MZ Series Safety Barriers

Shunt-diode Safety Barriers and Intrinsic Safety Accessories

TURCK works
For Safe Measurement and Certified for Worldwide Standards

TURCK’s MZ-Series shunt-diode intrinsic safety barriers protect electrical devices in all hazardous (classified) atmospheres, including flammable gases, dusts and fibers. MZ-Series barriers are approved by Factory Mutual in the USA, CSA in Canada, and by BASEEFA in the UK to CENELEC standards.

Exceptionally High Density

With a width of only 7 mm for one-, two-, and three-channel barriers, the MZ-Series achieves a very high density. These ultra-slim barriers also duplicate and replace many functions of conventional terminals, saving even more space.

Simple Installation

MZ-Series barriers clamp simply and securely onto a standard 35 mm DIN rail, simultaneously making a reliable ground connection. Extra terminals on each side of the barrier allow cable shields and ground returns to be terminated on the barrier. 'Dummy' barriers are available to secure and ground spare hazardous area conductors, as well as to provide feed-through connections for the optional power comb.

Secondary Replaceable Fuses

Secondary replaceable fuses are available on many models. These fuses provide protection against faults that could occur during commissioning that would otherwise blow the internal, non-replaceable safety fuse. The fuses can also be latched in a disconnect position, thus avoiding the need for additional disconnect terminals. Models in which a fuse is less likely to be necessary use a simple link that retains the loop-disconnect feature.
Control in Hazardous Areas

Overvoltage Protection

Models MZ06R2, MZ07P2, MZ08P2 are active barriers designed for use with transmitters, switches or solenoids. Barriers in these applications are often connected directly to a power supply. These models have built-in overvoltage protection circuits that allow their use with unregulated power supplies up to 35 V.

Convenient Power Comb

Optional power comb simplifies installations in which multiple barriers are powered from a common source. The comb replaces an individual power supply connection to each barrier, yet allows single barriers to be removed without affecting the others. The power comb distributes power to as many as 40 barriers and can be cut to power smaller numbers of barriers.

Secure Ground Terminals

MZGT ground terminals provide for connection of the DIN rail to an appropriate ground electrode. Two are recommended per discrete length of DIN rail.

Insulating Spacers

MZSP insulating spacers provide a simple and effective means of isolating the IS ground from panel ground.

Simple Identification

Barrier identification is provided by label carriers that snap onto the top of individual barriers. The label carriers hinge, allowing easy access to the barrier fuses / links while providing maximum label space. Self-adhesive labels are supplied on sheets of 120 for pre-printing.
Safety Barriers

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Specifications

Ambient temperature limits
-20° to 60°C (FM/CSA) continuous working
-20° to 40°C (BASEEFA) continuous working

Humidity limits
5 to 95% RH

Case flammability
UL94: V-2

Terminations
Terminals accommodate conductors up to 2.5 mm²
Hazardous-area terminals are identified as dark blue

Color coding of barrier type (label on top surface)
Red . . . . . . . . . . . . . . . . . . . . . Positive polarity (+)
Black . . . . . . . . . . . . . . . . . . . . . . . Negative polarity (-)
Grey . . . . . . . . . . . . . . . . . . . . . . . . . . Non-polarized
White . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . MZDB dummy barrier

Weight
100 g approximately

Mounting and grounding
Achieved by clamping onto standard 35 mm “top-hat” DIN-rail: 7.5 mm (low profile) or 15 mm (high profile).

EMC compliance
EN 50 081-2/EN 50 082-2, generic emission/immunity standards. These refer to appropriate IEC/CISPR standards.

General Specifications

Mounting details
TURCK MZ Series barriers pack closely together on DIN rails, permitting up to 132 barriers per meter of rail. A few factors need to be considered when calculating how many barriers will fit onto a given length of rail:

On the DIN rail, allow space for:
Barrier packing pitch: 7.4 mm
MZGT ground terminals: 10 mm each
MZSP insulating spacer: 14.7 mm (minimum of 2)

1) barriers and accessories cannot be mounted directly above an MZSP spacer when using a 7.5 mm rail. If the space above the spacer is needed, use a high-profile (15 mm) rail or low-profile screws, M6 x 16 with 1 mm heads.

2) to maintain rigidity of the DIN-rail when using MZSP spacers, the distance between spacers should not exceed 500 mm for 15 mm high-profile rail and 333 mm for 7.5 mm low-profile rail.

There is a provision to terminate a cable screen or ground return on the third terminal (6 or 3) on MZ Series barriers. Spare cores may be secured on the MZDB dummy barrier.

Grounding
MZ Series barriers must be securely grounded in order to perform their intended function. One connection is required, two are recommended using a 12 AWG minimum conductor. The resistance of the connection between barrier ground and ground electrode must be < 1 ohm. “Ground Electrode” is defined in the NEC, Article 250, or by other appropriate jurisdictional authority.
### Specifications

#### Single Channel, Positive Supply

<table>
<thead>
<tr>
<th>Type</th>
<th>Application Number*</th>
<th>Channel Number</th>
<th>( V_{\text{leakage}} @10 \text{ A} ) (V)</th>
<th>( V_{\text{MAX}} ) (V)</th>
<th>Maximum end-to-end resistance (( \Omega ))</th>
<th>Fuse / (fuse disc.) rating (mA)</th>
<th>Approval: CI I, II, III: Division 1; Groups -</th>
<th>Wiring Diagram**</th>
<th>ID Number</th>
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<tbody>
<tr>
<td>MZ22P1</td>
<td>–</td>
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<td>19.0</td>
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<td>27.0</td>
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* Applications begin on page 10

#### Single Channel, Negative Supply

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<th>( V_{\text{leakage}} @10 \text{ A} ) (V)</th>
<th>( V_{\text{MAX}} ) (V)</th>
<th>Maximum end-to-end resistance (( \Omega ))</th>
<th>Fuse / (fuse disc.) rating (mA)</th>
<th>Approval: CI I, II, III: Division 1; Groups -</th>
<th>Wiring Diagram**</th>
<th>ID Number</th>
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<tr>
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#### Dual Channel, Positive Supply

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<th>( V_{\text{MAX}} ) (V)</th>
<th>Maximum end-to-end resistance (( \Omega ))</th>
<th>Fuse / (fuse disc.) rating (mA)</th>
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#### Dual Channel, Negative Supply

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<th>( V_{\text{MAX}} ) (V)</th>
<th>Maximum end-to-end resistance (( \Omega ))</th>
<th>Fuse / (fuse disc.) rating (mA)</th>
<th>Approval: CI I, II, III: Division 1; Groups -</th>
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<tr>
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* Applications begin on page 10

#### Dual Channel, Positive Supply, Diode Return

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<th>Channel Number</th>
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<th>( V_{\text{MAX}} ) (V)</th>
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<th>Fuse / (fuse disc.) rating (mA)</th>
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<th>Wiring Diagram**</th>
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<td>K1026</td>
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<td>MZ87PX</td>
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<td>MZ87P1</td>
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<td>342</td>
<td>(50)</td>
<td>A-G</td>
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<td>K1027</td>
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<td>MZ87PX1</td>
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<td>324</td>
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<td>FM: A-G, CSA: C-G</td>
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#### Dual Channel, Low Level Alternating Potential

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<tr>
<th>Type</th>
<th>Application Number*</th>
<th>Channel Number</th>
<th>( V_{\text{leakage}} @10 \text{ A} ) (V)</th>
<th>( V_{\text{MAX}} ) (V)</th>
<th>Maximum end-to-end resistance (( \Omega ))</th>
<th>Fuse / (fuse disc.) rating (mA)</th>
<th>Approval: CI I, II, III: Division 1; Groups -</th>
<th>Wiring Diagram**</th>
<th>ID Number</th>
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<tbody>
<tr>
<td>MZ55A</td>
<td>6</td>
<td>1</td>
<td>0.6 (1 ( \mu \text{A} ))</td>
<td>3.0</td>
<td>24 – 100</td>
<td>A-G</td>
<td>6</td>
<td>K1011</td>
<td></td>
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</tbody>
</table>

* 24 \( \Omega \pm 0.15 \Omega \) at 20°C, channels track within 0.15 \( \Omega \) from -20°C to 60°C.

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** Courtesy of Steven Engineering, Inc. 230 Ryan Way, South San Francisco, CA, 94080-6370  Main Office: (650) 588-9200  Outside Local Area: (800) 258-9200  www.stevenengineering.com
**Wiring Diagrams**

Note:
The represented color of each unit is not the actual color of the safety barrier.
MZ barriers are only available in yellow.

Note:
Roman numerals refer to the channel number while the English numbers refer to the wiring ports.

<table>
<thead>
<tr>
<th>Approvals</th>
<th>Factory Mutual</th>
<th>Canadian Standards Association</th>
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<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>Channel</strong></td>
<td><strong>Voc (V)</strong></td>
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<tr>
<td>MZ22P1</td>
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<td>22</td>
</tr>
<tr>
<td>MZ28P</td>
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<td>28</td>
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<tr>
<td>MZ28P1</td>
<td>I</td>
<td>28</td>
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<td>MZ28PX1</td>
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<td>28</td>
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<td>MZ29P</td>
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<td>28</td>
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<tr>
<td>MZ28N</td>
<td>I</td>
<td>28</td>
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<tr>
<td>MZ28N1</td>
<td>I</td>
<td>28</td>
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<tr>
<td>MZ64N, MZ64N1</td>
<td>I &amp; II</td>
<td>15</td>
</tr>
<tr>
<td>MZ62P1</td>
<td>Each</td>
<td>10</td>
</tr>
<tr>
<td>MZ28P1</td>
<td>Each</td>
<td>10</td>
</tr>
<tr>
<td>MZ28PX</td>
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<tr>
<td>MZ96N</td>
<td>I &amp; II</td>
<td>28</td>
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<tr>
<td>MZ87P1</td>
<td>Each</td>
<td>10</td>
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<tr>
<td>MZ67P1</td>
<td>Each</td>
<td>20</td>
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<td>MZ68N</td>
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<tr>
<td>MZ55A</td>
<td>I &amp; II</td>
<td>6</td>
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**Wiring Diagrams Notes:**

1) Single Channel, Positive Supply
2) Single Channel, Negative Supply
3) Dual Channel, Positive Supply
4) Dual Channel, Negative Supply
5) Dual Channel, Positive Supply, Diode Return
6) Dual Channel, Low Level Alternating Potential

**Note:**
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www.stevenengineering.com
## Specifications

### Three Channel, Alternating Potential, Low Level

<table>
<thead>
<tr>
<th>Type</th>
<th>Application Number*</th>
<th>Channel Number</th>
<th>$V_{WKG}$ at 10 A leakage (V)</th>
<th>$V_{MAX}$ (V)</th>
<th>Maximum end-to-end resistance (Ω)</th>
<th>Fuse / (fuse disc.) rating (mA)</th>
<th>Approval: CI I, II, II; Division 1; Groups -</th>
<th>Wiring Diagram**</th>
<th>ID Number</th>
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<tbody>
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<td>A-G</td>
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<td>K1012</td>
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<td>0.3 (1 µA)</td>
<td>2.3</td>
<td>24*</td>
<td>100</td>
<td>A-G</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii</td>
<td>0.3 (1 µA)</td>
<td>2.3</td>
<td>24*</td>
<td>100</td>
<td>A-G</td>
<td></td>
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* Applications begin on page 10  

** Wiring Diagrams located on facing page

### Dual Channel, Alternating Potential, Higher Level

<table>
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<tr>
<th>Type</th>
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<th>Maximum end-to-end resistance (Ω)</th>
<th>Fuse / (fuse disc.) rating (mA)</th>
<th>Approval: CI I, II, II; Division 1; Groups -</th>
<th>Wiring Diagram**</th>
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<td>i</td>
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<td>8.3</td>
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<td>10.9</td>
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### Dual Channel, Alternating Potential, Star Connected

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<th>Fuse / (fuse disc.) rating (mA)</th>
<th>Approval: CI I, II, II; Division 1; Groups -</th>
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<tbody>
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<td>A-G</td>
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<td>+24.0/-22.3</td>
<td>+25.9/-23.8</td>
<td>640</td>
<td>50</td>
<td>A-G</td>
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</table>

### Active Barrier for 2-wire 4-20 mA Loops and “Smart” Transmitters

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply Voltage</th>
<th>Channel Number</th>
<th>Supply current @ 20 mA loop current</th>
<th>Voltage available to transmitter and lines</th>
<th>Safe area load</th>
<th>Output Current</th>
<th>Accuracy</th>
<th>Wiring Diagram**</th>
<th>ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MZ06R1</td>
<td>20-35 VDC</td>
<td>- - -</td>
<td>40 mA with 28 V supply 45 mA with 24 V supply 60 mA with 20 V supply</td>
<td>16.0 V @ 20 mA with 250 Ω load 11.25 V @ 20 mA with 500 Ω load</td>
<td>0-500 Ω</td>
<td>0-23.6 mA</td>
<td>±2 µmA (4-20 mA)</td>
<td>4</td>
<td>K1000</td>
</tr>
<tr>
<td>MZ06R2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>K1001</td>
</tr>
</tbody>
</table>

** Wiring Diagrams located on facing page

### Active Barrier for Discrete Inputs

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply Voltage</th>
<th>Channel Number</th>
<th>Supply Current</th>
<th>Voltage drop</th>
<th>Output Current</th>
<th>Leakage to ground</th>
<th>Wiring Diagram**</th>
<th>ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MZ07P2</td>
<td>10-35 VDC</td>
<td>- - -</td>
<td>At $V_i &lt; 26$ V: $I_{tump} + 1.5$ mA  At $V_i &gt; 28$ V: Limited to 50 mA</td>
<td>Terminals 1 to 4: $(I_{tump} x 348 Ω) + 1.2V$ Terminals 2 to 5: $(I_{tump} x 31 Ω) + 0.9V$</td>
<td>Up to 35 mA 1.5 mA max.</td>
<td>5</td>
<td>K1002</td>
<td></td>
</tr>
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</table>

### Active Barrier for Discrete Outputs

<table>
<thead>
<tr>
<th>Type</th>
<th>Supply Voltage</th>
<th>Channel Number</th>
<th>Supply Current</th>
<th>Voltage drop</th>
<th>Output Current</th>
<th>Leakage to ground</th>
<th>Wiring Diagram**</th>
<th>ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>MZ08P2</td>
<td>10-35 VDC</td>
<td>- - -</td>
<td>At $V_i &lt; 26$ V: $I_{tump} + 1.5$ mA  At $V_i &gt; 28$ V: Limited to 50 mA</td>
<td>Terminals 1 to 4: $(I_{tump} x 348 Ω) + 1.2V$</td>
<td>Up to 35 mA 1.5 mA max.</td>
<td>6</td>
<td>K1003</td>
<td></td>
</tr>
</tbody>
</table>

** Wiring Diagrams located on facing page

---

* 24 Ω ± 0.15 Ω at 20°C, channels track within 0.15 Ω from -20° to 60°C.
### Wiring Diagrams

1) Three Channel - Low Level

2) Dual Channel - High Level

3) Dual Channel - Star Connected

4) Active Barrier for 2-wire mA Loops

5) Active Barrier for Discrete Inputs

6) Active Barrier for Discrete Outputs

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**Approvals**

<table>
<thead>
<tr>
<th>Model</th>
<th>Channel</th>
<th>Voc (V)</th>
<th>Isc (A)</th>
<th>Ca AB/CE/DFG</th>
<th>La AB/CE/DFG</th>
<th>Voc (V)</th>
<th>Isc (A)</th>
<th>Ca AB/CE/DFG</th>
<th>La AB/CE/DFG</th>
<th>Vocc max</th>
<th>Vocc min</th>
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<tbody>
<tr>
<td>MZ6A</td>
<td>I</td>
<td>2</td>
<td>173</td>
<td>1000/3000/8000</td>
<td>0.75/5.4/9.99</td>
<td>2</td>
<td>173</td>
<td>1000/3000/8000</td>
<td>0.75/5.4/9.99</td>
<td>2</td>
<td>11.56</td>
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<tr>
<td></td>
<td>Any 2</td>
<td>(4)</td>
<td>(346)</td>
<td>404/1214/3239</td>
<td>0.34/1.42/2.52</td>
<td>4</td>
<td>346</td>
<td>404/1214/3239</td>
<td>0.34/1.42/2.52</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>I, II, III</td>
<td>(519)</td>
<td>404/1214/3239</td>
<td>0.15/0.66/1.12</td>
<td>4</td>
<td>519</td>
<td>404/1214/3239</td>
<td>0.15/0.66/1.12</td>
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<td></td>
</tr>
<tr>
<td>MZ61A2</td>
<td>Each</td>
<td>9</td>
<td>100</td>
<td>5.0/15.0/40.0</td>
<td>3.6/10.8/28.8</td>
<td>9</td>
<td>100</td>
<td>5.0/15.0/40.0</td>
<td>3.6/10.8/28.8</td>
<td>9</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>I &amp; II</td>
<td>(18)</td>
<td>(200)</td>
<td>0.42/1.26/3.36</td>
<td>0.52/2.0/7.6</td>
<td>18</td>
<td>200</td>
<td>0.42/1.26/3.36</td>
<td>0.52/2.0/7.6</td>
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<tr>
<td>MZ61AV, MZ61AV1</td>
<td>Each</td>
<td>9</td>
<td>25</td>
<td>4.6/13.8/36.8</td>
<td>52.0/156/416</td>
<td>9</td>
<td>25</td>
<td>4.6/13.8/36.8</td>
<td>52.0/156/416</td>
<td>9</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>I &amp; II</td>
<td>(18)</td>
<td>(52)</td>
<td>0.42/1.26/3.36</td>
<td>13.0/39.0/104</td>
<td>18</td>
<td>52</td>
<td>0.42/1.26/3.36</td>
<td>13.0/39.0/104</td>
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<tr>
<td>MZ64A2</td>
<td>Each</td>
<td>12</td>
<td>12</td>
<td>1.6/4.8/12.8</td>
<td>230/690/1840</td>
<td>12</td>
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<td>1000</td>
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<tr>
<td></td>
<td>I &amp; II</td>
<td>(24)</td>
<td>(24)</td>
<td>0.2/0.6/1.6</td>
<td>60/180/480</td>
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<tr>
<td>MZ66AV, MZ66AV1</td>
<td>Each</td>
<td>12</td>
<td>148</td>
<td>1.8/5.4/14.4</td>
<td>1.27/4.8/12.8</td>
<td>12</td>
<td>148</td>
<td>1.8/5.4/14.4</td>
<td>1.27/4.8/12.8</td>
<td>12</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>I &amp; II</td>
<td>(22.3)</td>
<td>296</td>
<td>0.2/0.6/1.6</td>
<td>0.2/1.02/2.72</td>
<td>22.3</td>
<td>296</td>
<td>0.2/0.6/1.6</td>
<td>0.2/1.02/2.72</td>
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<tr>
<td>MZ65A2</td>
<td>Each</td>
<td>15</td>
<td>150</td>
<td>0.75/2.25/6.0</td>
<td>1.39/4.95/13.2</td>
<td>15</td>
<td>150</td>
<td>0.75/2.25/6.0</td>
<td>1.39/4.95/13.2</td>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>I &amp; II</td>
<td>(15)</td>
<td>300</td>
<td>0.2/0.96/2.56</td>
<td>0.2/0.96/2.56</td>
<td>15</td>
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<td>0.2/0.96/2.56</td>
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<tr>
<td>MZ7BA2</td>
<td>Each</td>
<td>28</td>
<td>47</td>
<td>0.13/0.39/1.04</td>
<td>16/48/128</td>
<td>28</td>
<td>47</td>
<td>0.13/0.39/1.04</td>
<td>16/48/128</td>
<td>28</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>I &amp; II</td>
<td>(28)</td>
<td>(94)</td>
<td>0.13/0.39/1.04</td>
<td>4.2/12.6/33.6</td>
<td>28</td>
<td>94</td>
<td>0.13/0.39/1.04</td>
<td>4.2/12.6/33.6</td>
<td>30</td>
<td>600</td>
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<tr>
<td>MZ60A, MZ60A1</td>
<td>Each</td>
<td>9</td>
<td>120</td>
<td>4.5/13.5/36.0</td>
<td>2.5/7.5/20.0</td>
<td>9</td>
<td>120</td>
<td>4.5/13.5/36.0</td>
<td>2.5/7.5/20.0</td>
<td>9</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>I &amp; II</td>
<td>(9)</td>
<td>(240)</td>
<td>4.5/13.5/36.0</td>
<td>0.29/1.95/5.2</td>
<td>9</td>
<td>240</td>
<td>4.5/13.5/36.0</td>
<td>0.29/1.95/5.2</td>
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<td>–</td>
</tr>
<tr>
<td>MZ68R1, MZ68R2</td>
<td>I</td>
<td>27.8</td>
<td>92</td>
<td>0.14/0.43/1.16</td>
<td>4.27/17.1/34.9</td>
<td>28</td>
<td>93</td>
<td>0.13/0.39/1.04</td>
<td>4.2/12.6/33.6</td>
<td>28</td>
<td>300</td>
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<tr>
<td>MZ07P2</td>
<td>I</td>
<td>28</td>
<td>93</td>
<td>0.13/0.39/1.04</td>
<td>4.2/12.6/33.6</td>
<td>28</td>
<td>93</td>
<td>0.13/0.39/1.04</td>
<td>4.2/12.6/33.6</td>
<td>28</td>
<td>300</td>
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<tr>
<td></td>
<td>II</td>
<td>28</td>
<td>0</td>
<td>0.13/0.39/1.04</td>
<td>61.5/227/506</td>
<td>28</td>
<td>0</td>
<td>0.13/0.39/1.04</td>
<td>61.5/227/506</td>
<td>28</td>
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<tr>
<td>MZ08P2</td>
<td>I</td>
<td>28</td>
<td>93</td>
<td>0.13/0.39/1.04</td>
<td>4.2/12.6/33.6</td>
<td>28</td>
<td>93</td>
<td>0.13/0.39/1.04</td>
<td>4.2/12.6/33.6</td>
<td>28</td>
<td>93</td>
</tr>
</tbody>
</table>

Note:
The represented color of each unit is not the actual color of the safety barrier. MZ barriers are only available in yellow.

Note:
Roman numerals refer to the channel number while the English numbers refer to the wiring ports.

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Courtesy of Steven Engineering, Inc. Ÿ 230 Ryan Way, South San Francisco, CA, 94080-6370 Ÿ Main Office: (650) 588-9200 Ÿ Outside Local Area: (800) 258-9200 Ÿ www.stevenengineering.com
**Application 1**

**2-Wire Transmitters, 4-20 mA**

The MZ87P / MZ87P1, or the higher power MZ87PX / MZ87PX1, are recommended for use with conventional or ‘smart’ 4-20 mA transmitters supplied by a closely regulated supply. These provide up to 14.2 V at 20 mA to a transmitter and field wires as well as 5 V for the typical 250 Ω load. The MZ06R1/MZ06R2 is recommended for applications supplied by an unregulated supply (up to 35 V). It provides 16 V to the transmitter and field wires at 20 mA as well as 5 V to the measurement load.

**Application 2**

**Vibration Probes**

Vibration monitoring equipment is almost exclusively powered by a -24 VDC power supply.

The negatively polarized dual channel MZ96N / MZ96N1 is recommended for use in these applications.

**Application 3**

**Thermocouples and mV Sources**

The MZ60A / MZ60A1 is recommended for use with thermocouples and other mV sources.

This dual-channel alternating potential barrier provides at least 7 V of ‘float’ for these low-level signals.

**Application 4**

**Turbine Flowmeters and AC Sensors**

The MZ60A / MZ60A1 is recommended for use with many low-level AC sensors, turbine flowmeters, photocells, etc.
**Application 6**

**RTDs**

A dual-channel MZ55A is the most economical choice for 3-wire RTDs. This barrier is suitable for use with a floating bridge - the two leads from the bridge arms are protected by the barrier with the third lead (supply return) being grounded by the barrier. The barrier has a low end-to-end resistance of only 24 Ω/channel to minimize span changes. Its channels track within 0.15 Ω between -20° and +60°C to minimize zero shift with temperature.

If the bridge circuit is grounded, a third barrier channel is needed. The three-channel MZ56A provides this configuration. This barrier also provides additional accuracy when used with an ungrounded bridge, a configuration that cancels the small errors due to barrier leakage. Channels 2 (terminals 2-5) and 3 (terminals 3-6) track within 0.15 Ω between -20° and +60°C. 4-wire constant-current circuits do not need matched barrier resistance. These circuits can be protected more economically by two MZ60A / MZ60A1 barriers. If the loop resistance presents problems for the monitoring equipment, two MZ55A barriers may be used in the same configuration.

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**Application 5**

**Potentiometers**

The MZ60A / MZ60A1 is the simplest choice for use with slidewire displacement transducers and other devices that are essentially potentiometers.
Application 7

Single Strain Gauge Bridges

This connection, using two or three barriers, is safe for Groups A-G. With the MZ61A2, the circuit is powered from a 14 V, 230 Ω source. If the bridge resistance is 230 Ω, the bridge voltage is 7 V. If the bridge resistance is 350 Ω, the bridge voltage is 8.4 V. An MZ64A2 may be used to sense the bridge supply voltage. An MZ61A2 is used for the signal return. Alternately, if an MZ66AV1 is used for the bridge supply, the bridge voltage is 12.3 V for a 350 Ω bridge. In this case, MZ61AV1 barriers are used for the sense and signal lines.

Application 8

Multiple Strain Gauge Bridges

Often there is a need to monitor two or more load cells in parallel. The resultant higher current produces higher voltage drops. The lower end-to-end resistance of the MZ66AV is an advantage in these systems. The MZ66AV supplies power to the bridges and two MZ61AV or MZ61AV1 barriers are used for the sense and signal lines. For systems using 350 Ω bridges, the following voltages are available to the system from a +10 V supply:

1 bridge: 12.8 V
2 bridges: 9.4 V
3 bridges: 7.5 V
4 bridges: 6.2 V
Application 9

Controller Outputs (I/P Converters)

The single-channel MZ28P / MZ28P1 is the recommended choice for most controller outputs. Its end-to-end resistance of 332 / 342 Ω, producing voltage drops of 6.7 V / 6.9 V at 20 mA, is compatible with most modern equipment. Higher-power versions are also available: the MZ28PX1 (275 Ω, 5.5 V drop) is suitable for Group A-G locations; the MZ29PX1 (211 Ω, 4.2 V drop) is suitable for Group C-G locations. For controllers in which the control element is located in the return leg, the dual-channel MZ87P / MZ87P1 is recommended, as the 26 V return channel allows the control signal to be completely turned off. Its voltage drop is 8.2 V / 8.6 V at 20 mA. A higher-power version, the MZ87PX / MZ87PX1 (6.72 V / 7.24 V drop) is also available and is suitable for Group A-G locations.

Application 10

Discrete Inputs (Dry Contacts)

The dual-channel MZ87P / MZ87P1 is the recommended choice in systems with a closely regulated supply. The active MZ07P2 is recommended when the supply is not closely regulated (up to 35 V).

Application 11

Discrete Outputs

(Solenoid Valves, LEDs, Alarms, etc.)

The MZ28P / MZ28P1 is recommended for systems in which the control switch is in the supply leg. Higher-powered versions are available: the MZ28PX1 is suitable for Group A-G locations; the MZ29PX1 is suitable for Group C-G locations. For systems in which the control switch is in the return leg, the dual-channel MZ87P / MZ87P1 is recommended, or alternately, the higher-power MZ87PX / MZ87PX1. For systems without closely regulated supply voltage, the MZ08P2 is recommended.
The TD-3.5L is a loop-powered 4/20 mA indicator needing less than 1 V. The unit features linear or square-root extraction options. The latter is set by a link and directly indicates the flow from a differential pressure measurement loop using an orifice plate, Dall tube, venturi, etc. This mode is precise, being based on a pulse-width/pulse-height squaring circuit in a feedback loop.

Considered simple apparatus, TD-3.5L indicators can be inserted directly into any IS loop without further approval. They can be mounted in Division 1, Group A areas on posts or pipes, flat surfaces, or control-room panels.

A set of labels is supplied, pre-printed with a selection of legends or, alternatively, one of two blanks also supplied can be user-labeled as required.
**Specifications**

**Unit location**
Class I, Div 1, Group A hazardous areas

**Voltage requirements**
<1.0 V, loop-powered

**Input range**
4 to 20 mA

**Over range**
200 mA maximum without damage

**Display**
7 segment LCD, 3½- digit with 25 mm high characters

**Range**
~1999 to 1999 (3998 digits)

**Zero and span**
- Setting: Anywhere within range
- Mode: Set against internal references equivalent to 4 and 20 mA, selected by jumper links
- Method: Jumper links and 10-turn potentiometers
- Access: Behind front fascia

**Resolution**
1 digit

**Interaction**
None

**Scale direction**
Normal / reverse; selected by jumper link

**Decimal point**
Any position or none; selected by jumper link

**Out-of-range indication**
Display of all decimal points and under-range arrow (←) if input <3.77 mA at 25°C
Display of +1 or –1 for readings >±1999

**Operating modes**
Linear & square root selected by jumper link

**Root extraction error**
±16 µA ±1 µA / °C at input for signals between 4.16 and 20 mA

**Non-linearity and hysteresis**
±1 digit

**Effects of temperature on accuracy**
- Zero: ±0.1 digit / °C
- Suppression / elevation (E*): ±0.02% of E, digits / °C
- Span: ±0.02% of reading (R*), digits / °C
- * See chart for E and R

**Ripple rejection**
<1 digit error with 1 mA peak-to-peak ripple at 50 Hz

**Electrical safety**
Input terminals (nos. 1 and 2): simple apparatus (≤1.2 V, ≤0.1 A, ≤20 µl, ≤25 mW) Ceq=0, Leq=0. Can be connected without further approval into any IS loop with open-circuit voltage <60 V and short-circuit current <200 mA (application is governed by the entity concept).

**EMC compliance**
EN 50 081-2/EN 50 082-2, generic emission / immunity standards. These refer to appropriate IEC / CISPR standards
• Up to 100 dBA output
• 24 different sounds
• Two distinctive signals can be called remotely
• Easy to install in all hazardous areas
• Low power consumption offers application flexibility
• IEC IP 65 weatherproof enclosure rating

TA-5DB intrinsically safe multi-tone sounders are particularly suited for use in areas of high ambient noise.

24 tones can be selected via 5-way DIP switches, with a second tone via a ‘third wire’ terminal. The units are polarized and a chain of them may be fitted with a terminating resistor for reverse polarity testing and to permit line monitoring. The sounders have low frequencies to conform to BS 5839: Part 1: 1980, making them ideal for fire alarm systems and other annunciator applications. In safe areas, the sounders can be powered directly from 24 VDC. The absence of any current limitation increases the output by approximately 4 dB. The sounders give a useful output down to 8 V.

The IP 65 enclosure enables TA-5DB sounders to withstand the harsh environmental conditions found offshore as well as those of the oil, gas and chemical industries. The tough construction enhances the reliability of the solid-state piezoelectric sounder.

In addition, the low surface temperature means the unit can be used in areas where flammable dusts may be present. The twinned-pair inlet terminals and deep bases are convenient for looping to other circuits or for siting terminating resistors. The base has two knock-outs that will accommodate a 20 mm conduit, or PG13.5 or 20 mm cable glands and their appropriate sealing washers and lock nuts.
# TA-5DB IS Sounder Specifications

**Location**  
Class I, Div 1, Group A hazardous areas

**Supply**  
Min./max. at terminals 8–28 VDC  
Current (approx.) through interface: 12 mA

**Sound**  
24 tones, DIP-switch programmable  
Output level up to 100 dBA  
Control range to 15 dB  
Two sounders driven from the same IS power source reduce the individual output by 1.5 dB (three sounders by 2.2 dB).

**Electrical safety**  
$V_{\text{max}}$: in = 28 V, $I_{\text{max}}$: in = 147 mA, $W_{\text{max}}$: in = 0.81 W, $Leq$ & $Ceq$ = 0

**Suitable shunt-diode safety barriers**  
MZ28P, MZ28P1, MZ22P1, MZ07P2, MZ08P2, MZ87P1, MZ87P, MZ87PX, MZ87PX1

**Suitable isolating interfaces**  
MK72-S02-Ex0/24VDC  
MK72-S01-Ex0/24VDC

**Terminals**  
For conductors up to 14 AWG

**Recommended cable**  
20 AWG to 14 AWG with grounded shield and insulating sheath

**Protection**  
IEC IP 65

**Ambient temperature**
- Operating: -4°F to +131°F (-20°C to +55°C)
- Storage: -40°F to +176°F (-40°C to +80°C)

**Humidity**  
5 to 95% RH

**Construction**  
ABS enclosure with encapsulated electronic module

**Mounting**  
Surface

**Weight**  
9.6 oz (300 g)

**EMC compliance**  
EN 50 081-2/EN 50 082-2, generic emission/immunity standards. These refer to appropriate IEC / CISPR standards
Mounting / Grounding

DIN 35S standard DIN rail .................................. 6943000
The MZ-series barriers mount easily and quickly onto standard DIN rails (35 X 7.5 mm), which also act as the intrinsically safe ground. Made of steel with chromated cadmium finish, the DIN rail withstands use in potentially corrosive atmospheres. Supplied in 1 meter lengths.

MZSP Insulating Spacer ........................................... K1035
Attaches to the base of a DIN rail at either end or at intervals (depending upon DIN-rail length) to isolate the IS ground from panel ground.

MZGT Ground Terminal ........................................... K1036
Provides connections for routing the IS ground from the DIN rail to an appropriate ground electrode. Two recommended per discrete length of DIN rail.

MZDB Dummy Barrier ............................................ K1032
Used for securing and grounding unused cables and shields, and as feed-through connection for power comb.

Tagging

MZIDL Labels ...................................................... K1038
Self-adhesive labels for pre-printing supplied on sheets of 120.

MZIDC Label Carrier ............................................. K1037
The MZIDC mounts on top of an individual barrier to identify barrier details.

Miscellaneous

MZPC Power Comb .................................................. K1039
Feeds a 24 VDC supply to a maximum of 40 barriers in a single column. The comb and its teeth are shaped so that by deflecting the comb, barriers may be inserted into or removed from a column without having to disturb the remaining connections. Can be sub-divided easily to feed smaller numbers of barriers.

MZFD50 Replaceable Fuse ........................................ K1033
Spare secondary 50 mA fuses supplied in packs of five.

MZLD Removable Links .......................................... K1034
Spare “latch-out” links supplied in packs of five.
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