Pickering Series 116

Single-in-Line SIL/SIP Reed Relays

10 Watts switching - Very high packing density
1 Form A stacks on 0.15 x 0.27 inches pitch

Features

- **SoftCenter®** construction (see adjacent diagram)
- Highest quality instrumentation grade switches
- Plastic package with internal mu-metal magnetic screen
- They take up the minimum of board area, conserving board space
- Insulation resistance greater than $10^{12} \Omega$
- 3, 5 or 12 Volt coils with or without internal diode
- 100% tested for dynamic contact resistance for guaranteed performance

The Pickering Series 116 is a range of Single-in-Line relays intended for very high density applications such as A.T.E. switching matrices or multiplexers.

They have a switch rating of 10 Watts, 0.5 A and are pin compatible with the Pickering Series 117 which have a lower power rating of 5 Watts and a lower profile height of 0.38 inches (9.65 mm).

Switches have sputtered ruthenium contacts making them ideal for low level or “cold” switching applications.

1 or 2 pole, Form A (energize to make) versions are available.

The single pole version uses the same switch and coil assembly as the Pickering Series 112.

Single switch versions require a board area of only 0.15 inches x 0.27 inches. This is one quarter of the board area of the industry standard 0.2 x 0.8 inches Single-in-Line package. The very small size of these relays often makes it possible to increase the functionality of existing designs without increasing the size of printed circuit boards.

The relays feature an internal mu-metal magnetic screen.

Mu-metal has the advantage of a high permeability and low magnetic remanence and eliminates problems that would otherwise occur due to magnetic interaction. Interaction is usually measured as a percentage increase in the voltage required to operate a relay when additional relays, stacked each side, are themselves operated. An unscreened device mounted on this pitch would have an interaction figure of around 40 percent. Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required.

3 volt, 5 volt or 12 volt coils are available. An internal Back E.M.F suppression diode is available as an option.

Typical Pickering **SoftCenter®** Construction

Unique Pickering Construction vs. Industry Standard Construction

- **SoftCenter®** soft inner encapsulation material to protect reed switch
- **SoftCenter®** soft outer encapsulation material to protect coil windings
- Self supporting coil to minimize magnetic drive
- Very hard melting material
- Coil winding
- Coil supporting bolts, spacers, spools and reduce magnetic drive
The reed switch in the Series 116 is suitable for low level or ‘cold’ switching. In accordance with Pickering convention, this switch is referred to as type number 2. There is no general purpose switch (type number 1) currently available in this series, but the type 2 is suitable for all applications if it is used within its specified ratings.

**Series 116 switch ratings** - The contact ratings for each switch type are shown below:

<table>
<thead>
<tr>
<th>Switch No.</th>
<th>Switch form</th>
<th>Power rating</th>
<th>Max. switch current</th>
<th>Max. carry current</th>
<th>Max. switching volts</th>
<th>Life expectancy (ops typical) (see Note 1 below)</th>
<th>Operate time inc bounce (max)</th>
<th>Release time</th>
<th>Special features</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>A</td>
<td>10 W</td>
<td>0.5 A</td>
<td>0.5 A</td>
<td>2 V</td>
<td>1 OP</td>
<td>0.5 ms</td>
<td>0.2 ms</td>
<td>All applications</td>
</tr>
</tbody>
</table>

**Operating voltages**

<table>
<thead>
<tr>
<th>Coil voltage - nominal</th>
<th>Must operate voltage - maximum at 25°C</th>
<th>Must release voltage - minimum at 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 V</td>
<td>2.25 V</td>
<td>0.3 V</td>
</tr>
<tr>
<td>5 V</td>
<td>3.75 V</td>
<td>0.5 V</td>
</tr>
<tr>
<td>12 V</td>
<td>9.0 V</td>
<td>1.2 V</td>
</tr>
</tbody>
</table>

**Coil data and type numbers**

<table>
<thead>
<tr>
<th>Device type</th>
<th>Type Number</th>
<th>Coil (V)</th>
<th>Max. contact resistance (initial)</th>
<th>Insulation resistance (minimum)</th>
<th>Switch to coil</th>
<th>Across switch</th>
<th>Closed switch to coil</th>
<th>Across open switch</th>
<th>Capacitance (typical) (see Note 2,3 below)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Form A (energize to make)</td>
<td>116-1-A-3/2D</td>
<td>3</td>
<td>250 Q</td>
<td>0.12 Q</td>
<td>10¹³ Q</td>
<td>10¹² Q</td>
<td>2.1 pF</td>
<td>0.2 pF</td>
<td></td>
</tr>
<tr>
<td>Switch No. 2</td>
<td>116-1-A-5/2D</td>
<td>5</td>
<td>500 Q</td>
<td>0.12 Q</td>
<td>10¹³ Q</td>
<td>10¹² Q</td>
<td>2.1 pF</td>
<td>0.2 pF</td>
<td></td>
</tr>
<tr>
<td>116-1-A-12/2D</td>
<td>12</td>
<td></td>
<td>750 Q</td>
<td>0.12 Q</td>
<td>10¹³ Q</td>
<td>10¹² Q</td>
<td>2.1 pF</td>
<td>0.2 pF</td>
<td></td>
</tr>
<tr>
<td>2 Form A (energize to make)</td>
<td>116-2-A-5/2D</td>
<td>5</td>
<td>375 Q</td>
<td>0.12 Q</td>
<td>10¹³ Q</td>
<td>10¹² Q</td>
<td>2.1 pF</td>
<td>0.2 pF</td>
<td></td>
</tr>
<tr>
<td>Switch No. 2</td>
<td>116-2-A-12/2D</td>
<td>12</td>
<td>750 Q</td>
<td>0.12 Q</td>
<td>10¹³ Q</td>
<td>10¹² Q</td>
<td>2.1 pF</td>
<td>0.2 pF</td>
<td></td>
</tr>
</tbody>
</table>

When an internal diode is required, the suffix D is added to the part number as shown in the table.

**Environmental specification**

**Standard operating temperature range**: -20 to +65 °C.

**Note**: The upper temperature limit can be extended to +125 °C if the coil drive voltage is increased to accommodate the resistance/temperature coefficient of the copper coil winding. This is approximately 0.4% per °C. This means that at 125 °C the coil drive voltage will need to be increased by approximately 40 x 0.4 = 16% to maintain the required magnetic drive level.

Please contact sales@pickeringrelay.com for assistance if necessary.

**3D Models**: Interactive models of the complete range of Pickering relay products can be downloaded from the web site.

**Internal Mu-metal Magnetic Screen**

The Series 116 relays are fitted with an internal mu-metal magnetic screen which permits side-by-side stacking on 0.15 inches pitch.

**Order Code**

- **Series**
- **Number of reeds**
- **Switch form**
- **Coil voltage**
- **Switch number (Only Type 2 available)**
- **Diode if fitted (Omit if not required)**

**Help**

If you need any technical advice or other help, for example, any special tests that you would like carried out, please do not hesitate to contact our Technical Sales Department. We will always be pleased to discuss Pickering relays with you.

Please ask us for a FREE evaluation sample.

**Main contact**

UK Headquarters: email: sales@pickeringrelay.com | Tel: +44 1255 428141

Worldwide contacts:

USA: email: ussales@pickeringtest.com | Tel: +1 781 897 1710

Germany: email: de@pickeringtest.com | Tel: +49 89 125 953 160

China: email: johnson@tomtech.cn | Tel: 0755 8374 5452

For a full list of agents and representatives visit: pickeringrelay.com/agents

---

**Pin Configuration and Dimensional Data**

Dimensions in inches (Millimeters in brackets)

**Note**

1. View from below showing position of round pins

2. The spacing between pins 4 and 5 is greater than between other pins

3. When an option diode is fitted pin 1 is the positive connection.

**Example of Packing Density - Actual Size**

In this small area of only 2.16 x 1.2 inches (5.48 x 3.05 cm), it is possible to construct an 8 x 8 matrix - 64, 1 Form A relays.

---

**Pickering relay products can be downloaded from the web site.**