MC3, MC4 and MC6 Series
Safety Mat Controllers

The MC Series safety mat controllers are used in conjunction with a four-wire, normally open, safety mat where perimeter guarding is required. These control reliable controllers send a stop signal to the guarded machine when an object of sufficient weight is detected on the active mat area.

The MC Series controllers, when combined with a four-wire UM or UMQ series mat, provide access guarding and improved productivity. The work area is fully visible and accessible.


MC6

• Universal power input
• Up to 6 mat zone inputs
• Six mat zone status indicator LEDs
• Select from Automatic Start, Start/Restart Interlock or Start Interlock operating modes
• MPCE monitoring
• Remote access to reset functions
• 2-digit numeric display for fault diagnostics
• Surface mount, lockable metal enclosure

Options

• Lid-mounted reset key switch
• Quick disconnect for incoming power and relay outputs
• Quick disconnects up to 6 mat zone inputs
• Solid-state safety output module
• Safety relay output module

Description

MC3

The MC3 DIN mount controller may be used in applications that do not require the feature set of the MC6 controller. The MC3 single zone mat controller has removable terminal blocks and operates only on 24 VDC.

MC4

The MC4 is a NEMA 4, 12 rated single zone mat controller. This controller may be used in applications when the diagnostic features of the MC6 may not be required. The MC4 may be ordered in either 24 VDC or the universal auto-selecting power supply for 100-240 VAC.

MC6

The MC6 is a NEMA 4, 12 controller with six individual mat zone indicators and is designed to be backward compatible with the MC4. Both units are dimensionally identical. This is where the similarities stop: The MC6 has full featured diagnostics with a 24 VDC and an optional universal power supply (100-240 VAC auto-selecting). It is a controller that can be used anywhere in the world.

Additional Guarding Requirements

A safety mat system is often only one part of a machine guarding solution. If the safety mat does not protect all access to the point of operation, additional guarding must be used. Safety mat systems should only be used to detect the presence, not the absence, of a force.

Perimeter Guarding Requirements

For perimeter guarding installations, the guarded machine or robot controller must be wired such that any stop signal generated by the safety mat system will cause an immediate stop of the hazardous motion. The machine or robot must only be restarted by the actuation of a manual reset switch. This reset switch must be located outside the area of hazardous motion and positioned such that the hazardous area can be observed by the switch operator. The purpose of this arrangement is to prevent a machine or robot from automatically restarting once the sensing weight is no longer detected by the safety mat sensing area.
## Specifications

### Controller Specifications

<table>
<thead>
<tr>
<th></th>
<th>MC3</th>
<th>MC4</th>
<th>MC6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Performance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category 3 Safety Device:</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max Input Resistance:</td>
<td>8 ohm per input channel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Response Time:</td>
<td>&lt; 30 msec</td>
<td>1 - 2 Digit Diagnostic Display</td>
<td>1 - 2 Digit Diagnostic Display</td>
</tr>
<tr>
<td><strong>Indications:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - Green = Run</td>
<td></td>
<td>1 - Green = Run</td>
<td>1 - Green = Run</td>
</tr>
<tr>
<td>1 - Red = Stop</td>
<td>1 - Red = Stop</td>
<td>1 - Green = Mat Clear</td>
<td>1 - Yellow = Interlock</td>
</tr>
<tr>
<td>1 - Green = Mat Clear</td>
<td></td>
<td>6 - Red = Mat Zones</td>
<td></td>
</tr>
<tr>
<td><strong>Operational Modes:</strong> (Selectable)</td>
<td>Automatic Start, Start/Restart Interlock</td>
<td>DIP Switch Selected, Automatic Start, Start/Restart Interlock Start Interlock</td>
<td></td>
</tr>
<tr>
<td><strong>Electrical</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Input:</td>
<td>24 VDC ± 15% &lt; 3 watts</td>
<td>24 VDC ± 10% &lt; 3 watts or Autoselecting, 100 - 240 VAC ± 10%, 20 watts</td>
<td>24 VDC ± 10% 10 watts (Relay), 24 VDC ± 10% 50 watts (Solid-State), or Autoselecting, 100 - 240 VAC ± 10%, 20 watts</td>
</tr>
<tr>
<td>Safety Inputs:</td>
<td>One - 4-wire UM Safety Mat, or group series as one input. Approximately 12 multiple mats may be connected to a single zone in series. Do not exceed 8 ohms per input channel</td>
<td>Connections for up to six - 4-wire UM Safety Mats Approximately 12 multiple mats may be connected to a single zone in series Do not exceed 8 ohms per input channel</td>
<td></td>
</tr>
<tr>
<td>Safety Output Relays:</td>
<td>2 NO and 2 NC</td>
<td>2 NO and 2 NC</td>
<td>2 NO and 2 NC</td>
</tr>
<tr>
<td>Maximum Switched Current:</td>
<td>230 VAC, 6 A, 1500 watts 24 VDC - 2 A Inductive, 6 A Resistive</td>
<td>230 VAC, 7 A, 1600 watts 24 VDC - 2 A Inductive, 6 A Resistive</td>
<td>230 VAC, 7 A, 1600 watts 24 VDC - 2 A Inductive, 6 A Resistive</td>
</tr>
<tr>
<td>MPCE:</td>
<td>n/a</td>
<td>DIP Switch Selected</td>
<td></td>
</tr>
<tr>
<td>Aux. Output Relay:</td>
<td>None (NC may be used as Aux)</td>
<td>1 NO and 1 NC</td>
<td></td>
</tr>
<tr>
<td>Maximum Switched Current:</td>
<td>230 VAC, 6 A, 1500 watts</td>
<td>230 VAC, 6 A, 1500 watts</td>
<td>125 VAC, 0.5 A</td>
</tr>
<tr>
<td>Relay Life:</td>
<td>Mechanical = 10M operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal Blocks:</td>
<td>Removable Pressure point screw</td>
<td>Cage clamp terminal strip</td>
<td>Cage clamp terminal strip &amp; 2-part terminal blocks</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-State Outputs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid-State Safety Outputs:</td>
<td>n/a</td>
<td></td>
<td>2 Current Sourcing 24 VDC (PNP)</td>
</tr>
<tr>
<td>Maximum Switched Current:</td>
<td>n/a</td>
<td>0.625 A @ 24 VDC</td>
<td></td>
</tr>
<tr>
<td>Solid-State Aux. Outputs:</td>
<td>n/a</td>
<td>1 Current Sourcing (PNP) and 1 Current Sinking (NPN)</td>
<td></td>
</tr>
<tr>
<td>Maximum Switched Current:</td>
<td>n/a</td>
<td>Current Sourcing Max: 0.5 A @ 24 VDC Current Sinking Max: 0.1 A @ 24 VDC</td>
<td></td>
</tr>
<tr>
<td>Reset Function:</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key-switch (factory installed):</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote:</td>
<td>user supplied, Key-switch, or Pushbutton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mat Input Connectors:</td>
<td>n/a</td>
<td>Up to six quick-disconnect connectors</td>
<td></td>
</tr>
<tr>
<td>Power Input and Safety Output Connector:</td>
<td>n/a</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Enclosure:</td>
<td>Polycarbonate</td>
<td>Polyurethane-painted 14 ga. steel</td>
<td></td>
</tr>
<tr>
<td>Mounting:</td>
<td>35 mm DIN rail</td>
<td>Surface Mount</td>
<td></td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection Rating:</td>
<td>IP20</td>
<td>IP65/NEMA 4, 12</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature:</td>
<td>0 to 55°C (32 to 131° F)</td>
<td>0 to 55°C (32 to 131° F)</td>
<td></td>
</tr>
<tr>
<td>Relative Humidity:</td>
<td>90%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration:</td>
<td>5-60 Hz at 5 g max on three axis</td>
<td>10-55 Hz at 5 g max on three axis</td>
<td></td>
</tr>
<tr>
<td>Shock:</td>
<td>10 g for 0.016 sec., 1000 shocks for each axis on 3 axis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electromagnetic Compatibility (EMC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrostatic Discharge (ESD):</td>
<td>±8 kV (air discharge), ±6 kV (contact discharge)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiated RF Field:</td>
<td>10 V/m, 80 to 1,000 MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Fast Transients (EFT):</td>
<td>±2 kV (all power and I/O ports)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surge:</td>
<td>±2 kV (all power and I/O ports)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shipping Wt.:</td>
<td>0.22 kg (0.8 lbs.)</td>
<td>Approx 4 kg (9.0 lbs.)</td>
<td></td>
</tr>
<tr>
<td><strong>Standards of Conformity:</strong></td>
<td>TUV, CE, cCSAus CE Certificate # BB9910347 01 cCSAus Certificate # LR90200-14</td>
<td>TUV, CE, cCSAus CE Certificate # BB9910347 02 cCSAus Certificate # LR90200-14</td>
<td>TUV, CE, cCSAus CE Certificate # BB2110242 01 cCSAus Certificate # LR90200-14</td>
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<tr>
<td><strong>Designed to Meet or Exceed:</strong></td>
<td>EN1760-1998, EN954, ANSI/RIA15.06-1999 (R2009), ANSI B11.19-2010, OSHA 1910-217C, CSA AND UL508</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specifications are subject to change without notice.
### Dimensions (continued) (mm/in.)

#### MC3

- **Side View**
  - 15.3/0.6
  - 35.5/1.4
  - 98/3.9

- **Bottom View**
  - 61.2/2.4
  - 38/1.5
  - 55/2.2

#### UMDB-6

- **Side View**
  - 101.6/4.00
  - 38.1/1.50
  - 228.6/9.00

- **Bottom View**
  - 38.1/1.50
  - 78.2/3.08
  - 75.7/2.98

#### UMDB-8

- **Side View**
  - 101.6/4.00
  - 38.1/1.50
  - 228.6/9.00

- **Bottom View**
  - 38.1/1.50
  - 78.2/3.08
  - 75.7/2.98

#### UMDB-10

- **Side View**
  - 101.6/4.00
  - 38.1/1.50
  - 228.6/9.00

- **Bottom View**
  - 38.1/1.50
  - 78.2/3.08
  - 75.7/2.98

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For the Latest Information On the Internet: www.sti.com

MC Controllers  Safety Mats & Area Guarding
Wiring

MC6 with Multiple Mats Connected to One Zone

MULTIPLE MATS MAY BE CONNECTED TO THE CONTROLLER USING THIS METHOD. THE ABOVE EXAMPLE SHOWS 4 MATS WIRED. MATS MUST BE CONNECTED IN SEQUENCE, USING ZONE 1, ZONE 2, ZONE 3, etc. DIP SWITCHES MUST BE SET TO THE NUMBER OF ZONES BEING USED.

Mat Connections for Listed Controllers

- The MC4 and MC6 controllers may be ordered with up to 6 mat connectors (part #60477) installed.
- When using the MC3 controller, part #60477 may be ordered for mounting in customer enclosure.
Wiring (continued)

MC4 AC Power, 9-Pin Connector

MC4 DC Power, 9-Pin Connector

For the Latest Information On the Internet: www.sti.com
Wiring (continued)

MC6 AC Power, 12-Pin Connector

MC6 DC Power, 12-Pin Connector
Suggested Machine and PLC Connections

MC3, Two Normally Open Safety Relay Outputs
MC4, Two Normally Open Safety Relay Outputs, 100 to 240 VAC Power

**Terminal Connections for Safety Mats**

<table>
<thead>
<tr>
<th>Black</th>
<th>Blue</th>
<th>Brown</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Universal Power Supply (Optional) for AC Power**

- MC4
- F3 TZA 250V
- Shield
- Start 2
- Start 1
- +24 VAC In
- +24 V Ret
- K2
- JMP2
- K1
- JMP1
- JMP3
- LED1
- LED2
- LED3
- CLEAR
- RUN
- STOP
- RESET

**Relay Outputs**

- NC1
- NC1
- TO PLC CONTROL

**Customer Supplied Fuse**

- 7 Amps or Less

**Connection for Safety Mats & Area Guarding**

- Up to 6 mats may be connected to the controller using this method.
- As each mat is connected, the jumper is moved to the last unused terminal.
- The above example shows two mats wired.
- Jumpers would be placed as shown.
- (3 BLK) is jumpered to terminal labeled 6 BLU & (3 BRN) is jumpered to terminal labeled 6 WHT.
- When all 6 mats are connected, jumpers are not required.
Suggested Machine and PLC Connections (continued)

MC4, Two Normally Open Safety Relay Outputs, 24 VDC Power

Up to 6 mats may be connected to the controller using this method. As each mat is connected, the jumper is moved to the last unused terminal. The above example shows two mats wired, jumpers would be placed as shown. (3 BLK) is jumpered to terminal labeled 6 BLU & (3 BRN) is jumpered to terminal labeled 6 WHT. When all 6 mats are connected, jumpers are not required.
MC6, Two Normally Open Safety Relay Outputs, 100 to 240 VAC Power

Up to 6 mats may be connected to the controller using this method. The above example shows two 4 wire safety mats connected. Mats must be connected in sequence, using zone 1, zone 2, zone 3, etc. DIP switches must be set to the number of zones being used. In most cases shielding is not required for “MPCE” and remote start wiring.
Suggested Machine and PLC Connections (continued)

MC6, Two Solid-State Safety Outputs, 24 VDC Power

In most cases up to 6 mats may be connected to the controller using this method. The above example shows two - 4 wire safety mats connected. Mats must be connected in sequence, using Zone 1, Zone 2, Zone 3, etc. Dip switches must be set to the number of zones being used. In most cases shielding is not required for “MPCE” and remote start wiring.
MC Controllers  Safety Mats & Area Guarding

Ordering

MC-3

MC3 Series Safety Mat Controller

No options are available

MC-4

Power Input Connector

0  No power input & safety output connector
1  Power input & safety output connector

Lid Mounted Key-switch

0  No key-switch
1  Factory installed lid mounted key-switch

Power Input Voltage

0  24 VDC
1  100-240 VAC auto-selecting

Mat Input Connectors

0  No mat connectors
__  Please specify a number between 1 & 6

MC-6

Input Voltage

AC  AC power
DC  DC power

Power Input Connector

0  No power input & safety output connector
1  Power input & safety output connector

Lid Mounted Reset Key Switch

0  No reset keyswitch
1  Factory installed lid mounted reset keyswitch

Safety Output Module

1  Safety relay
2  Solid-state (not available with AC input)

Mat Input Connectors

0  No mat connectors
__  Please specify a number between 1 & 6

For information on Omron STI safety mats, see page F2

Rapid Delivery Products

The following models are readily available for shipment today or at least within 3 days. Please consider these for all new applications.

<table>
<thead>
<tr>
<th>Model</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC3</td>
<td>43767-0010</td>
<td>Din - 24 VDC</td>
</tr>
<tr>
<td>MC4-0004</td>
<td>43815-0004</td>
<td>NEMA 24, VDC, 4 mat connectors</td>
</tr>
<tr>
<td>MC4-0010</td>
<td>43815-0010</td>
<td>NEMA 24 VDC or 100-240 VAC, No connector</td>
</tr>
<tr>
<td>MC4-0011</td>
<td>43815-0011</td>
<td>NEMA 24 VDC or 100-240 VAC, 1 mat connector</td>
</tr>
<tr>
<td>MC4-0012</td>
<td>43815-0012</td>
<td>NEMA 24 VDC or 100-240 VAC, 2 mat connectors</td>
</tr>
<tr>
<td>MC4-0013</td>
<td>43815-0013</td>
<td>NEMA 24 VDC or 100-240, VAC, 3 mat connectors</td>
</tr>
<tr>
<td>MC4-0014</td>
<td>43815-0014</td>
<td>NEMA 24 VDC or 100-240, VAC, 4 mat connectors</td>
</tr>
<tr>
<td>MC6AC-0016</td>
<td>43938-0016</td>
<td>NEMA 24 VDC or 100-240 VAC, 6 mat connectors</td>
</tr>
<tr>
<td>MC6DC-0012</td>
<td>43939-0012</td>
<td>NEMA 24 VDC, 2 mat connectors</td>
</tr>
<tr>
<td>MC6DC-0016</td>
<td>43939-0016</td>
<td>NEMA 24 VDC, 6 mat connectors</td>
</tr>
</tbody>
</table>

Safety Standards and Precautions

A Safety Mat controller is a general purpose, safety mat control device and is not designed for any specific type, model or brand of machine. All safety-related functions of the guarded machine controls including pneumatic, electric, logic or hydraulic controls must be control reliable.

A Safety Mat controller when combined with a four-wire safety mat meets ANSI/RIA R15.06-1999 (R2009), ANSI B11.19-2010 and the following applicable OSHA standards. When used with mechanical power presses, OSHA standard 1910.217(c) applies. For other applications the requirements of section 1910.212 apply.

Only use a Safety Mat controller and four-wire safety mat system on machinery that stops consistently and immediately anywhere in its cycle or stroke. Never use a Safety Mat controller and four-wire safety mat system on a full-revolution clutched press or machine. Access to the point of operation or hazardous machine area not protected by the Safety Mat controller and four-wire safety mat system must be guarded by fencing, barriers or other appropriate methods.

The purchaser, installer and employer are responsible for meeting all local state and federal government laws, rules, codes or regulations relating to the proper use, installation, operation and maintenance of this control and the guarded machine. See Installation and Operation Manual for details.

All application examples described are for illustration purposes only. Actual installations may differ from those indicated.