|-----------------------------------|------|----------------------------|-----------------------|--------------|-------------|------------|-------------|-------------|
| | | | A | B | C | D | E | F |
| | MM | 1.2 (0.046) | 1.65 (0.065) | 12.7 (0.5) | 4.06 (0.16) | 25.4 (1.0) | 6.35 (0.25) | 3.05 (0.12) |
| | MO | 1.2 (0.046) | 1.65 (0.065) | 35.5 (1.4) | 7.87 (0.31) | 25.4 (1.0) | 6.35 (0.25) | 3.05 (0.12) |
| | MQ | 1.6 (0.062) | 2.36 (0.083) | 35.5 (1.4) | 7.87 (0.31) | 25.4 (1.0) | 6.35 (0.25) | 3.05 (0.12) |
| | MY | 1.2 (0.046) | 1.57 (0.062) | 10.16 (0.40) | 4.83 (0.19) | 12.7 (0.5) | 4.83 (0.19) | 3.05 (0.12) |

| Approximate Dimensions [mm (in.)] | Code | [mm (in.)] | Dimensions [mm (in.)] | | | |
|-----------------------------------|------|--------------|-----------------------|------------|-------------|-------------|
| | | | A | B | C | D |
| | MK | 0.70 (0.027) | 1.09 (0.043) | 25.4 (1.0) | 4.83 (0.19) | 2.29 (0.09) |
| | MN | 1.2 (0.046) | 1.65 (0.065) | 12.7 (0.5) | 31.7 (1.25) | 19 (0.75) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimension A [mm (in.)] |
|-----------------------------------|------|----------------------------|------------------------|
| | FG | 3.2 (0.125) | 4.75 (0.187) |
| | FH | 4.0 (0.156) | 5.54 (0.218) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|----------------------------|
| | MJ | 1.2 (0.046) |

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|--|------|----------------------------|
| <p>Side View Sensing</p> <p>Stainless Steel (Type 303) Fitting</p> | FO | 2.29 (0.09) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] | Dimension A [mm (in.)] |
|-----------------------------------|------|---------------------------------|------------------------|
| <p>Side View Sensing</p> <p>A</p> | FP | 2.29 (0.09) | 3.2 (0.125) |
| | FR | 0.5 x 2.5 (0.2 x 0.01) N-S slot | 3.94 (0.155) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|--------------------------------|
| | FQ | 51 x 0.3 (2.0 x 0.01) N-S slot |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|---------------------------------|
| | BA | 9.7 x 0.8 (0.382 x 0.032) (E-W) |

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|----------------------------|
| | BC | 38.1 x 0.3 (1.5 x 0.01) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|----------------------------|
| | BR | 25.4 x 0.4 (1.0 x 0.015) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|----------------------------|
| | BT | 3.9 x 0.5 (0.154 x 0.02) |

Glass Fiber Optic Cable Tips

Use with Configurators on page 1-258 and 1-259.

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|------------------------------------|
| | BE | 9.7 x 0.8 (0.382 x 0.032) (E-W) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|----------------------------|
| | BP | 2.79 x 2.79 (0.11 x 0.11) |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm (in.)] |
|-----------------------------------|------|------------------------------------|
| | BS | 0.3 x 6.35 (0.012 x 0.25) N-S slot |

Glass Fiber Optic Cable Tips

Bundle Sizes

These bundle size codes are used with the configurators on page 1-258 and 1-259.

Glass Fiber Bundle with Cylindrical Sensing End Tips

| Code | Diameter | | Arrangement | 2.2 mm Control End Tip | | 4.6 mm Control End Tip | |
|------|-----------|--------------|-------------|------------------------|------------|------------------------|------------|
| | mm | inches | | Transmitted Beam | Bifurcated | Transmitted Beam | Bifurcated |
| 00 | 0.70 | 0.027 | Randomized | X | X | X | X |
| 05 | 0.81 | 0.032 | Randomized | X | X | X | X |
| 10 | 1.2 | 0.046 | Randomized | X | X | X | X |
| 15 | 1.57 | 0.062 | Randomized | X | X | X | X |
| 20 | 2.29 | 0.090 | Randomized | | X | X | X |
| 22 | 2.79 | 0.110 | Randomized | | | X | X |
| 25 | 3.2 | 0.125 | Randomized | | | X | X |
| 30 | 4.0 | 0.156 | Randomized | | | X | X |
| 33 | 4.57 | 0.180 | Randomized | | | | X |
| 35 | 5.59 | 0.220 | Randomized | | | | X |
| 40 | 2.5 x 0.5 | 0.10 x 0.02 | E-W Slot | X | X | X | X |
| 41 | 0.5 x 2.5 | 0.02 x 0.10 | N-S Slot | X | X | X | X |
| 45 | 22 x 0.5 | 0.875 x 0.02 | Randomized | | | X | X |
| 46 | 51 x 0.3 | 2.0 x 0.01 | N-S Slot | | | X | X |

X = Suitable for use with glass fiber bundle.

Glass Fiber Bundle with Block Sensing End Tips

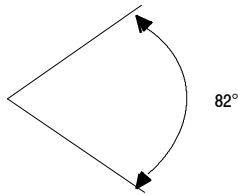
| Code | Diameter | |
|------|------------|---------------|
| | mm | inches |
| 70 | 3.9 x 0.5 | 0.154 x 0.020 |
| 72 | 9.7 x 0.8 | 0.382 x 0.320 |
| 73 | 38 x 0.25 | 1.50 x 0.010 |
| 74 | 51 x 0.25 | 2.00 x 0.010 |
| 77 | 0.4 x 0.25 | 0.154 x 0.010 |
| 78 | 0.3 x 0.25 | 0.110 x 0.110 |
| 79 | 25.4 x 0.4 | 1.00 x 0.015 |
| 80 | 6.4 x 0.3 | 0.25 x 0.012 |

Note: Typical fiber optic cable construction is normally randomized. Other options, such as half or shimmed half moon, are available. Please contact your local Rockwell Automation sales office or Allen-Bradley distributor.

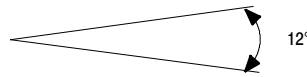
Extended Range Lens Assemblies

Extended range assemblies provide greater sensing range and reduce the field of view for detecting smaller objects at a greater distance. Without the extended range lens assembly the field of view is a divergent beam of 82°, leaving the end of the fiber optic cable tip. With the extended range lens the beam is reduced to 12°, thus permitting the sensing of smaller objects.

Fiber Optic Field of View Standard Fibers (Without Extended Range Lens Assembly)



Fiber Optic Field of View Standard Fibers (With Extended Range Lens Assembly)


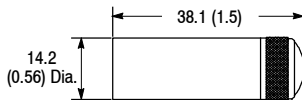

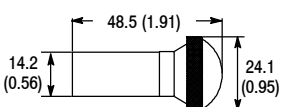

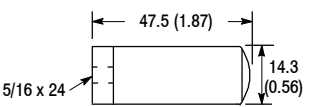
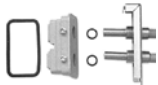
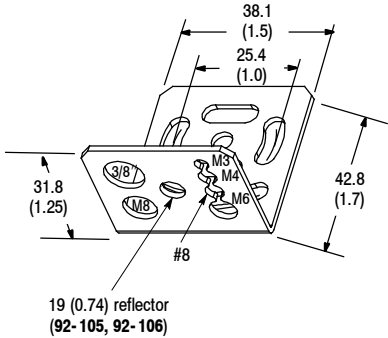
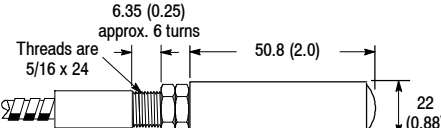


Adjustable Fixed Focus Sensing Lens

Consult your local Rockwell Automation sales office or Allen-Bradley distributor for special applications. All the lens assemblies shown can provide fixed focus sensing with glass fiber optic cables. The distance between the lens and sensing tip can be adjusted, thus varying the focal point and spot size. An example of this using the Cat. No. 60-1844 lens is shown as follows:

| [mm (in.)] | Spot Size (Diameter [mm (in.)]) | Focus Range [mm (in.)] |
|-------------|---------------------------------|------------------------|
| 0 | 31.8 (1.25) | 127 (5) |
| 2.54 (0.1) | 12.7 (0.5) | 51...89 (2...3.5) |
| 5.08 (0.2) | 7.62 (0.3) | 38...51 (1.5...2) |
| 7.62 (0.3) | 5.08 (0.2) | 33...38 (1.3...1.5) |
| 10.16 (0.4) | 3.81 (0.1) | 28...33 (1.1...1.3) |

It is necessary to reduce the sensitivity of the sensor when using lens assemblies with bifurcated cables to avoid detecting the rear surface of the adaptor lens.

| Description | Approximate Dimensions [mm (in.)] | Cat. No. |
|---|--|---|
|  Extended Range Lens Assembly—260°C (500°F) |  | 60-1844 (One Cat. No. = One Lens Assembly) Sensing end tips with a 4.74 mm (0.187 in.) diameter |
|  Extended Range Lens Assembly—260°C (500°F) |  | 60-2559 (One Cat. No. = One Lens Assembly) Sensing tips with 4.74 mm (0.187 in.) diameter |
|  Extended Range Lens Assembly—260°C (500°F) (Thread mount 5/16 x 24) |  | 60-2323 (One Cat. No. = One Lens Assembly) Sensing end tips with 5/16 x 24 threads |
|  Adaptor Kit for Series 5000 Green Line Sensors | | 61-5550 (One Cat. No. = One Lens Assembly) |
| Glass Fiber Optic Cable Bracket |  | 60-2696 |
| ColorSight Lens Extender |  | 60-2738 |

Plastic Fiber Optic Cables

Introduction



Application Recommendations

- Many plastic fiber optic cables are available in different core diameters. Larger core diameter cables can carry more light between the sensor and application. These cables will generally offer longer sensing ranges.
Smaller core diameter cables provide greater resolution and the ability to detect smaller targets.
- Note that different sensing distances can be achieved depending upon the cable core diameter. These sensing distances must be de-rated for adverse environments.
Longer custom cables will attenuate the light and reduce the operating range. Light loss is approximately 3% per foot for Plastic Fiber Optic cables. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for application assistance.
- Avoid sharp bends that can permanently deform the cable. Minimum radius bend is listed for each part.
- Some plastic fiber optic cables can be cut to length. A very sharp right angle cut is essential to provide good performance. The supplied cable cutter Cat. No. 57-127, must be used. Each opening in the cutter can be used only once.
- Some sensing tips cannot be bent. **Only special sensing tips can be bent as specified.** Bends should only be attempted in the areas shown in the illustrations. Do not exceed the minimum bend radius for the cable.
- Plastic fiber optic cables are suitable for applications where the sensor must be isolated from high voltage.
- X-RAY or GAMMA radiation will cause plastic fibers to eventually become opaque. Custom cables constructed with special optical quartz fibers must be ordered for use in areas with high radiation.
- Use Transmitted Beam sensing in submerged applications when possible.
- A plastic fiber optic sensor with a duplex cable can provide Retroreflective or Diffuse sensing depending upon the distance to the target and the sensitivity adjustment on the sensor. If the sensor and cable are to be used for Retroreflective sensing, the sensitivity of the sensor must be adjusted low enough to avoid unwanted diffuse response from the targets to be sensed.
- Plastic fiber optic cables have a wide field of view.** A smaller field of view can be achieved by attaching an Extended Range Lens Assembly such as the Cat. No. 63-118 (see page 1-288) to the sensing end of the fiber. These lens assemblies will also increase the available sensing distance.
- Plastic fiber optics cables can be used in applications where constant motion or flexing of the cable is required. Coiled cables (such as 43PR-NES57VS) are particularly well suited for these applications.
- Plastic fiber optic cables can be successfully applied in most industrial environments. However, where abrasion or occasional impact to the cable is a concern, glass fiber optic cables may provide more durability.
- Chemical Resistance: Acid and alkali solvents could damage the Polyethylene Fiber Core. The jacket will offer some washdown protection but long term use in chemical environments could destroy the core material.
- The maximum temperature rating of standard plastic fiber optic cables is 70°C (158°F). Custom cables with temperature ratings of 115°C (239°F) are available.

ATTENTION



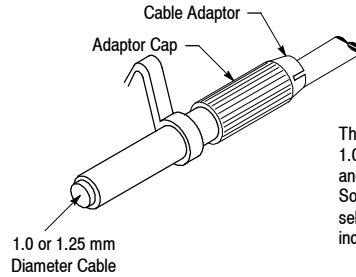
Fiber optic cables are not recommended for explosion-proof applications in hazardous environments. The fiber optic cable can provide a path for explosive fumes to travel from the hazardous area to the safe area.

Plastic Fiber Optic Cables

Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

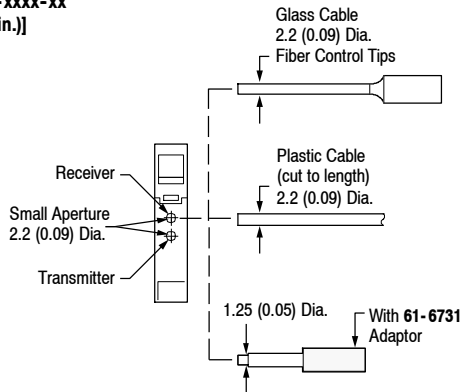
Plastic Fiber Optic Cables for use with Small Aperture Sensors

The plastic fiber optic cables on pages 1-272...1-280 are for use with small aperture sensors. The cables shown on pages 1-277...1-279 require an adaptor (included with the cable).

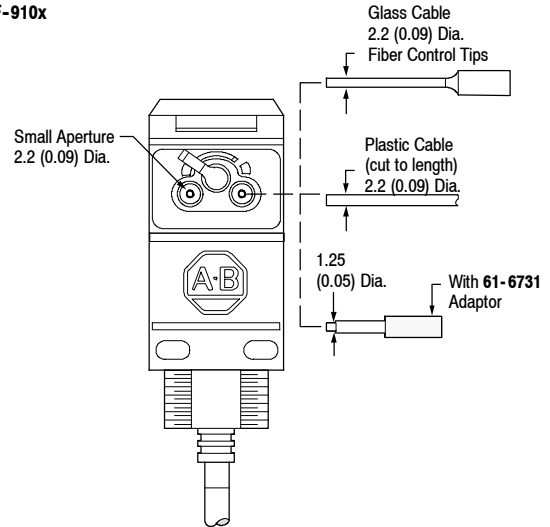


The drawing of the Cat. No. 61-6731 adaptor shows how 1.0/1.25 mm (0.04/0.05 in.) OD fibers (shown on pages 1-277 and 1-279) can be used with most small aperture sensors. Some sensors have adaptors for this purpose included. Product selection pages for each sensor will indicate if an adaptor is included as standard.

45Fxx-xxxx-xx
[mm (in.)]



42GxF-910x



Small Aperture Sensors:



42SRF-61xx
42SRF-63xx
with 61-6374 adaptor



45FVL-xxxx
45FSL-xxxx



42GTGF-101x0



42xRF-5x00FO
with 61-6374 adaptor



42GxF-910x



42KL-L2xxx



42SMF-71xx

Note: Sensing Distance

- Due to the variation between fiber optic cables, sensing distance can vary widely
- The sensing distance of bifurcated cables is measured with white paper (90% reflectivity). Other surfaces may be less reflective and therefore would have shorter sensing distances.
- The published numbers are based on extensive testing and are conservative
- The sensing distance of transmitted beam cables is measured from tip to tip
- Application considerations that effect distance
 - Sensor selected
 - Reflectivity of target
 - Environment
 - Accessories such as focusing lens
 - Length of the cable
- The cut of the plastic. Re-cutting the cable with the proper tool (Cat. No. 57-127) will typically give a better surface for the sensor to interface with, allowing a longer sensing distance.
- Bending a bendable tip beyond the minimum bend radius of the cable will reduce sensing distance.
- Consult product support for additional information.

All dimensions indicated are typical. Contact your local Rockwell Automation sales office or Allen-Bradley distributor for exact dimensions.

43PR Plastic Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

The fiber optic cables on pages 1-272...1-279 are for use with small aperture sensors such as follows:



Approximate Metric / Standard Distances

| | | | | | | | |
|---|----|-----|-----|-----|-----|-----|-----|
| 0 | 50 | 100 | 150 | 200 | 250 | 300 | mm |
| 0 | 2 | 4 | 6 | 8 | 10 | 12 | in. |

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Core Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|---|------------------------|-----------------------------------|--------------------|---|--------------|
| | 40 (1.6) | 2 x 1.5 (0.06) | Polyethylene | | 43PR-NDS59FS |
| | 25 (1.0) | 2 x 1 (0.04) | | | 43PR-NDS57ZS |
| | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | | 43PR-NES57ZS |
| | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | | 43PR-NES57VS |
| <p>43PR-NKS61FS has coaxial optics for more precise sensing</p> | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | | 43PR-NKS57FS |
| | 20 (0.8) | 1 x 0.75 (0.03) 4 x 0.5 (0.02) | | Characterization not available at time of publication | 43PR-NKS61FS |
| | 2 (0.08) | 2 x 0.5 (0.02) | 1 R Polyflex | Characterization not available at time of publication | 43PR-NKS65YS |
| | 2 (0.08) | 2 x 1.0 (0.04) | 1 R Polyflex | Characterization not available at time of publication | 43PR-NLS65YS |

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

PHOTOSWITCH® Photoelectric Sensors
43PR Plastic Fiber Optic Cables

Threaded Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|------------------------|----------------|--------------------|-----------------------|--------------|
| | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene | | 43PR-PES53FS |
| | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene | | 43PR-PFS53FS |
| | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | | 43PR-PIS57ZS |
| | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | | 43PR-PIS57VS |
| | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene | | 43PR-PJS53ZS |
| | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene | | 43PR-PJS53VS |

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

43PR Plastic Fiber Optic Cables

Ferrule Bifurcated Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance | Cat. No. |
|-----------------------------------|------------------------|-----------------------|--------------------|---|--------------|
| | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | Characterization not available at time of publication | 43PR-RAS57ZS |

Specialty Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

| | | | | | |
|--|----------|--------------|--------------|---|--------------|
| | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | Characterization not available at time of publication | 43PR-SBS57ZS |
| | 25 (1.0) | 2 x 1 (0.04) | Polyethylene | Characterization not available at time of publication | 43PR-SCS57ZS |
| | 25 (1.0) | 1 (0.04) | Polyethylene | The sensing distance is the width of the gap (11.9 mm). The target must cross the optical axis between the two prongs of the fork | 43PR-UAA56MS |

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

PHOTOSWITCH® Photoelectric Sensors
43PT Plastic Fiber Optic Cables

Threaded Transmitted Beam Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|------------------------|-----------------------|--------------------|---|--------------|
| | 25 (1.0) | 1 (0.04) | Polyethylene | | 43PT-NJS56FS |
| | 25 (1.0) | 1 (0.04) | Polyethylene | | 43PT-NJS56GS |
| | 40 (1.6) | 1.5 (0.06) | Polyethylene | | 43PT-NAS58FS |
| | 2 (0.08) | 1.0 (0.04) | 1 R Polylux | Characterization not available at time of publication | 43PT-NAS66RS |
| | 15 (0.6) | 0.5 (0.02) | Polyethylene | | 43PT-PAS52FS |
| | 15 (0.6) | 0.5 (0.02) | Polyethylene | | 43PT-PBS52FS |

Notes: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.
 Two cables per one plastic transmitted beam cat. no.

43PT Plastic Fiber Optic Cables

Threaded Transmitted Beam Cables for Small Aperture Sensors [2.2 mm (0.09 in.)]

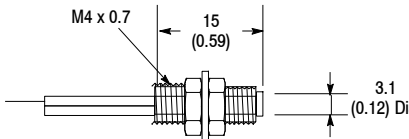
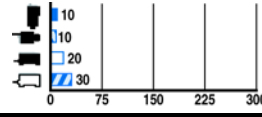
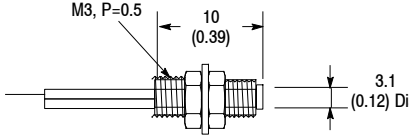
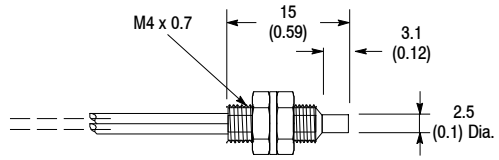
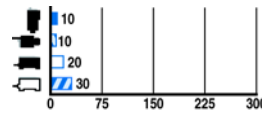
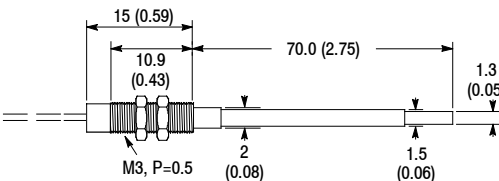
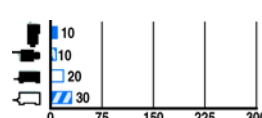
| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|------------------------|-----------------------|--------------------|-----------------------|--------------|
| | 25 (1.0) | 1 (0.04) | Polyethylene | | 43PT-PKS56FS |
| | 25 (1.0) | 1 (0.04) | Polyethylene | | 43PT-PKS56GS |
| | 15 (0.6) | 0.5 (0.02) | Polyethylene | | 43PT-PLS52FS |
| | 15 (0.6) | 0.5 (0.02) | Polyethylene | | 43PT-PLS52GS |

Ferrule Transmitted Beam for Small Aperture Sensors [2.2 mm (0.09 in.)]

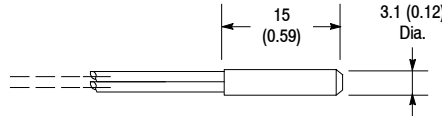
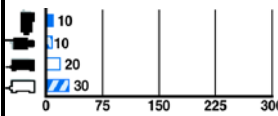
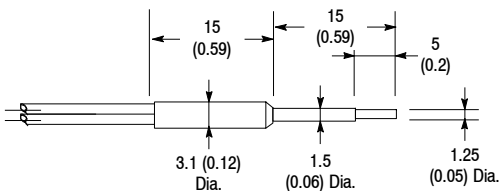
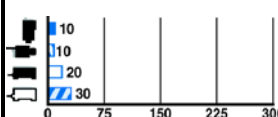
| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|------------------------|-----------------------|--------------------|---|--------------|
| | 25 (1.0) | 1 (0.04) | Polyethylene | | 43PT-CBS56FS |
| | 25 (1.0) | 1 (0.04) | Polyethylene | Characterization not available at time of publication | 43PT-SAS56FS |

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.
Two cables per one plastic transmitted beam Cat. No.

Threaded Bifurcated Miniature Cables for Small Aperture Sensors (adaptor required)

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|---|------------------------|-----------------------------------|--------------------|---|--------------|
|  <p>43PR-NAS60FM has coaxial optics for more precise sensing</p> | 25 (1.0) | 2 x 1 (0.04) | Polyethylene |  | 43PR-NAS57ZM |
| | 15 (0.6) | 1 x 0.5 (0.02) 4 x 0.25 (0.01) | | Characterization not available at time of publication | 43PR-NAS60FM |
|  | 2 (0.08) | 2 x 0.25 (0.01) | 1 R Polyflex | Characterization not available at time of publication | 43PR-NBS63YM |
|  | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene |  | 43PR-NFS53FM |
|  | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene |  | 43PR-PHS53ZM |

Ferrule Bifurcated Miniature Cables for Small Aperture Sensors (adaptor required) [2.2 mm (0.09 in.)]

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No.5 |
|---|------------------------|-----------------------|--------------------|---|--------------|
|  | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene |  | 43PR-CBS53ZM |
|  | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene |  | 43PR-AAS53ZM |

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

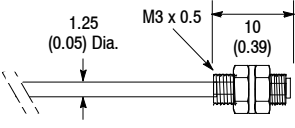
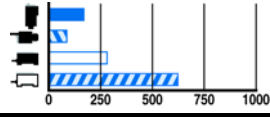
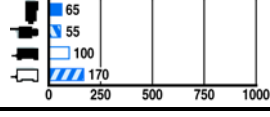
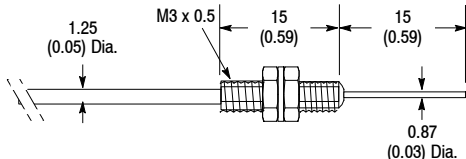
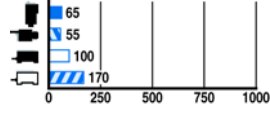
43PR Plastic Fiber Optic Cables

Ferrule Bifurcated Miniature Cables for Small Aperture Sensors (adaptor required)

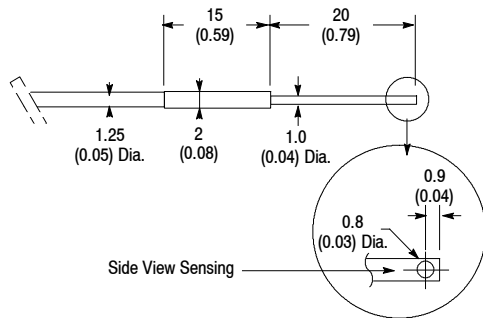
| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|-----------------------------------|------------------------|-----------------------|--------------------|---|--------------|
| | 15 (0.6) | 2 x 0.5 (0.02) | Polyethylene | Characterization not available at time of publication | 43PR-VBS53ZM |

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.

Threaded Transmitted Beam Miniature Cables for Small Aperture Sensors (adaptor required)

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|---|------------------------|-----------------------|--------------------|---|--------------|
|  | 25 (1.0) | 1 (0.04) | Polyethylene |  | 43PT-NBS56FM |
| | 15 (0.6) | 0.5 (0.02) | |  | 43PT-NBS52FM |
| | 2 (0.08) | | 1R Polyflex | Characterization not available at time of publication | 43PT-NBS64RM |
|  | 15 (0.6) | 0.5 (0.02) | Polyethylene |  | 43PT-PCS52FM |

Ferrule Transmitted Beam Miniature Cables for Small Aperture Sensors (adaptor required [2.2 mm (0.09 in.)])

| Approximate Dimensions [mm (in.)] | Bend Radius [mm (in.)] | Fiber Bundle Diameter | Sheathing Material | Sensing Distance [mm] | Cat. No. |
|--|------------------------|-----------------------|--------------------|---|--------------|
|  | 15 (0.6) | 0.5 (0.02) | Polyethylene | Characterization not available at time of publication | 43PT-VCS52FM |

Note: Standard length for plastic fiber optic cables is 2 m (78 in.) tip to tip.
 Two cables per one plastic transmitted beam Cat. No.

Plastic Fiber Optic Cables

Special Purpose

Approximate Dimensions [mm (in.)]

| Sensing Tip Material | Fiber Diameter | Sheathing Material | Nominal Sensing Ref. | Cat. No. |
|----------------------|------------------|--------------------|----------------------|----------|
| | | | | |
| PTFE | 1.25 (0.049) x 2 | PTFE | NA | 99-193-1 |

| | | | | |
|------|-----------------|------|----|----------|
| | | | | |
| PTFE | 2.2 (0.090) x 2 | PTFE | NA | 99-197-1 |

Plastic Fiber Optic Cables

Additional Cables for Small Aperture Sensors [2.2 mm (0.09 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

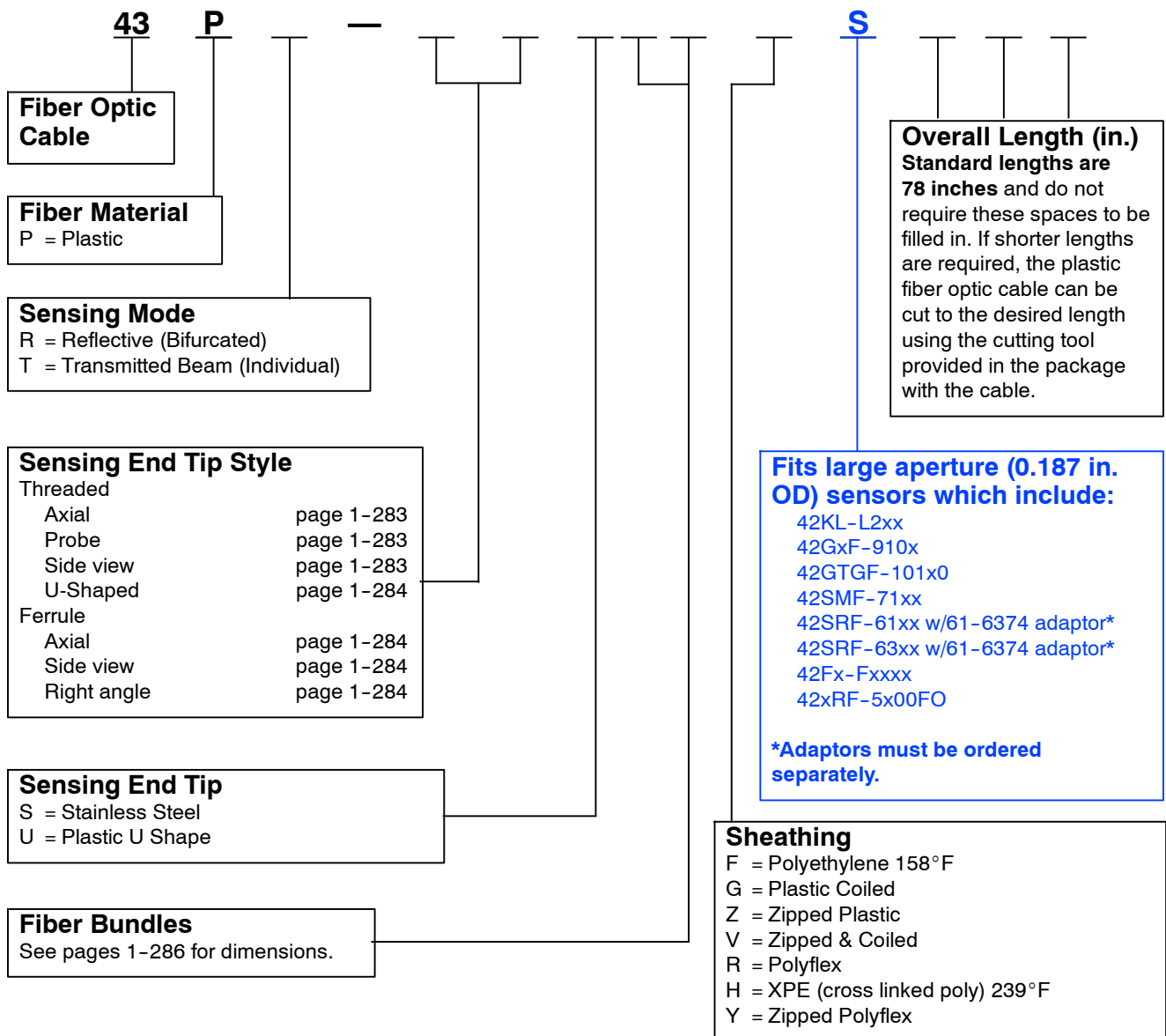
Rockwell Automation/Allen-Bradley can provide custom plastic fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths are available
- Custom temperature ratings up to 115°C (239°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

To Build a Custom Fiber Optic



Plastic Fiber Optic Cables

Additional Cables for Small Aperture Sensors [1.0/1.25 mm (0.04/0.05 in.) OD Sensor End Tip]

Custom Fiber Optic Cables

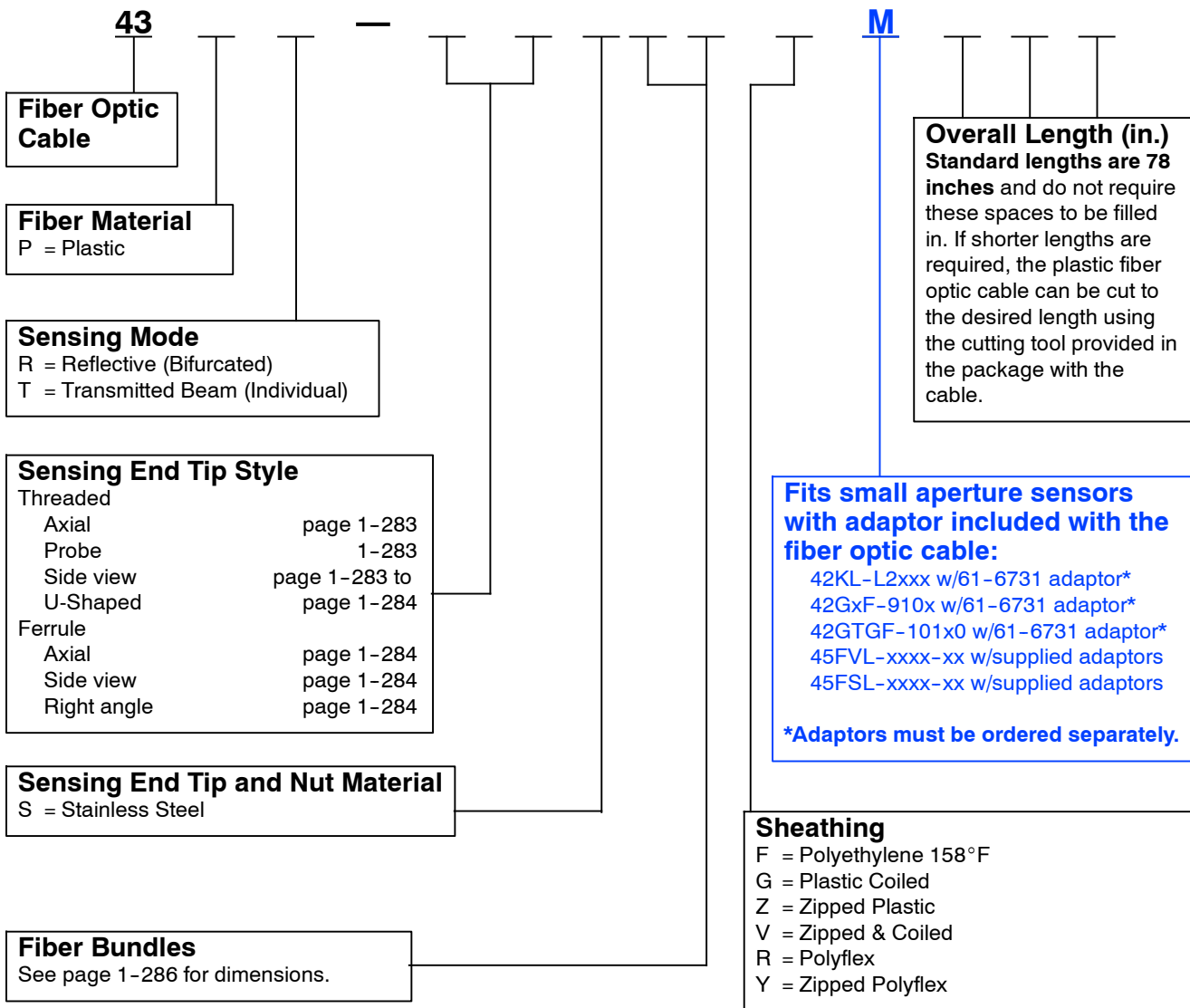
Rockwell Automation/Allen-Bradley can provide custom plastic fiber optic cables to meet nearly any application requirement.

Typical cable modifications include:

- Custom lengths are available
- Custom temperature ratings up to 70°C (158°F)
- Custom configurations including multiple sensing tips
- Custom sensing end tips—nearly any modification is possible

For more information contact your local Rockwell Automation sales office or Allen-Bradley distributor.

To Build a Custom Fiber Optic



PHOTOSWITCH® Photoelectric Sensors
Plastic Fiber Optic Cable Sensing Tips
 Use with Configurators on page 1-281 and 1-282.

| Approximate Dimensions | Code | Standard Bundle [mm] | Approximate Dimensions [mm (in.)] | | | | | |
|------------------------|------|----------------------|-----------------------------------|-------------|------------|-------------|-------------|-------------|
| | | | A | B | C | D | E | F |
| | NA | 0.5 | 14.9 (0.59) | — | M4, P=0.7 | 0.51 (0.02) | 3.0 (0.12) | — |
| | NB | 0.5 | 9.9 (0.39) | — | M3, P=0.5 | NA | — | — |
| | NC | 0.25 | 11.9 (0.47) | — | M4, P=0.7 | 3.05 (0.12) | 1.02 (0.04) | — |
| | ND | 1.5 | 13.9 (0.55) | 23.1 (0.91) | M6, P=1 | 1.02 (0.04) | 4.8 (0.19) | — |
| | NE | 1.0 | 17.0 (0.67) | — | M6, P=0.75 | 3.05 (0.12) | 4.06 (0.16) | — |
| | NF | 0.5 | 11.9 (0.47) | — | M4, P=0.7 | 3.05 (0.12) | 2.54 (0.10) | — |
| | NG | 0.75 | 10.9 (0.43) | 14.9 (0.59) | M3, P=0.5 | NA | — | 3.05 (0.12) |
| | NJ | 1.0 | 11.9 (0.47) | — | M4, P=0.7 | 3.05 (0.12) | — | — |
| | NK | 0.5 | 11.9 (0.47) | — | M6, P=0.75 | 3.05 (0.12) | 2.54 (0.10) | — |
| | NL | 0.5 | 14.9 (0.59) | 23.1 (0.91) | M6, P=1 | 4.8 (0.19) | 6.1 (0.24) | 6.1 (0.24) |

| Approximate Dimensions | Code | Standard Bundle [mm] | Approximate Dimensions [mm (in.)] | | | | | | |
|------------------------|------|----------------------|-----------------------------------|-------------|-------------|-------------|-------------|-----------|-------------|
| | | | A | B | C | D | E | F | G |
| | PA | 0.5 | 14.9 (0.59) | 35.0 (1.38) | 2.54 (0.1) | 1.02 (0.04) | 0.76 (0.03) | M4, P=0.7 | — |
| | PB | 0.5 | 14.9 (0.59) | 69.8 (2.75) | 2.54 (0.1) | 1.02 (0.04) | 0.76 (0.03) | M4, P=0.7 | — |
| | PD | 0.5 | 9.9 (0.39) | 69.8 (2.75) | 2.03 (0.08) | 1.02 (0.04) | 0.76 (0.03) | M3, P=0.5 | — |
| | PE | 0.5 | 14.9 (0.59) | 35.0 (1.38) | 2.54 (0.1) | 1.52 (0.06) | 1.27 (0.05) | M6, P=1 | 23.1 (0.91) |
| | PF | 0.5 | 14.9 (0.59) | 69.8 (2.75) | 2.54 (0.1) | 1.52 (0.06) | 1.27 (0.05) | M6, P=1 | 23.1 (0.91) |
| | PG | 0.5 | 14.9 (0.59) | 69.8 (2.75) | 2.54 (0.1) | 1.52 (0.06) | 1.27 (0.05) | M4, P=0.7 | — |
| | PH | 0.5 | 10.9 (0.43) | 69.8 (2.75) | 2.03 (0.08) | 1.52 (0.06) | 1.27 (0.05) | M3, P=0.5 | 14.9 (0.59) |

| Approximate Dimensions | Code | Standard Bundle [mm] | Approximate Dimensions [mm (in.)] | | | |
|------------------------|------|----------------------|-----------------------------------|-------------|--------------|------------|
| | | | A | B | C | D |
| | PC | 0.5 | 14.9 (0.59) | 14.9 (0.59) | 0.76 (0.03) | M3, P=0.5 |
| | PI | 1.0 | 17.0 (0.67) | 88.9 (3.5) | 2.54 (0.1) | M6, P=0.75 |
| | PJ | 0.5 | 11.4 (0.45) | 88.9 (3.5) | 1.27 (0.05) | M3, P=0.5 |
| | PK | 1.0 | 17.0 (0.67) | 88.9 (3.5) | 1.27 (0.05) | M6, P=0.75 |
| | PL | 0.5 | 10.9 (0.43) | 88.9 (3.5) | 0.86 (0.034) | M3, P=0.5 |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
|-----------------------------------|------|----------------------|
| | SA | 1.0 |

Plastic Fiber Optic Cable Sensing Tips

Use with Configurators on page 1-281 and 1-282.

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
|-----------------------------------|------|----------------------|
| <p>Side View Sensing</p> | VC | 0.5 |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
|-----------------------------------|------|----------------------|
| <p>Side View Sensing</p> | SB | 1.0 |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
|-----------------------------------|------|----------------------|
| <p>Side View Sensing</p> | SC | 1.0 |

| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
|-----------------------------------|------|----------------------|
| | RA | 1.0 |

PHOTOSWITCH® Photoelectric Sensors
Plastic Fiber Optic Cable Sensing Tips
 Use with Configurators on page 1-281 and 1-282.

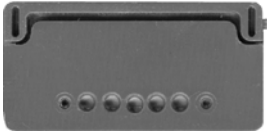
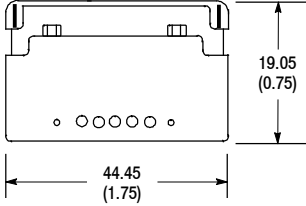

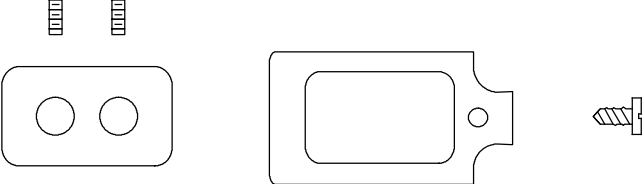

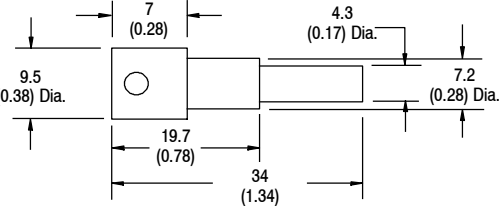
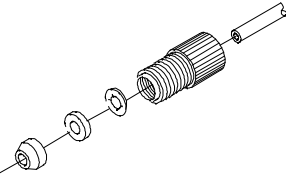
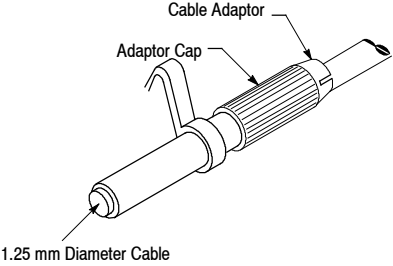
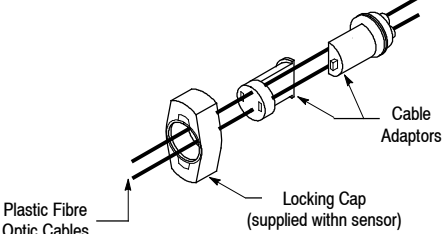
| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
|-----------------------------------|------|----------------------|
| | VA | 0.5 |
| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
| | AA | 0.5 |
| Approximate Dimensions [mm (in.)] | Code | Standard Bundle [mm] |
| | CA | 1.0 |

Plastic Fiber Optic Cable Sensing Tips

Use with Configurators on page 1-281 and 1-282.

The bundle size codes are used with the configurators on page 1-281 and 1-282.


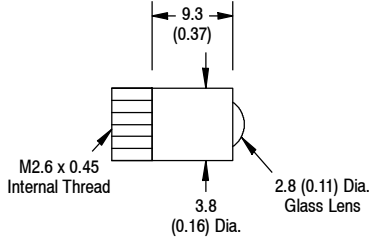
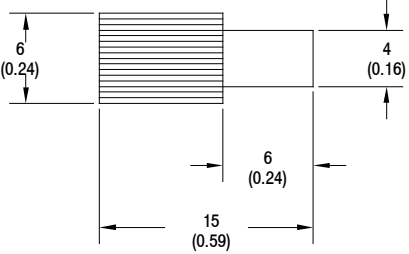
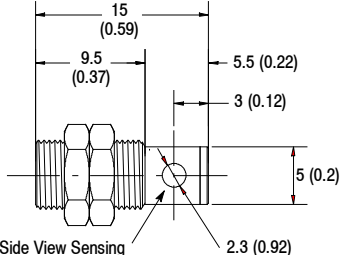
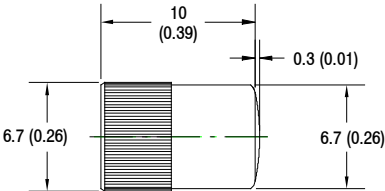
| Code | Diameter [mm] | Bend Radius [mm (in.)] | Arrangement |
|------|----------------------|------------------------|-----------------|
| 52 | 0.50 | 15 (0.6) | Single |
| 53 | 0.50 | 15 (0.6) | Pair Zipped |
| 56 | 1.0 | 25 (1.0) | Single |
| 57 | 1.0 | 25 (1.0) | Pair Zipped |
| 58 | 1.5 | 40 (1.6) | Single |
| 59 | 1.5 | 40 (1.6) | Pair |
| 60 | 0.50 x 1 0.25 x 4 | 15 (0.6) | Coaxial |
| 61 | 0.75 x 1 0.50 x 4 | 20 (0.8) | Coaxial |
| 64 | 0.50 | 2 (0.08) | Single Flexible |
| 65 | 0.50 | 2 (0.08) | Pair Flexible |
| 66 | 1.0 | 2 (0.08) | Single Flexible |
| 67 | 1.0 | 2 (0.08) | Pair Flexible |

| Description | Approximate Dimensions [mm (in.)] | Cat. No. |
|---|--|--|
|  <p>Cutting Tool for plastic Fiber Optic cable. For use with all cuttable cables. One cutter tool is packaged with each fiber optic cable.</p> |  | <p>57-127</p> |
|  <p>Molded Fiber Optic Adaptor Kit to be used with Type 42DRF and Type 42MRF Series 5000.</p> |  | <p>61-6310</p> |
|  <p>Control End Adaptor Kit for 2.3 mm (0.09 in.) OD Plastic Fiber Optic cable. Use with Series 9000, 10,000, 5000 and 6000.</p> |  | <p>61-6374 2/package</p> |
| <p>Control End Adaptor Kit for Series 7000.</p> |  | <p>129-125-5 2/package</p> |
| <p>1.25 mm outer jacket adaptor for the 42FA and 42FT (included with sensor) and MiniSight, Series 9100 and 10,000 (adaptor not included)</p> |  | <p>61-6731</p> |
| <p>1.0 mm outer jacket adaptor for 45FVL/45FSL</p> | | <p>61-6742</p> |
| <p>2.2 mm outer jacket adaptor for the 42FB (included with sensor)</p> |  | <p>61-6733</p> |

Plastic Fiber Optic Cables

Accessories

Lenses (One per package)

| Description | Approximate Dimensions [mm (in.)] | Cat. No. |
|---|--|----------|
|  <p>Range extender lens adaptor for 1 mm (0.04 in.) dia. transmitted beam plastic cable.</p> |  <p>M2.6 x 0.45 Internal Thread 9.3 (0.37) 3.8 (0.16) Dia. 2.8 (0.11) Dia. Glass Lens</p> | 63-118 |
| <p>Fixed focus lens adaptor used with reflective cables with 4 mm (0.16 in.) x 0.7 pitch threaded sensing tips. Plastic housing One Cat. No. = one adaptor</p> |  <p>6 (0.24) 4 (0.16) 6 (0.24) 15 (0.59)</p> | 60-2646 |
| <p>Right angle lens adaptor used with transmitted beam cables with 4 mm (0.16 in.) x 0.7 pitch threaded sensing tips. Metal housing One Cat. No. = one adaptor</p> |  <p>15 (0.59) 9.5 (0.37) 5.5 (0.22) 3 (0.12) 5 (0.2) 2.3 (0.92) Side View Sensing</p> | 60-2648 |
| <p>Range extender lens adaptor used with transmitted beam cables with 4 mm (0.16 in.) x 0.7 pitch threaded sensing tips. Metal housing One Cat. No. = one adaptor</p> |  <p>10 (0.39) 0.3 (0.01) 6.7 (0.26) 6.7 (0.26)</p> | 60-2652 |

General Specifications

| | |
|--------------------------------------|--|
| Housing Material | Nickel-plated brass |
| Operating Temperature [C (F)] | -25...+60° (-13...+140°) |
| Acceptable Fiber | 2.2 mm (0.08 in.) outer diameter |
| Fiber Optic Cable | Bifurcated = 99-854 Individual = 99-850 |

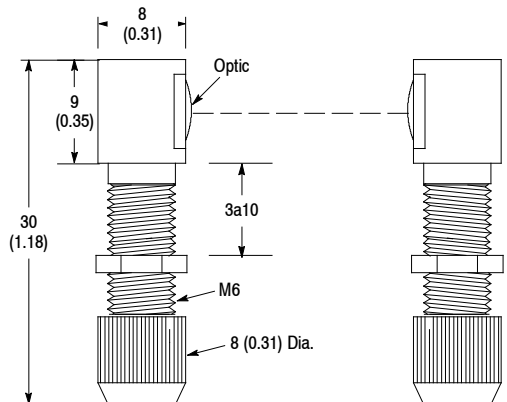
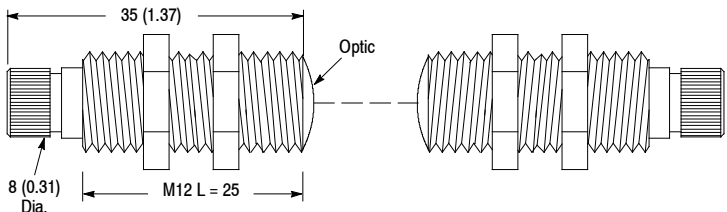
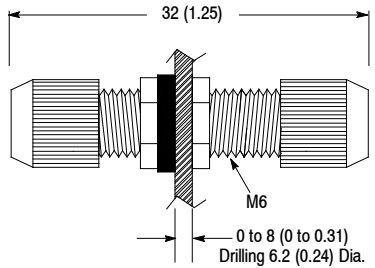
Approximate Dimensions [mm (in.)]

| Description | Approximate Dimensions [mm (in.)] | Nominal Sensing Distance [mm (in.)] | Cat. No. |
|---|-----------------------------------|-------------------------------------|----------|
| Range extending lens for ColorSight 9000 | | 114 (4.5) | 60-2738 |
| Lens for diffuse sensing. Accepts 2.2 mm plastic bifurcated fiber optic cable. One Cat. No. = one lens assembly | | 70 (2.75) | 60-2745 |
| Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable. One Cat. No. = two lens assemblies | | 200 (7.87) | 60-2746 |
| Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable. One Cat. No. = two lens assemblies | | 800 (31.49) | 60-2747 |
| Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable. One Cat. No. = two lens assemblies | | 1200 (47.24) | 60-2748 |

Plastic Fiber Optic Cables

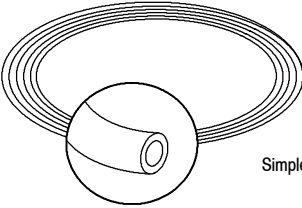
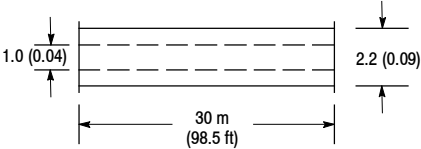
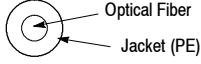
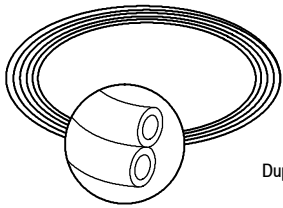
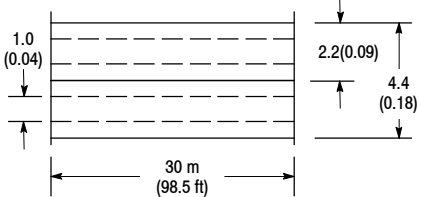
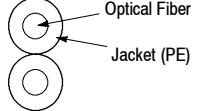
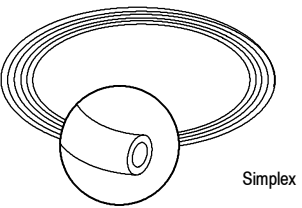
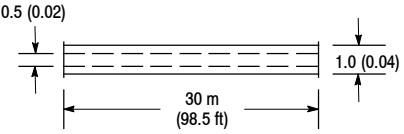
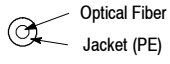
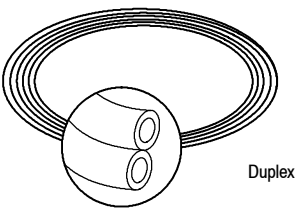
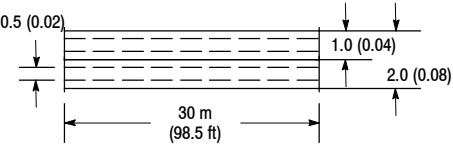
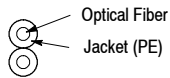
Fiber Optic Lens Assemblies (Field Attachable)

Approximate Dimensions [mm (in.)]

| Description | Approximate Dimensions [mm (in.)] | Nominal Sensing Distance [mm (in.)] | Cat. No. |
|--|---|-------------------------------------|----------------|
| <p>Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable.</p> <p>One Cat. No. = two lens assemblies</p> |  | <p>1200 (47.24)</p> | <p>60-2749</p> |
| <p>Range extending lens for transmitted beam sensing. Accepts 2.2 mm plastic individual fiber optic cable.</p> <p>One Cat. No. = two lens assemblies</p> |  | <p>4000 (157.48)</p> | <p>60-2750</p> |
| <p>Splicer for single 2.2 mm plastic fiber optic cable</p> <p>One Cat. No. = two splicers</p> |  <p>25% Attenuation</p> | <p>—</p> | <p>60-2751</p> |

Note: Nominal sensing reference is included to aid in the selection of fiber optic lens assemblies.

Unterminated Plastic Fiber Optic Cables

| Description | Approximate Dimensions [mm (in.)] | Cat. No. |
|---|--|----------------------|
|  <p>Simplex</p> |  <p>Single Fiber</p>  | <p>99-850</p> |
|  <p>Duplex</p> |  <p>Zipped</p>  | <p>99-854</p> |
|  <p>Simplex</p> |  <p>Single Fiber</p>  | <p>99-852</p> |
|  <p>Duplex</p> |  <p>Zipped</p>  | <p>99-853</p> |

The above cat. nos. are unterminated simplex (individual) and duplex (dual) plastic fibers.

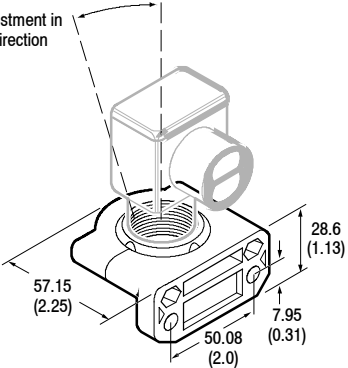
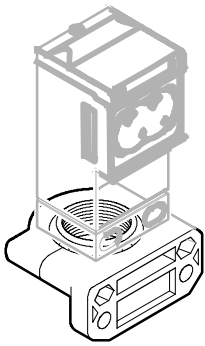
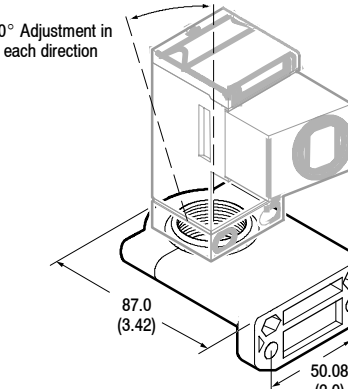
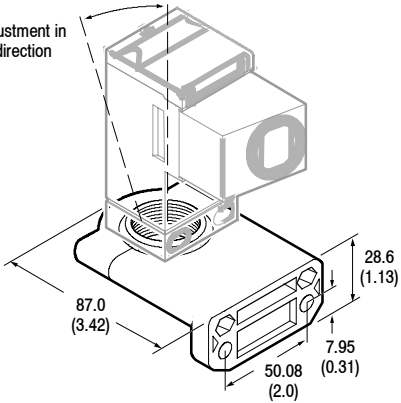
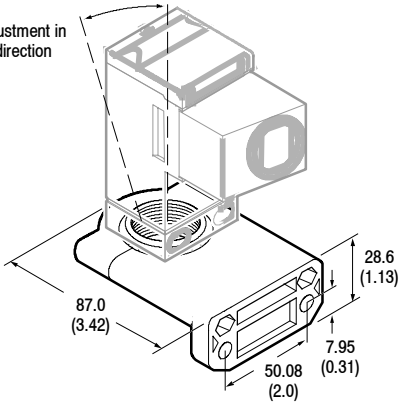
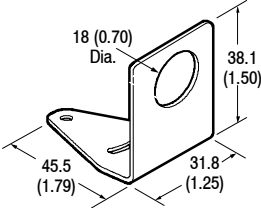
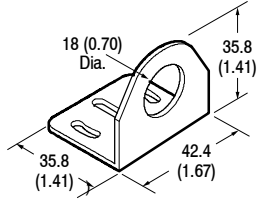
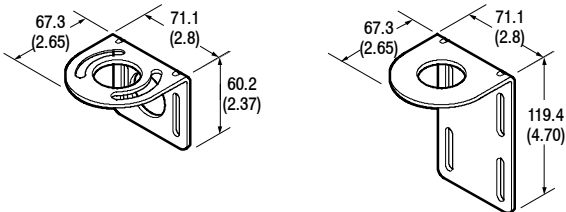
These plastic fiber optic cables can be used with plastic fiber optic sensors and require no control end tip to interface to the sensor.

A cutting tool for these unterminated plastic fiber optic cables is packaged with the fiber cable.

Fiber Optic Cable Cross Reference

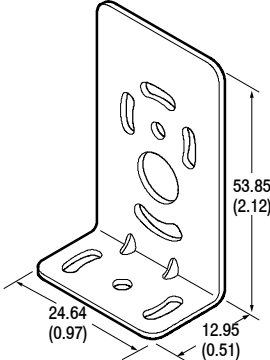
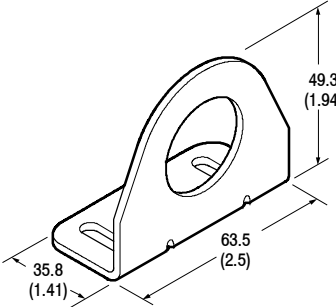
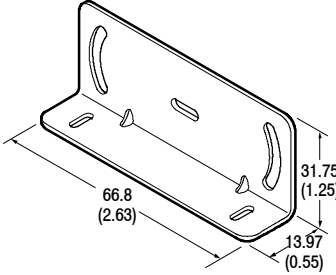
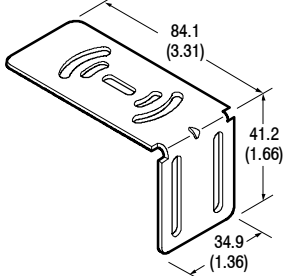
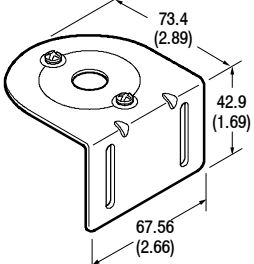
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|-----------|---------------|----------|---------------|----------|--------------|
| 99-1000-1 | 43GR-TAS20ML | 99-461-1 | 43GT-MMS10ML | 99-721-1 | 43GT-MIS15ML |
| 99-1003-1 | 43GR-XDB25SL | 99-477-1 | 43GT-TFS00ML | 99-722-1 | 43GT-TMS25ML |
| 99-108 | 43PT-PLS52FS | 99-479-1 | 43GT-MUS10ML | 99-723-1 | 43GT-TMS15MS |
| 99-109 | 43PT-PLS52GS | 99-487-1 | 43GT-MRS10ML | 99-751-1 | 43GR-XAS10SS |
| 99-110 | 43PR-PJS53ZS | 99-490-1 | 43GT-MHS15SL | 99-752-1 | 43GR-TIS10SS |
| 99-116-1 | 43GT-MIS15SL | 99-491-1 | 43GT-MHS15ML | 99-753-1 | 43GR-FTS10SS |
| 99-161-1 | 43GR-TAB20SS | 99-494-1 | 43GT-BCA73SL | 99-755-1 | 43GR-TDS10SS |
| 99-181-1 | 43GT-TWC25SL | 99-495-1 | 43GT-BCA73ML | 99-794-1 | 43GR-BRA79SL |
| 99-184-1 | 43GT-2FAS20SL | 99-500-1 | 43GT-TBS25SL | 99-800 | 43PR-NDS59FS |
| 99-201-1 | 43GR-FOS20ML | 99-50-1 | 43GT-FAS25SL | 99-801 | 43PR-NDS57ZS |
| 99-206-1 | 43GR-FPS20SL | 99-501-1 | 43GT-TBS25ML | 99-802 | 43PR-NAS57ZM |
| 99-214-1 | 43GR-FJS30SL | 99-502-1 | 43GT-TBB30SL | 99-803 | 43PR-NAS60FM |
| 99-222-1 | 43GR-TMC25SL | 99-504-1 | 43GT-TQC25SL | 99-804 | 43PR-NKS57ZS |
| 99-224-1 | 43GR-TMC15SL | 99-505-1 | 43GT-TQC25ML | 99-805 | 43PR-NKS61FS |
| 99-238-1 | 43GR-FGS25SL | 99-508-1 | 43GT-TRC30SL | 99-806 | 43PR-NFS53FM |
| 99-275-1 | 43GR-TFS10ML | 99-51-1 | 43GT-FAS25ML | 99-808Z | 43PR-NGS53ZM |
| 99-279-1 | 43GR-MUS10ML | 99-52-1 | 43GT-TBB25SL | 99-809Z | 43PR-NGS55ZM |
| 99-283-1 | 43GR-MS10ML | 99-530-1 | 43GT-TTC20SL | 99-810 | 43PR-PES53FS |
| 99-290-1 | 43GR-MHS15SL | 99-53-1 | 43GT-TBB25ML | 99-811 | 43PR-PFS53FS |
| 99-291-1 | 43GR-MHS15ML | 99-54-1 | 43GT-FIS25SL | 99-814 | 43PR-CBS53ZM |
| 99-294-1 | 43GR-BCA73SL | 99-55-1 | 43GT-FIS25ML | 99-816 | 43PR-AAS53ZM |
| 99-300-1 | 43GR-TBS25SL | 99-56-1 | 43GT-BAA72SL | 99-818 | 43PR-VBS53ZM |
| 99-30-1 | 43GR-FAS25SL | 99-57-1 | 43GT-BAA72ML | 99-819 | 43PT-NAS58FS |
| 99-301-1 | 43GR-TBS25ML | 99-58-1 | 43GT-MKS00SL | 99-820 | 43PT-NBS56FM |
| 99-302-1 | 43GR-TBB30SL | 99-59-1 | 43GT-MKS00ML | 99-821 | 43PT-NBS54FM |
| 99-304-1 | 43GR-TQC25SL | 99-614-1 | 43GR-MQS15SL | 99-822 | 43PT-NBS52FM |
| 99-308-1 | 43GR-TRC30SL | 99-623-1 | 43GR-2FAS25SL | 99-823 | 43PT-PAS52FS |
| 99-31-1 | 43GR-FAS25ML | 99-626-1 | 43GT-6TBB15SL | 99-825 | 43PT-PCS52FM |
| 99-315-1 | 43GR-TKC25ML | 99-643-1 | 43GR-4TBB22SL | 99-827 | 43PT-CBS56FS |
| 99-32-1 | 43GR-TBB25SL | 99-68-1 | 43GR-MVS00ML | 99-828 | 43PT-SAS56FS |
| 99-330-1 | 43GR-TTS20SL | 99-69-1 | 43GT-TMC25SL | 99-833 | 43PR-SCS57ZS |
| 99-33-1 | 43GR-TBB25ML | 99-700-1 | 43GR-TBS20MS | 99-838 | 43PR-SBS57ZS |
| 99-34-1 | 43GR-FIS25SL | 99-701-1 | 43GR-TBS15ML | 99-85-1 | 43GR-TGB33SL |
| 99-350-1 | 43GR-FRS40SL | 99-702-1 | 43GR-TAS20MS | 99-90 | 43PT-NJS56FS |
| 99-35-1 | 43GR-FIS25ML | 99-704-1 | 43GR-TAS20SS | 99-900 | 43PR-RAS57ZS |
| 99-36-1 | 43GR-BAA72SL | 99-705-1 | 43GR-TMS25ML | 99-91 | 43PT-NJS56GS |
| 99-37-1 | 43GR-BAA72ML | 99-706-1 | 43GR-TMS20MS | 99-92 | 43PT-PKS56FS |
| 99-39-1 | 43GR-MKS00ML | 99-708-1 | 43GR-TQS20MS | 99-93 | 43PT-PKS56GS |
| 99-400-1 | 43GT-FOS20SL | 99-710-1 | 43GT-TBS15MS | 99-94 | 43PR-NES57ZS |
| 99-408-1 | 43GT-FPS10SL | 99-714-1 | 43GT-TAS15SS | 99-95 | 43PR-NES57VS |
| 99-424-1 | 43GT-TMC15SL | 99-714-1 | 43GT-TAS15SS | 99-951-1 | 43GT-XAS10SS |
| 99-426-1 | 43GT-TOC30SL | 99-715-1 | 43GT-TFS10ML | 99-952-1 | 43GT-TIS10SS |
| 99-436-1 | 43GT-FAS30SL | 99-716-1 | 43GT-TOS30ML | 99-953-1 | 43GT-FTS10SS |
| 99-453-1 | 43GT-TJC30ML | 99-717-1 | 43GT-TQS25ML | 99-955-1 | 43GT-TDS10SS |
| 99-458-1 | 43GT-MBS10SL | 99-718-1 | 43GT-TQS15MS | 99-96 | 43PR-PI57ZS |
| 99-46-1 | 43GR-TXC25SL | 99-720-1 | 43GT-TRS30ML | 99-97 | 43PR-PI57VS |

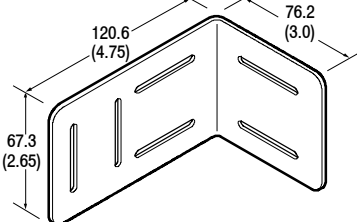
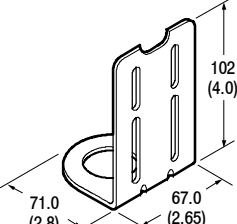
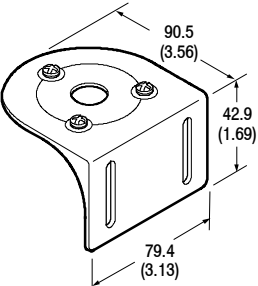
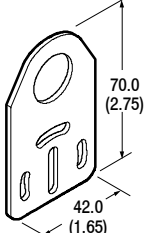
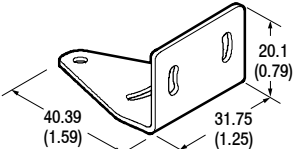
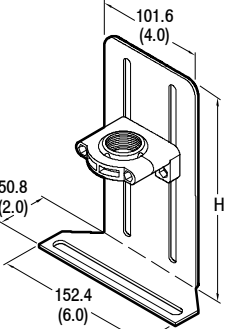


| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|--|--------------------|--|--|
| Swivel/Tilt bracket allows ± 10° vertical and 360° rotation adjustment. | 60-2649 | RightSight |  |
| | 60-2439 | Series 9000 Color Sight LaserSight |  |
| | 60-2681 | ClearSight 9000 |  |
| | 60-2619 | Series 7000 |  |
| | 60-2618 | Series 6000 |  |
| Right angle mounting bracket allows 30° horizontal adjustment. | 60-2664 | MiniSight 42CA, 42CB |  |
| | 60-2657 | RightSight MiniSight 42CA, 42CB |  |
| Right angle mounting bracket permits a 360° rotation adjustment. The Cat. No. 60-2513 bracket has mounting hole patterns compatible with the Cat. No. 60-1785. | 60-2421 60-2513 | Series 9000 ClearSight 9000 ColorSight LaserSight |  |

Accessories

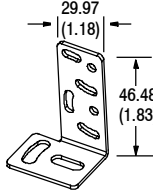
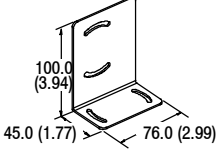
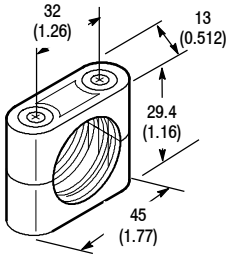
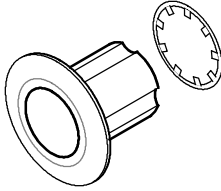
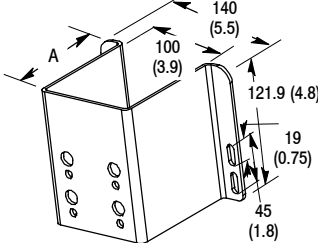
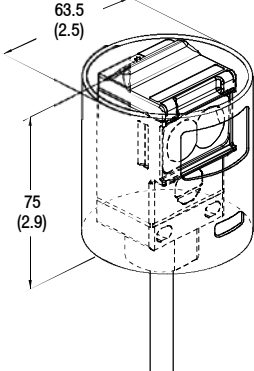
Mounting Brackets


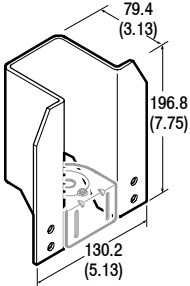

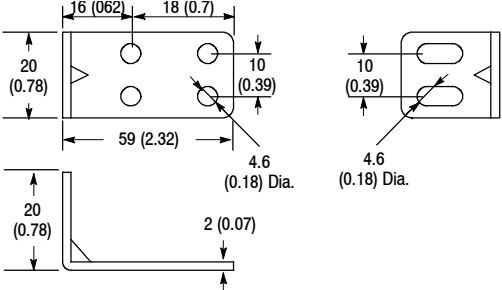
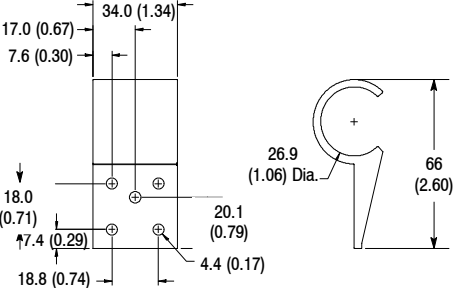
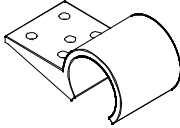
| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|---|--|--------------------|--|
| <p>Right angle mounting bracket allows 40° horizontal rotation. The Cat. No. 60-2152 permits a 30° horizontal rotation.</p> | <p>60-2151 60-2152</p> | <p>Series 7000</p> |  |
| <p>Right angle mounting bracket with 25.4 mm (1 in.) knockout for Series 6000 sensor.</p> | <p>60-2006</p> | <p>Series 6000</p> |  |
| <p>Tilt mounting bracket provides 30° vertical height adjustment.</p> | <p>60-2007</p> | <p>Series 6000</p> |  |
| <p>Right angle mounting bracket allows for both horizontal and vertical adjustment.</p> | <p>60-2008</p> | <p>Series 6000</p> |  |
| <p>Right angle mounting bracket provides vertical height and 360° rotation.</p> | <p>60-1785</p> | <p>Series 5000</p> |  |

| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|---|---|---|---|
| Right angle mounting bracket intended for use with Unistrut™ channel provides many vertical and horizontal adjustments. | 60-2014 | Series 5000 |  |
| Right angle mounting bracket allows 360° rotation and has hole patterns to match standard NEMA style limit switches. | 60-2230 | Series 5000 |  |
| Right angle mounting bracket provides 360° rotation. | 60-1479 | Series 4000 |  |
| Straight mounting bracket provides 30° horizontal rotation. | 60-2656 | RightSight MiniSight 42CA, 42CB |  |
| Side mounting bracket provides 30° of vertical and 20° of horizontal rotation. | 60-2663 | MiniSight |  |
| Photoelectric sensor vertical height adjustment bracket slotted for any swivel/tilt bracket. | 60-2721 (2 x 4 in.) 60-2722 (2 x 6 in.) 60-2723 (2 x 8 in.) 60-2724 (2 x 10 in.) | RightSight MiniSight Series 9000 ClearSight 9000 ColorSight LaserSight |  |

Accessories

Mounting Brackets

| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|--|--|--|--|
| Stainless steel mounting bracket | 60-BKTL-SS | 44B 42JS VisiSight |  |
| Mounting bracket | 60-2677 | 45MLD |  |
| Clamp style bracket fits any 18 mm sensor. | 871A-BP18 | RightSight MiniSight 42CA, 42CB |  |
| Flush mount adaptor allows any 18 mm sensor to be mounted flush against panel surface. | 60-2590 | RightSight MiniSight 42CA, 42CB |  |
| Heavy duty impact bracket of #12 steel can be used with swivel/tilt bracket. | 60-2695 A = 76 mm (3 in.) | RightSight MiniSight Series 9000 ColorSight LaserSight |  |
| | 60-2702 A = 117 mm (4.6 in.) | ClearSight 9000 | |
| Heavy duty impact bracket of #12 steel can be used with swivel/tilt bracket. | 60-2725 | Series 9000 |  |

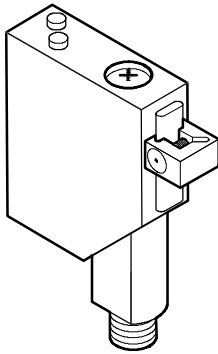
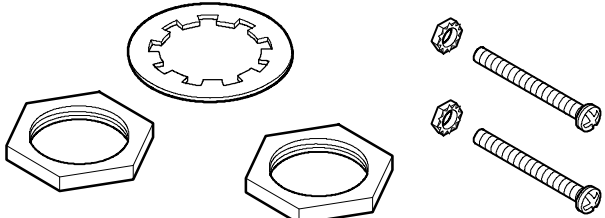
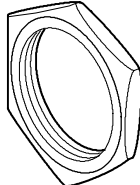
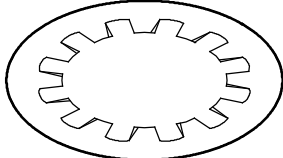
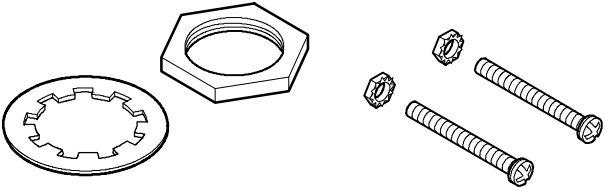
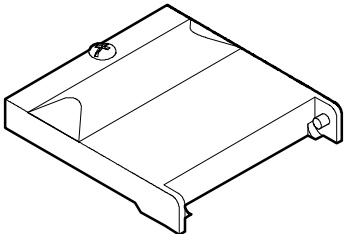
| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|--|----------------|-------------|--|
| Heavy duty mounting bracket designed for use in high vibration applications provides both horizontal and vertical height adjustment. | 60-1748 | Series 5000 |  |
| Heavy duty impact bracket of #12 steel can be used with the Cat. No. 60-1785 mounting bracket. | 60-2083 | Series 5000 |  |
| Heavy duty impact bracket protects sensor and provides 60° horizontal adjustment. | 60-1665 | Series 4000 |  |
| Mounting bracket (included with sensor) | 60-2773 | 45PVA |  |
| Plastic bracket (2 brackets) | 60-2779 | 45PVA |   |

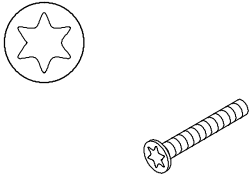
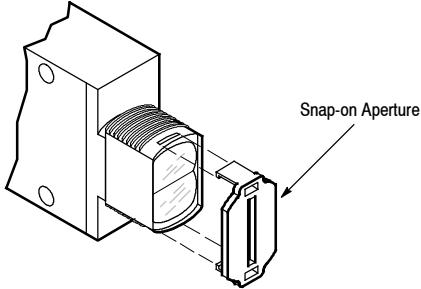
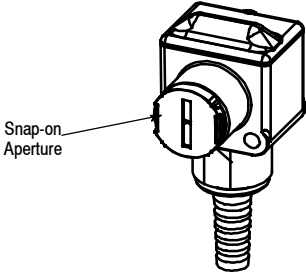
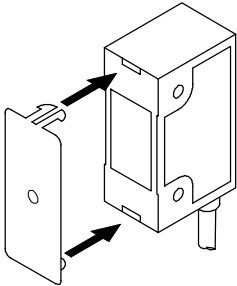
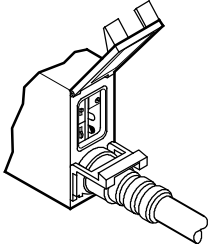
| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|--------------------------------|-----------|------------------|-----------------------------------|
| Metal brackets (2 brackets) | 60-2772 | 45PVA | |
| Galvanized steel | 60-2775-1 | 45PVA - 1LEB1-F4 | |
| Galvanized steel | 60-2776-1 | 45PVA - 1LEB2-F4 | |
| Galvanized steel | 60-2777-1 | 45PVA - 1LEB3-F4 | |
| Galvanized steel | 60-2778-1 | 45PVA - 1LEB4-F4 | |

| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|-----------------------|------------------|----------------|-----------------------------------|
| Mounting bracket | 60-BJS-L1 | 42JS VisiSight | |
| Mounting bracket | 60-BJS-L2 | 42JS VisiSight | |
| 18 mm snap-on adaptor | 60-AJS-18 | 42JS VisiSight | |

Accessories

Protective Brackets and Apertures

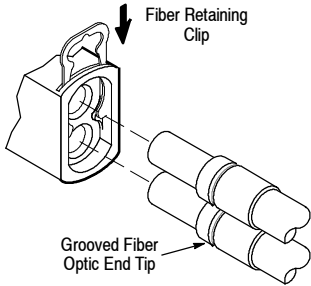
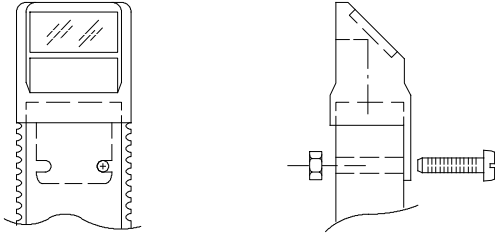
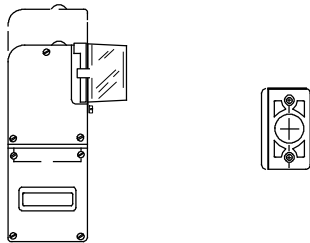
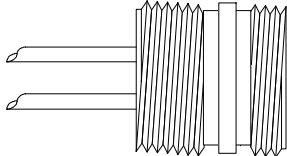
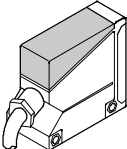
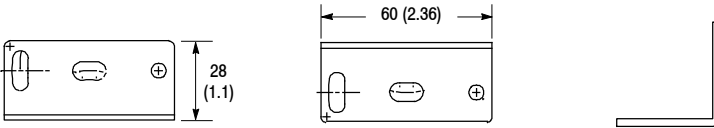
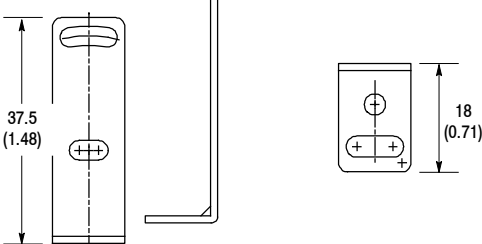
| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|---|-------------------|--|--|
| Dovetail mounting bracket | 44B-BKT | 44B 45LSP |  |
| 18 mm mounting kit contains lockwasher, nuts, and screws for both body or thru-hole mounting. | 60-2716 | RightSight |  |
| 18 mm mounting nut, plastic (2 each). | 871T-N3 | RightSight MiniSight 42CA, 42CB |  |
| 18 mm mounting nut, stainless steel (2 each). | 871T-N4 | RightSight MiniSight 42CA, 42CB | |
| 18 mm lockwasher, metal | 871A-LWN18 | RightSight MiniSight 42CA, 42CB |  |
| 30 mm mounting kit contains lockwasher, nuts, and screws for both body or thru-hole mounting. | 129-130 | Series 9000 ColorSight LaserSight ClearSight 9000 |  |
| Replacement user interface cover. | 60-2620 | Series 9000 ColorSight LaserSight ClearSight 9000 |  |

| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|---|--|--|---|
| Torx screw set to prevent tampering of sensor settings (set contains 25 pieces). Requires Torx screwdriver 57-144 . | 129-135 | Series 9000 ColorSight LaserSight ClearSight 9000 |  |
| Torx screwdriver | 57-144 | Series 9000 ColorSight LaserSight ClearSight 9000 | |
| Apertures are used on transmitted beam sensing models to decrease the field of view. This is helpful in applications where small targets must be detected with precision. Note that the sensing range will be reduced by as much as 90% when using apertures. Apertures should be fitted to both the source and receiver models for proper operation. Each kit comes with 20 apertures except as noted. | 60-2673 (1 mm) 60-2674 (2 mm) 60-2675 (4 mm) 60-2676 (1, 2, 4 mm) ① | MiniSight |  |
| | 60-2660 (1 mm) 60-2661 (2 mm) 60-2662 (4 mm) 60-2659 (1, 2, 4 mm) ① | RightSight |  |
| | 61-6726 (1 mm) 61-6727 (2 mm) 61-6728 (3 mm) 61-6729 (1x5 mm) ② | 42KB |  |
| Replacement cover and locking clip. | 60-2679 | MiniSight |  |

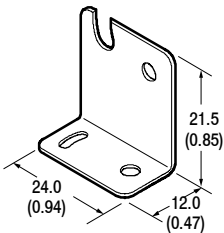
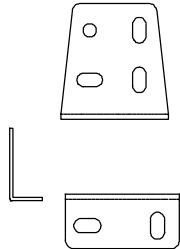
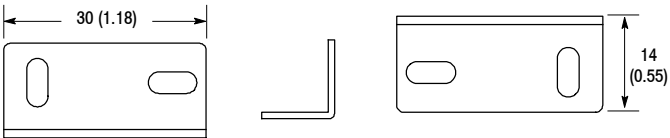
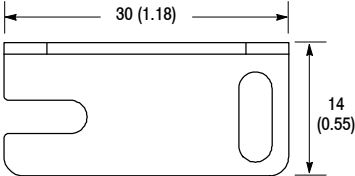
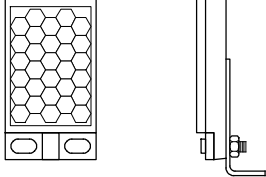
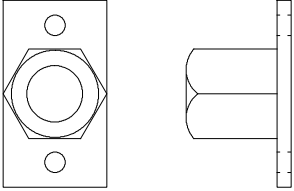
- ① 4 each per kit
- ② 10 pieces per kit

Accessories

Protective Brackets and Apertures

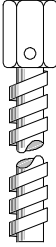
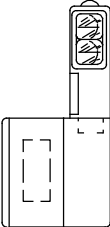
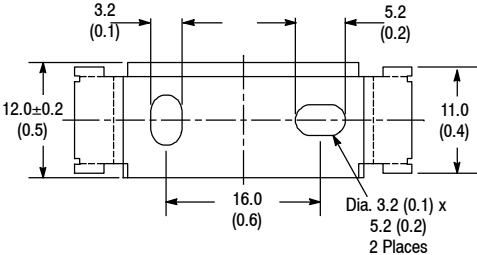
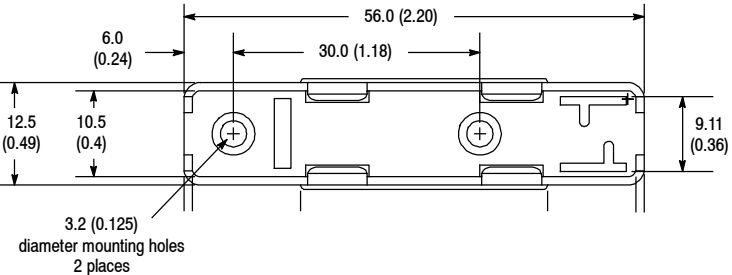
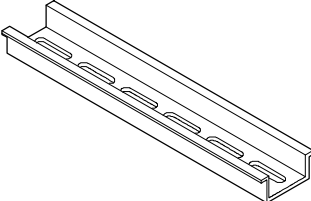
| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|--|----------------|-------------|---|
| Replacement fiber optic retaining clip (set of 5 pieces). | 60-2680 | MiniSight |  <p>Fiber Retaining Clip</p> <p>Grooved Fiber Optic End Tip</p> |
| Snap on mirror permits side viewing of targets. Only for retroreflective and transmitted beam sensing models and will reduce sensing range by 30%. | 60-2052 | Series 6000 |  |
| Snap on mirror permits side viewing of targets. Only for retroreflective, diffuse, and transmitted beam sensing models and will reduce sensing range by 30%. | 60-1840 | Series 5000 |  |
| 4-pin mini QD receptacle simplifies installation. | 60-2668 | 42BC |  |
| Replacement cover for user interface panel. | 60-2669 | 42BC |  |
| Replacement right angle mounting bracket. | 60-2637 | 42BC |  |
| Replacement mounting bracket side view. | 60-2633 | 42KB |  |

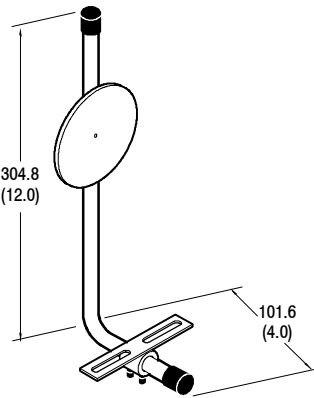
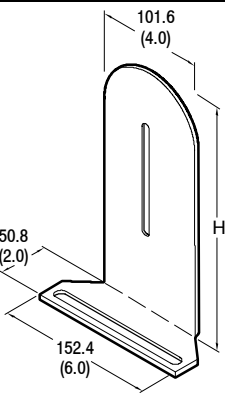
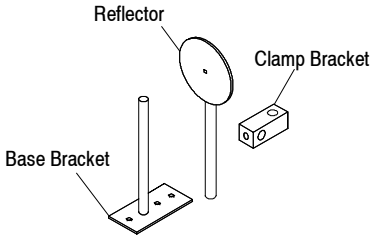
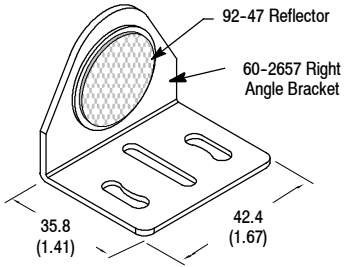
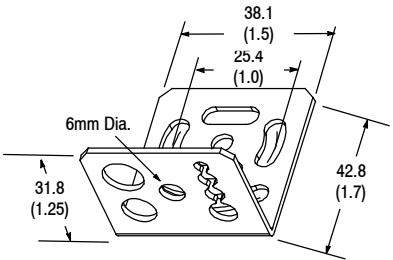
Protective Brackets and Apertures

| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|---|----------------|--------------|--|
| Replacement mounting bracket end view. | 60-2632 | 42KB |  |
| Replacement mounting bracket. | 60-2635 | 42KC |  |
| Replacement mounting bracket end view. | 60-2634 | 42KC |  |
| Replacement right angle mounting bracket. | 60-2636 | 42BA |  |
| Replacement reflector. | 92-93 | 42KB 42KC |  |
| Conduit mounting adaptor permits connection of sensor to 1/2 in. NPT conduit. Gasketed to maintain NEMA 4 rating. | 60-2213 | Series 5000 |  |

Accessories

Protective Brackets and Apertures

| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|---|----------------|------------------------|--|
| Adaptor contains 3 m (10 ft) or armoured cable to protect PVC cable found on Series 5000 cable style bases. | 60-1577 | Series 5000 |  |
| Counter/Totalizer module provides reliable high-speed counting capability and six digit, 5 mm high, LCD display. Battery powered for minimum 5 year life. | 60-2072 | Series 5000 Green Line |  |
| Replacement adaptor permits mounting of sensor to 35 mm DIN rail. | 60-2638 | 42FT 45FVL 45FSL |  |
| Replacement adaptor permits mounting of sensor to 35 mm DIN rail. | 60-2639 | 42FA |  |
| 35 mm DIN rail (1 m) for mounting sensor and other control equipment. | 64-134 | 42FT 45FVL 45FSL |  |

| Description | Cat. No. | Used for | Approximate Dimensions [mm (in.)] |
|---|--|--|--|
| Right angle reflector bracket set for mounting up to 3 in. diameter reflectors. | 60-2717 | 92-39 92-89 92-46 92-47 92-105 92-106 |  |
| Reflector vertical height adjustment bracket for mounting up to 3 in. diameter reflectors. | 60-2718 (2 x 8 in.) 60-2719 (2 x 10 in.) 60-2720 (2 x 12 in.) | 92-39 92-89 92-46 92-47 92-105 92-106 |  |
| Reflector bracket provides both vertical and horizontal height adjustment. Bracket comes with 3 in. reflector Cat. No. 92-39. | 60-2685 | 92-39 92-89 92-46 92-47 92-105 92-106 |  |
| Mounting bracket with Cat. No. 92-47 reflector mounted at right angle | 60-2692 | 92-47 |  |
| Right angle mounting bracket for both reflectors and fiber optic cables | 60-2696 | 92-105 92-106 92-47 92-46 |  |

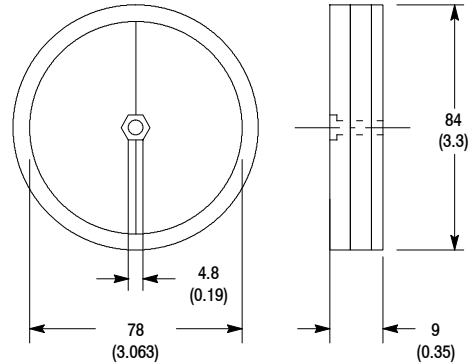
Accessories

Reflectors, Reflective Tape

Specifications

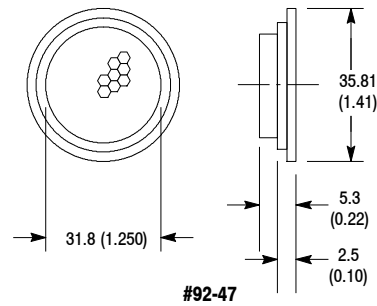
Approximate Dimensions [mm (in.)]

| Cat. No. | 92-39 | 92-124 |
|-------------------------------|--|--------|
| Description | Reflector, 76 mm (3 in.) dia. with center mount hole. (Plastic back) (ABS) | |
| Suitable for Polarized Sensor | Yes | |
| Cube Style | Corner cube | |
| Optimum Range | 150 mm (6 in.)...2 m (80 in.) | |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). | |

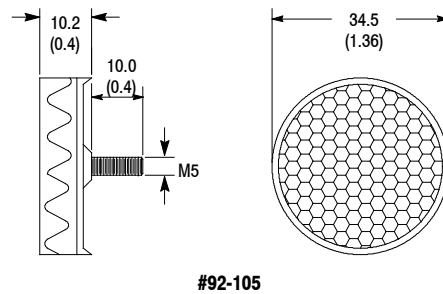


| Cat. No. | 92-89 |
|-------------------------------|---|
| Description | Reflector, 76 mm (3 in.) dia. with center mount hole. (Aluminum back) |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range | 150 mm (6 in.)...2 m (80 in.) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |

| Cat. No. | 92-47 |
|-------------------------------|---|
| Description | Reflector, 32 mm (1.25 in.) dia. Requires adhesive backing. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range | 150 mm (6 in.)...1.5 m (5 ft) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |



| Cat. No. | 92-105 |
|-------------------------------|---|
| Description | Reflector, 32 mm (1.25 in.) dia. with M5 screw |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range | 150 mm (6 in.)...1.5 m (5 ft) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |

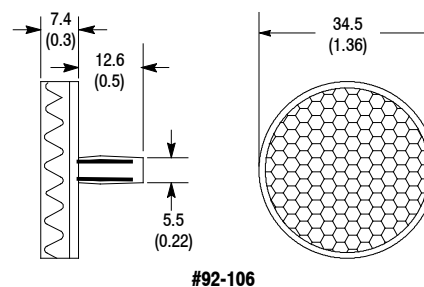


① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

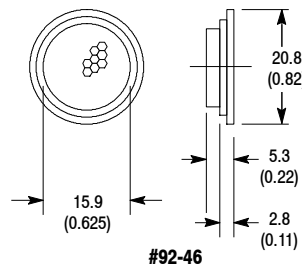
Specifications

Approximate Dimensions [mm (in.)]

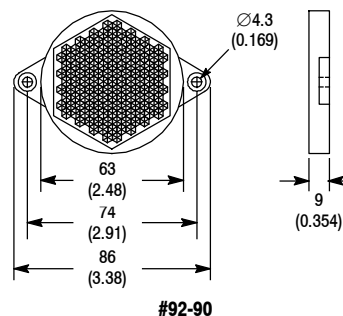
| | |
|--------------------------------------|---|
| Cat. No. | 92-106 |
| Description | Reflector, 32 mm (1.25 in.) dia. with snap fit post |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range ① | 150 mm (6 in.)...1.5 m (5 ft) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |



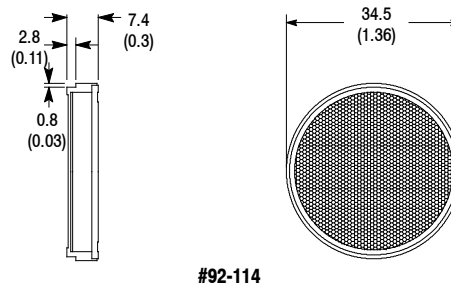
| | |
|--------------------------------------|---|
| Cat. No. | 92-46 |
| Description | Reflector, 16 mm (0.625 in.) dia. Requires adhesive backing. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range ① | 51 mm (2 in.)...150 mm (6 in.) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |



| | |
|--------------------------------------|--|
| Cat. No. | 92-90 |
| Description | Reflector, 86 mm (3 in.) dia. with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range ① | 51 mm (2 in.)...1.5 m (5 ft) |
| Recommended Application | Suitable for ClearSight photoelectric sensors and general purpose applications up to 65°C (150°F). |



| | |
|--------------------------------------|--|
| Cat. No. | 92-114 |
| Description | Reflector, 34 mm (1.35 in.) dia. Requires adhesive backing. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Micro cube |
| Optimum Range ① | |
| Recommended Application | Ideal for laser-based photoelectric sensors such as LaserSight as well as general purpose applications up to 65°C (150°F). |




① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.
 ② Cat. Nos. 92-47 and 92-46 can be mounted with adhesive tape (not included).

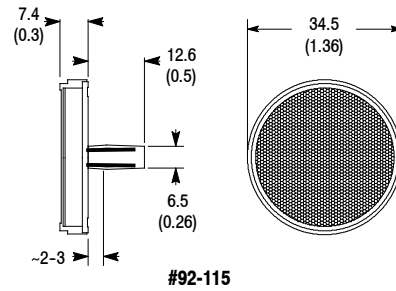
Accessories


Reflectors, Reflective Tape

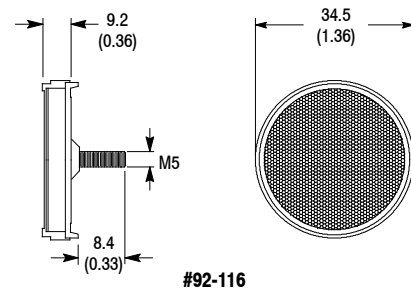
Specifications


| | |
|--|--|
| Cat. No. | 92-115 |
| Description | Reflector, 34 mm (1.35 in.) dia. with snap fit post. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Micro cube |
| Optimum Range  | |
| Recommended Application | Ideal for laser-based photoelectric sensors such as LaserSight as well as general purpose applications up to 65°C (150°F). |

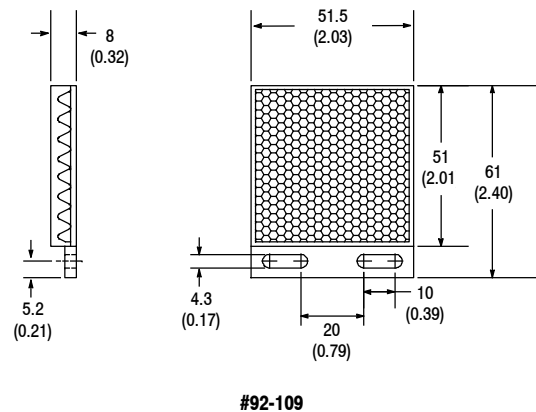
Approximate Dimensions [mm (in.)]




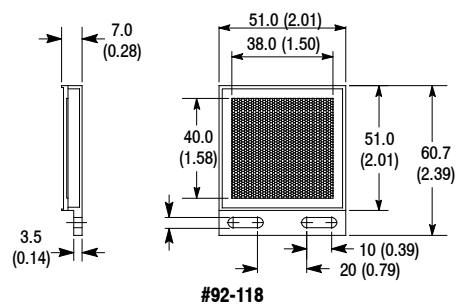
| | |
|--|--|
| Cat. No. | 92-116 |
| Description | Reflector, 34 mm (1.35 in.) dia. with threaded post. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Micro cube |
| Optimum Range  | |
| Recommended Application | Ideal for laser-based photoelectric sensors such as LaserSight as well as general purpose applications up to 65°C (150°F). |




| | |
|--|---|
| Cat. No. | 92-109 |
| Description | Reflector, 51 x 61 mm (2 x 2.5 in.) rectangular with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range  | 51 mm (2 in.)...3.0 m (10 ft) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |



| | |
|--|--|
| Cat. No. | 92-118 |
| Description | Reflector, 51 x 61 mm (2 x 2.5 in.) rectangular with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Micro cube |
| Optimum Range  | |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). The Cat. No. 92-118 is also suitable for laser-based photoelectric sensors such as LaserSight. |

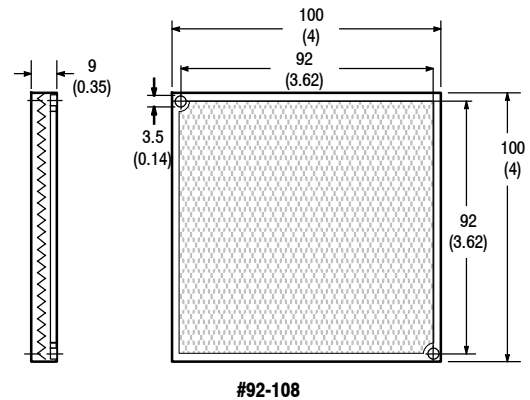


 Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

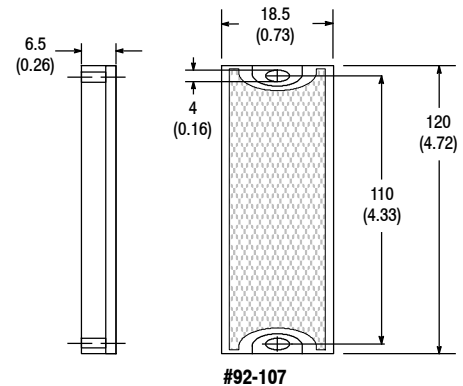
Specifications

Approximate Dimensions [mm (in.)]

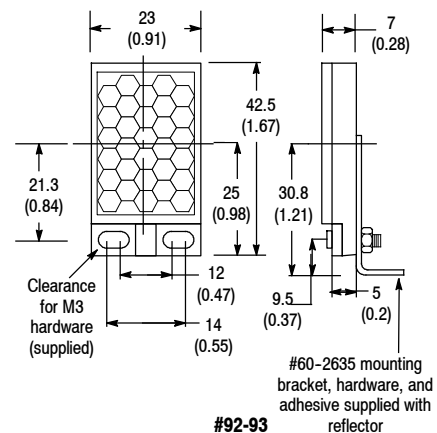
| | |
|--------------------------------------|--|
| Cat. No. | 92-108 |
| Description | Reflector, 100 x 100 mm (4 x 4 in.) square with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range ^① | 150 mm (6 in.)...3.0 m (10 ft) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |



| | |
|--------------------------------------|--|
| Cat. No. | 92-107 |
| Description | Reflector, 18.5 x 120 mm (0.73 x 4.72 in.) rectangular with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range ^① | 51 mm (2 in.)...1.5 m (5 ft) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |



| | |
|--------------------------------------|--|
| Cat. No. | 92-93 |
| Description | Reflector, 23 x 42.5 mm (0.91 x 1.67 in.) rectangular with mounting tabs and bracket. Right angle bracket and adhesive tape. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range ^① | 51 mm (2 in.)...150 mm (6 in.) |
| Recommended Application | Suitable for general purpose applications up to 55°C (130°F). |



① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

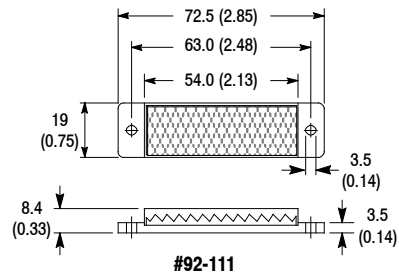
Accessories

Reflectors, Reflective Tape

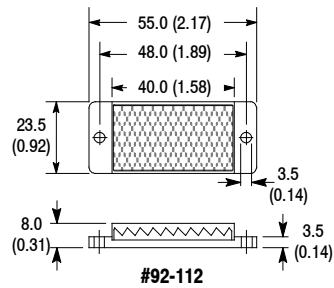
Specifications

Approximate Dimensions [mm (in.)]

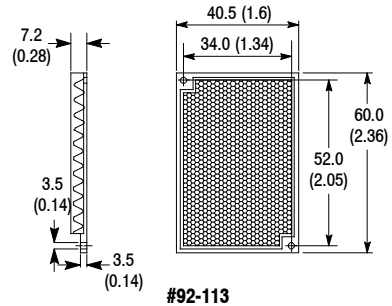
| | |
|--------------------------------------|---|
| Cat. No. | 92-111 |
| Description | Reflector, 19 x 72.5 mm (0.75 x 2.85 in.) rectangular with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range | |
| Recommended Application | Suitable for general purpose applications up to 55°C (130°F). |



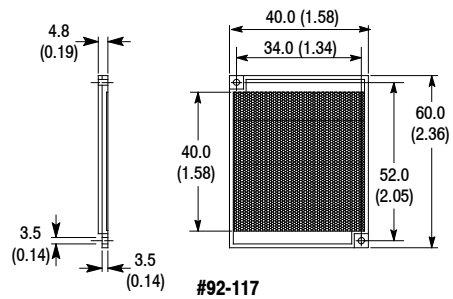
| | |
|--------------------------------------|--|
| Cat. No. | 92-112 |
| Description | Reflector, 23.5 x 55 mm (0.924 x 2.17 in.) rectangular with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range | |
| Recommended Application | Suitable for general purpose applications up to 55°C (130°F). |



| | |
|--------------------------------------|--|
| Cat. No. | 92-113 |
| Description | Reflector, 40.5 x 60 mm (1.6 x 2.36 in.) rectangular with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range | |
| Recommended Application | Suitable for general purpose applications up to 55°C (130°F). |




| | |
|--------------------------------------|---|
| Cat. No. | 92-117 |
| Description | Reflector, 40.5 x 60 mm (1.6 x 2.36 in.) rectangular with mounting tabs. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Micro cube |
| Optimum Range | |
| Recommended Application | Suitable for general purpose applications up to 55°C (130°F). The 92-117 is also suited for laser-based photoelectric sensors such as LaserSight. |

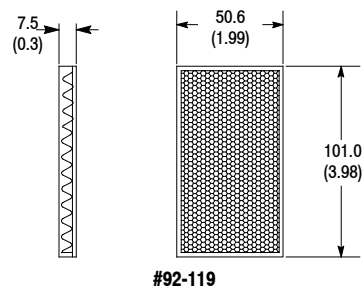



① Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

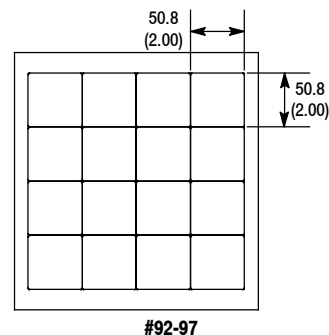
Specifications


Approximate Dimensions [mm (in.)]

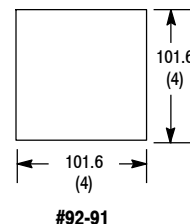
| | |
|--|---|
| Cat. No. | 92-119 |
| Description | Reflector, 51 x 101 mm (2 x 4 in.) rectangular with adhesive backing. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Corner cube |
| Optimum Range  | |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |




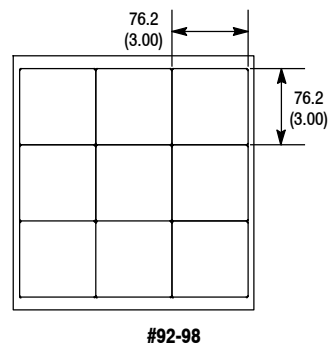
| | |
|--|---|
| Cat. No. | 92-97 |
| Description | Reflective tape, 51 mm (2 in.) square, sheet of 16 pieces with adhesive backing. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Glass bead |
| Optimum Range  | 150 mm (6 in.)...1.5 m (5 ft) |
| Recommended Application | Suitable for general purpose applications up to 121°C (250°F). Also suitable for polarized retroreflective sensors. |




| | |
|--|---|
| Cat. No. | 92-91 |
| Description | Reflective metal, 100 x 100 mm (4 x 4 in.) square. |
| Suitable for Polarized Sensor | No |
| Cube Style | Glass bead |
| Optimum Range  | 150 mm (6 in.)...1.5 m (5 ft) |
| Recommended Application | The Cat. No. 92-91 is intended for use in high temperature applications up to 480°C (900°F) but not with polarized retroreflective sensors. |



| | |
|--|--|
| Cat. No. | 92-98 |
| Description | Reflective tape, 76 mm (2.75 in.) square, sheet of 9 pieces with adhesive backing. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Glass bead |
| Optimum Range  | 150 mm (6 in.)...1.5 m (5 ft) |




 Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

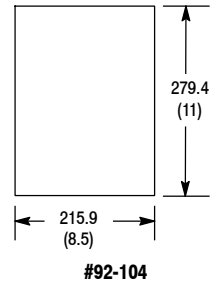
Accessories


Reflectors, Reflective Tape

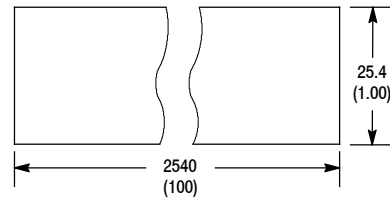
Specifications


Approximate Dimensions [mm (in.)]


| | |
|--|--|
| Cat. No. | 92-104 |
| Description | Reflective tape, 215.9 x 279.4 mm (8.5 x 11 in.) sheet with adhesive backing. |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Glass bead |
| Optimum Range  | 200 mm (8 in.)...1.5 m (5 ft) |
| Recommended Application | Suitable for general purpose applications up to 60°C (140°F) with polarized retroreflective sensors. |



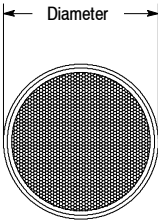
| | |
|--|---|
| Cat. No. | 92-99 |
| Description | Reflective tape, roll of 25 x 2540 mm (1 x 100 in.). |
| Suitable for Polarized Sensor | Yes |
| Cube Style | Glass bead |
| Optimum Range  | 150 mm (6 in.)...1.0 m (40 in.) |
| Recommended Application | Suitable for general purpose applications up to 65°C (150°F). |



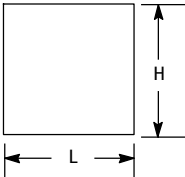
| | |
|--|---|
| Cat. No. | 92-100 |
| Description | Reflective tape, 25 x 2540 mm (1 x 100 in.). |
| Suitable for Polarized Sensor | No |
| Cube Style | Glass bead |
| Optimum Range  | 150 mm (6 in.)...1.0 m (40 in.) |
| Recommended Application | Suitable for general purpose applications up to 79°C (175°F). |

 Optimum range varies with sensor optics. See table on page 1-315 for reflectivity performance.

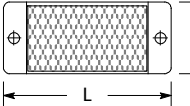
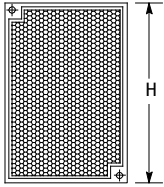
Round Reflectors

| Diameter [mm (in.)] | Cube Style | Mounting | Temperature | Approximate Dimensions [mm (in.)] | Cat. No. | |
|---------------------|-------------|---------------|-----------------------------------|---|----------|--------|
| 76.2 (3) | Corner Cube | Thru-Hole | $\leq 65^{\circ}\text{C}$ (150°F) |  | 92-39 | |
| 76.2 (3) | | | | | 92-89 | |
| 31.75 (1.25) | | Adhesive | | | 92-47 | |
| 31.75 (1.25) | | | | | M5 Screw | 92-105 |
| 31.75 (1.25) | | | | | Snap-Fit | 92-106 |
| 31.75 (1.25) | Micro Cube | Adhesive | | | 92-114 | |
| 31.75 (1.25) | | Snap-Fit | | | 92-115 | |
| 31.75 (1.25) | | M5 Screw | | | 92-116 | |
| 19.05 (0.75) | Corner Cube | Adhesive | | | 92-46 | |
| 57.15 (2.25) | | Thru-Hole x 2 | | | 92-90 | |

Reflective Tape

| Length x Height [mm (in.)] | Cube Style | Mounting | Temperature | Approximate Dimensions [mm (in.)] | Cat. No. |
|-------------------------------------|-------------------------------|----------|-----------------------------------|--|----------|
| 50 x 50 (2 x 2) (16 per sheet) | Glass Bead | Adhesive | $<121^{\circ}\text{C}$ (250°F) |  | 92-97 |
| 76 x 76 (3 x 3) (9 per sheet) | | | | | 92-98 |
| 100 x 100 (3.94 x 3.94) | | | $<60^{\circ}\text{C}$ (140°F) | | 92-104 |
| | | | $<480^{\circ}\text{C}$ (900°F) | | 92-91 |
| 2510 x 25 (98.8 x 0.98) (1 roll) | | | $\leq 65^{\circ}\text{C}$ (150°F) | | 92-99 |
| | $<79^{\circ}\text{C}$ (175°F) | 92-100 | | | |

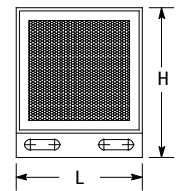
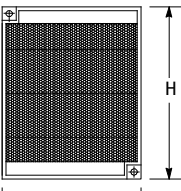
Rectangular Reflectors

| Length x Height [mm (in.)] | Cube Style | Mounting | Temperature | Approximate Dimensions [mm (in.)] | Cat. No. |
|----------------------------|-------------|---------------|---|---|------------------------|
| 40.5 x 60 (1.59 x 2.36) | Corner Cube | Thru-Hole x 2 | $<55^{\circ}\text{C}$ (130°F) |  | 92-113 |
| 50.6 x 101 (1.99 x 3.98) | | Adhesive | $<65^{\circ}\text{C}$ (150°F) | | 92-119 |
| 18.5 x 120 (0.73 x 4.72) | | Thru-Hole x 2 | | $<55^{\circ}\text{C}$ (130°F) | 92-112, 92-111, 92-107 |
| 55 x 23.5 (2.17 x 0.93) | | |  | | 92-112 |
| 72.5 x 19 (2.85 x 0.75) | | | | | 92-111 |
| 42 x 22 (1.65 x 0.87) | | | | | 92-93 |
| | | | 92-113, 92-117, 92-119 | | |

Accessories

Reflectors, Reflective Tape

Square Reflectors

| Length x Height [mm (in.)] | Cube Style | Mounting | Temperature | Approximate Dimensions [mm (in.)] | Cat. No. |
|----------------------------|-------------|---------------|----------------|--|---------------|
| 100 x 100 (3.94 x 3.94) | Corner Cube | Thru-Hole x 2 | ≤ 65°C (150°F) |  <p>92-108, 92-117</p> | 92-108 |
| 51.5 x 61 (2.08 x 2.40) | | | | | 92-109 |
| 40 x 60 (1.57 x 2.36) | | | | | 92-117 |
| 51 x 60.7 (2.01 x 2.39) | Micro Cube | | |  <p>92-109, 92-118</p> | 92-118 |

For more detailed dimensions, please refer to www.ab.com/e-tools.

Relative Reflectivity

Reflectivity varies with distance and with sensor optics. The table below is designed to be used as a comparison between reflectors. The numbers represent a reflectivity at a given range

by a class of sensors relative to the standard 92-39 3 in. round reflector.

The two classes of sensors shown represent optic styles. The standard size optic includes the Series 9000,

10,000, 5000, and 4000.

The miniature optics are used in the smaller sensor families: RightSight™, MiniSight™, 5000, 6000, and 7000 Series.

| Reflector | | Standard Polarized Sensors | | | Miniature Polarized Sensors | | | Laser-Based Sensors | |
|-------------------------|--|-------------------------------------|-----------------|------------------|---|-------------------|-------------------|---------------------|-------------------|
| | | Series 10,000, 9000, 5000, and 4000 | | | RightSight, MiniSight, Series 6000, 7000, and 42xx | | | LaserSight | |
| Cat. No. | Description | 3.0 m (10 ft) | 1.5 m (5 ft) | 0.61 m (2 ft) | 450 mm (18 in.) | 200 mm (8 in.) | 100 mm (4 in.) | 15.2 m (50 ft) | 3.05 m (10 ft) |
| 92-39, 92-89 | Reflector, 3 in. round | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 92-46 | Reflector, 3/4 in. round | — | — | 50 | 50 | 40 | 25 | — | 100 |
| 92-47 | Reflector, 1 1/4 in. round | — | 40 | 100 | 100 | 80 | 30 | — | 90 |
| 92-90 | Reflector, 2 in. hexagon | 70 | 150 | 150 | 350 | 150 | 200 | 130 | 100 |
| 92-91 | Reflective tape, high temperature | — | — | — | — | — | — | — | — |
| 92-93 | Reflector, 3/4 x 1.5 in. rectangular | — | — | 50 | 50 | 50 | 25 | — | 100 |
| 92-97 | Reflector, 2 in. ² | — | 90 | 150 | 200 | 80 | 50 | — | 80 |
| 92-98 | Reflector, 2 3/4 in. ² | — | 100 | 150 | 200 | 80 | 50 | — | 70 |
| 92-99 | Reflective tape, polarized | — | 40 | 70 | 100 | 50 | 30 | — | — |
| 92-100 | Reflective tape, nonpolarized | — | — | — | — | — | — | — | — |
| 92-104 | Reflective tape, 8.5 x 11 in. | 25 | 50 | 50 | 70 | 30 | 40 | — | 70 |
| 92-105 | Reflector, 1 1/4 in. round | — | 40 | 75 | 100 | 120 | 200 | 70 | 90 |
| 92-106 | Reflector, 1 1/4 in. round | — | 40 | 75 | 100 | 120 | 200 | 70 | 90 |
| 92-107 | Reflector, 3/4 x 4 3/4 in. rectangular | — | 50 | 100 | 100 | 60 | 60 | — | 110 |
| 92-108 | Reflector, 4 in. ² square | 250 | 150 | 100 | 120 | 90 | 150 | — | 100 |
| 92-109 | Reflector, 2 in. ² square | 100 | 150 | 100 | 100 | 90 | 150 | 150 | 110 |
| 92-111 | Reflector, 2 x 1, rectangular | 20 | 50 | 90 | 100 | 60 | 100 | — | — |
| 92-112 | Reflector, 2.8 x 3/4 in. rectangular | 20 | 60 | 100 | 100 | 60 | 110 | — | 100 |
| 92-113 | Reflector, 1.6 x 2 1/4 in. rectangular | 90 | 115 | 50 | 90 | 50 | 170 | 210 | 110 |
| 92-114 | Reflector, 1 1/4 in. round | 20 | 70 | 70 | 90 | 20 | — | 110 | 110 |
| 92-115 | Reflector, 1 1/4 in. round | 20 | 70 | 70 | 90 | 20 | — | 110 | 110 |
| 92-116 | Reflector, 1 1/4 in. round | 20 | 70 | 70 | 90 | 20 | — | 110 | 110 |
| 92-117 | Reflector, 1 1/2 x 2 1/4 in. rectangular | 30 | 130 | 140 | 200 | 60 | 50 | 30 | 100 |
| 92-118 | Reflector, 2 x 2 rectangular | 80 | 70 | 50 | 50 | 30 | — | 260 | 90 |

For more information on the theory of retroreflective sensing, see page 1-22. Some variation may be seen across the reflector. Data was measured with reflector rotating to normalize reflectance.

Notes
