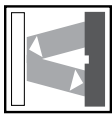




## MHP Series Miniature High-Performance Sensors

- Rugged IP69K housing withstands harsh environments and high-pressure washdown areas
- Cable or quick-disconnect models
- DC and AC models



### Convergent Beam Mode

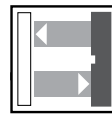
See pages 418-419

**Features:**

- Fixed-field, ignores foreground and background
- Consistent detection of light and dark objects

**Sensing Range:** 25 mm, 63 mm

**Outputs:** NPN and PNP



### Diffuse Mode

See pages 420-421

**Features:**

- Infrared and visible red light sources
- Adjustable sensing range

**Sensing Range:** 150 mm, 450 mm

**Outputs:** NPN and PNP, thyristor



### Retro-Reflective Mode

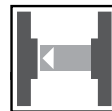
See pages 422-423

**Features:**

- Polarization filter models detect shiny objects
- Infrared and visible red light sources

**Sensing Range:** 2.4 m, 9.1 m

**Outputs:** NPN and PNP, thyristor



### Thru-Beam Mode

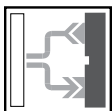
See pages 424

**Features:**

- Long-range scanning
- Separate transmitter and receiver housings

**Sensing Range:** 30.4 m

**Outputs:** NPN and PNP, thyristor



### Fiber Optic Diffuse and Thru-Beam Mode

See pages 425-426

**Features:**

- High-temperature applications
- Wide selection of fiber optic cables



**Sensing Range:** Determined by fiber optic cable

**Outputs:** NPN and PNP, thyristor

See pages 427-430 for MHP Series specifications, wiring and dimensions.

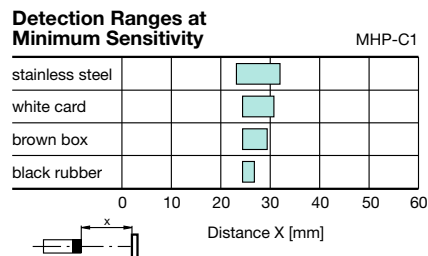
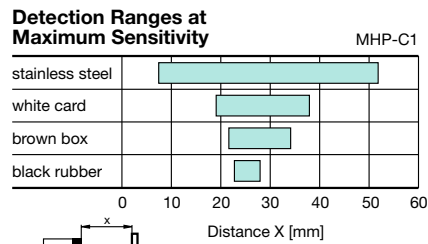
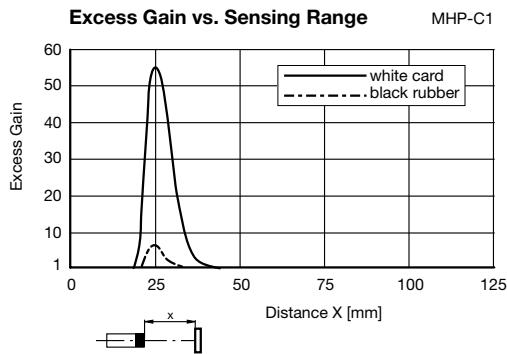


## Convergent Beam Mode

Specifications		
SENSING RANGE	25 mm	25 mm
SENSITIVITY ADJUSTMENT	Yes	Yes
MODEL NUMBER(S)	MHP-C133L	MHP-C133Q
OUTPUT	1 NPN and 1 PNP	1 NPN and 1 PNP
LOAD CURRENT	250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)
LEAKAGE CURRENT	10 µA	10 µA
INRUSH CURRENT	—	—
VOLTAGE DROP	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)
SUPPLY VOLTAGE	10-30 VDC	10-30 VDC
CURRENT CONSUMPTION	≤ 35 mA	≤ 35 mA
RESPONSE TIME	≤ 1.0 ms	≤ 1.0 ms
SWITCHING FREQUENCY	500 Hz	500 Hz
LIGHT SOURCE	Visible red LED	Visible red LED
WEIGHT	4.6 oz	1.5 oz
ELECTRICAL CONNECTION	 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1
ADDITIONAL DATA	<b>See pages 427-430</b>	

- ⚡ Stocked item
- Typical delivery 4 weeks or less
- Consult factory for all other models



### Sensing Characteristics





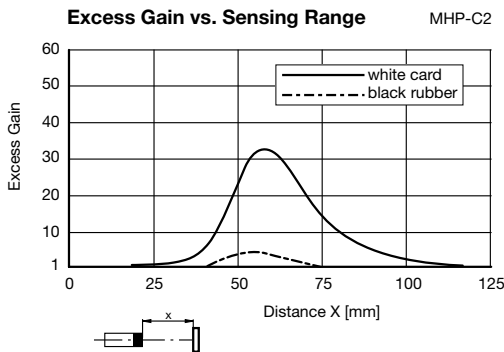
## Convergent Beam Mode

### Specifications

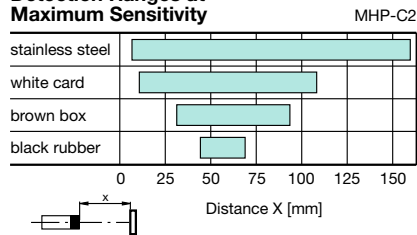
SENSING RANGE	63 mm	63 mm
SENSITIVITY ADJUSTMENT	Yes	Yes
MODEL NUMBER(S)	MHP-C233L	MHP-C233Q
OUTPUT	1 NPN and 1 PNP	1 NPN and 1 PNP
LOAD CURRENT	250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)
LEAKAGE CURRENT	10 $\mu$ A	10 $\mu$ A
INRUSH CURRENT	—	—
VOLTAGE DROP	$\leq$ 1.0 VDC (NPN) $\leq$ 2.0 VDC (PNP)	$\leq$ 1.0 VDC (NPN) $\leq$ 2.0 VDC (PNP)
SUPPLY VOLTAGE	10-30 VDC	10-30 VDC
CURRENT CONSUMPTION	$\leq$ 35 mA	$\leq$ 35 mA
RESPONSE TIME	$\leq$ 1.0 ms	$\leq$ 1.0 ms
SWITCHING FREQUENCY	500 Hz	500 Hz
LIGHT SOURCE	Visible red LED	Visible red LED
WEIGHT	4.6 oz	1.5 oz
ELECTRICAL CONNECTION	 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1
ADDITIONAL DATA	<b>See pages 427-430</b>	

- ⚡ Stocked item
- Typical delivery 4 weeks or less
- Consult factory for all other models

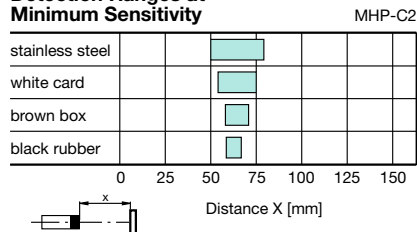
### Sensing Characteristics

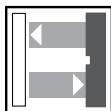


### Detection Ranges at Maximum Sensitivity







### Detection Ranges at Minimum Sensitivity

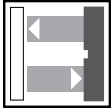




### Diffuse Mode



Specifications		150 mm	150 mm	450 mm	450 mm
<b>SENSING RANGE</b>		150 mm	150 mm	450 mm	450 mm
<b>SENSITIVITY ADJUSTMENT</b>		Yes	Yes	Yes	Yes
<b>MODEL NUMBER(S)</b>		<b>MHP-DR33L</b>	<b>MHP-DR33Q</b> •	<b>MHP-D33L</b> ⚡	<b>MHP-D33Q</b> ⚡
		—	—	—	—
<b>OUTPUT</b>	<i>33 (DC)</i>	1 NPN and 1 PNP	1 NPN and 1 PNP	1 NPN and 1 PNP	1 NPN and 1 PNP
	<i>2A (AC)</i>	—	—	—	—
<b>LOAD CURRENT</b>		250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)
<b>LEAKAGE CURRENT</b>		10 µA	10 µA	10 µA	10 µA
<b>INRUSH CURRENT</b>		—	—	—	—
<b>VOLTAGE DROP</b>		≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)
<b>SUPPLY VOLTAGE</b>		10-30 VDC	10-30 VDC	10-30 VDC	10-30 VDC
<b>CURRENT CONSUMPTION</b>		≤ 35 mA	≤ 35 mA	≤ 35 mA	≤ 35 mA
<b>RESPONSE TIME</b>		≤ 1.0 ms	≤ 1.0 ms	≤ 1.0 ms	≤ 1.0 ms
<b>SWITCHING FREQUENCY</b>		500 Hz	500 Hz	500 Hz	500 Hz
<b>LIGHT SOURCE</b>		Visible red LED	Visible red LED	Visible red LED	Visible red LED
<b>WEIGHT</b>		4.6 oz	1.5 oz	4.6 oz	1.5 oz
<b>ELECTRICAL CONNECTION</b>		 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1	 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1
<b>ADDITIONAL DATA</b>	<b>See pages 427-430</b>				

- ⚡ Stocked item
- Typical delivery 4 weeks or less  
Consult factory for all other models



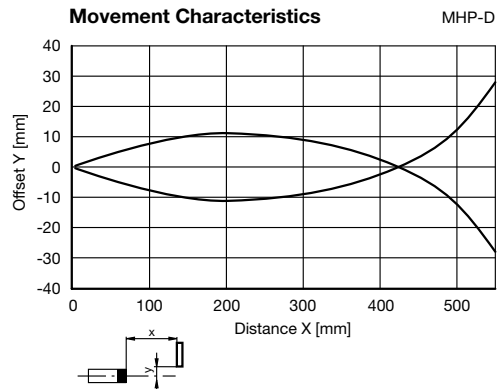
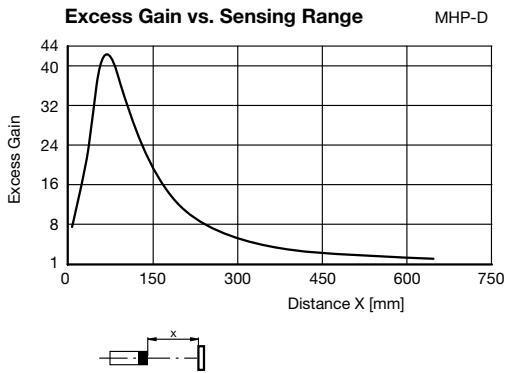
## Diffuse Mode

### Specifications

SENSING RANGE	450 mm	450 mm
SENSITIVITY ADJUSTMENT	Yes	Yes
MODEL NUMBER(S)	—	—
	<b>MHP-D2AL</b> ⚡	<b>MHP-D2AQ</b> ⚡
OUTPUT	—	—
33 (DC)	—	—
2A (AC)	Thyristor	Thyristor
LOAD CURRENT	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F
LEAKAGE CURRENT	1.8 mA	1.8 mA
INRUSH CURRENT	10 A/10 ms	10 A/10 ms
VOLTAGE DROP	≤ 6.7 V	≤ 6.7 V
SUPPLY VOLTAGE	20-260 VAC, 50-60 Hz	20-260 VAC, 50-60 Hz
CURRENT CONSUMPTION	≤ 1.5 mA	≤ 1.5 mA
RESPONSE TIME	≤ 8.0 ms	≤ 8.0 ms
SWITCHING FREQUENCY	60 Hz	60 Hz
LIGHT SOURCE	Infrared LED	Infrared LED
WEIGHT	5.6 oz	1.5 oz
ELECTRICAL CONNECTION	 3-meter cable, PVC covered 2-conductor	 Quick disconnect type V12
ADDITIONAL DATA	<b>See pages 427-430</b>	

- ⚡ Stocked item
- Typical delivery 4 weeks or less
- Consult factory for all other models





### Sensing Characteristics





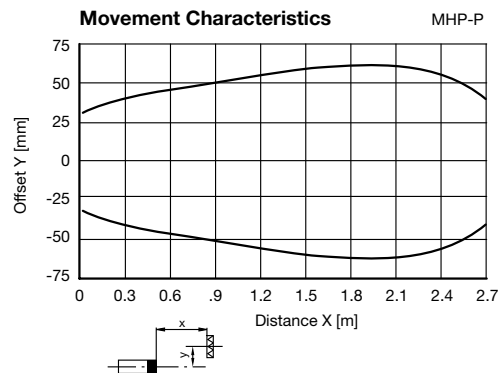
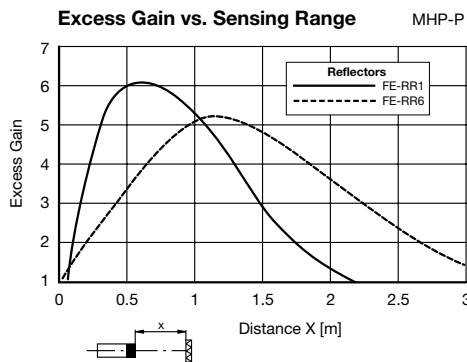
## Retro-Reflective Mode

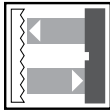
### Specifications

SENSING RANGE		2.4 m	2.4 m	2.4 m	2.4 m
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
POLARIZED FILTER		Yes	Yes	Yes	Yes
MODEL NUMBER(S)		MHP-P33L •	MHP-P33Q ⚡	—	—
		—	—	MHP-P2AL	MHP-P2AQ
OUTPUT	33 (DC)	1 NPN and 1 PNP	1 NPN and 1 PNP	—	—
	2A (AC)	—	—	Thyristor	Thyristor
LOAD CURRENT		250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F
LEAKAGE CURRENT		10 µA	10 µA	1.8 mA	1.8 mA
INRUSH CURRENT		—	—	10 A/10 ms	10 A/10 ms
VOLTAGE DROP		≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 6.7 V	≤ 6.7 V
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	20-260 VAC, 50-60 Hz	20-260 VAC, 50-60 Hz
CURRENT CONSUMPTION		≤ 35 mA	≤ 35 mA	≤ 1.5 mA	≤ 1.5 mA
RESPONSE TIME		≤ 1.0 ms	≤ 1.0 ms	≤ 8.0 ms	≤ 8.0 ms
SWITCHING FREQUENCY		500 Hz	500 Hz	60 Hz	60 Hz
LIGHT SOURCE		Visible red LED	Visible red LED	Visible red LED	Visible red LED
WEIGHT		4.6 oz	1.5 oz	5.6 oz	1.5 oz
ELECTRICAL CONNECTION		 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1	 3-meter cable, PVC covered 2-conductor	 Quick disconnect type V12
ADDITIONAL DATA		<i>See pages 427-430</i>			





- ⚡ Stocked item
- Typical delivery 4 weeks or less  
Consult factory for all other models

### Sensing Characteristics



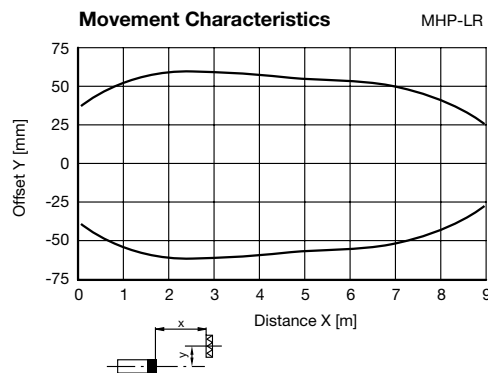
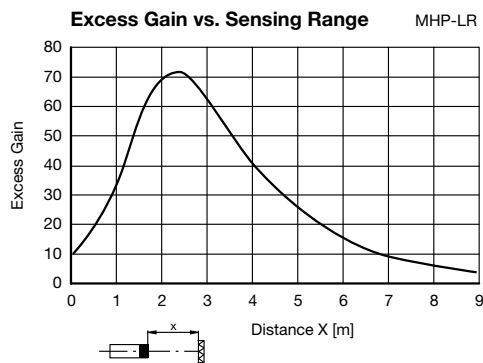


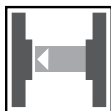
## Retro-Reflective Mode

Specifications		9.1 m	9.1 m	9.1 m	9.1 m
SENSING RANGE		9.1 m	9.1 m	9.1 m	9.1 m
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
POLARIZED FILTER		No	No	No	No
MODEL NUMBER(S)		MHP-LR33L	MHP-LR33Q ⚡	—	—
		—	—	MHP-LR2AL •	MHP-LR2AQ
OUTPUT	33 (DC)	1 NPN and 1 PNP	1 NPN and 1 PNP	—	—
	2A (AC)	—	—	Thyristor	Thyristor
LOAD CURRENT		250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F
LEAKAGE CURRENT		10 µA	10 µA	1.8 mA	1.8 mA
INRUSH CURRENT		—	—	10 A/10 ms	10 A/10 ms
VOLTAGE DROP		≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 6.7 V	≤ 6.7 V
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	20-260 VAC, 50-60 Hz	20-260 VAC, 50-60 Hz
CURRENT CONSUMPTION		≤ 35 mA	≤ 35 mA	≤ 1.5 mA	≤ 1.5 mA
RESPONSE TIME		≤ 1.0 ms	≤ 1.0 ms	≤ 8.0 ms	≤ 8.0 ms
SWITCHING FREQUENCY		500 Hz	500 Hz	60 Hz	60 Hz
LIGHT SOURCE		Infrared LED	Infrared LED	Infrared LED	Infrared LED
WEIGHT		4.6 oz	1.5 oz	5.6 oz	1.5 oz
ELECTRICAL CONNECTION		 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1	 3-meter cable, PVC covered 2-conductor	 Quick disconnect type V12
ADDITIONAL DATA	<b>See pages 427-430</b>				

- ⚡ Stocked item
- Typical delivery 4 weeks or less  
Consult factory for all other models





### Sensing Characteristics





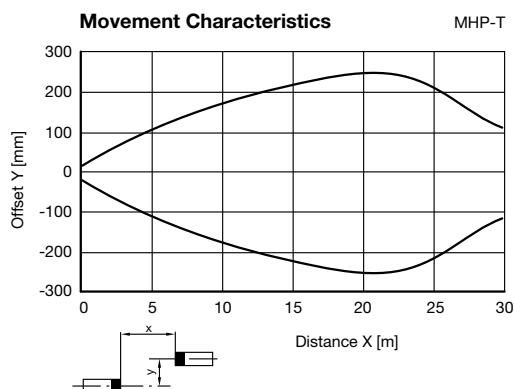
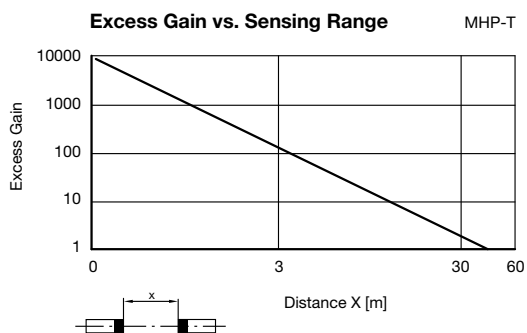
### Thru-Beam Mode

#### Specifications

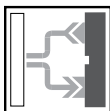
SENSING RANGE		30.4 m	30.4 m	30.4 m	30.4 m
SENSITIVITY ADJUSTMENT		Yes	Yes	Yes	Yes
MODEL NUMBER(S)	Transmitter	MHP-TLE30L	MHP-TLE30Q •	MHP-TE2AL	MHP-TE2AQ
	Receiver	MHP-TR33L	MHP-TR33Q •	MHP-TR2AL	MHP-TR2AQ
OUTPUT	33 (DC)	1 NPN and 1 PNP	1 NPN and 1 PNP	—	—
	2A (AC)	—	—	Thyristor	Thyristor
LOAD CURRENT		250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F
LEAKAGE CURRENT		10 µA	10 µA	1.8 mA	1.8 mA
INRUSH CURRENT		—	—	10 A/10 ms	10 A/10 ms
VOLTAGE DROP		≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 6.7 V	≤ 6.7 V
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC	20-260 VAC, 50-60 Hz	20-260 VAC, 50-60 Hz
CURRENT CONSUMPTION		≤ 35 mA	≤ 35 mA	≤ 1.5 mA	≤ 1.5 mA
RESPONSE TIME		≤ 1.0 ms	≤ 1.0 ms	≤ 8.0 ms	≤ 8.0 ms
SWITCHING FREQUENCY		500 Hz	500 Hz	60 Hz	60 Hz
LIGHT SOURCE		Infrared LED	Infrared LED	Infrared LED	Infrared LED
WEIGHT		4.6 oz	1.5 oz	5.6 oz	1.5 oz
ELECTRICAL CONNECTION		 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1	 3-meter cable, PVC covered 2-conductor	 Quick disconnect type V12
ADDITIONAL DATA		<b>See pages 427-430</b>			

- ⚡ Stocked item
- Typical delivery 4 weeks or less  
Consult factory for all other models





#### Sensing Characteristics







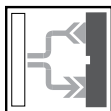
## Fiber Optic Diffuse and Thru-Beam Mode

Specifications				
SENSING RANGE	Determined by Cable*			
SENSITIVITY ADJUSTMENT	Yes	Yes	Yes	Yes
POLARIZED FILTER	No	No	No	No
MODEL NUMBER(S)	MHP-F33L	MHP-F33Q •	—	—
	—	—	MHP-F2AL	MHP-F2AQ
OUTPUT				
33 (DC)	1 NPN and 1 PNP	1 NPN and 1 PNP	—	—
2A (AC)	—	—	Thyristor	Thyristor
LOAD CURRENT	250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F	5-500 mA, up to 122 °F, derated to 300 mA at 158 °F
LEAKAGE CURRENT	10 µA	10 µA	1.8 mA	1.8 mA
INRUSH CURRENT	—	—	10 A/10 ms	10 A/10 ms
VOLTAGE DROP	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 6.7 V	≤ 6.7 V
SUPPLY VOLTAGE	10-30 VDC	10-30 VDC	20-260 VAC, 50-60 Hz	20-260 VAC, 50-60 Hz
CURRENT CONSUMPTION	≤ 35 mA	≤ 35 mA	≤ 1.5 mA	≤ 1.5 mA
RESPONSE TIME	≤ 1.0 ms	≤ 1.0 ms	≤ 8.0 ms	≤ 8.0 ms
SWITCHING FREQUENCY	500 Hz	500 Hz	60 Hz	60 Hz
LIGHT SOURCE	Infrared LED	Infrared LED	Infrared LED	Infrared LED
WEIGHT	4.6 oz	1.5 oz	5.6 oz	1.5 oz
ELECTRICAL CONNECTION	 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1	 3-meter cable, PVC covered 2-conductor	 Quick disconnect type V12
ADDITIONAL DATA	<b>See pages 427-430</b>			



- ⚡ Stocked item
- Typical delivery 4 weeks or less  
Consult factory for all other models



\*See pages 761-796 for fiber optic lengths and specifications.



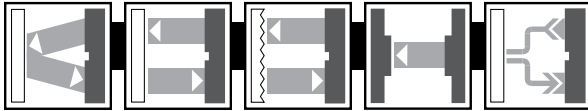
## Fiber Optic Diffuse and Thru-Beam Mode

Specifications		Determined by Cable*	Determined by Cable*
SENSING RANGE		Determined by Cable*	Determined by Cable*
SENSITIVITY ADJUSTMENT		Yes	Yes
POLARIZED FILTER		No	No
MODEL NUMBER(S)		<b>MHP-FR33L</b>	<b>MHP-FR33Q</b>
		—	—
OUTPUT	33 (DC)	1 NPN and 1 PNP	1 NPN and 1 PNP
	2A (AC)	—	—
LOAD CURRENT		250 mA max. (NPN) 150 mA max. (PNP)	250 mA max. (NPN) 150 mA max. (PNP)
LEAKAGE CURRENT		10 µA	10 µA
INRUSH CURRENT		—	—
VOLTAGE DROP		≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)	≤ 1.0 VDC (NPN) ≤ 2.0 VDC (PNP)
SUPPLY VOLTAGE		10-30 VDC	10-30 VDC
CURRENT CONSUMPTION		≤ 35 mA	≤ 35 mA
RESPONSE TIME		≤ 1.0 ms	≤ 1.0 ms
SWITCHING FREQUENCY		500 Hz	500 Hz
LIGHT SOURCE		Visible red LED	Visible red LED
WEIGHT		4.6 oz	1.5 oz
ELECTRICAL CONNECTION		 2-meter cable, PVC covered 4-conductor,	 Quick disconnect type V1
ADDITIONAL DATA		<b>See pages 427-430</b>	

- ⚡ Stocked item
- Typical delivery 4 weeks or less  
Consult factory for all other models



*\*See pages 761-796 for fiber optic lengths and specifications.*



## Series Specifications

### MHP Series Specifications

<b>SHORT CIRCUIT AND OVERLOAD PROTECTION</b>	No	
<b>REVERSE POLARITY PROTECTION</b>	Yes (DC), No (AC)	
<b>LED(s)</b>	Yes (2)*	
<b>OPERATING MODE</b>	Light on/dark on	
<b>PROTECTION (IEC)</b>	IP69K	
<b>TEMPERATURE RANGE</b>	<i>WORKING</i>	-22 °F to +158 °F
	<i>STORAGE</i>	-67 °F to +185 °F
<b>HOUSING MATERIAL</b>		Polysulphone
	<i>LENS</i>	Polycarbonate
<b>APPROVALS</b>		

\*See dimensional drawings for LED functions.

### Wiring Diagrams

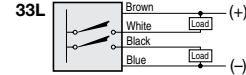
#### DC



#### Cable Connection

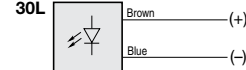
##### Light On/Dark On

NPN and PNP Outputs



##### Transmitter

(thru-beam models)



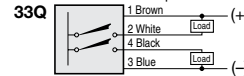
#### Quick Disconnect

Note: Wiring diagrams show quick disconnect pin numbers.

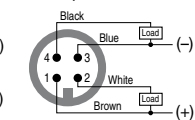
#### V1 Type

##### Light On/Dark On

NPN and PNP Outputs

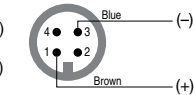
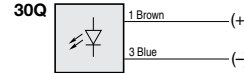


Male Receptacle End View



##### Transmitter

(thru-beam models)

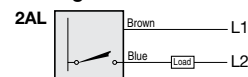


#### AC



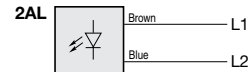
#### Cable Connection

##### Light On/Dark On



##### Transmitter

(thru-beam models)

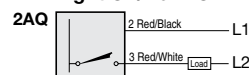


#### Quick Disconnect

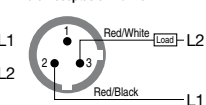
Note: Wiring diagrams show quick disconnect pin numbers.

#### V12 Type

##### Light On/Dark On

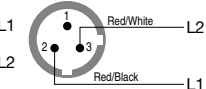
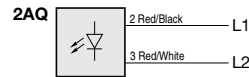


Male Receptacle End View



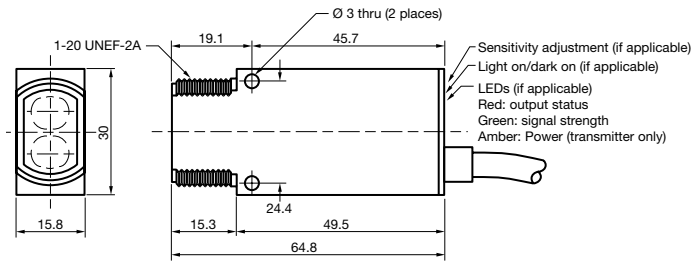
##### Transmitter

(thru-beam models)

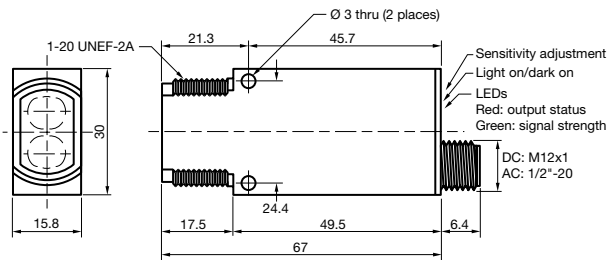
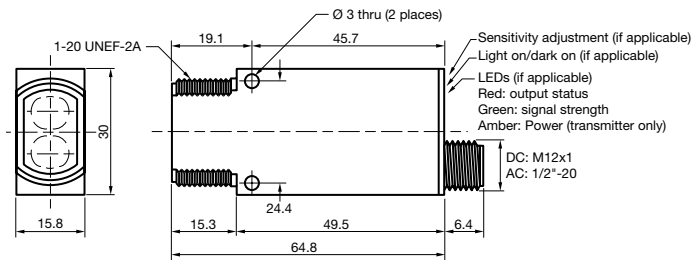
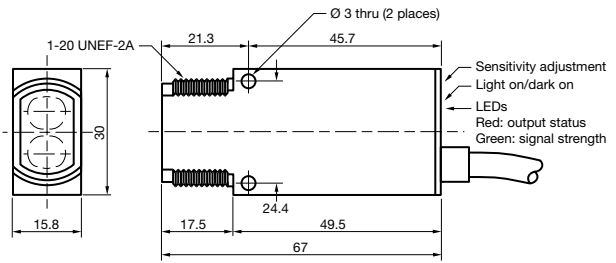


## Dimensions (mm)

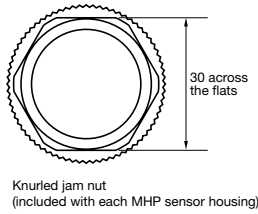
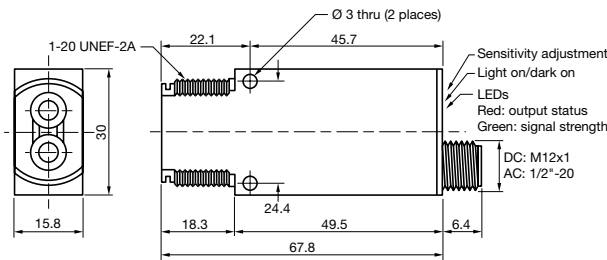
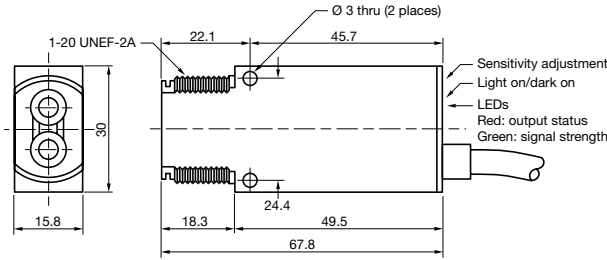
### MHP-C, MHP-D, MHP-R, MHP-L, MHP-T



### MHP-P



### MHP-F



## Typical Scan Distances for MHP Fiber Optics (Clean Air)

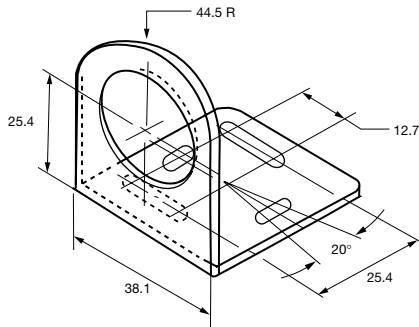
Sensor Type	Scan Technique	Glass W/O Lens	Plastic W/O Lens	Plastic W/Lens (FEF-PLT1)
Infrared MHP-F	Diffuse	58mm	N/A	N/A
	Thru-Beam	356mm	N/A	N/A
Visible Red MHP-FR	Diffuse	36mm	10mm	N/A
	Thru-Beam	254mm	84mm	660mm

Actual distance is limited by length of cables used. Distance values are given as a guide to relative optical power and rating using 3ft glass and 1m plastic cables.

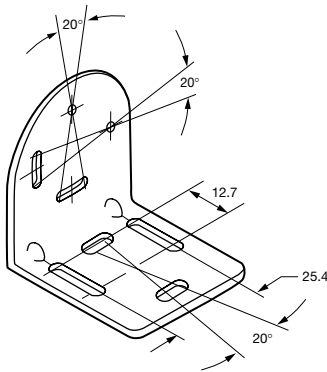
## Accessories

(Dimensions in mm)

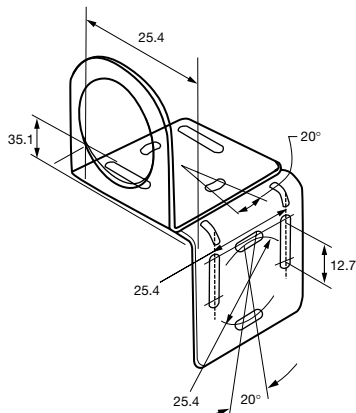
### Panel Mount Bracket Model MHPTB



### Side Mount Bracket Model MHPSB



### Combination Mount Bracket Model MHPCB



### Plastic Fiber Optic Adapter Model MHPFOA



### Mounting Kit Model MHPHDW

(included with all non-fiber MHP Series sensors)

Kit includes (1) locknut, (1) O-ring, (2) 1.25" length screws, (2) nuts, and (2) washers.

### Mounting Kit Model MHPHDW-FO

(included with all fiber MHP Series sensors)

Kit includes (1) locknut, (1) O-ring, (2) 1.25" length screws, (2) nuts, (2) washers, and (1) retaining clip for glass fiber optic cables.



See pages 803-854 for cordsets



See pages 797-802 for reflectors



See pages 865-872 for additional accessories



See pages 761-796 for fiber optic lengths and specifications.

Notes

Photoelectric MHP Series Miniature