

High Voltage SIL/SIP Reed Relays

Up to 3 kilovolts Stand-off

Stacking on 0.25 inches pitch

Features

- Small size
- Internal mu-metal magnetic screen
- One or two switches in a single package
- Form A (energise to make) or Form B (energise to break) configurations
- Dry and mercury wetted switches available
- 3, 5, 12 and 24 Volt coils with or without internal diode
- 100% tested for dynamic contact resistance for guaranteed performance

The Series 104 is a range of Single-In-Line reed relays intended for voltages that are beyond the capabilities of conventional SIL reed relays.

They are ideal for such applications as transformer or cable testing or any other automatic test equipment where high voltages are involved.

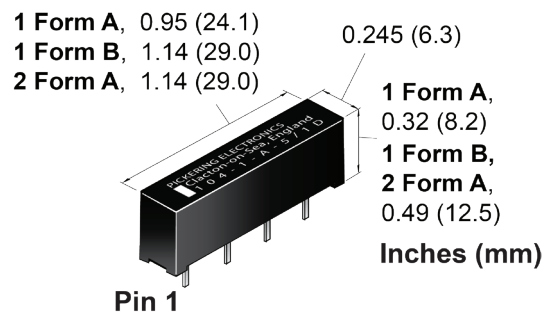
Where mains voltages are switched, for example to control and isolate S.C.R. or triac gates, they are an ideal choice.

One or two Form A (energise to make) or one Form B (energise to break) configurations are available.

The range features an internal mu-metal screen to eliminate problems that would otherwise be experienced due to magnetic interaction when they are closely stacked.

Three types of dry switches are available, capable of standing-off 1, 1.5 or 3kV d.c. The 3kV version has an increased clearance between the switch and coil pins to accommodate the higher voltage. Even higher voltage ratings are available to special order, please contact our sales office for further information.

Mercury wetted devices are also available for applications where bounce free switching is required. These are rated at 1500 volts d.c. minimum stand-off, 500 volts d.c. switching at up to 50 watts.



Switch Ratings - Dry switches

- **1 or 2 Form A (energise to make)**
 1000 Volts d.c. minimum stand-off
 500 Volts d.c. switching at 10 Watts
- **1 or 2 Form A (energise to make)**
 1500 Volts d.c. minimum stand-off
 1000 Volts d.c. switching at 10 Watts
- **1 Form A (energise to make)**
 3000 Volts d.c. minimum stand-off
 1000 Volts d.c. switching at 25 Watts
- **1 Form B (energise to break)**
 1000 Volts d.c. minimum stand-off
 500 Volts d.c. switching at 10 Watts
- **1 Form B (energise to break)**
 1500 Volts d.c. minimum stand-off
 1000 Volts d.c. switching at 10 Watts

Switch Ratings - Mercury switches

- **1 or 2 Form A (energise to make)**
 1500 Volts d.c. minimum stand-off
 500 Volts d.c. switching at 50 Watts

Series 104 switch ratings

The contact ratings for each switch type are shown below:

| Switch No | Switch form | Power rating | Max. switch current | Max. carry current | Max. switching volts | Min. stand-off volts | Life expectancy ops typical (see Note ¹ below) | Operate time inc bounce (max) | Release time |
|-----------|-------------|--------------|---------------------|--------------------|----------------------|----------------------|-----------------------------------------------------------|-------------------------------|--------------|
| 1 | A or B | 10 W | 0.50 A | 1.0 A | 500 | 1000 | 10 ⁸ | 1.0 ms | 0.3 ms |
| 2 | A or B | 10 W | 0.50 A | 1.0 A | 1000 | 1500 | 10 ⁸ | 1.0 ms | 0.3 ms |
| 3 | A | 25 W | 1.00 A | 1.5 A | 1000 | 3000 | 10 ⁸ | 1.0 ms | 0.3 ms |

Coil data and type numbers

| Device type | Type Number | Coil (V) | Coil resistance | Max. contact resistance (initial) | Insulation resistance (minimum) | | Capacitance (typical) (see Note ² below) | |
|------------------------------------------------------|---------------|----------|-----------------|-----------------------------------|---------------------------------|--------------------|-----------------------------------------------------|-----------------------|
| | | | | | Switch to coil | Across switch | Closed switch to coil | Across open switch |
| 1 Form A (energize to make) Switch No. 1 (1kV) | 104-1-A-5/1D | 5 | 375 Ω | 0.15 Ω | 10 ¹² Ω | 10 ¹² Ω | 2.5 pF | 0.1 pF |
| | 104-1-A-12/1D | 12 | 1000 Ω | | | | | |
| | 104-1-A-24/1D | 24 | 3000 Ω | | | | | |
| 1 Form A (energize to make) Switch No. 2 (1.5kV) | 104-1-A-5/2D | 5 | 375 Ω | 0.15 Ω | 10 ¹² Ω | 10 ¹² Ω | 2.5 pF | 0.1 pF |
| | 104-1-A-12/2D | 12 | 1000 Ω | | | | | |
| | 104-1-A-24/2D | 24 | 3000 Ω | | | | | |
| 1 Form A (energize to make) Switch No. 3 (3.0kV) | 104-1-A-5/3D | 5 | 220 Ω | 0.15 Ω | 10 ¹² Ω | 10 ¹² Ω | 2.5 pF | 0.1 pF |
| | 104-1-A-12/3D | 12 | 500 Ω | | | | | |
| | 104-1-A-24/3D | 24 | 3000 Ω | | | | | |
| 1 Form B (energize to break) Switch No. 1 (1kV) | 104-1-B-5/1D | 5 | 750 Ω | 0.20 Ω | 10 ¹² Ω | 10 ¹² Ω | 2.5 pF | 0.1 pF |
| | 104-1-B-12/1D | 12 | 2000 Ω | | | | | |
| | 104-1-B-24/1D | 24 | 3000 Ω | | | | | |
| 1 Form B (energize to break) Switch No. 2 (1.5kV) | 104-1-B-5/2D | 5 | 750 Ω | 0.20 Ω | 10 ¹² Ω | 10 ¹² Ω | 2.5 pF | 0.1 pF |
| | 104-1-B-12/2D | 12 | 2000 Ω | | | | | |
| | 104-1-B-24/2D | 24 | 3000 Ω | | | | | |
| 2 Form A (energize to make) Switch No. 1 (1kV) | 104-2-A-5/1D | 5 | 250 Ω | 0.20 Ω | 10 ¹² Ω | 10 ¹² Ω | See Note ³ | See Note ³ |
| | 104-2-A-12/1D | 12 | 750 Ω | | | | | |
| | 104-2-A-24/1D | 24 | 2000 Ω | | | | | |
| 2 Form A (energize to make) Switch No. 2 (1.5kV) | 104-2-A-5/2D | 5 | 250 Ω | 0.20 Ω | 10 ¹² Ω | 10 ¹² Ω | See Note ³ | See Note ³ |
| | 104-2-A-12/2D | 12 | 750 Ω | | | | | |
| | 104-2-A-24/2D | 24 | 2000 Ω | | | | | |

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

Mercury Reed: Series 104 switch ratings

The contact ratings for each switch type are shown below:

| Switch No | Switch form | Power rating | Max. switch current | Max. carry current | Max. switching volts | Min. stand-off volts | Life expectancy ops typical (see Note ¹ below) | Operate time (max) | Release time |
|-----------|-------------|--------------|---------------------|--------------------|----------------------|----------------------|-----------------------------------------------------------|--------------------|--------------|
| 6 | A | 50 W | 2.00 A | 3.00 A | 500 | 1500 | 10 ⁸ | 1.5 ms | 1.0 ms |

Mercury Relay: Coil data and type numbers

| Device type | Type Number | Coil (V) | Coil resistance | Max. contact resistance (initial) | Insulation resistance (minimum) | | Capacitance (typical) (see Note ² below) | |
|-----------------------------------------------------|---------------|----------|-----------------|-----------------------------------|---------------------------------|--------------------|-----------------------------------------------------|-----------------------|
| | | | | | Switch to coil | Across switch | Closed switch to coil | Across open switch |
| 1 Form A (energize to make) Switch No. 6 (1.5kV) | 104-1-A-5/6D | 5 | 100 Ω | 0.12 Ω | 10 ¹² Ω | 10 ¹¹ Ω | 3 pF | 0.1 pF |
| | 104-1-A-12/6D | 12 | 500 Ω | | | | | |
| | 104-1-A-24/6D | 24 | 1500 Ω | | | | | |
| 2 Form A (energize to make) Switch No. 6 (1.5kV) | 104-2-A-5/6D | 5 | 50 Ω | 0.15 Ω | 10 ¹² Ω | 10 ¹¹ Ω | See Note ³ | See Note ³ |
| | 104-2-A-12/6D | 12 | 275 Ω | | | | | |
| | 104-2-A-24/6D | 24 | 1000 Ω | | | | | |

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

Note¹ Life expectancy

The life of a reed relay depends upon the switch load and end of life criteria. For example, for an 'end of life' contact resistance specification of 1 Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10⁸ ops. At the maximum load (resistive), typical life is 1 x 10⁷ ops. In the event of abusive conditions, e.g. high currents due to capacitive inrushes, this figure reduces considerably. Pickering will be pleased to perform life testing with any particular load condition.

Note² Capacitance across open switch

The capacitance across the open switch was measured with other connections guarded.

Note³ Capacitance values

The value will depend upon on the mode of connection/guarding of unused terminals. Please contact technical sales for details.

Mercury Relays

Mercury relays should be mounted vertically with pin 1 uppermost. Pin 1 is marked with a bar on the top face of the relay.

Internal Mu-metal Magnetic Screen

The Series 104 relays are fitted with an internal mu-metal magnetic screen which permits side-by-side stacking.

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: desales@pickeringtest.com | Tel. +49 89 125 953 160

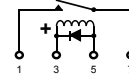
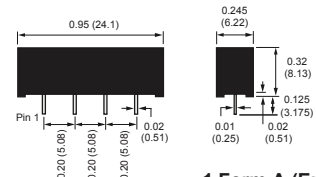
China: email: chinasales@pickeringtest.com | Tel. +86 4008-799-765

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



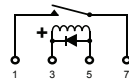
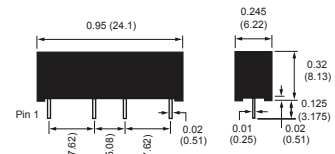
Pin Configuration and Dimensional Data

Dimensions in Inches (Millimeters in brackets)



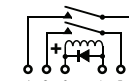
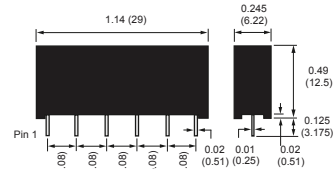
1 Form A (Energize to make)

Switch No. 1 (1 kV stand-off)
Switch No. 2 (1.5 kV stand-off)
Switch No. 6 (Mercury Wetted)



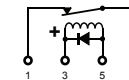
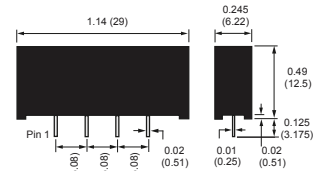
1 Form A (Energize to make)

Switch No. 3 (3 kV stand-off)



2 Form A (Energize to make)

Switch No. 1 (1 kV stand-off)
Switch No. 2 (1.5 kV stand-off)
Switch No. 6 (Mercury Wetted)



1 Form B (Energize to break)

Switch No. 1 (1 kV stand-off)
Switch No. 2 (1.5 kV stand-off)

Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

3D Models: Interactive models of Pickering relay products can be downloaded here: pickeringrelay.com/3d-models

Order Code

104 - 1 - A - 5 / 2 D

Series _____
 Number of reeds _____
 Switch form _____
 Coil voltage _____
 Switch number (See table adjacent) _____
 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. email: techsales@pickeringrelay.com

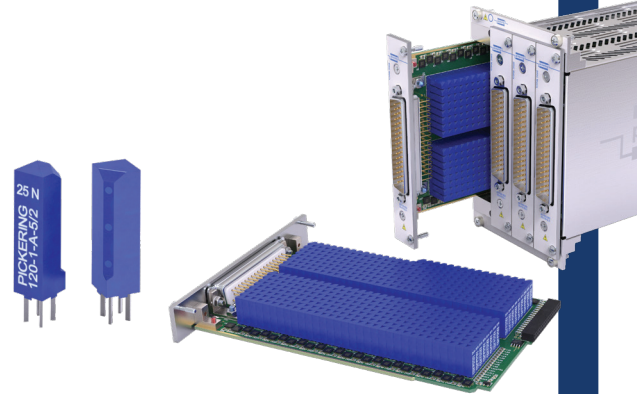
Please ask us for a FREE evaluation sample.

Why Pickering Electronics?

Because Quality Matters

Pickering Electronics continue to lead the high-end reed relay market through innovative product design, high performance components and exceptional quality control.

Part of the privately-owned Pickering Group, company operations employ around 200 staff across quality accredited factories in the UK and Czech Republic, supplying demanding Aerospace, Infrastructure, Test & Measurement and ATE applications worldwide.



Reliability through quality – 50 Year reputation for exceptional product life longevity derived from continuous staged manufacturing inspection, strenuous full range thermal cycling and 100% testing for all operating parameters.



Reliability through design – Environmentally compliant designs and unique Softcenter® technology combine to create an optimised assembly that minimises internal lifetime stresses, extending working life and contact stability.



Switching Performance – Compared with common bobbin based products, our formerless coil constructions maximise magnetic efficiency resulting in faster switching speeds, optimal switching action and several orders of extended lifetime at operational extremes.



Cost & Size Performance – Industry leading mu-metal magnetically screened packages deliver ultra-high PCB packing densities, saving significant cost and space.



Designers toolkit – Free samples, worldwide tech support and an unrivalled range of specialist and custom devices, Pickering engineers work alongside customers to deliver problem solving solutions for complex and challenging applications.



Quality Assurance and compliance - certified to ISO 9001-2015 and audited by the British Standards Institution. Committed to RoHS & REACH compliance.



Distribution – An established global network of group sales offices supported by local agents and distributors, Pickering operate an established logistical supply chain worldwide.



The Pickering Group – Employing around 400 staff across 8 sites in the UK and CZ, Pickering Electronics are a key technology partner for Pickering Interfaces and Pickering Connect, supporting the design and manufacture of high performance modular signal switching and simulation systems.