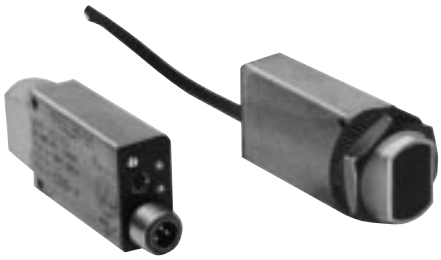
Miniature High Performance AC and DC Sensors

HARSH DUTY



FEATURES

- Withstands high pressure washdown (1,200 psi) which simulates cleaning procedure used in food and beverage processing, exceeding NEMA 6P and IP67
- Ultrasonically welded lens, plus fully potted housing ensures watertight seal integrity
- Rugged housing withstands strong acids, alkalines, cutting fluids, and thermal shock
- 18 or 30 ft. retroreflective, 8 ft. polarized retro, 6 or 18 in. diffuse, 1.0 or 2.5 in. convergent beam, 100 ft. thru scan, and visible red or infrared fiber optic controls
- 20-260 VAC, 2 wire; or 10-30 VDC with sink and source output in a single unit
- Quick-disconnect versions decrease downtime
- 15-turn sensitivity adjustment, red output indicator and green alignment indicator, plus selectable light operate/dark operate switch – for fast, easy, accurate setups

GENERAL INFORMATION

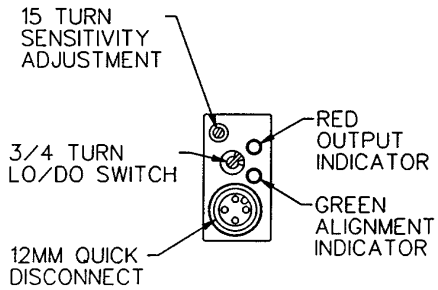
MHP Series miniature high-performance photoelectric sensors are rugged, powerful sensors packaged in a small, yet flexible housing design. They can be either side-mounted or thru-hole mounted.

All materials used to fabricate these products are chemically resistant. The housing is fully potted to withstand harsh industrial environments, including high-pressure washdown.

Units can be furnished with either preleaded cable or quick disconnect termination.

ADJUSTMENTS AND INDICATORS

Adjustments for sensitivity and light operate/dark operate selection are at the rear of the sensor housing.



A red LED output indicator (see drawing) is ON when the output is energized state, while a green LED alignment indicator is ON when a stable amount of light is received by the sensor.

SELF-DIAGNOSTIC OUTPUT

DC four-wire sinking or sourcing units have a unique self-diagnostic output which serves as a unique alarm system to help prevent downtime. It sends a 50 mA signal to provide early warning that a malfunction may be imminent unless corrective action is taken, such as lens cleaning, sensitivity adjustment or sensor realignment.

POLARIZED RETRO

MHP polarized retro units are recommended to prevent false triggering when detecting very shiny objects, such as polished stainless steel, aluminum foil or shrinkwrap. Polarizing filters mounted in front of the emitter and receiver lenses allow only light from a corner cubed reflector to reach the receiver. Shiny objects will break the sensor beam even if the sensor is mounted perpendicular to the object's surface.

Polarized units, with their visible red light source, are especially useful for detecting clear glass and plastic objects.

MHP Catalog Listing System

MHP	R	2A	L	◄ A.C. Example
MHP	R	33	L	◄ D.C. Example

Mini High Performance

SCAN TYPE

- R – 18 ft. Retro
- LR – 30 ft. Range Retro
- D – 18″ Diffuse
- DR – 6″ Visible Red Diffuse
- P – 8 ft. Polar
- F – IR Fiber Optic
- FR – Red Fiber Optic
- TE – AC 100 ft. T-Scan Emitter
- TR – AC 100 ft. T-Scan Receiver
- TLE – DC 100 ft. T-Scan Emitter
- TLR – DC 100 ft. T-Scan Receiver
- C1 – 1.0″ Convergent Beam
- C2 – 2.5″ Convergent Beam

OUTPUT

- 30 – DC Emitter
- 31 – Sink w/Self Diagnostic
- 32 – Source w/Self Diagnostic
- 33 – Sink and Source
- 2A – 2-wire A.C.

POWER CONNECTION

- L – 10 ft. Pre-leaded
- Q – Quick Disconnect

Miniature High Performance DC Sensors

DC - MHP SPECIFICATIONS

		MHP-□31□	MHP-□32□	MHP-□33□
Output	Type	Sinking-NPN Open Collector with NPN Self-Diagnostic	Sourcing-PNP Open Collector with PNP Self-Diagnostic	Dual Outputs: Sinking-NPN Open Collector and Sourcing-PNP Open Collector
	Load Current max.	250 mA	150 mA	250 mA (NPN), 150 mA (PNP)
	Self-Diagnostic	50 mA	50 mA	—
	Voltage Drop max.	.2 VDC @ 5 mA, 1.0 VDC @ 250 mA	1.0 VDC @ 5 mA, 2 VDC @ 150 mA	NPN: .2 VDC @ 5 mA 1.0 VDC @ 250 mA PNP: 1.0 VDC @ 5 mA, 2.0 VDC @ 150 mA
	Leakage Current, max.	10 µA	10 µA	10 µA
	Rate of Operations, max.	500 Hz or 30,000 operations per minute		
	Response Time, max.	ON: 1 msec.; OFF: 1 msec.		
Input	Voltage	10 to 30 VDC		
	Current Consumption	35 mA max. (excluding load); 20 mA max. for emitters		
Logic		Light operate/dark operate selectable		
Sensitivity		15-turn adjustment		
Electrical Protection		False pulse, reverse polarity, line transients, radiated noise immunity		
	Emitter	Reverse polarity		
Temperature	Operating	–22° to 158°F (–30° to 70°C)		
	Storage	–67° to 185°F (–55° to 85°C)		
Shock/Vibration		50G/10G		
Sealing		NEMA 1, 3, 4, 4X, 6, 6P, 12 & 13, plus high-pressure washdown test. (See description of washdown test.)		
Agency Listings		UL listed (E145799) and CSA certified (LR57323)		
Termination	Cable	PVC, 3 meters (9.8 ft.) 4 conductor		
	Connector	DC 4-pin micro type plastic connector		

DC - MHP SCAN DISTANCES - ORDER GUIDE

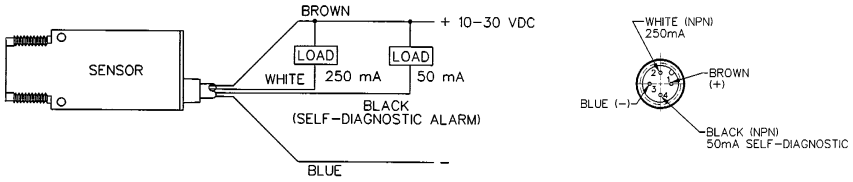
Scan Type	Scan Distance		Termination	Catalog Listings Sinking with Self-Diagnostic	Sourcing with Self-Diagnostic	Sinking and Sourcing
Retro (Infrared)	18 ft.		Preleaded Connector	MHP-R31L MHP-R31Q	MHP-R32L MHP-R32Q	MHP-R33L MHP-R33Q
	30 ft.		Preleaded Connector	MHP-LR31L MHP-LR31Q	MHP-LR32L MHP-LR32Q	MHP-LR33L MHP-LR33Q
Polar (Visible red)	8 ft.		Preleaded Connector	MHP-P31L MHP-P31Q	MHP-P32L MHP-P32Q	MHP-P33L MHP-P33Q
Diffuse (Visible red)	6 in.		Preleaded Connector	MHP-DR31L MHP-DR31Q	MHP-DR32L MHP-DR32Q	MHP-DR33L MHP-DR33Q
Diffuse (Infrared)	18 in.		Preleaded Connector	MHP-D31L MHP-D31Q	MHP-D32L MHP-D32Q	MHP-D33L MHP-D33Q
Thru Scan (Infrared)	100 ft.	Receiver	Preleaded Connector	MHP-TLR31L MHP-TLR31Q	MHP-TLR32L MHP-TLR32Q	MHP-TLR33L MHP-TLR33Q
		Emitter	Preleaded Connector	MHP-TLE30L MHP-TLE30Q		
Convergent Beam	1.0 in.	Visible red	Preleaded Connector	MHP-C131L MHP-C131Q	MHP-C132L MHP-C132Q	MHP-C133L MHP-C133Q
	2.5 in.	Visible red	Preleaded Connector	MHP-C231L MHP-C231Q	MHP-C232L MHP-C232Q	MHP-C233L MHP-C233Q
	1.0 in.	Visible green	Preleaded Connector	MHP-CG131L MHP-CG131Q	MHP-CG132L MHP-CG132Q	MHP-CG133L MHP-CG133Q
Fiber Optic*	See Page C11	Infrared	Preleaded Connector	MHP-F31L MHP-F31Q	MHP-F32L MHP-F32Q	MHP-F33L MHP-F33Q
		Visible Red	Preleaded Connector	MHP-FR31L MHP-FR31Q	MHP-FR32L MHP-FR32Q	MHP-FR33L MHP-FR33Q

* Fiber optic cables are ordered separately. Plastic cables require an **MHPFOA** adapter.

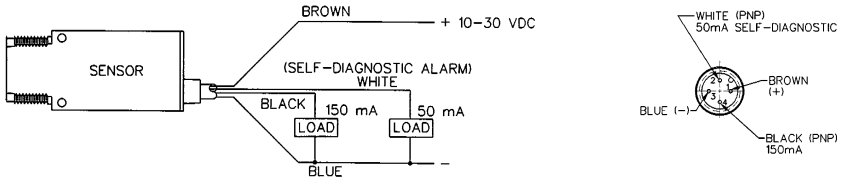
WIRING INFORMATION

Leadwires **Connector Pinout (Male)**

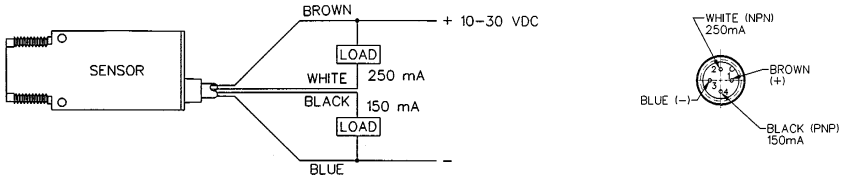
Sinking NPN With Self-Diagnostic Output



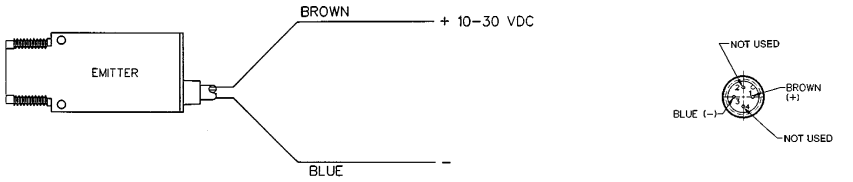
Sourcing PNP With Self-Diagnostic Output



Sinking NPN/Sourcing PNP Output



Emitter



WASHDOWN TEST

The MHP Series has been successfully tested to MICRO SWITCH Test Specification 060.167, Issue 2, Paragraph 4.9. This is a high-pressure (1200 psi), high-temperature (140°F) chemical washdown test. It simulates the cleaning procedure used by Food and Beverage processing plants – procedures which are more severe than the standard NEMA 4 hosedown. The test report is available upon request.

NOTICE

When using quick-disconnect MHP sensors in washdown areas, a sealant (i.e., teflon tape) must be applied to the connector threads to provide a proper seal.

DC/CONNECTOR CABLES ORDER GUIDE

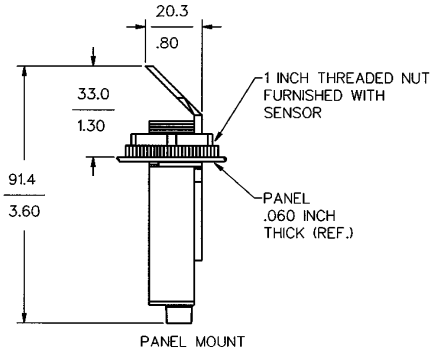
Connector Style	Cable Length	Catalog Listing
Straight	2 m (6.6 ft.)	80456-A
	5 m (16.4 ft.)	80459-A
Right Angle	2 m (6.6 ft.)	80496-A
	5 m (16.4 ft.)	80499-A

CABLE PLUG PINOUT (Female) AND LEADWIRE COLORS

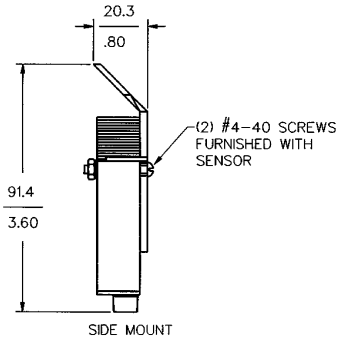
Pin #1 (Brown)
Pin #2 (White)
Pin #3 (Blue)
Pin #4 (Black)

RIGHT ANGLE ADAPTER FOR ALL MHP PRODUCTS (EXCEPT CONVERGENT BEAM)

Catalog Listing MHPRA is a right angle adapter which may be used with all MHP products. The sensor can be thru-hole panel mounted or side mounted (see drawing). The adapter reduces scan distance by 20-25%.

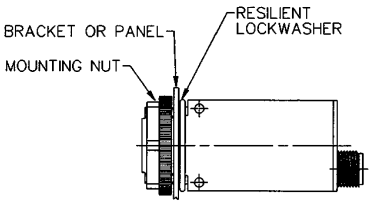


PANEL MOUNT



SIDE MOUNT

PANEL MOUNTING



Add resilient lockwasher to housing bushing prior to inserting bushing in bracket or panel.

Photoelectric

Miniature High Performance AC Sensors

AC - MHP SPECIFICATIONS

Input	Voltage	20-260 VAC, 50-60 Hz
	Current Consumption	1.5 mA max.
Output	Output Type	SPST SCR
	Load Current	5-500 mA, up to 50°C (122°F); derated to 300 mA at 70°C (158°F)
	Leakage Current	1.5 mA max.
	Voltage Drop	≤ 6.5 V at 500 mA, ≤ 12 V at 10 mA
	Load Surge Current, max.	10 amps for 10 msec (non-repetitive)
	Response Time	ON: 8 msec.; OFF: 8 msec.
	Rate of Operation	60 Hz max.
	Delay On Power Up	70 msec.
Electrical Protection		False pulse, industrial interference, line transients, NEMA noise
Temperature	Operating	–22° to 158°F (–30° to 70°C)
	Storage	–67° to 185°F (–55° to 85°C)
Shock/Vibration		50G/10G
Sealing		NEMA 1, 3, 4, 4X, 6, 6P, 12 & 13, plus high-pressure washdown test. (See description of washdown test.)
Agency Listings		UL listing and CSA certification pending
Termination	Cable	PVC, 3 meters (9.8 ft.) 2 conductor
	Connector	DC 3-pin micro type metal connector

AC - MHP SCAN DISTANCES - ORDER GUIDE

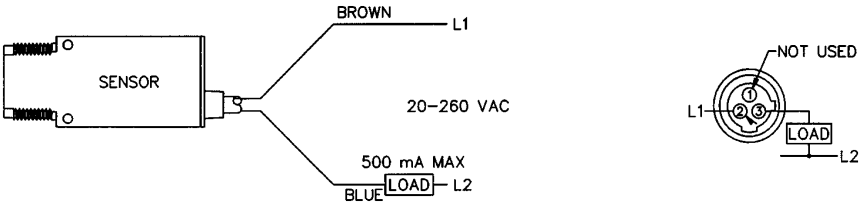
Scan Type	Scan Distance		Catalog Listing Preleaded	Connector
Retroreflective (Infrared)	18 ft.		MHP-R2AL	MHP-R2AQ
	30 ft.		MHP-LR2AL	MHP-LR2AQ
Polarized Retro (Visible red)	8 ft.		MHP-P2AL	MHP-P2AQ
Diffuse Scan (Infrared)	18 in.		MHP-D2AL	MHP-D2AQ
Thru Scan (Infrared)	100 ft.	Emitter	MHP-TE2AL	MHP-TE2AQ
		Receiver	MHP-TR2AL	MHP-TR2AQ
Convergent Beam (Visible red)	1.0 in.		MHP-C12AL	MHP-C12AQ
	2.5 in.		MHP-C22AL	MHP-C22AQ
Fiber Optic*	Facing page	Infrared	MHP-F2AL	MHP-F2AQ
		Visible Red	MHP-FR2AL	MHP-FR2AQ

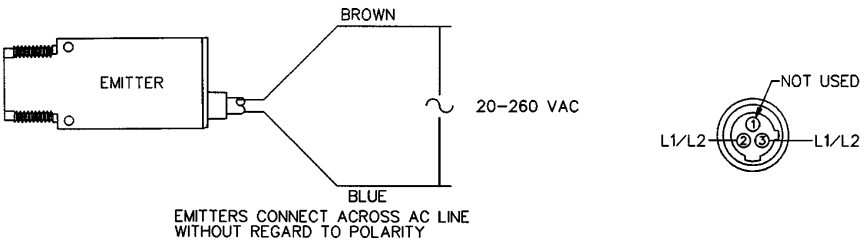
* Fiber optic cables are ordered separately. Plastic cables require an **MHPFOA** adapter.

AC - WIRING INFORMATION

Leadwires **Connector Pinout (Male)**

NOTICE Wiring sensor to AC line without load will cause permanent damage to sensor.



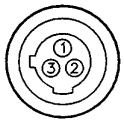


AC - CONNECTOR CABLES ORDER GUIDE

Connector Style	Cable Length	Catalog Listing
Straight	6 ft.	70213
	12 ft.	70215
Right Angle	6 ft.	70217
	12 ft.	70219

AC - CABLE PLUG PINOUT (Female) AND LEADWIRE COLORS

Pin #1 Green (Not used)
Pin #2 Red/Black (L1)
Pin #3 Red/White (Load-L2)



Photoelectric Sensors/Controls

Miniature Fiber Optic AC and DC Sensors

FEATURES

- Fiber optic sensors suited for use in space constricted areas, especially where high speed sensing of small parts is required
- High-performance construction, including MHP high pressure washdown sealing, adjustable sensitivity, alignment indicators, and selectable light/dark operate for installation ease
- Visible red or infrared light source for application versatility
- Choice of flexible plastic or glass fiber optic cables

GENERAL INFORMATION

MHP-F fiber optic sensors are ideal for use where space is limited and/or target objects are very small. Since these controls are self contained, no separate amplifier is needed for signal conditioning.

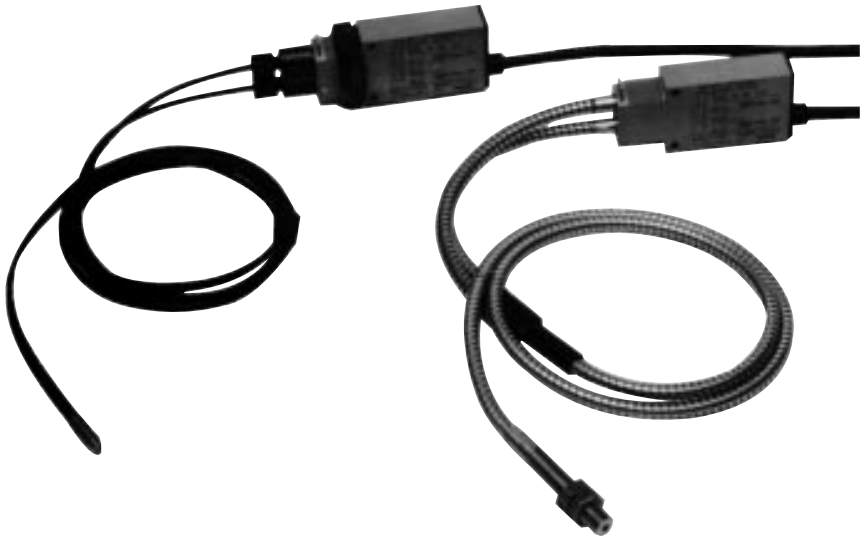
Infrared sensors with glass cables provide the greatest scanning distance and are most stable when sensing a wide variety of colors.

Visible red sensors with plastic cables are a cost-effective, reliable approach to presence/absence and color contrast applications. They are ideal for use with lighter colors as required in color mark detection.

FIBER OPTIC CABLES.

Glass cables. Armor grip cables have a flexible metal jacket to help the cable withstand physical abuse. Monocoil PVC cables provide greater sealing and should be used in areas of high pressure washdowns. Both types of glass cables have stainless steel end tips and corrosion resistant mounting hardware.

Plastic cables can be cut to length in the field. Standard cables with 1 mm dia. core are suitable for most uses. Cables with a 0,5 dia. core are best for detection of tiny parts. An **MHPFOA** plastic cable adapter (sold separately), is required to assemble plastic cables to MHP sensors.



DC/MHP-F ORDER GUIDE (Connector cables ordering information is on page C21.)

Description	Termination	Catalog Listing Infrared	Visible Red
Sinking Output, with Self Diagnostic	Preleaded Connector	MHP-F31L MHP-F31Q	MHP-FR31L MHP-FR31Q
Sourcing Output, with Self Diagnostic	Preleaded Connector	MHP-F32L MHP-F32Q	MHP-FR32L MHP-FR32Q
Dual Outputs, Sinking/Sourcing	Preleaded Connector	MHP-F33L MHP-F33Q	MHP-FR33L MHP-FR33Q

AC-MHP-F ORDER GUIDE

Description	Termination	Catalog Listing Infrared	Visible Red
SPST SCR	Preleaded Connector	MHP-F2AL MHP-F2AQ	MHP-FR2AL MHP-FR2AQ

Description	Catalog Listing
Adapter for Plastic Fiber Optic Cables	MHPFOA

TYPICAL SCAN DISTANCES FOR MHP FIBER OPTICS (In clean air)*

Sensor Type	Scan Type	Glass Cable w/o Lens**	Plastic Cable w/o Lens	Plastic Lensed FEF-PLT1 Cables
Infrared	Diffuse	2.3 in.	0.21 in.	N/A
	Thru scan	14 in.	3.50 in.	15.0 in.
Visible Red	Diffuse	1.4 in.	0.40 in.	N/A
	Thru Scan	10.0 in.	3.30 in.	26.0 in.

* Distance values are given as a guide to relative optical power and rated using 3 ft. (0,9 m) glass cables and 3.3 ft. (1 m) plastic cables, except thru scan glass cables w/lens.

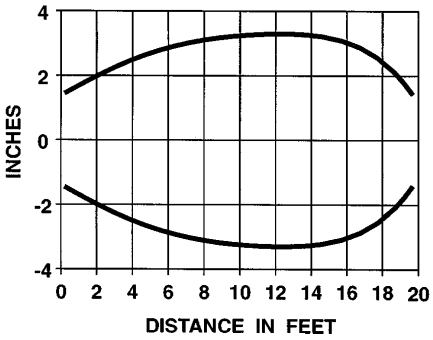
** Lens accessories improve scan range 3 to 5 times. Use FE-FZ-L4 lens with glass cables, FE-PA-L1 lens with plastic thru scan cables.

For fiber optic cable ordering information, see page C127.

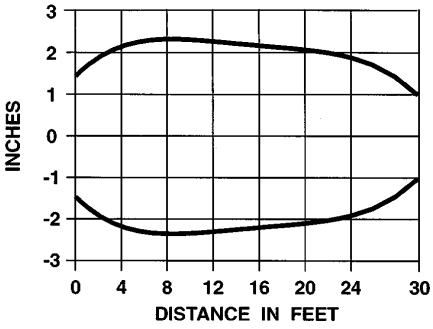
Miniature high performance AC and DC sensors

BEAM DIAMETER

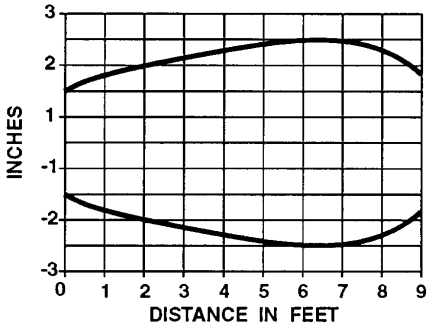
Retro (18 ft.)



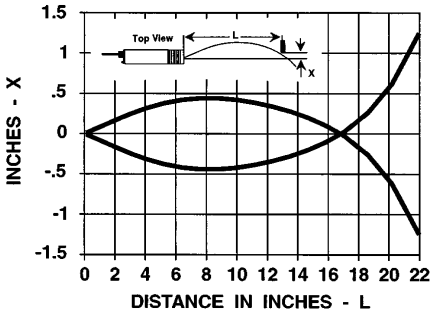
Retro (30 ft.)



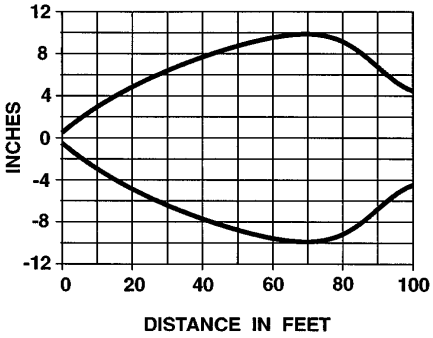
Polar



Diffuse

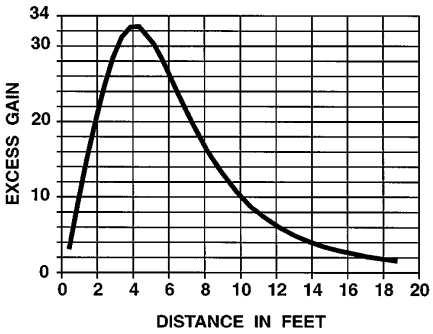


Thru Scan

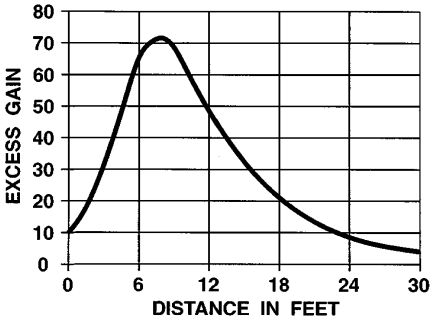


EXCESS GAIN

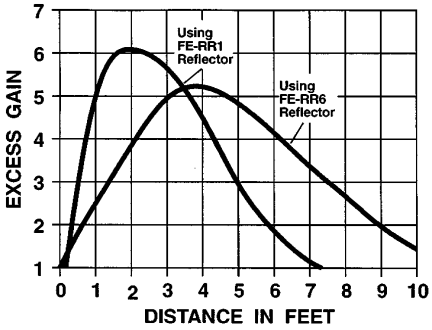
Retro (18 ft.)



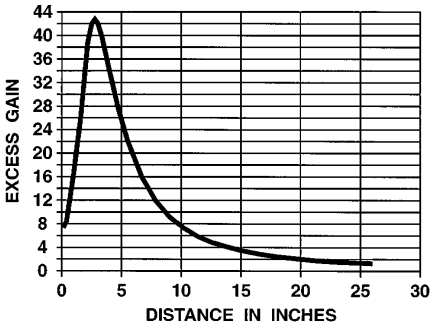
Retro (30 ft.)



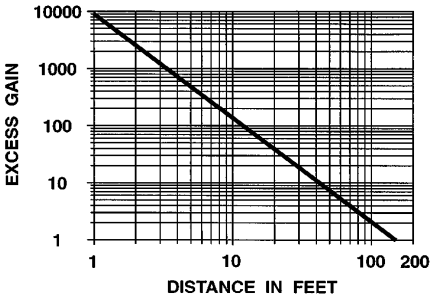
Polar



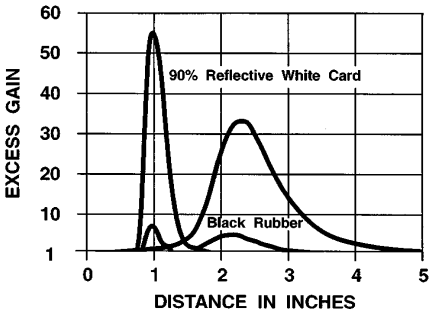
Diffuse



Thru Scan



Convergent Beam (1.0 in. & 2.5 in.)



Photoelectric Sensors/Controls

Miniature high performance AC and DC sensors

SENSING WINDOWS FOR RED CONVERGENT BEAM UNITS

Black bars in the charts indicate typical sensing window distances for various target materials. The sensing face is at the zero measurement.

Figures 1 and 3 show sensing windows when the 15-turn sensitivity adjustment is set at the maximum.

Figures 2 and 4 demonstrate how sensing windows tighten when the sensitivity is set at a lower level to enable more precise detection.

1.0 IN. CONVERGENT BEAM

Figure 1 - At Maximum Sensitivity

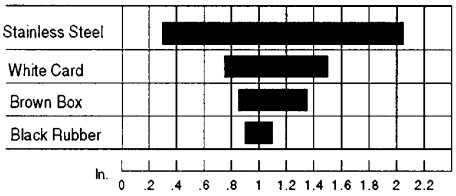
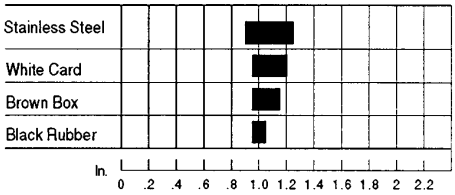


Figure 2 - At Reduced Sensitivity



2.5 IN. CONVERGENT BEAM

Figure 3 - At Maximum Sensitivity

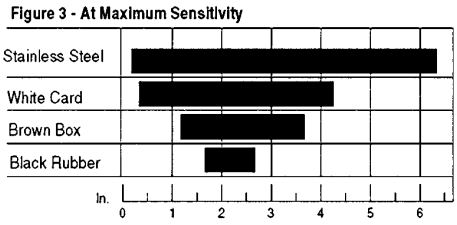
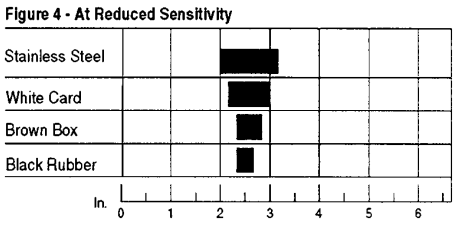
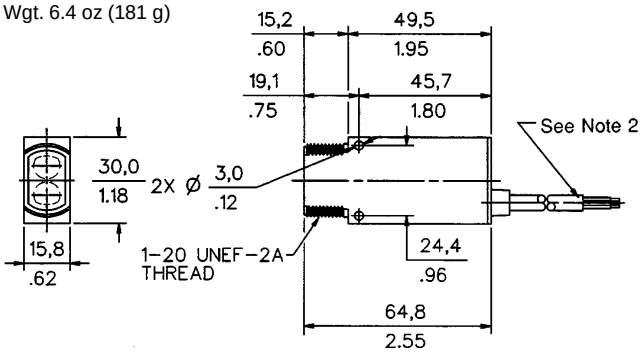


Figure 4 - At Reduced Sensitivity

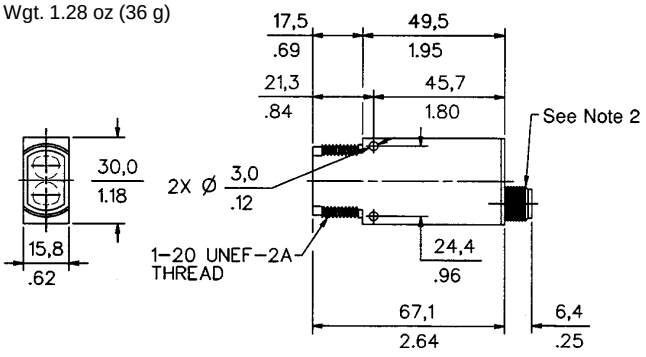


MOUNTING DIMENSIONS (For reference only)

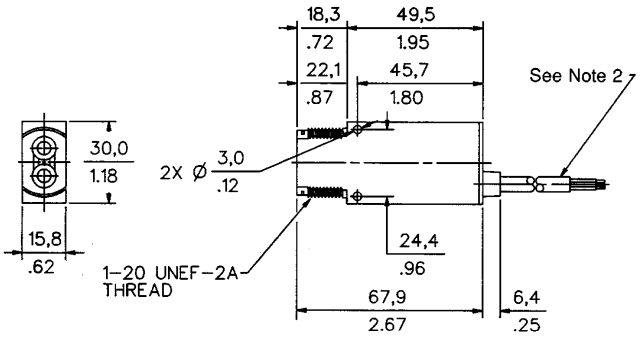
Retro, Diffuse, Convergent Beam, and Thru Scan[1]
Wgt. 6.4 oz (181 g)

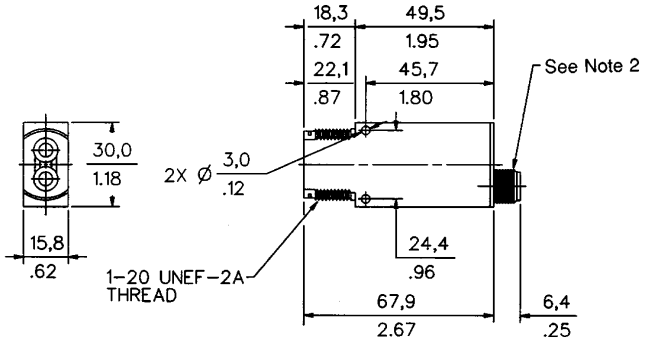


Polar[1]
Wgt. 1.28 oz (36 g)



Fiber Optic[1]



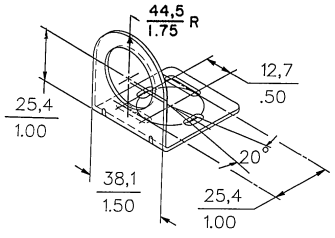


Note 1 – Incl. knurled mounting nut and resilient lockwasher for panel mounting and 2 ea. 4-40 SST screws and hexnuts w/lockwashers for side mounting.

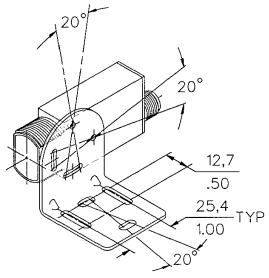
Note 2 – DC sensors have 22 gage/4 conductor UL 2464 cable, or 12 mm/4 pin connector; AC sensors have 22 gage/2 conductor cable, or 1/2-20 UNF 3 pin connector.

MOUNTING BRACKETS

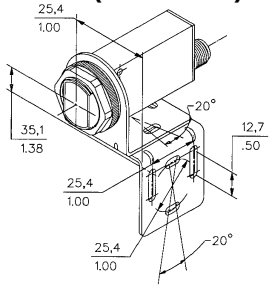
MHPTB (Panel Mount)



MHPSB (Side Mount)



MHPCB (Panel Mount)



MHPCB (combination bracket) provides maximum adjustability.

Photoelectric