UMA Series

UMA Safety Mat System

Heavy-duty two-wire or four-wire presence sensing safety mats with quick disconnect cables, perimeter trim and Cat. 3 controllers

System

When UMA series mats are combined with an SCC-1224A, MC3, or other Omron programmable safety controller (with complete diagnostics), the result is a system that meets the standard EN ISO 13856-1 and is entitled to display the CE mark. See below for an overview of the various components.

UMA Series Mat
• IP65 rated
• Single-piece molded polyurethane (PUR) construction
• Black or yellow color
• Easy cable connection

Controllers
• Safety category 3 devices
• SCC-1224A
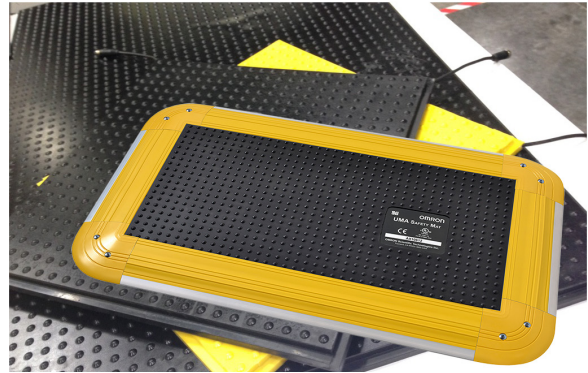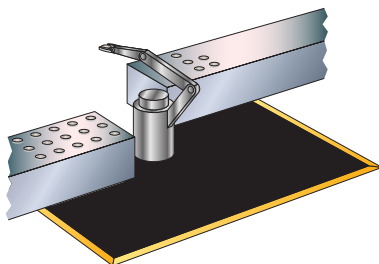• DIN-rail mount (MC3)

Trim
• One-part or Two-part perimeter and joining trim simplifies installation
• Two options for trim kit corners: Mitered and molded

Applications

Presence sensing safety mats are used to monitor an entire hazardous area. They offer flexibility, quick access and may frequently be the most economic choice. Other options for perimeter guarding include interlocked barrier guards and safety light curtains. However, personnel can become trapped inside a barrier guard and safety light curtains only monitor the perimeter, not the hazardous area inside. Additionally, mats can also simplify routine tasks such as machine setup, maintenance and repair. Applications can be found throughout industry and typically include the following areas:
  • Welding Robots
  • Assembly Machinery
  • Material Handling
  • Packaging Machinery
  • Punches
  • Presses
  • Robotic Work Cells

Description

The UMA Mat System offers quick-connect M8 connectors on the mat that easily conceal under the trim offering easier installation and quick replacement. The system can be used with with the MC3 and SCC-1224A controller; UMA mats can also be directly connected to NX-S or G9SP programmable safety controllers eliminating the need to intermediate controllers.

Safety Mats are ideally suited to harsh environments where devices such as laser scanners and light curtains can false trip due to contaminants in the environment. Safety mats when used as a start-up prevention device offer additional worker protection offering continual detection in hazardous areas.

How the System Works

The operation of a UMA Mat system is easy to understand. The mat is a simple, normally open switch. When a specified minimum weight is applied to the mat the "switch" closes. This sends a signal to the controller which, in turn, sends a stop signal to the guarded machine.

Each mat presents two wires with a terminating resistor or four wires to the controller providing the redundancy required to monitor the wiring for open circuits due to incorrect wiring or physical damage to the wires.

In order to meet many national safety regulations, Omron offers trim to secure the mat to the floor so that it cannot be easily relocated and therefore become ineffective.

In order to meet many national safety regulations, Omron offers ramp trim to minimize tripping and to secure the mat to the floor so that it cannot be easily relocated and therefore become ineffective.
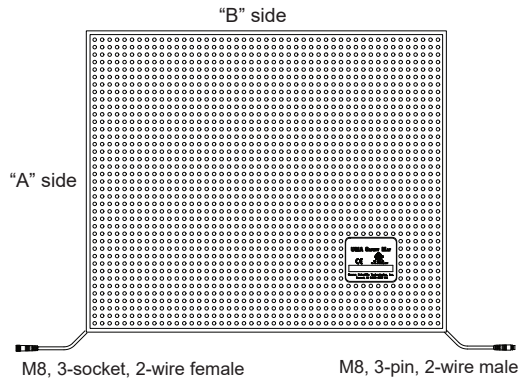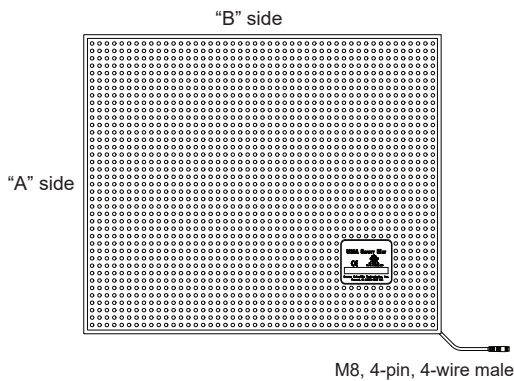
Specifications

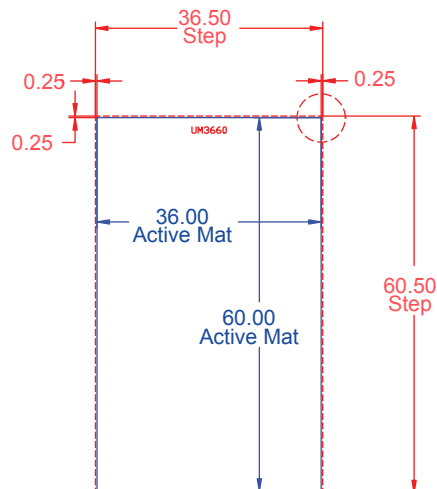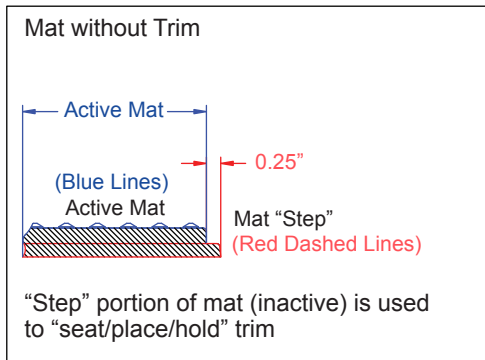| Mechanical	
Detection Method:	Pressure Sensitive
Mat Cover Material:	Polyurethane
Mat Type:	Normally open SPST, four-wire (1-cable type) or two-wire (2-cable type) available
Activation Force:	300 N (67 lbf) min. to 80 mm (3.14 in.) dia. test piece
Response Time (Reference only):	Average of 30 ms (measured at the center of the mat, at room temperature)
Dead Zone (or Inactive Edge):	10.2 mm (0.4 in.) around the inside perimeter of active surface
Maximum Load:	2,000N (450 lb) to 80 mm (3.14 in.) dia. body 1,862 kPa (270 lbs/in.2) (rolling load (stationary))
Mechanical Durability:	1×10^6 operations min.
Mat Exit Cable:	Model No. ending '-1': 1 exit cable, M8 4-pin cable, 4 conductors, 22 AWG, male Model No. ending '-2': 2 exit cables, M8 3-pin cable, 2 conductors, 22 AWG, 1 male and 1 female
Mat Weight:	Approx. 27kg/m^2
Environmental	
Protection:	IP65
Operating Temperature:	-10 to 55°C (14 to 131°F)
Mat Electrical Rating:	20.4V to 28.8V
Operating Humidity:	0-95% RH
Mat Chemical Resistance*: *40 minute exposure at 23°C (74°F)	
Water:	Distilled water: Good for brief exposure Tap water: Excellent Salt water: Excellent
Mineral Acids:	Sulfuric acid, 20% (by volume): Good Hydrochloric acid, 20% (by volume): Poor. Clean up immediately if spilled 15 to 40% Phosphoric acid stainless steel cleaner (diluted to 10%): good
Organic Acids:	200 Grain white vinegar (20%): Good for brief exposure under one hour Lactic acid, 88%: Good for brief exposure under one hour Lemon juice, 100%: Good for brief exposure under one hour
Aldehydes:	Phenolic aldehyde: Good
Caustics:	Ammonia all-purpose cleaner 7 to 7.5% (by volume): Good 25% Lye solution (by weight): Excellent
Petroleum Solvents:	Gasoline (5 to 10% Ethanol additive): Poor. Clean up immediately if spilled Hydrocarbon solvent: Excellent
Organic Solvents:	Acetone: Good ISO alcohol 100%: Good Allow natural evaporation if spilled
Chlorinated Solvents:	Bleach: Good
Dielectric Fluid:	Mineral oil/dielectric fluid: Good Synthetic cutting fluid: Good Machine oil: Good
Conforming to Standards:	EN12978, EN ISO13849-1, EN 13856-1, UL NKCR/NKCR7 Auxiliary Devices: ANSI/UL 508, ANSI/UL 60947-1, ANSI/UL 60947-5-1, CSA-C22.2 No. 14
Approvals:	UL E195653: NKCR/NKCR7
Integrated systems of mats and controller (MC3.or MC6)	SIL2; PFHd 4.8E-08; PLd; Category 3

Mat Selection

Multiple UMA series mat sizes are offered. A system can easily be configured to meet almost any guarding requirement. Cables exit on the side of the mat where the logo is located.

Standard Mat Sizes	
Widths (A)	12 to 72 in.
Lengths (B)	12 to 72 in.
Maximum Size is either 48 in. x 72 in. or 72 in. x 48 in.	
Metric Mat Sizes	
Widths (A)	500 to 1800 mm
Lengths (B)	500 to 1800 mm
Maximum Size is either 1200 mm. x 1800 mm. or 1800 mm x 1200 mm	

"B" side   "A" side   M8, 4-pin, 4-wire male

"B" side   "A" side   M8, 3-socket, 2-wire female   M8, 3-pin, 2-wire male

Mat Dimensions

For mat shown (UMA3660), active mat area is 36 in. x 60 in.
Overall mat size is 36.5 in. x 60.5 in.
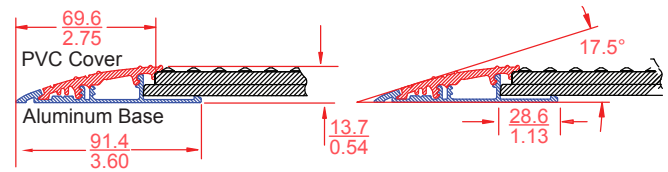"Step" adds 0.25 in. to perimeter.

Mat without Trim

Active Mat

(Blue Lines)
Active Mat

0.25"

Mat "Step"
(Red Dashed Lines)

"Step" portion of mat (inactive) is used to "seat/place/hold" trim

36.50
Step

0.25

0.25

0.25

UM3660

36.00
Active Mat

60.00
Active Mat

60.50
Step

Trim Selection

Several choices are available in trim selection and can be customized to a specific application.

Two-Part Ramp Trim with Yellow PVC Cover (TKM):
    - Ramp trim, aluminum base & PVC cover with mitered corners
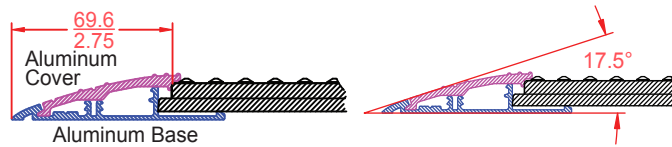   **- + / - 2.75 in. to mat layout dimensions**

This trim simplifies routing of cables and replacement of damaged mats. To position the mats correctly, place all of the mats in the approximate position, place the joining trim between the mats, then temporarily place the cover on the joining trim. Square the mats by sliding the ramp trim under the mats. When all of the mats are correctly positioned, anchor the perimeter trim to the floor. After the wires have been routed, a rugged cover of highly visible, safety yellow PVC is snapped into place. Corners can either be mitered or be our exclusive molded corners.

Two-Part Ramp Trim with Aluminum Cover (TKAT)
    - Ramp trim, two-part aluminium with mitered corners.
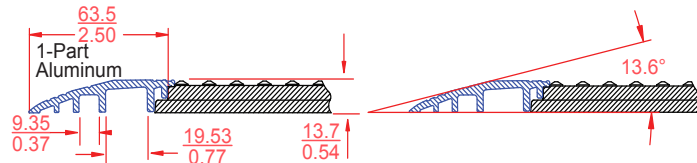   **- + / - 2.75 in. to mat layout dimensions**

This trim is the same as above except that the PVC cover is replaced with an aluminum cover that is attached by screws to the base. (See the Dimensions Section of this datasheet for details.)

Aluminum Ramp Trim (TKA)
    - Ramp trim, one-part aluminium with mitered corners.
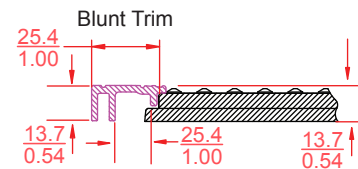   **- + / - 2.50 in. to mat layout dimensions**

This single part aluminum ramp trim is available for areas where the two part ramp trim may not be suitable.

Aluminum Blunt Trim (TKB)
    - Blunt trim, one-part aluminium with mitered corners or right angle corners .
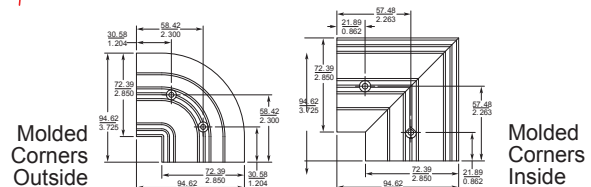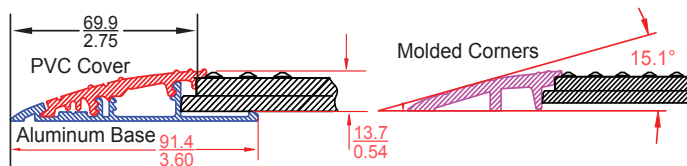   **- + / - 1.00 in. to mat layout dimensions**

Used to finish off the edge of a mat installation near a wall or machine. Helps hold mats in place. Use blunt end for sides of the mat without wheels or foot traffic only.

Molded Corners (TKC)
    - Perimeter ramp trim, aluminium base and PVC cover with molded corners.
    - + / - 2.75 in. to mat layout dimensions

Eliminates the need to miter the corners of perimeter trim. Designed to mate with Omron STI two-part PVC or aluminum trim.

Using Mat Trims

Using Trim Pieces

Ramp Trim with Yellow PVC Cover: UMRT4/UMRT8
Secures the edges of the Safety Mats to the floor.
It is composed of two parts with an aluminum base and a PVC Cover.

Joining Trim: UMJS4/UMJS8
The Joining Trims join the Safety Mats when two or more Safety Mats are being combined.
In addition to joining the Safety Mats, the Joining Trims preserve the Safety Mat's sensitivity at the joints.

Aluminum Ramp Trim: UMAL
Secures the edges of the Safety Mat to the floor.
The Aluminum Ramp Trim is hollow, so cable can be routed through it.

Molded Outside Corner: UMOC
Used together with the Ramp Trim with Yellow PVC Cover (UMRT4/UMRT8) to secure the external corners of the Safety Mats to the floor.
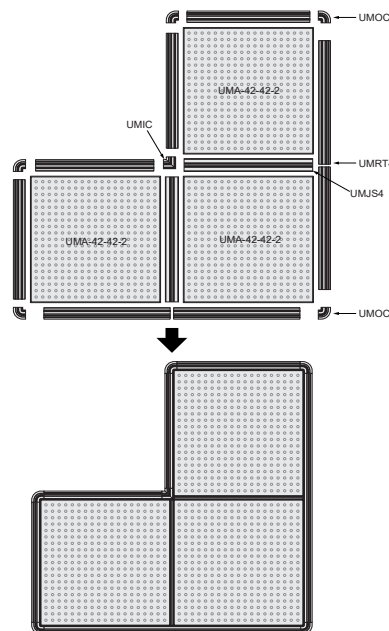
Molded Inside Corner: UMIC
Used together with the Ramp Trim with Yellow PVC Cover (UMRT4/UMRT8) to secure the internal corners of the Safety Mats to the floor.

> Note:
> The Aluminum Ramp Trim or Ramp Trim with Yellow PVC Cover must be cut to fit the size of the Safety Mats being used. Furthermore, when the Safety Mat's wiring is being routed through the Aluminum Ramp Trim or Ramp Trim with Yellow PVC Cover, it will be necessary to cut or notch the Aluminum Ramp Trim or Ramp Trim with Yellow PVC Cover for cable access.
> 2. The Joining Trim must be cut to fit the size of the Safety Mats being used.
> 3. The Ramp Trim with Yellow PVC Cover and Molded Corner must be anchored to the floor to secure the Safety Mats. It is also necessary to drill holes in the Trim to anchor it.

Safety Mat Configuration

The Safety Mats are secured by anchoring the Ramp Trim with Yellow PVC Cover and Molded Corner to the floor.
Before ordering, confirm the number of Ramp Trim with Yellow PVC Cover and Molded Corner pieces that will be needed.

Example 1: Using a Single Safety Mat

In this case, the perimeter of the Safety Mat is about 168 in. and the following pieces are required:
The example above consists of the following components:
UMA-42-42 Safety Mat : 1 piece
UMRT4 Ramp Trim with Yellow PVC Cover (48 in) : 4 pieces
UMOC Molded Outside Corner : 4 pieces

Example 2: Using three Safety Mats

In this case, the perimeter of the Safety Mat is about 84 in., the joint between the Safety Mats is 84 in. long, and the following pieces are required:

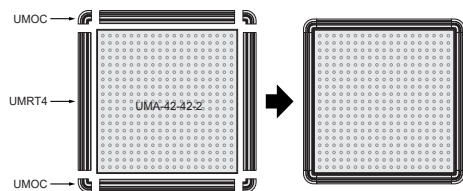The example above consists of the following components:
UMMA-42-42-2 Safety Mat : 3 pieces
UMRT4 Ramp Trim with Yellow PVC Cover (48 in.) : 8 pieces
UMJS4 Joining Trim (48 in.) : 2 pieces
UMOC Molded Outside Corner : 5 pieces
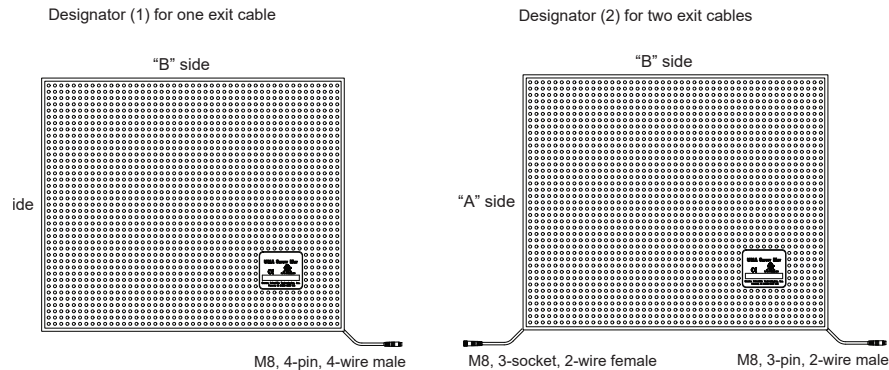UMIC Molded Inside Corner : 1 piece

Ordering

Ordering a Standard UMA Mat System

A Quick Disconnect UMA Mat System contains at least one mat, a 2 m, 5 m or 10 m cable, sufficient perimeter and joining trim and a controller. For multiple mat installations using a 4-wire DIN rail mount controller, the mats are connected in series to the controller. When using the MC6 controller, six mats may be connected directly to the controller.

Each component of a Universal Mat system must be ordered individually

Mats are available in black or yellow. Yellow mats are denoted by placing a "Y" in the ordering code. The exit cable location is specified by letter code at the end of the ordering number. Cable extensions must be ordered separately.

To order a Universal Mat System, simply fill in the fields in the model number sequence given.

Designator (1) for one exit cable

"B" side

ide

M8, 4-pin, 4-wire male

Designator (2) for two exit cables

"B" side

"A" side

M8, 3-socket, 2-wire female   M8, 3-pin, 2-wire male

Mat Ordering Code (inch dimensions):

__ - ___ - ___ - ___
❶   ❷   ❸   ❹

Example: UMA-24-60-1
This example is a 24 x 60 in. standard blackmat with one 4-pin cable.

❶   Information required. Represents mat type and color.

Designator	Description
UMA	Standard black mat
UMYA	Standard yellow mat
UMMA	Metric black mat
UMMYA	Metric yellow mat

❷❸   Information required. Represents the mat size. Dimensions are for active mat area. Mats are an additional 0.5 in. in each dimension. Choose one value from each column.

❷Standard Mat Widths in inches Designator A	❸Standard Mat Widths in inches Designator B
12 (12 in./304.8 mm)	12 (12 in./304.8 mm)
18 (18 in./457.2 mm)	18 (18 in./457.2 mm)
24 (24 in./609.6 mm)	24 (24 in./609.6 mm)
30 (30 in./762 mm)	30 (30 in./762 mm)
36 (36 in./914.4 mm)	36 (36 in./914.4 mm)
42 (42 in./1066.8 mm)	42 (42 in./1066.8 mm)
48 (48 in./1219.2 mm)	48 (48 in./1219.2 mm)
54 (54 in./1371.6 mm)	54 (54 in./1371.6 mm)
60 (60 in./1524 mm)	60 (60 in./1524 mm)
66 (66 in./1676.4 mm)	66 (66 in./1676.4 mm)
72 (72 in./1828.8 mm)	72 (72 in./1828.8 mm)
Special Standard Sizes*	
Restriction: Maximum size is 48 in. x 72 in. or 72 in. x 48 in.	

❹   Information required. Exit cable configuration.

Designator	Description
1	One 4-pin cable
2	Two 3-pin cable

Mat Ordering Code (metric dimensions):

___- ___ - ___ - ___
❶   ❷   ❸   ❹

Example: UMMA-0500-0500-2
This example is a 500 x 500 mm black metric quick disconnect mat with two 3-pin cable.

❶ Information required. Represents mat type and color.

Designator	Description
UMA	Standard black mat
UMYA	Standard yellow mat
UMMA	Metric black mat
UMMYA	Metric yellow mat

❷❸Information required. Represents the mat size. Dimensions are for active mat area. Mats are an additional 250 mm in each dimension. Choose one value from each column.

❷Metric Mat Widths in mm (inches) Designator A	❸Metric Mat Widths in mm (inches) Designator B
0500 (500 mm/19.7 in.)	0500 (500 mm/19.7 in.)
0750 (750 mm/29.5 in.)	0750 (750 mm/29.5 in.)
1000 (1000 mm/39.4 in.)	1000 (1000 mm/39.4 in.)
1200 (1200 mm/47.24 in.)	1200 (1200 mm/47.2 in.)
1250 (1250 mm/49.2 in.)	1250 (1250 mm/49.2 in.)
1500 (1500 mm/59.1 in.)	1500 (1500 mm/59.1 in.)
1750 (1750 mm/68.9 in.)	1750 (1750 mm/68.9 in.)
1800 (1800 mm/70.9 in.)	1800 (1800 mm/70.9 in.)
Restriction: Maximum size is 1200 mm x 1800 mm or 1800 mm x 1200 mm	

❹ Information required. Exit cable configuration.

Designator	Description
1	One 4-pin cable
2	Two 3-pin cable

Ordering (continued)

Ordering Perimeter Trim for a Single Mat

To order Perimeter Trim for a single mat, simply fill in the fields in the model number sequence given below.

Trim Kit Ordering Code (inch dimensions):

___-___ ___
❶ ❷ ❸

Example: TKM-1266
This example is a trim kit with mitered corners to fit a 12 x 66 in. standard mat.

❶   Information required. Represents trim type.

Designator	Description
TKM	Standard trim kit, 2-part mitered corners with PVC top cover
TKAT	Standard trim kit, 2-part mitered corners with aluminum top cover
TKC	Standard trim kit, 2-part with molded corners with PVC top cover
TKA	Standard trim kit, single part aluminum ramp trim (mitered only)
TKB	Blunt time, one-part aluminum with mitered or right angle corners

❷ ❸   Information required. Represents the mat size. Dimensions are for active mat area. Mats are an additional 0.5 in. in each dimension. Choose one value from each column.

❷ Trim Kit for Standard Mat Widths in inches Designator A	❸ Trim Kit for Standard Mat Widths in inches Designator B
12	12
18	18
24	24
30	30
36	36
42	42
48	48
54	54
60	60
66	66
72	72
Special Standard Sizes*	
Restriction: Maximum size is 48 in. x 72 in. or 72 in. x 48 in.	

Mat Ordering Code (metric dimensions):

___-___ ___
❶ ❷ ❸

Example: TKM-0500-0500
This example is a trim kit with mitered corners to fit a 500 x 500 mm standard mat.

❶   Information required. Represents trim type.

Designator	Description
MTKM	Metric trim kit with mitered corners
MTKC	Metric trim kit with molded corners

❷ ❸   Information required. Represents the mat size. Dimensions are for active mat area. Mats are an additional 250 mm. in each dimension. Choose one value from each column.

❷ Metric Mat Widths in mm Designator A	❸ Metric Mat Widths in mm (inches) Designator B
0500	0500
0750	0750
1000	1000
1200	1200
1250	1250
1500	1500
1750	1750
1800	1800
Restriction: Maximum size is 1200 mm x 1800 mm or 1800 mm x 1200 mm	

Ordering (continued)

Trim and Cable Accessories for Standard and Metric Sized Mats

Model No.	Description	Weight
UMRT4	Bulk two-part ramp trim with yellow PVC cover 1.22 m (48 in.) length	1.5 kg (3.3 lb.)
UMRT	Bulk two-part ramp trim with yellow PVC cover 2.44 m (96 in.) length	3.0 kg (6.6 lb.)
UMRT8A	Bulk two-part ramp trim with aluminum top 2.44 m (96 in.) length	3.2 kg (7.0 lb.)
UMJS4	Bulk two-part active joining trim 1.22 m (48 in.) length	1.4 kg (3.0 lb.)
UMJS8	Bulk two-part active joining trim 2.44 m (96 in.) length	2.7 kg (6.0 lb.)
UMJTC8Y	Bulk joining trim cover yellow 2.44 m (96 in.)	0.5 kg (1.0 lb.)
UMBT4	Bulk blunt trim 1.22 m (48 in.) length	1.1 kg (2.5 lb.)
UMBT8	Bulk blunt trim 2.44 m (96 in.) length	2.3 kg (5.0 lb.)
UMAL	Bulk aluminum ramp trim 2.44 m (96 in.)	2.9 kg (6.5 lb.)
UMOC	Molded outside corner	
UMIC	Molded inside corner	
UMA-SA-4PF-M8-4PM-M12	M8 female to M12 male adapter for use with MC6	
UMA-YA-3PMF-M8-4PM-M12	M8 to M12 3-pin to 4-pin Y adapter for use with MC6	
UMA-CBL-3PMF-M8-02M	M8, 3-pin male to female extension cable 2 m (78.7 in.) length for 2-wire mats	
UMA-CBL-3PMF-M8-05M	M8, 3-pin male to female extension cable 5 m (296.9 in.) length for 2-wire mats	
UMA-CBL-3PMF-M8-10M	M8, 3-pin male to female extension cable 10 m (393.7 in.) length for 2-wire mats	
UMA-CBL-4PMF-M8-05M	M8, 4-pin male to female extension cable 5 m (296.9 in.) length for 4-wire mats	
UMA-CBL-4PMF-M8-10M	M8, 4-pin male to female extension cable 10 m (393.7 in.) length for 4-wire mats	
UMA-CBL-3PMM-M8-0.15M	M8, 3-pin male to male extension cable 152 mm (6 in.) length for 2-wire mats	
UMA-CBL-3PFF-M8-0.15M	M8, 3-socket female to female extension cable 152 mm (6 in.) length for 2-wire mats	

OMRON
AUTOMATION & SAFETY

Authorized Distributor:

Automation Control Systems
• Machine Automation Controllers (MAC) • Programmable Controllers (PLC)
• Operator interfaces (HMI) • Distributed I/O • Software

Drives & Motion Controls
• Servo & AC Drives • Motion Controllers & Encoders

Temperature & Process Controllers
• Single and Multi-loop Controllers

Sensors & Vision
• Proximity Sensors • Photoelectric Sensors • Fiber-Optic Sensors
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• Ultrasonic Sensors • Vision Sensors

Industrial Components
• RFID/Code Readers • Relays • Pushbuttons & Indicators
• Limit and Basic Switches • Timers • Counters • Metering Devices
• Power Supplies

Safety
• Laser Scanners • Safety Mats • Edges and Bumpers • Programmable Safety
 Controllers • Light Curtains • Safety Relays • Safety Interlock Switches