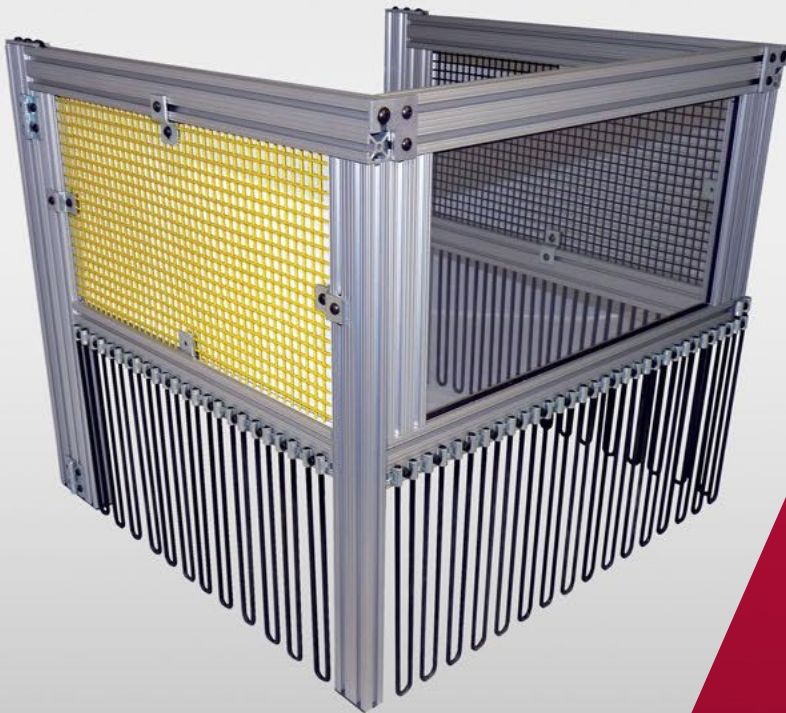




*The Trusted Choice for Machine Safety*



# EX-AL™ BARRIER & PERIMETER GUARDING

FOR INDUSTRIAL MACHINES

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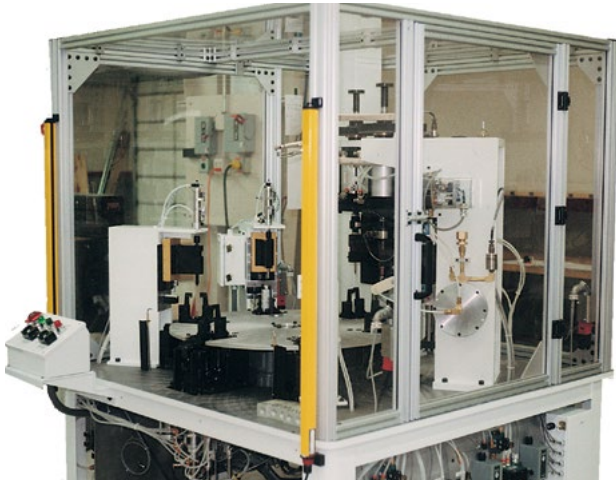
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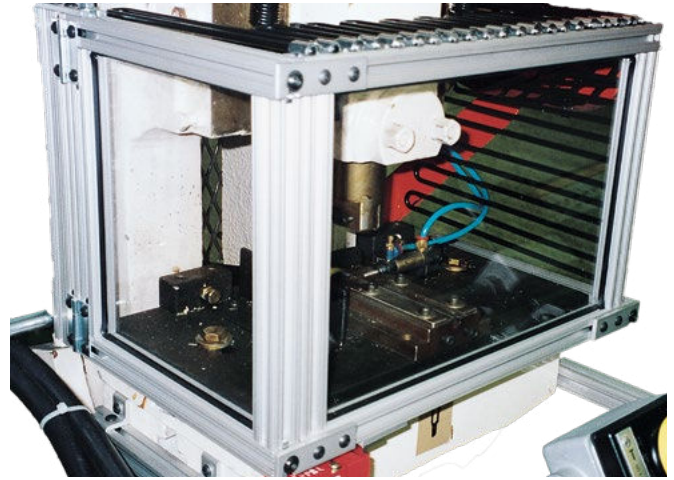
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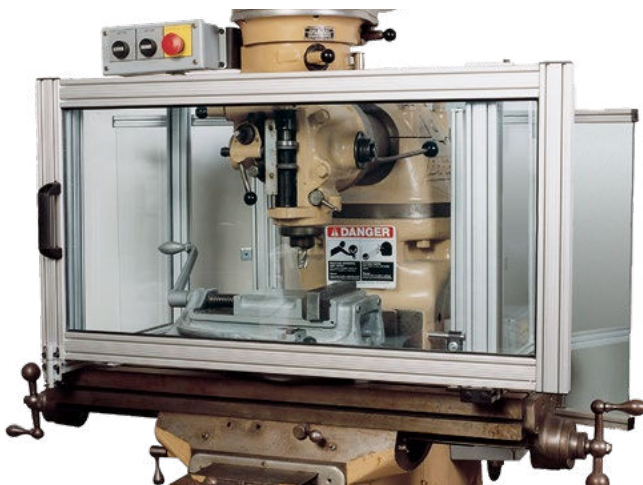
Light Curtain Mounting Bracket and Guard Combination  
Around Assembly Machine



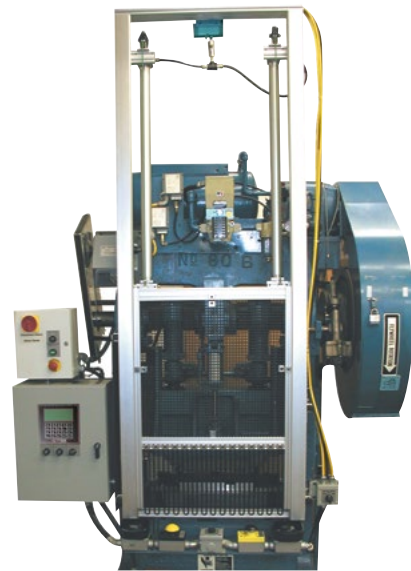
Point-of-Operation Guard on OBI Press



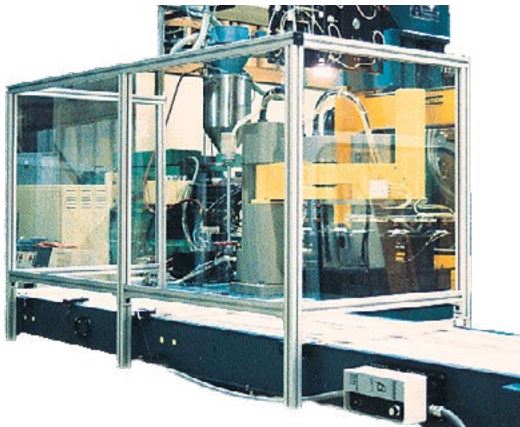
Milling Machine Shield With Sliding Front Door



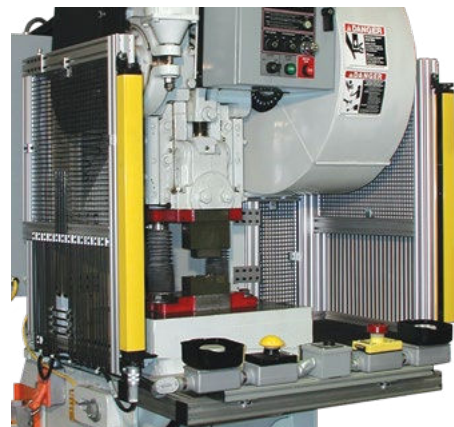
Air-Lift Guard on Press



Guard Mounted to Conveyor System and Machine



Point-of-Operation Light Curtains on a Press





## PORTABLE DEMONSTRATION UNIT

We offer custom guards that can be designed and built to fit most machines. Our product development and engineering personnel can design guards that are unique to your machines. These guards comply with OSHA (Occupational Safety and Health Administration) and ANSI (American National Standards Institute) safety standards.

A portable demonstration unit is available. This unit features various materials that are used to construct a shield or guarding system. This portable demonstration unit is ideal as a quick reference or as a visual aid for safety specialists, loss-control engineers, etc.

Please use Part No. FFD000263 when ordering.



*Portable Demonstration Unit*

## INTRODUCTION TO BARRIER GUARDING SYSTEMS

Barrier guards are usually the first point-of-operation safeguard considered for machines. The guards detailed in this catalog are intended and designed to meet the requirements of OSHA (Occupational Safety and Health Administration) and ANSI (American National Standards Institute) safety standards.

The OSHA 29 CFR 1910.217 requirements on the next page are specifically for guards on mechanical power presses; however, the same requirements apply for any other machinery used in industry.

When reviewing this catalog, please note guards are mounted on many different types of machines. These guards are not limited to fabricating equipment; they can be applied to any machine that requires point-of-operation safeguarding.

The EX-AL™ guarding systems can be used as a barrier (not guard) to protect the sides and rear of the machine when other safeguarding is used such as presence-sensing devices, two-hand control, pullbacks, and restraints.

An EX-AL™ guarding system can also be applied as shields on metal-cutting machines such as lathes, milling machines, and drill presses. This system is ideal for applications which require shielding from chips and coolant. At the same time, the shield provides a barrier between the point-of-operation hazard and the operator for added protection.

When operating any machine, personal protective equipment, including safety glasses, must be worn by the operator. All parts of the operator's body must be kept out of the point-of-operation hazard and the operator must not wear jewelry. Long hair must be restrained and loose clothing should be avoided.

Each EX-AL™ guarding system offered in this catalog is custom designed and built for each application. Frame extrusions are cut and assembled from detailed dimensions furnished to the factory on measurement forms, prints, or sketches. Delivery varies from stock (inventoried brackets, fasteners, etc.) to four weeks based on the quantity and complexity of the guards required.

An instruction manual, danger signs, and a CAD-generated drawing are included with each EX-AL™ shipment. This information is helpful when mounting the guard to the machine. When a measurement form has been provided for the design and fabrication of the guarding system, a copy of it will be included with the shipment of the guarding system.

Before measuring your machine for barrier guards, please refer to the following pages to select the proper guard. Take into consideration the safety and productivity requirements of each machine.

Barrier guards basically consist of three components:

1. Panels
2. Panel segments
3. Mounts

Once the decision has been made on these three components and the OSHA requirements have been read and understood (see next page), someone can measure the machine(s) for the appropriate type of guard.

## OSHA GUARD REQUIREMENTS TAKEN FROM 29 CFR 1910.217 FOR MECHANICAL POWER PRESSES

### (c)(2) Point-of-Operation Guards:

(i) Every point-of-operation guard shall meet the following design, construction, application, and adjustment requirements:

- (a) It shall prevent entry of hands or fingers into the point of operation by reaching through, over, under or around the guard;
- (b) It shall conform to the maximum permissible openings of Table O-10;
- (c) It shall, in itself, create no pinch point between the guard and moving machine parts;
- (d) It shall utilize fasteners not readily removable by operator, so as to minimize the possibility of misuse or removal of essential parts;
- (e) It shall facilitate its inspection, and
- (f) It shall offer maximum visibility of the point of operation consistent with the other requirements.

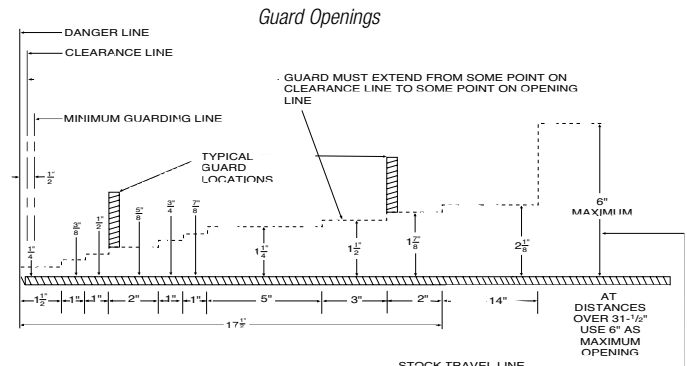
(ii) A die enclosure guard shall be attached to the die shoe or stripper in a fixed position.

(iii) A fixed barrier guard shall be attached securely to the frame of the press or to the bolster plate.

(iv) An interlocked press barrier guard shall be attached to the press frame or bolster and shall be interlocked into the press clutch control so that the clutch cannot be activated unless the guard itself, or the hinged or movable sections of the guard are in position to conform to the requirements of Table O-10.

(v) The hinged or movable sections of an interlocked press barrier guard shall not be used for manual feeding. The guard shall prevent opening of the interlocked section and reaching into the point of operation prior to die closure or prior to the cessation of slide motion. See paragraph (c)(3)(ii) of this section regarding manual feeding through interlocked press barrier devices.

(vi) The adjustable barrier guard shall be securely attached to the press bed, bolster plate, or die shoe, and shall be adjusted and operated in conformity with Table O-10 and the requirements of this subparagraph. Adjustments shall be made only by authorized personnel whose qualifications include a knowledge of the provisions of Table O-10 and this subparagraph.



## OSHA AND ANSI GUARD-OPENING SCALES

OSHA Guard-Opening Scale – Part No. KSC097



ANSI/CSA Guard-Opening Scale – Part No. KSC098



These guard-opening scales are used to check the openings in a guard once it has been installed.

## GENERAL INSTRUCTIONS FOR APPLYING BARRIER GUARDS

A barrier guard consists basically of three components: **PANELS**, **PANEL SEGMENTS** (if required), and **MOUNTS**.

### PANELS

1. Begin by determining what type of panel construction is required. Choices include a nonadjustable panel (NAP), or a variety of adjustable panels (AP1, AP2, AP3, AP4, AP5, and API).
2. Next, using a plain piece of paper or the measurement forms provided, measure accurately and record the sizes of each panel required. Important: All dimensions and information requested on each measurement form must be filled in and answered completely. Be sure to read the measuring instructions for each type of guard before writing down the dimensions.

### PANEL SEGMENTS

3. Determine if a segment inside the panel is required. If it is, decide which segment type.
4. Measure the segment size required and provide its location in the panel.
5. On some smaller guards, the segment could be the entire panel.

### MOUNTS

There are various mounts available for attaching the guard to the machine. Select the mount that best fits the application.

For price quotes or ordering, remember to:

1. Complete all dimensions for each barrier guard.
2. Measure accurately and complete all dimensions. Important: All dimensions and information requested on each measurement form must be filled in and answered completely. Note any machine obstructions, such as flywheel covers, knockout rods, feeds, and moving machine components on the measurement form and provide specific dimensions of these obstructions in the *Notes* section.
3. Send the completed information to Rockford for pricing.
4. When ordered, a complete barrier guard, ready for installation, will be furnished.

*Note: The barrier guards and/or mounting brackets/stands in this catalog will be fabricated to within  $\pm 1/8"$  of the measurements provided. Minor modification or additional material may be needed at the time of installation for proper fit to the machine or equipment.*

## PANELS

The standard panel frame is constructed of 1" x 2" extruded aluminum. The nonadjustable area of the panel is made of black or yellow mesh ( $\frac{1}{2}$ " sq. 16-gauge or 1" sq. 12-gauge), or  $\frac{3}{16}$ "-thick clear polycarbonate which is fastened in place for a permanent assembly. A panel can also be furnished with adjustable  $\frac{1}{4}$ " diameter, black-oxidized steel hairpins in any portion of the panel. This provides adjustability for strip or coil feeding, or for obstructions on the machine. The hairpins are secured to the panel frame with clips, T-nuts, and socket-head cap screws.

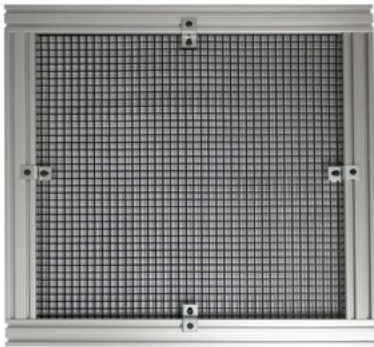
Various types of panel segments can also be furnished in the nonadjustable area of the panel to accommodate required features. A panel with adjustable hairpins does not have a panel segment unless the operator requires visibility into the point of operation. Panels can be attached to the machine using the mounts shown on pages 9 and 10.

### PANEL FRAME CONSTRUCTION

#### NAP—NONADJUSTABLE PANELS

The NAP panel is fastened in place for a permanent assembly. It can be furnished with  $\frac{1}{2}$ " or 1" black or yellow mesh, or  $\frac{3}{16}$ "-thick clear polycarbonate.

#### $\frac{1}{2}$ " MESH PANEL



#### POLYCARBONATE PANEL



#### AP—ADJUSTABLE PANELS

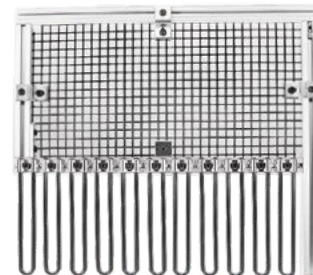
##### AP1—Lower Section ( $\frac{1}{2}$ Frame)

The AP1 panel has a sturdy frame around the top half of the nonadjustable panel area. Steel hairpins are on the lower portion of the panel to allow for adjustability.



##### AP2—LOWER SECTION ( $\frac{5}{8}$ FRAME)

The AP2 panel has adjustability on the lower section, with one side of the frame extending to the bottom of the panel for an extended mounting surface.



##### AP3—LOWER SECTION ( $\frac{3}{4}$ FRAME)

The AP3 panel has adjustability on the lower section, with both sides of the frame extending to the bottom of the panel for an extended mounting surface on both sides.

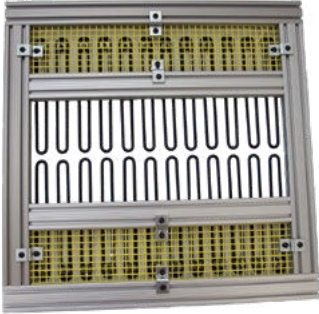




## PANEL FRAME CONSTRUCTION (CONTINUED)

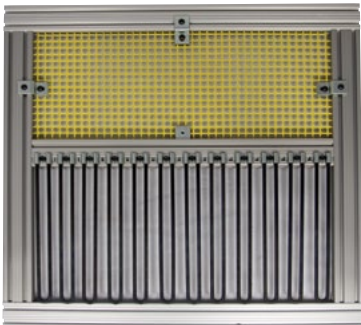
### AP4—INTERIOR SECTION (FULL FRAME)

The AP4 panel has steel hairpins located in the interior section of the panel for adjustability. This can be used when the material is fed through the center portion of the panel.



### AP5—LOWER SECTION FULL FRAME

The AP5 panel has adjustability on the lower section, with full-frame availability for mounting.



### API—LOWER SECTION (INCLINABLE)

The API panel has inclinable steel hairpins located in the lower section. The inclinable section slants the hairpins inward for effective feeding of material and accommodation of various size dies while providing point-of-operation safeguarding. When inclining these guards, refer to the requirements of Table O-10 (see page 5) for the proper size opening.



## PANEL SEGMENTS

Various types of panel segments can be positioned into the nonadjustable area of the framed panel to accommodate required features. A standard panel with adjustable hairpins does not have a panel segment unless the operator requires visibility into the point of operation.

### FEEDING (FS)



The feeding segment is used for strip or coil feeding through a nonadjustable area of the panel. This segment can accommodate various feedline heights.

### ADJUSTABLE (AS)



The adjustable segment is used for strip or coil feeding through an adjustable area. This segment can accommodate various feedline heights. When using this adjustable segment, refer to the requirements of Table O-10 (see page 5).

### POLYCARBONATE (PCS)



Polycarbonate (3/16"-thick) segments are furnished when greater visibility into the point of operation is required.

### EMPTY (ES)



An empty segment can be furnished to allow the user to exchange custom-built panel segments based on production requirements. When using this type of segment, refer to the requirements of Table O-10 (see page 5).



## MOUNTS

Various mounts are available which attach the barrier guards to the machine. (Please see illustrations throughout this catalog.) The mounts are furnished with all required components to mount and fasten the barrier guard to the machine.

### SINGLE-PANEL BARRIER GUARD MOUNTS

#### DFM (Direct Frame Mount) Assembly

Part No. FKT683 (Black Steel) - Mount

Part No. FKT656 (Aluminum) - Guard or Post Mount



The DFM (direct frame mount) assembly (set of four with fasteners) attaches a guard panel to a flat surface on the machine. The slotted hook-mount allows the guard panel to be lifted off the machine without removing the fastener.

#### IFM (Inside Frame Mount) Assembly

Part No. FKT684—Two-Hole

Part No. FKT690—Four-Hole

The IFM (inside frame mount) assembly (set of four with fasteners) has a right angle bracket that fastens a guard panel to the inside column or frame of the machine. The IFM assembly is used when there are obstructions on the outside frame (face) of the machine, or for conveniently locating the guard between the machine frame, closer to the hazard. Depending on the size of the panel, either a two-hole (under 10" square) or four-hole (over 10" square) IFM assembly will be provided.

#### EM (Extended Mount) Assembly

Part No. FKT608—3"

Part No. FKT609—5"

Part No. FKT610—7"



The EM (extended mount) assembly (set of four with fasteners) connects a panel up to 3", 5", or 7" out from the machine frame. The extended mount is ideal for machines that have obstructions, an irregular mounting surface, or requirements for the panel to be mounted at a specific location.

*Two-Hole  
Assembly*



*Four-Hole  
Assembly*



#### EM24 (Extended Mount) Assembly

Part No. FKT695



This assembly consists of a set of four with fasteners. It connects a panel 8" to 24" out from the machine frame. The EM24 mount is ideal for mounting a panel to machines with obstructions that require a panel to be mounted at a greater distance than the EM described above. DFM (direct frame mounts) are included with this assembly.

#### HM (Hinged Mount) Assembly

Part No. FKT686

The HM (hinged mount) assembly consists of two hinges, one latch, two 1" x 1" pieces of extrusion (length determined by dimensions furnished), and fasteners. DFM (direct frame mount), IFM (inside frame mount), or EM (extended mount) assemblies must be used with this assembly to connect the hinged hardware and panel to the frame of a machine.



## MOUNTS (CONTINUED)

### MOUNTS FOR MULTI-PANEL BARRIER GUARDS

The following assemblies are usually applied to gap-type machines. They are used when the side panels of XL2 through XL6 guards need to be hinged to the left and right. This hinged feature may be necessary when changing dies, making tooling adjustments, or freeing jammed workpieces.

#### Side Frame Mount (SFM) Assembly Part No. FKT682

The SFM (side frame mount) assembly includes four right-angle brackets (either two-hole or four-hole brackets depending on the size of the panel) that connect a guard to a smooth, upright surface of a machine. Additional parts for the assembly include four hinges, two 1" x 2" extrusions, and other hardware.



#### SFM3, -5, or -7 (Side Frame Mount) Assembly Part No. FKT677 SFM3 Part No. FKT678 SFM5 Part No. FKT679 SFM7

The SFM3, -5 or -7 (side frame mount) assembly includes four extended mount assemblies that can be 3", 5", or 7" long. This mount is ideal for mounting a guard to a machine with an irregular surface, or to avoid obstructions at the mounting point. Additional parts for the assembly include four hinges, two 1" x 2" extrusions, and other hardware.



#### SFM24 (Side Frame Mount) Assembly Part No. FKT680

The SFM24 (side frame mount) assembly connects a barrier guard 8" to 24" out from the sides of the machine. This SFM24 mount is ideal for mounting a guard to a machine when the guard must extend out from the machine frame. Additional parts for the assembly include four hinges, two 1" x 2" extrusions, and other hardware.



#### FFM (Front Frame Mount) Assembly Part No. FKT681

The FFM (front frame mount) assembly connects a barrier guard to the throat portion of a C-frame machine using right angle brackets. This mount is applied when a multi-panel guard cannot be attached to the side of the machine using the SFM, SFM3, -5, or -7, or the SFM24 mounts described on this page. Additional parts for the assembly include four hinges, two 1" x 2" extrusions, and other hardware.



## MULTI-PANEL XL2 THROUGH XL6



*Example of a Multi-Panel Barrier Guard on a Power Press*

Multi-panel barrier guards can be furnished for various machines including gap or C-frame presses that require barrier guards as the method of safeguarding. Ideal applications include manual strip-feeding operations in single stroke or for automatic-feeding operations in the continuous or automatic single stroke modes of operation. The guards are custom-designed for each application to meet the requirements of OSHA (Occupational Safety and Health Administration) and ANSI (American National Standards Institute). Each guard consists of three components: panels, panel segments (if required), and mounts.

The panels of these barrier guards are available in nonadjustable (NAP) and adjustable (AP1, AP2, AP3, AP4, AP5, and API) frame construction. Various panel segments can be positioned into a nonadjustable panel to meet specific requirements. Please see page 8 for details on panel segments.

Normally, panels with adjustable hairpins do not have panel segments unless the operator requires visibility into the point of operation. Mounts are used to attach guards to the machine.

Normally, the framework of the panels is constructed of 1" x 2" square extruded aluminum. Larger frame extrusions are available (see page 27 for choices). Standard panels can be furnished with black or yellow mesh (1/2" sq. 16-gauge or 1" sq. 12-gauge), or 3/16"-thick clear polycarbonate. Panels are available with adjustable, black-oxidized steel hairpins in the lower portion of the panel. These hairpins provide adjustability for strip or coil feeding, or for going around obstructions on the machine. The adjustable hairpins are secured to the panel frame with clips, T-nuts, and socket-head cap screws.

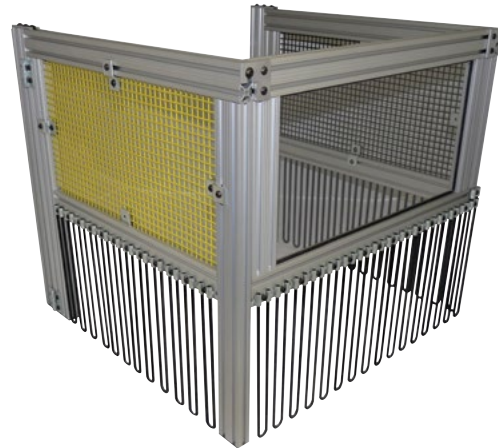
## MULTI-PANEL XL2 THROUGH XL6 (CONTINUED)

This page illustrates guards that are usually applied to C-frame machines. The two-panel and four-panel barrier guards cannot be considered a safeguard. They are to be used with safeguarding devices such as two-hand trip or control, presence-sensing devices, pullbacks, or restraints. They are designed to protect the sides of the point of operation while the front is open for feeding and removing of workpieces.

The three- and five-panel barrier guards are designed to meet the requirements of a point-of-operation guard as detailed on pages 5 and 6 of this catalog. The rear of the machine must also be guarded when applying front and side guards. A roof and/or floor section is required if the guard is designed and applied where someone could reach over or under it.



**Model XL2**—This two-panel guard can be constructed from any of the panels shown on pages 7 and 8. The mounts can be furnished as illustrated on pages 9 and 10. The barrier shown has two panels constructed of mesh and hairpins with SFM5 mounts.



**Model XL3**—This three-panel guard shows the same two panels as the XL2 with the addition of a front panel made of polycarbonate and adjustable hairpins.



**Model XL4**—This four-panel barrier guard is similar to the XL2 shown above with the addition of right rear and left rear panels. The XL4 barrier guard is used when the guard must extend out from the machine frame to provide clearance for the machine bed or tooling. This guard is constructed of polycarbonate and mesh panels and includes feeding and adjustable segments. SFM24 and FFM mounts are shown.



**Model XL5**—This five-panel guard shows the same four panels as the XL4 with the addition of a front panel. This panel is made of mesh and includes a polycarbonate segment.

*Note: Model XL6 (not shown) consists of two XL3 barrier guards placed on top of each other with a gap in between them to allow for large sheet metal feeding.*



## MEASURING INSTRUCTIONS FOR MULTI-PANEL MODELS XL2 THROUGH XL6 USED ON MECHANICAL OR HYDRAULIC POWER PRESSES WITH C-FRAME CONSTRUCTION

The following instructions are for measuring XL2 through XL6 barrier guards. The basic information necessary to quote or fabricate any of the listed guards is the frame type, nonadjustable area construction, height and length of panel(s), panel segments (if required), and mounts to attach the guards to the machine.

The following instructions are purposely kept as simple as possible to avoid long explanations of the many variations available.

1. Fill in the complete heading as indicated.
2. Check appropriate guard model number.
  - XL2** = 2 panel
  - XL3** = 3 panel
  - XL4** = 4 panel
  - XL5** = 5 panel
  - XL6** = 6 panel (gap style)
 (If any panels are not required, cross them out in the panel chart.)
3. Measure and record the bolster width and depth.
4. Measure web width of frame, if the barrier guard is to be mounted to the front of the frame behind the bolster plate.
5. Measure and record the outside width of the press frame behind the bolster plate.
6. Indicate desired position of each panel relative to the bolster. Drawing shows panels extended from the bolster. If panels should be inbound, enter minus (-) dimensions, or on the bolster, enter zero.
7. Measure and record the distance from the mounting point of the guard on the machine to the rear of the bolster, or back of press throat if using FFM mounts.
8. Measure and record the clearance from the flywheel cover to the top of the bolster. This dimension could affect the panel height if the panel is to be swung under the flywheel cover.
9. Measure and record the feedline depth if applying a gap type guard (XL6).
10. Enter the minimum and maximum feedline height if applying adjustable hairpins or inclinable panels.
11. Indicate mounts required.
  - SFM** Side Frame Mount
  - SFM7** Side Frame Mount up to 7"
  - SFM24** Side Frame Mount up to 24"
  - FFM** Front Frame Mount
12. Indicate frame type for each panel.
  - NAP** Nonadjustable Panel
  - AP1** Adjustable Panel (1/2 frame)
  - AP2** Adjustable Panel (5/8 frame)

<b>AP3</b>	Adjustable Panel (3/4 frame)
<b>AP4</b>	Adjustable Panel (Full frame)
<b>AP5</b>	Adjustable Panel (Full frame)
<b>API</b>	Adjustable Panel (Inclinable)

If adjustability is not required at the left and right front corners of the barrier guard, use AP3 panels for L and R, and AP1 panel for F for quicker removal of F panel.

If adjustability is required at the left and right front corners of the barrier guard, use AP2 panels for L and R, and AP1 panel for F and indicate in Notes section on the form. All panels (L, F, R) should have the same size nonadjustable area and it should be in the same position on all panels.

13. Indicate the construction of the nonadjustable area for each panel.
  - B** 1/2" Sq. Black Mesh (16 gauge)
  - B1** 1" Sq. Black Mesh (12 gauge)
  - Y** 1/2" Sq. Yellow Mesh (16 gauge)
  - Y1** 1" Sq. Yellow Mesh (12 gauge)
  - PC** Polycarbonate (3/16"-thick)
14. Indicate height of each panel.
15. Indicate length of each panel.
16. Indicate panel **Segment** type, height, length, and if hinged or nonhinged.
  - FS** Feeding Segment
  - AS** Adjustable Segment
  - PCS** Polycarbonate Segment
  - ES** Empty Segment
17. Indicate which panel(s) require an interlock switch and if switch is locking or nonlocking.
18. Indicate if **F** panel needs to be hinged (**L or R**).
19. Indicate if hairpins are required in place of **RR** or **LR** panel. The number of hairpins supplied will be determined by the height of the **L** or **R** panel.
20. Indicate if roof section(s) are required. Provide height and length.
21. Indicate if floor section(s) are required. Provide height and length.

## MEASUREMENT FORM FOR MULTI-PANEL MODELS XL2 THROUGH XL6



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### Multi-panel guards—XL2, XL3, XL4, XL5, XL6

If more than one machine is to be measured, please make copies of this page.

(See previous page for instructions.)

Company \_\_\_\_\_ Address \_\_\_\_\_

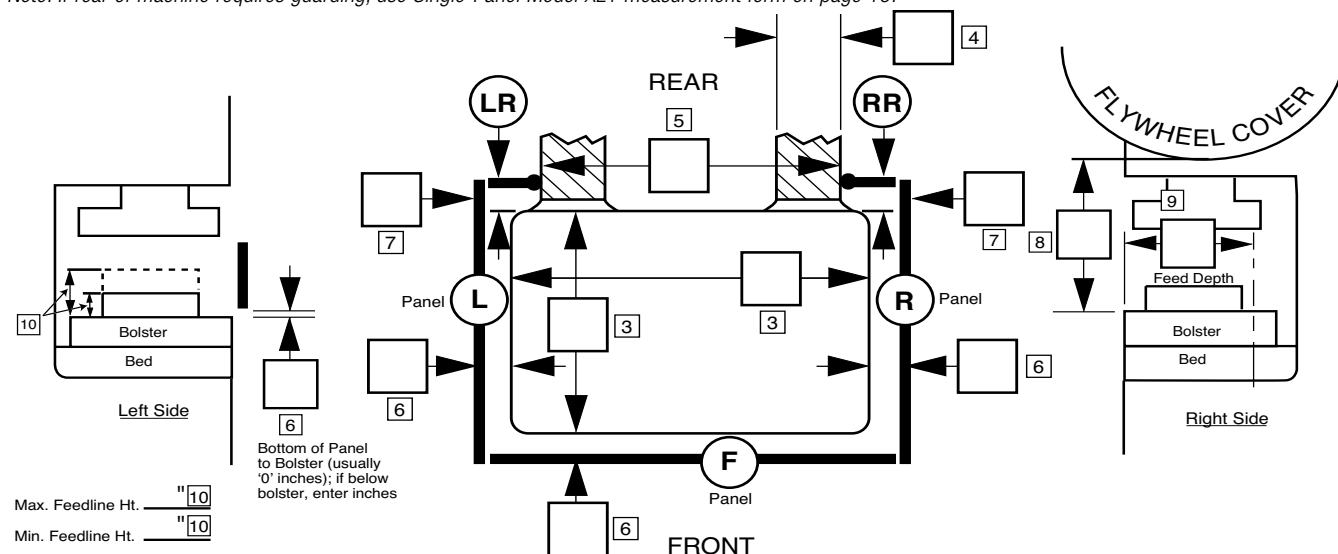
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Attention \_\_\_\_\_ Rep. \_\_\_\_\_

Machine Mfr. and Model No. \_\_\_\_\_ Machine No. \_\_\_\_\_

Measured By: \_\_\_\_\_

Note: If rear of machine requires guarding, use Single-Panel Model XL1 measurement form on page 19.



**2 MODEL**

☐ XL-2 ☐ XL-3  
☐ XL-4 ☐ XL-5 ☐ XL-6

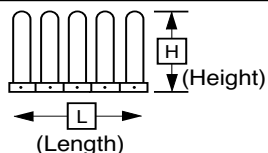
**11 MOUNTS**

☐ SFM  
☐ SFM-3, -5, or -7  
(Circle one)  
☐ SFM-24  
☐ FFM

**17 ELEC. INTERLOCK**

☐ Locking  
☐ Nonlocking

PANEL CHART					
Panel	LR	L	F	R	RR
Frame Type—NAP, AP1, AP2, AP3, AP4, AP5, or API	<input type="text"/> 12	<input type="text"/> 12	<input type="text"/> 12	<input type="text"/> 12	<input type="text"/> 12
Nonadjust. Area Const. B, B1, Y, Y1, PC	<input type="text"/> 13	<input type="text"/> 13	<input type="text"/> 13	<input type="text"/> 13	<input type="text"/> 13
H (Height)	<input type="text"/> 14	<input type="text"/> 14	<input type="text"/> 14	<input type="text"/> 14	<input type="text"/> 14
L (Length)	<input type="text"/> 15	<input type="text"/> 15	<input type="text"/> 15	<input type="text"/> 15	<input type="text"/> 15
Panel Segment Type FS, AS, PCS, or ES	<input type="text"/> 16	<input type="text"/> 16	<input type="text"/> 16	<input type="text"/> 16	<input type="text"/> 16
H (Height)					
L (Length)					
H (Hinged) NH (Nonhinged)					
Electrical Interlock Y (Yes) N (No)		<input type="text"/> 17	<input type="text"/> 17	<input type="text"/> 17	
F Panel Only Hinged L or R			<input type="text"/> 18		
Hairpins (In place of LR or RR)	<input type="text"/> 19				<input type="text"/> 19



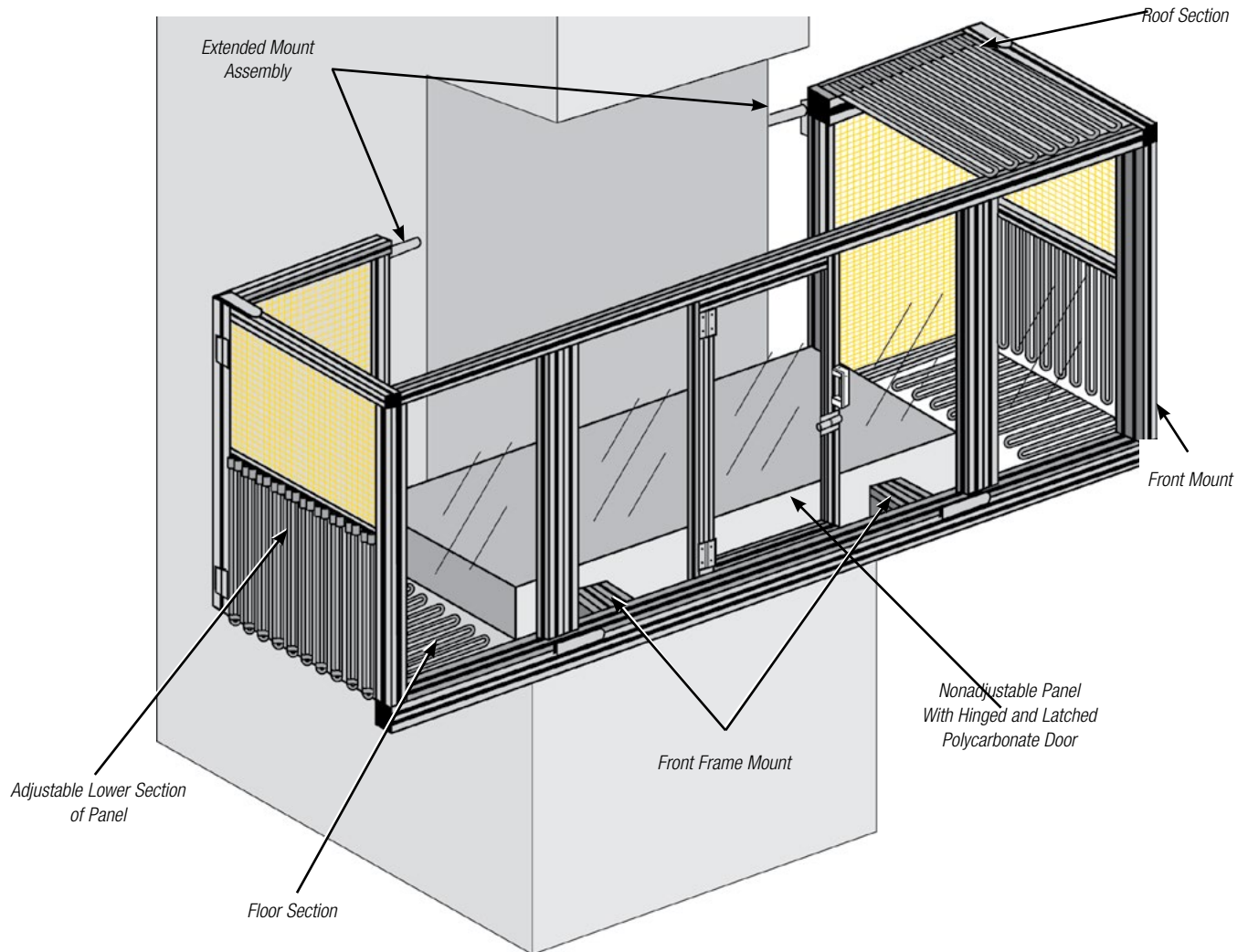
**20 ROOF SECTION**

Panel	H	L
L		
F		
R		

**21 FLOOR SECTION**

Panel	H	L
L		
F		
R		

## FRONT MOUNT XL1 THROUGH XL7



### Example of a Seven-Panel Guard (XL7) on a Gap-Type Machine

The front-mount guarding system is applied to machines that usually have a gap-type construction with components that extend to the right or left of the point of operation. These components can be dies, tooling, feeds, scrap choppers, etc. The front-mount extrusion provides support for the guard across the front of the machine. The front portion of the machine can be safeguarded with one, two, or three panels (see the measurement form on page 17 for the **LF**, **F**, and **RF** panels).

If panels need to be removed or hinged, please indicate how they should be attached. When measuring for a front-mount guard and the construction of the panel is determined, a roof and/or floor section is required if someone can reach over or under the guard.

The panel length will be determined at the factory based on the information provided on the measurement form.

## MEASURING INSTRUCTIONS FOR FRONT-MOUNT MODELS XL1 FM THROUGH XL7 FM

The following instructions are for measuring XL1 through XL7 front mount barrier guards. The basic information necessary to quote or fabricate any of the listed guards is the frame type, nonadjustable area construction, height of panel(s), panel segments (if required), and mounts to attach the guards to the machine. **The length of all panels will be determined by Rockford Systems.**

The following instructions are purposely kept as simple as possible to avoid long explanations of the many variations available.

1. Fill in the complete heading as indicated.
2. Check appropriate guard model number.
 

<b>XL1</b> = 1 panel	<b>XL5</b> = 5 panel
<b>XL2</b> = 2 panel	<b>XL6</b> = 6 panel
<b>XL3</b> = 3 panel	<b>XL7</b> = 7 panel
<b>XL4</b> = 4 panel	

(If any panels are not required, cross them out in the panel chart.) Indicate how front mount will be attached to the press: direct, extended, or tie-bar boss.
3. Measure and record the bolster width and depth.
4. Measure and record the distance from the edge of the bolster to the outside of the frame of the machine on both sides.
5. Measure and record the distance from the mounting point of the guard on the frame of the machine to the rear of the bolster.
6. Indicate desired position of **L**, **F**, and **R** panels relative to the bolster. Drawing shows panels outbound of the bolster. If panels should be inbound, enter minus (-) dimensions, or on the bolster, enter zero.
7. Indicate the distance of the **LR** and **RR** panels to the mounting point on the frame of the machine.
8. Enter the center to center distance of tie-bar bosses or extended mount locations and distance from the right edge of the bolster to the center of the right tie-bar boss or right extended mount.
9. Measure and record the distance from the edge of the bolster to the right edge of the **LF** panel and the left edge of the **RF** panel. If the edge of the panel(s) is on the bolster, enter zero. If there is no **LF** or **RF** panel(s), put an "X" in the square.
10. Enter the minimum and maximum feedline heights.
11. Indicate mounts required for **LR**, **L**, **R**, or **RR** panels.
 

<b>SFM</b>	Side Frame Mount
<b>SFM7</b>	Side Frame Mount up to 7"
<b>SFM24</b>	Side Frame Mount up to 24"
<b>FFM</b>	Front Frame Mount
12. Measure and record the distance from the top of the Front Mount to the top of the bolster.
13. Enter the distance between the bottom of the front panel(s) to the top of the Front Mount.
14. Indicate frame type for each panel.
 

<b>NAP</b>	Nonadjustable Panel
<b>AP1</b>	Adjustable Panel ( $\frac{1}{2}$ frame)
<b>AP2</b>	Adjustable Panel ( $\frac{3}{8}$ frame)
<b>AP3</b>	Adjustable Panel ( $\frac{3}{4}$ frame)
<b>AP4</b>	Adjustable Panel (Full frame)
<b>AP5</b>	Adjustable Panel (Full frame)
<b>API</b>	Adjustable Panel (Inclinable)
15. Indicate the construction of the nonadjustable area for each panel.
 

<b>B</b>	$\frac{1}{2}$ " Sq. Black Mesh (16 gauge)
<b>B1</b>	1" Sq. Black Mesh (12 gauge)
<b>Y</b>	$\frac{1}{2}$ " Sq. Yellow Mesh (16 gauge)
<b>Y1</b>	1" Sq. Yellow Mesh (12 gauge)
<b>PC</b>	Polycarbonate ( $\frac{3}{16}$ "-thick)
16. Indicate height of each panel.
17. Indicate length of each panel. **Rockford Systems will determine length(s) based on other dimensions provided.**
18. Indicate panel segment type, height, length, and if hinged or nonhinged, if required.
 

<b>FS</b>	Feeding Segment
<b>AS</b>	Adjustable Segment
<b>PCS</b>	Polycarbonate Segment
<b>ES</b>	Empty Segment
19. Indicate which panel(s) require an interlock switch and if switch is locking or nonlocking.
20. Indicate if **L**, **LF**, **F**, **RF**, or **R** panels need to be hinged (**L** or **R**).
21. Indicate if hairpins are required in place of **LR** or **RR** panel. The number of hairpins supplied will be determined by the height of the **L** or **R** panel.
22. Indicate if roof section(s) are required. Provide height and length.
23. Indicate if floor section(s) are required. Provide height and length.



# MEASUREMENT FORM FOR FRONT MOUNT MODELS XL1 FM THROUGH XL7 FM



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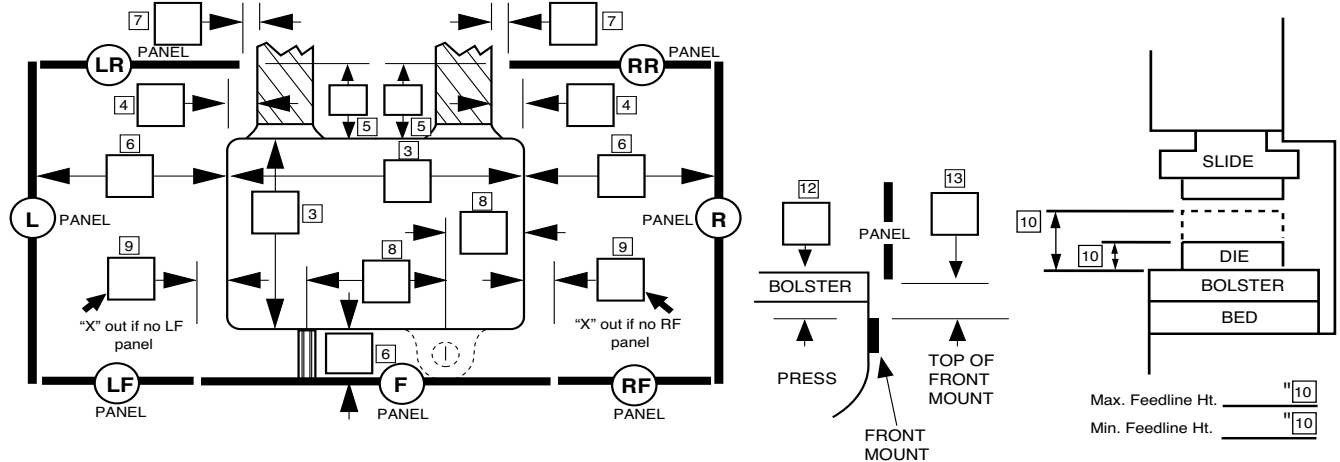
## FRONT MOUNT MODELS—XL1, XL2, XL3, XL4, XL5, XL6, XL7

If more than one machine is to be measured, please make copies of this page.

(See previous page for instructions.)

Company \_\_\_\_\_ Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Attention \_\_\_\_\_ Rep. \_\_\_\_\_  
Machine Mfr. and Model No. \_\_\_\_\_ Machine No. \_\_\_\_\_  
Measured By: \_\_\_\_\_

Note: If rear of machine requires guarding, use Single-Panel Model XL1 measurement form on page 19.



### Notes:

**2 MODEL XL-\_\_ FM**

☐ 1 ☐ 2 ☐ 3 ☐ 4  
☐ 5 ☐ 6 ☐ 7

**2 FRONT-MOUNT TYPE**

☐ Direct ☐ Tie-Bar Boss  
☐ Extended

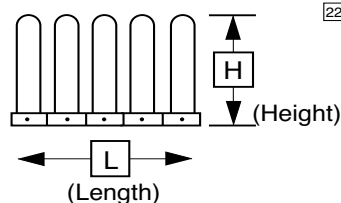
**11 MOUNTS FOR LR, L, R, RR**

☐ SFM  
☐ SFM-3, -5, or -7  
(Circle One)  
☐ SFM-24  
☐ FFM

**19 ELEC. INTERLOCK**

☐ Locking  
☐ Nonlocking

PANEL CHART							
Panel	LR	L	LF	F	RF	R	RR
Frame Type NAP, AP1 AP2, AP3, AP4, AP5, or API	14	14	14	14	14	14	14
Nonadjust. Area Const. B, B1, Y, Y1, PC	15	15	15	15	15	15	15
H (Height)	16	16	16	16	16	16	16
L RSI To Complete (Length)	17	17	17	17	17	17	17
Panel Segment Type FS, AS, PCS, or ES	18	18	18	18	18	18	18
H (Height)							
L (Length)							
H (Hinged) NH (Nonhinged)							
Electrical Interlock Y (Yes) N (No)		19	19	19	19	19	
Hinged L or R		20	20	20	20	20	
Hairpins (In place of LR or RR)	21						21



**22 ROOF SECTION**

Panel	H	L
L		
LF		
F		
RF		
R		

**23 FLOOR SECTION**

Panel	H	L
L		
LF		
F		
RF		
R		

## SINGLE-PANEL MODEL XL1 OR DOUBLE PANEL MODEL XL2

The single-panel barrier guard can be furnished for any machine that requires simple, one-sided guarding. The panel can be custom designed for each application. In some applications, it is more convenient to have a double panel (split guard) with two panels in line with each other that are hinged and latched. Applications include areas of the machine not protected by a light curtain—front, rear, sides of the machine, or for auxiliary guarding.

The framework of the panel is typically constructed of 1" x 2" square extruded aluminum. The fixed area of the panel is made of black or yellow mesh ( $\frac{1}{2}$ " sq. 16-gauge or 1" sq. 12-gauge), or  $\frac{3}{16}$ "-thick clear polycarbonate. It is fastened in place for a permanent assembly. Adjustable, black-oxidized steel hairpins are available for the lower portion of the panel. These hairpins provide adjustability for strip or coil feeding, or for going around obstructions on the machine. The adjustable hairpins are secured to the panel frame with hairpin clips, T-nuts, and socket-head cap screws. Various panel segments can also be positioned into a framed panel to meet specific requirements. Panels with adjustable hairpins normally do not have a panel segment unless the operator requires visibility into the point of operation.

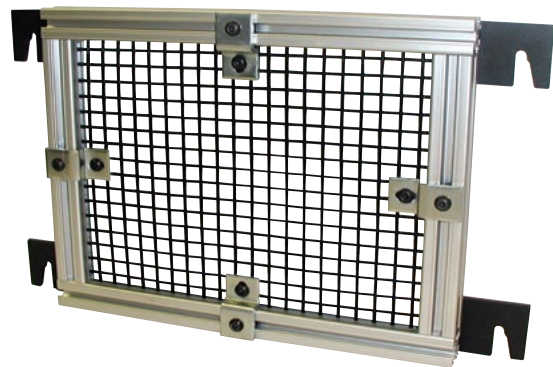
A single-panel can be attached to the machine using any of the mounts described on the next page.



Single-Panel Barrier Guard With Notched Upper Left Corner Mounted on Back of a Machine



Double Panel Model XL2 With Black Mesh, Heavy Hinge Assembly and Door Handles



Single-Panel Model XL1 With Black Mesh and Direct Frame Mounts

# MEASUREMENT FORM FOR SINGLE-PANEL MODEL XL1 OR DOUBLE PANEL XL2



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If more than one machine is to be measured, please make copies of this page.

Company \_\_\_\_\_ Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Attention \_\_\_\_\_ Rep. \_\_\_\_\_  
Machine Mfr. and Model No. \_\_\_\_\_ Machine No. \_\_\_\_\_  
Measured By: \_\_\_\_\_



## DFM (Direct Frame Mount) Assembly

Mounting center distance will be approximately 2" greater than the overall panel length.



## IFM (Inside Frame) Mount Assembly

Panel length will be approximately the inside machine frame dimension.



## EM (Extended Mount) Assembly

Mounting center distance will be approximately 1" greater than the overall panel length.

## HM (Hinged Mount) Assembly

If hinging is required, order this HM (hinge mount) assembly along with one of the following: DFM, IFM, or EM.



If **Direct Frame Hinged Mounts** are used, the mounting center distance will be approximately 4" greater than the overall panel length.

If **Inside Frame Hinged Mounts** are used, the panel length will be approximately 2" less than the inside machine frame dimension.

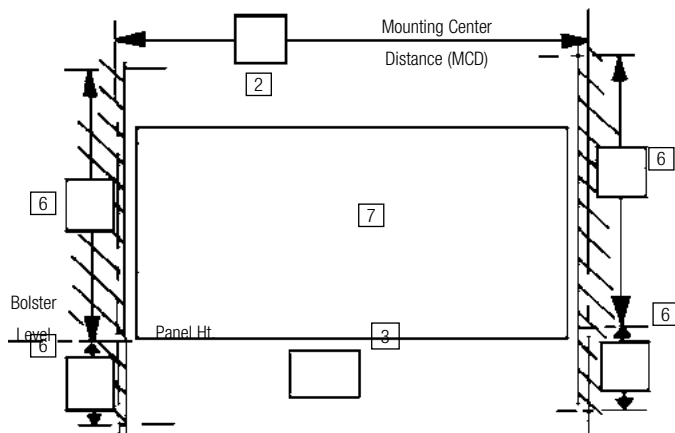
If **Extended Hinged Mounts** are used, the mounting center distance will be approximately 3" greater than the overall panel length.

## MEASURING INSTRUCTIONS

This single-panel Model XL1 or double panel Model XL2 measurement form includes drawings of mounting situations. By entering dimensions and selecting the appropriate mounts, the barrier guard will mount easily to the machine.

1. Fill in the complete heading as indicated above.
2. Enter the MCD (mounting center distance).
3. Enter height and panel frame construction.
4. Enter panel construction for nonadjustable area.
5. Select appropriate mounts and check box(es) provided.  
*If extended mounts are selected, check the distance the panel must be out from the mounting surface. Hollow studs will accommodate up to 7 inches.*
6. Enter appropriate location of all mounts, especially if above and below the panel.
7. Enter panel segment location in panel (if applicable) and select type of segment.
8. Check type of electrical interlock switch, if any.

Identify, dimension and locate desired panel segments or panel cutouts, if required, by sketching on blank panel drawing below.



Note: If the guard will be divided into two hinged and latched panels, indicate above so the proper XL2 barrier guard is furnished.

## 3. Panel Frame Construction (select one)

- ☐ Nonadjustable (NAP) ☐ Adjustable (Full Frame)AP4  
☐ Adjustable (1/2 Frame) AP1 ☐ Adjustable (Full Frame)AP5  
☐ Adjustable (3/8 Frame) AP2 ☐ Adjustable (Inclinable) API  
☐ Adjustable (3/4 Frame) AP3

## 4. Nonadjustable Area Construction (select one)

- ☐ 1/2" Black Mesh ☐ 1/2" Yellow Mesh ☐ Polycarbonate  
☐ 1" Black Mesh ☐ 1" Yellow Mesh

## 5. Mounts and Connectors

Select and enter the appropriate information

- ☐ Direct Frame Mount (DFM)  
☐ Inside Frame Mount (IFM)  
☐ Hollow Studs (check one) 3" ☐ 5" ☐ 7" ☐  
☐ Hinged Mounts (HM): (*plus either DFM, IFM, or EM*)  
☐ Hinged Right (HR) ☐ Hinged Left (HL)

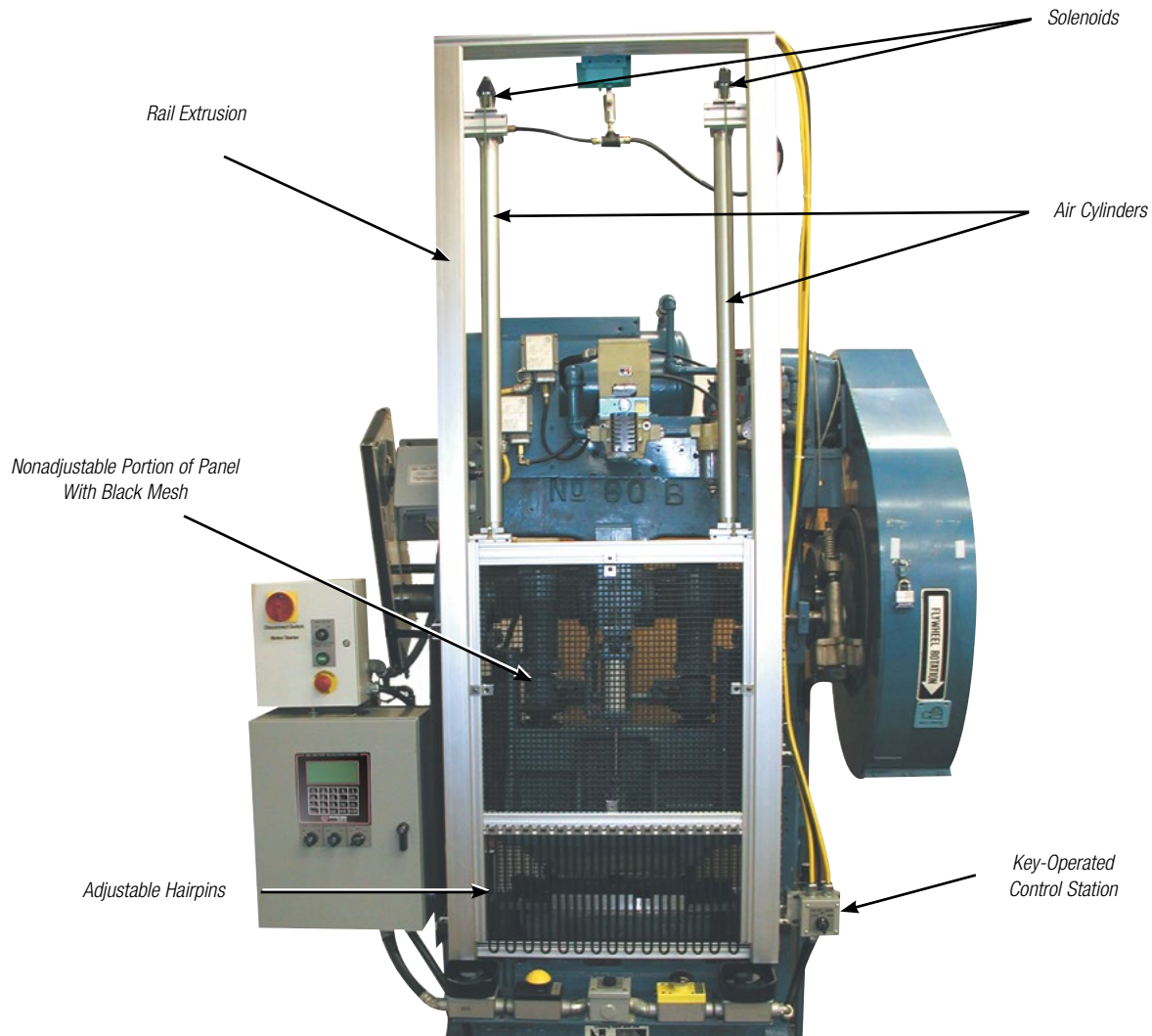
## 7. Panel Segment Type

- ☐ Feeding (FS) ☐ Polycarbonate (PCS)  
☐ Adjustable (AS) ☐ Empty (ES)

## 8. Electrical Interlock Switch and Bracket

- ☐ Locking ☐ Nonlocking ☐ None

## SPRING LIFT XL1 SL OR AIR LIFT XL1 AL



**Air-Lift Guard XL1 AL on a Power Press With 1/2" Square Black Mesh and Hairpins**

Lift-type guards, either spring lift or air lift, can be furnished on machines where guards need to be quickly and easily positioned up out of the way for die setup and maintenance. These lift-type guards are custom designed for each application to meet the requirements of OSHA (Occupational Safety and Health Administration) and ANSI (American National Standards Institute) safety standards.

These barrier guards are available with non-adjustable panels (NAP), or a variety of adjustable panels (AP3, AP4, AP5, and API). Various panel segments can be located in the nonadjustable area of the panel to meet specific requirements. Panels with adjustable hairpins do not have panel segments unless the operator requires visibility into the point of operation. The lift-type barrier guards are attached to the machine by mounting the rails directly to the machine frame.

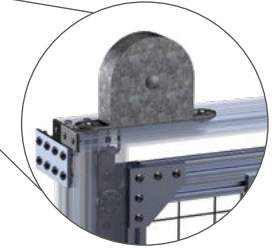
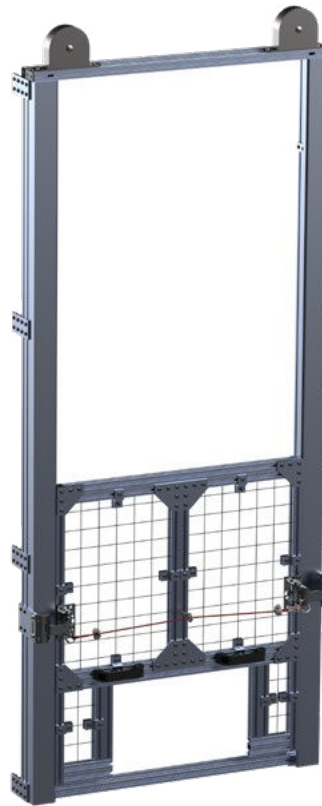
Usually, the panel framework of the guard is constructed of a rail and carriage assembly. The nonadjustable portion of the panel can be furnished with black or yellow mesh (1/2" sq. 16-gauge or 1" sq. 12-gauge), or 3/16"-thick clear polycarbonate. A panel can be furnished with adjustable steel hairpins. The hairpins provide adjustability for strip or coil feeding, or for obstructions on the machine. The adjustable hairpins are secured to the panel frame with clips, T-nuts and socket-head cap screws.

This style of guard can also be furnished for horizontal operation rather than vertical operation as illustrated. Please contact the factory for details on horizontal applications.



## SPRING LIFT XL1 SL OR AIR LIFT XL1 AL (CONTINUED)

**Spring-Lift Guard XL1 SL With ½" Square Black Mesh, Hairpins, and Polycarbonate Hinged Segment**



*Mechanical Motor Spring Helps Counterbalance the Spring-Lift Guard*

The spring-lift and air-lift guards are usually applied to a machine that has straight vertical sides with a point of operation that needs to be guarded. The mechanical motor springs on the spring-lift guard provide a counterbalance for the weight of the guard. This allows the guard to move upward from the guarded position to access the point of operation.



**Part No. LLD240**  
**Key-Operated Selector Switch**  
**Station for Air-Lift Guard**  
(Included in Air-Lift Assembly)

The air-lift guard is usually applied to larger machines. With this system, the guards are raised and lowered by air cylinders (2) and operating cables that are attached to the guard.

A separate key-operated selector switch station controls the movement of the guard. This selector switch operates a solenoid which controls the air cylinders. The solenoid has a built-in check valve to keep the guard from dropping if air pressure is lost.



The spring-lift and air-lift guards are not designed for manual feeding operations. For manual feeding operations using gates, please consult the factory.

MOTOR SPRING*	
PART NO.	LIFT CAPACITY
FKT673	20 LB
FKT674	30 LB
FKT675	40 LB
FKT676	50 LB

AIR CYLINDER		
PART NO.	DESCRIPTION	LIFT CAPACITY
FKT795	24" Lift Air Cylinder	174 lb
FKT796	36" Lift Air Cylinder	174 lb
FKT797	48" Lift Air Cylinder	174 lb

\*Different springs are available in sets of two or four to accommodate a variety of panel weights (a minimum of two springs required for each panel). Please consult the factory.

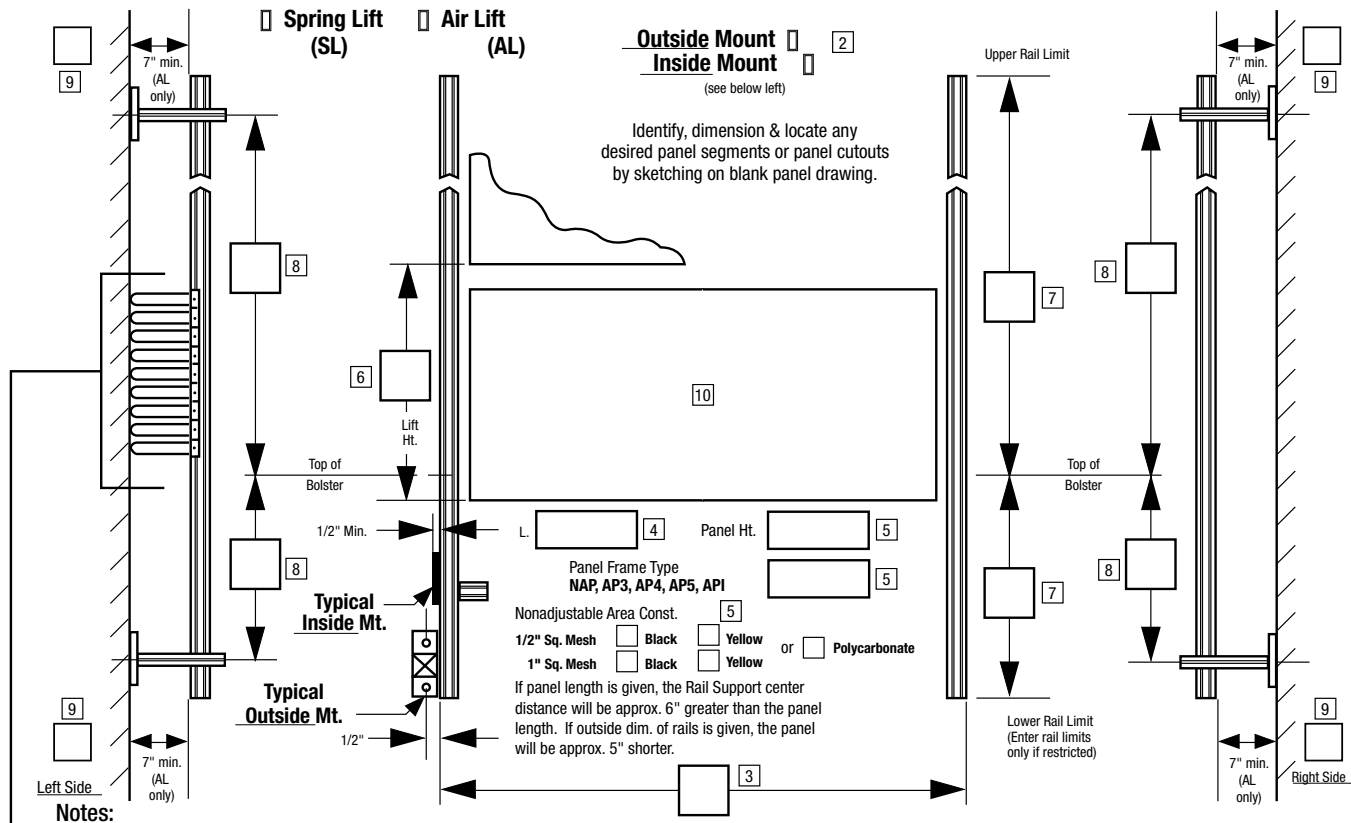
## MEASUREMENT FORM FOR SPRING-LIFT MODEL XL1 SL AND AIR-LIFT MODEL XL1 AL



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If more than one machine is to be measured, please make copies of this page.

Company \_\_\_\_\_ Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
Attention \_\_\_\_\_ Rep. \_\_\_\_\_  
Machine Mfr. and Model No. \_\_\_\_\_ Machine No. \_\_\_\_\_  
Measured By: \_\_\_\_\_



☐ Spring Lift (SL)    ☐ Air Lift (AL)

**Outside Mount** ☐ **Inside Mount** ☐ (see below left)

Identify, dimension & locate any desired panel segments or panel cutouts by sketching on blank panel drawing.

Top of Bolster

Lift Ht.

1/2" Min.

Panel Frame Type  
NAP, AP3, AP4, AP5, API

Nonadjustable Area Const.

1/2" Sq. Mesh ☐ Black ☐ Yellow or ☐ Polycarbonate  
1" Sq. Mesh ☐ Black ☐ Yellow

If panel length is given, the Rail Support center distance will be approx. 6" greater than the panel length. If outside dim. of rails is given, the panel will be approx. 5" shorter.

Upper Rail Limit

Lower Rail Limit (Enter rail limits only if restricted)

Left Side

Right Side

Notes:

**SIDE GUARDS:**

H	L
Left Side	Right Side

**ELECTRICAL INTERLOCK**

☐ Locking  
☐ Nonlocking  
☐ None

### MEASURING INSTRUCTIONS

The lift guard measurement form is designed to be used for the XL1 SL and XL1 AL guards.

- Fill in the complete heading as indicated.
- Check whether an **Outside** or **Inside** mount is required. (See lower left side of front view drawing for examples.)
- Enter outside rail dimension;  
**or**
- Enter panel length. If outside rail dimension is specified, it will dictate the panel length and vice versa. (See note.)
- Enter panel height, frame type, and construction of nonadjustable area.

- Enter lift height. This will usually be the same as panel height.
- Enter upper and lower rail limits, if any.
- If outside mounted, enter the appropriate location of upper and lower mounting point for each rail. These dimensions plus the panel height and lift height will help determine the length of the rails.
- Enter the desired length of the four rail supports. Allow for any obstructions (7" min. for air lift only).
- Enter dimensions and information for panel segments and/or side guards as required.
- Check type of electrical interlock switch, if any.

## INTRODUCTION TO PERIMETER GUARDING SYSTEMS

Perimeter safeguarding is used in numerous applications in manufacturing: around robots and robot systems, assembly machines, packaging machines, transfer lines, cut-to-length lines, slitting lines, etc. It is also applied in a diverse number of industries such as printing, bottling, food processing, textiles, and petroleum products.

When safeguarding the perimeter area around a machine or process, the safeguarding must prevent access to the hazard or cause the hazard to cease. To protect individuals that work in or around large work areas, several choices of primary safeguarding are available under these categories:

1. **Barrier guards** are physical barriers that prevent access to the hazard.
2. **Presence-sensing devices**, such as light curtains, single- or multiple-beam devices, area scanners, radio-frequency devices, and pressure-sensitive mats, detect the presence of a person and stop the hazardous motion of the robot or machine.
3. **Hostage controls** can be applied where an application requires that a control be held actuated while the machine is running. Two-hand controls, or a single-hand or foot control, can be used for this. A hostage control must be fixed in position at the proper safety distance to keep the operator at a safe distance from the hazard. However, hostage controls only protect the individuals using them, so other safeguarding must be provided for other personnel that are exposed to the hazard.

Additional supplemental safeguarding can be applied with the use of awareness barriers, awareness signals (audible or visual), warning signs, and color-coding. Safety procedures and personal protective equipment can also play a role in protecting individuals.

Risk assessment and hazard analysis should be done before applying safeguards to a perimeter application. First, identify the hazards; second, identify the risk that individuals will be exposed to around the machine and equipment. Lastly, decisions must be made as to what tolerable risk remains when running production, setting up, and maintaining the machine and equipment.

Two safety standards in North America are usually referenced when applying perimeter safeguarding:

1. ANSI/RIA\* R15.06-1999, *American National Standard for Industrial Robots and Robot Systems—Safety Requirements*
2. CSA† Z434-03, *Industrial Robots and Robot Systems—General Safety Requirements*.

Both standards require that safeguards are designed, constructed, attached, and maintained so that personnel cannot reach over, under, around, or through the guard or device undetected and reach the hazard.

Barrier guards must prevent access to a hazard. They must be constructed with materials (such as steel or aluminum) that will hold up to the environment and application, and must not themselves create a hazard.

If openings are needed in a guard, the openings must comply with the guard-opening table in the standards. Any fixed portion of a guard must require the use of tools to be adjusted or removed. If the possibility

exists that some object, workpiece, etc., can be ejected from the hazard area, the barrier guard must contain these objects.

The requirements for barrier guards are the same in both the ANSI/RIA and CSA standards. The only difference is in the minimum height requirements of the bottom and top of the guard above adjacent walking surfaces.

ANSI/RIA R15.06 requires that the bottom of the guard be no more than 12 inches above adjacent walking surfaces and that the top of the guard be no lower than 60 inches above adjacent walking surfaces unless additional safeguarding devices are installed to prevent or detect access to the hazard.

CSA Z434 has the same language except the dimensions are 6 inches for the bottom of the guard and 72 inches for the top of the guard above adjacent walking surfaces.

When barrier guards have interlocked sections, each section must provide two sets of contacts unless the risk assessment determines one set of contacts is acceptable. If magnetic switches are used, they must be magnetically coded to reduce the possibility of defeat or interference. Switches designed with a positive opening operation must be mounted in a positive mode so that when the actuator is disengaged, the motion forces a nonresilient linkage to open the closed contact(s) tied in to the safety-stop circuit.

Switches other than positive-opening switches must be automatically monitored to detect faults with the switches or their installation. The interlocking device must not be used as an end-of-travel stop. It must be tamper-resistant and unable to be defeated without tools, and it must be capable of being easily unlocked from the inside of the safeguarded area with or without power available (when the possibility of full body access exists). The device must be interfaced to the safety-stop circuit so that the robot or machine cannot be placed in automatic operation until the interlocked guard is closed. When the guard is opened, a stop signal must be given by the device, and closing of the guard must not, by itself, restart automatic operation—automatic operation must require a deliberate action outside the safeguarded area.

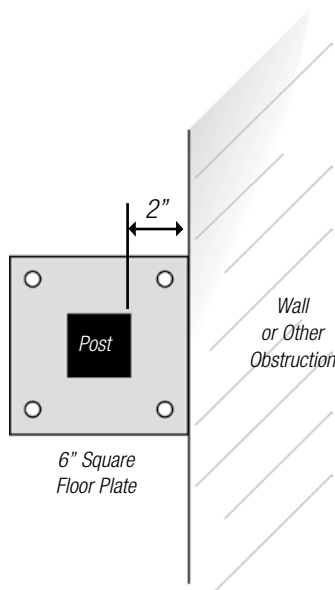
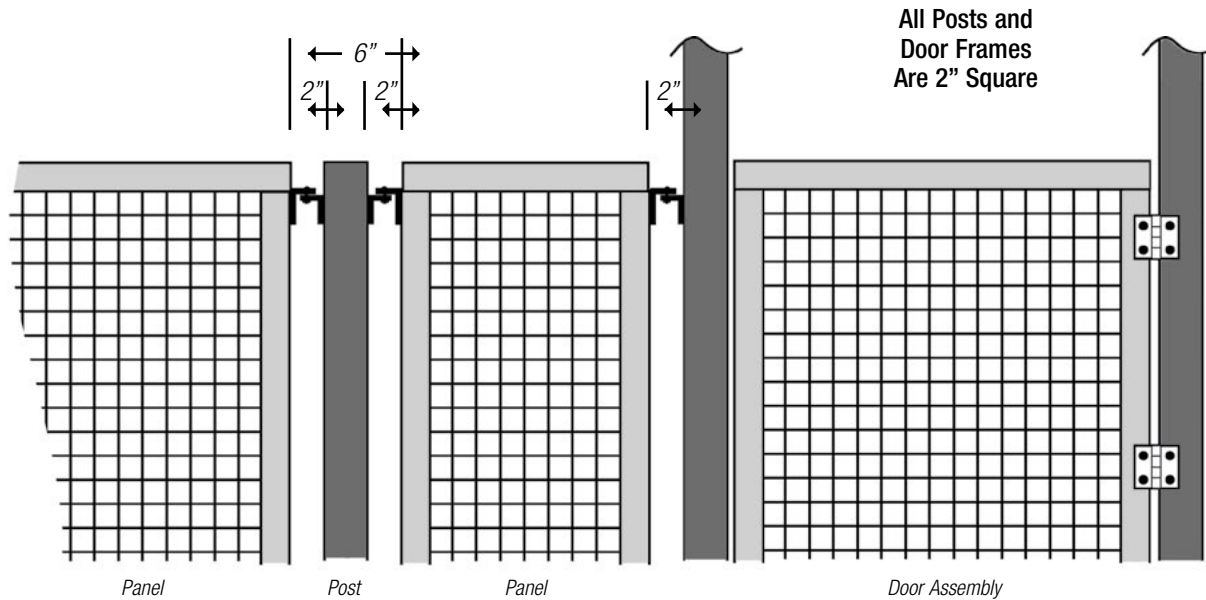
To ensure that an individual is out of the hazard area so that automatic operation cannot be accidentally restarted by someone else, the interlocking system should require a key, password or security code from that individual before permitting restart. For special interlock controls, please consult the factory for details.

\*American National Standards Institute/Robotic Industries Association

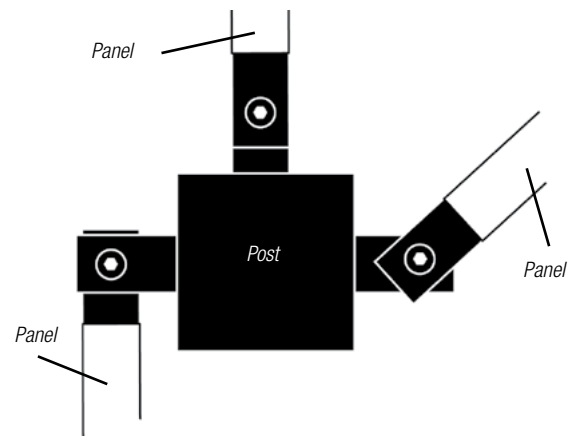
†Canadian Standards Association

## MEASURING PERIMETER GUARDS

The aluminum perimeter guarding systems offered in this catalog consist of aluminum panels and posts. The mounting hardware and distances between components are shown below. Please refer to the following drawings when measuring.



The standard panels are furnished in widths of 18", 24", 30", and 36". Standard doors are either 30" or 36" wide. Special panels and doors are available upon request; please consult the factory.



The L-shaped panel-to-post connector shown on page 26 will allow the panel to be positioned anywhere within 180° of the post. This allows the panel to be at an angle from the post, which makes installation easy at corners.



## ALUMINUM PANELS, DOORS AND POSTS



The outside door frame is constructed of 2" square aluminum with two T-slots on each side. The frame sits in the same foot described above and the door posts are fastened together at the top for stability. The height under the door frame is 84".

The door is constructed of a 1" x 2" aluminum frame. The center portion is available in 1" or 2" square black mesh, 1" square yellow mesh, or  $\frac{3}{16}$ "-thick clear polycarbonate. Special doors and center material are available upon request.

The aluminum posts are constructed of 2" square aluminum with two T-slots on each side. The standard posts are 60" or 72" high. Special-height posts are available upon request.

The foot for the post is 6" square with four holes on 4½" centers. The foot is constructed of steel.

For more information about our customized perimeter guarding systems, please contact a machine safeguarding specialist.

The aluminum panels are constructed of 1" square aluminum frames with a T-slot on all four sides. The material in the center portion of the panel can be 1" or 2" square black mesh, 1" square yellow mesh, or  $\frac{3}{16}$ "-thick clear polycarbonate.

The mesh is held in the frame with clamps and the polycarbonate is held in place with a rubber gasket.

The standard panels are furnished in widths of 18", 24", 30", and 36". Standard heights are 48" (60" height from the floor) and 66" (72" height from the floor). This provides a 6" sweep under the 66" high panel and a 6" sweep under the 72" high panel. Other center materials and special-size panels are available upon request.



## HARDWARE

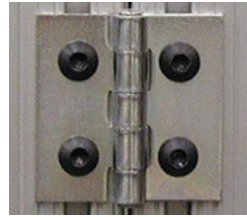
### PANEL-TO-POST CONNECTOR



**Part No. STL013 Panel-to-Post Connector**

The connector assembly for attaching a panel to a post consists of two right-angle steel brackets. One bracket has an elongated slot and the other has a tapped hole. A fastener with nut is included.

### HINGE FOR ALUMINUM DOOR



**Part No. FKT584 Hinge**

This steel hinge measures 2" x 2".  
Four hinges are furnished on each door.

### DOOR STOP FOR ALUMINUM DOOR



**Part No. FKT595 Door Stop**

The door stop is made of aluminum.  
Two are furnished for each door.

## INTERLOCKING DOOR BOLTS



Closed



Open

Interlocking door bolts are made of steel and aluminum components. The sliding type slides back and forth to latch the door closed and provides a guide for the interlock switch. The back side of the assembly has a knob to slide the bolt open if someone is inside the guard and the bolt is latched. It is available for both hinged and lift-off doors. The fixed type is available for sliding doors. Special latch hardware for other interlock switches is available upon request.

*Note: These interlocking door bolts do not include a safety interlock switch.*

For use with Safety Switches 6025060, 6022580, 6025067, and 6025073

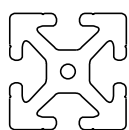
NO.	DESCRIPTION
SL20L	Sliding Type for a Hinged-Left or Lift-Off Door
SL20R	Sliding Type for a Hinged-Right or Lift-Off Door
FKT1019	Fixed Type for a Sliding Door that Opens Left to Right
FKT1020	Fixed Type for a Sliding Door that Opens Right to Left

## EXTRUSIONS

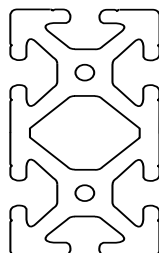
This page illustrates cross sections of the various extruded aluminum sizes that are available. Most of the guards and barriers offered in this catalog use the 1" square, 1" x 2", 1½" square, or 2" square sizes. Larger sizes are available for guards, fixtures, mounting brackets, machine bases, furniture, or anything that requires this type of material for its design and construction. Extrusions are in stock in 12-foot lengths; however, longer lengths are available up to 20 feet. The extrusions are made of strong, lightweight 6105-T5, clear anodized, #204-R1 aluminum.

### MATERIAL SPECIFICATIONS

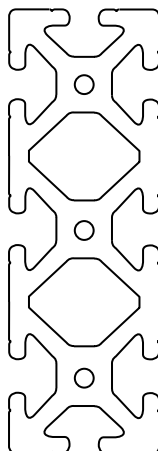
- Yield strength 35,000 lb/in<sup>2</sup> minimum
- Tensile strength 38,000 lb/in<sup>2</sup> minimum
- Elongation A5 minimum 10%
- Elongation A10 minimum 8%
- Rockwell hardness approximately E-88
- Extrusion conforming to DIN 17 615 specifications
- Twist per foot of length not to exceed .25 degree and total twist over 20 feet of length not to exceed 1.5 degrees
- Flatness .004" per inch of width
- Straightness 0.0125" per foot of length, not to exceed .120" over 20 feet of length
- All extrusions have etch and clear (204-R1) anodizing with depth of .004" and surface hardness of approximately 250 HV



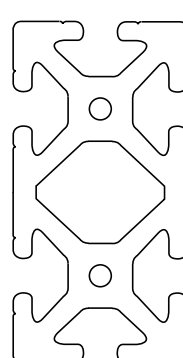
Part No. EXT1010  
(per inch)  
Part No. FKT1036  
(per 12' length)  
1" x 1"



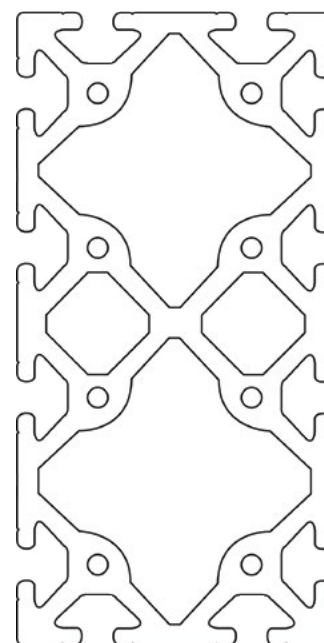
Part No. EXT1020  
(per inch)  
Part No. FKT1037  
(per 12' length)  
1" x 2"



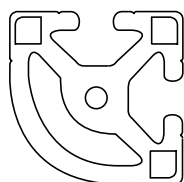
Part No. EXT1030  
1" x 3"



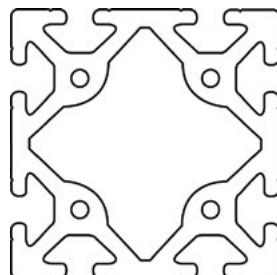
Part No. EXT1530  
1½" x 3"



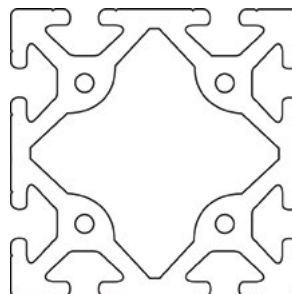
Part No. EXT3060  
3" x 6"



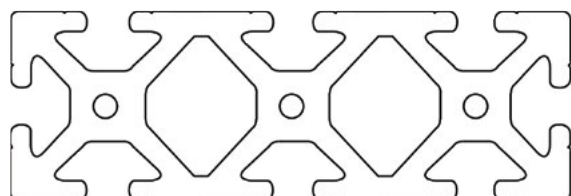
Part No. FKT537  
1½" x Quarter Round



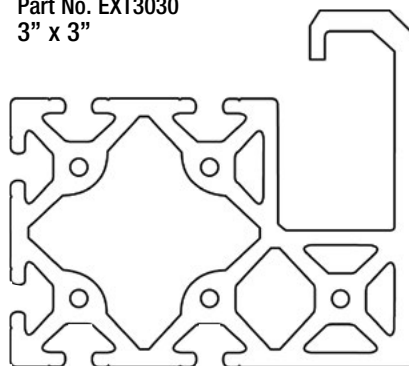
Part No. EXT2020  
(per inch)  
Part No. FKT1038  
(per 12' length)  
2" x 2"



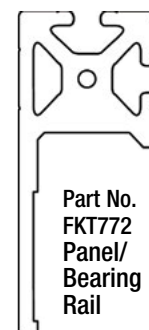
Part No. EXT3030  
3" x 3"



Part No. EXT1545  
1½" x 4½"



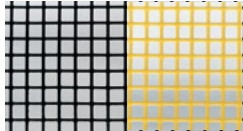
Part No. FKT773  
Rail Extrusion



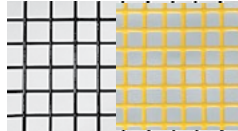
Part No.  
FKT772  
Panel/  
Bearing  
Rail

## MESH

The nonadjustable area of a panel can be constructed of black or yellow mesh (1/2" square 16 gauge, 1" square 12-gauge, or 2" square 16-gauge). Usually, the 1/2" square mesh is used for point-of-operation guards and the 1" or 2" square mesh is used for large work envelope (perimeter) safeguarding. The mesh is made of PVC-coated carbon steel which is rust resistant. Black mesh provides better visibility into the point of operation. Mesh can be ordered in any size up to 48 x 96 inches. Please provide dimensions when ordering.



**1/2" Square**  
Black or Yellow Mesh



**1" Square**  
Black or Yellow Mesh



**2" Square**  
Black Mesh

### ORDERING INFORMATION

PART NO.	DESCRIPTION	SIZE
MSHPVC12BLK	Black 1/2" square	Per in <sup>2</sup>
FKT1049	Black 1/2" square	Per 4' x 8'
MSHPVC1BLK	Black 1" square	Per in <sup>2</sup>
FKT1031	Black 1" square	Per 4' x 8'
MSHPVC2BLK	Black 2" square	Per in <sup>2</sup>
FKT1033	Black 2" square	Per 4' x 8'
MSHPVC12YEL	Yellow 1/2" square	Per in <sup>2</sup>
FKT1050	Yellow 1/2" square	Per 4' x 8'
MSHPVC1YEL	Yellow 1" square	Per in <sup>2</sup>
FKT1032	Yellow 1" square	Per 4' x 8'

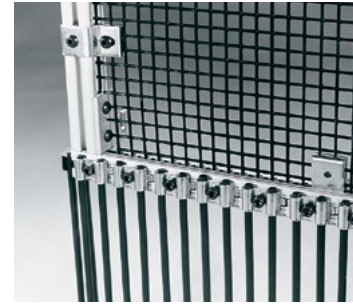
## PANEL RETAINER

PART NO. FKT560

The panel retainer holds mesh in the extruded-aluminum framework of the guard. This retainer prevents panel push out and is the strongest way to hold panels in place.

*Front View of Panel Retainer*

*Rear View of Panel Retainer*



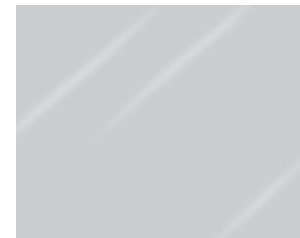
## POLYCARBONATE

PART NO. SHTPLYCLR177 (PER SQ. INCH)

PART NO. FKT1035 (4' X 8')

The nonadjustable area of a panel can be constructed of clear polycarbonate. Polycarbonate is ideal when high visibility is required. It is also useful for containing chips, sparks, and coolant.

The polycarbonate is 3/16"-thick and can be mounted in extruded-aluminum frames with rubber gaskets (see below). Please provide dimensions when ordering; sizes available up to 48 x 96 inches.



**3/16"-Thick Polycarbonate**

## RUBBER GASKET FOR POLYCARBONATE PANEL

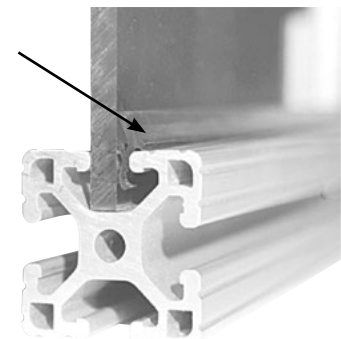
PART NO. GSKT10

The rubber gasket tightly holds the polycarbonate panels in the T-slot of the extruded aluminum. This gasket is made of high-grip rubber and is easily inserted into the T-slot after the panel is assembled in the frame. Polycarbonate panels (3/16"-thick) are secured with the gasket on one side of the panel. The gasket material can be ordered by the inch.



**Rubber Gasket**

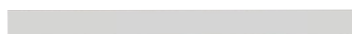
*Gasket Shown  
Inserted Into  
T-Slot With  
Polycarbonate  
Panel*



## T-SLOT COVERS

These T-slot covers snap into the T-slots of the extruded aluminum. They keep dust and dirt out and wires in place.

FKT726  
Gray T-Slot Cover



FKT839  
Yellow T-Slot Cover



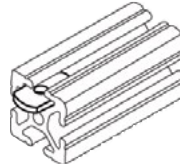


## T-NUTS

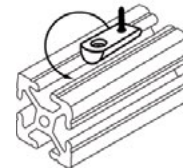
T-nuts allow joining plates, panels, hinges and other accessories to be bolted into the T-slot of any of the extrusions. They are made of hardened steel and are coated with corrosion-resistant black oxide. Standard T-nuts slide into the T-slot from the end.

The drop-in style allows the T-nut to be dropped into the slot after the extrusions have already been fastened together. T-nuts are usually fastened to button-head cap screws.

ORDERING INFORMATION	
PART NO.	DESCRIPTION
FSY028	End-Load T-nut
FST586	Drop-In Style T-nut
FSC072	Button-Head Cap Screw (1/4-20 x 1/2")



End-Load T-nut



Drop-In-Style T-nut



Button-Head  
Cap Screw

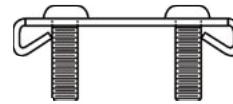
## END FASTENERS

The end fastener provides a concealed method for connecting extrusions at 90° without external joining plates. The end fastener creates a tight, square joint. These fasteners consist of a stamping that aligns the T-slots and a button-head cap screw that threads into the tapped extrusion end. The end fastener is ideal for tight space restrictions. When loosened, connected extrusions glide smoothly over end fasteners. When connecting extrusions, 1/4" drilled access holes are required to allow a hex wrench to reach the button-head cap screws. Access holes are drilled 1/2" from the end of the extrusion. Additional holes are drilled at 1" centers from the first hole.

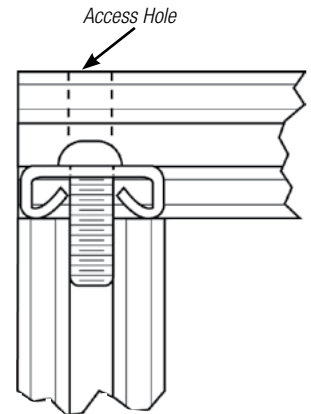
ORDERING INFORMATION	
PART NO.	DESCRIPTION
FKT562	End Fastener
FKT613	Double End Fastener
FSC072	Button-Head Cap Screw (1/4-20 x 1/2")



Part No. FKT562 End  
Fastener With Button-  
Head Screw for 1"  
Square Extrusions



Part No. FKT613 Double  
End Fastener With Button-  
Head Screw for 1" x 2"  
and 2" x 2" Extrusions



Cross Section of End Fastener  
Connecting Extrusions at 90°

## HAIRPINS AND FASTENERS



The adjustable area of a panel consists of individual black-oxidized steel hairpins. These hairpins are 1/4" round rods on 3/4" centers (1" wide from outside to outside) which create a 1/2" opening between hairpins. Hairpins provide adjustability of the guard for going around conveyors, chutes, or other obstructions on the machine or robot.

The clip that secures the hairpin in place uses 1" of the total hairpin length, and the rounded tip uses 1/2". For this reason, add 1 1/2" to the adjustability required on the hairpin to obtain the proper hairpin length. Example: An 11" hairpin will have 9 1/2" of adjustability; a 20" hairpin will have 18 1/2" of adjustability, etc.

Part No. FKT753 Hairpin Clip  
Assembly



### Clips and Fasteners

Each hairpin is secured to the panel frame with one clip, one socket-head cap screw, and one T-nut.

## HAIRPINS AND FASTENERS (CONTINUED)

ORDERING INFORMATION					
LENGTH	PART NO.	LENGTH	PART NO.	LENGTH	PART NO.
3"	HP030	13"	HP130	22"	HP220
4"	HP040	14"	HP140	23"	HP230
5"	HP050	15"	HP150	24"	HP240
6"	HP060	16"	HP160	25"	HP250
7"	HP070	17"	HP170	26"	HP260
8"	HP080	18"	HP180	27"	HP270
9"	HP090	19"	HP190	28"	HP280
10"	HP100	20"	HP200	29"	HP290
11"	HP110	21"	HP210	30"	HP300
12"	HP120				

## ROLLER BEARING ASSEMBLY

PART NO. FKT837

The roller bearing assembly is used on the spring- and air-lift guards shown on pages 20 and 21 of this catalog, and on gate assemblies. These bearings are available for guiding guards up and down or back and forth. The roller bearing assembly consists of a roller bearing, bearing plate, collar, and necessary hardware.



Roller Bearing  
Assembly



Roller Bearing  
Entering Extrusion

## HINGES

PART NO. FKT687 (STANDARD)

PART NO. FKT671 (LIFT-OFF RIGHT)

PART NO. FKT670 (LIFT-OFF LEFT)

Hinges are used to swing guard panels and segments to the right or left. They are attached to the aluminum extrusion anywhere along the T-slot with button-head or socket-head cap screws and T-nuts (furnished). Standard aluminum hinges and lift-off hinges are available.



Part No. FKT671  
Lift-Off Assembly (Right)  
Part No. FKT670  
Lift-Off Assembly (Left)



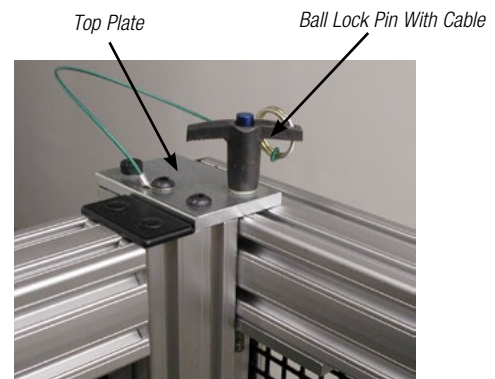
Part No. FKT687 One  
(1) Standard Hinge  
With Fasteners

*Note: Both lift-off assemblies consist of five hinge parts plus fasteners.*

## SWING-AWAY HINGE ASSEMBLY

PART NO. FKT655

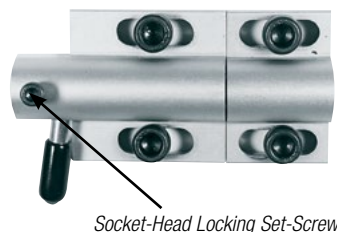
This specially designed hinge assembly is used on the light curtain swing-away mounting brackets. The assembly consists of two plates with fasteners for the top and bottom of the swing-away bracket. The top plate has a ball lock pin that holds the side guard in position. These hinges are designed to allow the side panel to move forward or backward for light curtain safety distance adjustment. Please use **Part No. FKT655** for ordering one right or left swing-away hinge assembly.



## DEADBOLT LATCH

PART NO. FKT620

A deadbolt latch is ideal for holding guard doors closed. This spring-loaded deadbolt is made of anodized aluminum. A socket-head locking set-screw located towards the end of the latch requires the use of a tool to open the guard. This feature complies with OSHA 29 CFR 1910.217 (c)(2)(d). This deadbolt with side latch includes all mounting hardware.



## DOOR HANDLE

PART NO. TXS101

This plastic door handle is ideal for T-slot frame doors on guards or shields. Handles bolt directly to doors and panels using two 1/4-20 screws and two T-nuts (sold separately, see chart). The handle is made of high-strength black polycarbonate and is corrosion resistant.



ORDERING INFORMATION	
PART NO.	DESCRIPTION
TXS101	Door Handle
FSC072	1/4-20 x 1/2" Screw
FSY028	T-Nut

## END CAPS

End caps are made of black high-impact styrene. They fit easily onto the end of extrusions to present a finished look. Push in fasteners (sold separately) are used to secure the end caps to the extrusion. Other sizes are available—please consult the factory.



ORDERING INFORMATION	
PART NO.	DESCRIPTION
FKT615	1" x 1" End Cap
FKT600	1" x 2" End Cap
FKT551	2" x 2" End Cap
FKT653	Push-In Fastener

## T-HANDLE HEX WRENCHES

The T-handle hex wrench is an ideal way to tighten and loosen button-head cap screws and socket-head cap screws. The handle has a cushion grip and the long arm provides access to hard to reach areas. The end of the hex wrench is ball-shaped which allows for angle entry up to 25°. Two sizes are available.

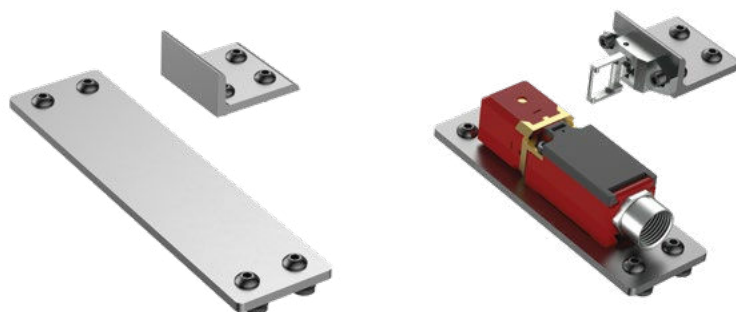


ORDERING INFORMATION	
PART NO.	DESCRIPTION
FKT658	3/16" Hex Wrench
FKT657	5/32" Hex Wrench

## BRACKETS FOR INTERLOCK SWITCHES

EXAL0016 is a universal kit for mounting interlock switches to extrusions and latch assemblies, using aluminum plate and angle. Drilling and tapping for the switch components is required.

For switch-specific mounting kits or switch selection for a specific application, contact Rockford Systems at 1-800-922-7533 or email [customerservice@rockfordsystems.com](mailto:customerservice@rockfordsystems.com).



Universal Interlock Switch Mounting Bracket Kit  
EXAL0016

## BRACKETS AND PLATES

A variety of brackets, plates, clamps, bolts, bearings, rollers, etc., are available for attaching guards to machines and for guard assemblies. Joining plates are used to connect extruded panels without additional machining.



Part No. FKT560  
Mesh Clamp Assembly



Part No. FKT604  
1" Mesh Clamp



Part No. FKT647  
2" Mesh Clamp



Part No. FKT562  
Single End Fastener



Part No. FKT613  
Double End Fastener



Part No. FKT586  
1/4-20 Drop-In T-Nut



Part No. FKT587  
1/4-20 Drop-In T-Nut W/Set Screw



Part No. FKT630  
Channel Guide



Part No. FKT589  
Roller Wheel



Part No. FKT837  
Roller Bearing Assembly



Part No. FKT636  
Linear Bearing



Part No. FKT649  
Double-Wide Linear Bearing



Part No. FSY028  
1/4-20 Standard T-Nut



Part No. FKT753  
Hairpin Clip Assembly



Part No. FKT754  
End Cap for Hairpins



Part No. FKT558  
90° SAB Hinge Nub



Part No. FKT606  
180° Living Nub



Part No. FKT555  
L-Bracket W/Brass Insert



Part No. FKT559  
Flat Pivot Arm W/Brass Insert



Part No. FKT656  
Inside Bayonet Connector



Part No. FKT591  
Locking Plate



Part No. FKT654  
SAB Top Locking Plate



## BRACKETS AND PLATES (CONTINUED)



Part No. FKT563  
Bayonet Plate



Part No. FKT572  
Joining Strip



Part No. FKT588  
Joining Strip



Part No. FKT573  
Joining Plate



Part No. FKT574  
Joining Plate



Part No. FKT645  
8-Hole Flat Joining Bracket



Part No. FKT554  
90° Joining Plate



Part No. FKT575  
90° Joining Plate



Part No. FKT576  
90° Joining Plate



Part No. FKT577  
Tee Joining Plate



Part No. FKT578  
Tee Joining Plate



Part No. FKT596  
Inside Corner Bracket



Part No. FKT597  
Slotted Corner Bracket



Part No. FKT598  
Single Floor-Mount Bracket



Part No. FKT557  
Double Floor-Mount Bracket



Part No. FKT607  
3/16" Inside Corner Bracket



Part No. FKT642  
Inside Corner Bracket



Part No. FKT561  
Inside Corner Bracket



Part No. FKT619  
Inside Corner Bracket



Part No. FKT700  
SSA Mounting Bracket



Part No. FKT616  
Inside Corner Gusset



Part No. FKT631  
90° Rotating Corner Bracket (Left)



Part No. FKT632  
90° Rotating Corner Bracket (Right)



Part No. FKT691  
45° Heavy-Duty Bracket



Part No. FKT1021  
Ball Lock Pin With Cable

## FLOOR STAND PART NO. KTR077

When light bars (transmitter or receiver) cannot be conveniently mounted to the machine, a floor stand can be furnished. Floor stands can also be used when safeguarding large work envelopes or perimeter areas. Mirrors or single-beam devices can be attached to the floor stand when the application requires multiple-sided safeguarding. Light bars, single-beam devices, or mirrors can easily be adjusted up or down on any side of the upright extruded-aluminum stand.

This floor stand assembly consists of a 6' length of 2" square extruded aluminum, one base, and two right-angle brackets with fasteners. The base has four holes for permanent attachment to the floor with bolts (not furnished). Other floor stand sizes are available. Please consult the factory.



Floor Stand With Light  
Curtain Transmitter

## CONTROL BOX STANDS

When a control box cannot be conveniently mounted to the machine or the machine has excess vibration, rigid and adjustable control box stands are available. These stands are made of extruded aluminum and have base plates to permanently attach to the floor with bolts (not furnished).

Adjustable stands are available in models with height adjustment, and are also available in models with tilt adjustment for operator comfort.

ORDERING INFORMATION	
PART NO.	DESCRIPTION
KCL017	Vertical Adjustable Stand
KCL062	24" Wide Control Box Stand
KCL063	36" Wide Control Box Stand



Vertical Adjustable Stand



Tilt Adjustable Stand\*

*\*Consult the factory for custom tilt stands.*



Control Box Stand With Control Box  
and Combination Starter/Disconnect

## FUNCTION-TESTING CHECKLIST FOR PERIMETER BARRIER GUARDS



This is a generic function-testing checklist. Your barrier guard may have other features that require different tests. Please refer to your barrier guard installation manual.



If the barrier guard is interlocked, make sure that the interlock device has been interfaced properly to the machine's control system to provide control reliability (if required, based on the risk assessment).

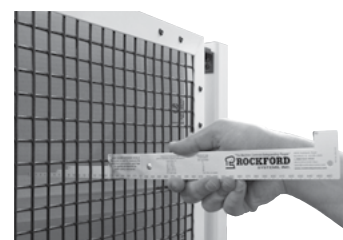
### **⚠ DANGER**

**Never** place your hands or any part of your body in the hazard area while performing these tests.



**Always** perform these tests at every setup, operator, and shift change, as well as every time after maintenance is performed.

1. Make sure that the barrier guard is designed and constructed so that someone cannot reach over, under, around, or through the barrier guard and reach the hazard. Additional guards or safeguarding devices must protect all areas not protected by the barrier guard.
2. If there are openings in the barrier guard, check the openings for compliance with the ANSI/RIA\* and CSA† guard-opening requirements. (See next page.)
3. Verify that the barrier guard is designed and constructed of materials substantial for the application to protect individuals from identified hazards. If the possibility exists that some object, workpiece, etc., can be ejected from the hazard area, confirm that the barrier guard will contain these objects.
4. Make sure that any fixed portion of the barrier guard must require the use of tools to be adjusted or removed.
5. Confirm that the barrier guard is fixed in position.
6. Check that the barrier guard is free of sharp edges and projections that may cause injury to individuals when handling, removing, or using the barrier guard.
7. Make sure that the barrier guard is installed, maintained, and operated such that it does not create any pinch points between itself and moving parts of the machine or robot.
8. Verify that the barrier guard provides adequate visibility to the point of operation, if required, with material such as perforated metal, wire mesh, or transparent polycarbonate. If visibility is provided through perforations or slots, the color of the material should be darker than the area observed to enhance visibility.
9. Check that the bottom of the guard is no more than 12 inches above adjacent walking surfaces and the top of the guard is no lower than 60 inches above adjacent walking surfaces.  
*Note: CSA Z434-03 uses dimensions of 6 inches for the bottom of the guard and 72 inches for the top of the guard.*
10. If the barrier guard has one or more interlocked sections, perform the following tests for each interlocked section.
  - a. Check that the interlocked section opens laterally or away from the hazard, and not into the safeguarded space, and cannot close by itself and activate the interlocking circuitry.
  - b. With the machine on and ready to be cycled in a production mode of operation, open an interlocked section of the barrier guard and attempt to cycle the machine. The machine should not cycle.
  - c. An interlocked section must either (1) prevent opening until hazardous motion has stopped (with a **locking** interlock device), or (2) be located at the proper safety distance so that when it is opened, an individual cannot reach the hazard before hazardous motion has stopped (with a **nonlocking** interlock device).
    - (1) **Locking:** With all interlocked sections of the barrier guard closed while the machine is cycling, attempt to open an interlocked section. The interlocked section should not open. A locking interlocked section must open only when the hazardous motion of the machine has stopped after a normal stop command.
    - (2) **Nonlocking:** With all interlocked sections of the barrier guard closed while the machine is cycling, open an interlocked section. The machine should stop before someone can reach the hazard.



ANSI guard-opening scale being used to check openings for compliance

\*American National Standards Institute/Robotic Industries Association

†Canadian Standards Association

## FUNCTION-TESTING CHECKLIST FOR PERIMETER BARRIER GUARDS (CONTINUED)

- d. Verify that reclosing of an open interlocked section does not, by itself, cause any hazardous motion of the machine. Restarting of the machine must require a deliberate action outside the safeguarded area. To ensure that an individual is out of the hazard area so that automatic operation cannot be accidentally restarted by someone else, the interlocking system should require a key or a unique password or security code from that individual before permitting restart.
- e. Verify that the interlock device will not be adversely affected by the environmental conditions.
- f. Make sure that the interlock device is tamper-resistant and unable to be defeated without tools.
- g. Confirm that the interlock device is not used as an end-of-travel stop for the interlocked section of the barrier guard.
- h. Verify that the interlock device has two sets of contacts (unless the risk assessment determined that one set of contacts was acceptable). If the interlock device is a magnetic switch, make sure that it is magnetically coded to reduce the possibility of defeat or interference. Confirm that if the interlock device is a switch designed with a positive opening operation (cam-operated switching element), it is mounted in a positive mode so that when the actuator is disengaged, the motion forces a linkage to open the closed safety contact(s). If the interlock device is a switch other than a positive-opening switch (magnetic switch, limit switch, etc.), check that it is automatically monitored to detect faults with the switch or its installation.
- i. Confirm that the interlock device is capable of being easily unlocked from the inside of the safeguarded area with or without power available (when the possibility of full body access exists).
- j. Make sure that spare keys and actuating devices are supervisory-controlled and not readily available for the purpose of defeating the safeguard.
11. If any of these function tests fail, take corrective action before running production. If all tests pass, remove all keys from the selector switches before running production.

## ANSI/RIA AND CSA GUARD-OPENING REQUIREMENTS

The minimum distance from the hazard as a function of barrier opening size as required by Table 5 of ANSI/RIA R15.06-1999, *Industrial Robots and Robot Systems—Safety Requirements*, and by Table 5 of CSA Z434-03, *Industrial Robots and Robot Systems—General Safety Requirements*, is as follows:

Barrier Opening Size (Smallest Dimension)		Minimum Distance From Hazard	
mm	inches	Slotted opening	Square opening
0.0–6.0	0.000–0.250	≥ 13.0 mm* [0.5 in]	≥ 13.0 mm* [0.5 in]
6.1–11.0	0.251–0.375	≥ 64.0 mm [2.5 in]	≥ 48 mm [1.9 in]
11.1–16.0	0.376–0.625	≥ 89.0 mm [3.5 in]	≥ 66 mm [2.6 in]
16.1–32.0	0.626–1.250	≥ 166.0 mm [6.5 in]	≥ 166.0 mm [6.5 in]
32.1–49.0	1.251–1.875	≥ 445.0 mm [17.5 in]	≥ 445.0 mm [17.5 in]
49.1–132.0†	1.876–5.000†	≥ 915.0 mm [36.0 in]	≥ 915.0 mm [36.0 in]

\*Barriers shall not be located less than 13.0 mm (0.5 inches) from the hazard.

†Barrier openings shall not be greater than 132.0 mm (5.0 inches) unless a risk assessment is performed.

## SAFETY DISTANCE FOR NONLOCKING INTERLOCKED BARRIER GUARDS

The safety equation for **nonlocking** interlocked barrier guards from Table 6 of ANSI/RIA R15.06-1999, *Industrial Robots and Robot Systems—Safety Requirements*, and from 10.4.3b of CSA Z434-03, *Industrial Robots and Robot Systems—General Safety Requirements*, is as follows:

$$D_s = K(T_s + T_c + T_r)$$

Where:

$D_s$  = safety distance that the interlocked section of the barrier guard must be located from the hazard

$K$  = maximum speed that an individual can approach the hazard (63 inches/second [1.6 meters/second] is commonly used)

$T_s$  = worst stopping time of the machine/equipment

$T_c$  = worst stopping time of the control system

$T_r$  = reaction time of the interlock device and its interface



## FUNCTION-TESTING CHECKLIST FOR POINT-OF-OPERATION BARRIER GUARDS



This is a generic function-testing checklist. Your barrier guard may have other features that require different tests. Please refer to your barrier guard installation manual.



If the barrier guard is interlocked, make sure that the interlock device has been interfaced properly to the machine's control system to provide control reliability.

### **⚠ DANGER**

**Never** place your hands or any part of your body in the hazard area while performing these tests.



**Always** perform these tests at every setup, operator, and shift change, as well as every time after maintenance is performed.

1. Make sure that the barrier guard is designed and constructed so that someone cannot reach over, under, around, or through the barrier guard and reach the hazard. Additional guards or safeguarding devices must protect all areas not protected by the barrier guard.
2. If there are openings in the barrier guard, check the openings for compliance with the OSHA or ANSI guard-opening requirements. (See next page.)
3. Verify that the barrier guard is designed and constructed of materials substantial for the application to protect individuals from identified hazards.
4. Make sure that the barrier guard is designed, constructed, and maintained with fasteners not readily removable to protect against unauthorized adjustment or circumvention. Examples of fasteners that should **not** be used are slotted or Phillips head screws, wing nuts, magnets, latches and hasps, and hooks and eyes.
5. Confirm that the barrier guard is designed and constructed to ensure ease of use. If the barrier guard is overly large or cumbersome, it may discourage proper use.
6. Check that the barrier guard is free of sharp edges, burrs, slag welds, etc., that may cause injury to individuals when handling, removing, or using the barrier guard.
7. Make sure that the barrier guard is installed, maintained, and operated such that it does not create any pinch points between itself and moving parts of the machine.
8. Verify that the barrier guard provides adequate visibility to the point of operation, if required, with material such as perforated metal, wire mesh, or transparent polycarbonate. If visibility is provided through perforations or slots, the color of the material should be darker than the area observed to enhance visibility.
9. If the barrier guard has one or more interlocked sections, perform the following tests for each interlocked section.
  - a. With the machine on and ready to be cycled in a production mode of operation, open an interlocked section of the barrier guard and attempt to cycle the machine. The machine should not cycle.
  - b. An interlocked section must either (1) prevent opening until hazardous motion has stopped (with a **locking** interlock device), or (2) be located at the proper safety distance so that an individual cannot reach the hazard before hazardous motion has stopped when it is opened (with a **nonlocking** interlock device; see next page for the ANSI safety-distance equation).
    - (1) **Locking:** With all interlocked sections of the barrier guard closed while the machine is cycling, attempt to open an interlocked section. The interlocked section should not open. A locking interlocked section must open only when the hazardous motion of the machine has stopped after a normal stop command.
    - (2) **Nonlocking:** With all interlocked sections of the barrier guard closed while the machine is cycling, open an interlocked section. The machine should stop.
  - c. Verify that reclosing of an open interlocked section does not, by itself, cause any hazardous motion of the machine. Restarting of the machine must require a deliberate action, such as reactuating the normal actuating means.
10. If any of these function tests fail, take corrective action before running production. If all tests pass, remove all keys from the selector switches before running production.



Guard-opening scale being used to check openings for compliance

## OSHA GUARD-OPENING REQUIREMENTS

The maximum permissible opening for guards as required by OSHA 29 CFR 1910.217 for mechanical power presses is as follows:

TABLE O-10

Distance of opening from point-of-operation hazard (inches)	Maximum width of opening (inches)
½ to 1½	¼
1½ to 2½	⅜
2½ to 3½	½
3½ to 5½	⅝
5½ to 6½	¾
6½ to 7½	⅞
7½ to 12½	1¼
12½ to 15½	1½
15½ to 17½	1⅞
17½ to 31½	2⅞

## ANSI GUARD-OPENING REQUIREMENTS

The maximum permissible opening for guards as required by Annex D of ANSI B11.19-2003, Performance Criteria for Safeguarding, is as follows:

As a function of gap size in millimeters (inches)				As a function of distance in millimeters (inches)			
Known Gap		Minimum Distance		Known Distance		Maximum Gap	
0–6	(0–0.24)	13	(0.5)	< 13	(< 0.5)	Not permitted	
6.1–11	(0.25–0.375)	64	(2.5)	13–63.9	(0.5–2.49)	6	(0.250)
11.1–16	(0.376–0.625)	89	(3.5)	64–88.9	(2.5–3.49)	11	(0.375)
16.1–32	(0.626–1.250)	166	(6.5)	89–165.9	(3.5–6.49)	16	(0.625)
32.1–49	(1.251–1.875)	445	(17.5)	166–444.9	(6.5–17.49)	32	(1.250)
49.1–132	(1.876–5.000)	915	(36.0)	445–914.9	(17.5–35.99)	49	(1.875)
> 132	(> 5.0)	Not permitted		≥ 915	(≥ 36.0)	132	(5.000)

## OSHA AND ANSI GUARD-OPENING SCALES

OSHA Guard-Opening Scale – Part No. KSC097



ANSI/CSA Guard-Opening Scale – Part No. KSC098



An OSHA or ANSI guard-opening scale can be used during the design, installation, and inspection of barrier guards to make sure they comply with the OSHA and ANSI guard-opening requirements. These stainless-steel guard-opening scales are available online at [www.rockfordsystems.com](http://www.rockfordsystems.com).

## SAFETY DISTANCE FOR NONLOCKING INTERLOCKED BARRIER GUARDS

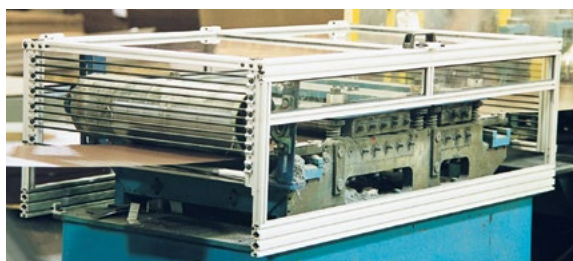
The safety-distance equation for nonlocking interlocked barrier guards from Annex D of ANSI B11.19-2003, *Performance Criteria for Safeguarding*, is as follows:

$$D_s = K(T_s + T_c + T_r + T_{spm})$$

Where:

- $D_s$  = safety distance that the interlocked section of the barrier guard must be located from the point-of-operation hazard
- $K$  = maximum speed that an individual can approach the hazard (63 inches/second is commonly used)
- $T_s$  = stopping time of the machine measured at the final control element
- $T_c$  = reaction time of the control system
- $T_r$  = reaction time of the interlock device and its interface
- $T_{spm}$  = additional time allowed for the stopping-performance monitor to compensate for variations in normal stopping time (if applicable)

## EXAMPLES OF SPECIAL PERIMETER AND POINT-OF-OPERATION BARRIER GUARDS



Guard on a Straightener



Guard on a Package Roller



Spring-Lift Guard on a Straight-Side Press  
With Adjustable Side Guards



Perimeter Guard Around a Transfer Line



5795 Logistics Parkway, Rockford, Illinois 61109 United States  
1-800-922-7533 | 815-874-7891  
[www.rockfordsystems.com](http://www.rockfordsystems.com)