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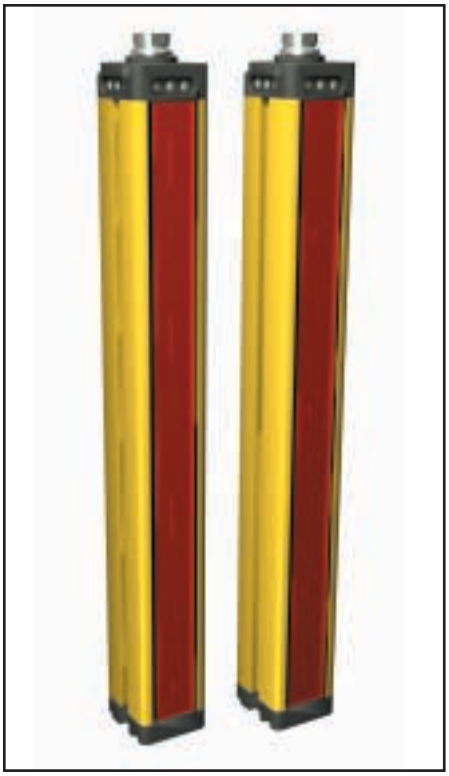
MINI-SCREEN MSXLHD Emitters and Receivers

Supplement to Primary Instruction Manual for Systems with Long-Range Emitters and Receivers with Heavy-Duty Housing



CAUTION . . .
It is very important to keep this document with its associated manual.
It contains information critical to the operation of the MINI-SCREEN Systems.

Description

MSXLHD emitters and receivers are a modification of MINI-SCREEN MSXLE and MSXLR long-range sensors. They have heavy-duty housings and flexible mounting options.

The information contained in this supplement either replaces or supplements information in the primary manuals. **The primary instruction manual for MSXHDE Emitters and the MSXHDR Receivers is dependent on the controller used. It is very important to keep this document with its associated primary manual.** Both documents contain information critical to the operation of the enclosed MINI-SCREEN safety light screen system.

MSXLHD series emitters and receivers have different optical specifications from the standard MSXL series sensors. The information in this document must be used in order to install the sensors at the proper separation distance.

Section numbers or figure numbers in this document are accompanied by the words “replacement” or “addition”. If an item is a replacement, that entire item in the primary manual should be replaced by the corresponding information in this document. If the item is an addition, the information in the primary manual is still valid and must be followed, along with the information contained in this supplement.

Section 1. Addition

1.1(s) MINI-SCREEN Heavy-Duty Components and Kits

Heavy-Duty MINI-SCREEN emitters and receivers are available in seven lengths, with defined area heights ranging from 610 mm to 1829 mm (24" to 72"), as shown on page 2. The rectangular sensor design includes a swivel bracket at each end for quick mounting and ease of alignment. The housing also includes a mounting channel on either side for increased mounting flexibility.

Receivers have three colored LED indicators for system operating status and alignment. Emitters have Power ON indicators. Each sensor has three sets of LEDs (front and both sides) for high visibility.

The Banner Heavy-Duty MINI-SCREEN System is rated for a sensing range (emitter-to-receiver separation distance) of 18 meters (60'), with a Minimum Object Sensitivity of 38 mm (1.5"). The modulated infrared light provides exceptionally high immunity to ambient light interference.

MINI-SCREEN Heavy-Duty Long-Range Emitter and Receiver Models			
Defined Area	**Model Number**	**Description**	**Number of Beams**
610 mm (24")	MSXLHDE2412Y	Emitter	24
	MSXLHDR2412Y	Receiver	
813 mm (32")	MSXLHDE3212Y	Emitter	32
	MSXLHDR3212Y	Receiver	
1016 mm (40")	MSXLHDE4012Y	Emitter	40
	MSXLHDR4012Y	Receiver	
1219 mm (48")	MSXLHDE4812Y	Emitter	48
	MSXLHDR4812Y	Receiver	
1422 mm (56")	MSXLHDE5612Y	Emitter	56
	MSXLHDR5612Y	Receiver	
1626 mm (64")	MSXLHDE6412Y	Emitter	64
	MSXLHDR6412Y	Receiver	
1829 mm (72")	MSXLHDE7212Y	Emitter	72
	MSXLHDR7212Y	Receiver	

Section 2. Addition

2. Overview of MINI-SCREEN System Operation

2.1(s) Blanking

Floating blanking options vary between controllers. Options include 2-beam floating blanking or selectable 1- or 2-beam floating blanking.

Floating Blanking	Maximum Size of Undetected Objects	Minimum Object Sensitivity
OFF	(Not Applicable)	38 mm (1.5")
1-Beam	15 mm (0.6")	62 mm (2.45")
2-Beam	40 mm (1.6")	89 mm (3.5")

Fixed Blanking Information

Defined Area	Number of Beams	Maximum Number Fixed Blanked Beams	Total Fixed Blanked Area*
610 mm (24")	24	7	192 mm (6.8")
813 mm (32")	32	9	243 mm (8.3")
1016 mm (40") or larger	40 to 72	12	319 mm (12.6")

* Assumes all blanked beams are adjacent; if multiple areas are blanked (multiple objects ignored) the total blanked area increases slightly.

WARNING . . .
Position Components Carefully

The emitter and receiver must be positioned such that the hazard can not be accessed by reaching over, under, around or through the sensing field. Additional guarding may be required; see Hard Guarding, Section 3.2.2.

WARNING . . .
Proper Separation Distance

Banner MINI-SCREEN System emitters and receivers must be mounted at a distance from moving machine parts that is determined by OSHA standards found in Section 1910.217(c)(3)(iii)(e). **Failure to establish and maintain the required separation distance exactly as described in this manual could result in serious bodily injury or death.**

WARNING . . .
Determine Correct Stop Time

Be sure to include the stop time of all relevant devices and controls in your calculations. The measurement of stop time (T_S) must include the response time of *all* devices or controls that react to stop the machine. If all devices are not included, the calculated separation distance (D_S) will be too short. **This can lead to serious bodily injury or death.**

CAUTION . . .
Proper Installation When Using Floating Blanking

Floating blanking increases D_{pf} (see values at right).

- **You must increase the penetration factor to calculate the separation distance whenever floating blanking is used.**
- **Always turn floating blanking OFF when the larger minimum object detection size is not required.**

Section 3. Replacement

3.2.1(s) Separation Distance

The MINI-SCREEN System must be able to react fast enough, when a hand or other object is inserted into the defined area, to send a "stop" signal to the guarded machine before the object or hand reaches the closest reachable hazard point on the machine. The separation distance (or safety distance) is the minimum distance required between the midpoint of the defined area and the closest reachable hazard point. The calculation of the separation distance takes into account several factors, including the speed of the hand (or object), the total system stopping time (of which there are several response time components), and the depth penetration factor. The formula used to calculate the separation distance is:

$$Ds = K \times (Ts + Tr) + Dpf$$

where:

Ds = the separation distance;

K = the OSHA-recommended hand speed constant of 63" per second (NOTE 1, below);

Ts = the overall stop time of the machine, measured from the application of the "stop" signal to the final ceasing of all motion (including stop times of all relevant control elements, and measured at maximum machine velocity). See the WARNINGs (left), NOTE 2 (below), and the NOTICE Regarding MPCEs in the primary manual.

Tr = the response time of the typical MINI-SCREEN System:
0.048 seconds for 610 mm (24") and 813 mm (32") emitter/receiver
0.060 seconds for 1016 mm (40") to 1626 mm (64") emitter/receiver
0.072 seconds for 1829 mm (72") emitter/receiver

NOTE: Verify actual response times in your controller's primary manual. (For example: add 10 ms to the response times listed above for MSCC-xxxM controllers.)

Dpf = the added distance due to depth penetration factor, as prescribed in OSHA 1910.217 and ANSI B11 standards:

Heavy-Duty Sensors

Floating blanking	OFF	Dpf = 106 mm (4.2")
1-beam blanking	ON	Dpf = 187 mm (7.4")
2-beam blanking	ON	Dpf = 914 mm (36")

NOTES:

1) The OSHA-recommended hand-speed constant K has been determined by various studies, and although these studies indicate speeds of 63"/sec to over 100"/sec, they are not conclusive determinations. The employer should consider all factors, including the physical ability of the operator, when determining the value of K to be used.

2) Ts is usually measured by a stop-time measuring device. If the specified machine stop time is used, we recommend that at least 20% be added as a safety factor to account for clutch/brake system deterioration.

3) Use of floating blanking will always cause the required Ds to increase.

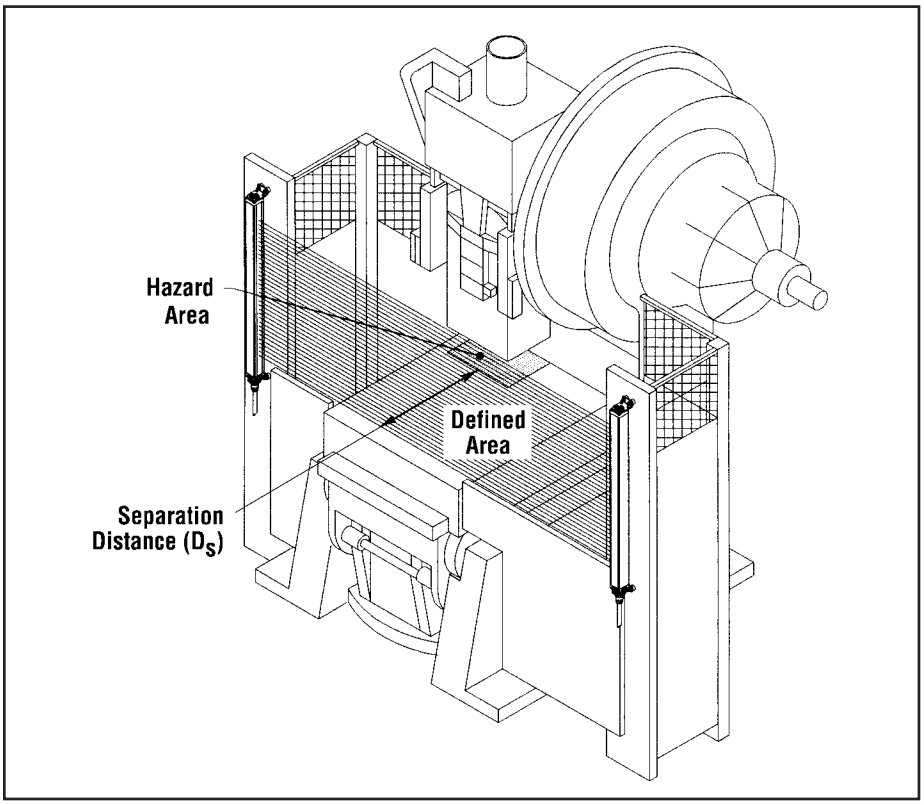


Figure 1. Separation distance

Example: Separation Distance (D_S) Calculation

The following example shows how to use the formula from page 3 to calculate separation (safety) distance (Ds). We will use these numbers for the variables in the formula:

$$D_S = K \times (T_S + T_r) + D_{pf}$$

Sensors have 18 m (60') range

K = 63" per second (the hand speed constant set by OSHA)

T_S = .250 second (the total stop time of the example machine, specified by machine manufacturer)

T_r = .048, .060, or .072 second (the specified response time of the MINI-SCREEN System; see Specifications in primary instruction manual.)

Our example uses no floating blanking and 48" E & R, so we use a D_{pf} of 4.2" (page 3). Response time for this example is .060 second. Substitute the numbers into the formula as follows:

$D_S = K \times (T_S + T_r) + D_{pf}$

$D_S = 63 \times (.250 \times 1.2^* + .060) + 4.2" = 27"$

Therefore, in this example, the MINI-SCREEN emitter and receiver must be mounted so that no part of the defined area will be closer than 28" to the closest reachable hazard point on the guarded machine.

*20% safety factor (see NOTE 2, page 3)

WARNING . . .

Banner MINI-SCREEN System emitters and receivers must be mounted at a distance from moving machine parts that is determined by OSHA standards found in Section 1910.217 (c)(3)(iii)(e). **Failure to establish and maintain the required separation distance exactly as described in this manual could result in serious bodily injury or death.**

WARNING . . .

Include the stop time of all relevant devices and controls in your calculations.

The measurement of stop time (T_S) must include the response time of *all* devices or controls that react to stop the machine. **If all devices are not included, the calculated separation distance (D_S) will be too short. This can lead to serious bodily injury or death.**

CAUTION . . .

Floating blanking increases D_{pf}

Increase the penetration factor to calculate the separation distance whenever floating blanking is used.

Always turn floating blanking OFF when the larger minimum object detection size is not required.

Figure 2(s). Attaching standard brackets to the end caps or side of the housing

Section 3.3 Addition

3.3(s) Mounting Procedure

Emitters and receivers may be mounted up to 18 m (60') apart. If Banner SSM corner mirrors are used, the total range decreases by approximately 8 percent per mirror, as follows:

1 mirror = 16.8 m (55') total

2 mirrors = 15.5 m (51') total

3 mirrors = 14.3 m (47') total

The emitter and the receiver must be mounted parallel to each other, with their LED indicators either both at the top or both at the bottom; see Figure 2(s). If corner mirrors are used, they must also be mounted in the same parallel line.

Several mounting bracket options are available. Brackets may attach directly to MSXLHD sensor end caps, or at any point along the sensor's length, using the supplied T-nuts in the housing's side slots. Bracket dimensions are shown in Figure 3(s) and on page 8.

Standard Brackets

The standard brackets (EZA-MBK-1), included with each sensor, may attach to the side of the housing or to the top and bottom end caps.

If mounting to the end caps, the beam path may run either parallel or perpendicular to the mounting surface. The brackets allow ±30° rotation for beam alignment. To mount the bracket, insert the two included M5 screws through the slots in the bracket, into the end cap's two threaded holes.

If side-mounting to the housing, lay the housing on its side and slide four T-nuts into the slot on one side of the housing. Connect a bracket near the top and one near the bottom of the sensor, using two T-nuts and screws per bracket; see Figure 2(s). For easier optical alignment, swivel brackets (described below) are recommended when sensors will be side-mounted.

Stand-Mount Brackets

The accessory stand-mount brackets (EZA-MBK-2) are used in conjunction with the standard brackets described above for mounting to an MSA Series stand. They may also be used with a U-bolt for attaching to a round stand, such as Machine Guard stand MGA-S72-1.

Swivel Brackets

The accessory swivel brackets (EZA-MBK-3) mount to the sides of the housing using the same T-nuts used for the standard brackets. The two-part brackets rotate up to 180° for easy alignment. After sensors are aligned (see primary manual), tighten brackets firmly into place.

Adjustable Brackets

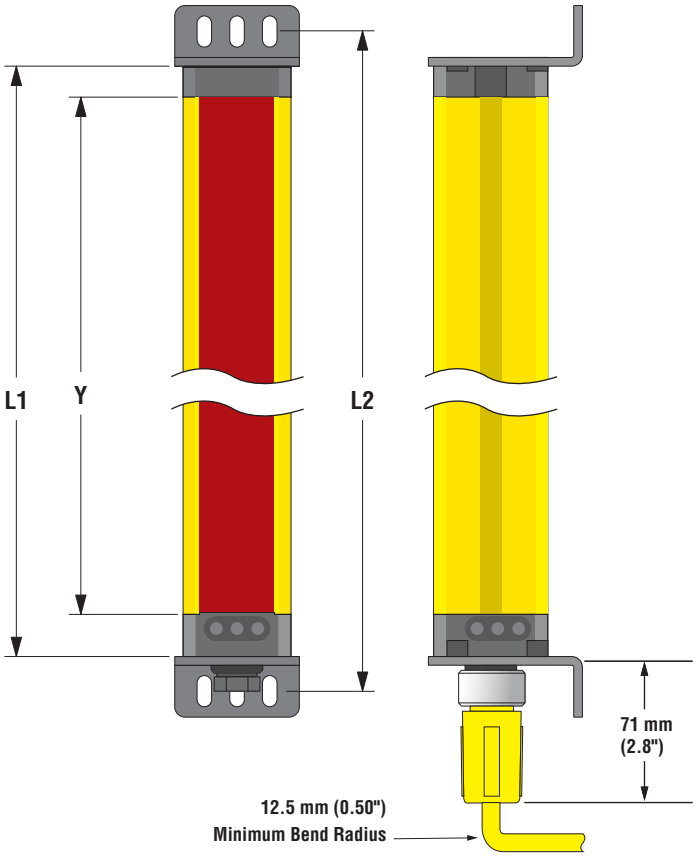
The adjustable brackets (EZA-MBK-9) mount to the housing top and bottom and allow the space between the sensor and its mounting surface to be increased or decreased. When fixed stands and bases are used, the EZA-MBK-9 brackets may be used to provide the necessary adjustability for alignment.

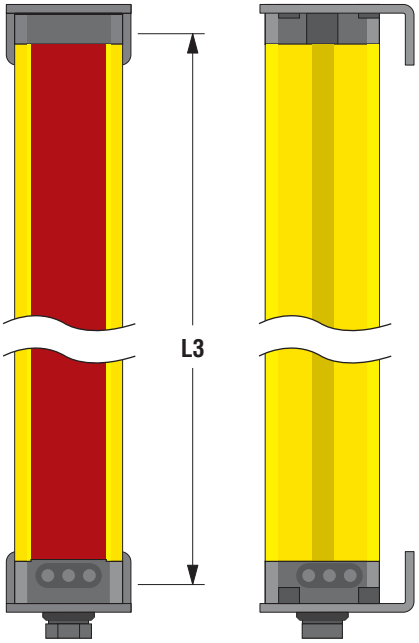
Center Bracket

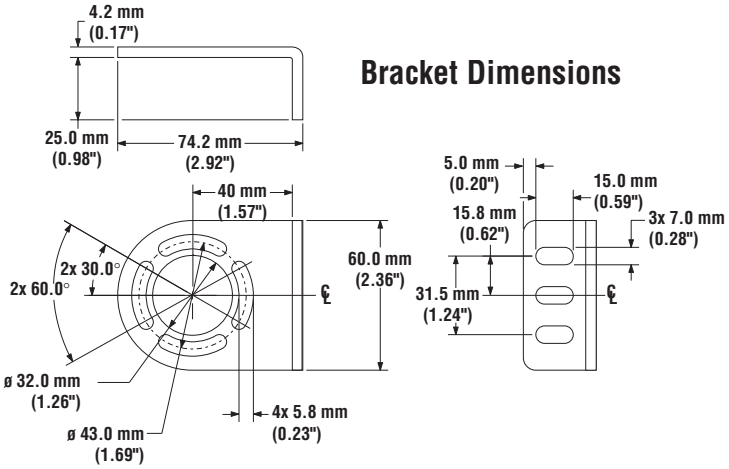
In situations where vibration is a concern, a center mounting bracket should be used with sensors longer than 32". The center bracket should be attached at about the sensor's midpoint.

Section 3.3 Addition

3.3.1(s) Emitter and Receiver Mounting Dimensions and Location of Defined Area







Bracket Dimensions

Sensor Defined Length	Window Length Y	Enclosure Length L1	Mounting Length	
			Brackets Out L2	Brackets In L3
24"	625 mm (24.6")	661 mm (26.0")	694 mm (27.3")	636 mm (25.0")
32"	826 mm (32.5")	862 mm (33.9")	895 mm (35.2")	836 mm (32.9")
40"	1029 mm (40.5")	1065 mm (41.9")	1098 mm (43.2")	1039 mm (40.9")
48"	1229 mm (48.4")"	1266 mm (49.8")	1299 mm (51.1")	1240 mm (48.8")
56"	1433 mm (56.4")	1469 mm (57.8")	1502 mm (59.1")	1443 mm (56.8")
64"	1633 mm (64.3")	1670 mm (65.7")	1703 mm (67.0")	1643 mm (64.7")
72"	1836 mm (72.3")	1873 mm (73.7")	1906 mm (75.0")	1847 mm (72.7")

Figure 3(s). Sensor dimensions (standard end-cap brackets shown) and EZA-MBK-1 mounting bracket dimensions

Section Addition

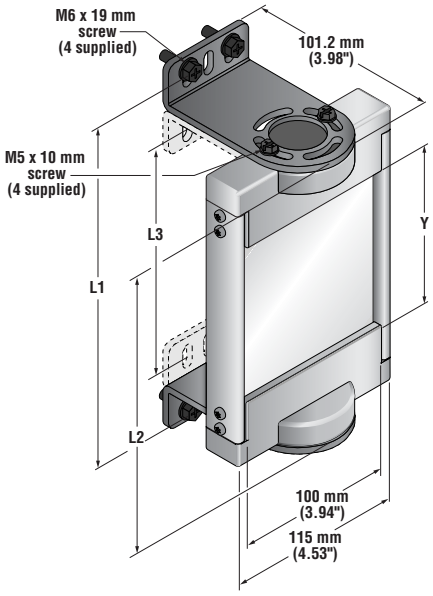
Accessories

Model	Part Number	Description
LAT-1	52150	Laser Alignment Tool with adapter clip
EZA-LAT-1	66027	Clip-on retro-reflective target
BRT-THG-2-100	26620	50 mm (2") wide reflective tape, 2.5 m (100") long
BT-1	26809	Beam Tracker
SI-QS-CG13	48564	Pg13.5 cable gland
SI-QM-13	48559	Adapter, 1/2" NPT to Pg13.5
SI-QM-13-M20	66579	Adapter, M20 to Pg13.5

Lens Shields

NOTE: The total range decreases by approximately 10% per shield.

Model	Part Number	For Sensor Defined Area Length
MSHDS24	70507	24"
MSHDS32	70508	32"
MSHDS40	70509	40"
MSHDS48	70510	48"
MSHDS56	70511	56"
MSHDS64	70512	64"
MSHDS72	70513	72"



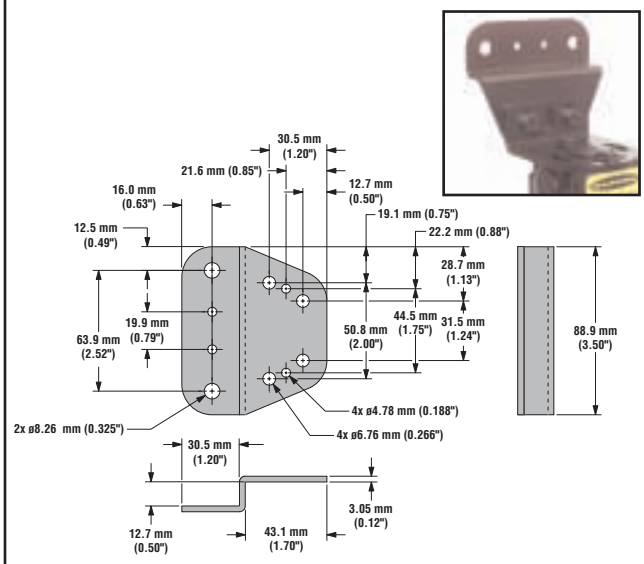
Mirrors

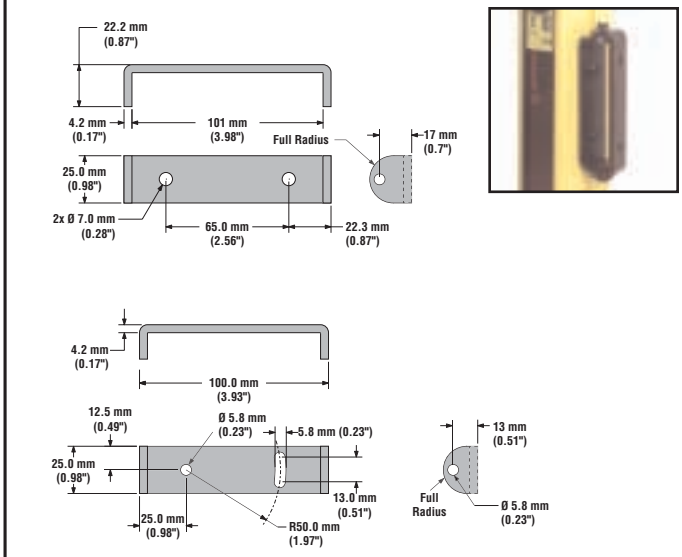
NOTE: The total range decreases by approximately 8% per mirror.

Model	Part Number	Fits Sensor Defined Area Length	Length			
			Y	L1	L2	L3
SSM-675	61896	24"	675 mm (26.6")	753 mm (29.6")	786 mm (31.0")	728 mm (28.7")
SSM-975	61898	32"	975 mm (38.4")	1053 mm (41.5")	1086 mm (42.8")	1028 mm (40.5")
SSM-1175	61899	40"	1175 mm (46.3")	1253 mm (49.3")	1286 mm (50.6")	1228 mm (48.3")
SSM-1275	61900	48"	1275 mm (50.2")	1353 mm (53.3")	1386 mm (54.6")	1328 mm (52.3")
SSM-1475	61901	56"	1475 mm (58.1")	1553 mm (61.1")	1586 mm (62.5")	1528 mm (60.2")
SSM-1675	61902	64"	1675 mm (65.9")	1753 mm (69.0")	1786 mm (70.3")	1728 mm (68.0")
SSM-1900	61903	72"	1900 mm (74.8")	1978 mm (77.9")	2011 mm (79.2")	1953 mm (76.9")

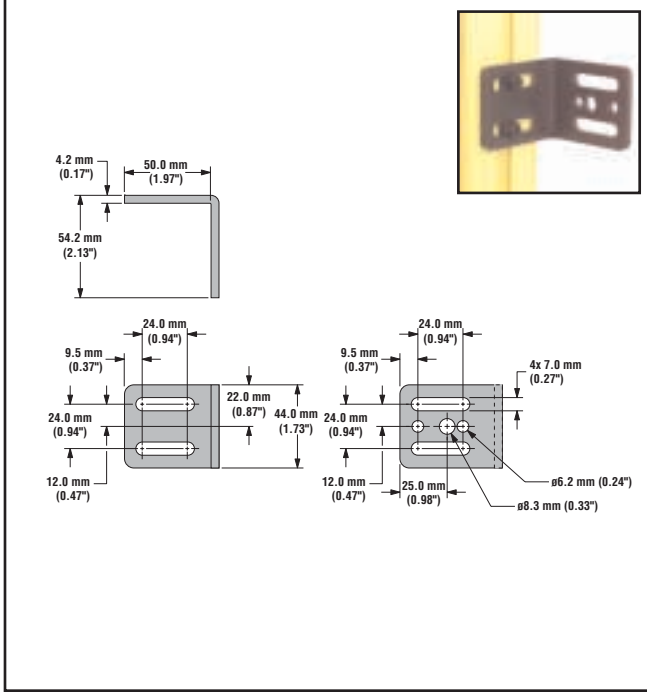
Accessory Brackets and Dimensions

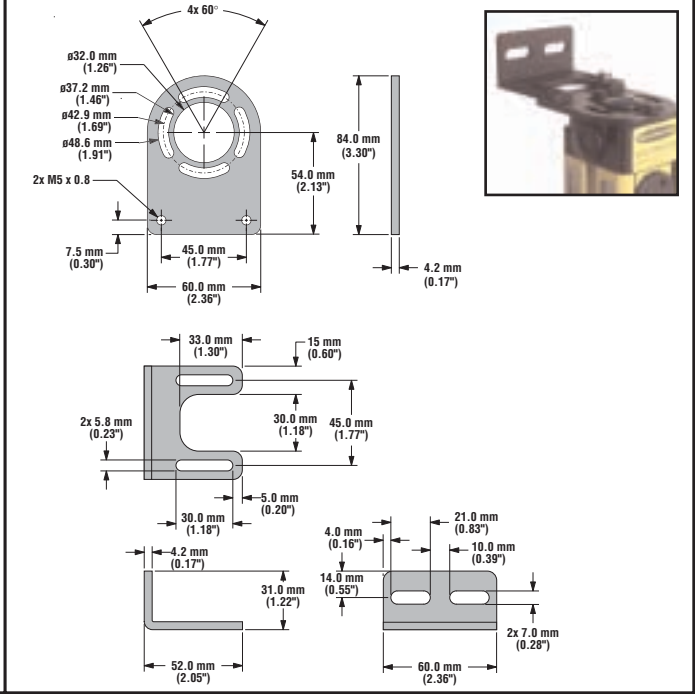
EZA-MBK-2	• Adaptor Bracket Kit for MSA Series Stands • P/N 61947	**EZA-MBK-3**	• Side-Swivel Bracket Kit • P/N 61980





EZA-MBK-8	• Retrofit Bracket Kit (to replace SICK/Leuze Grid systems)	**EZA-MBK-9**	• Adjustable Bracket Kit • P/N 66013





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