Long Distance Square Inductive Proximity Sensor

E2Q5

- M12 Plug-in connection
- Integrated short circuit and reverse polarity protection
- Active face positioning: Y-axis 15°, X-axis 90° increments

Square Proximity Sensor

Ordering Information

<table>
<thead>
<tr>
<th>Sensing distance</th>
<th>Connection</th>
<th>Active face</th>
<th>NO</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mm shielded</td>
<td>Plug-in connector</td>
<td>Changable</td>
<td>NPN</td>
<td>E2Q5-N20E1-M1, E2Q5-N20E3-M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PNP</td>
<td>E2Q5-N20F1-M1, E2Q5-N20F3-M1</td>
</tr>
<tr>
<td>40 mm non-shielded</td>
<td>Plug-in connector</td>
<td>Changable</td>
<td>NPN</td>
<td>E2Q5-N40ME1-M1, E2Q5-N40ME3-M1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PNP</td>
<td>E2Q5-N40MF1-M1, E2Q5-N40MF3-M1</td>
</tr>
</tbody>
</table>
## Rating/performance

<table>
<thead>
<tr>
<th>Item</th>
<th>shielded</th>
<th>non-shielded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>E2Q5-N20-M1</td>
<td>E2Q5-N40-M3-M1</td>
</tr>
<tr>
<td>Sensing distance Sn</td>
<td>20 mm ± 10%</td>
<td>40 mm ± 10%</td>
</tr>
<tr>
<td>Standard target size, L x W x H, Fe 37</td>
<td>60 x 60 x 1 mm</td>
<td>120 x 120 x 1 mm</td>
</tr>
<tr>
<td>Setting distance</td>
<td>0 to 16,2 mm</td>
<td>0 to 32,4 mm</td>
</tr>
<tr>
<td>Switching frequency</td>
<td>150 Hz</td>
<td></td>
</tr>
<tr>
<td>Sensing object</td>
<td>Ferrous metals</td>
<td></td>
</tr>
<tr>
<td>Differential travel</td>
<td>15% max. of sensing distance Sn</td>
<td></td>
</tr>
<tr>
<td>Operating voltage</td>
<td>10 to 30 VDC</td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>20 mA max.</td>
<td></td>
</tr>
<tr>
<td>Control output Type</td>
<td>E2Q5-N1E1-M: NPN - NO</td>
<td>E2Q5-N1F1-M: PNP - NO</td>
</tr>
<tr>
<td></td>
<td>E2Q5-N3E3-M: NPN - NO + NC</td>
<td>E2Q5-N3F3-M: PNP - NO + NC</td>
</tr>
<tr>
<td></td>
<td>E2Q5-N3E1-M: PNP - NO</td>
<td>E2Q5-N3F1-M: NPN - NO + NC</td>
</tr>
<tr>
<td>Load</td>
<td>200 mA max.</td>
<td></td>
</tr>
<tr>
<td>On-stage voltage drop</td>
<td>3 VDC max. (at 200 mA load current)</td>
<td></td>
</tr>
<tr>
<td>Circuit protection</td>
<td>Reverse polarity, output short circuit</td>
<td></td>
</tr>
<tr>
<td>Indicator</td>
<td>Operating indicator (yellow LED), operating voltage (green LED)</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>Operating: -25° to 85°C</td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>35 to 95% RH</td>
<td></td>
</tr>
<tr>
<td>Influence of temperature</td>
<td>± 10% max. of Sn at 23° in temperature range of -25° to 70°C</td>
<td></td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>1.500 VAC, 50/60 Hz for 1 min. between current carry parts and case</td>
<td></td>
</tr>
<tr>
<td>Electromagnetic compatibility EMC</td>
<td>EN 60947-5-2</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>10 to 55 Hz, 1 mm amplitude according IEC 60068-2-6</td>
<td></td>
</tr>
<tr>
<td>Shock resistance</td>
<td>Approx. 30 G for 11 ms according to IEC 60068-2-27</td>
<td></td>
</tr>
<tr>
<td>Protection degree</td>
<td>IP67 IEC 60529, IP69K DIN 40050</td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>Connector M12 plug, 4 pins</td>
<td></td>
</tr>
<tr>
<td>Material</td>
<td>Case PBT</td>
<td>Sensing face PBT</td>
</tr>
<tr>
<td>Approvals</td>
<td><img src="logo.png" alt="Certified" /></td>
<td><img src="logo.png" alt="Listed" /></td>
</tr>
</tbody>
</table>
## NPN output

<table>
<thead>
<tr>
<th>Model</th>
<th>Operation mode</th>
<th>Timing chart</th>
<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2Q5-N20E1-M1 E2Q5-N40E1-M1</td>
<td>NO</td>
<td></td>
<td><img src="image" alt="NO Output Circuit Diagram" /></td>
</tr>
<tr>
<td>E2Q5-N20E3-M1 E2Q5-N40E3-M1</td>
<td>NO + NC</td>
<td></td>
<td><img src="image" alt="NO + NC Output Circuit Diagram" /></td>
</tr>
</tbody>
</table>

**Connector Pin Arrangement**

Note: Terminal 2 is not used

### Output Circuit Diagram

- **E2Q5-N20E1-M1**
- **E2Q5-N40E1-M1**
- **E2Q5-N20E3-M1**
- **E2Q5-N40E3-M1**

**Sensing object (%)**

- Sensing zone
- Non-sensing zone

**Rated sensing distance**

- Sensing zone
- Non-sensing zone
- Proximity

**Sensor**

- ON
- OFF

**Yellow indicator**

- ON
- OFF

**Control output**

- NO
- NC

**Load**

- Brown (1)
- Black (4)
- Blue (3)
- Brown (1)
- Black (4)
- Blue (3)

**Proximity Sensor main circuits**

- 4.7kΩ

**Operation Indicator (yellow)**

- 4.7kΩ
### PNP output

<table>
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<tr>
<th>Model</th>
<th>Operation mode</th>
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<th>Output circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2Q5-N20F1-M1</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2Q5-N40F1-M1</td>
<td>NO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2Q5-N20F3-M1</td>
<td>NO + NC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2Q5-N40F3-M1</td>
<td>NO + NC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***Note: Terminal 2 is not used***

### Connector Pin Arrangement

#### E2Q5-N20F1-M1, E2Q5-N40F1-M1

- **Brown**: +V
- **Black**: 0 V
- **Blue**: NO + NC

#### E2Q5-N20F3-M1, E2Q5-N40F3-M1

- **Brown**: +V
- **White**: Load
- **Black**: NO
- **Blue**: NC

### Dimensions (Unit:mm)

**E2Q5-...-M1 type**

- **LED yellow**: ø 5.5
- **LED green**: ø 5.5
- **M12 x 1**: 40
- **40**: 60
- **46**: 67
- **5.5**:

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**Inductive Sensors**

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**D-4**
Precautions

Power supply
Do not impose an excessive voltage on the E2Q2, otherwise it may explode or burn.
Do not connect an AC power supply to any DC model. If AC power (100 VAC or more) is supplied to the sensor, it may explode or burn.

Be sure to abide by the following precautions for the safe operation of the Sensor.

Wiring
Power Supply Voltage and Output Load
Power Supply Voltage
Make sure that the power supply to the Sensor is within the rated voltage range. If a voltage exceeding the rated voltage range is supplied to the Sensor, it may explode or burn.

Load Short-circuiting
Do not short-circuit the load, otherwise the Sensor may be damaged.

Connection without Load
Do not connect the power supply to the Sensor with no load connected, otherwise the internal elements may explode or burn.

Operating Environment
Do not use the Sensor in locations with explosive or flammable gas.

Correct Use

Design
Effects of Surrounding Metal
Provide a minimum distance between the Sensor and the surrounding metal as shown in the table below.

<table>
<thead>
<tr>
<th>Model</th>
<th>Length</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>E2Q5-N20-M1</td>
<td></td>
<td>45</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>E2Q5-N40M-M1</td>
<td></td>
<td>120</td>
<td>300</td>
<td>40</td>
</tr>
</tbody>
</table>

E2Q5-N20-M1
E2Q5-N40M-M1

Mutual Interference
If more than one Sensor is located in parallel, ensure to maintain enough space between adjacent Sensors to suppress mutual interference as provided in the following diagram.

Power Reset Time
The Sensor is ready to operate within 300 ms after the Sensor is turned ON. If the load and Sensor are connected to independent power supplies respectively, be sure to turn ON the Sensor before supplying power to the load.

Power OFF
The Proximity Sensor may output a pulse signal when it is turned OFF. Therefore, it is recommended that the load be turned OFF before turning OFF the Proximity Sensor.

Power Supply Transformer
When using a DC power supply, make sure that the DC power supply has an insulated transformer. Do not use a DC power supply with an auto-transformer.

Sensing Object
The sensing distance of the Proximity Sensor vary with the metal coating on sensing objects.

Wiring
High-tension cables
Wiring through Metal conduit:
If there is power or high-tension line near the cable of the Proximity Sensor, wire the cable through an independent metal conduit to prevent against Proximity Sensor damage or malfunction.
Mounting
Mounting the Sensor
The Proximity Sensor must be subjected to excessive shock with a hammer when it is installed, otherwise the Proximity Sensor may be damaged or lose its water-resistivity.

Maintenance and Inspection
Periodically perform the following checks to ensure stable operation of the Proximity Sensor over a long period of time.

- Check for mounting position, dislocation, looseness or distortion of the Proximity Sensor and sensing objects.
- Check for loose wiring and connections, improper contacts and line breakage.
- Check for attachment or accumulation of metal powder or dust.
- Check for abnormal temperature conditions and other environmental conditions.

Never disassemble or repair the Sensor.

Environment
Water Resistivity
Do not use the Proximity Sensor underwater, outdoors or in the rain.

Operating Environment
Be sure to use the Proximity Sensor within its operating ambient temperature range and do not use the Proximity Sensor outdoors so that its reliability and life expectancy can be maintained. Although the Proximity Sensor is water resistive, a cover to protect the Proximity Sensor from water or water-soluble machining oil is recommended so that its reliability and life expectancy can be maintained.

Do not use the Proximity Sensor in an environment with chemical gas (e.g., strong alkaline or acid gasses including nitric, chromic and concentrated sulfuric acid gases).

Inrush Current
A load that has a large inrush current (e.g., a lamp or motor) will damage the Proximity Sensor, in this case connect the load to the Proximity Sensor through a Relay.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. E47E-EN-01 In the interest of product improvement, specifications are subject to change without notice.