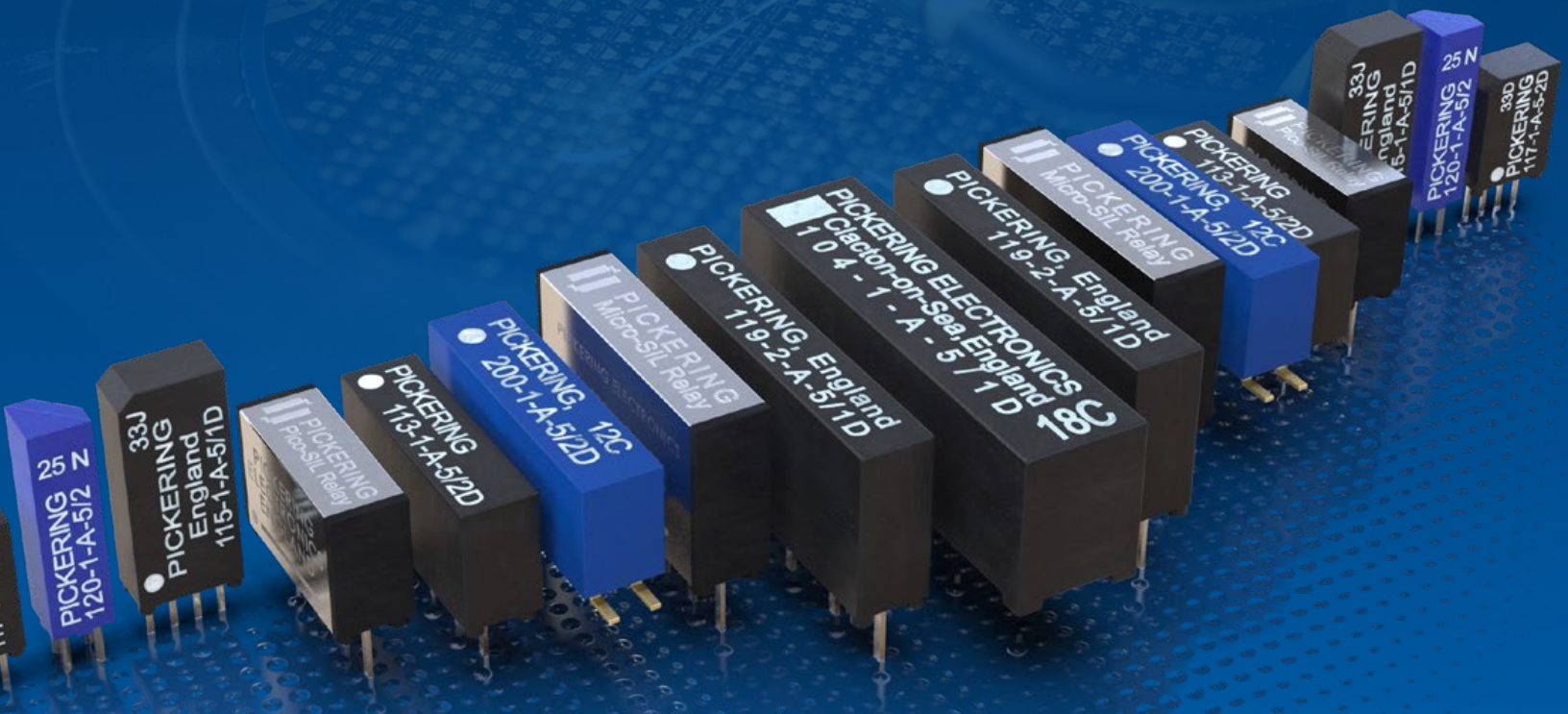
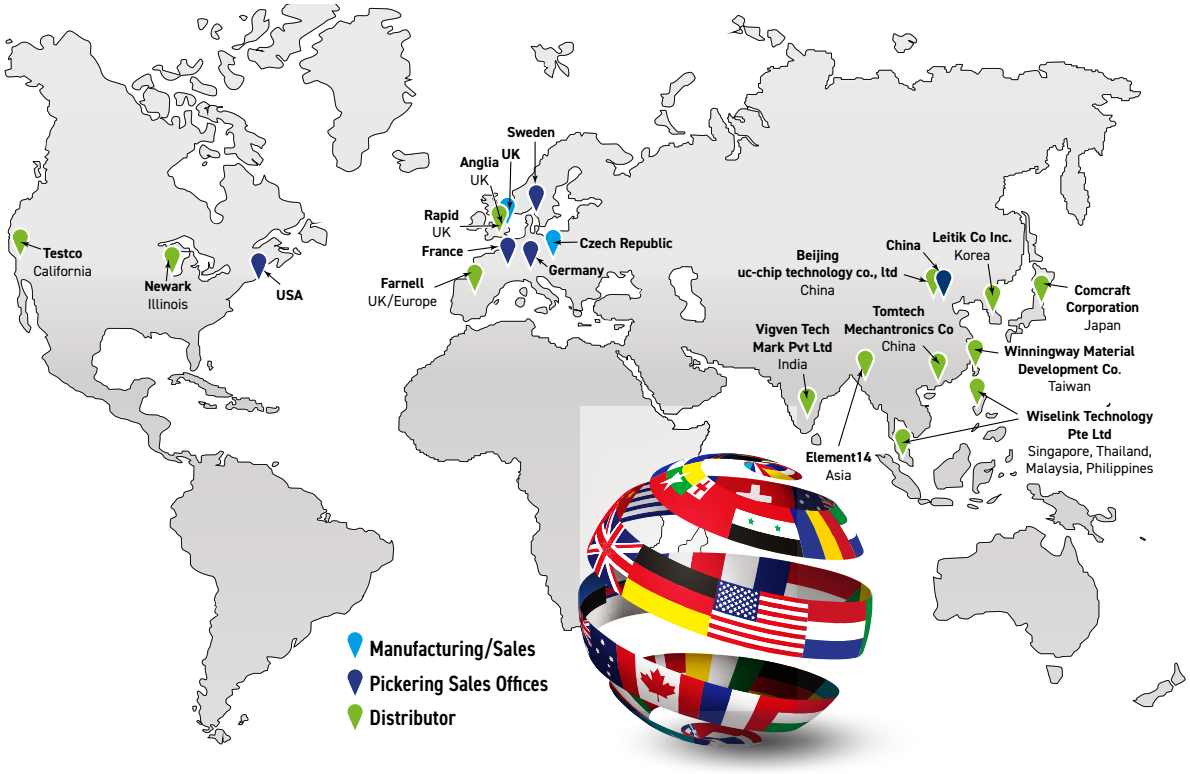
pickering

Reed Relay Product Catalog



pickeringrelay.com

Global Operations



Pickering operates globally with manufacturing facilities in the UK and Czech Republic, along with additional representation in countries throughout the Americas, Europe, Asia and Australasia.

To contact an official Pickering agent please visit: **pickeringrelay.com/agents**

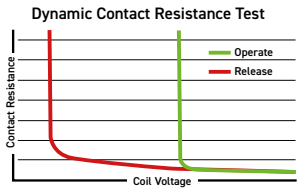
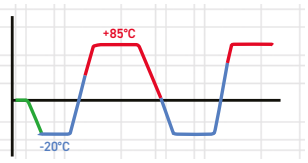
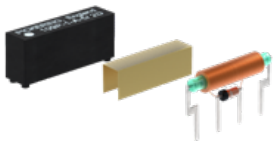
Support Literature

The **Reed RelayMate** book from Pickering is an educational book providing an overview of how reed relays work, how they are constructed and how to interpret their specifications and make best use of them in their applications.

The **Reed Relay Finder** is a single sheet reference to our entire range of high quality reed relays.

For your free **Reed RelayMate** and/or **Reed Relay Finder** please visit: **pickeringrelay.com**
Support literature is available to download as a pdf or you can request a hard copy.

10 Key Benefits of Pickering Reed Relays

Key Benefit	Pickering Reed Relays	Typical Industry Reed Relays	
1 **Instrumentation Grade Reed Switches**	Instrumentation Grade Reed Switches with vacuum sputtered Ruthenium plating to ensure stable, long life up to 5x10E9 operations.	Often low grade Reed Switches with electroplated Rhodium plating resulting in higher, less stable contact resistance.	
2 **Formerless Coil Construction**	Formerless coil construction increases the coil winding volume, maximizing magnetic efficiency, allowing the use of less sensitive reed switches resulting in optimal switching action and extended lifetime at operational extremes.	Use of bobbins decreases the coil winding volume, resulting in having less magnetic drive and a need to use more sensitive reed switches which are inherently less stable with greatly reduced restoring forces.	 Pickering former-less coil. Typical industry coil wound on bobbin
3 **Magnetic Screening**	Mu-metal magnetic screening (either external or internal), enables ultra-high PCB side-by-side packing densities with minimal magnetic interaction, saving significant cost and space. **Pickering Mu-Metal magnetic screen - interaction approx. 5%**	Lower cost reed relays have minimal or no magnetic screening, resulting in magnetic interaction issues causing changes in operating and release voltages, timing and contact resistance, causing switches to not operate at their nominal voltages. **Typical industry screen - interaction approx. 30%**	 X-Ray of Pickering mu-metal magnetic screen. X-Ray of typical industry magnetic screen
4 ***SoftCenter***™ **Technology**	***SoftCenter***™ technology, provides maximum cushioned protection of the reed switch, minimising internal lifetime stresses and extending the working life and contact stability.	Transfer moulded reed relays (produced using high temperature/pressure), result in significant stresses to the glass reed switch which can cause the switch blades to deflect or misalign leading to changes in the operating characteristics, contact resistance stability and operating lifetime.	 Pickering soft center protection of the reed switch. Typical industry thermo-setting hard moulded protection of the reed switch
5 **100% Dynamic Testing**	100% testing for all operating parameters including dynamic contact wave-shape analysis with full data scrutiny to maintain consistency.	Simple DC testing or just batch testing which may result in non-operational devices being supplied.	
6 **100% Inspection at Every Stage of Manufacturing**	Inspection at every stage of manufacturing maintaining high levels of quality.	Often limited batch inspection.	
7 **100% Thermal Cycling**	Stress testing of the manufacturing processes, from -20 °C to +85 °C to -20 °C, repeated 3 times.	Rarely included resulting in field failures.	
8 **Flexible Manufacturing Process**	Flexible manufacturing processes allow quick-turn manufacturing of small batches.	Mass production: Usually large batch sizes and with no quick-turn manufacturing.	
9 **Custom Reed Relays**	Our reed relays can be customized easily, e.g. special pin configurations, enhanced specifications, non-standard coil or resistance figures, special life testing, low capacitance, and more.	Limited ability to customize.	
10 **Product Longevity**	Pickering are committed to product longevity; our reed relays are manufactured and supported for more than 25 years from introduction, typically much longer.	Most other manufacturers discontinue parts when they reach a low sales threshold; costing purchasing and R&D a great deal of unnecessary time and money to redesign and maintain supply.	

For more information go to: pickeringrelay.com/10-key-benefits

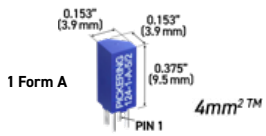
Contents

Quick Reference Guide

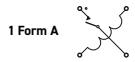
Series 124

P.No. 7

Very High Density ATE/Instrumentation



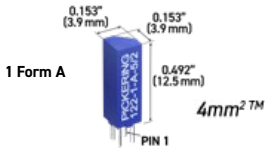
- The industry's smallest through-hole reed relay currently available
- Plastic package with internal mu-metal magnetic screen
- 3 or 5 V coils
- Switching up to 0.5 A, 10 W
- Dry ruthenium switches



Series 122

P.No. 13

Very High Density ATE/Instrumentation

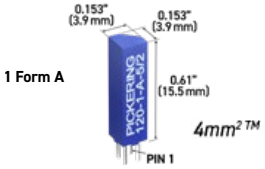


- Highest packing density currently available
- Plastic package with internal mu-metal magnetic screen
- 3 or 5 V coils
- Switching up to 1A, 15 W
- Dry ruthenium switches

Series 120

P.No. 19

Very High Density ATE/Instrumentation

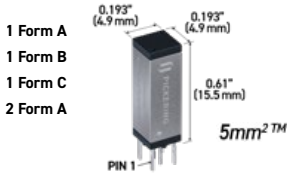


- Highest packing density currently possible
- Plastic package with internal mu-metal magnetic screen
- 3, 5 or 12 V coils
- Switching up to 1 A, 20 W
- Dry ruthenium switches

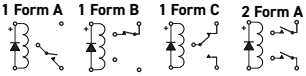
NEW Series 125

P.No. 25

Very High Density ATE/Instrumentation



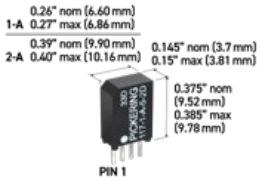
- Highest packing density currently available for a dual pole relay
- 3, 5 or 12 V coils with internal diode.
- Mu-metal package
- Switching up to 1 A, 20 W
- Dry ruthenium switches



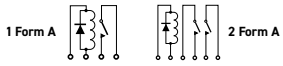
Series 117

P.No. 33

Very High Density ATE/Instrumentation



- Very high packing density - requires a board area of only 0.15 x 0.27 inches
- Plastic package with internal mu-metal magnetic screen
- 3 and 5 V coils
- Dry ruthenium switches

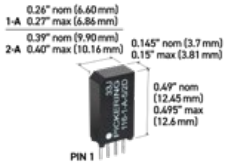


Diodes are optional

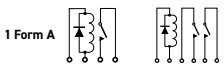
Series 116

P.No. 39

Very High Density ATE/Instrumentation



- Pin compatible, 10 Watts version of the Series 117 requires the same area of only 0.15 x 0.27 inches
- Plastic package with internal mu-metal magnetic screen
- 3 V, 5 V or 12 V coils
- Dry ruthenium switches

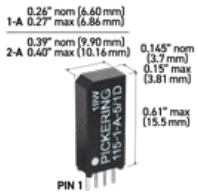


Diodes are optional

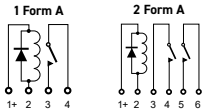
Series 115

P.No. 45

Very High Density ATE/Instrumentation



- Plastic package with internal mu-metal magnetic screen
- 3 V, 5 V or 12 V coils
- Dry ruthenium switches



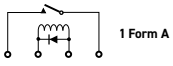
Diodes are optional

Series 112

P.No. 51

High Density ATE/Instrumentation

- Plastic package with internal mu-metal screen
- Requires a board area of only 0.15 x 0.4 inches
- 3 V, 5 V or 12 V coils
- Dry ruthenium switches

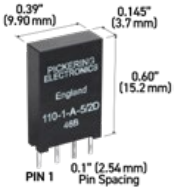


Diodes are optional

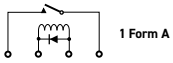
Series 110

P.No. 56

High Density ATE/Instrumentation



- Plastic package with internal mu-metal screen
- Requires a board area of only 0.15 x 0.4 inches
- 3 V, 5 V or 12 V coils
- Dry ruthenium switches

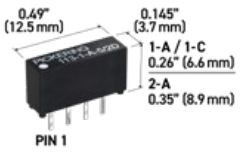


Diodes are optional

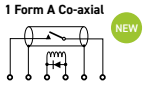
Series 113

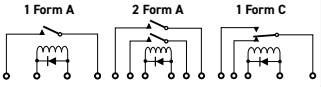
P.No. 61

High Density ATE/Instrumentation



- Plastic package with internal mu-metal screen
- Requires a board area of only 0.15 x 0.5 inches
- 3 V, 5 V or 12 V coils
- Dry switches



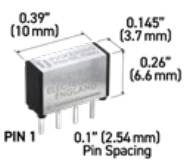


Diodes are optional

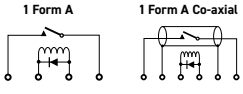
Series 111

P.No. 69

High Density ATE/Instrumentation



- Mu-metal or screened plastic package (not illustrated)
- RF version available
- Dry ruthenium switches
- 3 V and 5 V coils

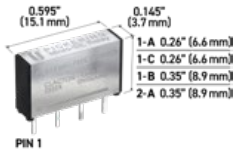


Diodes are optional

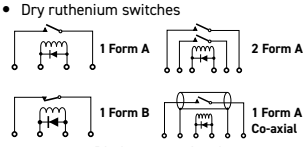
Series 109

P.No. 76

High Density ATE/Instrumentation



- Mu-metal or screened plastic package (not illustrated)
- RF version available
- 3 V, 5 V or 12 V coils
- Dry ruthenium switches



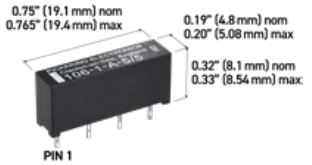
Diodes are optional

Quick Reference Guide

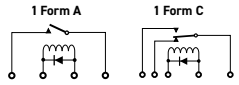
Series 106

P.No. 83

ATE/Instrumentation
General Purpose



- Plastic package with internal mu-metal screen
- High Voltage version available
- 3 V, 5 V or 12 V coils
- Dry switches

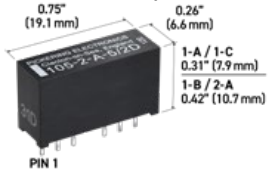


Diodes are optional

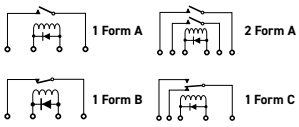
Series 105

P.No. 89

Instrumentation
General Purpose



- Plastic package with internal mu-metal screen
- 3 V, 5 V, 12 V or 24 V coils
- Wide range of dry switches

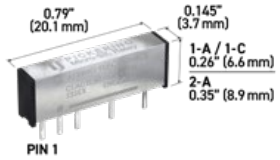


Diodes are optional

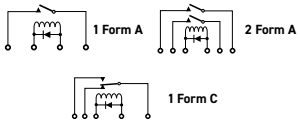
Series 108

P.No. 96

ATE/Instrumentation
General Purpose



- Mu-metal package
- Requires a board area of only 0.15 x 0.8 inches
- 3 V, 5 V or 12 V coils
- Dry switches

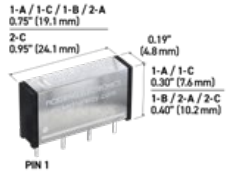


Diodes are optional

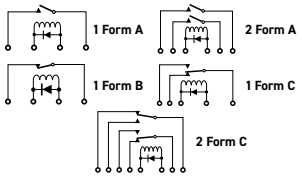
Series 107

P.No. 102

ATE/Instrumentation
General Purpose



- Mu-metal package 3 V, 5 V, 12 V, 24 V coils
- Wide range of dry switches

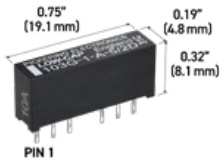


Diodes are optional

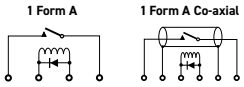
Series 103

P.No. 109

Low Capacitance
Wide Bandwidth



- Plastic package with optional magnetic screen
- 1 Form A - One fifth the normal capacitance level
- 1 Form A Coaxial
  3 V, 5 V or 12 V coils

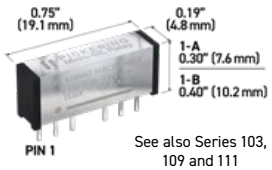


Diodes are optional

Series 102

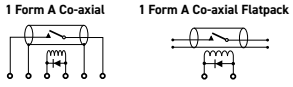
P.No. 116

Radio Frequency
Up to 3 GHz



See also Series 103, 109 and 111

- Mu-metal Single-in-Line package or plastic flatpack (not illustrated)
- 50 Ohms characteristic impedance -
- Up to 1.5 GHz - SIL or 3 GHz - flatpack
- 3 V, 5 V or 12 V coils

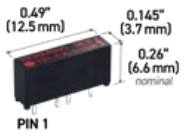


Diodes are optional

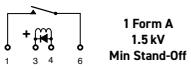
Series 131

P.No. 123

High Voltage - Min 1.5 kV Stand



- 3 V, 5 V or 12 V coils
- 1 Form A. Switching up to 0.7 A, 10 W.
- Ideal for a variety of high voltage testing applications.
- Plastic package, internal mu-metal magnetic screen

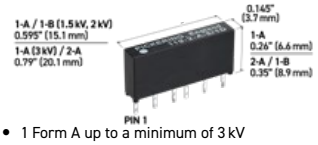


Diodes are optional

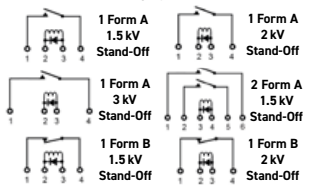
Series 119

P.No. 129

High Voltage - Up to 3 kV



- 1 Form A up to a minimum of 3 kV stand-off, switching up to 1 kV.
- 1 Form B up to a minimum of 2 kV stand-off, switching up to 1 kV.
- 2 Form A up to a minimum of 1.5 kV stand-off, switching up to 1 kV.



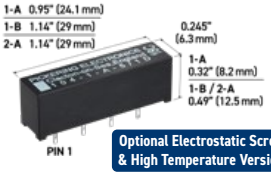
Diodes are optional

Series 104

NEW

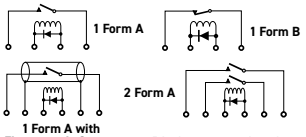
P.No. 137

High Voltage - Up to 5 kV



Optional Electrostatic Screen & High Temperature Versions

- 1 Form A up to a minimum of 5 kV stand-off, switching up to 1 kV.
- 1 Form B up to a minimum of 2 kV stand-off, switching up to 1 kV.
- 2 Form A up to a minimum of 2 kV stand-off, switching up to 1 kV.

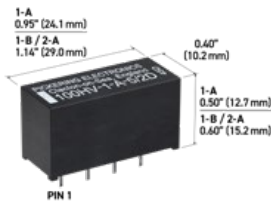


Diodes are optional

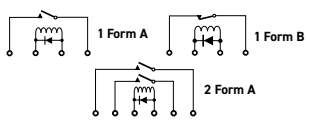
Series 100HV

P.No. 147

High Voltage - Up to 3 kV



- Up to 3 kV stand-off
- High coil resistance (up to 6800 Ω) for low power consumption
- Thermal EMF levels between 3 µV & 10 µV



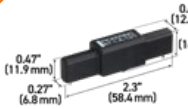
Diodes are optional

Series 67/68

NEW

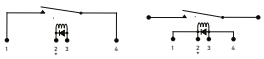
P.No. 154

High Voltage up to 10 kV

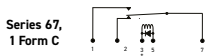


Optional Electrostatic Screen

- Plastic package with internal mu-metal screen
- Robust 50 or 200 W Tungsten contacts
- Series 67 has pcb pins for all connections. Series 68 has flying leads from the top face for the high voltage connections.
- 1 Form A. Standing off 5 kV, switching up to 3.5 kV
  Standing off 8 kV, switching up to 6 kV
  Standing off 10 kV, switching up to 7.5 kV
  1 Form C. Standing off 5 kV, switching up to 2.5 kV



(Optional Electrostatic Screen available)

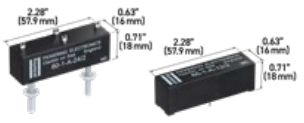


Diodes are optional

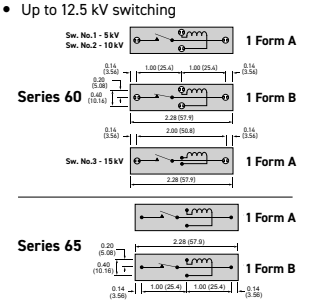
Series 60/65

P.No. 162

Chassis/PCB Mounting
High Voltage



- Up to 12.5 kV switching



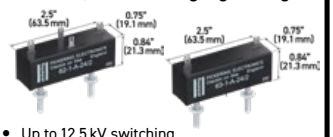
Diodes are optional

Quick Reference Guide

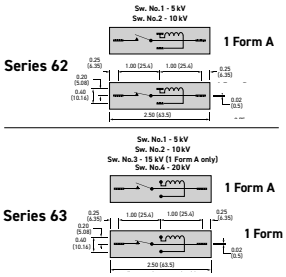
Series 62/63

P.No. 169

Chassis/PCB Mounting High Voltage



- Up to 12.5 kV switching



Diodes are optional

Series 600

NEW

P.No. 176

Modular High Voltage

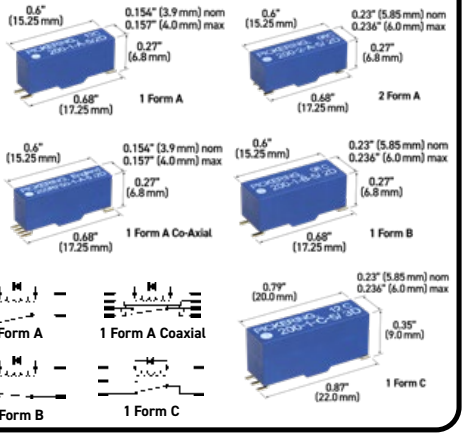
- Modular design with wide range of rating and connection options
- Up to 12.5 kV switching, 50 W, 100 W or 200 W maximum
- 20 kV stand-off (switch - switch)
- 25 kV stand-off (switch coil)
- 5, 12, 24 V Coils
- Optional electrostatic/magnetic screens
- Custom potting materials
- 1 Form A, 1 form B and 1 form C contact configurations
- Optional internal diode or Zener + diode

Series 200 - Surface Mount

P.No. 189

High Density ATE/Instrumentation

- High Temperature plastic package with internal mu-metal magnetic screen
- Wide range of switching configurations with Dry switches
- Coaxial version for high speed digital switching or R.F. to 5 GHz
- 3 V, 5 V or 12 V coils with optional diode

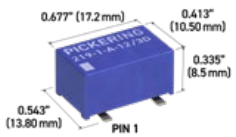


Series 219

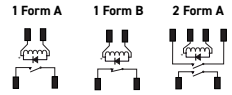
NEW

P.No. 196

High Voltage - Up to 3000 V



- Up to 3 kV Standoff (Switch - Switch)
- Up to 5 kV Standoff (Switch - Coil)
- 3 V, 5 V, or 12 V coils

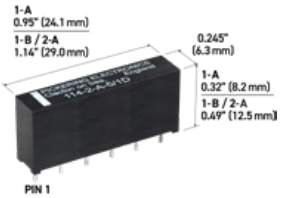


Diodes are optional

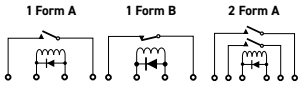
Series 114

P.No. 205

High Power - Up to 40 W



- Plastic package with internal mu-metal screen
- 3 V, 5 V, 12 V or 24 V coils
- Will replace mercury wetted relays in many applications



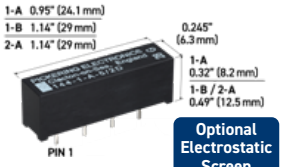
Diodes are optional

Series 144

NEW

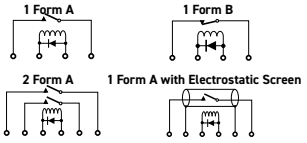
P.No. 211

High Voltage - Up to 3 kV



Optional Electrostatic Screen

- 1A switching up to 80 W
- 2 A switching up to 60 W
- Up to 3 A continuous carry current
- Up to 3 kV Standoff

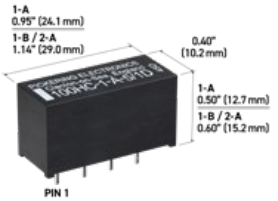


Diodes are optional

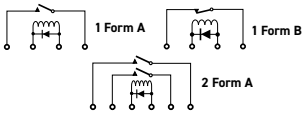
Series 100HC

P.No. 219

High Power - Up to 40 W



- Up to 3 A continuous carry current
- High coil resistance (up to 6000 Ω) for low power consumption
- Thermal EMF levels less than 10 µV

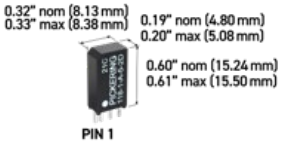


Diodes are optional

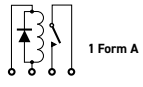
Series 118

P.No. 225

High Coil Resistance ATE/Instrumentation



- 3 and 5 V coils, 5 V versions have a resistance up to 2.2 kΩ
- Requires a board area of 0.2 x 0.33 in
- Plastic package with internal mu-metal magnetic screen
- Dry ruthenium switches

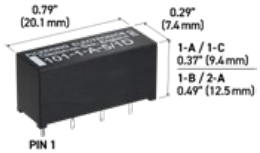


Diodes are optional

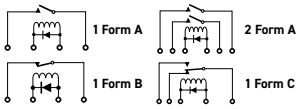
Series 101

P.No. 229

Direct Drive from HC or HCT CMOS



- Plastic package with internal mu-metal screen
- 3 V, 5 V, 12 V or 24 V coils
  5 V coil is 1600 Ω
- Wide range of dry switches

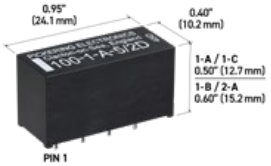


Diodes are optional

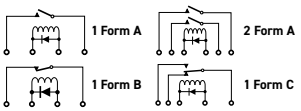
Series 100

P.No. 235

Direct Drive from CMOS Low Thermal EMF



- Ideal for data acquisition or thermo-couple switching
- 3 V, 5 V, 12 V or 24 V coils
  5 V coil is 3300 Ω
- Wide range of dry switches

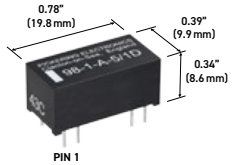


Diodes are optional

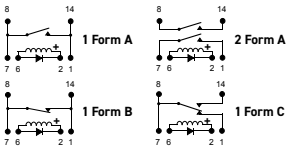
Series 98

P.No. 241

CMOS Drive DIL/DIP Reed Relays



- Pin compatible with standard DIL/DIP relays
- 5 V, 12 V or 24 V coils
- Wide range of dry switches

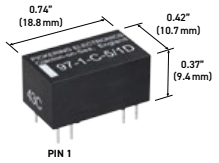


Diodes are optional

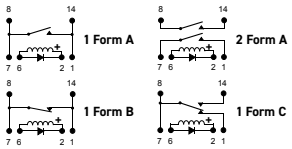
Series 97

P.No. 247

Dual-in-Line DIL/DIP Reed Relays



- Plastic package with internal magnetic screen
- Wide range of switch configurations
- 5 V , 12 V or 24 V coils with or without internal diode



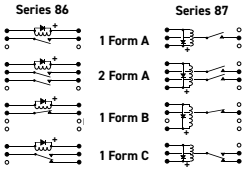
Diodes are optional

Series 86/87

P.No. 253

Dry High Sensitivity Reed Relays

- Plastic package with magnetic screen
- Wide range of switch configurations
- 5 V, 12 V or 24 V coils

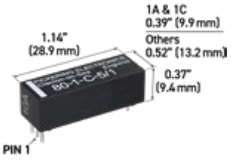


Diodes are optional

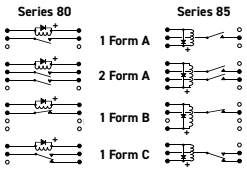
Series 80/85

P.No. 260

Dry General Purpose Relays



- Plastic package with magnetic screen
- Wide range of switch configurations
- 5 V, 12 V or 24 V coils



Other configurations also available
Diodes are optional

Legacy/Classic Reed Relays

- The industry's smallest through-hole reed relay currently available
- Stacking on **4 mm x 4 mm** pitch allowing the highest packing density currently available
- **3** or **5 V** coils
- **10 W, 0.5 A** switching
- **1 Form A** (SPST) normally open (NO) energize to make
- Very fast operate and release times making these relays ideal for high speed test systems
- Plastic package with internal mu-metal magnetic screen
- Ideal for A.T.E. switching matrices or multiplexers
- Sputtered ruthenium instrumentation grade switch
- Insulation resistance **>10^{12} Ω**
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

1 **Package Type**

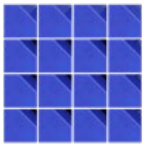
The Series 124 reed relay range is part of Pickering's new ultra-high density 4 mm² product line, which take up the minimum board area of only 4 mm x 4 mm, allowing the highest packing density currently available.

The range features a sputtered ruthenium instrumentation grade switch rated at 10 W, 0.5 A. These are the same reed switches as used in the long established Pickering Series 111, 111P and 117 but are orientated vertically within the package, allowing this high density. If a higher rating is required, please consider our Series 120 which are rated up to 1.0 A at 20 W but with a higher profile height.

The small size of the package does not allow an internal diode. Back EMF suppression diodes are included in many relay drivers but if they are not, and depending on your drive methods, these may have to be provided externally.

While socketing relays is not normally recommended due to the risk of affecting contact resistance integrity, it is appreciated that sockets may sometimes be desired for ease of servicing/replacement, in the case of a relay being damaged or reaching the end of its working life. The device has pins on a 2 mm square pitch. There are suitable connectors available from some manufacturers, both SMD and Through Hole, that will allow these relays to be stacked in either a row or in a matrix on a 4 mm pitch.

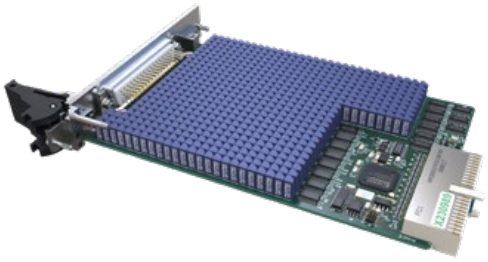
Examples of Packing Density



Pickering Electronics' Series 124

Industry standard reed relay of the same electrical specification

The above actual size graphic shows sixteen Series 124 Relays packed into an area of 1.6 cm x 1.6 cm. In comparison, only four of the industry standard reed relays can be fitted into the same area.



A total of 606 Series 124 relays on a Pickering Interfaces ultra-high-density PXI module illustrates the packing density of these extremely small Reed Relays.

Switch Ratings - Dry Switches

1 Form A (energize to make)
10 W at 170 V

The reed switch in the Series 124 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. This means that high inrush currents, particularly caused by capacitive loads must be avoided.

Series 124 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
2	A	10 W	0.5 A	0.5 A	170	10^8	0.2 ms	0.1 ms	All applications

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. 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 2.5 x 10^8 ops. At the maximum load (resistive), typical life is 1 x 10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 124 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil @1kV DC	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 2 Package Type 1	124-1-A-3/2	3	75 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	1.6 pF	0.25 pF
	124-1-A-5/2	5	200 Ω					

Note[2]: Switch to coil capacitance

Due to the asymmetrical internal construction of the relay, the capacitance to the coil from one switch connection is approximately half the capacitance of the other switch connection, pin 1 is lower. In some applications this feature may be used to advantage for example, in a multiplexer where it is desirable to minimize the capacitance of the common connection to maximize bandwidth.

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

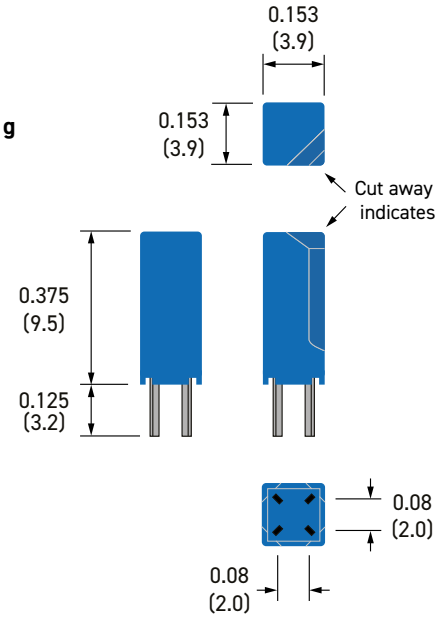
For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

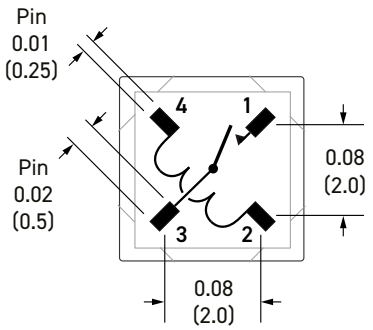
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.28 g



1 Form A



Connection details - viewed from underside

Similar Relays Comparison

If the Series 124 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		124-1-A	122-1-A		120-1-A	
Physical Outline						
Depth	mm (inches)	3.9 (0.153)	3.9 (0.153)		3.9 (0.153)	
Width		3.9 (0.153)	3.9 (0.153)		3.9 (0.153)	
Height		9.5 (0.375)	12.5 (0.492)		15.5 (0.61)	
Package Volume (**mm³**)		❶ 145	191		236	
Typical Weights (**g**)		0.28	0.37		0.49	
Contact Configuration		1-A (SPST)	1-A (SPST)		1-A (SPST)	
Reed Switch Type		Dry	Dry		Dry	Dry
Switching Voltage (**V**)		170	200	200	200	200
Switching Current (**A**)		0.5	1.0	0.5	1.0	0.5
Carry Current (**A**)		0.5	1.0	0.5	1.2	1.2
Switch Power (**W**)		10	15	10	20 (15)	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 124 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

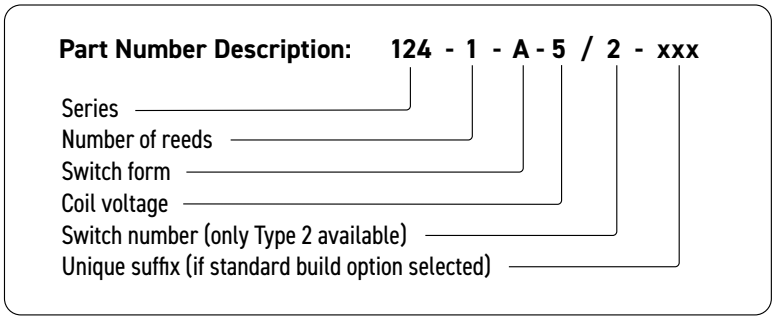
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Stacking on **4 mm x 4 mm** pitch allowing the highest packing density currently available
- **3** or **5 V** coils
- Up to **15 W**, **1 A** switching
- **1 Form A** (SPST) normally open (NO) energize to make
- Fast operate and release times making these relays ideal for high speed test systems
- Plastic package with internal mu-metal magnetic screen
- Ideal for A.T.E. switching matrices or multiplexers
- Sputtered ruthenium instrumentation grade switch
- Insulation resistance **>10^{12} Ω**
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

1 **Package Type**

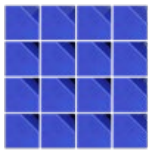
The Series 122 reed relay range is part of Pickering's new ultra-high density 4 mm² product line, which take up the minimum board area of only 4 mm x 4 mm, allowing the highest packing density currently available.

The range features sputtered ruthenium instrumentation grade switches rated at up to 15 W, 1.0 A. These are the same reed switches as used in the Pickering Series 112, 113 and 116 but are orientated vertically within the package, allowing this high density. If a higher rating is required, please consider our Series 120 which are rated up to 1.0 A at 20 W but with a higher profile height. If a lower profile height is required, please consider our Series 124 with a height of just 9.5 mm whilst rated up to 10 W, 0.5 A switching.

The small size of the package does not allow an internal diode. Back EMF suppression diodes are included in many relay drivers but if they are not, and depending on your drive methods, these may have to be provided externally.

While socketing relays is not normally recommended due to the risk of affecting contact resistance integrity, it is appreciated that sockets may sometimes be desired for ease of servicing/replacement, in the case of a relay being damaged or reaching the end of its working life. The device has pins on a 2 mm square pitch. There are suitable connectors available from some manufacturers, both SMD and Through Hole, that will allow these relays to be stacked in either a row or in a matrix on a 4 mm pitch.

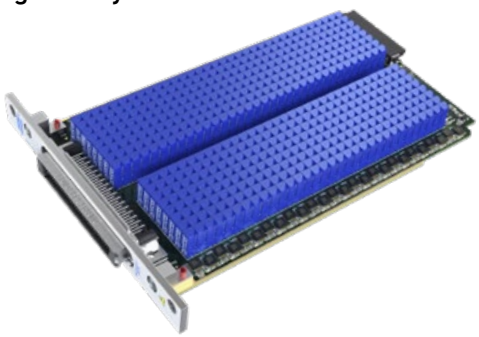
Examples of Packing Density



Pickering Electronics' Series 122

Industry standard reed relay of the same electrical specification

The above actual size graphic shows sixteen Series 122 Relays packed into an area of 1.6 cm x 1.6 cm. In comparison, only four of the industry standard reed relays can be fitted into the same area.



A total of 528 Series 122 relays on a Pickering Interfaces ultra-high-density PXI module illustrates the packing density of these extremely small Reed Relays.

Switch Ratings - Dry Switches

1 Form A (energize to make)
10 W at 200 V 15 W at 200 V

Series 122 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	15 W	1 A	1 A	200	10^8	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	0.5 A	200	10^8	0.2 ms	0.1 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. 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 2.5 x 10^8 ops. At the maximum load (resistive), typical life is 1 x 10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 122 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil @1kV DC	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1	122-1-A-3/1	3	125 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	1.6 pF	0.25 pF
	122-1-A-5/1	5	350 Ω					
1 Form A, Switch No. 2 Package Type 1	122-1-A-3/2	3	125 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	1.6 pF	0.25 pF
	122-1-A-5/2	5	350 Ω					

Note[2]: Switch to coil capacitance

Due to the asymmetrical internal construction of the relay, the capacitance to the coil from one switch connection is approximately half the capacitance of the other switch connection, pin 1 is lower. In some applications this feature may be used to advantage for example, in a multiplexer where it is desirable to minimize the capacitance of the common connection to maximize bandwidth.

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

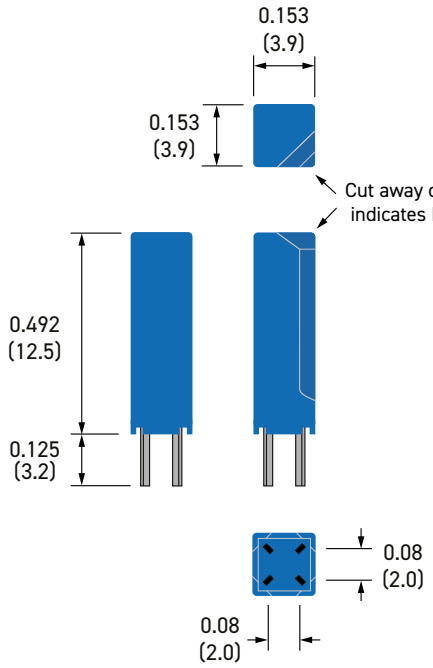
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

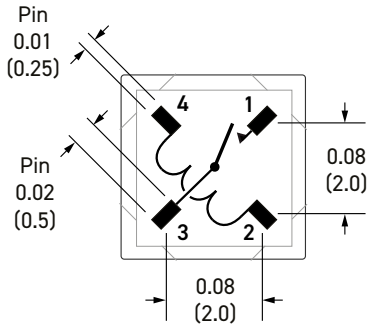
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.37 g



1 Form A



Connection details - viewed from underside

Similar Relays Comparison

If the Series 122 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		124-1-A	122-1-A		120-1-A	
Physical Outline						
Depth	mm (inches)	3.9 (0.153)	3.9 (0.153)		3.9 (0.153)	
Width		3.9 (0.153)	3.9 (0.153)		3.9 (0.153)	
Height		9.5 (0.375)	12.5 (0.492)		15.5 (0.61)	
Package Volume (mm³)		145	1 191		236	
Typical Weights (g)		0.28	0.37		0.49	
Contact Configuration		1-A (SPST)	1-A (SPST)		1-A (SPST)	
Reed Switch Type		Dry	Dry		Dry	Dry
Switching Voltage (V)		170	200	200	200	200
Switching Current (A)		0.5	1.0	0.5	1.0	0.5
Carry Current (A)		0.5	1.0	0.5	1.2	1.2
Switch Power (W)		10	15	10	20 (15)	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 122 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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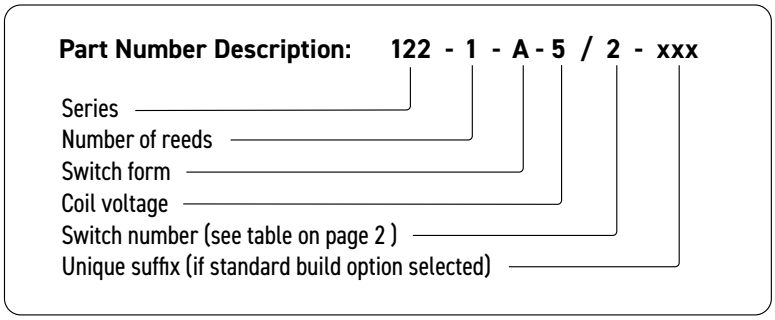


Help

If you need any technical advice or other help, 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

- Stacking on **4 mm x 4 mm** pitch allowing the highest packing density currently available
- **3**, **5** or **12 V** coils
- Switching up to **1 A**, **20 W**
- **1 Form A** (SPST) normally open (NO) energize to make
- Plastic package with internal mu-metal magnetic screen
- Sputtered ruthenium instrumentation grade switch
- Insulation resistance **$>10^{12}$ Ω**
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

1 **Package Type**

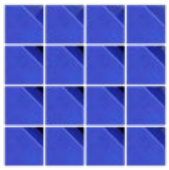
The Series 120 reed relay range takes up the minimum board area making them ideal for very high density applications such as A.T.E. switching matrices or multiplexers. Requiring a board area of only 4 mm x 4 mm, these relays allow the highest packing density currently available.

Two switch types are available, a general purpose sputtered ruthenium switch rated at 15 W, 1 A (3 V version) or 20 W, 1 A (5 & 12 V versions) and a low level sputtered ruthenium switch rated at 10 W, 0.5 A.

The small size of the package does not allow an internal diode. Back EMF suppression diodes are included in many relay drivers but if they are not, and depending on your drive methods, these may have to be provided externally.

While socketing relays is not normally recommended due to the risk of affecting contact resistance integrity, it is appreciated that sockets may sometimes be desired for ease of servicing/replacement, in the case of a relay being damaged or reaching the end of its working life. The device has pins on a 2 mm square pitch. There are suitable connectors available from some manufacturers, both SMD and Through Hole, that will allow these relays to be stacked in either a row or in a matrix on a 4 mm pitch.

Examples of Packing Density



Pickering Electronics' Series 120

Industry standard reed relay of the same electrical specification

The above actual size graphic shows sixteen Series 120 Relays packed into an area of 1.6 cm x 1.6 cm. In comparison, only four of the industry standard reed relays can be fitted into the same area.

A total of 528 Series 120 relays on a Pickering Interfaces ultra-high-density PXI module illustrates the packing density of these extremely small Reed Relays.

Switch Ratings - Dry Switches

1 Form A (energize to make)
20 W at 200 V
15 W at 200 V
10 W at 200 V

Series 120 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9.0 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 120 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 (*Note 15 W for 3 V coil) Package Type 1	120-1-A-3/1 *	3	200 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	2.9 pF	0.14 pF
	120-1-A-5/1	5	300 Ω					
	120-1-A-12/1 ‡	12	800 Ω					
1 Form A Switch No. 2 Package Type 1	120-1-A-3/2	3	200 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	2.9 pF	0.14 pF
	120-1-A-5/2	5	500 Ω					
	120-1-A-12/2 ‡	12	800 Ω					

‡ See Note[5] below.

Note[2]: Switch to coil capacitance

Due to the asymmetrical internal construction of the relay, the capacitance to the coil from one switch connection is approximately half the capacitance of the other switch connection, pin 1 is lower. In some applications this feature may be used to advantage for example, in a multiplexer where it is desirable to minimize the capacitance of the common connection to maximize bandwidth.

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Note[5]: 12 volt coil versions

With limited room inside small packages, it is not possible to achieve the high coil resistance figures that would be preferred, without using extremely fine wire gauges. If these ultra-fine gauges were used, there would be a resultant risk of poorer reliability due to the delicate nature of such wire. Reliability is of paramount importance to Pickering, so ultra fine gauges are avoided. The heating effect from the coil (V^2/R) will therefore be higher than for the 3 or 5 V versions. For example:

3 V type: 200 Ω = 45 mW
5 V type: 300 Ω = 83 mW
12 V type: 800 Ω = 180 mW

12 V versions are suitable for applications such as Multiplexers or Matrices where they are operated on a low duty cycle but consideration should be made where they are left operated for longer due to this heating effect.

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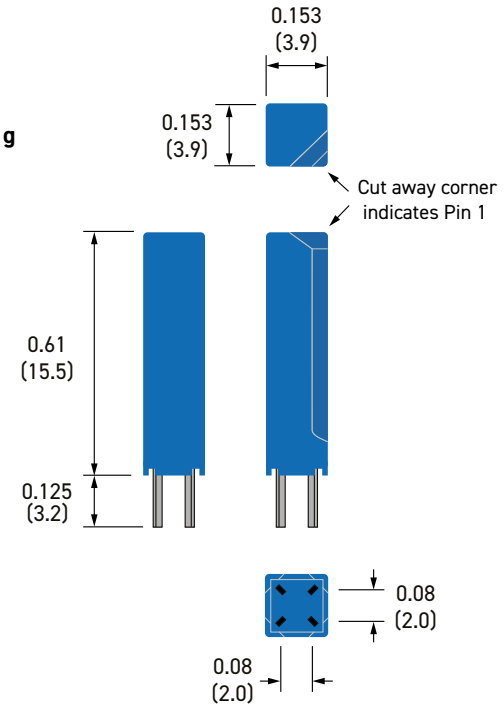
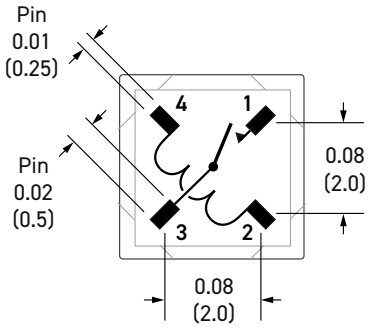
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **1**

Weight: Typical 0.49 g



1 Form A



Connection details - viewed from underside

Similar Relays Comparison

If the Series 120 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		124-1-A	122-1-A		120-1-A	
Physical Outline						
Depth	mm (inches)	3.9 (0.153)	3.9 (0.153)		3.9 (0.153)	
Width		3.9 (0.153)	3.9 (0.153)		3.9 (0.153)	
Height		9.5 (0.375)	12.5 (0.492)		15.5 (0.61)	
Package Volume (mm^3)		145	191		❶ 236	
Typical Weights (g)		0.28	0.37		0.49	
Contact Configuration		1-A (SPST)	1-A (SPST)		1-A (SPST)	
Reed Switch Type		Dry	Dry		Dry	Dry
Switching Voltage (V)		170	200	200	200	200
Switching Current (A)		0.5	1.0	0.5	1.0	0.5
Carry Current (A)		0.5	1.0	0.5	1.2	1.2
Switch Power (W)		10	15	10	20 (15)	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 120 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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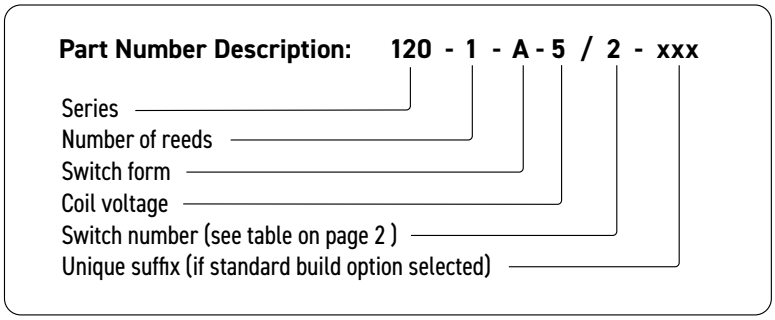

Help

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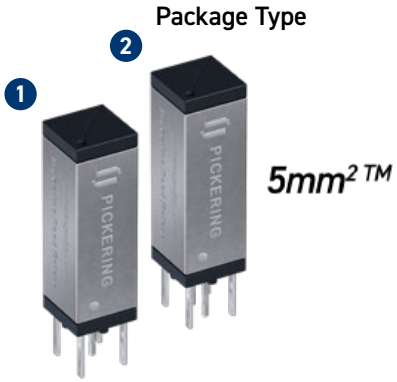
- **1 Form A, 2 Form A, 1 Form B** & **1 Form C**
- Stacking on **5 mm x 5 mm** pitch allowing the **highest packing density currently available** for a dual pole relay
- **3, 5** or **12 V** coils with internal diode
- Switching up to **1 A, 20 W**
- Mu-metal magnetic screening
- Sputtered ruthenium instrumentation grade switch
- Insulation resistance **>10^{12} Ω**
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

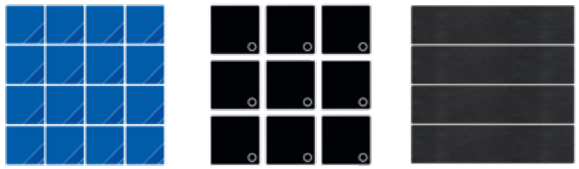


The Series 125 reed relay range require a board area of only 5 mm x 5 mm making them ideal for very high packing density applications such as A.T.E. switching matrices or multiplexers.

Three switch types are available. A general purpose sputtered ruthenium switch rated at 15 W, 1 A (3 & 5 V versions) or 20 W, 1 A (12 V versions), a low level sputtered ruthenium switch rated at 10 W, 0.5 A, and a Rhodium changeover switch rated at 2 W, 0.1 A.

Mu-metal, due to its high permeability and low magnetic remanence is used to provide magnetic screening. This 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 two additional relays, stacked one each side, are themselves operated. An unscreened device mounted on this pitch would have an interaction figure of around 40%. Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required. Pickering Series 125 relays have a typical interaction figure of 1%.

Examples of Packing Density



Pickering Electronics' Series 120/122/124 | Pickering Electronics' Series 125 | Industry standard reed relay of the same electrical specification

The above graphic shows the relative packing density of some high density reed relays.

Sixteen (SPST) Series 120/122/124 (***4 mm²***) relays, nine (DPST) Series 125 (***5 mm²***) relays, and four industry standard reed relays can be fitted into the same area.

A total of 288 Series 125 relays on a Pickering Interfaces PXI BRIC daughter card illustrates the packing density of these extremely small Reed Relays.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)
20 W at 200 V (1 kV Switch to Coil Standoff) 10 W at 200 V (1 kV Switch to Coil Standoff)	15 W at 200 V (1 kV Switch to Coil Standoff) 10 W at 200 V (1 kV Switch to Coil Standoff)
1 Form C (energize to make)	**2 Form A (energize to make)**
2 W at 200 V (1 kV Switch to Coil Standoff)	20 W at 200 V (1 kV Switch to Coil Standoff) 15 W at 200 V (1 kV Switch to Coil Standoff) 10 W at 200 V (1 kV Switch to Coil Standoff)

Series 125 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A & B	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A & B	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	2 W	0.1 A	0.1 A	30	10^7	0.75 ms	0.2 ms	Change over

Note[1]: Life Expectancy - Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9.0 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 125 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (20 W) Package Type 1	-	-	-	0.18 Ω	10^{12} Ω	10^{12} Ω	2.9pF	0.14pF
	125-1-A-5/1D	5	500 Ω					
	125-1-A-12/1D ‡	12	1000 Ω					
2 Form A, Switch No. 1 (20 W) (*Note 15 W for 5 V coils) Package Type 2	-	-	-	0.18 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	125-2-A-5/1D *	5	250 Ω					
	125-2-A-12/1D ‡	12	750 Ω					
1 Form B Switch No. 1 (15 W) Package Type 2	-	-	-	0.18 Ω	10^{12} Ω	10^{12} Ω	2.9pF	0.14pF
	125-1-B-5/1D	5	750 Ω					
	-	-	-					
1 Form A Switch No. 2 (10 W) Package Type 1	125-1-A-3/2D	3	330 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	2.9pF	0.14pF
	125-1-A-5/2D	5	500 Ω					
	125-1-A-12/2D ‡	12	1000 Ω					
2 Form A Switch No. 2 (10 W) Package Type 2	125-2-A-3/2D	3	150 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	125-2-A-5/2D	5	375 Ω					
	125-2-A-12/2D ‡	12	750 Ω					
1 Form B Switch No. 2 (10 W) Package Type 2	-	-	-	0.18 Ω	10^{12} Ω	10^{12} Ω	2.9pF	0.14pF
	125-1-B-5/2D	5	750 Ω					
	-	-	-					
1 Form C Switch No. 3 (2 W) Package Type 1	125-1-C-3/3D	3	100 Ω	0.25 Ω	10^{12} Ω	10^{11} Ω	See Note[3]	See Note[3]
	125-1-C-5/3D	5	150 Ω					
	-	-	-					

‡ See Note[5] next page.

Note[2]: Capacitance across open switch
The capacitance across the open switch was measured with other connections guarded.

Note[3]: Capacitance values
The value will depend upon on the mode of connection/guarding of unused terminals. Please contact technical sales for details.

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Note[5]: 12 volt coil versions

With limited room inside small packages, it is not possible to achieve the high coil resistance figures that would be preferred, without using extremely fine wire gauges. If these ultra-fine gauges were used, there would be a resultant risk of poorer reliability due to the delicate nature of such wire. Reliability is of paramount importance to Pickering, so ultra fine gauges are avoided. The heating effect from the coil (V^2/R) will therefore be higher than for the 3 or 5 V versions. For example:

3 V type: 200 Ω = 45 mW
5 V type: 375 Ω = 60 mW
12 V type: 750 Ω = 192 mW

12 V versions are suitable for applications such as Multiplexers or Matrices where they are operated on a low duty cycle but consideration should be made where they are left operated for longer due to this heating effect.

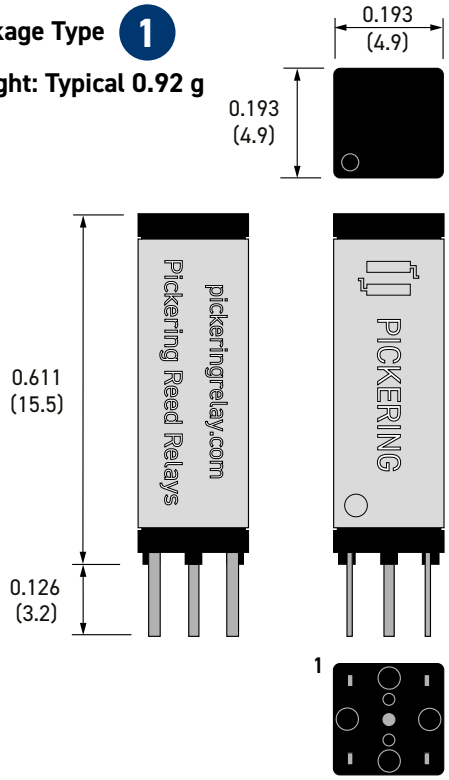
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

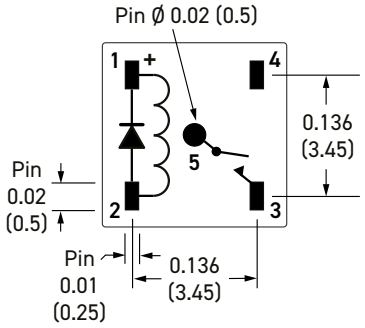
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.92 g

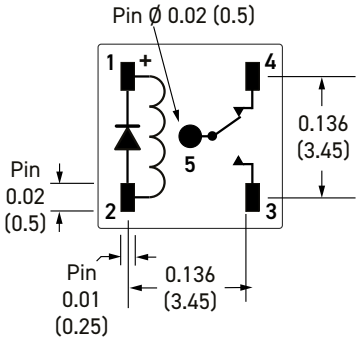


1 Form A



Connection details - viewed from underside

1 Form C



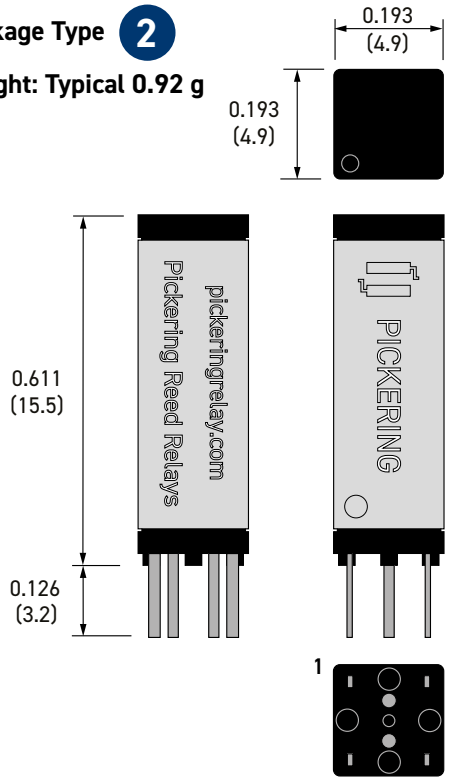
Connection details - viewed from underside

Important: The correct coil polarity must be observed, as shown by the + symbol on the schematic.

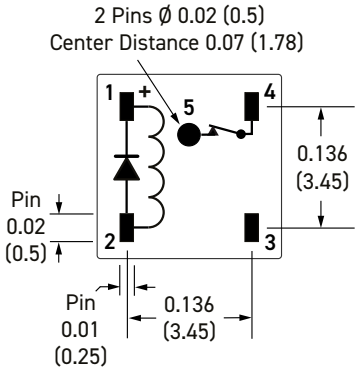
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **2**

Weight: Typical 0.92 g

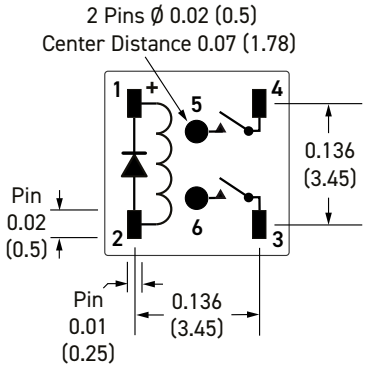


1 Form B



Connection details - viewed from underside

2 Form A



Connection details - viewed from underside

Important: The correct coil polarity must be observed, as shown by the + symbol on the schematic.

Similar Relays Comparison

If the Series 125 is unsuitable for your application, Pickering also manufactures four other series of double pole reed relays with similar characteristics, but in different package sizes.

Series Name		117-2-A	116-2-A		115-2-A		109-2-A
Physical Outline							
Depth	**mm (inches)**	3.7 (0.145)	3.7 (0.145)		3.7 (0.145)		3.7 (0.145)
Width		9.9 (0.39)	9.9 (0.39)		9.9 (0.39)		15.1 (0.595)
Height		9.52 (0.375)	12.45 (0.49)		15.5 (0.61)		8.9 (0.35)
Package Volume (**mm³**)		349	456		568		498
Typical Weights (**g**)		0.64	0.76		0.91		1.03
Contact Configuration		2-A (DPST)	2-A (DPST)		2-A (DPST)		2-A (DPST)
Reed Switch Type		Dry	Dry		Dry		Dry
Switching Voltage (**V**)		170	200	200	200	200	200
Switching Current (**A**)		0.5	1.0	0.5	1.0	0.5	0.5
Carry Current (**A**)		0.5	1.0	0.5	1.2	1.2	1.2
Switch Power (**W**)		10	20 (15)	10	15	10	10

Series Name		125-1-A		125-1-B		125-1-C	125-2-A	
Physical Outline								
Depth	**mm (inches)**	4.9 (0.193)		4.9 (0.193)		4.9 (0.193)	4.9 (0.193)	
Width		4.9 (0.193)		4.9 (0.193)		4.9 (0.193)	4.9 (0.193)	
Height		15.5 (0.611)		15.5 (0.611)		15.5 (0.611)	15.5 (0.611)	
Package Volume (**mm³**)		① 372		② 372		① 372	② 372	
Typical Weights (**g**)		0.92		0.92		0.92	0.92	
Contact Configuration		1-A (SPST)		1-B (SPST)		1-C (SPDT)	2-A (DPST)	
Reed Switch Type		Dry		Dry		Dry	Dry	
Switching Voltage (**V**)		200	200	200	200	30	200	200
Switching Current (**A**)		1.0	0.5	1.0	0.5	0.1	1.0	0.5
Carry Current (**A**)		1.2	1.2	1.2	1.2	0.1	1.2	1.2
Switch Power (**W**)		20	10	15	10	2	20 (15)	10

Reed Relay Selection Tool

Because Pickering offer the largest range of high-quality reed relays, sometimes it can be difficult to find the right reed relay you require. That is why we created the Reed Relay Selector, this tool will help you narrow down our offering to get you the correct reed relay for your application. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 125 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

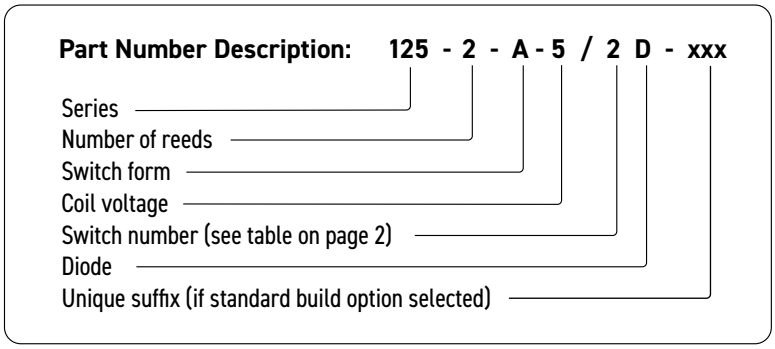
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Optional Internal Diode
	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

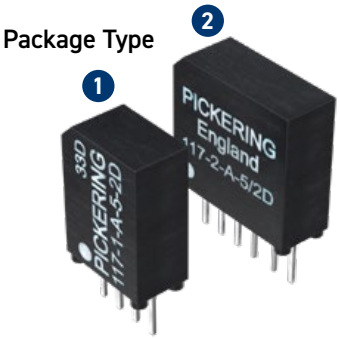
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

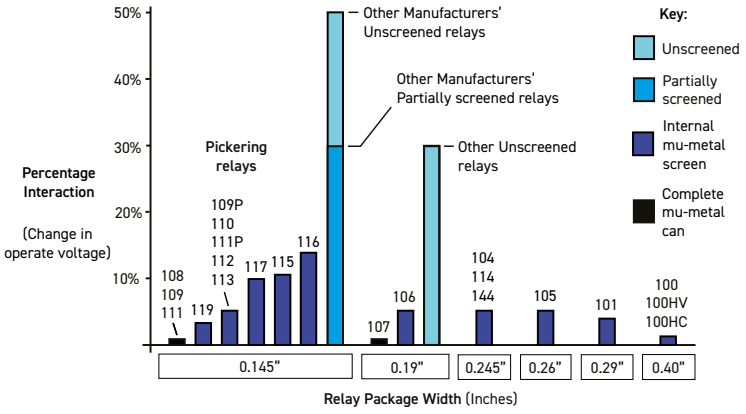
- Very high packing density taking up minimum PCB area
- **1 Form A** (SPST) or **2 Form A** (DPST) N.O.
- **1 Form A** stacks on **0.15 x 0.27** inches pitch
- Highest quality instrumentation grade switches
- Plastic package with internal mu-metal magnetic screen
- Increase functionality of existing designs without increasing the size of PCB
- Insulation resistance **>10^{12} Ω**
- **3** or **5 V** coils with optional internal back E.M.F suppression diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for high density instrumentation applications such as A.T.E. switching matrices or multiplexers



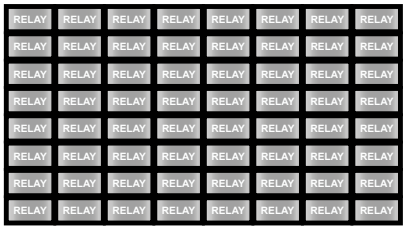
The relays feature an internal mu-metal magnetic screen. Mu-metal has the advantage of a high permeability and low magnetic remanence and eliminates problems that would otherwise occur due to magnetic interaction. Interaction is usually measured as a percentage increase in the voltage required to operate 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%. Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required. To learn more visit: pickeringrelay.com/magnetic-interaction

The Series 117 is suitable for most instrumentation applications. If a higher rating is required, the Series 115, which is rated at up to 20 W, 1.0 A should be considered. The relay footprint and pin configurations of the Series 115 are identical but the case height increases to 0.61 inches (15.5 mm). Please see further down the Series 117 datasheet for a similar relay comparison table.

Magnetic Interaction



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.

Switch Ratings - Dry Switches

1 Form A (energize to make)	2 Form A (energize to make)
10 W at 170 V	10 W at 170 V

Series 117 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
2	A	10 W	0.5 A	0.5 A	170 V	10^8	0.3 ms	0.15 ms	All applications

The reed switch in the Series 117 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. This means that high inrush currents, particularly caused by capacitive loads must be avoided.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. 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 2.5 x 10^8 ops. At the maximum load (resistive), typical life is 1 x 10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 117 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 2 Package Type 1	117-1-A-3/2D	3	200 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.14 pF
	117-1-A-5/2D	5	400 Ω					
2 Form A, Switch No. 2 Package Type 2	117-2-A-5/2D	5	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.14 pF

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

Note[2]: Switch to Coil Capacitance

Due to the asymmetrical internal construction of the relay, the capacitance to the coil from one switch connection is approximately half the capacitance of the other switch connection, pin 3 is lower. In some applications this feature may be used to advantage for example, in a multiplexer where it is desirable to minimize the capacitance of the common connection to maximize bandwidth.

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

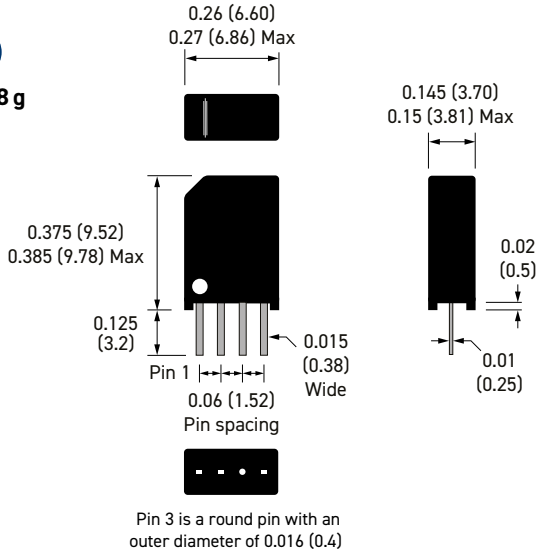
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

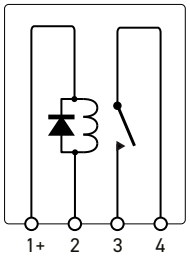
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.38 g

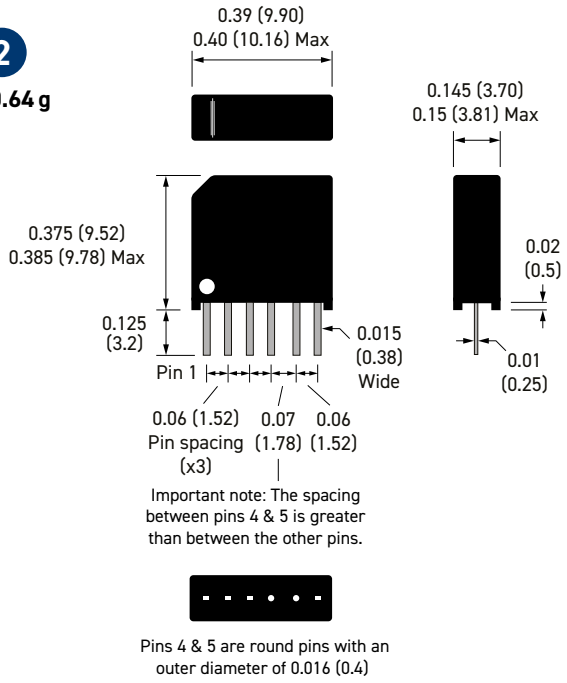


1 Form A

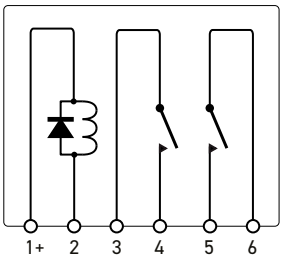


Package Type 2

Weight: Typical 0.64 g



2 Form A



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

Similar Relays Comparison

If the Series 117 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		117-1-A	117-2-A	116-1-A		116-2-A	
Physical Outline							
Depth	mm (inches)	3.7 (0.145))	3.7 (0.145)	3.7 (0.145))		3.7 (0.145)	
Width		6.6 (0.26)	9.9 (0.39)	6.6 (0.26)		9.9 (0.39)	
Height		9.52 (0.375)	9.52 (0.375)	12.45 (0.49)		12.45 (0.49)	
Package Volume (mm^3)		❶ 233	❷ 349	304		456	
Typical Weights (g)		0.38	0.64	0.53		0.76	
Contact Configuration		1-A (SPST)	2-A (DPST)	1-A (SPST)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry		Dry	
Stand-off Voltage (V)		-	-	-		-	
Switching Voltage (V)		170	170	200	200	200	200
Switching Current (A)		0.5	0.5	1.0	0.5	1.0	0.5
Carry Current (A)		0.5	0.5	1.0	0.5	1.0	0.5
Switch Power (W)		10	10	20 (15)	10	20 (15)	10

Series Name		115-1-A		115-2-A		125-2-A	
Physical Outline							
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)		4.9 (0.193)	
Width		6.6 (0.26)		9.9 (0.39)		4.9 (0.193)	
Height		15.5 (0.61)		15.5 (0.61)		15.5 (0.611)	
Package Volume (mm^3)		379		568		372	
Typical Weights (g)		0.66		0.91		0.92	
Contact Configuration		1-A (SPST)		2-A (DPST)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry		Dry	
Stand-off Voltage (V)		-	-	-		1000	
Switching Voltage (V)		200	200	200	200	200	200
Switching Current (A)		1.0	0.5	1.0	0.5	1.0	0.5
Carry Current (A)		2.0	1.2	1.2	1.2	1.2	1.2
Switch Power (W)		20 (15)	10	15	10	20 (15)	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 117 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

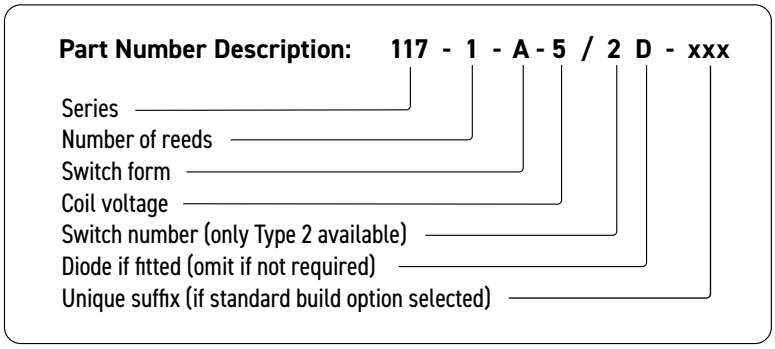
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

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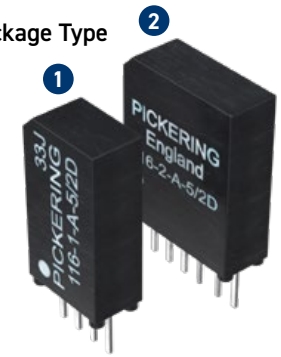
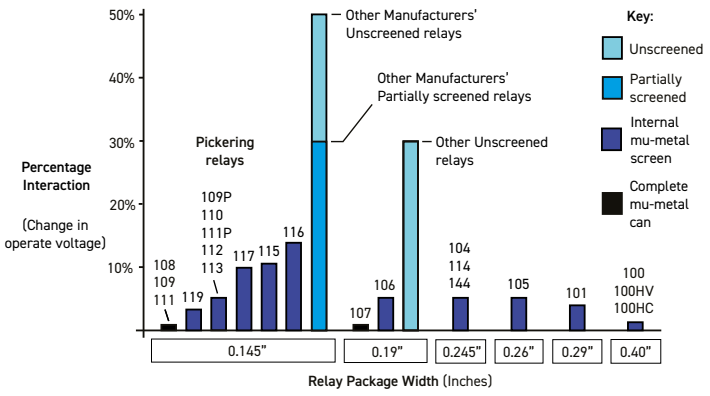
- Up to **20 W**, **1 A** switching
- **1 Form A** (SPST) or **2 Form A** (DPST) N.O.
- **1 Form A** stacks on **0.15 x 0.27** inches pitch
- Instrumentation grade switches with sputtered ruthenium contacts making them ideal for low level or "cold" switching applications
- Plastic package with internal mu-metal magnetic screen
- Take up minimum board area of only **0.15 x 0.27** inches; making it possible to increase the functionality of existing designs without increasing the size of PCB
- Insulation resistance **$>10^{12}\,\Omega$**
- **3**, **5** or **12 V** coils with optional internal back E.M.F suppression diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for high density instrumentation applications such as A.T.E. switching matrices or multiplexers.

Package Type

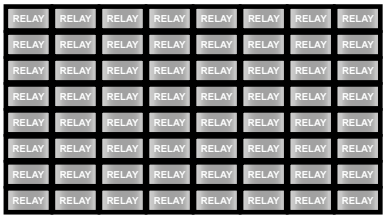


The relays feature an internal mu-metal magnetic screen. Mu-metal has the advantage of a high permeability and low magnetic remanence and eliminates problems that would otherwise occur due to magnetic interaction. Interaction is usually measured as a percentage increase in the voltage required to operate 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%. Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required. To learn more visit: pickeringrelay.com/magnetic-interaction

Magnetic Interaction



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.

Switch Ratings - Dry Switches

1 Form A (energize to make)	2 Form A (energize to make)
20 W at 200 V	20 W at 200 V
15 W at 200 V	15 W at 200 V
10 W at 200 V	10 W at 200 V

Series 116 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W for 3 & 5 V coils)	1 A	1 A	200 V	10^8	0.5 ms	0.2 ms	General Purpose
2	A	10 W	0.5 A	0.5 A	200 V	10^8	0.5 ms	0.2 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification off 1 Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 2.5 x 10^8 ops. At the maximum load (resistive), typical life is 1 x 10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 116 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1 (* 15 W for 3 & 5 V coils)	116-1-A-3/1D *	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.1 pF	0.2 pF
	116-1-A-5/1D *	5	500 Ω					
	116-1-A-12/1D	12	750 Ω					
1 Form A Switch No. 2 Package Type 1	116-1-A-3/2D	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.1 pF	0.2 pF
	116-1-A-5/2D	5	500 Ω					
	116-1-A-12/2D	12	750 Ω					
2 Form A, Switch No. 1 Package Type 2 (* 15 W for 5 V coils)	116-2-A-5/1D *	5	375 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.1 pF	0.2 pF
	116-2-A-12/1D	12	750 Ω					
2 Form A, Switch No. 2 Package Type 2	116-2-A-5/2D	5	375 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.1 pF	0.2 pF
	116-2-A-12/2D	12	750 Ω					

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

Note[2]: Switch to Coil Capacitance

Due to the asymmetrical internal construction of the relay, the capacitance to the coil from one switch connection is approximately half the capacitance of the other switch connection, pin 3 is lower. In some applications this feature may be used to advantage for example, in a multiplexer where it is desirable to minimize the capacitance of the common connection to maximize bandwidth.

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

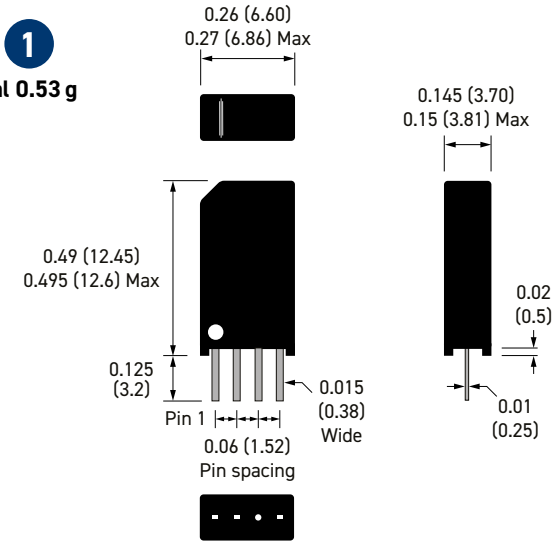
For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

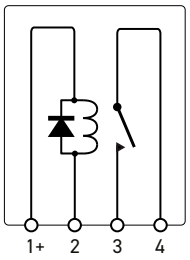
Package Type 1

Weight: Typical 0.53 g



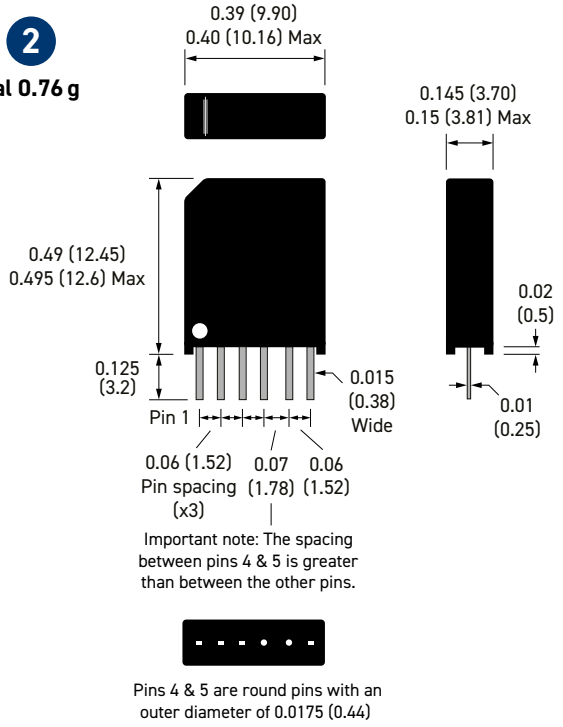
Pin 3 is a round pin with an outer diameter of 0.0175 (0.44)

1 Form A



Package Type 2

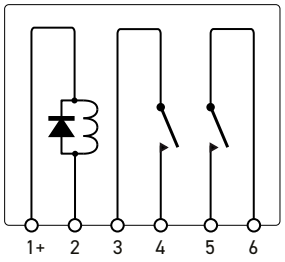
Weight: Typical 0.76 g



Important note: The spacing between pins 4 & 5 is greater than between the other pins.

Pins 4 & 5 are round pins with an outer diameter of 0.0175 (0.44)

2 Form A



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

Similar Relays Comparison

If the Series 116 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		117-1-A	117-2-A	116-1-A		116-2-A	
Physical Outline							
Depth	**mm (inches)**	3.7 (0.145))	3.7 (0.145)	3.7 (0.145))		3.7 (0.145)	
Width		6.6 (0.26)	9.9 (0.39)	6.6 (0.26)		9.9 (0.39)	
Height		9.52 (0.375)	9.52 (0.375)	12.45 (0.49)		12.45 (0.49)	
Package Volume (**mm³**)		233	349	**1** 304		**2** 456	
Typical Weights (**g**)		0.38	0.64	0.53		0.76	
Contact Configuration		1-A (SPST)	2-A (DPST)	1-A (SPST)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry		Dry	
Stand-off Voltage (**V**)		-	-	-		-	
Switching Voltage (**V**)		170	170	200	200	200	200
Switching Current (**A**)		0.5	0.5	1.0	0.5	1.0	0.5
Carry Current (**A**)		0.5	0.5	1.0	0.5	1.0	0.5
Switch Power (**W**)		10	10	20 (15)	10	20 (15)	10

Series Name		115-1-A		115-2-A		125-2-A	
Physical Outline							
Depth	**mm (inches)**	3.7 (0.145)		3.7 (0.145)		4.9 (0.193)	
Width		6.6 (0.26)		9.9 (0.39)		4.9 (0.193)	
Height		15.5 (0.61)		15.5 (0.61)		15.5 (0.611)	
Package Volume (**mm³**)		379		568		372	
Typical Weights (**g**)		0.66		0.91		0.92	
Contact Configuration		1-A (SPST)		2-A (DPST)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry		Dry	
Stand-off Voltage (**V**)		-	-	-		-	
Switching Voltage (**V**)		200	200	200	200	200	200
Switching Current (**A**)		1.0	0.5	1.0	0.5	1.0	0.5
Carry Current (**A**)		2.0	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		20 (15)	10	15	10	20 (15)	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 116 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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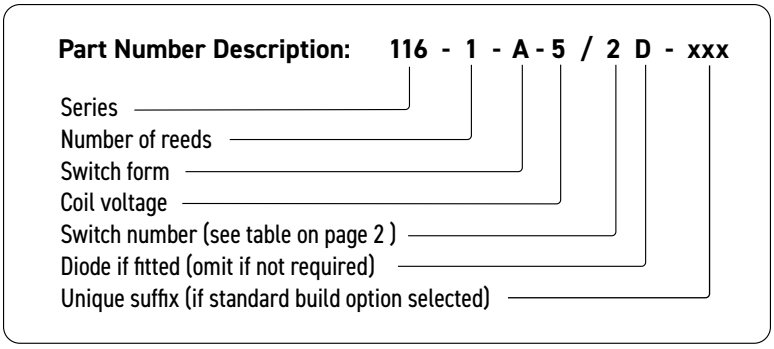

Help

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- **10**, **15** or **20 W** switching
- SPST stacks on **0.15 x 0.27 inches** pitch
- Highest quality instrumentation grade switches
- Plastic package with internal mu-metal magnetic screen
- **1 Form A** (SPST) or **2 Form A** (DPST) N.O.
- Insulation resistance **$>10^{12}\ \Omega$**
- **3**, **5** or **12 V** coils with optional internal back E.M.F suppression diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for high density instrumentation applications such as A.T.E. switching matrices or multiplexers.

Package Type 2

Two switch types are available. Both types have sputtered ruthenium contacts for long life and high reliability.

Switch type number 1 is better suited for general purpose applications. It has a layer of copper beneath the ruthenium to help dissipate the heat from the contact area. This gives an improved current inrush handling ability.

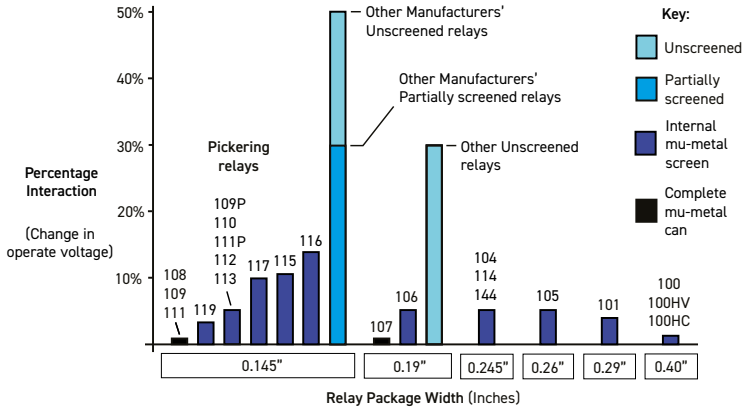
Switch type number 2 should be chosen for low level or 'cold' switching applications.

Series 115 is pin compatible with the Series 116 and 117 but has a slightly higher profile.

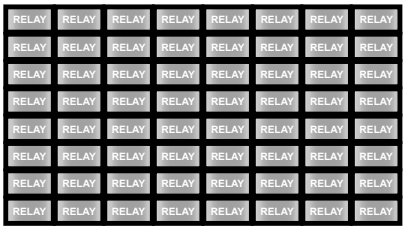
The reed switch/coil assemblies used in this series are the same as used in the long established and well proven, Series 109 and 109P.

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. Relays of this size without magnetic screening would be totally unsuitable for applications where dense packing is required. To learn more visit: pickeringrelay.com/magnetic-interaction

Magnetic Interaction



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.

Switch Ratings - Dry Switches

1 Form A (energize to make)	2 Form A (energize to make)
10 W at 200 V 15 W at 200 V 20 W at 200 V	10 W at 200 V

Series 115 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15W)	1.0 A	1.2 A	200 V	10^9	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200 V	10^9	0.5 ms	0.2 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics
In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines
Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 115 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 (*Note: 15 W for 3 V coil) Package Type 1	115-1-A-3/1D *	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.9 pF	0.14 pF
	115-1-A-5/1D	5	500 Ω					
	115-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 1	115-1-A-3/2D	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.9 pF	0.14 pF
	115-1-A-5/2D	5	500 Ω					
	115-1-A-12/2D	12	1000 Ω					
2 Form A, Switch No. 1 (Note: 15 W) Package Type 2	115-2-A-5/1D	5	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.9 pF	0.14 pF
	115-2-A-12/1D	12	750 Ω					
2 Form A, Switch No. 2 Package Type 2	115-2-A-5/2D	5	375 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.9 pF	0.14 pF
	115-2-A-12/2D	12	750 Ω					

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

Note[2]: Switch to Coil Capacitance

Due to the asymmetrical internal construction of the relay, the capacitance to the coil from one switch connection is approximately half the capacitance of the other switch connection, pin 3 is lower. In some applications this feature may be used to advantage for example, in a multiplexer where it is desirable to minimize the capacitance of the common connection to maximize bandwidth.

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

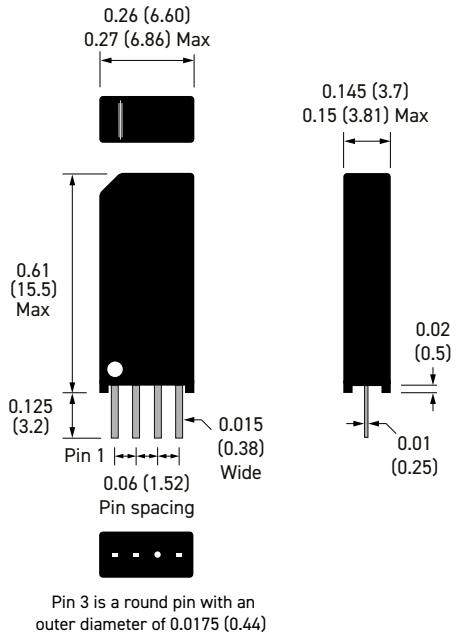
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

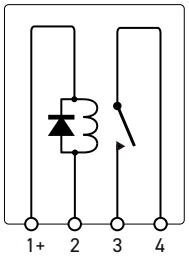
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.66 g

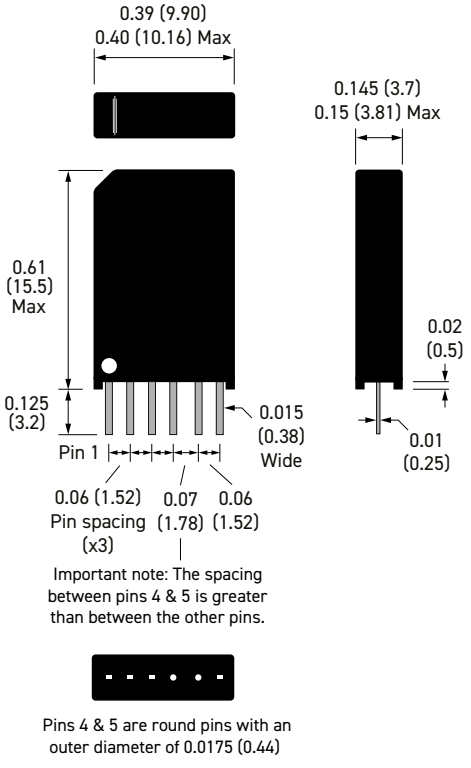


1 Form A

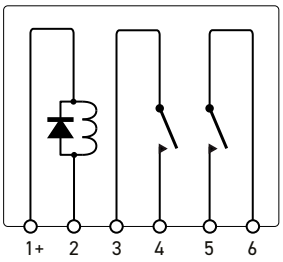


Package Type 2

Weight: Typical 0.91 g



2 Form A



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

Similar Relays Comparison

If the Series 115 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		117-1-A	117-2-A	116-1-A		116-2-A	
Physical Outline							
Depth	**mm (inches)**	3.7 (0.145))	3.7 (0.145)	3.7 (0.145))		3.7 (0.145)	
Width		6.6 (0.26)	9.9 (0.39)	6.6 (0.26)		9.9 (0.39)	
Height		9.52 (0.375)	9.52 (0.375)	12.45 (0.49)		12.45 (0.49)	
Package Volume (**mm³**)		233	349	304		456	
Typical Weights (**g**)		0.38	0.64	0.53		0.76	
Contact Configuration		1-A (SPST)	2-A (DPST)	1-A (SPST)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry		Dry	
Stand-off Voltage (**V**)		-	-	-		-	
Switching Voltage (**V**)		170	170	200	200	200	200
Switching Current (**A**)		0.5	0.5	1.0	0.5	1.0	0.5
Carry Current (**A**)		0.5	0.5	1.0	0.5	1.0	0.5
Switch Power (**W**)		10	10	20 (15)	10	20 (15)	10

Series Name		115-1-A		115-2-A		125-2-A	
Physical Outline							
Depth	**mm (inches)**	3.7 (0.145)		3.7 (0.145)		4.9 (0.193)	
Width		6.6 (0.26)		9.9 (0.39)		4.9 (0.193)	
Height		15.5 (0.61)		15.5 (0.61)		15.5 (0.611)	
Package Volume (**mm³**)		❶ 379		❷ 568		372	
Typical Weights (**g**)		0.66		0.91		0.92	
Contact Configuration		1-A (SPST)		2-A (DPST)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry		Dry	
Stand-off Voltage (**V**)		-	-	-		1000	
Switching Voltage (**V**)		200	200	200	200	200	200
Switching Current (**A**)		1.0	0.5	1.0	0.5	1.0	0.5
Carry Current (**A**)		2.0	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		20 (15)	10	15	10	20 (15)	10

Reed Relay Selection Tool

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Standard Build Options

The Series 115 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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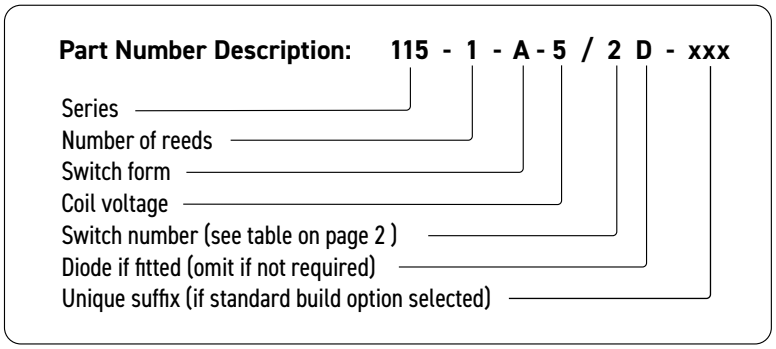

Help

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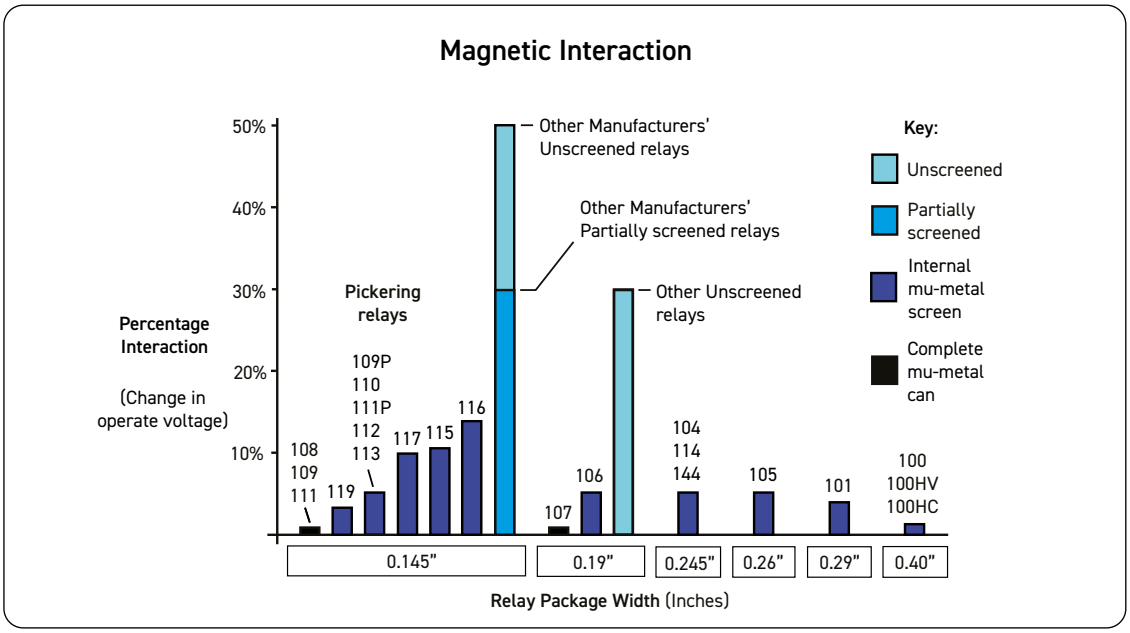
- Switching up to **20 W, 1A**
- **1 Form A** stacks on **0.15 x 0.40 inches** pitch
- Highest quality, sputtered ruthenium instrumentation grade reed switches
- Ideal for high density card based systems and automatic test equipment
- Plastic package with internal mu-metal magnetic screen
- They take up the minimum of board area, conserving board space
- Insulation resistance **$>10^{12}\,\Omega$**
- **3**, **5** or **12 V** coils with or without internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

1 **Package Type**

Suitable for high density card based systems such as VME, VXI, Compact PCI, and PXI. The high quality, sputtered ruthenium switch contacts also makes them ideal for Automatic Test Equipment. The 5 V coil version has a resistance of 500 Ω and may be driven directly from TTL logic.

The Series 112 is encapsulated in a plastic package using a very high resistivity resin to achieve an insulation resistance greater than $10^{12}\,\Omega$.

The relay has an internal mu-metal screen which totally eliminates the risk of magnetic interaction problems. An unscreened device mounted on this pitch would have an interaction figure of around 40%. Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required. Pickering Series 112 have a typical interaction figure of 5%.



For more information on magnetic interaction please visit: pickeringrelay.com/magnetic-interaction

Switch Ratings - Dry Switches

1 Form A (energize to make)
20 W at 200 V 15 W at 200 V 10 W at 200 V

Series 112 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W for 3 V coils)	1 A	1 A	200	10^8	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	0.5 A	200	10^8	0.5 ms	0.2 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^6 ops. IIn abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 112 Coil data and type numbers

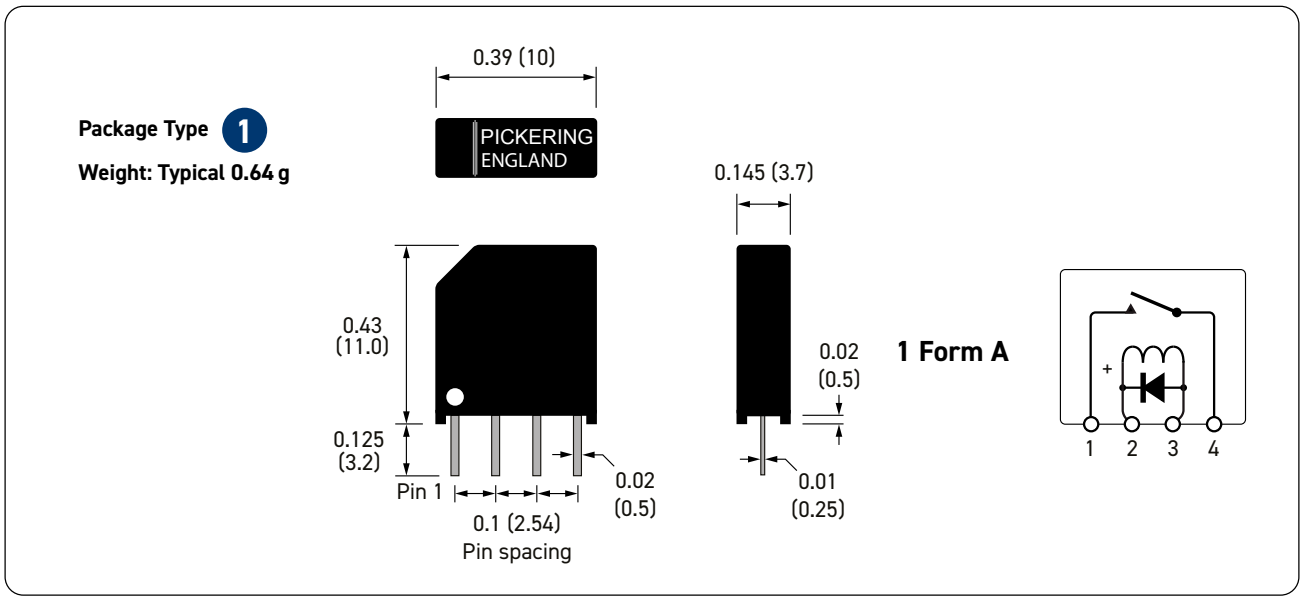
Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[3])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1 (* 15 W for 3 V coils)	112-1-A-3/1D *	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF
	112-1-A-5/1D	5	500 Ω					
	112-1-A-12/1D	12	750 Ω					
1 Form A, Switch No. 2 Package Type 1	112-1-A-3/2D	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF
	112-1-A-5/2D	5	500 Ω					
	112-1-A-12/2D	12	750 Ω					

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

Note[2]: Capacitance across open switch
The capacitance across the open switch was measured with other connections guarded.

Note[3]: Insulation resistance
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)



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

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Similar Relays Comparison

If the Series 112 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		111P-1-A	112-1-A		116-1-A		116-2-A		110-1-A	
Physical Outline										
Depth	mm (inches)	3.7 (0.145)	3.7 (0.145)		3.7 (0.145)		3.7 (0.145)		3.7 (0.145)	
Width		10.0 (0.39)	10.0 (0.39)		6.60 (0.26)		9.90 (0.39)		10.0 (0.39)	
Height		6.6 (0.26)	11.0 (0.43)		12.45 (0.49)		12.45 (0.49)		15.0 (0.60)	
Package Volume (**mm³**)		245	407 (1)		304		456		555	
Typical Weights (**g**)		0.44	0.64		0.53		0.76		1.08	
Contact Configuration		1-A (SPST)	1-A (SPST)		1-A (SPST)		2-A (DPST)		1-A (SPST)	
Reed Switch Type		Dry	Dry		Dry		Dry		Dry	Dry
Switching Voltage (**V**)		170	200	200	200	200	200	200	200	200
Switching Current (**A**)		0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5
Carry Current (**A**)		0.5	1.0	0.5	1.0	0.5	1.0	0.5	1.2	1.2
Switch Power (**W**)		10	20 (15)	10	20 (15)	10	20 (15)	10	20	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 112 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

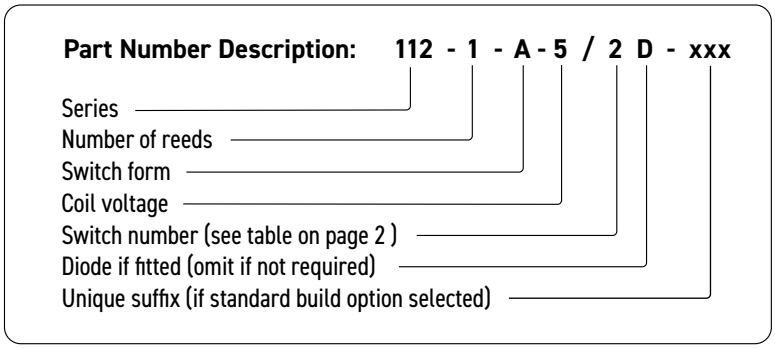
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



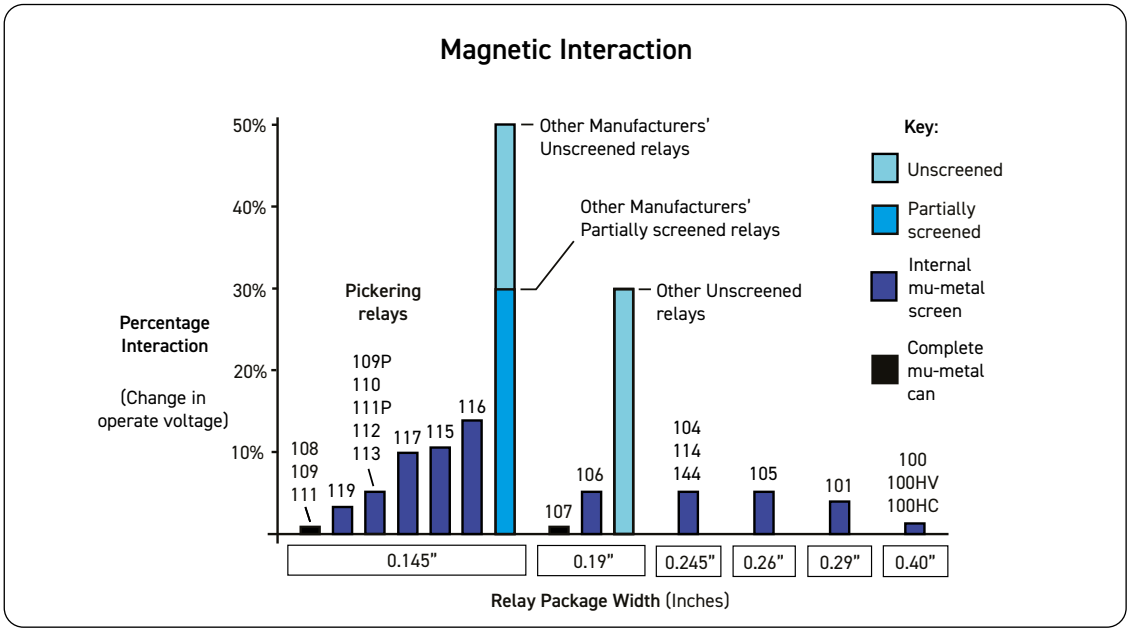
Help

If you need any technical advice or other help, 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

- **20 W** switching
- **1 Form A** stacks on **0.15 x 0.40 inches** pitch
- 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 **$>10^{12}\,\Omega$**
- **3**, **5** & **12 V** coils with or without internal diode
- **5 V** coils of **500 Ω** may be driven directly from TTL logic
- Two types of form a switches available, a general purpose version and a type suitable for low level or "cold" switching applications
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for **A.T.E.** switching matrices

1 Package Type

The Series 110 relay has an internal mu-metal screen which totally eliminates the risk of magnetic interaction problems. An unscreened device mounted on this pitch would have an interaction figure of around 40%. Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required. Pickering Series 110 have a typical interaction figure of 5%. To learn more visit: pickeringrelay.com/magnetic-interaction
If a lower profile device is required, take a look at the Series 111 & 112.



Switch Ratings - Dry Switches

1 Form A (energize to make)
20 W at 200 V
10 W at 200 V

Series 110 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 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.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 110 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[3])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1	110-1-A-5/1D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.1 pF
	110-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 1	110-1-A-3/2D	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.1 pF
	110-1-A-5/2D	5	500 Ω					
	110-1-A-12/2D	12	1000 Ω					

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

Note[2]: Capacitance across open switch

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

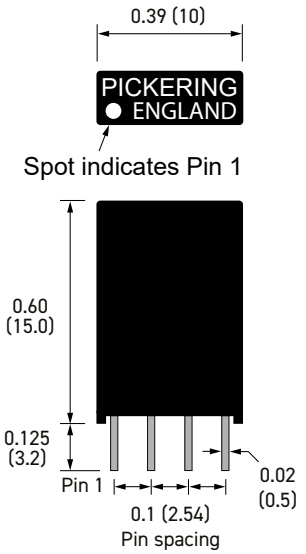
Note[3]: Insulation resistance

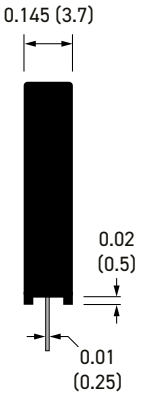
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

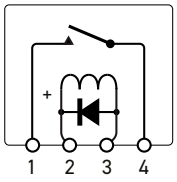
Package Type 1

Weight: Typical 1.08 g





1 Form A



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

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Similar Relays Comparison

If the Series 110 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		110-1-A		111P-1-A	112-1-A		115-1-A			115-2-A
Physical Outline										
Depth	**mm (inches)**	3.7 (0.145)		3.7 (0.145)	3.7 (0.145)		3.7 (0.145)			3.7 (0.145)
Width		10.0 (0.39)		10.0 (0.39)	10.0 (0.39)		6.60 (0.26)			9.90 (0.39)
Height		15.0 (0.60)		6.6 (0.26)	11.0 (0.43)		15.5 (0.61)			15.5 (0.61)
Package Volume (**mm³**)		❶ 555		245	407		379			568
Typical Weights (**g**)		1.08		0.44	0.64		0.66			0.91
Contact Configuration		1-A (SPST)		1-A (SPST)	1-A (SPST)		1-A (SPST)			2-A (DPST)
Reed Switch Type		Dry	Dry	Dry	Dry		Dry	Dry	Dry	Dry
Switching Voltage (**V**)		200	200	170	200	200	200	200	200	200
Switching Current (**A**)		1.0	0.5	0.5	1.0	0.5	1.0	1.0	0.5	0.5
Carry Current (**A**)		1.2	1.2	0.5	1.0	0.5	1.2	1.2	1.2	1.2
Switch Power (**W**)		20	10	10	20 (15)	10	20	15	10	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 110 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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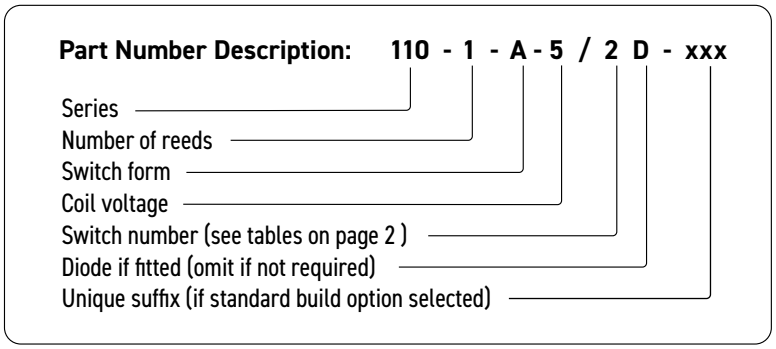
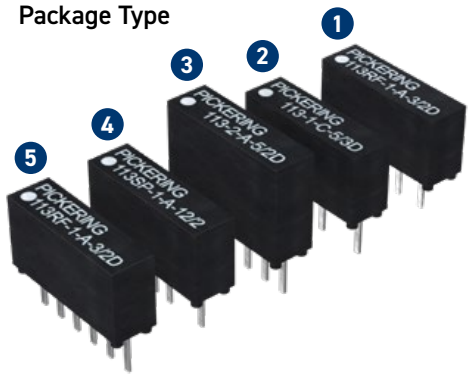


Help

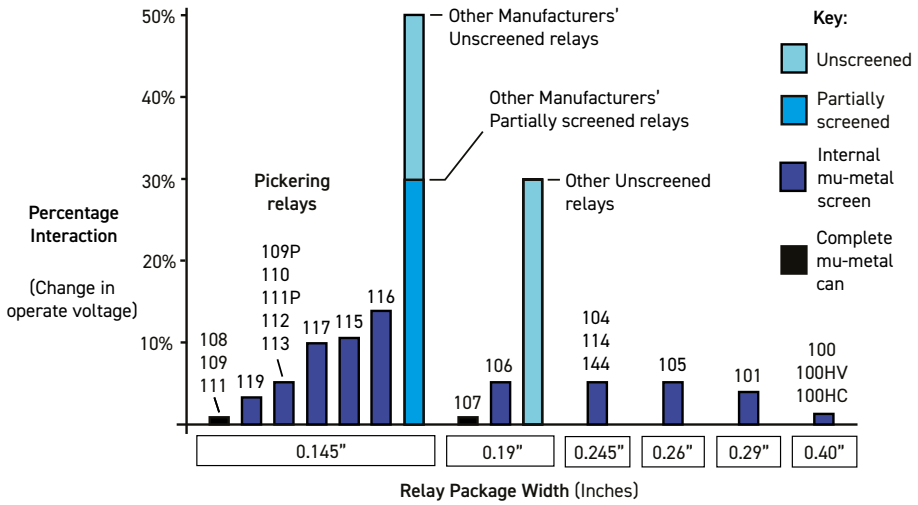
If you need any technical advice or other help, please do not hesitate to contact our Technical Sales Department. We will always be pleased to discuss Pickering relays with you. email: techsales@pickeringrelay.com

- Includes **New 113RF** coaxial types suitable for up to **3 GHz**
- Up to **20 W** switching
- High packing density stacking on **0.15 x 0.5 inches** pitch
- Highest quality instrumentation grade switches
- **Form A** versions have sputtered ruthenium contacts, ideal for automatic test equipment
- **Form C** version smallest changeover reed relay available on the market
- Plastic package with internal mu-metal magnetic screen
- Form A, Form A coaxial and Form C configurations
- Insulation resistance **>10^{12} Ω** for **Form A** types and **>10^{10} Ω** for **Form C** types
- **3**, **5** & **12 V** coils with or without internal diode
- **1 Form A**, **5 V** version has a coil resistance of **500 Ω**, drives directly from **TTL** logic
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

Package Type



Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form C (change-over)	2 Form A (energize to make)
20 W at 200 V	2 W at 30 V	20 W at 200 V
15 W at 200 V		15 W at 200 V
10 W at 200 V		10 W at 200 V

Series 113 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W for 3 V coils)	1 A	1 A	200	10^8	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	0.5 A	200	10^8	0.5 ms	0.2 ms	Low level
3	C	2 W	0.1 A	0.1 A	30	10^7	1.0 ms	0.2 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to:f 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 2.5 x 10^8 ops. At the maximum load (resistive), typical life is 1 x 10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 113 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1 (* 15 W for 3 V coils)	113-1-A-3/1D *	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF
	113-1-A-5/1D	5	500 Ω					
	113-1-A-12/1D	12	650 Ω					
1 Form A, Switch No. 2 Package Type 1	113-1-A-3/2D	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF
	113-1-A-5/2D	5	500 Ω					
	113-1-A-12/2D	12	650 Ω					
1 Form A, Switch No. 2 Special Pinout Package Type 4	113SP-1-A-5/2D	5	500 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF
	113SP-1-A-12/2D	12	650 Ω					
1 Form A, Switch No. 2 Package Type 5	113RF-1-A-3/2D	3	100 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	113RF-1-A-5/2D	5	300 Ω					
1 Form C Switch No. 3 Package Type 2	113-1-C-5/3D	5	150 Ω	0.2 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
2 Form A Switch No. 1 Package Type 3	113-2-A-5/1D	5	150 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
2 Form A Switch No. 2 Package Type 3	113-2-A-5/2D	5	150 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

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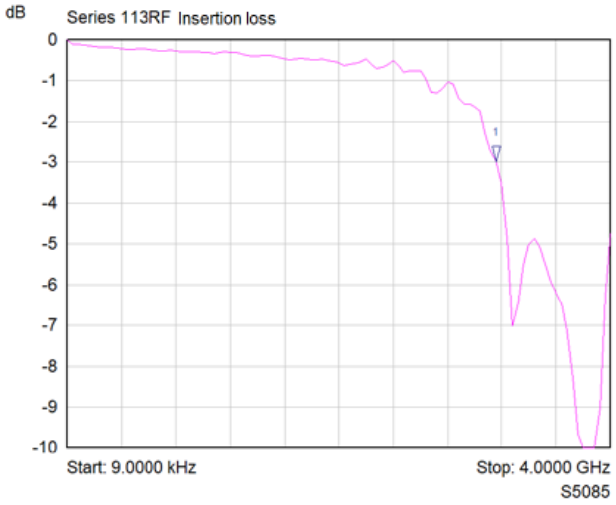
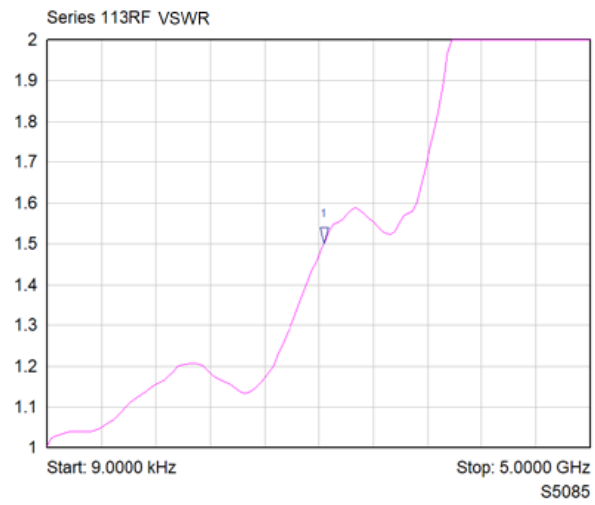
RF Plots for the 113RF Reed Relay



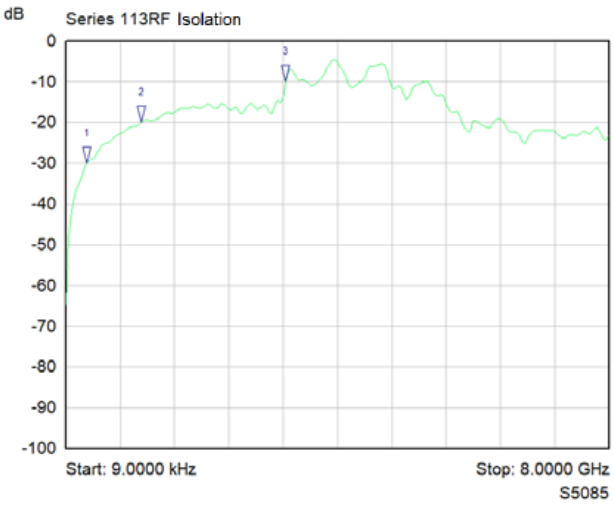
Mkr	Trace	X-Axis	Value
1	Series 113RF	3.1618 GHz	-3.00 dB

113RF Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1	Series 113RF	2.5468 GHz	1.50

113RF Typical VSWR Plot



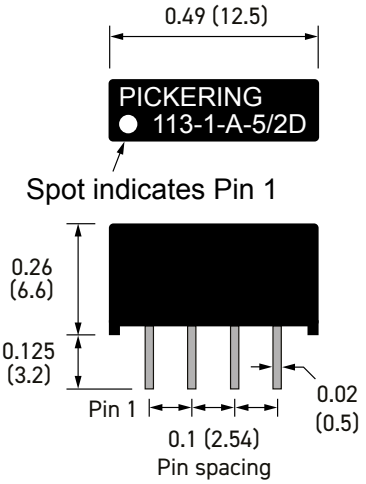
Mkr	Trace	X-Axis	Value
1	Series 113RF	311.7632 MHz	-30.00 dB
2	Series 113RF	1.1120 GHz	-20.00 dB
3	Series 113RF	3.2413 GHz	-10.00 dB

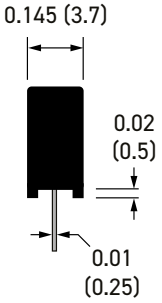
113RF Typical Isolation Plot

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

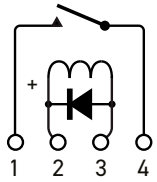
Package Type 1

Weight: Typical 0.52 g



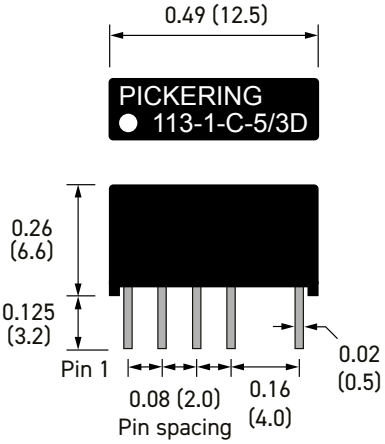


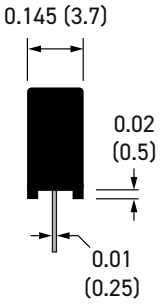
1 Form A



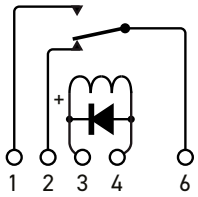
Package Type 2

Weight: Typical 0.47 g



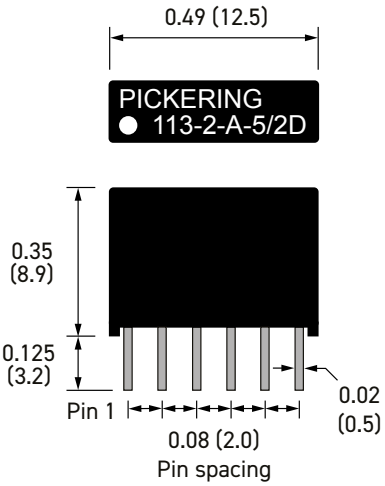


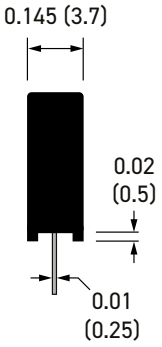
1 Form C



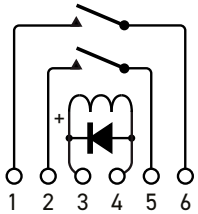
Package Type 3

Weight: Typical 0.69 g





2 Form A



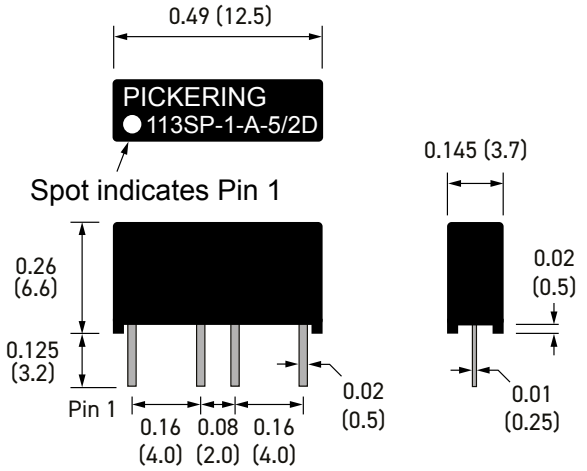
Important: Where the optional internal diode is fitted the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Special Pin Configuration and Dimensional Data for 1 Form A (dimensions in inches, millimeters in brackets)

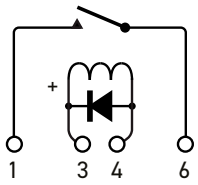
The standard 1 Form A device has 4 pins on 0.1 inches (2.54 mm) pitch (see drawing). This configuration makes it pin compatible with the Pickering Series 110, 111 and 112. A special pin configuration is also available with a pinout compatible with that of the 2 Form A type (see drawing). The switch terminals are pins 1&6, the coil is Pins 3&4 with pins 2&5 omitted, this version has the prefix 113SP. It is sometimes desirable to have a PCB that can be used for either 1 Form A or 2 Form A switching, this arrangement allows the use of a common board fitted with the appropriate relay.

Package Type 4

Weight: Typical 0.52 g



113SP
1 Form A
Special
Pinout

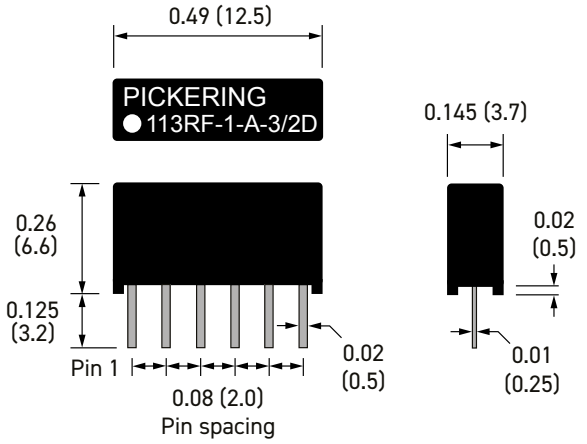


Important: Where the optional internal diode is fitted the correct coil polarity must be observed, as shown by the + symbol on the schematics.

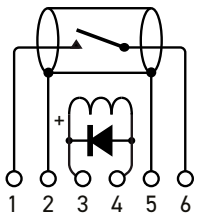
113RF Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 5

Weight: Typical 0.58 g



113RF
1 Form A



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

Similar Relays Comparison

If the Series 113 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		111P-1-A	111RF-1-A	113-1-A		113SP-1-A	113RF-1-A	113-1-C	113-2-A	
Physical Outline										
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)						
Width		10.0 (0.39)		12.5 (0.49)						
Height		6.6 (0.26)		6.6 (0.26)					8.9 (0.35)	
Package Volume (**mm³**)		245		❶ 306		❹ 306	❺ 306	❷ 306	❸ 412	
Typical Weights (**g**)		0.44	0.56	0.52			0.58	0.47	0.69	
Contact Configuration		1-A (SPST)		1-A (SPST)				1-C (SPDT)	2-A (DPST)	
Reed Switch Type		Dry		Dry		Dry	Dry	Dry	Dry	
Switching Voltage (**V**)		170		200	200	200	200	30	200	200
Switching Current (**A**)		0.5		1.0	0.5	0.5	0.5	0.1	1.0	0.5
Carry Current (**A**)		0.5		1.0	0.5	0.5	0.5	0.1	1.0	0.5
Switch Power (**W**)		10		20 (15)	10	10	10	2	20 (15)	10

Series Name		109-1-A			109RF50-1-A		109RF75-1-A		109-1-B	109-1-C	109-2-A	109P-1-A		
Physical Outline														
Depth	mm (inches)	3.7 (0.145)							3.7 (0.145)					
Width		15.1 (0.595)							15.1 (0.595)					
Height		6.6 (0.26)							8.9 (0.35)	6.6 (0.26)	8.9 (0.35)	6.6 (0.26)		
Package Volume (**mm³**)		369							498	369	498	369		
Typical Weights (**g**)		0.80			0.88		0.87		1.14	0.77	1.03	0.68		
Contact Configuration		1-A (SPST)			1-A (SPST) 50 Ω Coaxial		1-A (SPST) 75 Ω Coaxial		1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)		
Reed Switch Type		Dry			Dry		Dry		Dry	Dry	Dry	Dry		
Switching Voltage (**V**)		200			200		200		200	30	200	200		
Switching Current (**A**)		1.0	1.0	0.5	1.0	0.5	1.0	0.5	0.5	0.1	0.5	1.0	1.0	0.5
Carry Current (**A**)		1.2			1.2		1.2		1.2	0.1	1.2	1.2		
Switch Power (**W**)		20	15	10	20	10	20	10	10	2	10	20	15	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 113 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

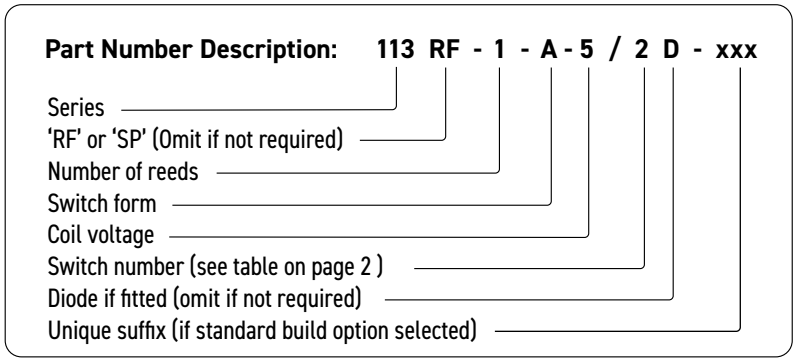
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

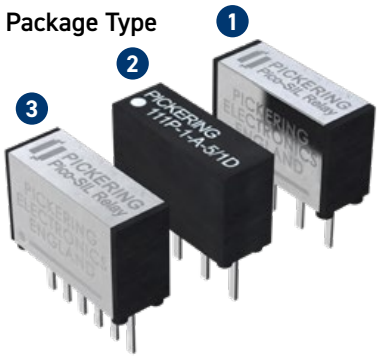
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Stacks on **0.15 x 0.40 inches** pitch
- Highest quality instrumentation grade switches
- Mu-metal magnetic screening
- Two package styles - mu-metal package or plastic package with internal mu-metal magnetic screen
- They take up the minimum of board area, conserving board space
- Includes **111RF**, a **50 Ω** coaxial device suitable for use **up to 2.5 GHz**
- Insulation resistance **$>10^{12}$ Ω**
- **3** or **5 V** coils with or without internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



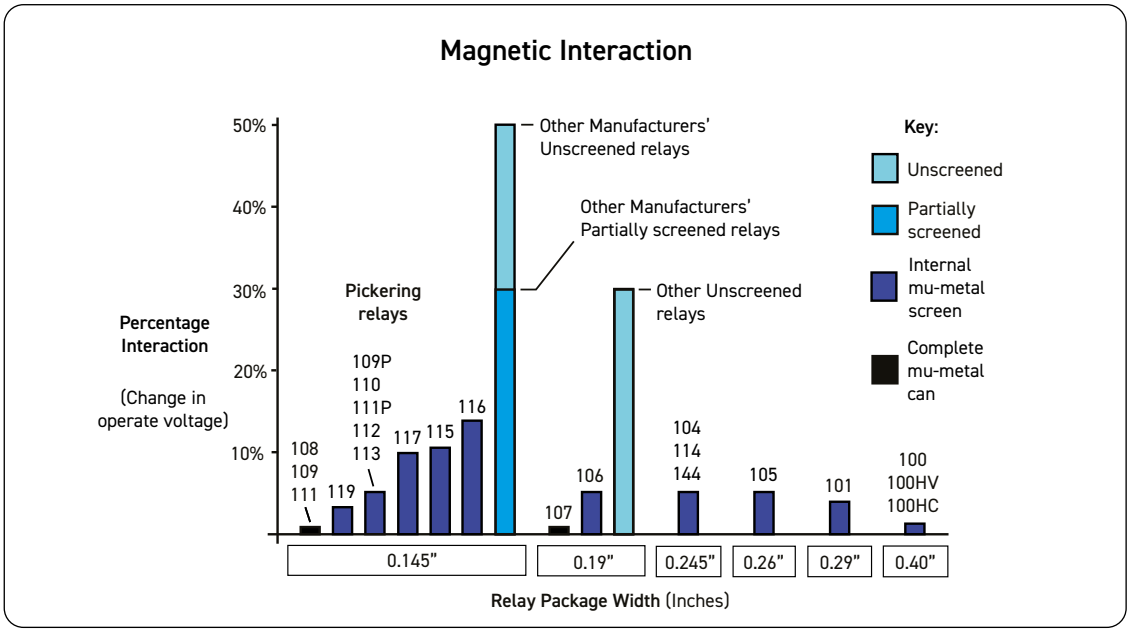
Requiring around one third the board area of the more usual 0.2 x 0.8 inch devices these relays are ideal for high density applications.

Two package styles are available:

The type 111 is encapsulated in a mu-metal can. The coaxial version, type 111RF, is also available in this package style.

The type 111P is encapsulated in a plastic package and features an internal mu-metal screen. An internal diode is an option in both types.

Magnetic screening is essential to avoid magnetic interaction problems. Interaction is usually measured as a percentage increase in the voltage required to operate a relay when two additional relays, stacked one each side, are themselves operated. An unscreened device mounted on this pitch would have an interaction figure of around 40%. Relays of this size would therefore be totally unsuitable for applications where dense packing is required. Pickering Series 111 have an interaction figure of around 1%.



For more information on magnetic interaction please visit: pickeringrelay.com/magnetic-inte

Switch Ratings - Dry Switches

1 Form A (energize to make)
10 W at 170 V

Series 111 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	10 W	0.5A	0.5A	170	10^8	0.5ms	0.2ms	General purpose

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 2.5 x 10^8 ops. At the maximum load (resistive), typical life is 1 x 10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20°C to +85°C
Storage Temperature Range	-35°C to +100°C
Shock Resistance	50g
Vibration Resistance (10 - 2000Hz)	20g
Soldering Temperature (max) (10s max)	270°C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 111 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[3])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1 (mu-metal)	111-1-A-3/1D	3	200 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF
	111-1-A-5/1D	5	500 Ω					
1 Form A, Switch No. 1 Package Type 2 (plastic)	111P-1-A-3/1D	3	200 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF
	111P-1-A-5/1D	5	400 Ω					
1 Form A Coaxial Switch No. 1 Package Type 3 (mu-metal)	111RF-1-A-5/1D	5	180 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	1.5 pF	0.15 pF

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

Note[2]: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

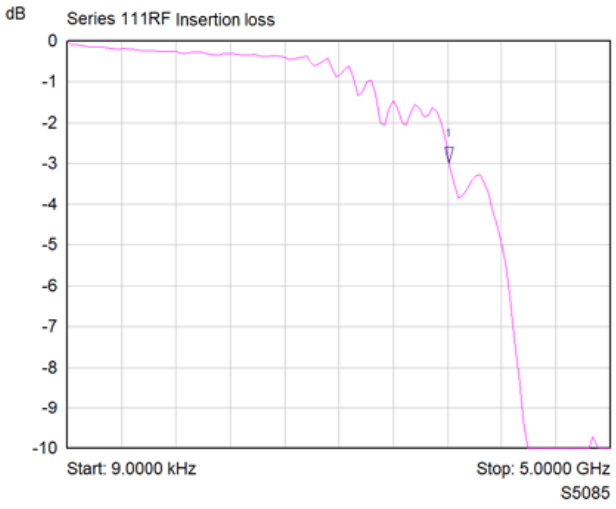
Note[3]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

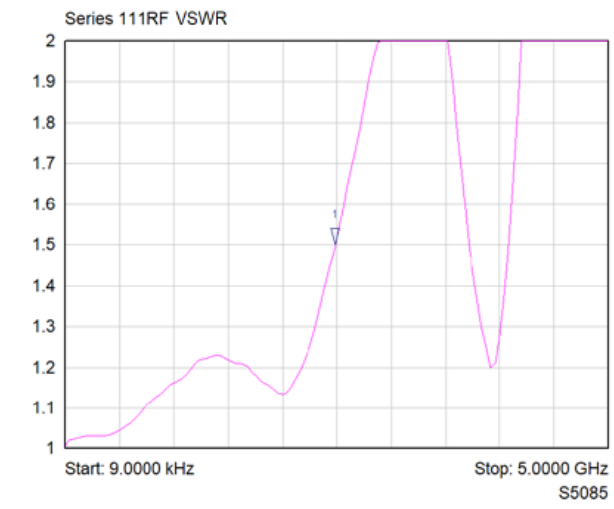
For different values, latest specifications and product details, please contact your local Pickering sales office.

RF Plots for the 111RF Reed Relay



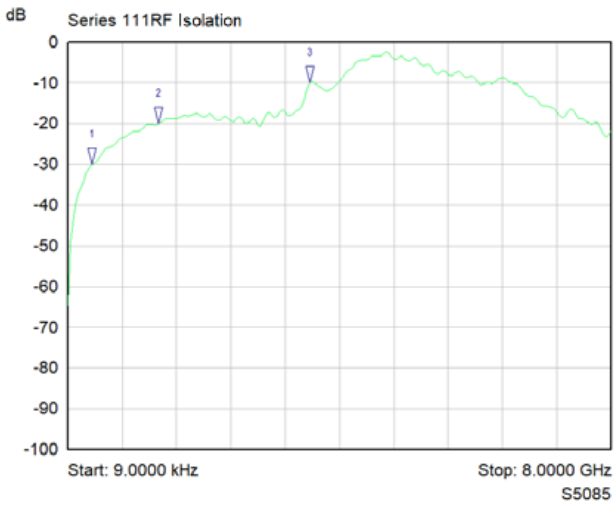
Mkr	Trace	X-Axis	Value
1	Series 111RF	3.5153 GHz	-3.00 dB

111RF Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1	Series 111RF	2.4895 GHz	1.50

111RF Typical VSWR Plot



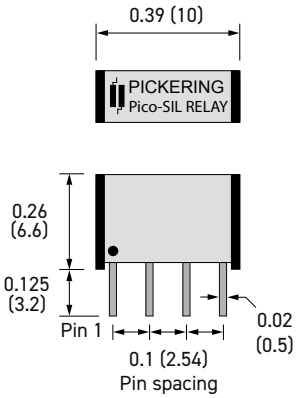
Mkr	Trace	X-Axis	Value
1	Series 111RF	356.7777 MHz	-30.00 dB
2	Series 111RF	1.3368 GHz	-20.00 dB
3	Series 111RF	3.5691 GHz	-10.00 dB

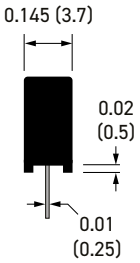
111RF Typical Isolation Plot

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

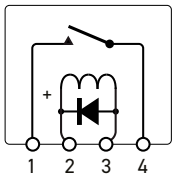
Package Type 1
Mu-metal

Weight: Typical 0.51 g





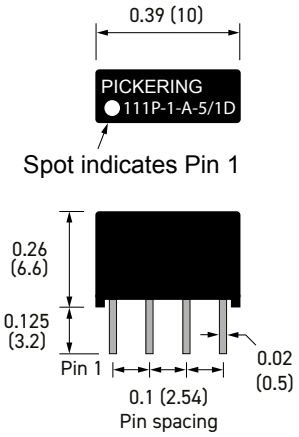
1 Form A

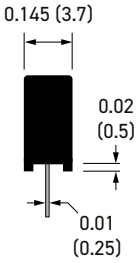


Package Type 2

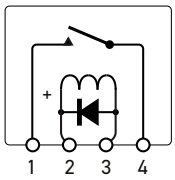
Plastic with Internal Mu-metal Screen

Weight: Typical 0.44 g



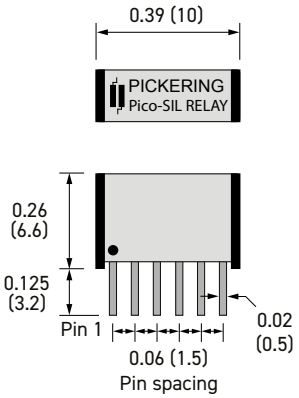


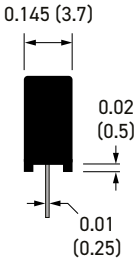
1 Form A



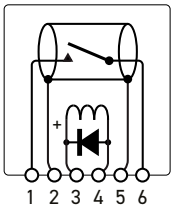
Package Type 3
Mu-metal

Weight: Typical 0.56 g





1 Form A
Coaxial



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

Similar Relays Comparison

If the Series 111 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		111-1-A	111P-1-A	111RF-1-A	113-1-A	113SP-1-A	113RF-1-A	113-1-C	113-2-A	
Physical Outline										
Depth	mm (inches)	3.7 (0.145)			3.7 (0.145)					
Width		10.0 (0.39)			12.5 (0.49)					
Height		6.6 (0.26)			6.6 (0.26)				8.9 (0.35)	
Package Volume (mm³)		① 245	② 245	③ 245	306		306	306	412	
Typical Weights (g)		0.51	0.44	0.56	0.52		0.58	0.47	0.69	
Contact Configuration		1-A (SPST)			1-A (SPST)			1-C (SPDT)	2-A (DPST)	
Reed Switch Type		Dry			Dry	Dry	Dry	Dry	Dry	
Switching Voltage (V)		170			200	200	200	200	30	200	200
Switching Current (A)		0.5			1.0	0.5	0.5	0.5	0.1	1.0	0.5
Carry Current (A)		0.5			1.0	0.5	0.5	0.5	0.1	1.0	0.5
Switch Power (W)		10			20 (15)	10	10	10	2	20 (15)	10

Series Name		109-1-A			109RF50-1-A		109RF75-1-A		109-1-B	109-1-C	109-2-A	109P-1-A		
Physical Outline														
Depth	mm (inches)	3.7 (0.145)							3.7 (0.145)					
Width		15.1 (0.595)							15.1 (0.595)					
Height		6.6 (0.26)							8.9 (0.35)	6.6 (0.26)	8.9 (0.35)	6.6 (0.26)		
Package Volume (mm³)		369							498	369	498	369		
Typical Weights (g)		0.80			0.88		0.87		1.14	0.77	1.03	0.68		
Contact Configuration		1-A (SPST)			1-A (SPST) 50 Ω Coaxial		1-A (SPST) 75 Ω Coaxial		1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)		
Reed Switch Type		Dry			Dry		Dry		Dry	Dry	Dry	Dry		
Switching Voltage (V)		200			200		200		200	30	200	200		
Switching Current (A)		1.0	1.0	0.5	1.0	0.5	1.0	0.5	0.5	0.1	0.5	1.0	1.0	0.5
Carry Current (A)		1.2			1.2		1.2		1.2	0.1	1.2	1.2		
Switch Power (W)		20	15	10	20	10	20	10	10	2	10	20	15	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 111 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

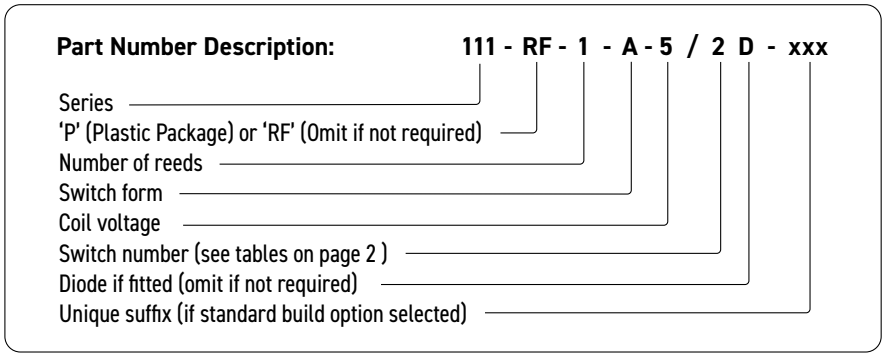
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

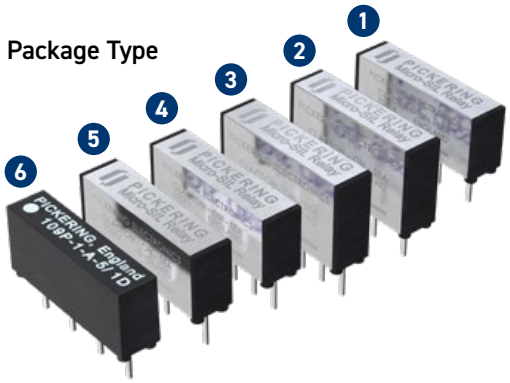
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

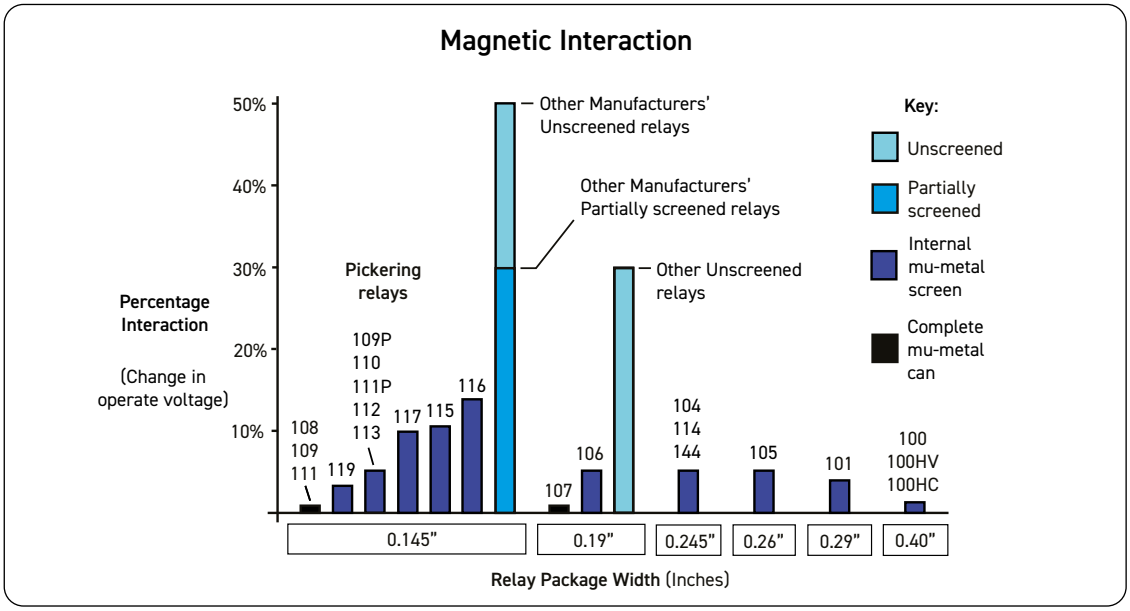
If you need any technical advice or other help, please do not hesitate to contact our Technical Sales Department. We will always be pleased to discuss Pickering relays with you. email: techsales@pickeringrelay.com

- Includes coaxial types
- Up to **20 W** switching
- Highest quality instrumentation grade switches
- **1 Form A**, **2 Form A** (energise to make), **1 Form B** (energise to break), **1 Form C** (changeover), **1 Form A** coaxial **50** or **75 Ω** impedance (energise to make) configurations suitable for **up to 2 GHz**
- Mu-metal magnetically screened relays stacking on a **0.15** inches x **0.6** inches pitch.
- Insulation resistance **$>10^{12}$ Ω**
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for high density applications such as A.T.E. switching matrices



Two types of Form A (energize to make) switches are available, a general purpose switch (switch no.1) and a sputtered ruthenium switch (switch no.2) which is ideal for low level or "cold" switching applications. 5 V coils normally have a resistance of 500 Ω and 12 V coils are 1000 Ω. A sensitive single pole 5 V device with a 1000 Ω coil is also available. Internal back E.M.F. clamping diodes are an option for all types. The small size of these relays often makes it possible to increase the functionality of existing designs without increasing the size of printed circuit boards.

Mu-metal, due to its high permeability and low magnetic remanence is used to provide magnetic screening. This 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 two additional relays, stacked one each side, are themselves operated. An unscreened device mounted on this pitch would have an interaction figure of around 40%. Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required. Pickering Series 109 and 109RF have a typical interaction figure of 1%. Series 109P and 109PH have a typical figure of 3%.
To learn more visit: pickeringrelay.com/magnetic-interaction



Switch Ratings - Dry Switches

1 Form A (energize to make) mu-metal	1 Form A Coaxial 50 Ω and 75 Ω (energize to make) mu-metal	1 Form A (energize to make) plastic package	1 Form B (energize to break) mu-metal	1 Form C (changeover) mu-metal	2 Form A (energize to make) mu-metal
20 W at 200 V 15 W at 200 V 10 W at 200 V	20 W at 200 V 10 W at 200 V	20 W at 200 V 15 W at 200 V 10 W at 200 V	10 W at 200 V	2 W at 30 V	10 W at 200 V

Series 109 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A or B	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	2 W	0.1A	0.1 A	30	10^7	0.75 ms	0.5 ms	Change over

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 109 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 (*Note 15 W for 5L version) Package Type 1	109-1-A-5/1D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109-1-A-5L/1D *	5	1000 Ω					
	109-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 1	109-1-A-3/2D	3	330 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109-1-A-5/2D	5	500 Ω					
	109-1-A-5L/2D	5	1000 Ω					
	109-1-A-12/2D	12	1000 Ω					
1 Form B, Switch No. 2 Package Type 2	109-1-B-5/2D	5	750 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
1 Form C, Switch No. 3 Package Type 5	109-1-C-3/3D	3	100 Ω	0.25 Ω	10^{12} Ω	10^{11} Ω	See Note[3]	See Note[3]
	109-1-C-5/3D	5	150 Ω					
2 Form A, Switch No. 2 Package Type 3	109-2-A-3/2D	3	200 Ω	0.14 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	109-2-A-5/2D	5	375 Ω					
	109-2-A-12/2D	12	750 Ω					
50 Ω Coaxial, Switch No. 1 Package Type 4	109RF50-1-A-5/1D	5	375 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109RF50-1-A-12/1D	12	600 Ω					
50 Ω Coaxial Switch No. 2 Package Type 4	109RF50-1-A-3/2D	3	200 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109RF50-1-A-5/2D	5	375 Ω					
	109RF50-1-A-12/2D	12	600 Ω					
75 Ω Coaxial, Switch No. 1 Package Type 4	109RF75-1-A-5/1D	5	375 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109RF75-1-A-12/1D	12	600 Ω					
75 Ω Coaxial, Switch No. 2 Package Type 4	109RF75-1-A-5/2D	5	375 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109RF75-1-A-12/2D	12	600 Ω					
1 Form A, Switch No. 1 (*Note 15 W for 5L version) Package Type 6	109P-1-A-5/1D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109P-1-A-5L/1D *	5	1000 Ω					
	109P-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 6	109P-1-A-3/2D	3	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	109P-1-A-5/2D	5	500 Ω					
	109P-1-A-5L/2D	5	1000 Ω					
	109P-1-A-12/2D	12	1000 Ω					

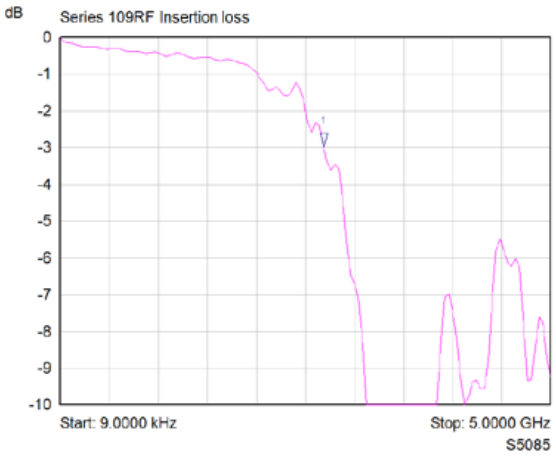
When an internal diode is required, the suffix D is added to the part number as shown in the table.

Note[2]: Capacitance across open switchs
The capacitance across the open switch was measured with other connections guarded.

Note[3]: Capacitance values
The value will depend upon on the mode of connection/guarding of unused terminals. Please contact technical sales for details.

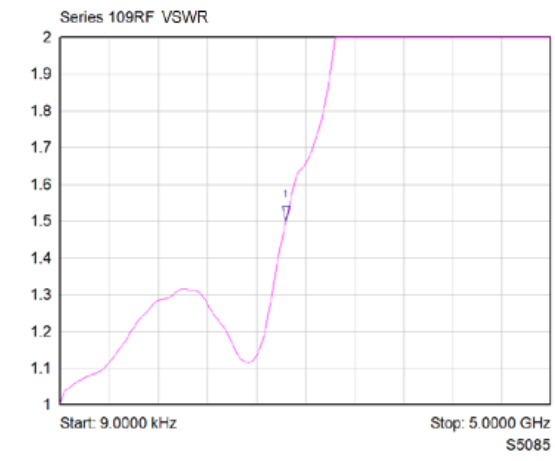
Note[4]: Insulation resistance
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

RF Plots for the 109RF Reed Relay



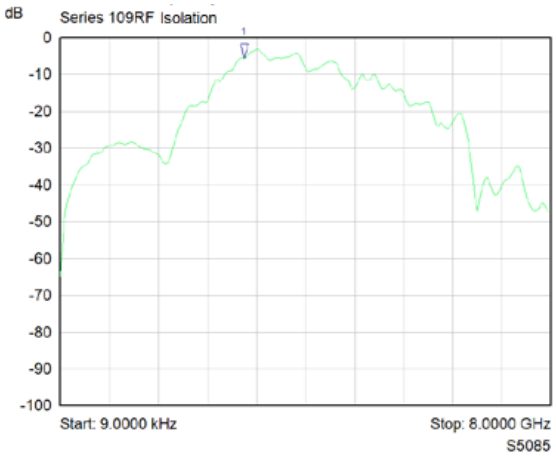
Mkr	Trace	X-Axis	Value
1	Series 109RF	2.6857 GHz	-3.00 dB

109RF Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1	Series 109RF	2.2996 GHz	1.50

109RF Typical VSWR Plot



Mkr	Trace	X-Axis	Value
1	Series 109RF	3.0000 GHz	-5.62 dB

109RF Typical Isolation Plot

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

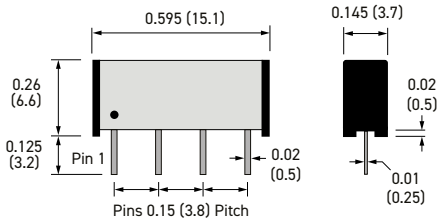
For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

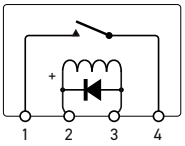
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type (Mu-metal) 1

Weight: Typical 0.80 g

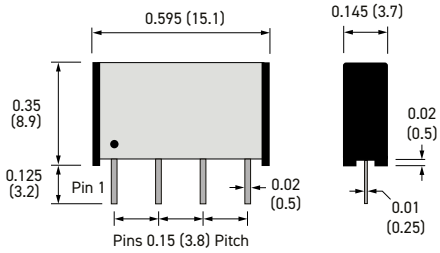


1 Form A

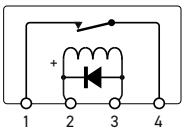


Package Type (Mu-metal) 2

Weight: Typical 1.14 g

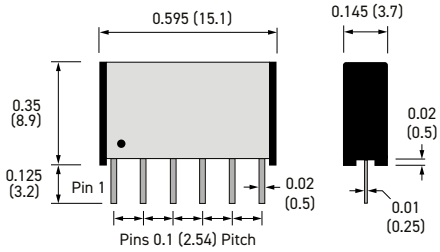


1 Form B (see Note)

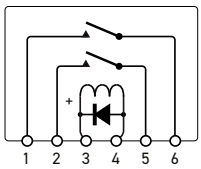


Package Type (Mu-metal) 3

Weight: Typical 1.03 g

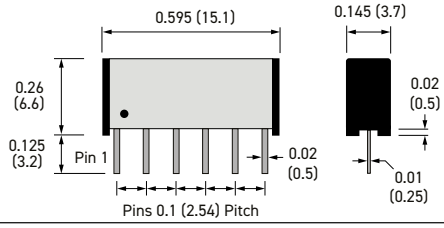


2 Form A

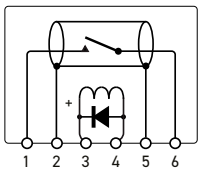


Package Type (Mu-metal) 4

Weight: Typical
50 Ω 0.88 g
75 Ω 0.87 g

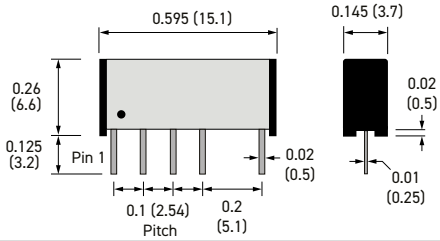


1 Form A Coaxial

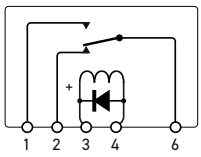


Package Type (Mu-metal) 5

Weight: Typical 0.77 g

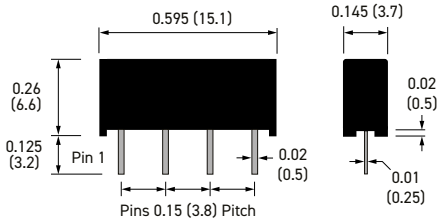


1 Form C

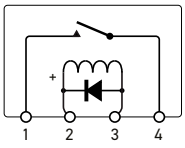


Package Type (Plastic) 6

Weight: Typical 0.68 g



1 Form A



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.

Similar Relays Comparison

If the Series 109 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		109-1-A			109RF50-1-A		109RF75-1-A		109-1-B	109-1-C	109-2-A	109P-1-A		
Physical Outline														
Depth	mm (inches)	3.7 (0.145)							3.7 (0.145)					
Width		15.1 (0.595)							15.1 (0.595)					
Height		6.6 (0.26)							8.9 (0.35)	6.6 (0.26)	8.9 (0.35)	6.6 (0.26)		
Package Volume (mm³)		1 369			4 369				2 498	5 369	3 498	6 369		
Typical Weights (g)		0.80			0.88		0.87		1.14	0.77	1.03	0.68		
Contact Configuration		1-A (SPST)			1-A (SPST) 50 Ω Coaxial		1-A (SPST) 75 Ω Coaxial		1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)		
Reed Switch Type		Dry			Dry		Dry		Dry	Dry	Dry	Dry		
Switching Voltage (V)		200			200		200		200	30	200	200		
Switching Current (A)		1.0	1.0	0.5	1.0	0.5	1.0	0.5	0.5	0.1	0.5	1.0	1.0	0.5
Carry Current (A)		1.2			1.2		1.2		1.2	0.1	1.2	1.2		
Switch Power (W)		20	15	10	20	10	20	10	10	2	10	20	15	10

Series Name		111P-1-A		111RF-1-A	113-1-A		113SP-1-A	113RF-1-A	113-1-C	113-2-A		125-2-A	
Physical Outline													
Depth	mm (inches)	3.7 (0.145)			3.7 (0.145)							4.9 (0.193)	
Width		10.0 (0.39)			12.5 (0.49)							4.9 (0.193)	
Height		6.6 (0.26)			6.6 (0.26)					8.9 (0.35)		15.5 (0.611)	
Package Volume (mm³)		245			306			306	306	412		372	
Typical Weights (g)		0.44		0.56	0.52			0.58	0.47	0.69		0.92	
Contact Configuration		1-A (SPST)			1-A (SPST)				1-C (SPDT)	2-A (DPST)		2-A (DPST)	
Reed Switch Type		Dry			Dry		Dry	Dry	Dry	Dry		Dry	
Switching Voltage (V)		170			200	200	200	200	30	200	200	200	200
Switching Current (A)		0.5			1.0	0.5	0.5	0.5	0.1	1.0	0.5	1.0	0.5
Carry Current (A)		0.5			1.0	0.5	0.5	0.5	0.1	1.0	0.5	1.2	1.2
Switch Power (W)		10			20 (15)	10	10	10	2	20 (15)	10	20 (15)	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 109 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging possibility	Operate or de-operate time
Equivalents to competitors discontinued parts	Pulse capability
	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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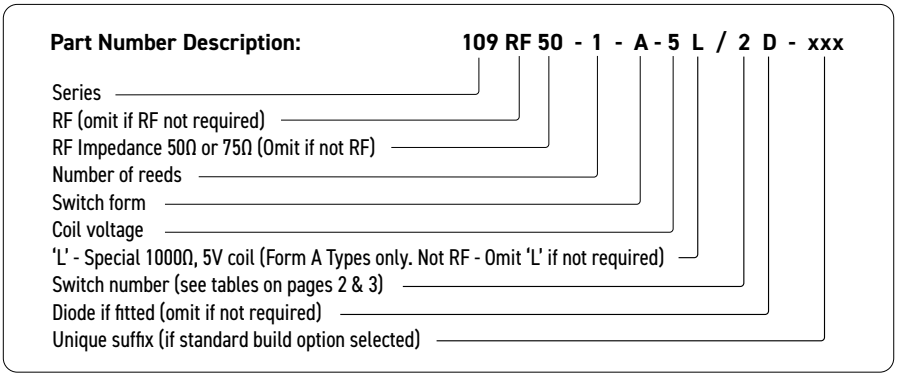

Help

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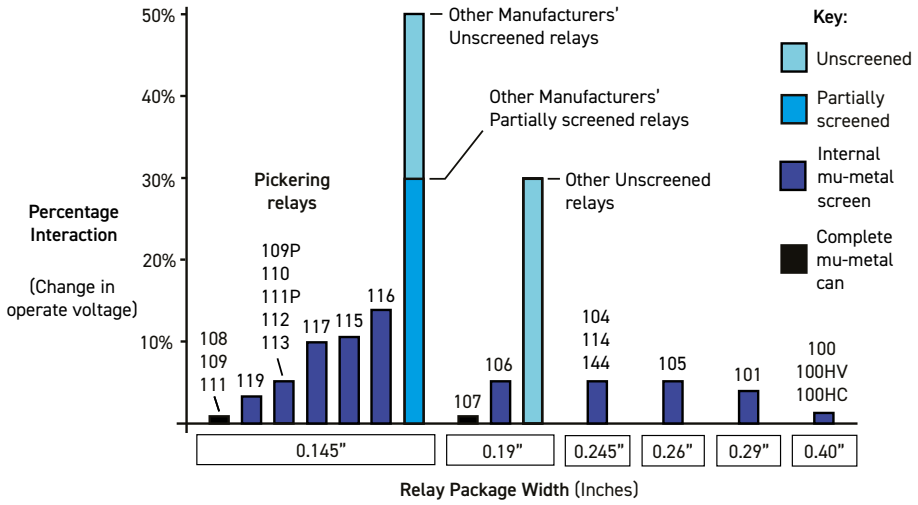
- **1 Form A, 20 W** at **200 V**
- **1 Form A, 10 W** at **500 V, 1500 V Standoff** NEW
- **1 Form C, 3 W** at **200 V**
- Highest quality instrumentation grade switches
- Internal mu-metal magnetic screen
- Insulation resistance **$>10^{12}\,\Omega$** for **Form A** devices
- Dry switches are available in both **1 Form A** and **1 Form C** configurations
- **3 V, 5 V** or **12 V** coils with optional internal diode
- **5 V** coils may be driven directly from **TTL** logic
- Ideal choice for automatic test equipment.
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

Package Type 1 2

Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings

1 Form A (energize to make)	1 Form C (changeover)
Up to 1 A switching at 20 W 500 VDC switching at 10 W	3 W at 200 V

Series 106 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.0 ms	0.5 ms	Change over
5	A	10 W	0.5 A	1.2 A	500	10^9	0.5 ms	0.2 ms	1500 V d.c. standoff

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. I In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Series 106 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 1	106-1-A-5/1D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	106-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 1	106-1-A-3/2D	3	500 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	106-1-A-5/2D	5	500 Ω					
	106-1-A-12/2D	12	1000 Ω					
1 Form A Switch No. 5 Package Type 1	106-1-A-5/5D	5	375 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	106-1-A-12/5D	12	1000 Ω					
1 Form C Switch No. 3 Package Type 2	106-1-C-5/3D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	106-1-C-12/3D	12	1000 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

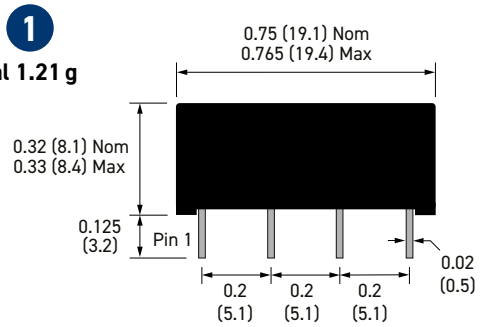
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

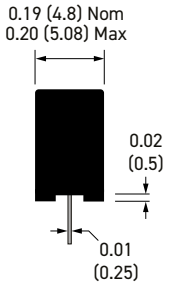
For different values, latest specifications and product details, please contact your local Pickering sales office.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

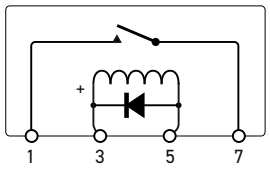
Package Type 1

Weight: Typical 1.21 g



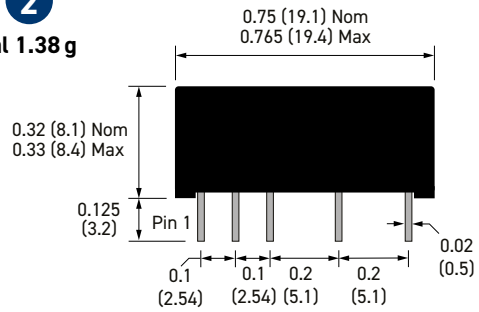


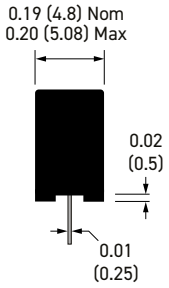
1 Form A



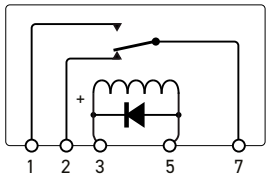
Package Type 2

Weight: Typical 1.38 g





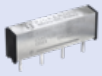
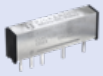
1 Form C



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.

Similar Relays Comparison

If the Series 106 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		105-1-A				105-1-B	105-1-C	105-2-A			108-1-A		108-1-C
Physical Outline													
Depth	mm (inches)	6.6 (0.26)				6.6 (0.26)	6.6 (0.26)	6.6 (0.26)			3.7 (0.145)		3.7 (0.145)
Width		19.1 (0.75)				19.1 (0.75)	19.1 (0.75)	19.1 (0.75)			20.0 (0.79)		20.0 (0.79)
Height		7.9 (0.31)				10.7 (0.42)	7.9 (0.31)	10.7 (0.42)			6.6 (0.26)		6.6 (0.26)
Package Volume (mm³)		996				1349	996	1349			489		489
Typical Weights (g)		1.63				2.47	1.71	2.18			1.03		1.11
Contact Configuration		1-A (SPST)				1-B (SPNC)	1-C (SPDT)	2-A (SPST)			1-A (SPST)		1-C (SPDT)
Reed Switch Type		Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry
Stand-off Voltage (V)		-	-	1000	-	-	-	-	-	-	-	-	-
Switching Voltage (V)		200	200	500	500	200	200	200	200	500	200	200	200
Switching Current (A)		1.0	0.5	0.5	2	1.0	0.25	1.0	0.5	2	1.0	0.5	0.5
Carry Current (A)		1.2	1.2	1.2	3	1.2	1.2	1.2	1.2	3	1.2	1.2	1.2
Switch Power (W)		20 (15)	10	10	50	1D: 20 (15) 2D: 10	3	20 (15)	10	50	20 (15)	10	3

Series Name		106-1-A			106-1-C	107-1-A				107-1-B	107-1-C	107-2-A			107-2-C
Physical Outline															
Depth	mm (inches)	4.8 (0.19)			4.8 (0.19)	4.8 (0.19)				4.8 (0.19)	4.8 (0.19)	4.8 (0.19)			4.8 (0.19)
Width		19.1 (0.75)			19.1 (0.75)	19.1 (0.75)				19.1 (0.75)	19.1 (0.75)	19.1 (0.75)			24.1 (0.95)
Height		8.1 (0.32)			8.1 (0.32)	7.6 (0.30)				10.2 (0.40)	7.6 (0.30)	10.2 (0.40)			10.2 (0.40)
Package Volume (mm³)		❶ 743			❷ 743	697				936	697	936			1180
Typical Weights (g)		1.21			1.38	1.32				2.20	1.74	2.24			2.42
Contact Configuration		1-A (SPST)			1-C (SPDT)	1-A (SPST)				1-B (SPNC)	1-C (SPDT)	2-A (SPST)			2-C (DPDT)
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Mercury Wetted	Dry
Stand-off Voltage (V)		-	-	1500	-	-	-	500	-	-	-	-	-	-	-
Switching Voltage (V)		200	200	500	200	200	200	400	500	200	200	200	200	500	200
Switching Current (A)		1.0	0.5	0.5	0.25	1.0	0.5	0.5	2	1.0	0.25	1.0	0.5	2	0.25
Carry Current (A)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	3	1.2	1.2	1.2	1.2	3	1.2
Switch Power (W)		20	10	10	3	20 (15)	10	10	50	1D: 20 (15) 2D: 10	3	20 (15)	10	50	3

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 106 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

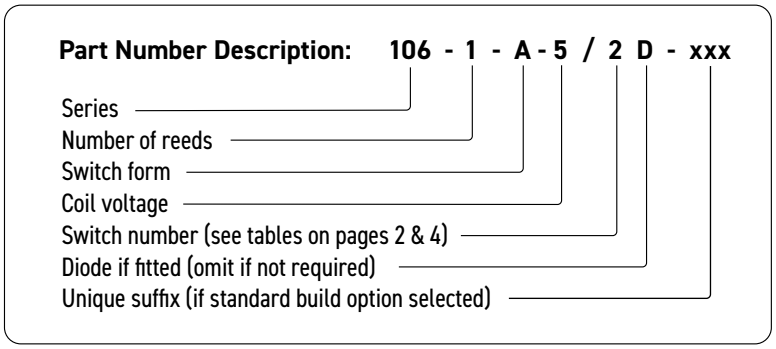
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging possibility	Operate or de-operate time
Equivalents to competitors discontinued parts	Pulse capability
	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

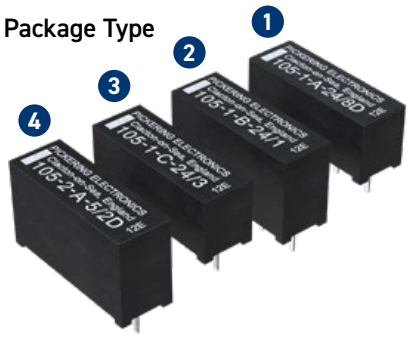
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

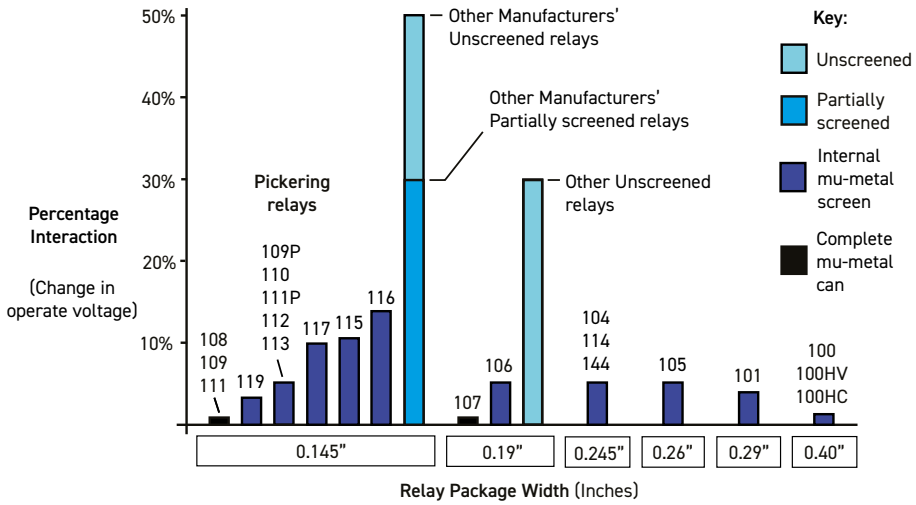
If you need any technical advice or other help, please do not hesitate to contact our Technical Sales Department. We will always be pleased to discuss Pickering relays with you. email: techsales@pickeringrelay.com

- Up to **20 W** switching
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- **3**, **5**, **12** & **24 V** coils with or without internal diode
- **1 Form A**, **2 Form A**, **1 Form B** & **1 Form C** configurations
- Two pole relay requires the same board area as the single pole type
- Optional internal coaxial electrostatic screen
- Insulation resistance **$>10^{12}\,\Omega$**
- Dry switches
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



The Pickering Series 100, 101, 103, 106, 107 and 108 all have the same pin locations as the Series 105. If a reduced coil power is desired, please consider our Series 100 and 101 which may be driven directly from CMOS logic. If a higher packing density is required, smaller devices are available in other Pickering SIL ranges.

Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (changeover)	2 Form A (energize to make)
Up to 1 A switching at 20 W	Up to 1 A switching at 20 W	0.25 A switching at 3 W	Up to 1 A switching at 20 W

Dry Reed: Series 105 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A or B	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A or B	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.0 ms	0.5 ms	Change over
4	A	10 W	0.5 A	1.2 A	500	10^7	0.75 ms	0.5 ms	1000 V stand-off

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics
In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines
Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Mercury Relays

Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Dry Relay: Series 105 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (*Note 15 W for 3 V coil) Package Type 1	105-1-A-3/1D *	3	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	105-1-A-5/1D	5	500 Ω					
	105-1-A-12/1D	12	1000 Ω					
	105-1-A-24/1D	24	3000 Ω					
1 Form A Switch No. 2 Package Type 1	105-1-A-3/2D	3	500 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	105-1-A-5/2D	5	500 Ω					
	105-1-A-12/2D	12	1000 Ω					
	105-1-A-24/2D	24	3000 Ω					
1 Form A HV Switch No. 4 Package Type 1	105-1-A-5/4D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	105-1-A-12/4D	12	1000 Ω					
	105-1-A-24/4D	24	3000 Ω					
1 Form B, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 2	105-1-B-5/1D *	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	105-1-B-12/1D	12	3000 Ω					
	105-1-B-24/1D	24	3000 Ω					
1 Form B Switch No. 2 Package Type 2	105-1-B-5/2D	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	105-1-B-12/2D	12	3000 Ω					
	105-1-B-24/2D	24	3000 Ω					
1 Form C Switch No. 3 Package Type 3	105-1-C-5/3D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	105-1-C-12/3D	12	1000 Ω					
	105-1-C-24/3D	24	3000 Ω					
2 FormA, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 4	105-2-A-5/1D *	5	500 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	105-2-A-12/1D	12	1000 Ω					
	105-2-A-24/1D	24	3000 Ω					
2 Form A Switch No. 2 Package Type 4	105-2-A-5/2D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	105-2-A-12/2D	12	1000 Ω					
	105-2-A-24/2D	24	3000 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

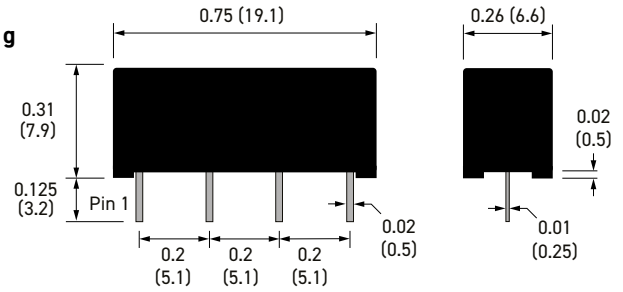
Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

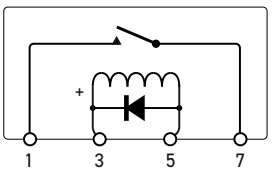
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **1**

Weight: Typical 1.63 g

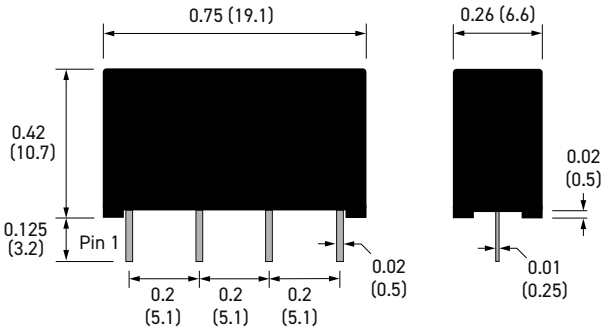


1 Form A

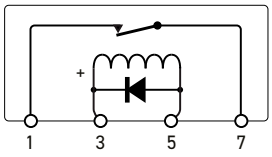


Package Type **2**

Weight: Typical 2.47 g

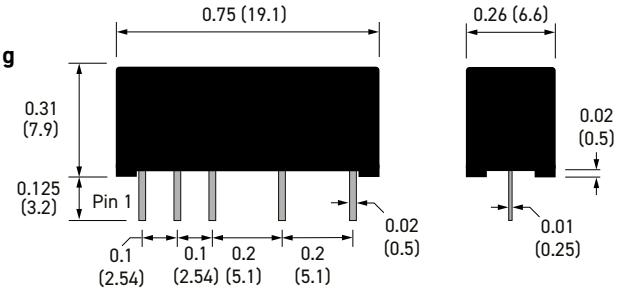


1 Form B (see Note)

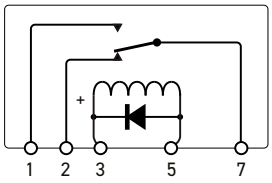


Package Type **3**

Weight: Typical 1.71 g

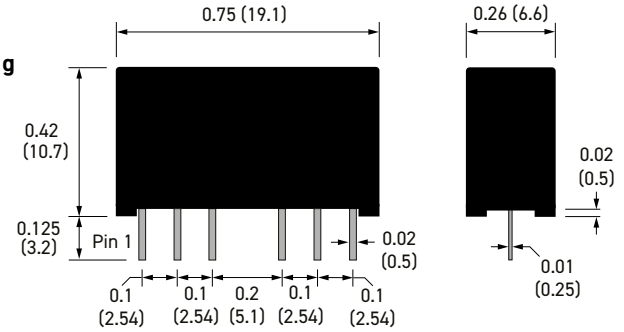


1 Form C

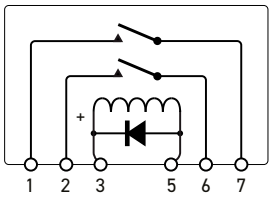


Package Type **4**

Weight: Typical 2.18 g



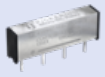
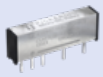
2 Form A

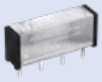
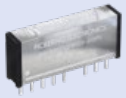


Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Similar Relays Comparison

If the Series 105 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		105-1-A			105-1-B	105-1-C	105-2-A		108-1-A		108-1-C
Physical Outline											
Depth	mm (inches)	6.6 (0.26)			6.6 (0.26)	6.6 (0.26)	6.6 (0.26)		3.7 (0.145)		3.7 (0.145)
Width		19.1 (0.75)			19.1 (0.75)	19.1 (0.75)	19.1 (0.75)		20.0 (0.79)		20.0 (0.79)
Height		7.9 (0.31)			10.7 (0.42)	7.9 (0.31)	10.7 (0.42)		6.6 (0.26)		6.6 (0.26)
Package Volume (mm^3)		❶ 996			❷ 1349	❸ 996	❹ 1349		489		489
Typical Weights (g)		1.63			2.47	1.71	2.18		1.03		1.11
Contact Configuration		1-A (SPST)			1-B (SPNC)	1-C (SPDT)	2-A (SPST)		1-A (SPST)		1-C (SPDT)
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (V)		-	-	1000	-	-	-	-	-	-	-
Switching Voltage (V)		200	200	500	200	200	200	200	200	200	200
Switching Current (A)		1.0	0.5	0.5	1.0	0.25	1.0	0.5	1.0	0.5	0.5
Carry Current (A)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (W)		20 (15)	10	10	1D: 20 (15) 2D: 10	3	20 (15)	10	20 (15)	10	3

Series Name		106-1-A			106-1-C	107-1-A			107-1-B	107-1-C	107-2-A		107-2-C
Physical Outline													
Depth	mm (inches)	4.8 (0.19)			4.8 (0.19)	4.8 (0.19)			4.8 (0.19)	4.8 (0.19)	4.8 (0.19)		4.8 (0.19)
Width		19.1 (0.75)			19.1 (0.75)	19.1 (0.75)			19.1 (0.75)	19.1 (0.75)	19.1 (0.75)		24.1 (0.95)
Height		8.1 (0.32)			8.1 (0.32)	7.6 (0.30)			10.2 (0.40)	7.6 (0.30)	10.2 (0.40)		10.2 (0.40)
Package Volume (mm^3)		743			743	697			936	697	936		1180
Typical Weights (g)		1.21			1.38	1.32			2.20	1.74	2.24		2.42
Contact Configuration		1-A (SPST)			1-C (SPDT)	1-A (SPST)			1-B (SPNC)	1-C (SPDT)	2-A (SPST)		2-C (DPDT)
Reed Switch Type		Dry			Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (V)		-	-	1500	-	-	-	500	-	-	-	-	-
Switching Voltage (V)		200	200	500	200	200	200	400	200	200	200	200	200
Switching Current (A)		1.0	0.5	0.5	0.25	1.0	0.5	0.5	1.0	0.25	1.0	0.5	0.25
Carry Current (A)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (W)		20	10	10	3	20 (15)	10	10	1D: 20 (15) 2D: 10	3	20 (15)	10	3

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 105 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models

Part Number Description: 105 - 1 - A - 5 / 2 D - xxx

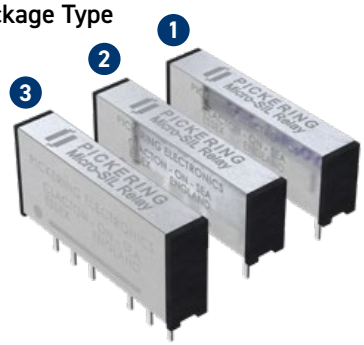
- Series
- Number of reeds
- Switch form
- Coil voltage
- Switch number (see table on page 2)
- Diode if fitted (omit if not required)
- Unique suffix (if standard build option selected)

Help

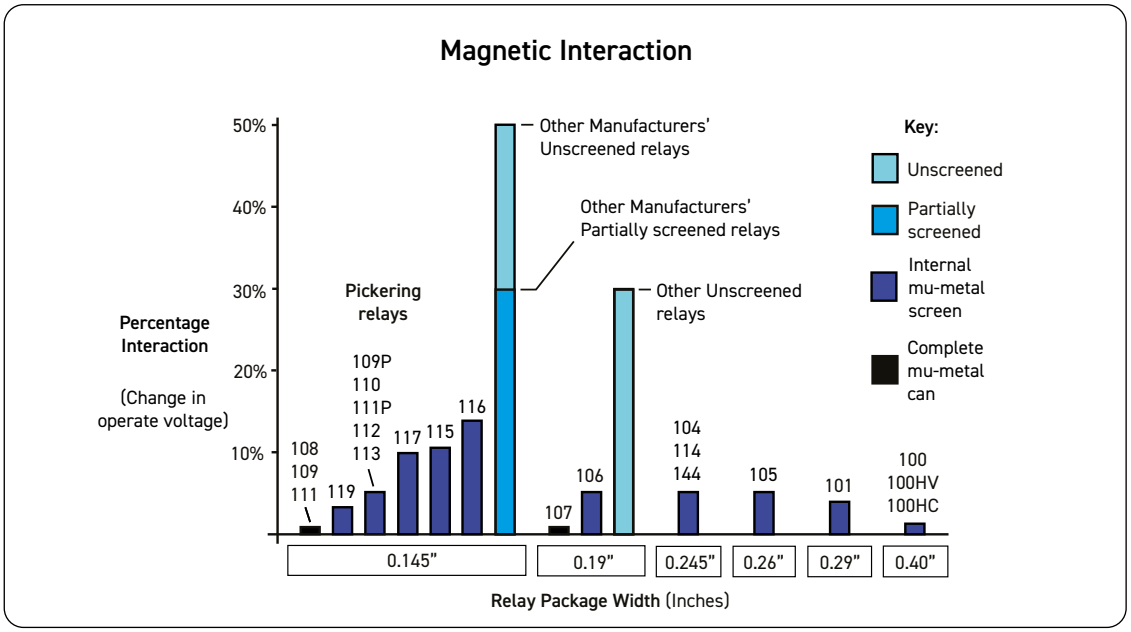
If you need any technical advice or other help, please do not hesitate to contact our Technical Sales Department. We will always be pleased to discuss Pickering relays with you. email: techsales@pickeringrelay.com

- **20 W** at **200 V** - **1 Form A** and **2 Form A** (energize to make)
- **3 W** at **200 V** - **1 Form C** (change-over)
- Highest quality instrumentation grade switches
- Encapsulated in a mu-metal magnetic can, stacking on a **0.15 inches** (3.8 mm) pitch
- **1 Form A**, **2 Form A** and **1 Form C** configurations. **2 Form A** types require the same board area as **1 Form A**
- **3**, **5** & **12 V** coils with or without internal diode
- **5 V** coils are **500 Ω** and may be driven directly from **TTL** Logic
- Insulation resistance **$>10^{12}$ Ω** and superb contact resistance stability
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Ideal for high-end instrumentation applications

Package Type



The Series 108 is encapsulated in a mu-metal can using a very high resistivity resin. Mu-metal is used rather than steel because of both its very high permeability and its low magnetic remanence. This construction totally eliminates the risk of magnetic interaction problems. Magnetic interaction is usually measured as a percentage increase in the voltage required to operate a relay when two additional relays, stacked one each side, are themselves operated. An unscreened device mounted on this pitch would have an interaction figure of around 40%, it would therefore be totally unsuitable for applications where relays are to be packed densely. Pickering Series 108 have a typical interaction figure of only 1%.
To learn more visit: pickeringrelay.com/magnetic-interaction



Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form C (changeover)	2 Form A (energize to make)
Up to 1 A switching at 20 W	0.25 A switching at 3 W	Up to 1 A switching at 20 W

Series 108 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.0 ms	0.5 ms	Change over

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Series 108 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 1	108-1-A-5/1D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.15 pF
	108-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 1	108-1-A-3/2D	3	330 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.15 pF
	108-1-A-5/2D	5	500 Ω					
	108-1-A-12/2D	12	1000 Ω					
1 Form C Switch No. 3 Package Type 2	108-1-C-5/3D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	108-1-C-12/3D	12	1000 Ω					
2 Form A, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 3	108-2-A-5/1D *	5	375 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	108-2-A-12/1D	12	1000 Ω					
2 Form A (energize to make) Package Type 3	108-2-A-5/2D	5	375 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	108-2-A-12/2D	12	1000 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

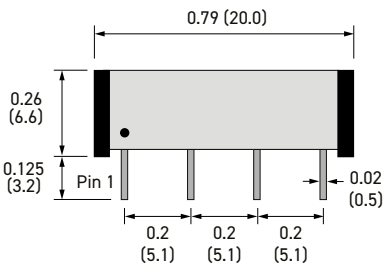
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

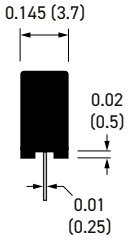
For different values, latest specifications and product details, please contact your local Pickering sales office.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

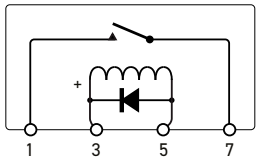
Package Type **1**

Weight: Typical 1.03 g



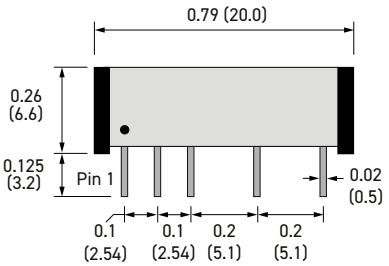


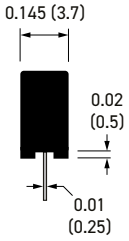
1 Form A



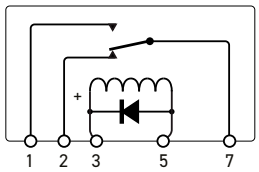
Package Type **2**

Weight: Typical 1.11 g



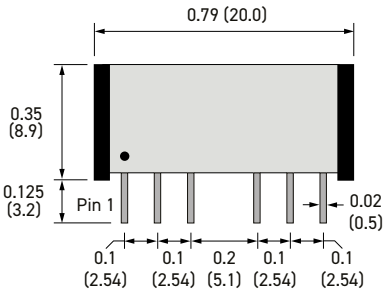


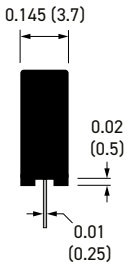
1 Form C



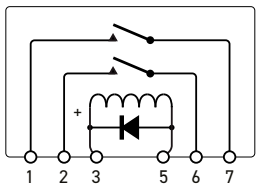
Package Type **3**

Weight: Typical 1.46 g





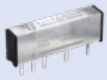
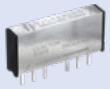
2 Form A

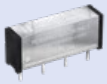
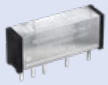


Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Similar Relays Comparison

If the Series 108 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		109-1-A		109P-1-A		109-1-C	109-2-A	108-1-A		108-1-C	108-2-A	
Physical Outline												
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)		3.7 (0.145)	3.7 (0.145)	3.7 (0.145)		3.7 (0.145)	3.7 (0.145)	
Width		15.1 (0.595)		15.1 (0.595)		15.1 (0.595)	15.1 (0.595)	20.0 (0.79)		20.0 (0.79)	20.0 (0.79)	
Height		6.6 (0.26)		6.6 (0.26)		6.6 (0.26)	8.9 (0.35)	6.6 (0.26)		6.6 (0.26)	8.9 (0.35)	
Package Volume (mm^3)		369		369		369	498	❶ 489		❷ 489	❸ 659	
Typical Weights (g)		0.80		0.68		0.77	1.03	1.03		1.11	1.46	
Contact Configuration		1-A (SPST)				1-C (SPDT)	2-A (SPST)	1-A (SPST)		1-C (SPDT)	2-A (SPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (V)		-	-	-	-	-	-	-	-	-	-	-
Switching Voltage (V)		200	200	200	200	30	200	200	200	200	200	200
Switching Current (A)		1.0	0.5	1.0	0.5	0.1	0.5	1.0	0.5	0.5	1.0	0.5
Carry Current (A)		1.2	1.2	1.2	1.2	0.1	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (W)		20 (15)	10	20 (15)	10	2	10	20 (15)	10	3	20 (15)	10

Series Name		107-1-A				107-1-B	107-1-C	107-2-A			107-2-C
Physical Outline											
Depth	mm (inches)	4.8 (0.19)				4.8 (0.19)	4.8 (0.19)	4.8 (0.19)			4.8 (0.19)
Width		19.1 (0.75)				19.1 (0.75)	19.1 (0.75)	19.1 (0.75)			24.1 (0.95)
Height		7.6 (0.30)				10.2 (0.40)	7.6 (0.30)	10.2 (0.40)			10.2 (0.40)
Package Volume (mm^3)		697				936	697	936			1180
Typical Weights (g)		1.32				2.20	1.74	2.24			2.42
Contact Configuration		1-A (SPST)				1-B (SPNC)	1-C (SPDT)	2-A (SPST)			2-C (DPDT)
Reed Switch Type		Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Mercury Wetted	Dry
Stand-off Voltage (V)		-	-	500	-	-	-	-	-	-	-
Switching Voltage (V)		200	200	400	500	200	200	200	200	500	200
Switching Current (A)		1.0	0.5	0.5	2	1.0	0.25	1.0	0.5	2	0.25
Carry Current (A)		1.2	1.2	1.2	3	1.2	1.2	1.2	1.2	3	1.2
Switch Power (W)		20 (15)	10	10	50	1D: 20 (15) 2D: 10	3	20 (15)	10	50	3

Reed Relay Selection Tool

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Standard Build Options

The Series 108 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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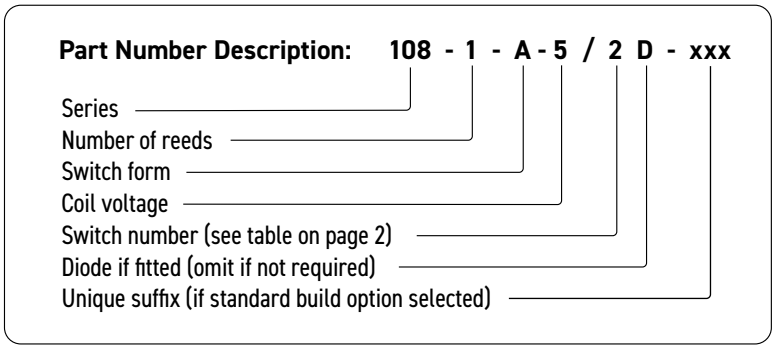

Help

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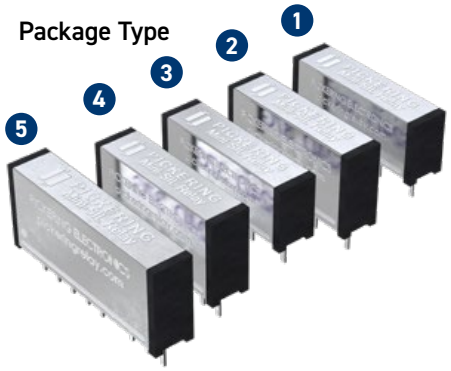
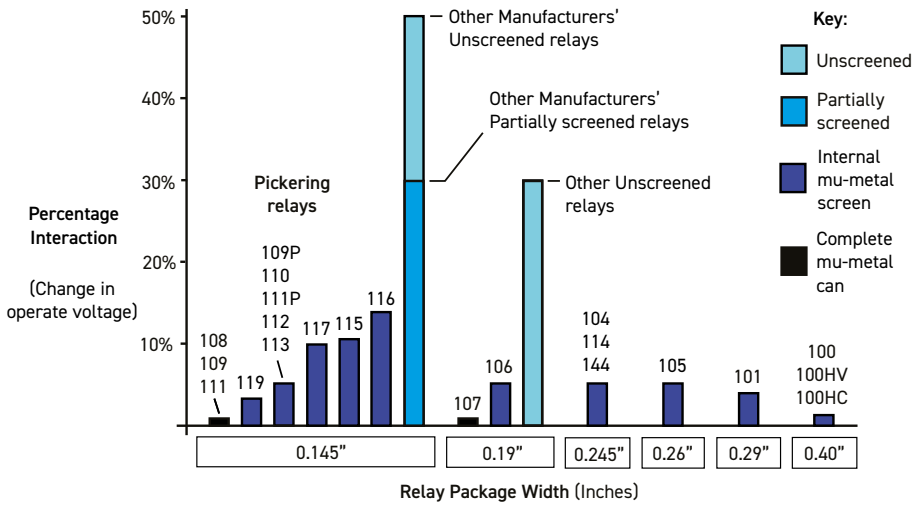
- Up to **20 W** switching
- Stacking on **0.2 Inches** (5.08 mm) pitch
- Highest quality instrumentation grade switches
- Encapsulated in patented mu-metal can
- Insulation resistance **>10^{12} Ω** for **Form A** devices
- Dry switches
- Wide range of switch configurations - **1 Form A**, **1 Form B**, **2 Form A**, **1 Form C**, and **2 Form C**
- **3 V**, **5 V**, **12 V** or **24 V** coils with optional internal diode
- Ideal choice for high quality instrumentation
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- For R.F. or high speed digital applications, **50 Ω** coaxial devices are available in the same package style, see **Series102M**



Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (changeover)	2 Form A (energize to make)	2 Form C (changeover)
Up to 1 A switching at 20 W	Up to 1 A switching at 20 W	0.25 A switching at 3 W	Up to 1 A switching at 20 W	0.25 A switching at 3 W

Dry Reed: Series 107 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A or B	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A or B	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.0 ms	0.5 ms	Change over
4	A	10 W	0.5 A	1.2 A	400	10^7	0.75 ms	0.5 ms	500 V stand-off

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Mercury Relays

Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Dry Relay: Series 107 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (*Note 15 W for 3 V coil) Package Type 1	107-1-A-3/1D *	3	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.2 pF
	107-1-A-5/1D	5	500 Ω					
	107-1-A-12/1D	12	1000 Ω					
	107-1-A-24/1D	24	3000 Ω					
1 Form A Switch No. 2 Package Type 1	107-1-A-3/2D	3	500 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.2 pF
	107-1-A-5/2D	5	500 Ω					
	107-1-A-12/2D	12	1000 Ω					
	107-1-A-24/2D	24	3000 Ω					
1 Form A HV Switch No. 4 Package Type 1	107-1-A-5/4D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	107-1-A-12/4D	12	1000 Ω					
	107-1-A-24/4D	24	3000 Ω					
1 Form B, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 2	107-1-B-5/1D *	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.2 pF
	107-1-B-12/1D	12	3000 Ω					
	107-1-B-24/1D	24	3000 Ω					
1 Form B Switch No. 2 Package Type 2	107-1-B-5/2D	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.2 pF
	107-1-B-12/2D	12	3000 Ω					
	107-1-B-24/2D	24	3000 Ω					
1 Form C Switch No. 3 Package Type 3	107-1-C-5/3D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	107-1-C-12/3D	12	1000 Ω					
	107-1-C-24/3D	24	3000 Ω					
2 Form A, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 4	107-2-A-5/1D *	5	500 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	107-2-A-12/1D	12	1000 Ω					
	107-2-A-24/1D	24	3000 Ω					
2 Form A Switch No. 2 Package Type 4	107-2-A-5/2D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	107-2-A-12/2D	12	1000 Ω					
	107-2-A-24/2D	24	3000 Ω					
2 Form C Switch No. 3 Package Type 5	107-2-C-3/3D	3	200 Ω	0.22 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	107-2-C-5/3D	5	375 Ω					
	107-2-C-12/3D	12	1000 Ω					
	107-2-C-24/3D	24	2700 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

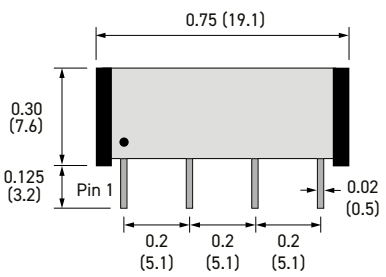
Note[4]: Insulation resistance

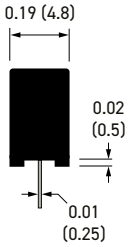
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

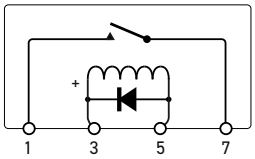
Package Type 1

Weight: Typical 1.32 g



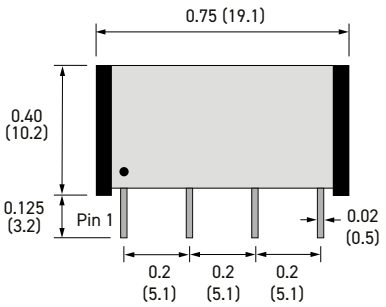


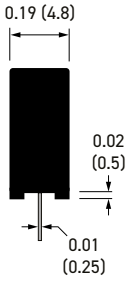
1 Form A



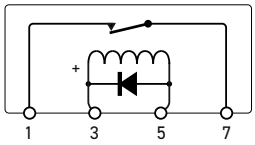
Package Type 2

Weight: Typical 2.20 g



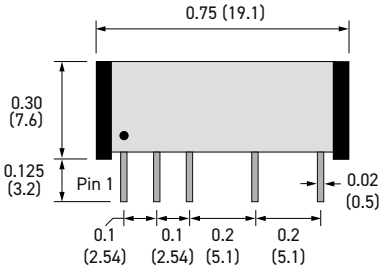


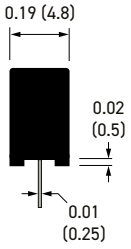
1 Form B (see Note)



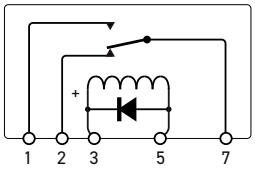
Package Type 3

Weight: Typical 1.74 g



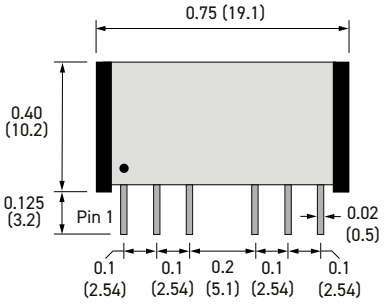


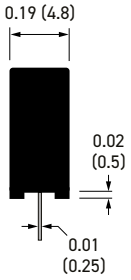
1 Form C



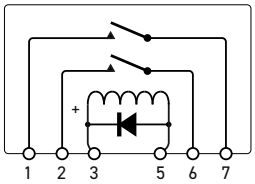
Package Type 4

Weight: Typical 2.24 g



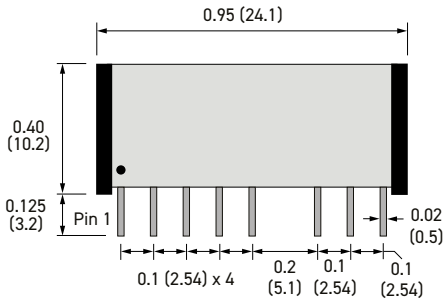


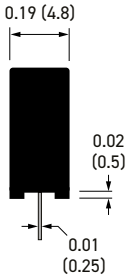
2 Form A



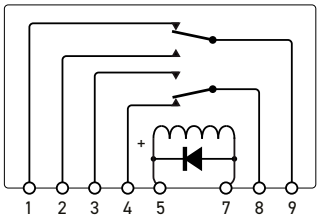
Package Type 5

Weight: Typical 2.42 g





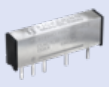
2 Form C

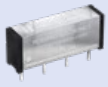
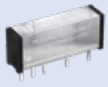


Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Similar Relays Comparison

If the Series 107 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		109-1-A		109P-1-A		109-1-C	109-2-A	108-1-A		108-1-C		108-2-A	
Physical Outline													
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)		3.7 (0.145)	3.7 (0.145)	3.7 (0.145)		3.7 (0.145)		3.7 (0.145)	
Width		15.1 (0.595)		15.1 (0.595)		15.1 (0.595)	15.1 (0.595)	20.0 (0.79)		20.0 (0.79)		20.0 (0.79)	
Height		6.6 (0.26)		6.6 (0.26)		6.6 (0.26)	8.9 (0.35)	6.6 (0.26)		6.6 (0.26)		8.9 (0.35)	
Package Volume (**mm³**)		369		369		369	498	489		489		659	
Typical Weights (**g**)		0.80		0.68		0.77	1.03	1.03		1.11		1.46	
Contact Configuration		1-A (SPST)				1-C (SPDT)	2-A (SPST)	1-A (SPST)		1-C (SPDT)		2-A (SPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	
Stand-off Voltage (**V**)		-	-	-	-	-	-	-	-	-	-	-	
Switching Voltage (**V**)		200	200	200	200	30	200	200	200	200	200	200	
Switching Current (**A**)		1.0	0.5	1.0	0.5	0.1	0.5	1.0	0.5	0.5	1.0	0.5	
Carry Current (**A**)		1.2	1.2	1.2	1.2	0.1	1.2	1.2	1.2	1.2	1.2	1.2	
Switch Power (**W**)		20 (15)	10	20 (15)	10	2	10	20 (15)	10	3	20 (15)	10	

Series Name		106-1-A			107-1-A			107-1-B	107-1-C	107-2-A		107-2-C
Physical Outline												
Depth	mm (inches)	4.8 (0.19)			4.8 (0.19)			4.8 (0.19)	4.8 (0.19)	4.8 (0.19)		4.8 (0.19)
Width		19.1 (0.75)			19.1 (0.75)			19.1 (0.75)	19.1 (0.75)	19.1 (0.75)		24.1 (0.95)
Height		8.1 (0.32)			7.6 (0.30)			10.2 (0.40)	7.6 (0.30)	10.2 (0.40)		10.2 (0.40)
Package Volume (**mm³**)		743			❶ 697			❷ 936	❸ 697	❹ 936		❺ 1180
Typical Weights (**g**)		1.21			1.32			2.20	1.74	2.24		2.42
Contact Configuration		1-A (SPST)			1-A (SPST)			1-B (SPNC)	1-C (SPDT)	2-A (SPST)		2-C (DPDT)
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		-	-	1500	-	-	500	-	-	-	-	-
Switching Voltage (**V**)		200	200	500	200	200	400	200	200	200	200	200
Switching Current (**A**)		1.0	0.5	0.5	1.0	0.5	0.5	1.0	0.25	1.0	0.5	0.25
Carry Current (**A**)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		20	10	10	20 (15)	10	10	1D: 20 (15) 2D: 10	3	20 (15)	10	3

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 107 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

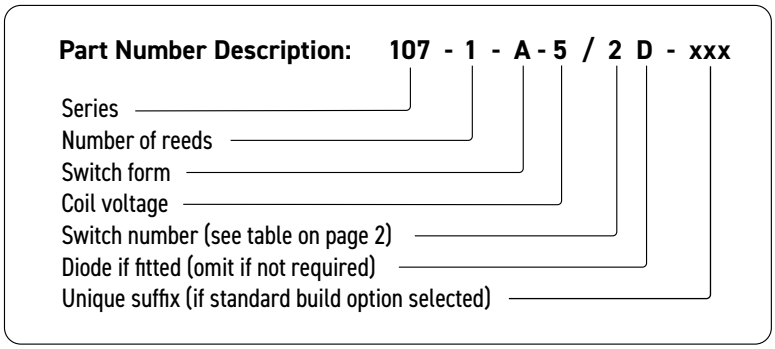
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models

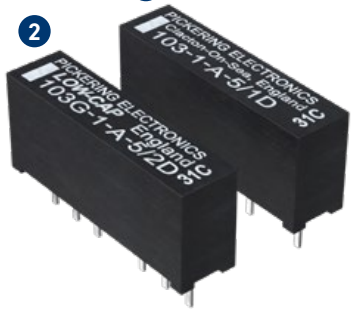


Help

If you need any technical advice or other help, 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

- Up to **20 W** switching
- Stacking on **0.2 Inches** pitch
- Highest quality instrumentation grade switches
- Inter-terminal capacitances are a fraction of that for standard SIL relays
- **1 Form A** or **1 Form A** (**Coaxial**) configurations
- Pin compatible with standard **0.2 Inch SIL** relays
- Optional internal mu-metal magnetic screen
- Optional internal coaxial electrostatic screen
- Insulation resistance **$>10^{12}\,\Omega$**
- Suitable for wide bandwidth A.T.E. switching matrices and attenuator switching
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

Package Type 1 2



The Pickering Series 103 is a range of Single-in-Line reed relays intended for such applications as wide bandwidth A.T.E. switching matrices, attenuator switching or any other applications where exceptionally low levels of inter-terminal capacitances are required, for example, when carrying fast rise time pulses. A version with an internal co-axial electrostatic screen is available which is ideal for applications where capacitively coupled noise from switch to coil connections is undesirable. The co-axial device has a characteristic impedance of 50 Ω and is also suitable for high frequency applications up to 2 GHz.

The range consists of two basic types, the first achieves ultra low capacitance levels of typically 0.1 pF from each switch connection to the coil and typically 0.08 pF across the open switch contacts, by virtue of an internal coaxial electrostatic screen or guard connection. Where it is not possible to drive a guard, the second type has inherently low capacitance figures of typically 0.4 pF from each switch connection to the coil and typically 0.1 pF across the open switch contacts. These figures for the unguarded version are around one quarter of those for standard SIL devices. An internal mu-metal magnetic screen is an option in both of these types.

Two types of Form A (energize to make) switches are available, a general purpose switch (switch no.1) and a vacuum sputtered ruthenium switch (switch no.2) which is ideal for very low level or "cold" switching applications.

Switch Ratings

1 Form A (energize to make)	1 Form A co-axial (energize to make)
Up to 20 W at 1 A	Up to 20 W at 1 A (50 Ω)

Series 103 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W)	1.0A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10^8	0.5 ms	0.2 ms	Low level

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification off 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. I In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Coil data and type numbers

Device Type	Switch		Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
	Form	Type					Switch to coil	Across switch	Closed switch to coil (C1 & C2)	Across open switch (C3)
No magnetic screen or guard screen (*Note 15 W for 5 V coil) Package Type 1	A	1	103-1-A-5/1D *	5	150 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	0.4 pF	0.13 pF
	A	2	103-1-A-5/2D	5	150 Ω	0.12 Ω				0.10 pF
Magnetic screen only (*Note 15 W for 5 V coil) Package Type 1	A	1	103M-1-A-5/1D *	5	150 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	0.45 pF	0.23 pF
	A	2	103M-1-A-5/2D	5	150 Ω	0.12 Ω				0.20 pF
Guard screen only (*Note 15 W for 5 V coil) Package Type 2	A	2	103G-1-A-3/2D	3	300 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	0.1 pF	0.08 pF
	A	1	103G-1-A-5/1D *	5	500 Ω	0.15 Ω				0.10 pF
	A	2	103G-1-A-5/2D	5	500 Ω	0.12 Ω				0.08 pF
	A	1	103G-1-A-12/1D	12	1000 Ω	0.15 Ω				0.10 pF
	A	2	103G-1-A-12/2D	12	1000 Ω	0.12 Ω				0.08 pF
Guard screen and magnetic screen Package Type 2	A	2	103GM-1-A-3/2D	3	300 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	0.2 pF	0.08 pF
	A	1	103GM-1-A-5/1D	5	500 Ω	0.15 Ω				0.10 pF
	A	2	103GM-1-A-5/2D	5	500 Ω	0.12 Ω				0.08 pF
	A	1	103GM-1-A-12/1D	12	1000 Ω	0.15 Ω				0.10 pF
	A	2	103GM-1-A-12/2D	12	1000 Ω	0.12 Ω				0.08 pF

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

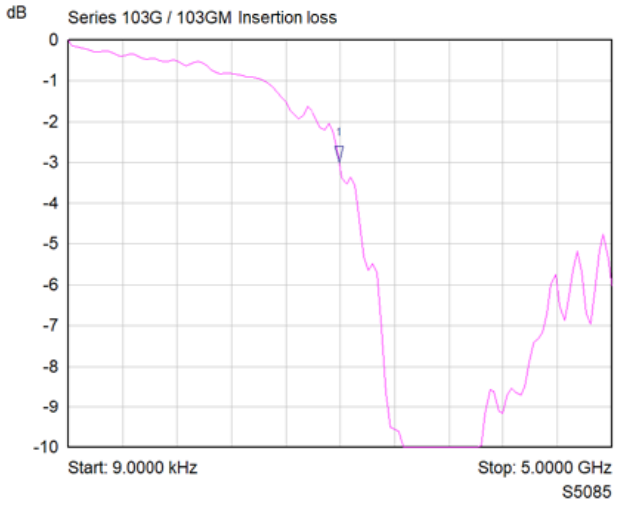
Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

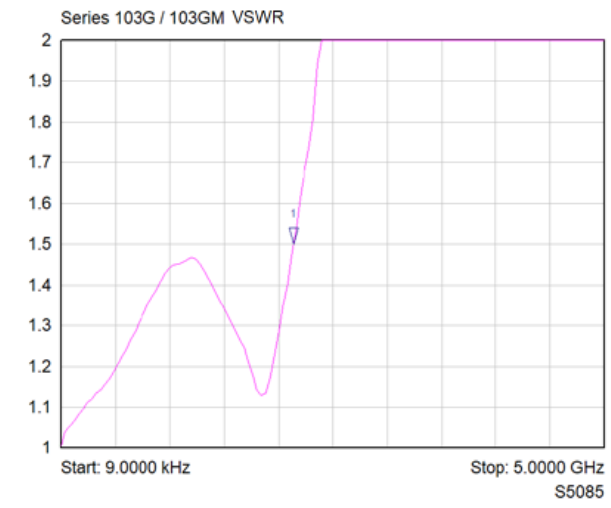
For different values, latest specifications and product details, please contact your local Pickering sales office.

RF Plots for the 103G / 103GM Reed Relays



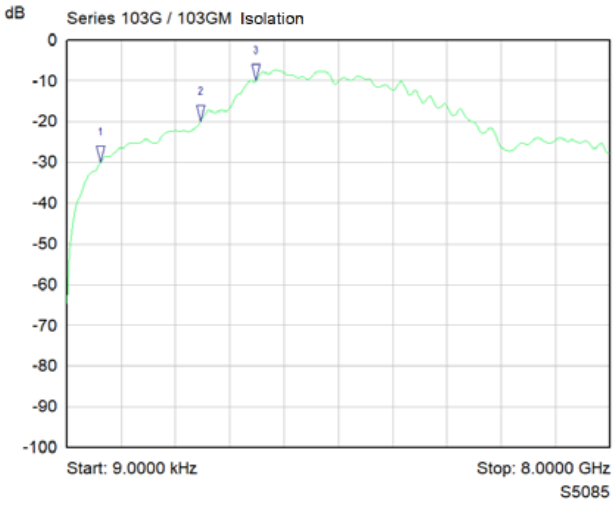
Mkr	Trace	X-Axis	Value
1	Series 103G / 103GM	2.4952 GHz	-3.00 dB

103G / 103GM Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1	Series 103G / 103GM	2.1356 GHz	1.50

103G / 103GM Typical VSWR Plot



Mkr	Trace	X-Axis	Value
1	Series 103G / 103GM	498.4497 MHz	-30.00 dB
2	Series 103G / 103GM	1.9722 GHz	-20.00 dB
3	Series 103G / 103GM	2.7855 GHz	-10.00 dB

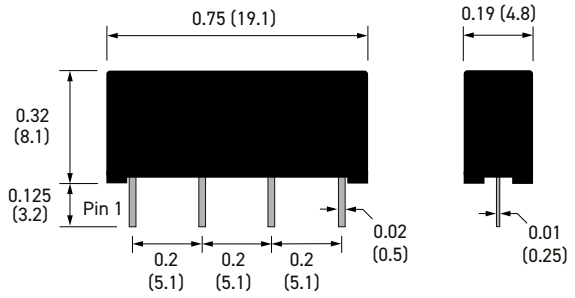
103G / 103GM Typical Isolation Plot

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

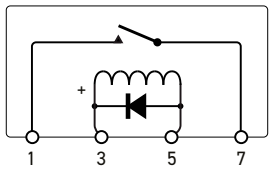
Package Type 1

103-1-A
Weight: Typical 0.92 g

103M-1-A
Weight: Typical 1.14 g



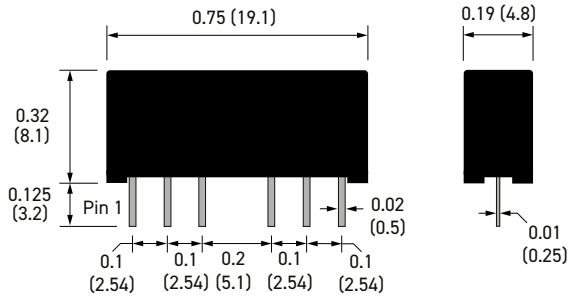
1 Form A



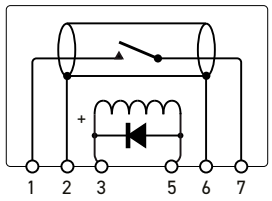
Package Type 2

103G-1-A
Weight: Typical 1.11 g

103GM-1-A
Weight: Typical 1.28 g



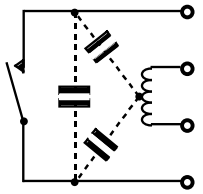
1 Form A
Coaxial



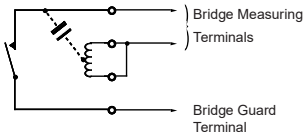
Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Simplified Equivalent Circuits

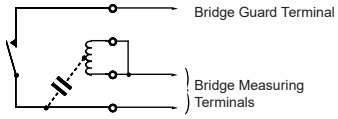
It is convenient to consider the internal capacitances as a delta network as in the circuit diagram alongside. C1 is the capacitance between one end of the switch and the coil, C2 is the capacitance between the other end of the switch and the coil. These two figures will be approximately equal. C3 is the capacitance across the open switch. When measuring the values of any one of these capacitances, it is necessary to "guard" the unused relay connections to avoid the parallel effects of the other capacitances, connection details when performing these measurements on a capacitance bridge are shown below. Relays with an internal electrostatic screen have the screen terminals guarded in all cases.



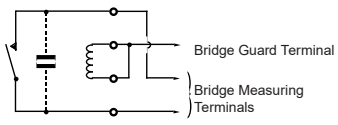
Measurement of C1- switch to coil



Measurement of C2- switch to coil

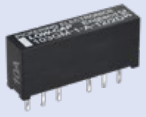


Measurement of C3 - open switch



Similar Relays Comparison

If the Series 103GM is unsuitable for your application, Pickering also manufactures four other reed relay types with similar characteristics, but in different package sizes.

Series Name		111RF-1-A	113RF-1-A	109RF50-1-A		109RF75-1-A		102M-1-A		102M-1-B		103GM-1-A	
Physical Outline													
Depth	mm (inches)	3.7 (0.145)	3.7 (0.145)	3.7 (0.145)				4.8 (0.19)		4.8 (0.19)		4.8 (0.19)	
Width		10.0 (0.39)	12.5 (0.49)	15.1 (0.595)				19.1 (0.75)		19.1 (0.75)		19.1 (0.75)	
Height		6.6 (0.26)	6.6 (0.26)	6.6 (0.26)				7.6 (0.3)		10.2 (0.4)		8.1 (0.32)	
Package Volume (**mm³**)		245	306	369				697		936		743	
Typical Weights (**g**)		0.56	0.58	0.88		0.87		1.43		2.19		1.28	
Contact Configuration		1-A (SPST)	1-A (SPST)	1-A (SPST)		1-A (SPST)		1-A (SPST)		1-B (SPNC)		1-A (SPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry		Dry		Dry	
Stand-off Voltage (**V**)		-	-	-	-	-	-	-	-	-	-	-	-
Switching Voltage (**V**)		170	200	200	200	200	200	200	200	200	200	200	200
Switching Current (**A**)		0.5	0.5	1.0	0.5	1.0	0.5	0.5	1	0.5	1	1	0.5
Carry Current (**A**)		0.5	0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		10	10	15/20	10	15/20	10	10	20	10	20	20	10

Reed Relay Selection Tool

Because Pickering offer the largest range of high-quality reed relays, sometimes it can be difficult to find the right reed relay you require. That is why we created the Reed Relay Selector, this tool will help you narrow down our offering to get you the correct reed relay for your application. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 103 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

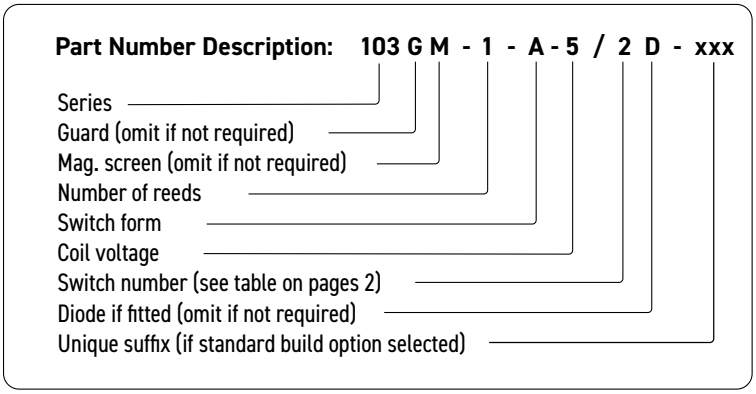
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Very low capacitance
Custom packaging possibility	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

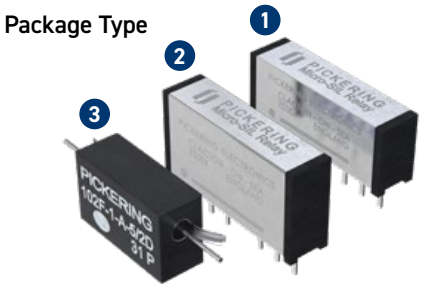
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Up to **20 W** switching capability
- Highest quality instrumentation grade switches
- **1 Form A** or **1 Form B** configurations
- Insulation resistance **>10^{12} Ω**
- **3 V**, **5 V** or **12 V** coils with optional internal diode
- Suitable for high frequency applications up to **3 GHz** and portable applications.
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



The Series 102 is a range of subminiature coaxial reed relays for high frequency applications up to 3 GHz, performance characteristics will be found on reverse of this sheet. Three package types are available, all displaying outstanding RF performance in terms of low insertion loss, good isolation and excellent VSWR characteristics in 50 ohms systems. These relays have good coil drive levels making them ideal for portable applications or where space is at a premium. If an even smaller RF relay is required, look at the Series 109RF or 111 RF.

102M (Mu-metal) Package.

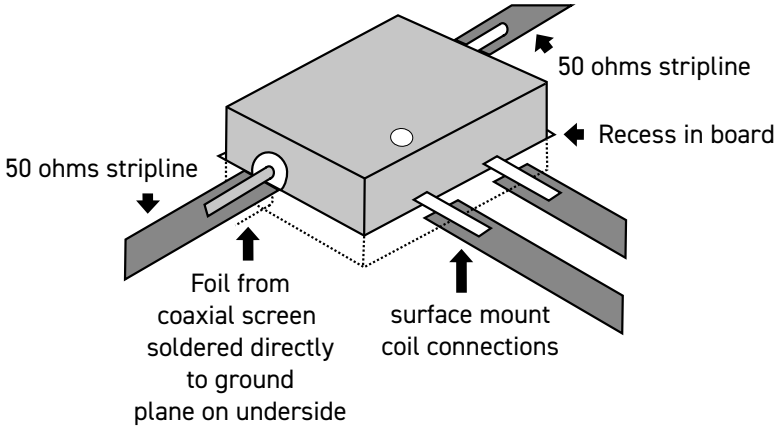
This device, constructed in the popular Single-In-Line format, features a mu-metal case allowing dense packaging without magnetic interaction problems. It has six pins for conventional PCB mounting. With careful printed circuit board layout this configuration will perform well up to 1.5 GHz, it is easy to use and will meet most requirements.

102F (Flatpack) package.

The 102F package dispenses with the leadframe connections to the switch and screen. These terminations are instead brought out axially from the ends of the device where they are soldered directly to the stripline. This technique allows very accurate matching to the 50 ohms line and gives an excellent VSWR right up to 3 GHz.

102F Mounting method:

A small rectangular hole is punched into the printed circuit board or notched into the board edge to accommodate the package. The switch leads are then soldered directly to the 50 ohms stripline, the tin plated copper foil from the screen is soldered directly to the ground plane on the reverse side of the PCB. The coil connections are soldered directly to their tracks in the same way.



Flatpack PCB Connections

Also available - Low capacitance reed relays

If your high frequency application does not require coaxial relays, Pickering also manufacture devices featuring very low levels of capacitance between the switch and coil, see our **Series 103**. These are especially useful for such applications as the switching of ranges and attenuators in computer controlled instrumentation. Contact our sales office for further details.

Switch Ratings

1 Form A coaxial (energize to make)	1 Form B coaxial (energize to break)
10 W at 200 V 20 W at 200 V	10 W at 200 V 20 W at 200 V

Series 102 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A or B	10 W	0.5 A	1.2 A	200	10^8	0.5 ms	0.2 ms	Low Level
2	A or B	20 W	1A	1.2 A	200	10^8	0.5 ms	0.2 ms	General Purpose

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads or when 'cold' switching, typical life is expected to be greater than 1×10^9 ops. At higher voltages and the maximum load (resistive), typical life is 1×10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

102M (mu-metal) Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 1	102M-1-A-3/1D	3	250 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	0.1 pF
	102M-1-A-5/1D	5	500 Ω					
	102M-1-A-12/1D	12	1000 Ω					
1 Form A, Switch No. 2 Higher Power Dry Reed Package Type 1	102M-1-A-5/2D	5	375 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	0.1 pF
	102M-1-A-12/2D	12	1000 Ω					
1 Form B Switch No. 1 Package Type 2	102M-1-B-5/1D	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	0.1 pF
	102M-1-B-12/1D	12	1500 Ω					
1 Form B, Switch No. 2 Higher Power Dry Reed Package Type 1	102M-1-B-5/2D	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	0.1 pF
	102M-1-B-12/2D	12	1500 Ω					

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

102F (flatpack) Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 3	102F-1-A-3/1D	3	250 Ω	0.10 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	0.1 pF
	102F-1-A-5/1D	5	500 Ω					
	102F-1-A-12/1D	12	1000 Ω					
1 Form A, Switch No. 2 Higher Power Dry Reed Package Type 3	102F-1-A-5/2D	5	375 Ω	0.10 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	0.1 pF
	102F-1-A-12/2D	12	1000 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

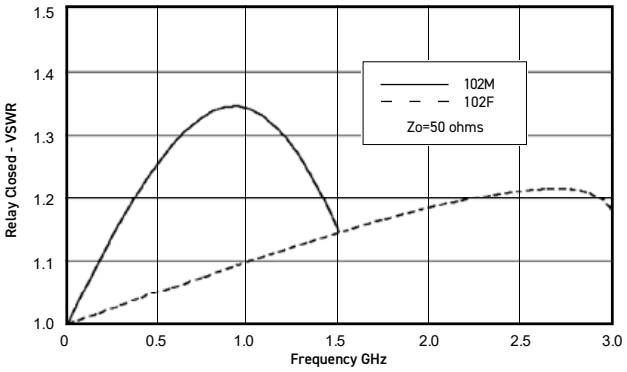
Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

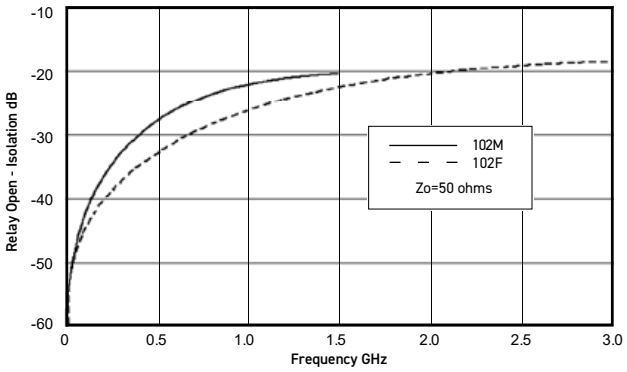
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

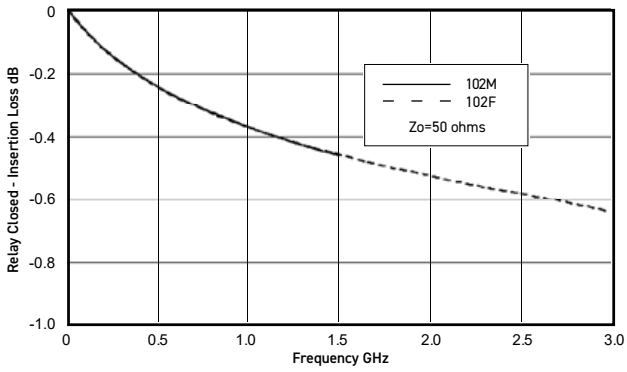
Typical Performance Characteristics



VSWR



Isolation

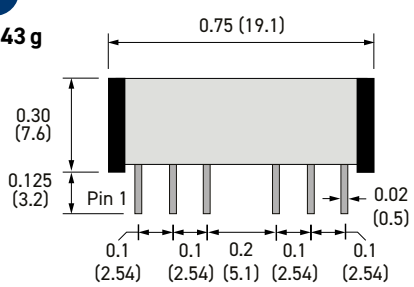


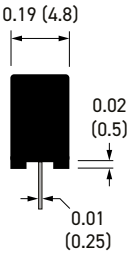
Insertion Loss

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

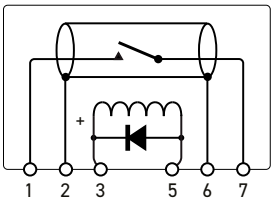
Package Type 1

Weight: Typical 1.43 g



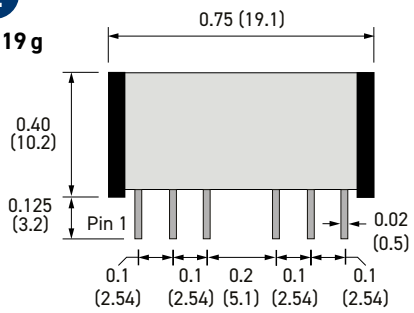


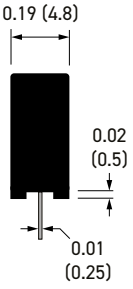
1 Form A Coaxial



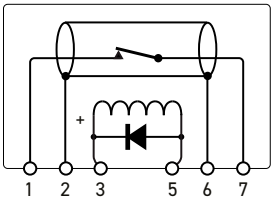
Package Type 2

Weight: Typical 2.19 g



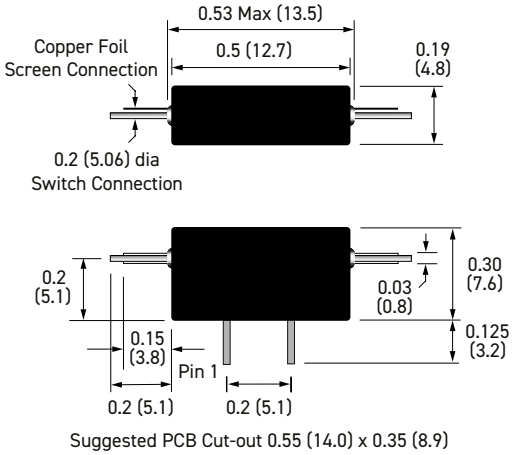


1 Form B Coaxial

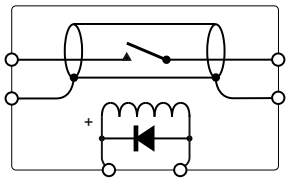


Package Type 3

Weight: Typical 0.80 g



102F Package



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.

Similar Relays Comparison

If the Series 102 is unsuitable for your application, Pickering also manufactures three other reed relay types with similar characteristics, but in different package sizes.

If your high frequency application does not require coaxial relays, Pickering also manufacture devices featuring very low levels of capacitance between the switch and coil, see our Series 103. These are especially useful for such applications as the switching of ranges and attenuators in computer controlled instrumentation. Contact our sales office for further details.

Series Name		111RF-1-A	109RF50-1-A		109RF75-1-A		102M-1-A		102M-1-B		102F-1-A		103GM-1-A	
Physical Outline														
Depth	mm (inches)	3.7 (0.145)	3.7 (0.145)				4.8 (0.19)		4.8 (0.19)		7.6 (0.30)		4.8 (0.19)	
Width		10.0 (0.39)	15.1 (0.595)				19.1 (0.75)		19.1 (0.75)		12.7 (0.5)		19.1 (0.75)	
Height		6.6 (0.26)	6.6 (0.26)				7.6 (0.3)		10.2 (0.4)		4.8 (0.19)		8.1 (0.32)	
Package Volume (**mm³**)		245	369				❶ 697		❷ 936		❸ 464		743	
Typical Weights (**g**)		0.56	0.88		0.87		1.43		2.19		0.8		1.28	
Contact Configuration		1-A (SPST)	1-A (SPST)		1-A (SPST)		1-A (SPST)		1-B (SPNC)		1-A (SPST)		1-A (SPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry		Dry		Dry		Dry	
Stand-off Voltage (**V**)		-	-	-	-	-	-	-	-	-	-	-	-	-
Switching Voltage (**V**)		170	200	200	200	200	200	200	200	200	200	200	200	200
Switching Current (**A**)		0.5	1.0	0.5	1.0	0.5	0.5	1	0.5	1	0.5	1	1	0.5
Carry Current (**A**)		0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		10	15/20	10	15/20	10	10	20	10	20	10	20	20	10

Reed Relay Selection Tool

Because Pickering offer the largest range of high-quality reed relays, sometimes it can be difficult to find the right reed relay you require. That is why we created the Reed Relay Selector, this tool will help you narrow down our offering to get you the correct reed relay for your application. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 102 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

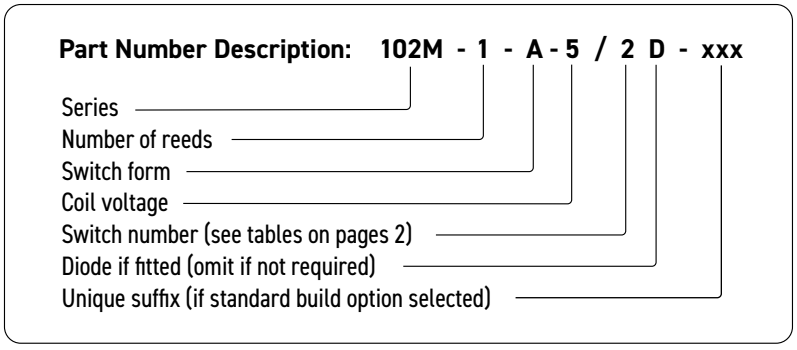
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Up to **1500 V** stand-off
- Choice of **3**, **5** or **12 V** coils with optional internal diode
- **1 Form A** (energize to make) SPST N.O. configuration
- Smallest high voltage reed relay currently available
- Switching up to **0.7 A**, **10 W**
- Internal mu-metal magnetic screen allows side by side stacking without magnetic interaction
- **100%** tested for dynamic contact resistance
- Highest quality vacuumed, sputtered ruthenium reed switches
- **General Purpose** & **Low Level** switch options available
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Ideal for cable testers, mixed signal/semiconductor testers, backplane testers, high voltage instrumentation, in-circuit test equipment or other applications where high voltage capability is required.

1 **Package Type**

Text color option

Switch Ratings - Dry Switches

1 Form A (energize to make)
Stand-off 1 kV, switching up to 1 kV
Stand-off 1.5 kV, switching up to 1 kV

Series 131 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts (see Note[1])	Min. stand-off volts	Life expectancy ops typical (see Note[2])	Operate time inc bounce (max)	Release time	Special features
1 (L)	A	10 W	0.7 A	1.25 A	1000	1000	10^8	0.5 ms	0.2 ms	High voltage
1	A	10 W	0.7 A	1.25 A	1000	1500	10^8	0.5 ms	0.2 ms	High voltage

Note[1]: Switching Voltage

This high voltage rating is for **RESISTIVE loads only**. At these high voltages, even stray capacitance can generate very high current pulses, which can damage the contact plating causing welding of the reed switch. If there is capacitance in circuit, provision should be made to limit the surge, to within the current and power ratings of the relay.
The quoted Switching Voltage is VDC or VAC Peak.

Note[2]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1 Ω, switching low loads or when 'cold' switching, typical life is expected to be greater than 1 x 10^8 ops. At higher voltages and the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Application Note:

A characteristic of the switch used in this range is the contact resistance can increase over time if subjected to standoff voltages in the upper range of the specification. This does not affect the life expectancy but can result in contact resistances greater than 1Ω. In most high voltage applications this increase has no effect on performance but, in some mixed signal applications low and stable contact resistance is important.

For this reason, Pickering offer both a low-level and a general-purpose option for all package types, the low-level parts have a reduced high voltage standoff and are tested for extended contact resistance stability as part of the production testing. The low-level versions have 131L at the start of the part number.

For new applications or for further information please contact our Technical department.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (1 kV) Package Type 1	131L-1-A-3/1DR	3	100 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	131L-1-A-5/1DR	5	250 Ω					
	131L-1-A-12/1DR	12	750 Ω					
1 Form A Switch No. 1 (1.5 kV) Package Type 1	131-1-A-3/1DR	3	100 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	131-1-A-5/1DR	5	250 Ω					
	131-1-A-12/1DR	12	750 Ω					

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

Note[3]: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

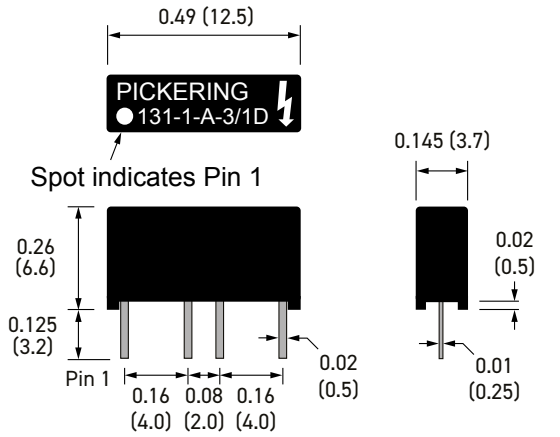
Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance. The quoted Insulation Resistance is at 25 °C, 1000 VDC or VAC.

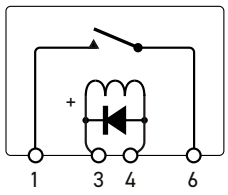
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.58 g



1 Form A



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

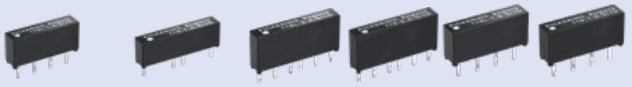
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

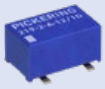
For FREE evaluation samples go to: pickeringrelay.com/samples

Similar Relays Comparison

If the Series 131 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		131L-1-A	131-1-A	119L-1-A		119-1-A			119L-2-A	119-2-A	119L-1-B	119-1-B		104-1-A & 104HT-1-A		
Physical Outline																
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)										6.3 (0.245)		
Width		12.5 (0.49)		15.1 (0.595)					20.1 (0.79)		15.1 (0.595)			24.1 (0.95)		
Height		6.6 (0.26)		6.6 (0.26)					8.9 (0.35)					8.2 (0.32)		
Package Volume (mm³)		❶ 306		369	369	369	369	491	662	662	498	498	498	1245		1245
Typical Weights (g)		0.58		0.67				0.74	1.06		0.89			2.06		2.06
Contact Configuration		1-A (SPST)		1-A (SPST)					2-A (DPST)		1-B (SPNC)			1-A (SPST)		
Reed Switch Type		Dry Low Level	Dry	Dry Low Level	Dry Low Level	Dry	Dry	Dry	Dry Low Level	Dry	Dry Low Level	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry
Stand-off Voltage (V)		1000	1500	1000	1500	1500	2000	3000	1000	1500	1000	1500	2000	1500	2000	1500	3000	4000
Switching Voltage (V)		1000		1000										1000	500	1000		
Switching Current (A)		0.7		0.7										1	2	1		
Carry Current (A)		1.25		1.25										1.5	3	1.5		
Switch Power (W)		10		10										25	50	25		

Series Name		104ES-1-A			104-1-B		104-2-A			100HV-1-A			100HV-1-B		100HV-2-A	
Physical Outline																
Depth	mm (inches)	6.3 (0.245)								10.2 (0.40)			10.2 (0.40)		10.2 (0.40)	
Width		24.1 (0.95)			29 (1.14)					24.1 (0.95)			29 (1.14)		29 (1.14)	
Height		8.2 (0.32)			12.5 (0.49)					12.7 (0.50)			15.2 (0.60)		15.2 (0.60)	
Package Volume (mm³)		1245			2284					3122		3122	4496		4496	
Typical Weights (g)		1.94			3.75		3.7			6.99			8.75		8.75	
Contact Configuration		1-A (SPST)s			1-B (SPNC)		2-A (DPST)			1-A (SPST)			1-B (SPNC)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (V)		1500	2000	3000	1500	2000	1500	2000	1500	1500	2000	3000	1500	2000	1500	2000
Switching Voltage (V)		1000	1000	1000	1000		1000		500	1000			1000		1000	
Switching Current (A)		1	1	1	1		1		2	1			1		1	
Carry Current (A)		1.5	1.5	1.5	1.5		1.5		3	1.5			1.5		1.5	
Switch Power (W)		25	25	25	25		25		50	25			25		25	

Series Name		219-1-A			219-2-A	219-1-B	
Physical Outline							
Depth	**mm (inches)**	10.5 (0.42) Body, 13.8 (0.55) Across Legs					
Width		17.2 (0.677)					
Height		8.5 (0.34)					
Package Volume (**mm**^{3})		1535			1535	1535	
Typical Weights (**g**)		2.12			2.39	2.19	
Contact Configuration		1-A (SPST)			2-A (DPST)	1-B (SPNC)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	1500	2000
Switching Voltage (**V**)		1000					
Switching Current (**A**)		0.7					
Carry Current (**A**)		1.25					
Switch Power (**W**)		10					

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 131 Reed Relay is available with a number of standard build options to tailor it to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

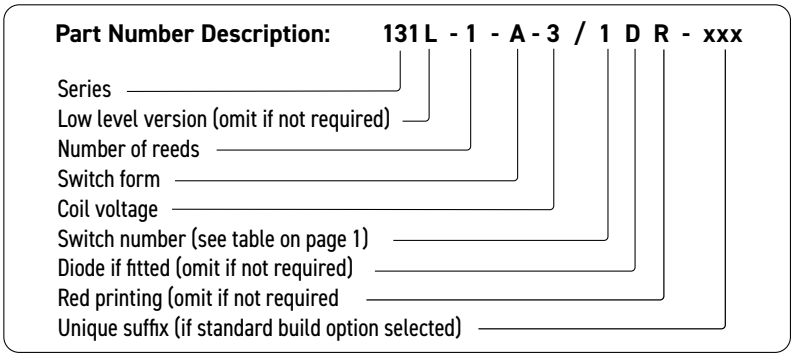
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Very low capacitance possibility
Custom packaging possibility	Different stand-off or switching voltage
	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

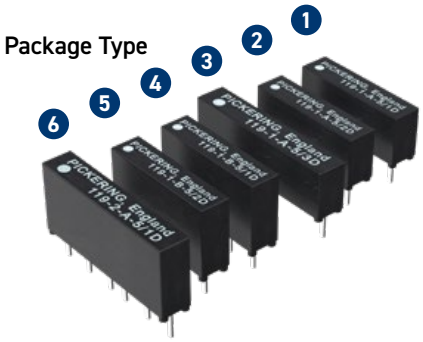
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Up to **3 kV** stand-off
- **1 Form A**, **2 Form A** or **1 Form B** configurations
- **3 V**, **5 V** & **12 V** coils with **optional internal diode**
- Insulation resistance **>10^{12} Ω**
- Switching up to **0.7 A**, **10 W**
- **General Purpose** & **Low Level** switch options available
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	2 Form A (energize to make)
Stand-off 1 kV, switching up to 1 kV Stand-off 1.5 kV, switching up to 1 kV Stand-off 2 kV, switching up to 1 kV Stand-off 3 kV, switching up to 1 kV	Stand-off 1 kV, switching up to 1 kV Stand-off 1.5 kV, switching up to 1 kV Stand-off 2 kV, switching up to 1 kV	Stand-off 1 kV, switching up to 1 kV Stand-off 1.5 kV, switching up to 1 kV

Series 119 switch ratings - contact ratings for each switch type

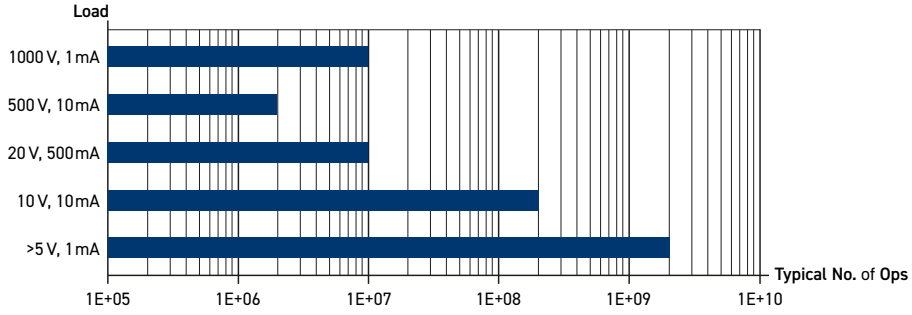
Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts (see Note[1])	Min. stand-off volts	Life expectancy ops typical (see Note[2])	Operate time inc bounce (max)	Release time	Special features
1 (L)	A or B	10 W	0.7 A	1.25 A	1000	1000	10^8	0.5 ms	0.2 ms	High voltage
1	A or B	10 W	0.7 A	1.25 A	1000	1500	10^8	0.5 ms	0.2 ms	High voltage
2 (L)	A	10 W	0.7 A	1.25 A	1000	1500	10^8	0.5 ms	0.2 ms	High voltage
2	A or B	10 W	0.7 A	1.25 A	1000	2000	10^8	0.5 ms	0.2 ms	High voltage
3	A	10 W	0.7 A	1.25 A	1000	3000	10^8	0.5 ms	0.2 ms	High voltage

Note[1]: Switching Voltage

This high voltage rating is for **RESISTIVE loads only**. At these high voltages, even stray capacitance can generate very high current pulses, which can damage the contact plating causing welding of the reed switch. If there is capacitance in circuit, provision should be made to limit the surge, to within the current and power ratings of the relay. The quoted Switching Voltage is VDC or VAC Peak.

Note[2]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1 Ω, switching low loads or when 'cold' switching, typical life is expected to be greater than 1 x 10^8 ops. At higher voltages and the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.



Series 119 Life Test Data

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Contact Resistance

A characteristic of the switch used in this range is the contact resistance can increase over time if subjected to standoff voltages in the upper range of the specification. This does not affect the life expectancy but can result in contact resistances greater than 1Ω. In most high voltage applications this increase has no effect on performance but, in some mixed signal applications low and stable contact resistance is important.

For this reason, Pickering offer both a low-level and a general-purpose option for all package types, the low-level parts have a reduced high voltage standoff and are tested for extended contact resistance stability as part of the production testing. The low-level versions have 119L at the start of the part number.

For new applications or for further information please contact our Technical Department.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A (L) Switch No. 1 (1 kV) Package Type 1	119L-1-A-3/1D	3	100 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119L-1-A-5/1D	5	250 Ω					
	119L-1-A-12/1D	12	750 Ω					
1 Form A Switch No. 1 (1.5 kV) Package Type 1	119-1-A-3/1D	3	100 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119-1-A-5/1D	5	250 Ω					
	119-1-A-12/1D	12	750 Ω					
1 Form A (L) Switch No. 2 (1.5 kV) Package Type 2	119L-1-A-3/2D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119L-1-A-5/2D	5	125 Ω					
	119L-1-A-12/2D	12	400 Ω					
1 Form A Switch No. 2 (2 kV) Package Type 2	119-1-A-3/2D	3	75 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119-1-A-5/2D	5	200 Ω					
	119-1-A-12/2D	12	500 Ω					
1 Form A Switch No. 3 (3 kV) Package Type 3	119-1-A-3/3D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.1 pF
	119-1-A-5/3D	5	125 Ω					
	119-1-A-12/3D	12	400 Ω					
2 Form A (L) Switch No. 1 (1 kV) Package Type 6	119L-2-A-3/1D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119L-2-A-5/1D	5	100 Ω					
	119L-2-A-12/1D	12	400 Ω					
2 Form A Switch No. 1 (1.5 kV) Package Type 6	119-2-A-3/1D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119-2-A-5/1D	5	100 Ω					
	119-2-A-12/1D	12	400 Ω					
1 Form B (L) Switch No. 1 (1 kV) Package Type 4	119L-1-B-3/1D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119L-1-B-5/1D	5	100 Ω					
	119L-1-B-12/1D	12	400 Ω					
1 Form B Switch No. 1 (1.5 kV) Package Type 4	119-1-B-3/1D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119-1-B-5/1D	5	100 Ω					
	119-1-B-12/1D	12	400 Ω					
1 Form B Switch No. 2 (2 kV) Package Type 5	119-1-B-3/2D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	119-1-B-5/2D	5	100 Ω					
	119-1-B-12/2D	12	400 Ω					

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

Note[3]: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

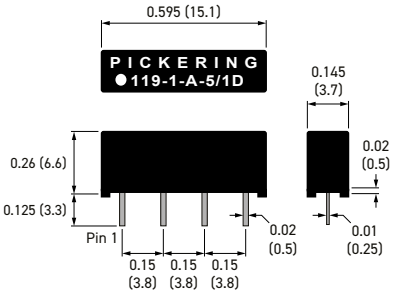
Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance. The quoted Insulation Resistance is at 25 °C, 1000 VDC or VAC.

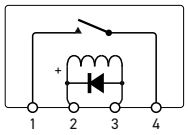
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.67 g



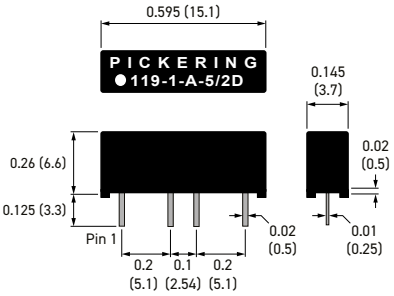
1 Form A



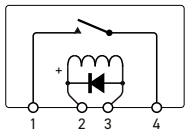
Switch No. 1 (1.5 kV stand-off)

Package Type 2

Weight: Typical 0.67 g



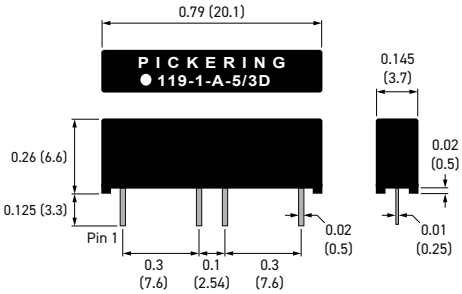
1 Form A



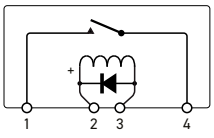
Switch No. 2 (2 kV stand-off)

Package Type 3

Weight: Typical 0.74 g



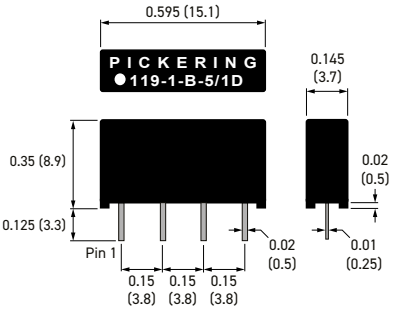
1 Form A



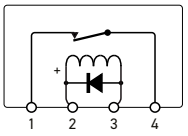
Switch No. 3 (3 kV stand-off)

Package Type 4

Weight: Typical 0.89 g



1 Form B (see Note)



Switch No. 1 (1.5 kV stand-off)

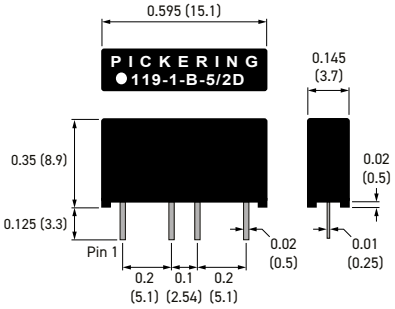
Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Note: A 1cm space should be left between Form B types and other relays, as the magnetic field from the internal biasing magnet could slightly affect the sensitivity of the relay alongside.

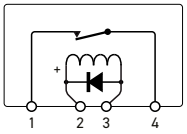
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **5**

Weight: Typical 0.89 g



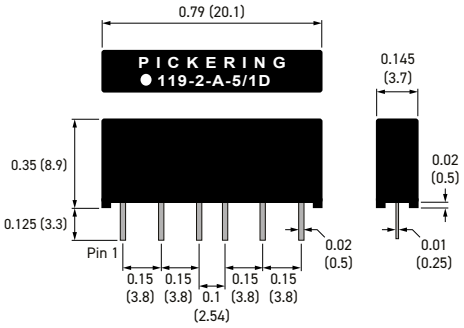
1 Form B
(see Note)



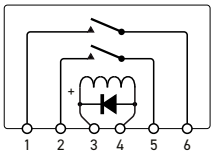
Switch No. 2 (2 kV stand-off)

Package Type **6**

Weight: Typical 1.06 g



2 Form A



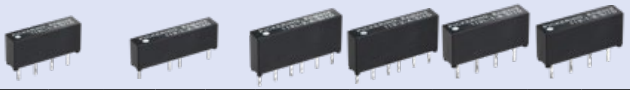
Switch No. 1 (1.5 kV stand-off)

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.

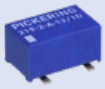
Note: A 1cm space should be left between Form B types and other relays, as the magnetic field from the internal biasing magnet could slightly affect the sensitivity of the relay alongside.

Similar Relays Comparison

If the Series 119 is unsuitable for your application, Pickering also manufactures three other series of reed relays with similar characteristics, but in different package sizes.

Series Name		131L-1-A	131-1-A	119L-1-A	119-1-A			119L-2-A	119-2-A	119L-1-B	119-1-B		104-1-A & 104HT-1-A				
Physical Outline																	
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)									6.3 (0.245)				
Width		12.5 (0.49)		15.1 (0.595)				20.1 (0.79)		15.1 (0.595)			24.1 (0.95)				
Height		6.6 (0.26)		6.6 (0.26)				8.9 (0.35)					8.2 (0.32)				
Package Volume (mm^3)		306		1 369	2 369	1 369	2 369	3 491	6 662	6 662	4 498	4 498	5 498	1245		1245	
Typical Weights (**g**)		0.58		0.67				0.74	1.06		0.89			2.06		2.06	
Contact Configuration		1-A (SPST)		1-A (SPST)					2-A (DPST)		1-B (SPNC)			1-A (SPST)			
Reed Switch Type		Dry Low Level	Dry	Dry Low Level	Dry Low Level	Dry	Dry	Dry	Dry Low Level	Dry	Dry Low Level	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry
Stand-off Voltage (**V**)		1000	1500	1000	1500	1500	2000	3000	1000	1500	1000	1500	2000	1500	2000	1500	3000	4000
Switching Voltage (**V**)		1000		1000										1000		500	1000	
Switching Current (**A**)		0.7		0.7										1		2	1	
Carry Current (**A**)		1.25		1.25										1.5		3	1.5	
Switch Power (**W**)		10		10										25		50	25	

Series Name		104ES-1-A			104-1-B		104-2-A			100HV-1-A			100HV-1-B		100HV-2-A	
Physical Outline																
Depth	mm (inches)	6.3 (0.245)								10.2 (0.40)			10.2 (0.40)		10.2 (0.40)	
Width		24.1 (0.95)			29 (1.14)					24.1 (0.95)			29 (1.14)		29 (1.14)	
Height		8.2 (0.32)			12.5 (0.49)					12.7 (0.50)			15.2 (0.60)		15.2 (0.60)	
Package Volume (mm^3)		1245			2284					3122		3122	4496		4496	
Typical Weights (**g**)		1.94			3.75		3.7			6.99			8.75		8.75	
Contact Configuration		1-A (SPST)s			1-B (SPNC)		2-A (DPST)			1-A (SPST)			1-B (SPNC)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	2000	1500	2000	1500	1500	2000	3000	1500	2000	1500	2000
Switching Voltage (**V**)		1000	1000	1000	1000		1000		500	1000			1000		1000	
Switching Current (**A**)		1	1	1	1		1		2	1			1		1	
Carry Current (**A**)		1.5	1.5	1.5	1.5		1.5		3	1.5			1.5		1.5	
Switch Power (**W**)		25	25	25	25		25		50	25			25		25	

Series Name		219-1-A			219-2-A	219-1-B	
Physical Outline							
Depth	**mm (inches)**	10.5 (0.42) Body, 13.8 (0.55) Across Legs					
Width		17.2 (0.677)					
Height		8.5 (0.34)					
Package Volume (**mm³**)		1535			1535	1535	
Typical Weights (**g**)		2.12			2.39	2.19	
Contact Configuration		1-A (SPST)			2-A (DPST)	1-B (SPNC)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	1500	2000
Switching Voltage (**V**)		1000					
Switching Current (**A**)		0.7					
Carry Current (**A**)		1.25					
Switch Power (**W**)		10					

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 119 Reed Relay is available with a number of standard build options to tailor it to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

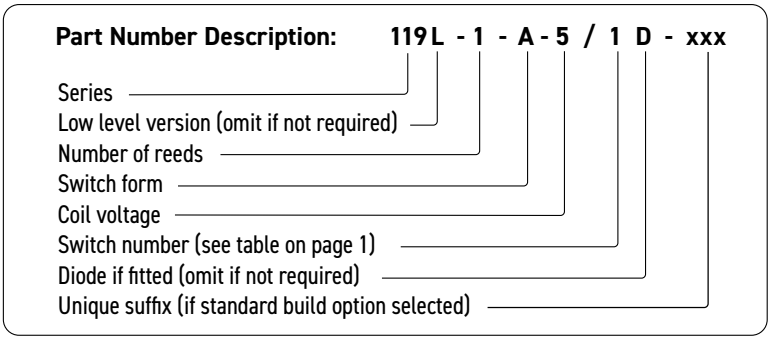
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Very low capacitance possibility
Custom packaging possibility	Different stand-off or switching voltage
	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

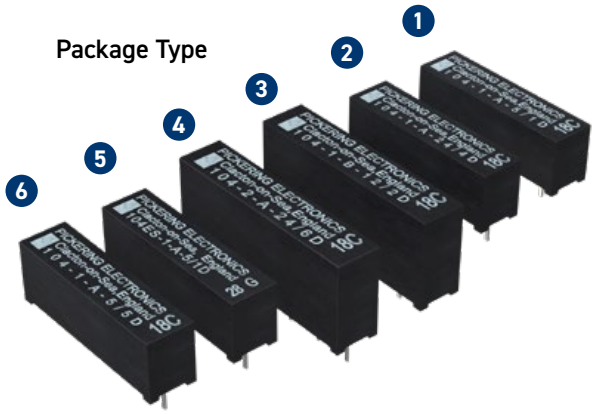
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Up to **5 kV** stand-off NEW
- Switching Voltage up to **1500 VDC** NEW
- Small size. Stacking on **0.25 Inches** pitch
- Internal mu-metal magnetic screen
- Optional electrostatic screen NEW
- **104HT** High temperature versions available NEW
- One or two switches in a single package
- **1 Form A**, **2 Form A** & **1 Form B** configurations
- Dry switches
- **5 V**, **12 V** or **24 V** Coils with optional internal diode
- Ideal for mixed semiconductor testers, renewable energies and much more (see below)
- Additional build options are available including many pin configurations
- Many benefits compared to industry standard relays (see here)



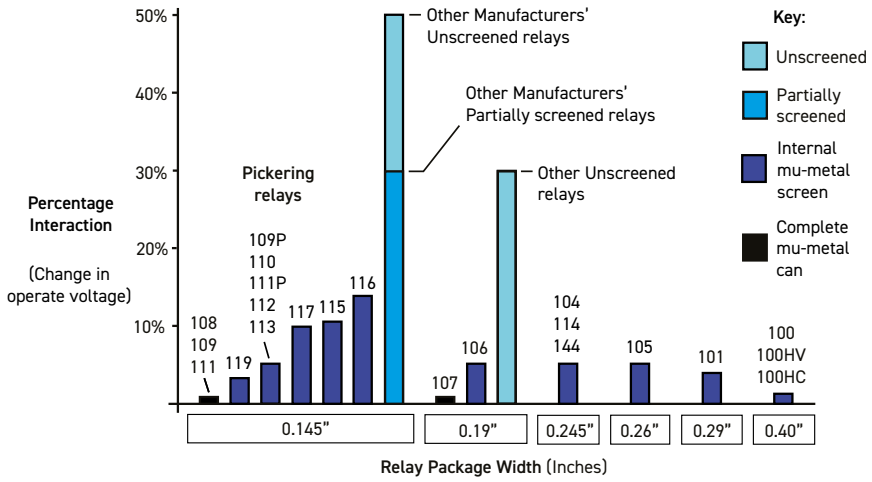
The Series 104 reed relays are ideal for mixed signal semiconductor testers, cable testing, monitoring photovoltaic efficiency, EVs & charge point testing, mining gas analysis, medical electronics, in-circuit test equipment, high voltage instrumentation, and much more.

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.

There is an option for an electrostatic shield between the switch and the coil to help minimise noise between the coil drive and high voltage circuits.

Where extended operating temperature ranges are required, options are designed to work from -40 °C to +125 °C, or custom versions up to +150 °C.

Five types of dry switches are available, capable of standing-off 1.5, 2, 3, 4 or 5 kV DC. The 1.5 kV and 2 kV versions are rated to switch up to 1000 VDC, for 3 kV, 4 kV and 5 kV versions, under certain conditions, this can be extended to 1500 VDC. The 3, 4 & 5 kV versions also have an increased clearance between the switch and coil pins to accommodate the higher voltage. For information on the recommended spacing between high voltage parts, please see page 3.



Magnetic Interaction

This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	2 Form A (energize to make)
1500 VDC min stand-off 1000 VDC switching at 25 W	1500 VDC min stand-off 1000 VDC switching at 25 W	1500 VDC min stand-off 1000 VDC switching at 25 W
2000 VDC min stand-off 1000 VDC. switching at 25 W	2000 VDC min stand-off 1000 VDC switching at 25 W	2000 VDC min stand-off 1000 VDC switching at 25 W
3000 VDC min stand-off 1000* VDC switching at 25 W	-	-
4000 VDC min stand-off 1000* VDC switching at 25 W	-	-
5000 VDC min stand-off 1000* VDC switching at 25 W	-	-

* For higher standoff versions, switching voltages greater than 1000 VDC are possible at reduced current and power, see the Extending Switching Voltages table below.

Dry Reed: Series 104 switch ratings - contact ratings for each switch type

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])	Operate time inc bounce (max)	Release time	Special features
1	A or B	25 W	1.0 A	1.5 A	1000	1500	10^8	1.0 ms	0.3 ms	High voltage
2	A or B	25 W	1.0 A	1.5 A	1000	2000	10^8	1.0 ms	0.3 ms	High voltage
3	A	25 W	1.0 A	1.5 A	1000*	3000	10^8	1.0 ms	0.3 ms	High voltage
4	A	25 W	1.0 A	1.5 A	1000*	4000	10^8	1.0 ms	0.3 ms	High voltage
5	A	25 W	1.0 A	1.5 A	1000*	5000	10^8	1.0 ms	0.3 ms	High voltage

* For higher standoff versions, switching voltages greater than 1000 VDC are possible at reduced current and power, see the Extending Switching Voltages table below.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions..

Dry Reed: Series 104 switch ratings - Extended Switching Voltages

Switch No	Switch form	Max. switch current	Max. switching volts	Switched power	Typical life expectancy
3, 4 or 5	A	1 mA	1250	1.25 W	10^7
3, 4 or 5	A	4 mA	1250	5 W	5 x 10^6
3, 4 or 5	A	8 mA	1250	10 W	10^6
3, 4 or 5	A	1 mA	1500	1.5 W	10^6
3, 4 or 5	A	2 mA	1500	3 W	5 x 10^5

For more detailed information on switching voltages greater than 1000 VDC please see our application note extending switching voltages or contact our technical team techsales@pickeringrelay.com

Operating Voltages - Standard

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Operating Voltages - HT (High Temperature) Versions

Coil voltage - nominal	Must operate voltage		Must release voltage	
	maximum at 25 °C	maximum at 125 °C	minimum at 25 °C	minimum at 125 °C
5 V	2.75 V	3.75 V	0.5 V	0.5 V
12 V	6 V	9 V	1.2 V	1.2 V
24 V	12 V	18 V	2.4 V	2.4 V

Environmental Specification/Mechanical Characteristics

In applications where a higher or lower operating temperature range is required, the 104HT range has been designed to maintain optimum performance from -40 °C to +125 °C.

Standard Operating Temperature Range	-20 °C to +85 °C
Standard Storage Temperature Range	-35 °C to +100 °C
104HT Operating Temperature Range	-40 °C to +125 °C
104HT Storage Temperature Range	-40 °C to +150 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Extended Operating Temperature Range

With the copper coil winding wire having a resistance/temperature coefficient of approximately 0.4% per °C, changes in temperature will result in changes in operating voltage. A standard reed relay is designed to have optimum performance up to the maximum operating temperature of +85 °C, the 104HT range has increased coil drive to ensure the same performance up to 125 °C, and with certain considerations, up to +150 °C. For more information, see our Temperature guide or contact techsales@pickeringrelay.com

Recommended Spacing for High Voltage Parts

When working with high voltages, the recommended space between pins is 2 mm per 1 kV stand-off voltage. For example, the 5 kV version of the 104 should have a gap of 10 mm between the pins.

Dry Relay: Series 104 Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (1.5 kV) Package Type 1 *	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 Switch No. 2 (2 kV) Package Type 1 *	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 Switch No. 3 (3 kV) Package Type 2	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 A Switch No. 4 (4 kV) Package Type 2	104-1-A-5/4D	5	220 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104-1-A-12/4D	12	500 Ω					
	104-1-A-24/4D	24	3000 Ω					
1 Form A Switch No. 5 (5 kV) Package Type 6 *	104-1-A-5/5D	5	220 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104-1-A-12/5D	12	500 Ω					
	104-1-A-24/5D	24	3000 Ω					
1 Form B Switch No. 1 (1.5 kV) Package Type 3	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 Switch No. 2 (2 kV) Package Type 3	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 Switch No. 1 (1.5 kV) Package Type 4	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 Switch No. 2 (2 kV) Package Type 4	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.

* Package Type 2 available, contact Pickering for more details.

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Dry Relay: Series 104 (Electrostatic Shield) Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[3])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A (ES Shielded) Switch No. 1 (1.5 kV) Package Type 5	104ES-1-A-5/1D	5	150 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104ES-1-A-12/1D	12	600 Ω					
	104ES-1-A-24/1D	24	2000 Ω					
1 Form A (ES Shielded) Switch No. 2 (2 kV) Package Type 5	104ES-1-A-5/2D	5	150 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104ES-1-A-12/2D	12	600 Ω					
	104ES-1-A-24/2D	24	2000 Ω					
1 Form A (ES Shielded) Switch No. 3 (3 kV) Package Type 5	104ES-1-A-5/3D	5	50 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104ES-1-A-12/3D	12	400 Ω					
	104ES-1-A-24/3D	24	1200 Ω					

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

Dry Relay: Series 104 (High Temperature) Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[3])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A (HT High Temp) Switch No. 1 (1.5 kV) Package Type 1	104HT-1-A-5/1D	5	300 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104HT-1-A-12/1D	12	750 Ω					
	104HT-1-A-24/1D	24	3000 Ω					
1 Form A (HT High Temp) Switch No. 2 (2 kV) Package Type 1	104HT-1-A-5/2D	5	300 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104HT-1-A-12/2D	12	750 Ω					
	104HT-1-A-24/2D	24	3000 Ω					
1 Form A (HT High Temp) Switch No. 3 (3 kV) Package Type 2	104HT-1-A-5/3D	5	125 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104HT-1-A-12/3D	12	500 Ω					
	104HT-1-A-24/3D	24	2500 Ω					
1 Form A (HT High Temp) Switch No. 4 (4 kV) Package Type 2	104HT-1-A-5/4D	5	125 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104HT-1-A-12/4D	12	500 Ω					
	104HT-1-A-24/4D	24	2500 Ω					
1 Form A (HT High Temp) Switch No. 5 (5 kV) Package Type 6	104HT-1-A-5/5D	5	125 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	104HT-1-A-12/5D	12	500 Ω					
	104HT-1-A-24/5D	24	2500 Ω					

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

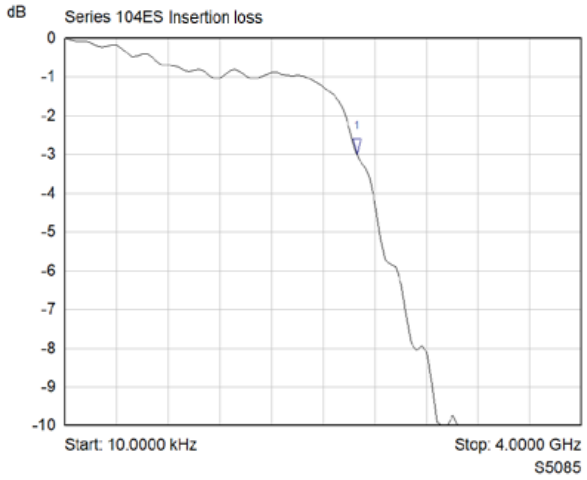
Note[2]: Capacitance across open switch

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

Note[3]: Insulation resistance

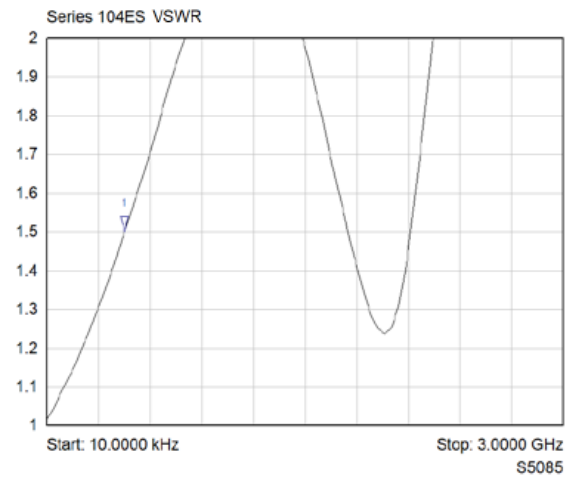
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

RF Plots for the 104ES Reed Relay



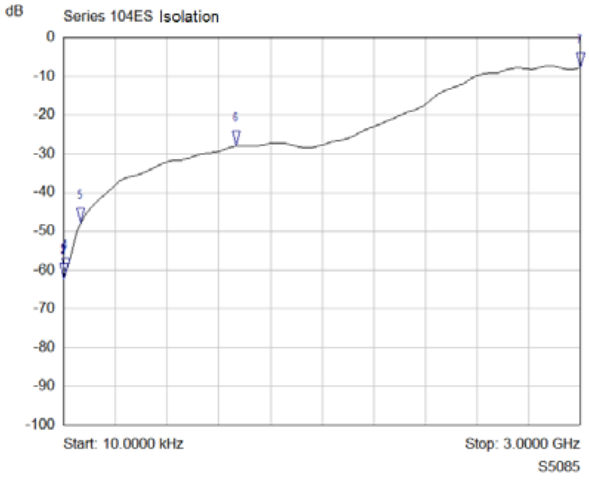
Mkr	Trace	X-Axis	Value
1	Series 104ES	2.2594 GHz	-3.00 dB

104ES Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1	Series 104ES	450.1271 MHz	1.50

104ES Typical VSWR Plot



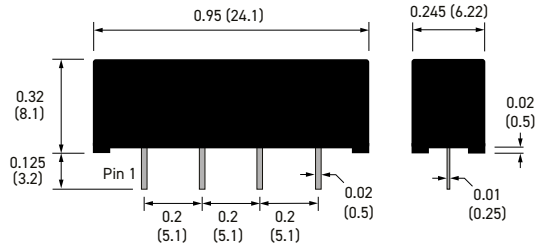
Mkr	Trace	X-Axis	Value
1	Series 104ES	10.0000 kHz	-62.29 dB
2	Series 104ES	100.0000 kHz	-62.28 dB
3	Series 104ES	1.0000 MHz	-62.15 dB
4	Series 104ES	10.0000 MHz	-60.86 dB
5	Series 104ES	100.0000 MHz	-47.95 dB
6	Series 104ES	1.0000 GHz	-28.04 dB
7	Series 104ES	3.0000 GHz	-7.83 dB

104ES Typical Isolation Plot

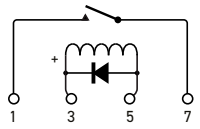
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 2.06 g



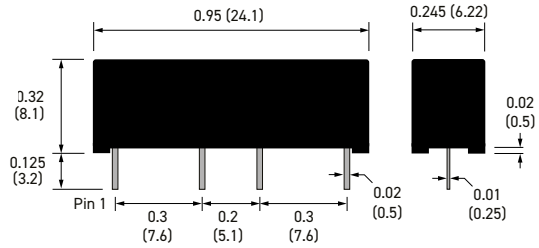
1 Form A



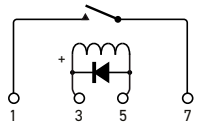
Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)

Package Type 2

Weight: Typical 2.06 g



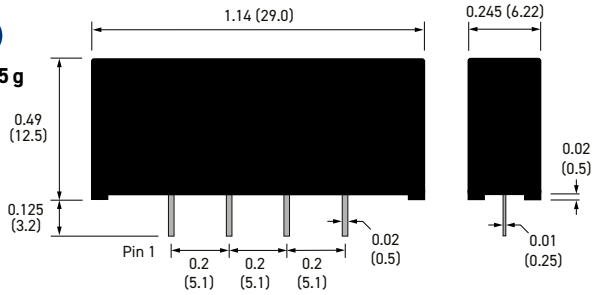
1 Form A



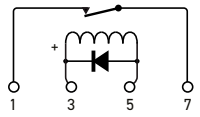
Switch No. 3 (3 kV stand-off)
Switch No. 4 (4 kV stand-off)
Additional Build Options:
Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)
Switch No. 5 (5 kV stand-off)

Package Type 3

Weight: Typical 3.75 g



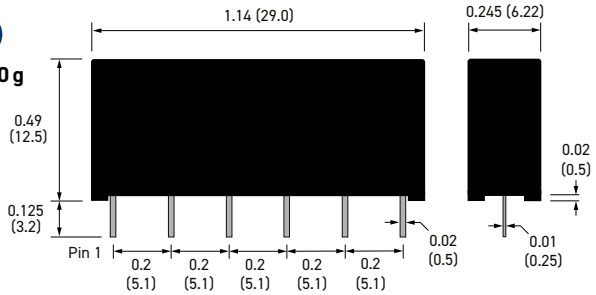
1 Form B (see Note)



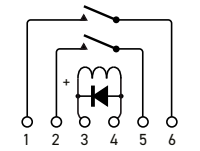
Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)

Package Type 4

Weight: Typical 3.70 g



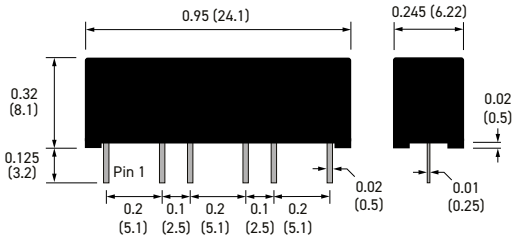
2 Form A



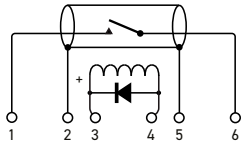
Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)

Package Type 5

Weight: Typical 1.94 g



1 Form A Coaxial



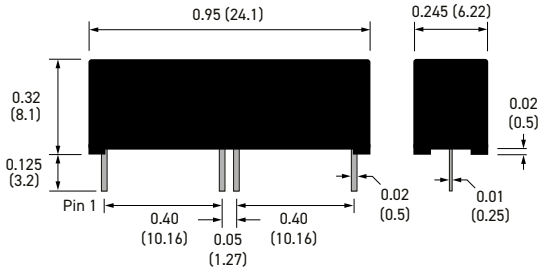
Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)
Switch No. 3 (3 kV stand-off)

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.

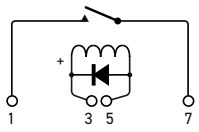
Pin Configuration, Weights and Dimensional Data Continued (dimensions in inches, millimeters in brackets)

Package Type 6

Weight: Typical 2.06 g



1 Form A



Switch No. 5 (5 kV stand-off)

Important: Where the optional internal diode is fitted, the correct coil polarity must be observed, as shown by the + symbol on the schematic.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Mercury Relays

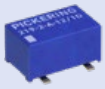
Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

Similar Relays Comparison

If the Series 104 is unsuitable for your application, Pickering also manufactures four other series of reed relays with similar characteristics, but in different package sizes.

Series Name		131-1-A	119-1-A			119-2-A	119-1-B		104-1-A & 104HT-1-A					104ES-1-A		
Physical Outline																
Depth	mm (inches)	3.7 (0.145)	3.7 (0.145)						6.3 (0.245)							
Width		12.5 (0.49)	15.1 (0.595)			20.1 (0.79)	15.1 (0.595)		24.1 (0.95)							
Height		6.6 (0.26)	6.6 (0.26)			8.9 (0.35)	8.9 (0.35)		8.2 (0.32)							
Package Volume (mm^3)		306	369		491	662	498		1 & 2 1245		2 1245		6 1245	5 1245		
Typical Weights (g)		0.58	0.67		0.74	1.06	0.89		2.06		2.06		2.06	1.94		
Contact Configuration		1-A (SPST)	1-A (SPST)			2-A (DPST)	1-B (SPNC)		1-A (SPST)					1-A (SPST)		
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (V)		1500	1500	2000	3000	1500	1500	2000	1500	2000	3000	4000	5000	1500	2000	3000
Switching Voltage (V)		1000	1000						1000		1000 (1500)			1000	1000	1000
Switching Current (A)		0.7	0.7						1		1			1	1	1
Carry Current (A)		1.25	1.25						1.5		1.5			1.5	1.5	1.5
Switch Power (W)		10	10						25		25 (3)			25	25	25

Series Name		104-1-B		104-2-A		100HV-1-A			100HV-1-B		100HV-2-A	
Physical Outline												
Depth	mm (inches)	6.3 (0.245)				10.2 (0.40)			10.2 (0.40)		10.2 (0.40)	
Width		29 (1.14)				24.1 (0.95)			29 (1.14)		29 (1.14)	
Height		12.5 (0.49)				12.7 (0.50)			15.2 (0.60)		15.2 (0.60)	
Package Volume (**mm**³)		❸ 2284		❹ 2284		3122		3122	4496		4496	
Typical Weights (**g**)		3.75		3.7		6.99			8.75		8.75	
Contact Configuration		1-B (SPNC)		2-A (DPST)		1-A (SPST)			1-B (SPNC)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	1500	2000	1500	2000	3000	1500	2000	1500	2000
Switching Voltage (**V**)		1000		1000		1000			1000		1000	
Switching Current (**A**)		1		1		1			1		1	
Carry Current (**A**)		1.5		1.5		1.5			1.5		1.5	
Switch Power (**W**)		25		25		25			25		25	

Series Name		219-1-A			219-2-A	219-1-B	
Physical Outline							
Depth	mm (inches)	10.5 (0.42) Body, 13.8 (0.55) Across Legs					
Width		17.2 (0.677)					
Height		8.5 (0.34)					
Package Volume (**mm**³)		1535			1535	1535	
Typical Weights (**g**)		2.12			2.39	2.19	
Contact Configuration		1-A (SPST)			2-A (DPST)	1-B (SPNC)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	1500	2000
Switching Voltage (**V**)		1000					
Switching Current (**A**)		0.7					
Carry Current (**A**)		1.25					
Switch Power (**W**)		10					

Reed Relay Selection Tool

Because Pickering offer the largest range of high-quality reed relays, sometimes it can be difficult to find the right reed relay you require. That is why we created the Reed Relay Selector, this tool will help you narrow down our offering to get you the correct reed relay for your application. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 104 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

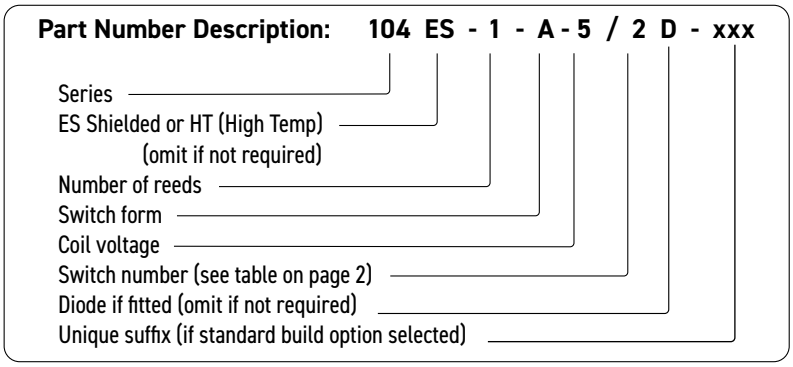
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging possibility	Operate or de-operate time
Equivalents to competitors discontinued parts	Pulse capability
	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

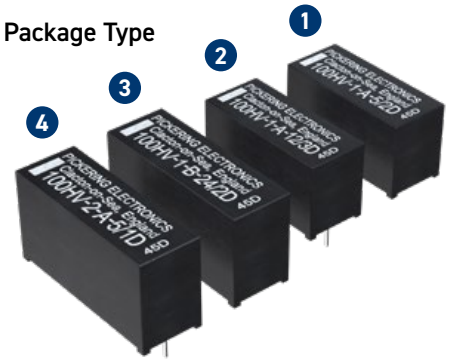
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Up to **3 kV** stand-off
- Stacking on **0.40 Inches** pitch
- High coil resistance for low power consumption
- Thermal EMF levels between 3 µV and 10 µV
- Internal mu-metal magnetic screen
- One or two switches in a single package
- **1 Form A**, **2 Form A** & **1 Form B** configurations
- **5 V**, **12 V** or **24 V** coils with optional internal diode
- Ideal for transformer or cable testing
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

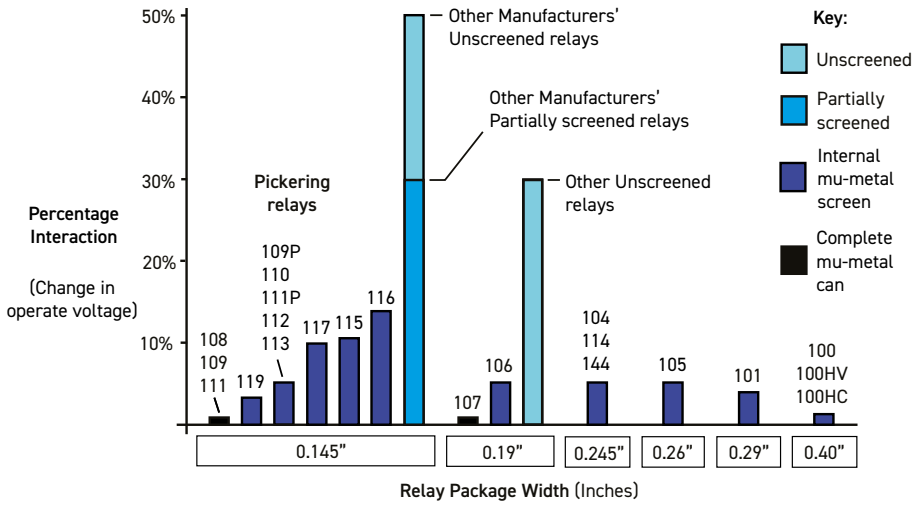


The Series 100HV have the same High Voltage specifications as the Pickering Series 104 but with over double the coil resistance. They are ideal for such applications as transformer or cable testing or any other automatic test equipment where high voltages are involved and low coil power consumption is required.

Where mains voltage are switched, for example to control and isolate S.C.R. or triac gates, they are an ideal choice. And in mixed signal applications the lower coil power reduces the Thermal EMF voltages generated across the switch. 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 1.5, 2 or 3 kV DC. The 3 kV 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.

Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	2 Form A (energize to make)
1500 VDC min stand-off 1000 VDC switching at 25 W	1500 VDC min stand-off 1000 VDC switching at 25 W	1500 VDC min stand-off 1000 VDC switching at 25 W
2000 VDC. min stand-off 1000 VDC switching at 25 W	2000 VDC min stand-off 1000 VDC. switching at 25 W	2000 VDC. min stand-off 1000 VDC. switching at 25 W
3000 VDC min stand-off 1000 VDC switching at 25 W	-	-

Dry Reed: Series 100HV switch ratings - contact ratings for each switch type

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])	Operate time inc bounce (max)	Release time	Special features
1	A or B	25 W	1.0 A	1.5 A	1000	1500	10^8	2.0 ms	1.0 ms	High voltage
2	A or B	25 W	1.0 A	1.5 A	1000	2000	10^8	2.0 ms	1.0 ms	High voltage
3	A	25 W	1.0 A	1.5 A	1000	3000	10^8	2.0 ms	1.0 ms	High voltage

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 100HV Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 (1.5 kV) Package Type 1	100HV-1-A-5/1D	5	2200 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	100HV-1-A-12/1D	12	6800 Ω					
	100HV-1-A-24/1D	24	6800 Ω					
1 Form A, Switch No. 2 (2 kV) Package Type 1	100HV-1-A-5/2D	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	100HV-1-A-12/2D	12	3300 Ω					
	100HV-1-A-24/2D	24	6800 Ω					
1 Form A, Switch No. 3 (3 kV) Package Type 2	100HV-1-A-5/3D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	100HV-1-A-12/3D	12	2000 Ω					
	100HV-1-A-24/3D	24	6800 Ω					
1 Form B, Switch No. 1 (1.5 kV) Package Type 3	100HV-1-B-5/1D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	100HV-1-B-12/1D	12	2500 Ω					
	100HV-1-B-24/1D	24	6000 Ω					
1 Form B, Switch No. 2 (2 kV) Package Type 3	100HV-1-B-5/2D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	100HV-1-B-12/2D	12	2000 Ω					
	100HV-1-B-24/2D	24	4000 Ω					
2 Form A, Switch No. 1 (1.5 kV) Package Type 4	100HV-2-A-5/1D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	100HV-2-A-12/1D	12	2500 Ω					
	100HV-2-A-24/1D	24	6000 Ω					
2 Form A, Switch No. 2 (2 kV) Package Type 4	100HV-2-A-5/2D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	100HV-2-A-12/2D	12	2000 Ω					
	100HV-2-A-24/2D	24	4000 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

Note[4]: Insulation resistance

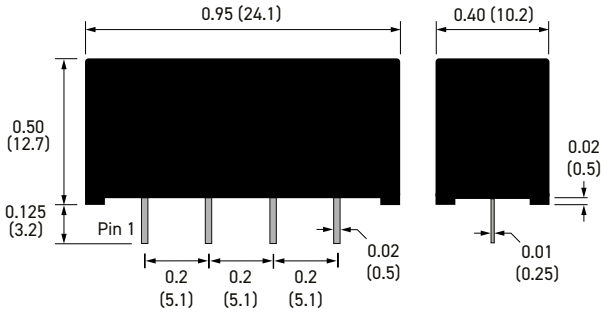
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

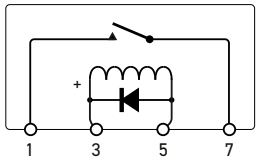
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 6.99 g



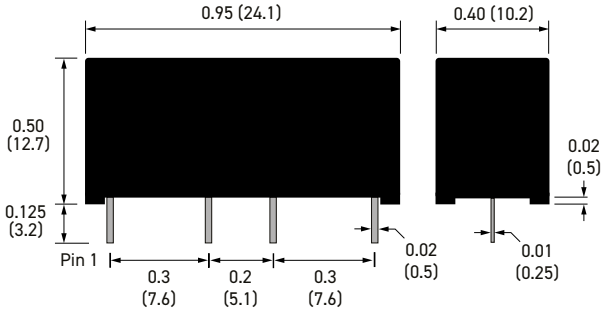
1 Form A



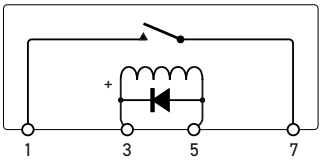
Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)

Package Type 2

Weight: Typical 6.99 g



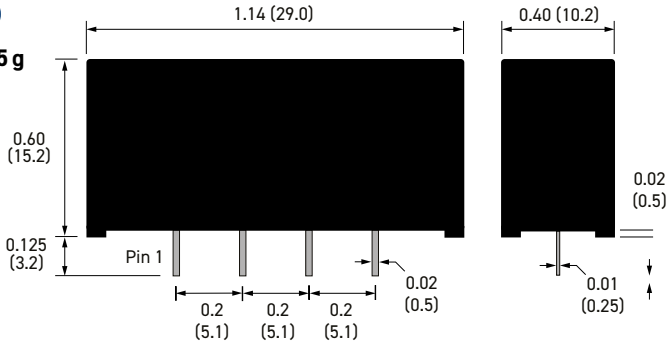
1 Form A



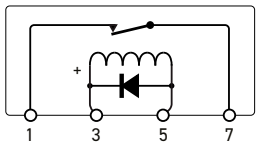
Switch No. 3 (3 kV stand-off)

Package Type 3

Weight: Typical 8.75 g



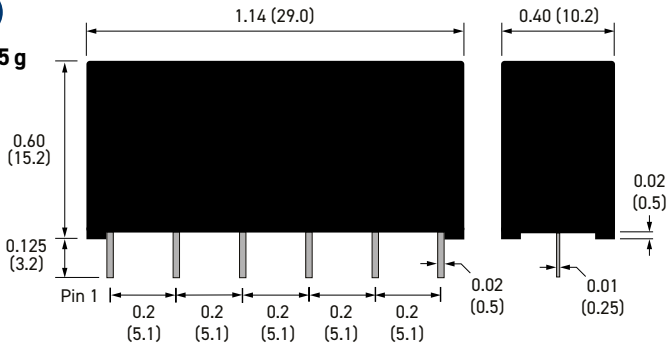
1 Form B (see Note)



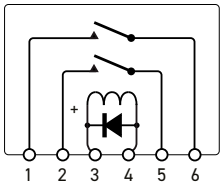
Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)

Package Type 4

Weight: Typical 8.75 g



2 Form A

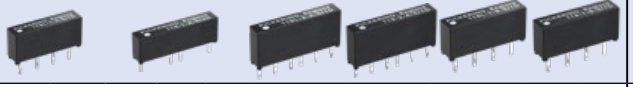


Switch No. 1 (1.5 kV stand-off)
Switch No. 2 (2 kV stand-off)

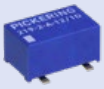
Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Similar Relays Comparison

If the Series 100HV is unsuitable for your application, Pickering also manufactures four other series of reed relays with similar characteristics, but in different package sizes.

Series Name		131L-1-A	131-1-A	119L-1-A	119-1-A			119L-2-A	119-2-A	119L-1-B	119-1-B		104-1-A & 104HT-1-A				
Physical Outline																	
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)									6.3 (0.245)				
Width		12.5 (0.49)		15.1 (0.595)				20.1 (0.79)		15.1 (0.595)			24.1 (0.95)				
Height		6.6 (0.26)		6.6 (0.26)				8.9 (0.35)					8.2 (0.32)				
Package Volume (**mm³**)		306		369	369	369	369	491	662	662	498	498	498	1245			1245
Typical Weights (**g**)		0.58		0.67				0.74	1.06		0.89			2.06			2.06
Contact Configuration		1-A (SPST)		1-A (SPST)					2-A (DPST)		1-B (SPNC)		1-A (SPST)				
Reed Switch Type		Dry Low Level	Dry	Dry Low Level	Dry Low Level	Dry	Dry	Dry	Dry Low Level	Dry	Dry Low Level	Dry	Dry	Dry	Mercury Wetted	Dry	Dry
Stand-off Voltage (**V**)		1000	1500	1000	1500	1500	2000	3000	1000	1500	1000	1500	2000	1500	2000	1500	3000	4000
Switching Voltage (**V**)		1000		1000										1000		500	1000	
Switching Current (**A**)		0.7		0.7										1		2	1	
Carry Current (**A**)		1.25		1.25										1.5		3	1.5	
Switch Power (**W**)		10		10										25		50	25	

Series Name		104ES-1-A			104-1-B		104-2-A			100HV-1-A			100HV-1-B		100HV-2-A	
Physical Outline																
Depth	mm (inches)	6.3 (0.245)								10.2 (0.40)			10.2 (0.40)		10.2 (0.40)	
Width		24.1 (0.95)			29 (1.14)					24.1 (0.95)			29 (1.14)		29 (1.14)	
Height		8.2 (0.32)			12.5 (0.49)					12.7 (0.50)			15.2 (0.60)		15.2 (0.60)	
Package Volume (**mm³**)		1245			2284					❶ 3122		❷ 3122	❸ 4496		❹ 4496	
Typical Weights (**g**)		1.94			3.75		3.7			6.99			8.75		8.75	
Contact Configuration		1-A (SPST)s			1-B (SPNC)		2-A (DPST)			1-A (SPST)			1-B (SPNC)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	2000	1500	2000	1500	1500	2000	3000	1500	2000	1500	2000
Switching Voltage (**V**)		1000	1000	1000	1000		1000		500	1000			1000		1000	
Switching Current (**A**)		1	1	1	1		1		2	1			1		1	
Carry Current (**A**)		1.5	1.5	1.5	1.5		1.5		3	1.5			1.5		1.5	
Switch Power (**W**)		25	25	25	25		25		50	25			25		25	

Series Name		219-1-A			219-2-A	219-1-B	
Physical Outline							
Depth	**mm (inches)**	10.5 (0.42) Body, 13.8 (0.55) Across Legs					
Width		17.2 (0.677)					
Height		8.5 (0.34)					
Package Volume (**mm³**)		1535			1535	1535	
Typical Weights (**g**)		2.12			2.39	2.19	
Contact Configuration		1-A (SPST)			2-A (DPST)	1-B (SPNC)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	1500	2000
Switching Voltage (**V**)		1000					
Switching Current (**A**)		0.7					
Carry Current (**A**)		1.25					
Switch Power (**W**)		10					

Reed Relay Selection Tool

Because Pickering offer the largest range of high-quality reed relays, sometimes it can be difficult to find the right reed relay you require. That is why we created the Reed Relay Selector, this tool will help you narrow down our offering to get you the correct reed relay for your application. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 100HV Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

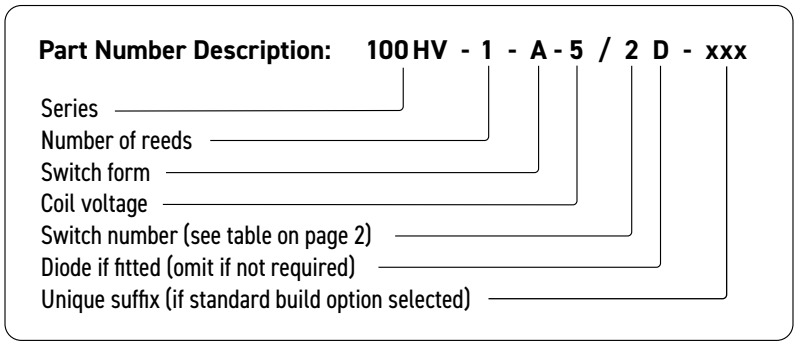
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging possibility	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

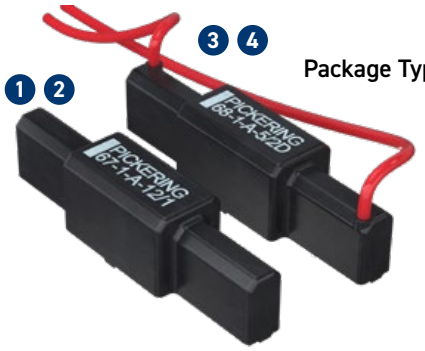
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- **Series 67** - pcb connections to switch and coil. The highest power switch in the Pickering portfolio - **Up to 200 W at 6 kV**
- **Series 68** - pcb connections to coil and flying leads to the switch which keeps the high voltage away from the pcb - **Up to 200 W at 6 kV**
- Small size
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Optional electrostatic screen NEW
- Up to **10 kV** stand-off
- Tungsten plated contacts ensure a long and reliable life
- **5**, **12**, and **24 V** coils with optional internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- **1 Form A** and **1 Form C** configurations



Package Type

Note: Package Types 1 & 2 and 3 & 4 have the same body style yet different pin positions

The Series 67 and 68 ranges of high voltage reed relays have similar specifications to the established Series 60/65 and 62/63 but are constructed using a leadframe in a Single-in-Line format and feature former-less coils which enables a smaller package than is usual for this type of device.

There is also an option for an electrostatic shield between the switch and the coil to help minimise noise between the coil drive and high voltage circuits.

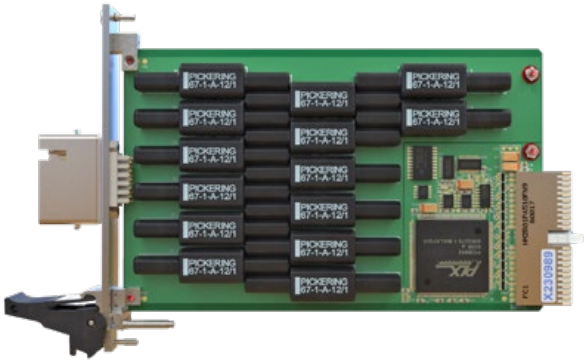
The unusual package style allows some interesting stacking possibilities (see image below) when used to construct high density multiplexers or matrices.

Other voltages can be supplied to special order as can variations in the lead length of the Series 68 type.

Switch Ratings

1 Form A (energize to make)	1 Form C (changeover)
Stand-off 5 kV, switching up to 3.5 kV Stand-off 8 kV, switching up to 6 kV Stand-off 10 kV, switching up to 7.5 kV	Stand-off 5 kV, switching up to 2.5 kV

Relay Packing on PCB



Example of Series 67 Packing Possibility

Series 67, 68 switch ratings - contact ratings for each switch type

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[2])	Operate time inc bounce (max)	Release time
1	A	50 W	3 A	3.5 A	3500 (Note[1])	5000	10^8	3 ms	2 ms
2	A	50 W	3 A	3.5 A	7500 (Note[1])	10000	10^8	3 ms	2 ms
4	A	200 W	3 A	5 A	6000 (Note[1])	8000	10^8	6 ms	2 ms
5 (Series 67 only)	C	100 W	3 A	3.2 A	2500 (Note[1])	5000	10^8	6 ms	6 ms

Note[1]: Switching Voltage

This high voltage rating is for **RESISTIVE loads only**. At these high voltages, even stray capacitance can generate very high current pulses, which can damage the contact plating causing welding of the reed switch. If there is capacitance in circuit, provision should be made to limit the surge, to within the current and power ratings of the relay.

Note[2]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1 Ω, switching low loads with a current less than 1 mA, or when 'cold' switching, typical life is expected to be greater than 1 x 10^8 ops. At higher voltages up to a maximum 50 W resistive load, typical life is 1 x 10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Series 67 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[5])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (5 kV) Package Type 1	67-1-A-5/1D	5	40 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	67-1-A-12/1D	12	150 Ω					
	67-1-A-24/1D	24	600 Ω					
1 Form A (ES Shielded) Switch No. 1 (5 kV) Package Type 2	67ES-1-A-5/1D	5	15 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	67ES-1-A-12/1D	12	100 Ω					
	67ES-1-A-24/1D	24	200 Ω					
1 Form A Switch No. 2 (10 kV) Package Type 1	67-1-A-5/2D	5	40 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	67-1-A-12/2D	12	150 Ω					
	67-1-A-24/2D	24	600 Ω					
1 Form A Switch No. 4 (200 W, 8 kV) Package Type 1	67-1-A-5/4D	5	40 Ω	0.5 Ω	10^{10} Ω	10^{10} Ω	3 pF	0.15 pF
	67-1-A-12/4D	12	150 Ω					
	67-1-A-24/4D	24	600 Ω					
1 Form C Switch No. 5 (5 kV) Package Type 2	67-1-C-5/5D	5	40 Ω	0.5 Ω	10^{10} Ω	10^{10} Ω	See Note[4]	See Note[4]
	67-1-C-12/5D	12	150 Ω					
	67-1-C-24/5D	24	600 Ω					

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

Note[3]: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

Note[4]: Capacitance values

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

Note[5]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

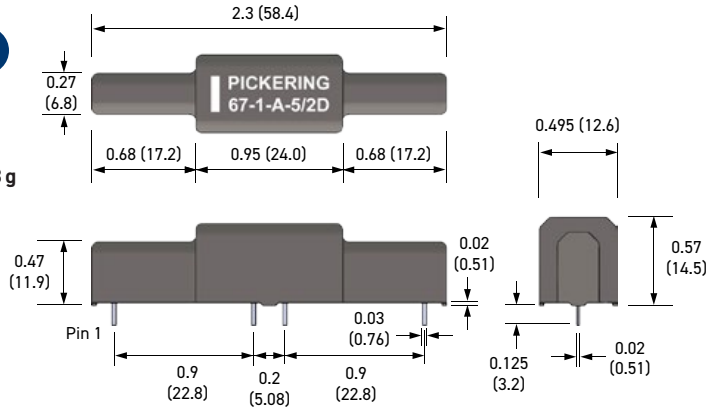
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

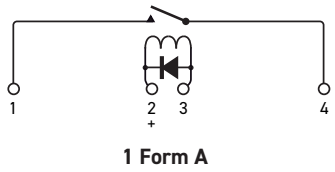
Package Type 1

Series 67

1 Form A

Weight: Typical 14.53 g





1 Form A

Package Type 2

Series 67

1 Form C

Weight: Typical 13.58 g

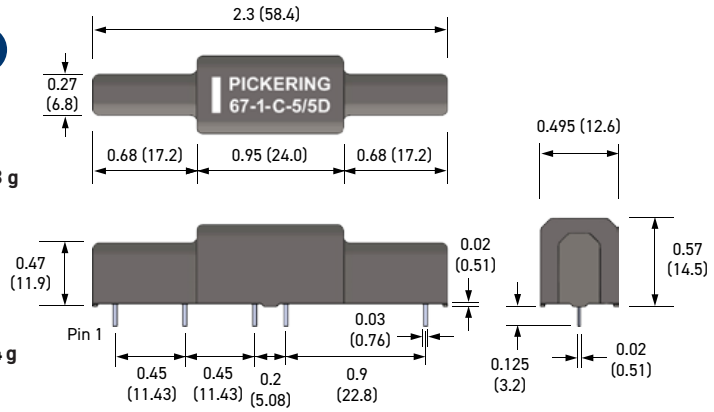
and

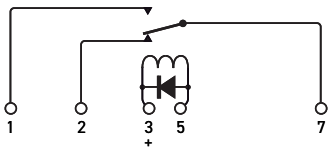
Series 67ES

1 Form A

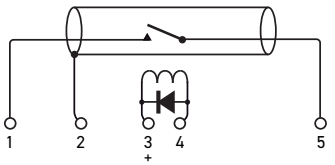
(ES Shielded)

Weight: Typical 12.64 g





1 Form C



1 Form A (ES Shielded)

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.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Series 68 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[7])		Capacitance (typical) (see Note[6])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (5 kV) Package Type 3	68-1-A-5/1D	5	40 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	68-1-A-12/1D	12	150 Ω					
	68-1-A-24/1D	24	600 Ω					
1 Form A (ES Shielded) Switch No. 1 (5 kV) Package Type 4	68ES-1-A-5/1D	5	15 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	68ES-1-A-12/1D	12	100 Ω					
	68ES-1-A-24/1D	24	200 Ω					
1 Form A Switch No. 2 (10 kV) Package Type 3	68-1-A-5/2D	5	40 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	68-1-A-12/2D	12	150 Ω					
	68-1-A-24/2D	24	600 Ω					
1 Form A (ES Shielded) Switch No. 2 (10 kV) Package Type 4	68ES-1-A-5/2D	5	15 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	68ES-1-A-12/2D	12	100 Ω					
	68ES-1-A-24/2D	24	200 Ω					
1 Form A Switch No. 4 (200 W, 8 kV) Package Type 3	68-1-A-5/4D	5	40 Ω	0.5 Ω	10^{10} Ω	10^{10} Ω	3 pF	0.15 pF
	68-1-A-12/4D	12	150 Ω					
	68-1-A-24/4D	24	600 Ω					

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

Note[6]: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

Note[7]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here,** or **contact Pickering** for more in depth guidance.

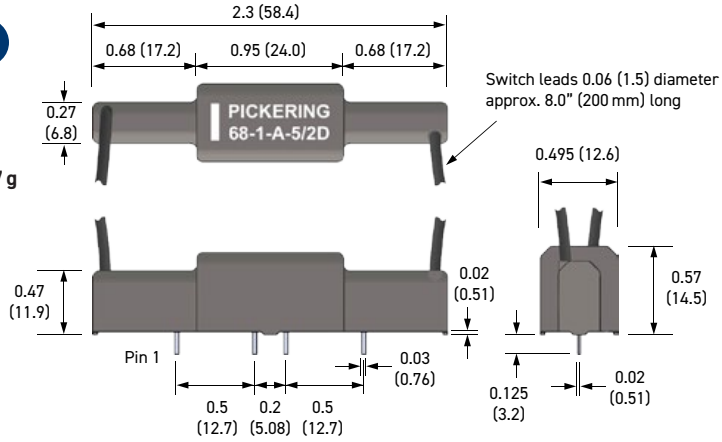
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

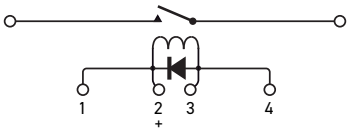
Package Type 3

Series 68

1 Form A

Weight: Typical 16.47 g





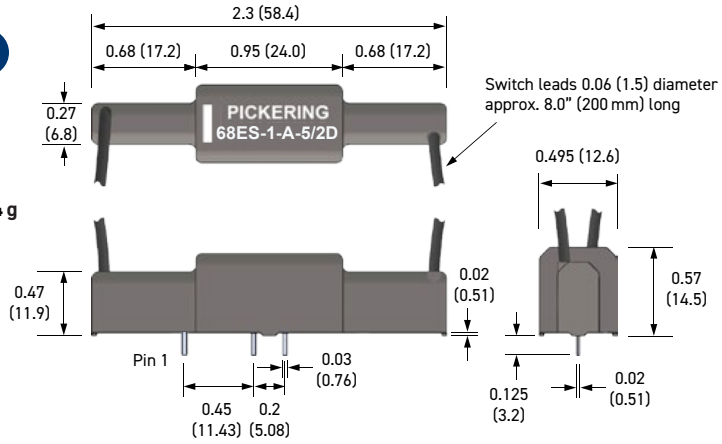
1 Form A

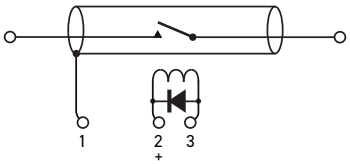
Package Type 4

Series 68ES

1 Form A
(ES Shielded)

Weight: Typical 12.64 g





1 Form A (ES Shielded)

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

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Similar Relays Comparison

If the Series 67 and 68 are unsuitable for your application, Pickering also manufactures four other series of reed relays with similar characteristics, but in different package sizes.

Series Name		60-1-A			60-1-B		65-1-A		65-1-B		67-1-A			67-1-C	67ES-1-A
Physical Outline															
Depth	mm (inches)	16.0 (0.63)					16.0 (0.63)				12.6 (0.495)				
Width		57.9 (2.28)					57.9 (2.28)				58.4 (2.3)				
Height		18.0 (0.71)					18.0 (0.71)				14.5 (0.57)				
Package Volume (mm^3)		16676					16676				❶ 9543			❷ 9543	❷ 9543
Typical Weights (**g**)		28.43			31.83		23.99		31.65		14.53			13.58	12.64
Contact Configuration		1-A (SPST)			1-B (SPNC)		1-A (SPST)		1-B (SPNC)		1-A (SPST)			1-C (SPDT)	1-A (SPST)
Reed Switch Type		Dry			Dry		Dry		Dry		Dry			Dry	Dry
Stand-off Voltage (**V**)		5000	10000	15000	5000	10000	5000	10000	5000	10000	5000	8000	10000	5000	5000
Switching Voltage (**V**)		3500	7500	12500	3500	7500	3500	7500	3500	7500	3500	6000	7500	2500	3500
Switching Current (**A**)		3					3				3			3	3
Carry Current (**A**)		3.5					3.5				3.5	5	3.5	3.2	3.5
Switch Power (**W**)		50					50				50	200	50	100	50

Series Name		68-1-A			68ES-1-A		62-1-A		62-1-B		63-1-A				63-1-B		
Physical Outline																	
Depth	mm (inches)	12.6 (0.495)			12.6 (0.495)		19.05 (0.75)				19.05 (0.75)						
Width		58.4 (2.3)			58.4 (2.3)		63.5 (2.5)				63.5 (2.5)						
Height		14.5 (0.57)			14.5 (0.57)		21.3 (0.84)				21.3 (0.84)						
Package Volume (mm^3)		❸ 9543			❹ 9543		❶ 25767				❷ 25767						
Typical Weights (**g**)		16.47			12.64		44.16		44.69)		45.47				44.69		
Contact Configuration		1-A (SPST)			1-A (SPST)		1-A (SPST)		1-B (SPNC)		1-A (SPST)				1-B (SPNC)		
Reed Switch Type		Dry			Dry		Dry		Dry		Dry				Dry		
Stand-off Voltage (**V**)		5000	8000	10000	5000	10000	5000	10000	5000	10000	5000	10000	15000	20000	5000	10000	20000
Switching Voltage (**V**)		3500	6000	7500	3500	7500	3500	7500	3500	7500	3500	7500	12500	12500	3500	7500	12500
Switching Current (**A**)		3			3		3				3						
Carry Current (**A**)		3.5	5	3.5	3.5		3.5				3.5						
Switch Power (**W**)		50	200	50	50		50				50						

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 67 and 68 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

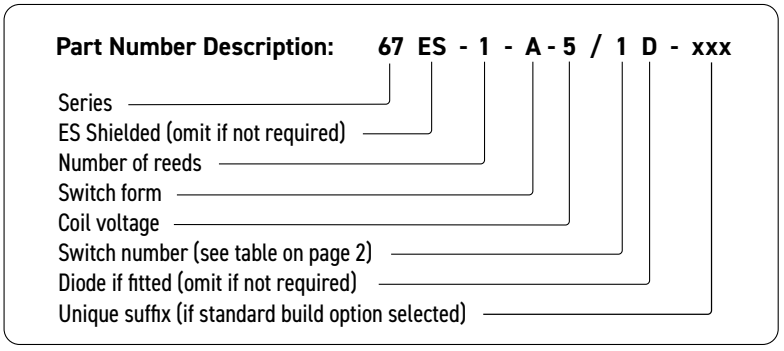
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging	Operate or de-operate time
Equivalents to competitors discontinued parts	Pulse capability
	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

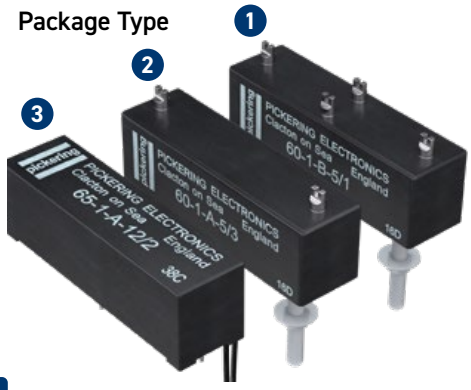
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- **Series 60** - chassis mounting with solder connections on the top face
- **Series 65** - printed circuit mounting
- Up to **15 kV** stand-off, **12.5 kV** switching at **50 W** maximum
- **5**, **12** and **24 V** coils
- Tungsten plated contacts ensure a long and reliable life
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



The Series 60 and 65 ranges of high voltage reed relays have been manufactured for many years and remain popular due to their small size and ease of use.

Both Form A (energize to make) and Form B (energize to break) configurations are available and with appropriate control circuitry to ensure break before make for operate and release, it is usually possible to achieve a Form C (change-over) function by using the Form A and a Form B type together. However, a 1 Form C, up to 5 kV, is available within the Series 67 range.

Form B types are magnetically biased and should not be mounted directly onto ferrous metal chassis or less than 1.5 inches (38 mm) away from other relays as the coil operating voltage characteristics will be altered due to magnetic interaction. The coils of Form B relays are polarity sensitive, the positive connection is identified by a red spot.

Form A types can be mounted on ferrous chassis but a space of 1 inch (25 mm) should be allowed between adjacent relays.

If similar relays with "push-on" connectors are preferred, please look at our Series 62 and Series 63.

Switch Ratings

1 Form A (energize to make)	1 Form B (energize to break)
Stand-off 5 kV, switching up to 3.5 kV Stand-off 10 kV, switching up to 7.5 kV Stand-off 15 kV, switching up to 12.5 kV	Stand-off 5 kV, switching up to 3.5 kV Stand-off 10 kV, switching up to 7.5 kV

Series 60, 65 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Max. stand-off volts	Life expectancy ops typical (see Note[2])	Operate time inc bounce (max)	Release time
1	A or B	50 W	3 A	3.5 A	3500 (Note[1])	5000	10^8	3 ms	2 ms
2	A or B	50 W	3 A	3.5 A	7500 (Note[1])	10000	10^8	3 ms	2 ms
3	A	50 W	3 A	3.5 A	12500 (Note[1])	15000	10^8	3 ms	2 ms

Note[1]: Switching Voltage

This high voltage rating is for **RESISTIVE loads only**. At these high voltages, even stray capacitance can generate very high current pulses, which can damage the contact plating causing welding of the reed switch. If there is capacitance in circuit, provision should be made to limit the surge, to within the current and power ratings of the relay.

Note[2]: Life Expectancy

Relay life depends upon switch load and the end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads with a current less than 1 mA, or when 'cold' switching, typical life is expected to be greater than 1×10^8 ops. At higher voltages up to a maximum 50 W resistive load, typical life is 1×10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Series 60 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (5 kV) Package Type 1	60-1-A-5/1	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	60-1-A-12/1	12	150 Ω					
	60-1-A-24/1	24	500 Ω					
1 Form A Switch No. 2 (10 kV) Package Type 1	60-1-A-5/2	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	60-1-A-12/2	12	150 Ω					
	60-1-A-24/2	24	500 Ω					
1 Form A Switch No. 3 (15 kV) Package Type 2	60-1-A-5/3	5	15 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	60-1-A-12/3	12	50 Ω					
	60-1-A-24/3	24	200 Ω					
1 Form B Switch No. 1 (5 kV) Package Type 1	60-1-B-5/1	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	60-1-B-12/1	12	150 Ω					
	60-1-B-24/1	24	500 Ω					
1 Form B Switch No. 2 (10 kV) Package Type 1	60-1-B-5/2	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	60-1-B-12/2	12	150 Ω					
	60-1-B-24/2	24	500 Ω					

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Series 65 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (5 kV) Package Type 3	65-1-A-5/1	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	65-1-A-12/1	12	150 Ω					
	65-1-A-24/1	24	500 Ω					
1 Form A Switch No. 2 (10 kV) Package Type 3	65-1-A-5/2	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	65-1-A-12/2	12	150 Ω					
	65-1-A-24/2	24	500 Ω					
1 Form B Switch No. 1 (5 kV) Package Type 3	65-1-B-5/1	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	65-1-B-12/1	12	150 Ω					
	65-1-B-24/1	24	500 Ω					
1 Form B Switch No. 2 (10 kV) Package Type 3	65-1-B-5/2	5	35 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	65-1-B-12/2	12	150 Ω					
	65-1-B-24/2	24	500 Ω					

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

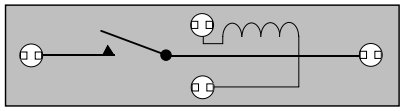
For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

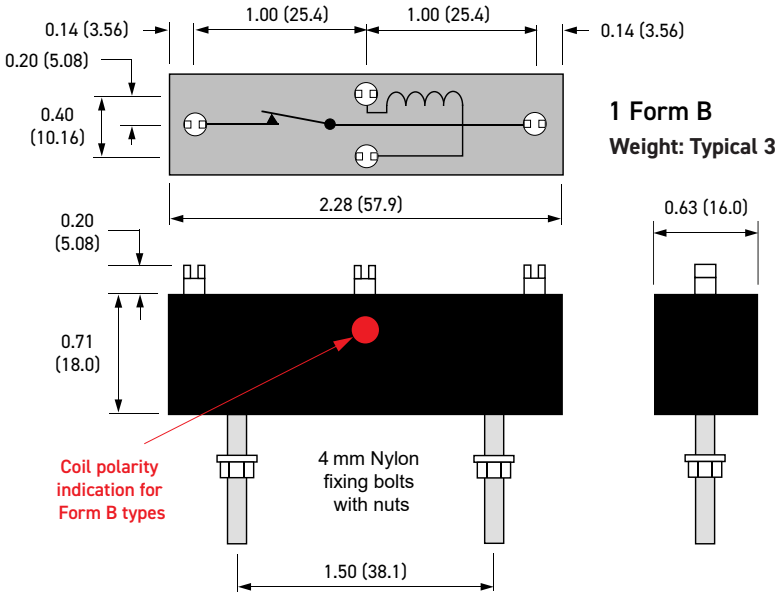
Series 60: Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Sw. No.1 - 5 kV
Sw. No.2 - 10 kV



1 Form A
Weight: Typical 28.43 g

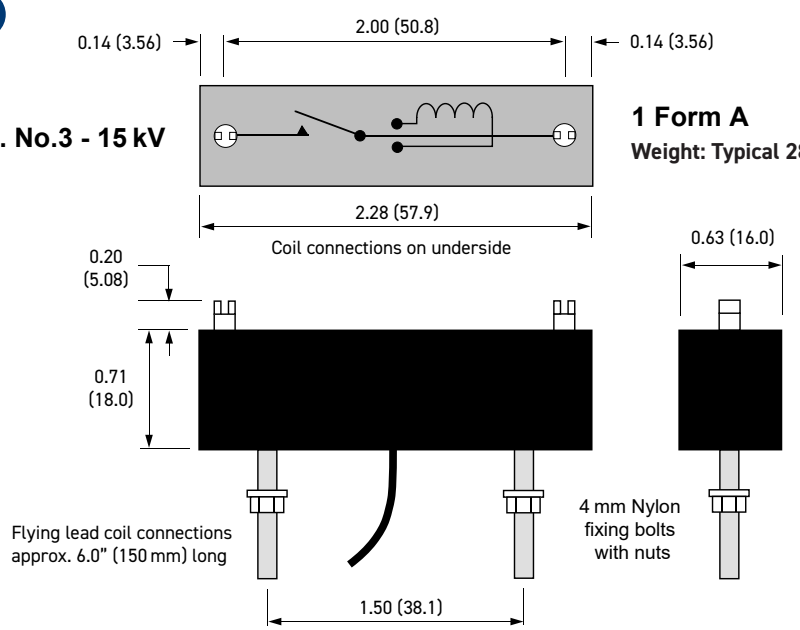


1 Form B
Weight: Typical 31.83 g

Package Type 2

Sw. No.3 - 15 kV

1 Form A
Weight: Typical 28.43 g



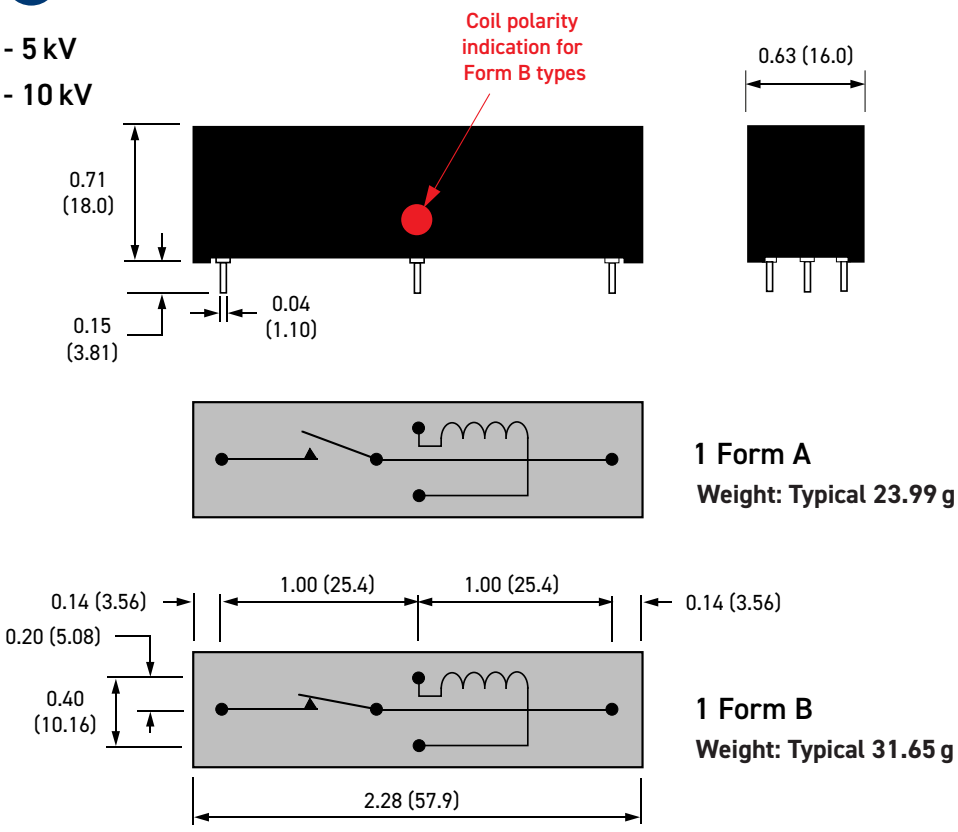
Important: For all Form B types, the correct coil polarity must be observed. The positive connection is shown by the red spot on the package.

Series 65: Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **3**

Sw. No.1 - 5 kV

Sw. No.2 - 10 kV



1 Form A

Weight: Typical 23.99 g

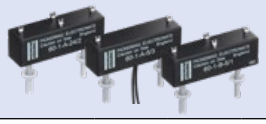
1 Form B

Weight: Typical 31.65 g

Important: For all Form B types, the correct coil polarity must be observed. The positive connection is shown by the red spot on the package.

Similar Relays Comparison

If the Series 60 and 65 are unsuitable for your application, Pickering also manufactures four other series of reed relays with similar characteristics, but in different package sizes.

Series Name		60-1-A			60-1-B		65-1-A		65-1-B		67-1-A			67-1-C	68-1-A	
Physical Outline																
Depth	mm (inches)	16.0 (0.63)					16.0 (0.63)				12.6 (0.495)					
Width		57.9 (2.28)					57.9 (2.28)				58.4 (2.3)					
Height		18.0 (0.71)					18.0 (0.71)				14.5 (0.57)					
Package Volume (mm^3)		❶ 16676		❷ 16676	❶ 16676		❸ 16676				9543			9543	9543	
Typical Weights (**g**)		28.43			31.83		23.99		31.65		14.53			13.58	16.47	
Contact Configuration		1-A (SPST)			1-B (SPNC)		1-A (SPST)		1-B (SPNC)		1-A (SPST)			1-C (SPDT)	1-A (SPST)	
Reed Switch Type		Dry			Dry		Dry		Dry		Dry			Dry	Dry	
Stand-off Voltage (**V**)		5000	10000	15000	5000	10000	5000	10000	5000	10000	5000	8000	10000	5000	5000	10000
Switching Voltage (**V**)		3500	7500	12500	3500	7500	3500	7500	3500	7500	3500	6000	7500	2500	3500	7500
Switching Current (**A**)		3					3				3			3	3	
Carry Current (**A**)		3.5					3.5				3.5	5	3.5	3.2	3.5	
Switch Power (**W**)		50					50				50	200	50	100	50	

Series Name		62-1-A		62-1-B		63-1-A				63-1-B		
Physical Outline												
Depth	mm (inches)	19.05 (0.75)				19.05 (0.75)						
Width		63.5 (2.5)				63.5 (2.5)						
Height		21.3 (0.84)				21.3 (0.84)						
Package Volume (mm^3)		❶ 25767				❷ 25767						
Typical Weights (**g**)		44.16		44.69)		45.47				44.69		
Contact Configuration		1-A (SPST)		1-B (SPNC)		1-A (SPST)				1-B (SPNC)		
Reed Switch Type		Dry		Dry		Dry				Dry		
Stand-off Voltage (**V**)		5000	10000	5000	10000	5000	10000	15000	20000	5000	10000	20000
Switching Voltage (**V**)		3500	7500	3500	7500	3500	7500	12500	12500	3500	7500	12500
Switching Current (**A**)		3				3						
Carry Current (**A**)		3.5				3.5						
Switch Power (**W**)		50				50						

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 60 and 65 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging	Operate or de-operate time
Equivalents to competitors discontinued parts	Pulse capability
	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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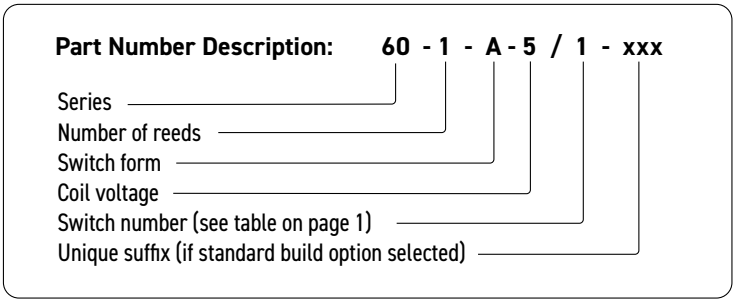

Help

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- **Series 62** - chassis mounting with push-on HV connections on the top face
- **Series 63** - printed circuit mounting with push-on HV connections on the top face
- Up to **20 kV** stand-off, **12.5 kV** switching at **50 W** maximum
- **5**, **12**, and **24 V** coils
- Tungsten plated contacts ensure a long and reliable life
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

Package Type 1 2

The Series 62 and 63 ranges of high voltage reed relays feature push-on terminals and are supplied complete with the appropriate connectors and insulating boots.

Form A (energize to make) and Form B (energize to break) configurations are available with appropriate control circuitry to ensure break before make for operate and release. It is usually possible to achieve a Form C (change-over) function by using Form A and Form B types together. However, a 1 Form C, up to 5 kV, is available within the Series 67 range.

These relays feature internal mu-metal magnetic screens which permits Form A (energize to make) versions to be mounted side by side. Special versions can be manufactured with an electrostatic screen and/or earth connection to the magnetic screen where EMC problems may be encountered. Please contact our technical sales office for more information and advice.

Form B types are magnetically biased and should not be mounted directly onto ferrous metal chassis or less than 1 inch (25 mm) away from other relays as the coil operating voltage characteristics will be altered due to magnetic interaction. The coils of Form B relays are polarity sensitive, the positive connection is identified by a red spot.

Switch Ratings

1 Form A (energize to make)	1 Form B (energize to break)
Stand-off 5 kV, switching up to 3.5 kV Stand-off 10 kV, switching up to 7.5 kV Stand-off 15 kV, switching up to 12.5 kV Stand-off 20 kV, switching up to 12.5 kV	Stand-off 5 kV, switching up to 3.5 kV Stand-off 10 kV, switching up to 7.5 kV Stand-off 20 kV, switching up to 12.5 kV

Series 62, 63 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Max. stand-off volts	Life expectancy ops typical (see Note[2])	Operate time inc bounce (max)	Release time
1	A or B	50 W	3 A	3.5 A	3500 (Note[1])	5000	10^8	3 ms	2 ms
2	A or B	50 W	3 A	3.5 A	7500 (Note[1])	10000	10^8	3 ms	2 ms
3	A	50 W	3 A	3.5 A	12500 (Note[1])	15000	10^8	3 ms	2 ms
4	A or B	50 W	3 A	3.5 A	12500 (Note[1])	20000	10^8	3 ms	2 ms

Note[1]: Switching Voltage
Voltage rating is for **RESISTIVE loads only**. At higher voltages stray capacitance can generate large current pulses, potentially damaging the contact plating and causing switch welding. Capacitive circuits require provision to limit the surge to within the current and power ratings of the relay.

Note[2]: Life Expectancy
Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads with a current less than 1mA, or when 'cold' switching, typical life is expected to be greater than 1×10^8 ops. At higher voltages up to a maximum 50 W resistive load, typical life is 1×10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Series 62 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (5 kV) Package Type 1	62-1-A-5/1	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	62-1-A-12/1	12	150 Ω					
	62-1-A-24/1	24	500 Ω					
1 Form A Switch No. 2 (10 kV) Package Type 1	62-1-A-5/2	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	62-1-A-12/2	12	150 Ω					
	62-1-A-24/2	24	500 Ω					
1 Form B Switch No. 1 (5 kV) Package Type 1	62-1-B-5/1	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	62-1-B-12/1	12	150 Ω					
	62-1-B-24/1	24	500 Ω					
1 Form B Switch No. 2 (10 kV) Package Type 1	62-1-B-5/2	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	62-1-B-12/2	12	150 Ω					
	62-1-B-24/2	24	500 Ω					

Note[3]: Capacitance across open switch
Capacitance across open switch measured with other connections guarded.

Note[4]: Insulation resistance
Insulation resistance reduced at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for guidance.

Series 63 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (5 kV) Package Type 2	63-1-A-5/1	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	63-1-A-12/1	12	150 Ω					
	63-1-A-24/1	24	500 Ω					
1 Form A Switch No. 2 (10 kV) Package Type 2	63-1-A-5/2	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	63-1-A-12/2	12	150 Ω					
	63-1-A-24/2	24	500 Ω					
1 Form A Switch No. 3 (15 kV) Package Type 2	63-1-A-5/3	5	25 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	63-1-A-12/3	12	75 Ω					
	63-1-A-24/3	24	350 Ω					
1 Form A Switch No. 4 (20 kV) Package Type 2	63-1-A-24/4	24	350 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
1 Form B Switch No. 1 (5 kV) Package Type 2	63-1-B-5/1	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	63-1-B-12/1	12	150 Ω					
	63-1-B-24/1	24	500 Ω					
1 Form B Switch No. 2 (10 kV) Package Type 2	63-1-B-5/2	5	50 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF
	63-1-B-12/2	12	150 Ω					
	63-1-B-24/2	24	500 Ω					
1 Form B Switch No. 4 (20 kV) Package Type 2	63-1-B-24/4	24	200 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.15 pF

Note[3]: Capacitance across open switch
Capacitance across open switch measured with other connections guarded.

Note[4]: Insulation resistance
Insulation resistance reduced at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

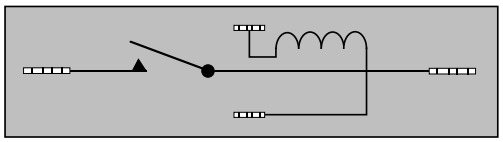
For different values, latest specifications and product details, please contact your local Pickering sales office.

Series 62: Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

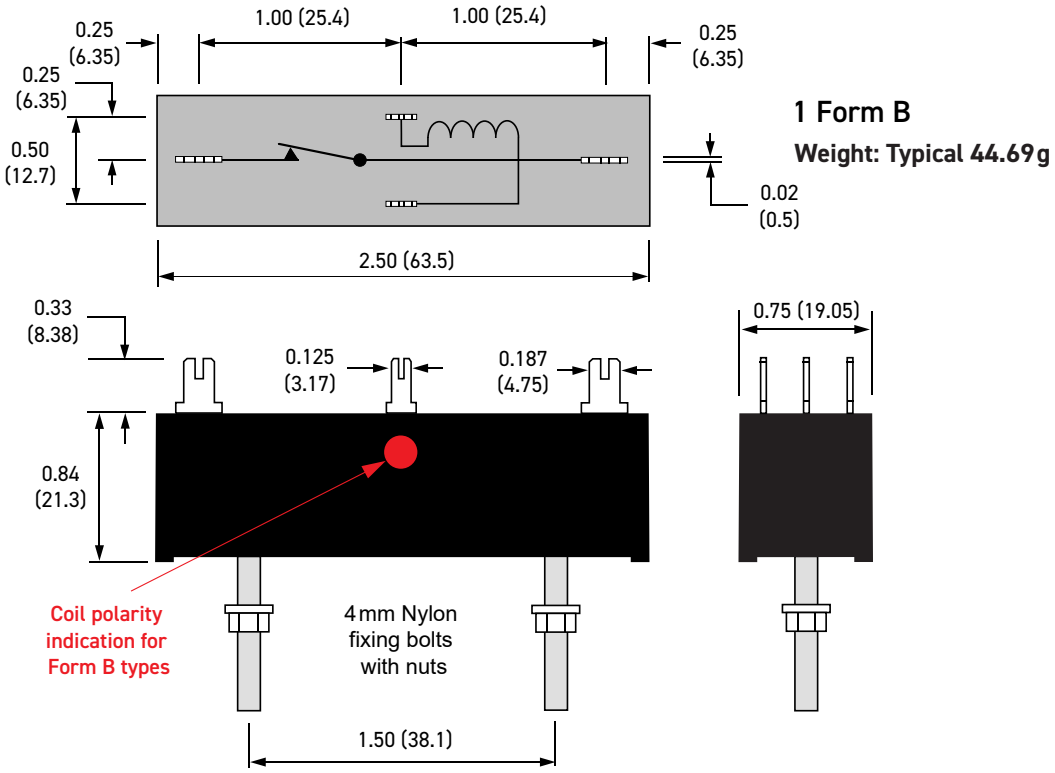
Sw. No.1 - 5kV

Sw. No.2 - 10kV



1 Form A

Weight: Typical 44.16g



1 Form B

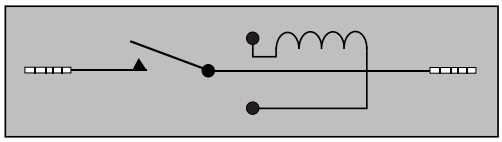
Weight: Typical 44.69g

Important: For all Form B types, the correct coil polarity must be observed. The positive connection is shown by the red spot on the package.

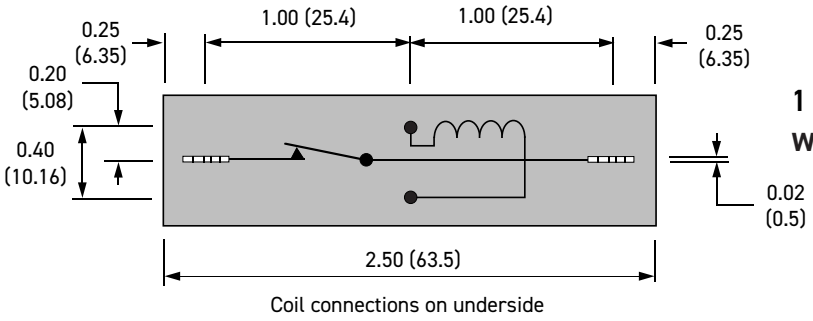
Series 63: Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **2**

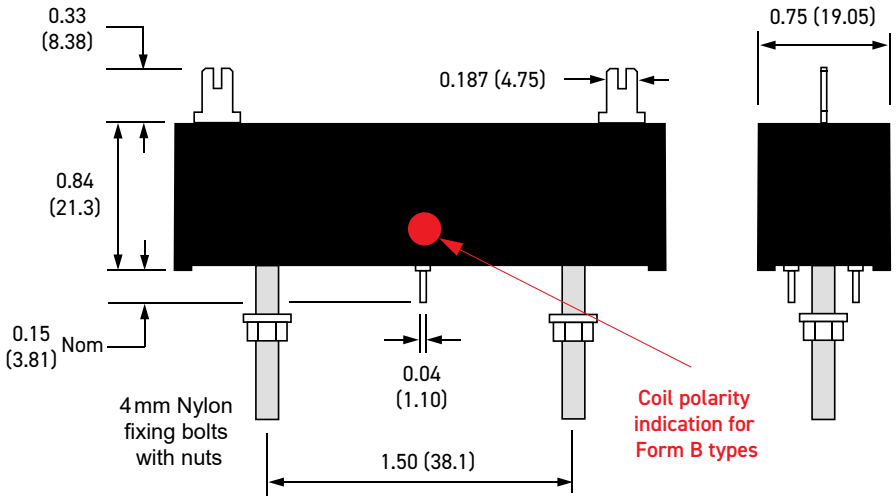
Sw. No.1 - 5kV
Sw. No.2 - 10kV
Sw. No.3 - 15kV
(1 Form A only)
Sw. No.4 - 20kV



1 Form A
Weight: Typical 45.47g



1 Form B
Weight: Typical 44.50g



Important: For all Form B types, the correct coil polarity must be observed. The positive connection is shown by the red spot on the package.

Similar Relays Comparison

If the Series 62 and 63 are unsuitable for your application, Pickering also manufactures four other series of reed relays with similar characteristics, but in different package sizes.

Series Name		60-1-A			60-1-B		65-1-A		65-1-B		67-1-A			67-1-C	68-1-A	
Physical Outline																
Depth	mm (inches)	16.0 (0.63)					16.0 (0.63)				12.6 (0.495)					
Width		57.9 (2.28)					57.9 (2.28)				58.4 (2.3)					
Height		18.0 (0.71)					18.0 (0.71)				14.5 (0.57)					
Package Volume (mm^3)		16676					16676				9543					
Typical Weights (**g**)		28.43			31.83		23.99		31.65		14.53			13.58	16.47	
Contact Configuration		1-A (SPST)			1-B (SPNC)		1-A (SPST)		1-B (SPNC)		1-A (SPST)			1-C (SPDT)	1-A (SPST)	
Reed Switch Type		Dry			Dry		Dry		Dry		Dry			Dry	Dry	
Stand-off Voltage (**V**)		5000	10000	15000	5000	10000	5000	10000	5000	10000	5000	8000	10000	5000	5000	10000
Switching Voltage (**V**)		3500	7500	12500	3500	7500	3500	7500	3500	7500	3500	6000	7500	2500	3500	7500
Switching Current (**A**)		3					3				3			3	3	
Carry Current (**A**)		3.5					3.5				3.5	5	3.5	3.2	3.5	
Switch Power (**W**)		50					50				50	200	50	100	50	

Series Name		62-1-A		62-1-B		63-1-A				63-1-B		
Physical Outline												
Depth	mm (inches)	19.05 (0.75)				19.05 (0.75)						
Width		63.5 (2.5)				63.5 (2.5)						
Height		21.3 (0.84)				21.3 (0.84)						
Package Volume (mm^3)		❶ 25767				❷ 25767						
Typical Weights (**g**)		44.16		44.69)		45.47				44.69		
Contact Configuration		1-A (SPST)		1-B (SPNC)		1-A (SPST)				1-B (SPNC)		
Reed Switch Type		Dry		Dry		Dry				Dry		
Stand-off Voltage (**V**)		5000	10000	5000	10000	5000	10000	15000	20000	5000	10000	20000
Switching Voltage (**V**)		3500	7500	3500	7500	3500	7500	12500	12500	3500	7500	12500
Switching Current (**A**)		3				3						
Carry Current (**A**)		3.5				3.5						
Switch Power (**W**)		50				50						

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 62 and 63 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

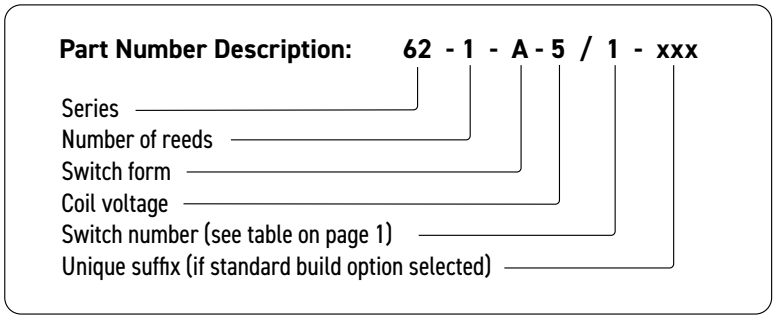
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging	Operate or de-operate time
Equivalents to competitors discontinued parts	Pulse capability
	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

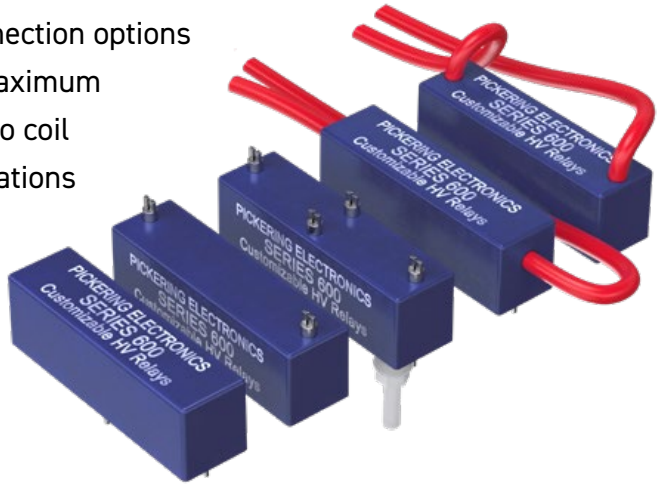
3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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



- **Modular design** with wide range of rating and connection options
- Up to **12.5 kV** Switching**, 50 W, 100 W** or **200 W** maximum
- Up to **20 kV** stand-off across switch, **25 kV** switch to coil
- **1 Form A**, **1 Form B** and **1 Form C** contact configurations
- **5, 12** and **24 V** coils (custom options available)
- Optional coaxial or electrostatic screen
- Internal mu-metal magnetic screen
- Tungsten plated contacts
- Insulation resistance > **10^{13} Ω**
- Custom potting materials
- Optional internal diode or Zener + diode for coil back EMF clamping
- Dedicated in-house performance testing
- Many benefits compared to industry standard relays (see here)

Utilizing over 55 years of experience in the field, Pickering has developed the 600 series in response to increasing demand for custom high voltage reed relays. It employs a modular design allowing customers to precisely specify the parameters and connection options they require, without compromising performance.

Manufactured with tungsten plated contacts for superior reliability and operating life, they also feature internal mu-metal magnetic screens which minimize magnetic interference and promote relay stability, allowing Form A (energize to make) versions to be mounted side by side. Insulation resistance is over 10^{13} Ω for applications requiring high reliability.

Customization options include a coaxial or electrostatic screen for improved signal integrity and noise reduction, and an optional diode or Zener diode for clamping coil back EMF. A broad range of switching capabilities, contact forms and connection types are available, in addition to dedicated performance testing. Custom potting materials can also be used where specific environmental or performance requirements must be met. Please contact our technical sales office for more information and advice.

Form B types are magnetically biased and should not be mounted directly onto ferrous metal chassis or less than 1 inch (25 mm) away from other relay as the coil operating voltage characteristics will be altered due to magnetic interaction. The coils of Form B relays are polarity sensitive and the coil positive voltage must be connected to the coil positive connection shown in the connection options. Please see the diagrams on pages 7-10.

Switch Ratings

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (changeover)
Stand-off 5 kV, switching up to 3.5 kV	Stand-off 5 kV, switching up to 3.5 kV	Standoff 5 kV, switching up to 2.5 kV
Standoff 8 kV, switching up to 5 kV	Standoff 8 kV, switching up to 5 kV	
Standoff 8 kV, switching up to 6 kV	Standoff 8 kV, switching up to 6 kV	
Standoff 10 kV, switching up to 7.5 kV	Standoff 10 kV, switching up to 7.5 kV	
Standoff 15 kV, switching up to 10 kV	Standoff 15 kV, switching up to 10 kV	
Standoff 15 kV, switching up to 12.5 kV	Standoff 15 kV, switching up to 12.5 kV	
Standoff 20 kV, switching up to 12.5 kV	Standoff 20 kV, switching up to 12.5 kV	

Series 600 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating (see Note[1])	Max. switch current	Max. carry current	Max. switching volts (see Note[2])	Max. stand-off volts	Life expectancy ops typical (see Note[3])	Operate time inc bounce (max)	Release time (see Note[4])
1	A or B	100 W	3.0 A	3.5 A	3500 V	5000 V	10^8	3 ms	2 ms
2	A or B	100 W	3.0 A	3.5 A	5000 V	8000 V	10^8	3 ms	2 ms
3	A or B	100 W	3.0 A	3.5 A	7500 V	10000 V	10^8	3 ms	2 ms
4	A or B	50 W	3.0 A	3.5 A	10000 V	15000 V	10^8	3 ms	2 ms
5	A or B	50 W	3.0 A	3.5 A	12500 V	15000 V	10^8	3 ms	2 ms
6	A or B	50 W	3.0 A	3.5 A	12500 V	20000 V	10^8	3 ms	2 ms
7	A or B	200 W	3.0 A	5.0 A	6000 V	8000 V	10^8	3 ms	2 ms
8	C	100 W	3.0 A	3.2 A	2500 V	5000 V	10^8	6 ms	6 ms

Note[1]: Power Rating
Power rating is for **RESISTIVE** loads only. At higher voltages stray capacitance can generate large current pulses, potentially damaging the contact plating and causing switch welding. Capacitive circuits require provision to limit the surge to within the current and power ratings of the relay. Contact Pickering for more information.

Note[2]: Switching Voltage
Switching voltage ratings are for D.C. or A.C. peak. Where the requirement is for A.C. RMS voltage, multiply the value by 1.414 for the A.C. peak value.

Note[3]: Life Expectancy
Relay life depends upon switch load and end of life criteria, which is usually when the switch fails to open (sticking), fails to close or the closed contact resistance exceeds an acceptable value. In cold switching applications, typical life is expected to be greater than 1×10^9 ops. When switching high voltages, contact erosion will take place. At very low power levels, typical life is expected to be greater than 1×10^9 ops. At low to medium resistive loads, typical life is expected to be greater than 1×10^8 ops, and at higher voltages, at resistive load up to the maximum ratings, typical life is 1×10^6 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering has a large database for a range of loads and can perform life testing with any load conditions.

Note[4]: Release Times
The type of back EMF clamping across the coil will affect the release times. With no suppression, the release times can be less than 0.1 ms and with a standard flyback diode less than 2 ms. Using a flyback diode and Zener diode in series can result in release times less than 1ms. Contact Pickering for more information.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Part Number Description

(Omit code for non FT/FE connections)

Series	Electrostatic Screen		No of reeds	Switch Form	Coil Voltage		Switch No	Coil Suppression	Connection	Layout	Wire Length (FT/FE)
600	E	-	1	A	05	-	1	D	PC	1	1

Code	Type
600	Standard Case
620	Larger Case

Code	Type
N	No Electrostatic Screen
E	Electrostatic Screen

Code	Type
1	1 Reed

Code	Type
A	Form A
B	Form B
C	Form C

Code	Type
05	5 V
12	12 V
24	24 V

Code	Type
1	3.5 kV / 5 kV
2	5 kV / 8 kV
3	7.5 kV / 10 kV
4	10 kV / 15 kV
5	12.5 kV / 15 kV
6	12.5 kV / 20 kV
7	6 kV / 8 kV
8	2.5 kV / 5 kV

Code	Type
N	No Diode
D	Diode
Z	Diode + Zener

Code	Type
PC	All PCB pins
TL	All turret lugs
TB	Switch turret lugs,coil PCB
FT	Flying leads - top
FE	Flying leads - side

Code	Type
1	See part drawings on page 7-10
2	
3	
4	
5	

Code	Length
1	100 mm
2	200 mm
3	300 mm

Series: Pickering offers 2 case sizes to increase the configuration options to allow users to select the most suitable part. Our Series 600 High Voltage Reed Relays use our standard size case similar to our Series 60/65 range requiring approximately 58mm x 16mm board area.

Our Series 620 High Voltage Reed Relays use a larger case allowing for increased spacing between connections, along with larger clearances, both internal and external, which can be crucial at higher voltages.

Switch No: With a wide range of switch specifications available as listed in the table on page 2, when selecting the most suitable for an application ensure all the requirements are within the published ratings.

Coil Suppression: With any wound component, the back EMF induced when the part is turned off can interfere with or damage the driver's circuitry.

Pickering recommends having suppression fitted across the reed relay coil, either externally or internally within the package.

A standard free wheeling diode will clamp the back EMF to around 0.7 V, but clamping this value higher with the use of a Zener diode can reduce the release time. For higher voltage parts, this can help with breaking the arc that occurs as the switch begins to open. For further information, contact technical sales.

ES Screen: In some applications, the inclusion of an electrostatic screen between the coil and the switch can improve signal integrity and noise reduction. However, there are factors that need to be considered compared to unscreened parts.

For example, reduced internal clearances and increased capacitance which may compromise the overall performance in specific applications.

Connection & Layout: With the modular and customizable design of the Series 600, there are a large array of connection options available. Where PCB mounting for all the pins is required, the pin positioning can be whatever the customer requires, or a combination of PCB pins for the coil and turret lugs or flying leads for the switch connection.

Panel mounting is another option using turret lugs or flying leads. Flying lead versions can help to greatly reduce the possibility of surface tracking at very high voltages, for more information and advice, contact technical sales.

Examples of Form A (Normally Open) configurations, with a wide range of custom options available, contact techsales@pickeringrelay.com for more information.

Device Type	Series	Configuration Code (see Note[5])	Coil Voltage (V)	Wire Length	Initial contact resistance	Insulation resistance (see Note[6])		Capacitance (see Note[7])	
						Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (100 W, 5 kV)	600N 600E 620N 620E	-1A**-1DPC1 -1A**-1DTB1 -1A**-1DTL1 -1A**-1DFT1* -1A**-1DFE1*	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
1 Form A Switch No. 2 (100 W, 8 kV)	600N 600E 620N 620E	-1A**-2DPC1 -1A**-2DTB1 -1A**-2DTL1 -1A**-2DFT1* -1A**-2DFE1*	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
1 Form A Switch No. 3 (100 W, 10 kV)	600N 600E 620N 620E	-1A**-3DPC1 -1A**-3DTB1 -1A**-3DTL1 -1A**-3DFT1* -1A**-3DFE1*	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
1 Form A Switch No. 4 (50 W, 15 kV)	600N 600E 620N 620E	-1A**-4DPC1 -1A**-4DTB1 -1A**-4DTL1 -1A**-4DFT1* -1A**-4DFE1*	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
1 Form A Switch No. 5 (50 W, 15 kV)	620N	-1A**-5DTB1 -1A**-5DFT1* -1A**-5DFE1*	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
1 Form A Switch No. 6 (50 W, 20 kV)	620N	-1A**-6DTB1 -1A**-6DFT1* -1A**-6DFE1*	** = 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
1 Form A Switch No. 7 (200 W, 8 kV)	600N 600E 620N 620E	-1A**-7DPC1 -1A**-7DTB1 -1A**-7DTL1 -1A**-7DFT1* -1A**-7DFE1*	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.5 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF

Examples of Form B (Normally Closed) configurations, with a wide range of custom options available, contact techsales@pickeringrelay.com for more information.

Device Type	Series	Configuration Code (see Note[5])	Coil Volatge (V)	Wire Length	Initial contact resistance	Insulation resistance (see Note[6])		Capacitance (see Note[7])	
						Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form B Switch No. 2 (100 W, 5 kV)	600N 600E 620N 620E	-1B**-1DPC1	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
		-1B**-1DTB1							
		-1B**-1DTL1							
		-1B**-1DFT1*							
		-1B**-1DFE1*							
1 Form B Switch No. 2 (100 W, 8 kV)	600N 600E 620N 620E	-1B**-2DPC1	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
		-1B**-2DTB1							
		-1B**-2DTL1							
		-1B**-2DFT1*							
		-1B**-2DFE1*							
1 Form B Switch No. 3 (100 W, 10 kV)	600N 600E 620N 620E	-1B**-3DPC1	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
		-1B**-3DTB1							
		-1B**-3DTL1							
		-1B**-3DFT1*							
		-1B**-3DFE1*							
1 Form B Switch No. 4 (50 W, 15 kV)	600N 600E 620N 620E	-1B**-4DPC1	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
		-1B**-4DTB1							
		-1B**-4DTL1							
		-1B**-4DFT1*							
		-1B**-4DFE1*							
1 Form B Switch No. 5 (50 W, 15 kV)	620N	-1B**-5DTB1	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
		-1B**-5DFT1*							
		-1B**-5DFE1*							
1 Form B Switch No. 6 (50 W, 20 kV)	620N	-1B**-6DTB1	** = 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
		-1B**-6DFT1*							
		-1B**-6DFE1*							
1 Form B Switch No. 7 (200 W, 8 kV)	600N 600E 620N 620E	-1B**-7DPC1	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.5 Ω	10^{13} Ω	10^{13} Ω	3 pF	0.15 pF
		-1B**-7DTB1							
		-1B**-7DTL1							
		-1B**-7DFT1*							
		-1B**-7DFE1*							

Examples of Form C (Changeover) configurations, with a wide range of custom options available, contact techsales@pickeringrelay.com for more information.

Device Type	Series	Configuration Code (see Note[5])	Coil Volatge (V)	Wire Length	Initial contact resistance	Insulation resistance (see Note[6])		Capacitance (see Note[7])	
						Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form C Switch No. 8 (100 W, 5 kV)	600N 600E 620N 620E	-1C**-8DPC8	** = 05, 12 or 24 V	* = 1 (100 mm), 2 (200 mm) or 3 (300 mm)	0.12 Ω	10^{13} Ω	10^{10} Ω	See Note[8]	See Note[8]
		-1C**-8DTB8							
		-1C**-8DTL8							
		-1C**-8DFT8							
		-1C**-8DFE8							

Note 5: Configuration Code
The configuration code includes the switch form, the coil voltage, the switch specification code and the connection configuration. For connection options, please see table on page 3.

Note 6: Insulation Resistance
Pickering test for insulation resistance at 25°C up to 15kV, insulation resistance can reduce at higher temperatures depending on the materials used, for more information click here for our in depth guide.

Note 7: Capacitance (form A and B)
Capacitance is measured with all unused component leads connected to the guard terminal.

Note 8: Capacitance (ES and form C)
These values will depend upon on the mode of connection/guarding of unused terminals. Please contact technical sales for details.

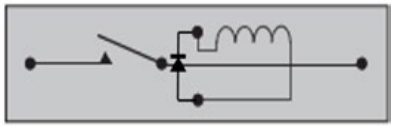
Potting Materials.

The modular design of the Series 600 allows for different potting materials to be used in a single device. With high performance silicon rubbers and polyurethanes providing unique characteristics, the combination best suited to the application can be used. For more information click here or contact techsales@pickeringrelay.com

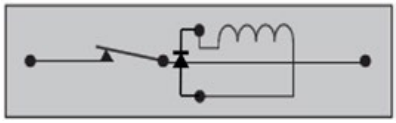
Series 600: Pin Configuration and Dimensional Data (dimensions in inches, millimeters in brackets)

600N 1A or B PC1

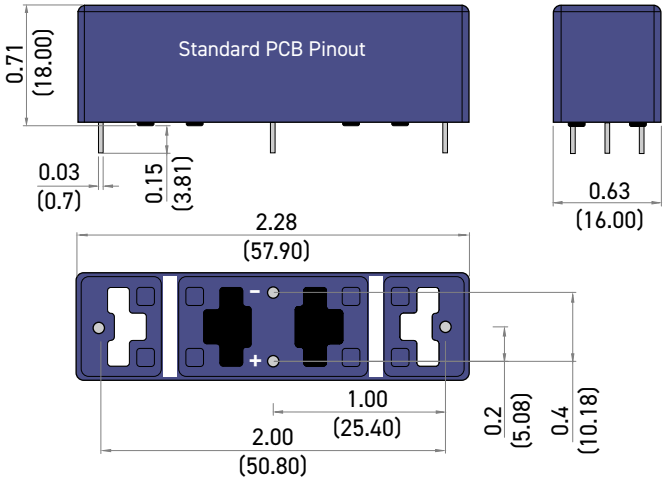
Form A (NO)



Form B (NC)

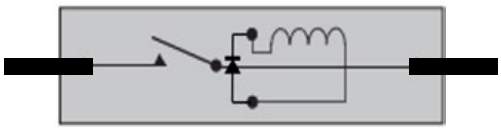


Schematics Shown from top of Relay

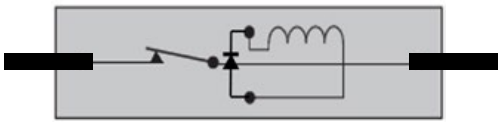


600N 1A or B FE1

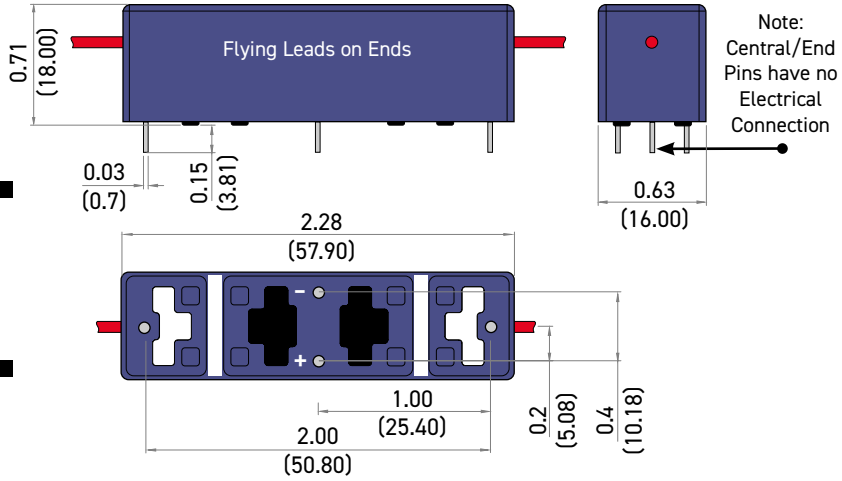
Form A (NO)



Form B (NC)

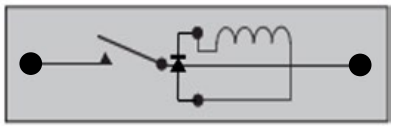


Schematics Shown from top of Relay

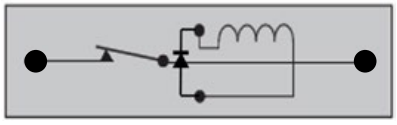


600N 1A or B FT1

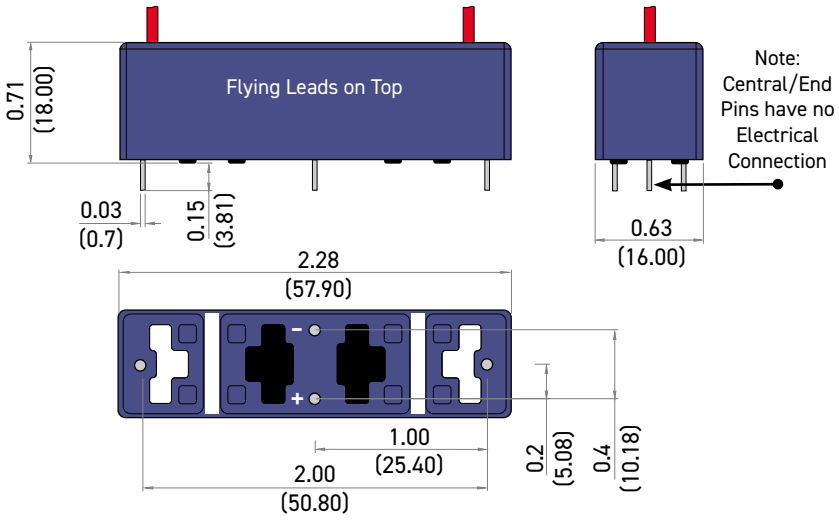
Form A (NO)



Form B (NC)



Schematics Shown from top of Relay

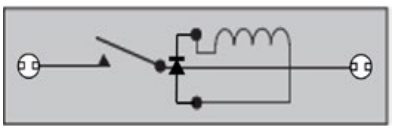


Important: For all Form B types, the correct coil polarity must be observed.

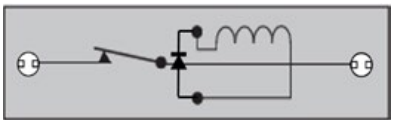
Series 600: Pin Configuration and Dimensional Data (dimensions in inches, millimeters in brackets)

600N 1A or B TB1

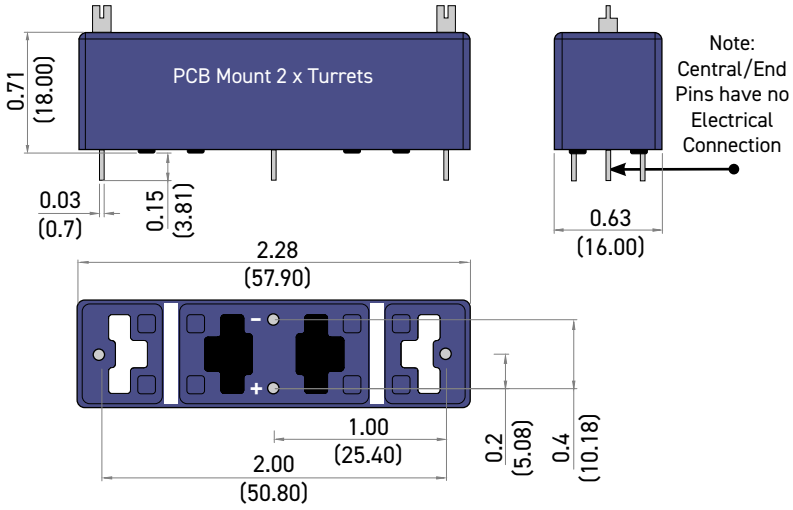
Form A (NO)



Form B (NC)

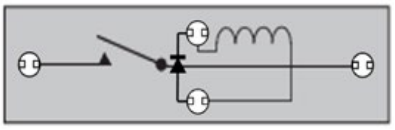


Schematics Shown from top of Relay

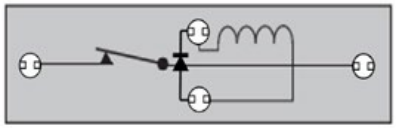


600N 1A or B TL1

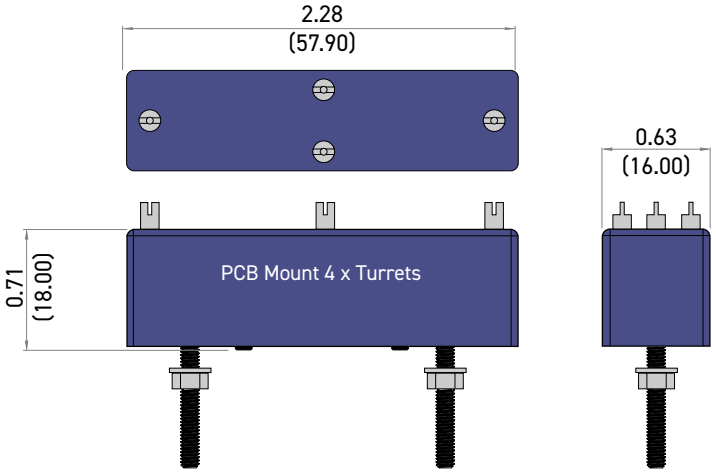
Form A (NO)



Form B (NC)

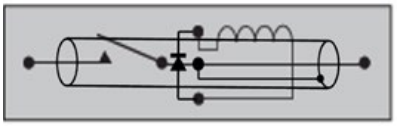


Schematics Shown from top of Relay

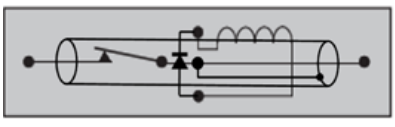


600E 1A or B PC1

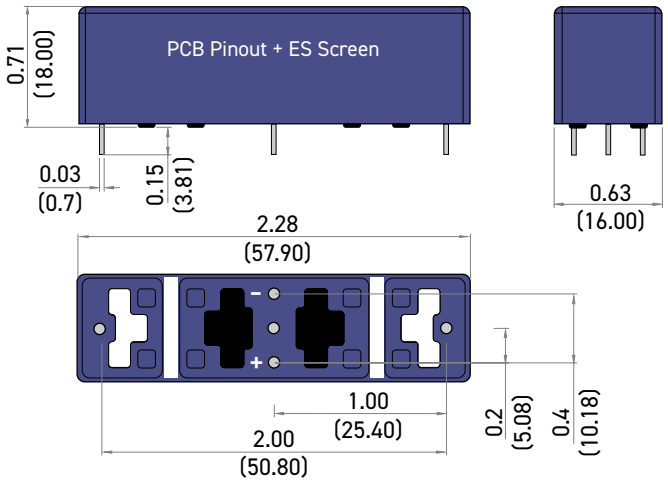
Form A (NO)



Form B (NC)



Schematics Shown from top of Relay

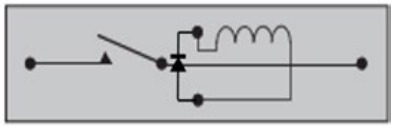


Important: For all Form B types, the correct coil polarity must be observed.

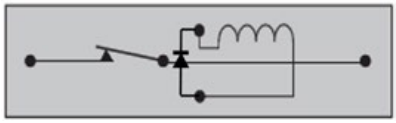
Series 620: Pin Configuration and Dimensional Data (dimensions in inches, millimeters in brackets)

620N 1A or B PC1

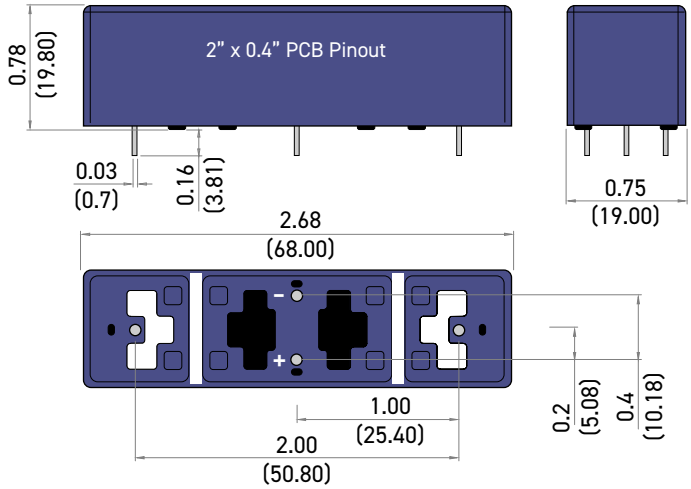
Form A (NO)



Form B (NC)

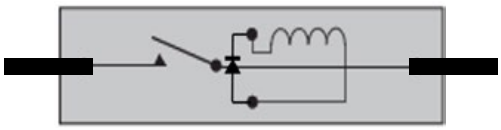


Schematics Shown from top of Relay

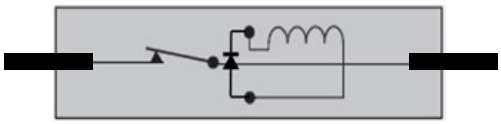


620N 1A or B FE1

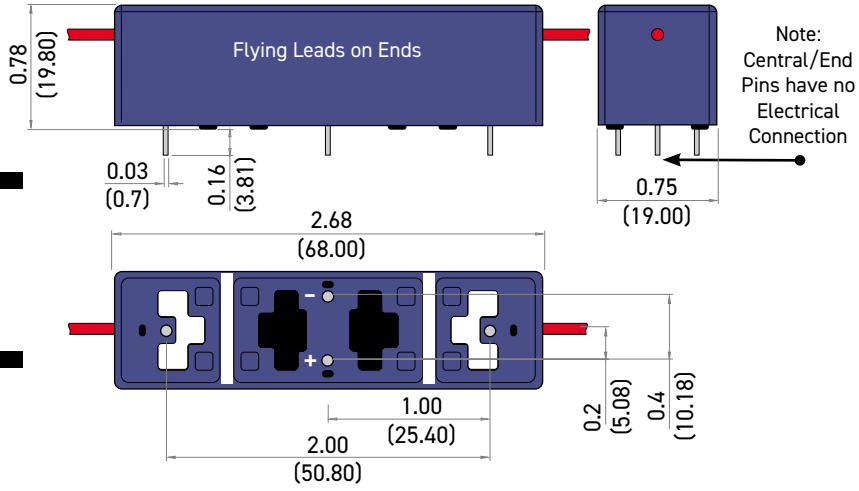
Form A (NO)



Form B (NC)

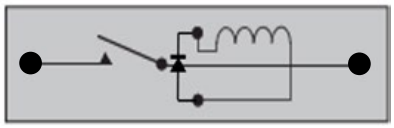


Schematics Shown from top of Relay

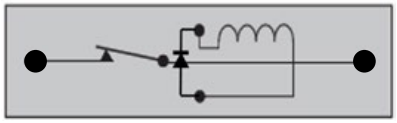


620N 1A or B FT1

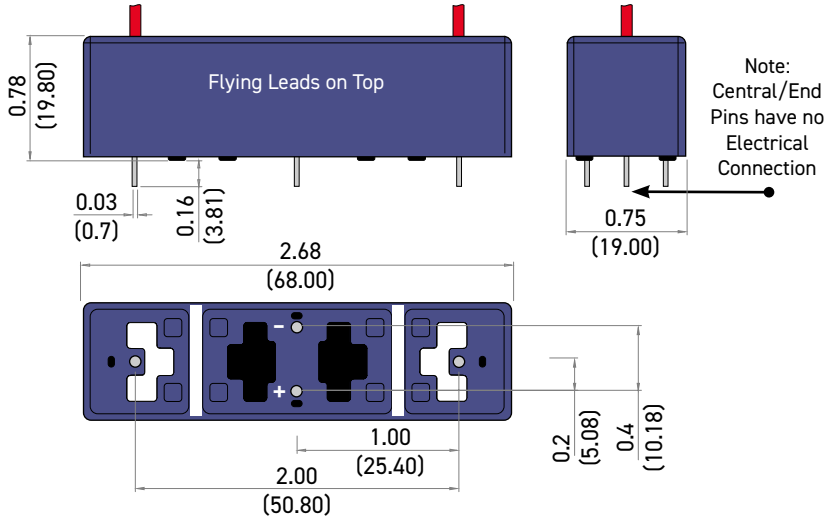
Form A (NO)



Form B (NC)



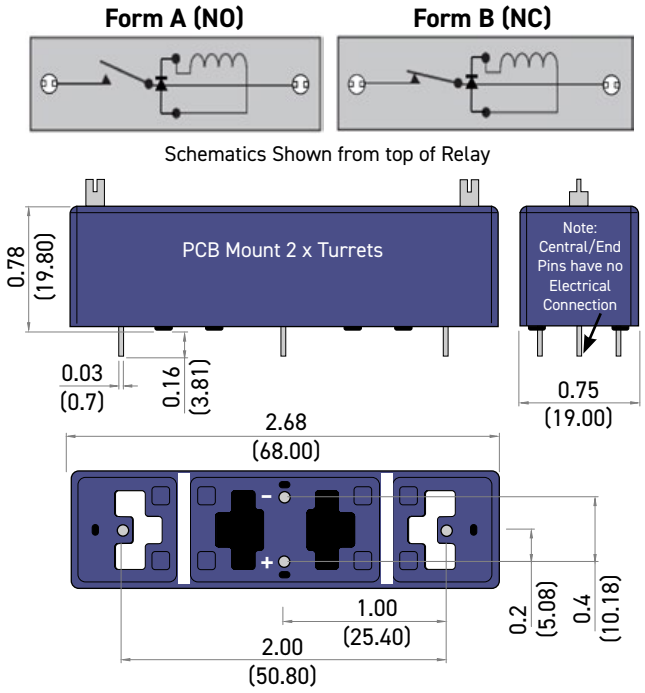
Schematics Shown from top of Relay



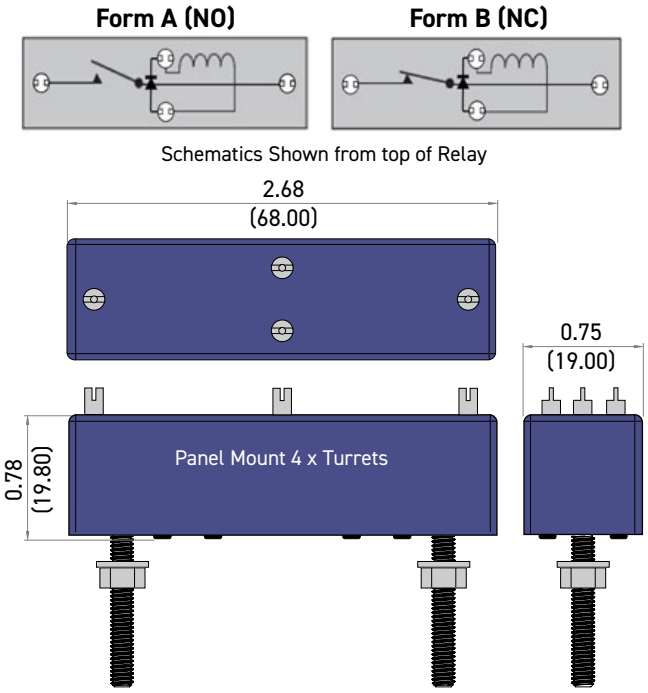
Important: For all Form B types, the correct coil polarity must be observed.

Series 600: Pin Configuration and Dimensional Data (dimensions in inches, millimeters in brackets)

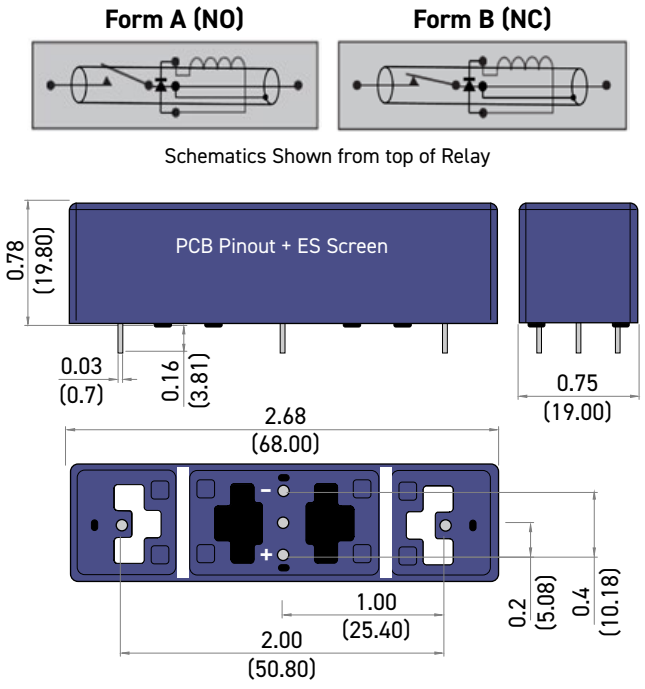
620N 1A or B TB1



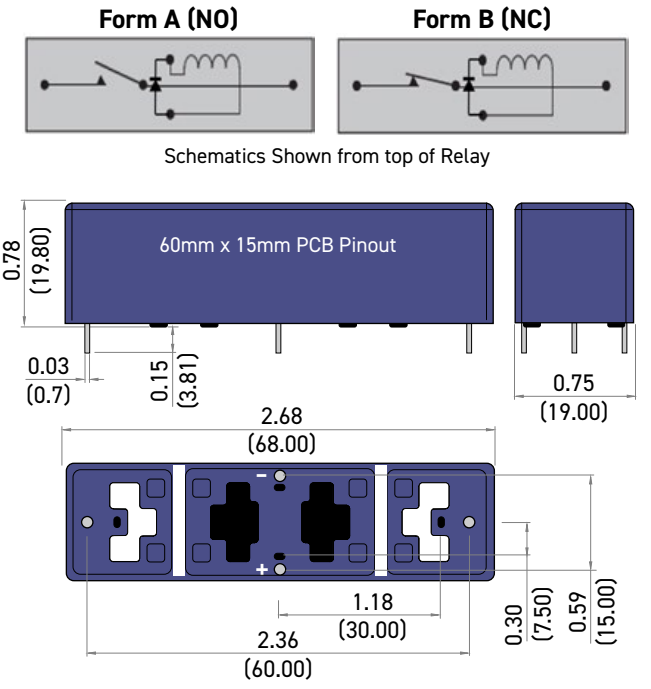
620N 1A or B TL1



620E 1A or B PC1

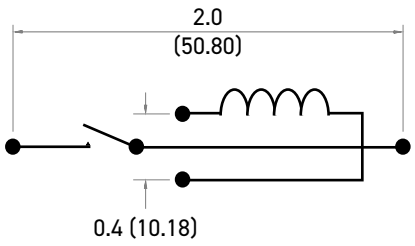
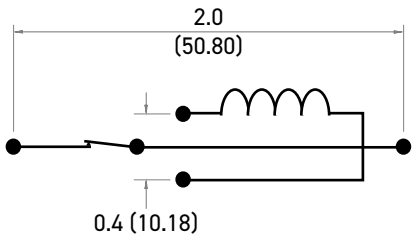
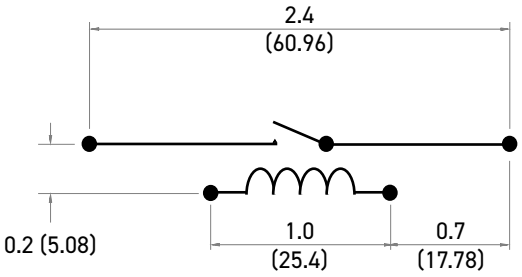
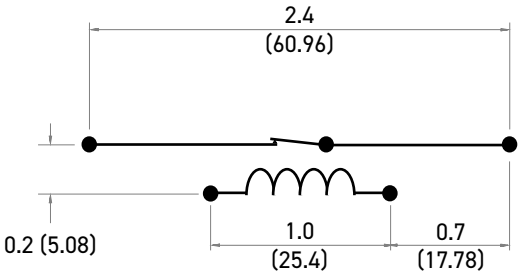
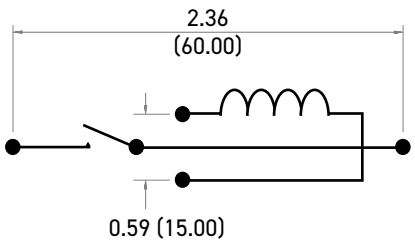
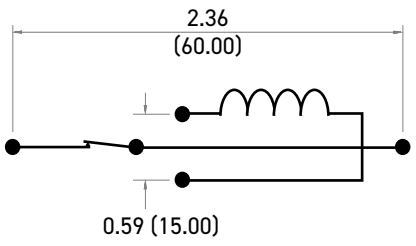


620N 1A or B PC3



Important: For all Form B types, the correct coil polarity must be observed.

Series 600: Examples of PCB Pinouts (dimensions in inches, millimeters in brackets)

Form A (NO)	Form B (NC)
PC1 	**PC1** 
PC2 	**PC2** 
PC3 	**PC3** 

With our modular design, many more pinout options are available.
Please contact technicalsales@pickeringrelay.com to discuss your requirements.

Similar Relays Comparison

If the Series 600 are unsuitable for your application, Pickering also manufactures four other series of reed relays with similar characteristics, but in different package sizes.

Series Name		60-1-A			60-1-B		65-1-A		65-1-B		67-1-A			67-1-C	68-1-A	
Physical Outline																
Depth	mm (inches)	16.0 (0.63)					16.0 (0.63)				12.6 (0.495)					
Width		57.9 (2.28)					57.9 (2.28)				58.4 (2.3)					
Height		18.0 (0.71)					18.0 (0.71)				14.5 (0.57)					
Package Volume (**mm³**)		16676					16676				9543					
Typical Weights (**g**)		28.43			31.83		23.99		31.65		14.53			13.58	16.47	
Contact Configuration		1-A (SPST)			1-B (SPNC)		1-A (SPST)		1-B (SPNC)		1-A (SPST)			1-C (SPDT)	1-A (SPST)	
Reed Switch Type		Dry			Dry		Dry		Dry		Dry			Dry	Dry	
Stand-off Voltage (**V**)		5000	10000	15000	5000	10000	5000	10000	5000	10000	5000	8000	10000	5000	5000	10000
Switching Voltage (**V**)		3500	7500	12500	3500	7500	3500	7500	3500	7500	3500	6000	7500	2500	3500	7500
Switching Current (**A**)		3					3				3			3	3	
Carry Current (**A**)		3.5					3.5				3.5	5	3.5	3.2	3.5	
Switch Power (**W**)		50					50				50	200	50	100	50	

Series Name		62-1-A		62-1-B		63-1-A				63-1-B		
Physical Outline												
Depth	mm (inches)	19.05 (0.75)				19.05 (0.75)						
Width		63.5 (2.5)				63.5 (2.5)						
Height		21.3 (0.84)				21.3 (0.84)						
Package Volume (**mm³**)		(1) 25767				(2) 25767						
Typical Weights (**g**)		44.16		44.69		45.47				44.69		
Contact Configuration		1-A (SPST)		1-B (SPNC)		1-A (SPST)				1-B (SPNC)		
Reed Switch Type		Dry		Dry		Dry				Dry		
Stand-off Voltage (**V**)		5000	10000	5000	10000	5000	10000	15000	20000	5000	10000	20000
Switching Voltage (**V**)		3500	7500	3500	7500	3500	7500	12500	12500	3500	7500	12500
Switching Current (**A**)		3				3						
Carry Current (**A**)		3.5				3.5						
Switch Power (**W**)		50				50						

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Built-In Customization

The Series 600 Reed Relays are highly customizable as standard, with a wide range of mechanical and electrical options available to suit your specific application. These are not special-order modifications, they're part of our flexible, application-focused design approach. Selecting one or more options may result in a unique part number suffix.

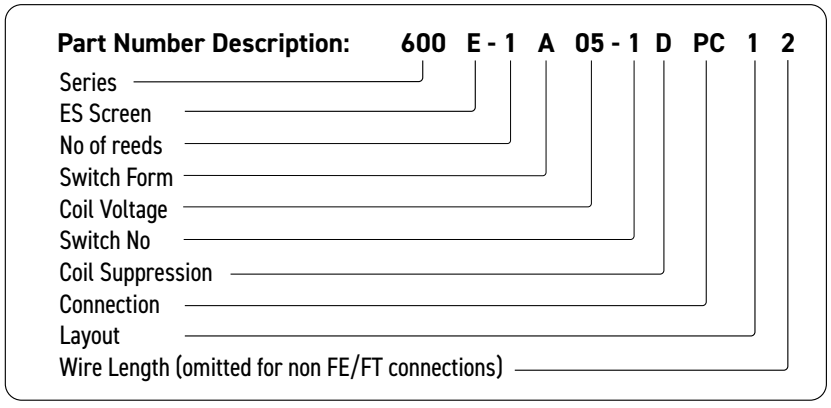
Mechanical Options	Electrical Options
Special pin configurations or pin lengths	Custom coil resistance
Customer-specific print (logo or part number)	Alternative stand-off or switching voltages
Custom packaging	Modified operate or release times
Equivalents to competitors discontinued parts	Pulse capability
Enhanced or application-specific specifications	Non-standard coil voltages/resistance
Life testing under customer load conditions	
Specific environmental requirements	

Need Something Else?

If your requirements aren't covered by the options above, please contact us. Our engineering team will work with you to develop a solution: pickeringrelay.com/contact

3D Models

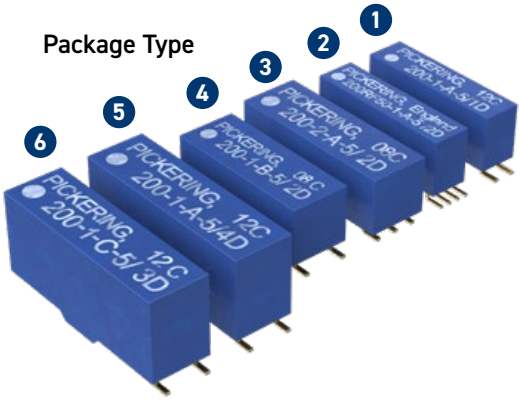
Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Including coaxial types for up to **5 GHz**
- Highest quality instrumentation grade switches
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Insulation **>10^{12} Ω** for dry Form A devices
- Dry switches
- Wide range of switch configurations - **1 Form A**, **2 Form A**, **1 Form B** and **1 Form C**
- For R.F. or high speed digital applications, **50** or **75 Ω** coaxial devices are available in the same small package
- **3**, **5** or **12 V** coils are standard, with optional internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



Please contact our technical department for supplementary RF data.

The special high temperature plastic package will withstand the temperatures associated with Infra-red or vapor phase reflow soldering processes. A flexible inner encapsulant protects the sensitive glass/metal reed switch seals - this is a very big advantage over the more usual hard moulded package.

The range features an internal mu-metal screen to minimize problems that would otherwise be experienced due to magnetic interaction when they are closely stacked. Form A and Form C versions may be stacked side-by-side. Due to the fact that the Form B types feature an internal biasing magnet, a gap of 3 mm minimum should be left between adjacent relays.

Series 200 User Guide

The Guide gives information on PCB Footprints, Handling Procedures, Packing Options, Soldering, Disposal & Standards.

Download your copy from
pickeringrelay.com/pdfs/series-200-smt-user-guide.pdf

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form A Coaxial 50 Ω (energize to make)	1 Form A Coaxial 75 Ω (energize to make)	1 Form B (energize to break)	1 Form C (change-over)	2 Form A (energize to make)
10 W at 200 V 15 W at 200 V 20 W at 200 V 10 W at 500 V	10 W at 200 V	10 W at 200 V	10 W at 200 V	3 W at 200 V	10 W at 200 V

Dry Reed: Series 200 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A or B	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.0 ms	0.5 ms	Change over
4	A	10 W	0.5 A	1.2 A	500	10^8	0.5 ms	0.2 ms	High voltage

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Mercury Relays

Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

Dry Relay: Series 200 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 1	200-1-A-5/1D *	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 1	200-1-A-3/2D	3	330 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-A-5/2D	5	500 Ω					
	200-1-A-12/2D	12	1000 Ω					
1 Form A, Switch No. 2 (50 Ω Coaxial) Package Type 2	200RF50-1-A-5/2D	5	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
1 Form A, Switch No. 2 (75 Ω Coaxial) Package Type 2	200RF75-1-A-5/2D	5	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
1 Form A, HV Switch No. 4 Package Type 5	200-1-A-5/4D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-A-12/4D	12	1000 Ω					
1 Form B, Switch No. 2 Package Type 4	200-1-B-5/2D	5	750 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-B-12/2D	12	1000 Ω					
1 Form C Switch No. 3 Package Type 6	200-1-C-5/3D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{11} Ω	See Note[3]	See Note[3]
	200-1-C-12/3D	12	1000 Ω					
2 Form A, Switch No. 2 Package Type 3	200-2-A-5/2D	5	400 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	200-2-A-12/2D	12	1000 Ω					

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

Note[2]: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

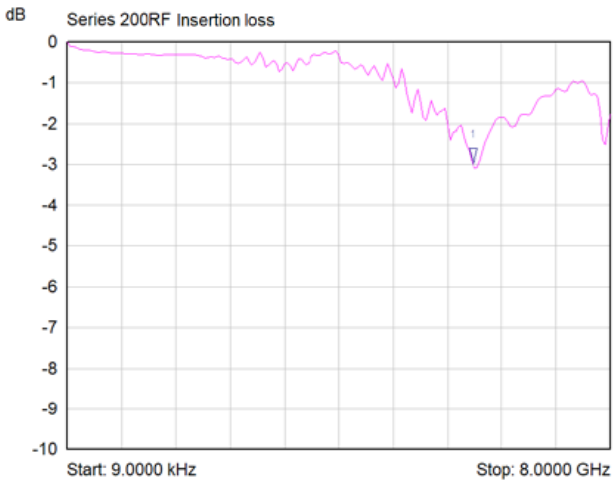
Note[3]: Capacitance values

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

Note[4]: Insulation resistance

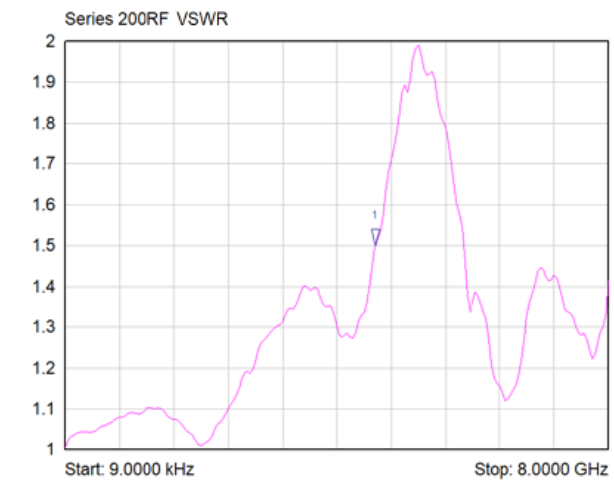
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

RF Plots for the 200RF Reed Relay



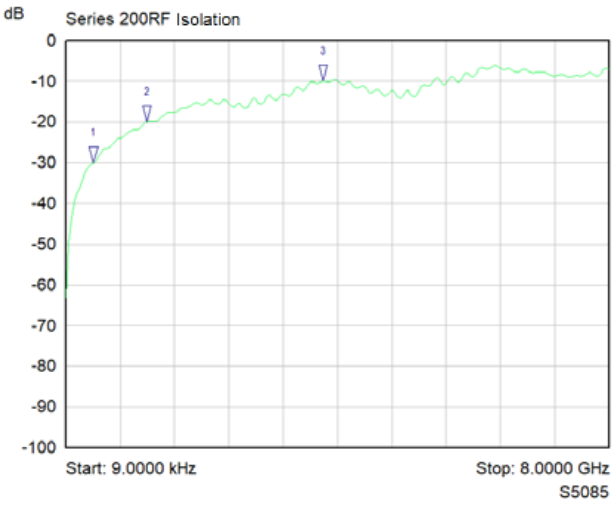
Mkr	Trace	X-Axis	Value
1	Series 200RF	5.9780 GHz	-3.00 dB

200RF Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1	Series 200RF	4.5734 GHz	1.50

200RF Typical VSWR Plot



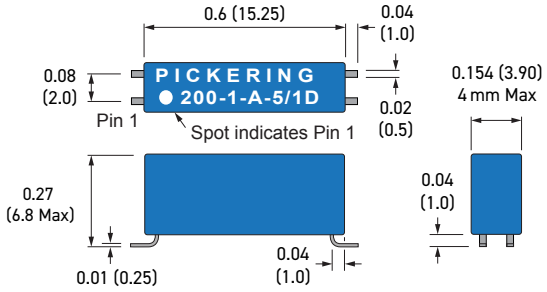
Mkr	Trace	X-Axis	Value
1	Series 200RF	412.3787 MHz	-30.00 dB
2	Series 200RF	1.1868 GHz	-20.00 dB
3	Series 200RF	3.7935 GHz	-10.00 dB

200RF Typical Isolation Plot

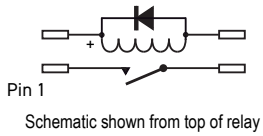
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.75 g



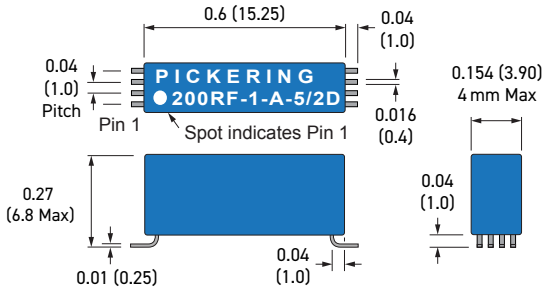
1 Form A



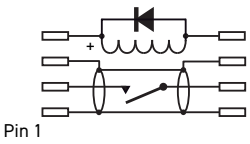
Schematic shown from top of relay

Package Type 2

Weight: Typical 0.74 g



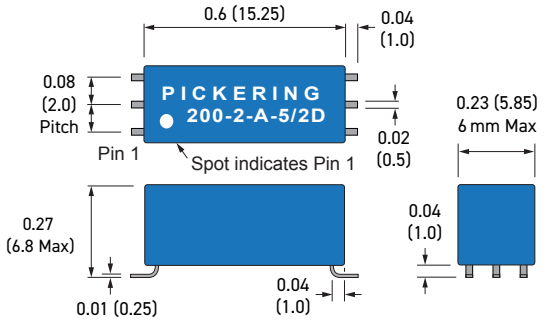
1 Form A Coaxial



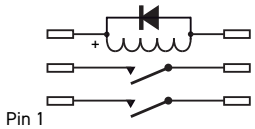
Schematic shown from top of relay

Package Type 3

Weight: Typical 1.13 g



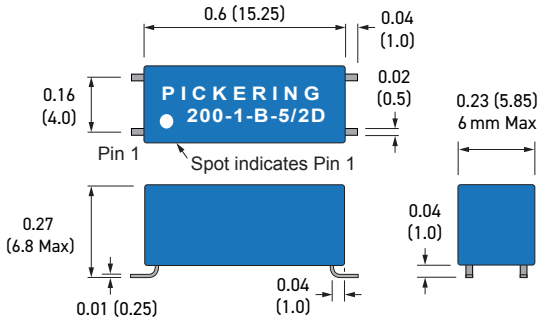
2 Form A



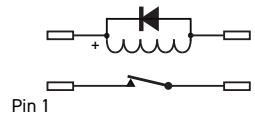
Schematic shown from top of relay

Package Type 4

Weight: Typical 1.10 g



1 Form B

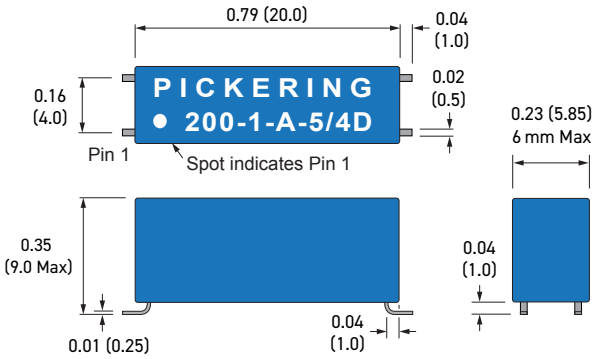


Schematic shown from top of relay

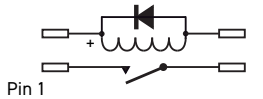
Important: When an optional internal diode is fitted the orientation spot end of the relay forms the positive connection.

Package Type 5

Weight: Typical 1.81 g



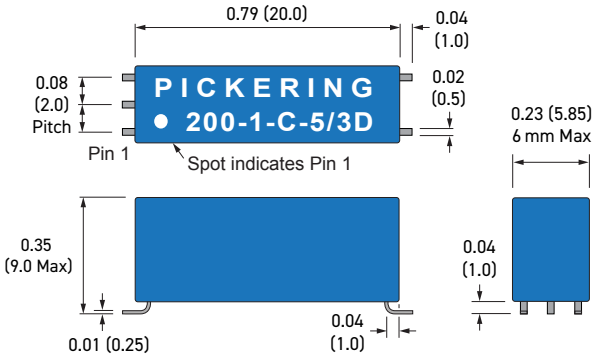
1 Form A



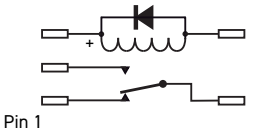
Schematic shown from top of relay

Package Type 6

Weight: Typical 1.89 g



1 Form C



Schematic shown from top of relay

Important: When an optional internal diode is fitted the orientation spot end of the relay forms the positive connection.

Similar Relays Comparison

The Series 200 is unique in the Pickering range of reed relays. Pickering do not manufacture another series of standard voltage surface mount relays. For higher voltage applications please see our Series 219 range.

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Standard Build Options

The Series 200 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

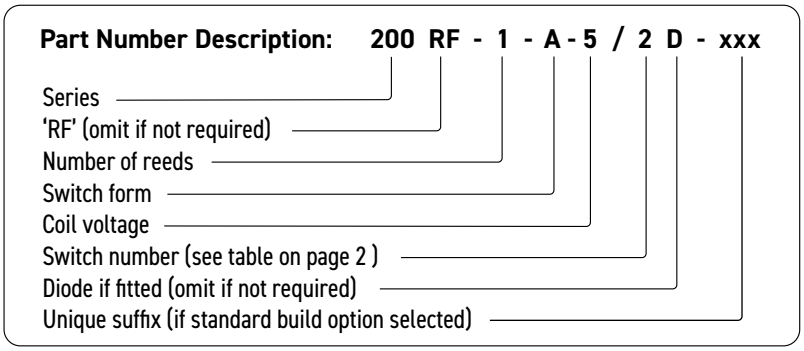
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models

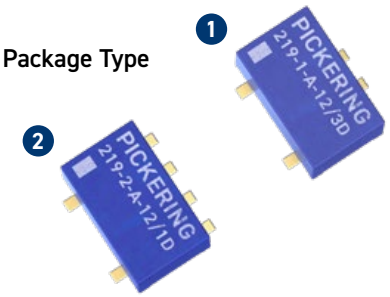


Help

If you need any technical advice or other help, 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

- Up to **3 kV** stand-off Switch - Switch & Up to **5 kV** stand-off Switch - Coil
- **1 Form A**, **2 Form A** or **1 Form B** configurations
- **3 V**, **5 V** & **12 V** coils with **optional internal diode**
- Insulation resistance **>10^{12} Ω**
- Switching up to **0.7 A**, **10 W**
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for mixed signal semiconductor testing, medical electronic equipment testing, EV charge point testing, monitoring photovoltaic efficiency, in-circuit test equipment, and high voltage instrumentation

Package Type



Note: Package Types 1 & 2 are the same size yet have different pin positions

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	2 Form A (energize to make)
Stand-off 1.5 kV, switching up to 1 kV Stand-off 2 kV, switching up to 1 kV Stand-off 3 kV, switching up to 1 kV	Stand-off 1.5 kV, switching up to 1 kV Stand-off 2 kV, switching up to 1 kV	Stand-off 1.5 kV, switching up to 1 kV

Series 219 switch ratings - contact ratings for each switch type

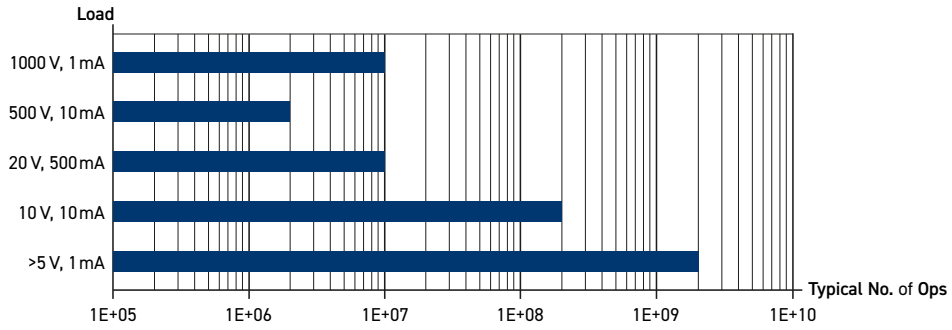
Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts (see Note[1])	Min. stand-off volts (Switch - Switch)	Min. stand-off volts (Switch - Coil)	Life expectancy ops typical (see Note[2])	Operate time inc bounce (max)	Release time	Special features
1	A or B	10 W	0.7 A	1.25 A	1000	1500	1500	10^8	0.5 ms	0.2 ms	High voltage
2	A or B	10 W	0.7 A	1.25 A	1000	2000	5000	10^8	0.5 ms	0.2 ms	High voltage
3	A	10 W	0.7 A	1.25 A	1000	3000	5000	10^8	0.5 ms	0.2 ms	High voltage

Note[1]: Switching Voltage

This high voltage rating is for **RESISTIVE loads only**. At these high voltages, even stray capacitance can generate very high current pulses, which can damage the contact plating causing welding of the reed switch. If there is capacitance in circuit, provision should be made to limit the surge, to within the current and power ratings of the relay.

Note[2]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads or when 'cold' switching, typical life is expected to be greater than 1 x 10^8 ops. At higher voltages and the maximum load (resistive), typical life is 1 x 10^7 ops.In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.



Series 219 Life Test Data

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-40 °C to +105 °C
Storage Temperature Range	-40 °C to +125 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Contact Resistance

A characteristic of the switch used in this range is the contact resistance can increase over time if subjected to standoff voltages in the upper range of the specification. This does not affect the life expectancy but can result in contact resistances greater than 1Ω. In most high voltage applications this increase has no effect on performance but, in some mixed signal applications low and stable contact resistance is important.

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For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (1.5 kV) Package Type 1	219-1-A-3/1D	3	100 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	219-1-A-5/1D	5	250 Ω					
	219-1-A-12/1D	12	750 Ω					
1 Form A Switch No. 2 (2 kV) Package Type 1	219-1-A-3/2D	3	75 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	219-1-A-5/2D	5	200 Ω					
	219-1-A-12/2D	12	500 Ω					
1 Form A Switch No. 3 (3 kV) Package Type 1	219-1-A-3/3D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.1 pF
	219-1-A-5/3D	5	125 Ω					
	219-1-A-12/3D	12	400 Ω					
2 Form A Switch No. 1 (1.5 kV) Package Type 2	219-2-A-3/1D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	219-2-A-5/1D	5	100 Ω					
	219-2-A-12/1D	12	400 Ω					
1 Form B Switch No. 1 (1.5 kV) Package Type 1	219-1-B-3/1D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	219-1-B-5/1D	5	100 Ω					
	219-1-B-12/1D	12	400 Ω					
1 Form B Switch No. 2 (2 kV) Package Type 1	219-1-B-3/2D	3	50 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	219-1-B-5/2D	5	100 Ω					
	219-1-B-12/2D	12	400 Ω					

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

Note[3]: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

Note[4]: Insulation resistance

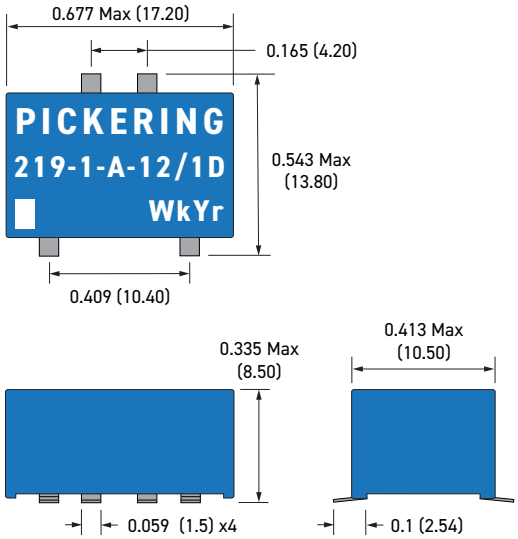
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

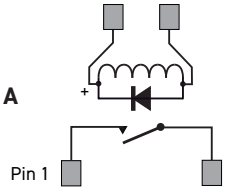
Package Type 1

1 Form A
Weight: Typical 2.12 g

1 Form B
Weight: Typical 2.19 g

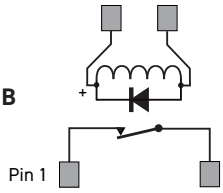


1 Form A



Schematic shown from top of relay

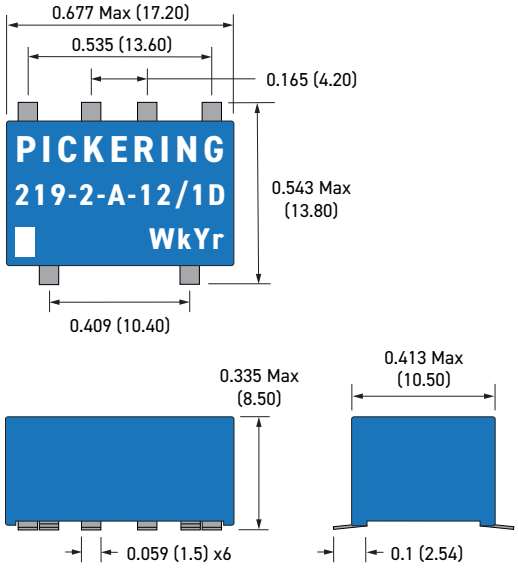
1 Form B



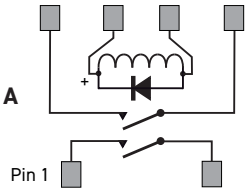
Schematic shown from top of relay

Package Type 2

2 Form A
Weight: Typical 2.39 g



2 Form A

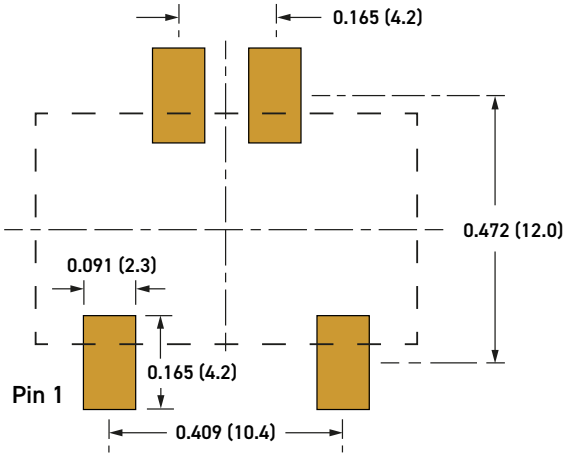


Schematic shown from top of relay

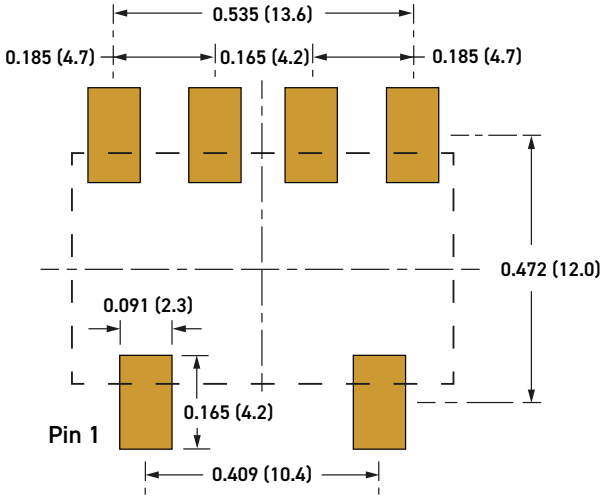
Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Note: A 1cm space should be left between Form B types and other relays, as the magnetic field from the internal biasing magnet could slightly affect the sensitivity of the relay alongside.

PCB Footprints (dimensions in inches, millimeters in brackets)

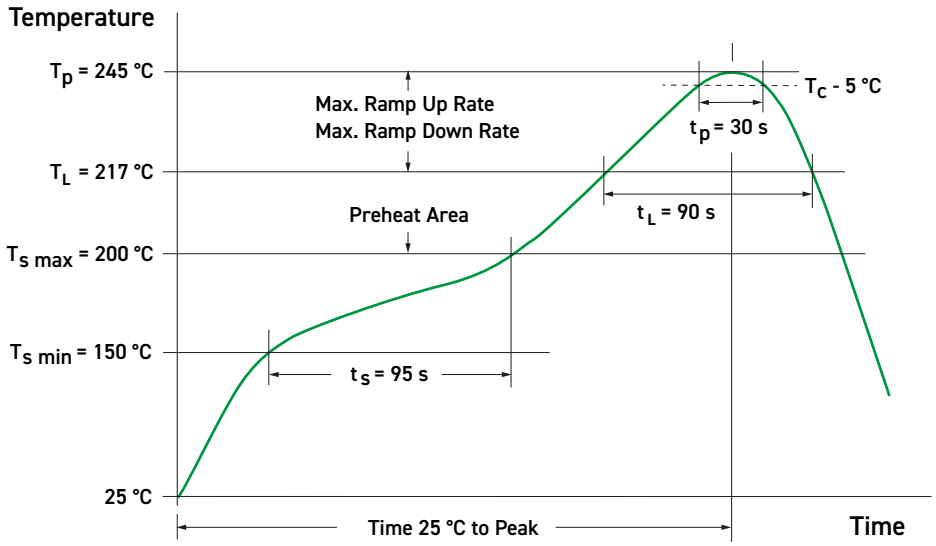


219-1-A and 219-1-B Footprints
1 Form A and 1 Form B
(Package Type 1)



219-2-A Footprint
2 Form A
(Package Type 2)

Reflow Soldering: Recommended Profile and Parameters



SMT Soldering Profile based on IPC/JEDEC J-STD-020E

Profile Feature		Value
Preheat Temperature Min	T_S min	150 °C
Preheat Temperature Max	T_S max	200 °C
Preheat Time t_S from T_S min to T_S max	t_S	60 - 120 s
Ramp-up Rate (T_L to T_P)		3 °C/s max
Liquidous Temperature	T_L	217 °C
Time t_L maintained above T_L	t_L	60 -150 s

Profile Feature		Value
Peak Package Body Temperature	T_P	245 °C
Time within 5 °C of actual Peak Temperature	t_P	20-30 s
Ramp-down Rate (T_L to T_P)		6 °C/s max
Time 25 °C to Peak Temperature		8 minutes max
Applied Cycles		2 cycles max

Moisture Sensitivity of Surface Mount Reed Relays

Quality and reliability concerns regarding internal damage, cracks and delamination from the solder reflow process have demanded standardised procedures regarding moisture control for some surface mount devices. Pickering Series 219 Surface Mount Reed Relays are classified to IPC/JEDEC J-STD-020 MSL1, and thus dry packs and special procedures are not required.

Packing

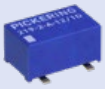
Pickering 219 Series relays can be provided in tape and reel format on request.

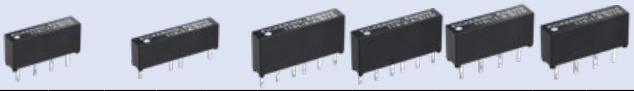
Shelf and Floor Life

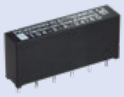
Through their moisture sensitivity level 1 classification 219 Series relays have an "infinite floor life" when the conditions are 30 °C/85% RH.

Similar Relays Comparison

If the Series 219 is unsuitable for your application, Pickering also manufacture four series of thru-hole high voltage reed relays in various package sizes.

Series Name		219-1-A			219-2-A	219-1-B	
Physical Outline							
Depth	mm (inches)	10.5 (0.42) Body, 13.8 (0.55) Across Legs					
Width		17.2 (0.677)					
Height		8.5 (0.34)					
Package Volume (mm^3)		❶ 1535			❷ 1535	❶ 1535	
Typical Weights (**g**)		2.12			2.39	2.19	
Contact Configuration		1-A (SPST)			2-A (DPST)	1-B (SPNC)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	1500	2000
Switching Voltage (**V**)		1000					
Switching Current (**A**)		0.7					
Carry Current (**A**)		1.25					
Switch Power (**W**)		10					

Series Name		131L-1-A	131-1-A	119L-1-A	119-1-A			119L-2-A	119-2-A	119L-1-B	119-1-B		104-1-A & 104HT-1-A				
Physical Outline																	
Depth	mm (inches)	3.7 (0.145)		3.7 (0.145)									6.3 (0.245)				
Width		12.5 (0.49)		15.1 (0.595)				20.1 (0.79)		15.1 (0.595)			24.1 (0.95)				
Height		6.6 (0.26)		6.6 (0.26)				8.9 (0.35)					8.2 (0.32)				
Package Volume (mm^3)		306		369	369	369	369	491	662	662	498	498	498	1245			1245
Typical Weights (**g**)		0.58		0.67				0.74	1.06		0.89			2.06			2.06
Contact Configuration		1-A (SPST)		1-A (SPST)					2-A (DPST)		1-B (SPNC)			1-A (SPST)			
Reed Switch Type		Dry Low Level	Dry	Dry Low Level	Dry Low Level	Dry	Dry	Dry	Dry Low Level	Dry	Dry Low Level	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry
Stand-off Voltage (**V**)		1000	1500	1000	1500	1500	2000	3000	1000	1500	1000	1500	2000	1500	2000	1500	3000	4000
Switching Voltage (**V**)		1000		1000										1000		500	1000	
Switching Current (**A**)		0.7		0.7										1		2	1	
Carry Current (**A**)		1.25		1.25										1.5		3	1.5	
Switch Power (**W**)		10		10										25		50	25	

Series Name		104ES-1-A			104-1-B		104-2-A			100HV-1-A			100HV-1-B		100HV-2-A	
Physical Outline																
Depth	**mm (inches)**	6.3 (0.245)								10.2 (0.40)			10.2 (0.40)		10.2 (0.40)	
Width		24.1 (0.95)			29 (1.14)					24.1 (0.95)			29 (1.14)		29 (1.14)	
Height		8.2 (0.32)			12.5 (0.49)					12.7 (0.50)			15.2 (0.60)		15.2 (0.60)	
Package Volume (**mm³**)		1245			2284					3122		3122	4496		4496	
Typical Weights (**g**)		1.94			3.75		3.7			6.99			8.75		8.75	
Contact Configuration		1-A (SPST)s			1-B (SPNC)		2-A (DPST)			1-A (SPST)			1-B (SPNC)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	2000	1500	2000	1500	1500	2000	3000	1500	2000	1500	2000
Switching Voltage (**V**)		1000	1000	1000	1000		1000		500	1000			1000		1000	
Switching Current (**A**)		1	1	1	1		1		2	1			1		1	
Carry Current (**A**)		1.5	1.5	1.5	1.5		1.5		3	1.5			1.5		1.5	
Switch Power (**W**)		25	25	25	25		25		50	25			25		25	

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 219 Reed Relay is available with a number of standard build options to tailor it to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

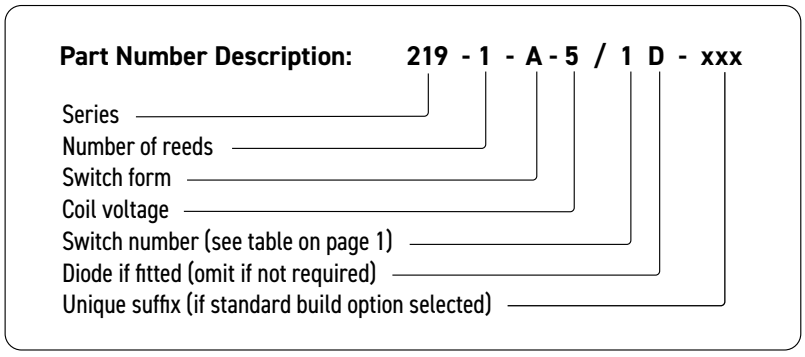
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Very low capacitance possibility
Custom packaging possibility	Different stand-off or switching voltage
	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models

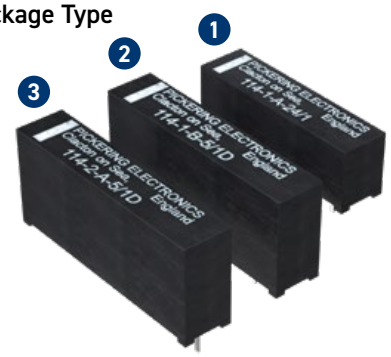


Help

If you need any technical advice or other help, 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

- **1 A** switching at up to **40 W**, carrying **3 A**
- Highest quality instrumentation grade switches
- 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
- **3**, **5**, **12** or **24 V** coils with optional internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for high power applications and in many cases, may be used as an alternative to mercury wetted reed relays

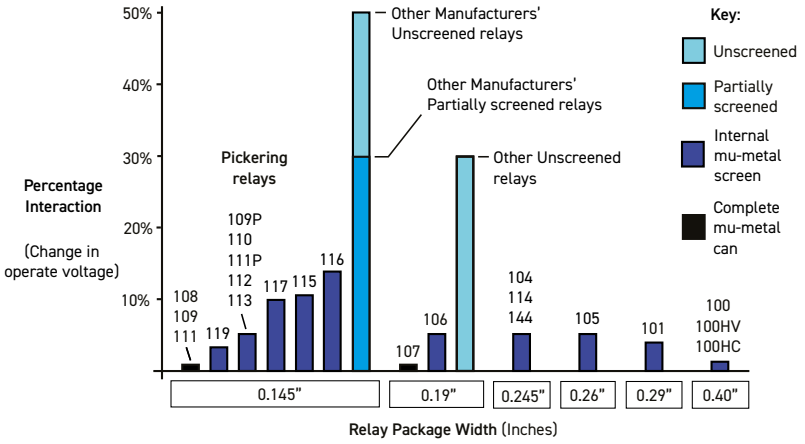
Package Type



Unusually for high power relays, the Series 114 feature sputtered ruthenium contacts instead of the more common electroplated rhodium or tungsten types. This also makes them suitable for low level or "dry" switching. They are able to switch a.c. mains voltages so are suitable for interfacing to larger electromechanical relays or contactors. It is important however, to suppress back EMFs from inductive loads. This is achievable by using an RC snubber, varistor or similar voltage limiting device.

The range features an internal mu-metal screen to minimize problems that would otherwise be experienced due to magnetic interaction when they are closely stacked. Form A versions may be stacked side-by-side. Due to the fact that the Form B types feature an internal biasing magnet, a gap of 0.4 inches minimum should be left between adjacent relays.

Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energise to break)	2 Form A (energize to make)
200 VDC or 240 VAC at 40 W 500 V min stand-off	200 VDC or 240 VAC at 40 W 500 V min stand-off	200 VDC or 240 VAC at 40 W 500 V min stand-off

Series 114 switch ratings - contact ratings for each switch type

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])	Operate time inc bounce (max)	Release time	Special features
1	A or B	40 W	1.0 A	3.0 A	200 V DC 240 V AC RMS	500	10^8	1.0 ms	0.5 ms	General purpose

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25°C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 114 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1	114-1-A-3/1D	3	75 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.1 pF
	114-1-A-5/1D	5	250 Ω					
	114-1-A-12/1D	12	750 Ω					
	114-1-A-24/1D	24	2000 Ω					
1 Form B Switch No. 1 Package Type 2	114-1-B-5/1D	5	350 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.1 pF
	114-1-B-12/1D	12	1000 Ω					
	114-1-B-24/1D	24	2200 Ω					
2 Form A Switch No. 1 Package Type 3	114-2-A-5/1D	5	150 Ω	0.25 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	114-2-A-12/1D	12	350 Ω					
	114-2-A-24/1D	24	1000 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

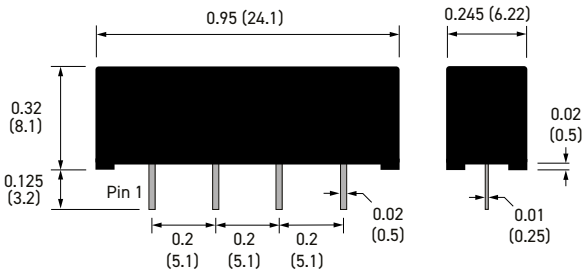
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

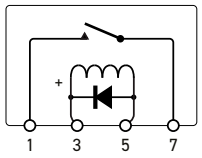
Pin Configuration and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 2.07 g

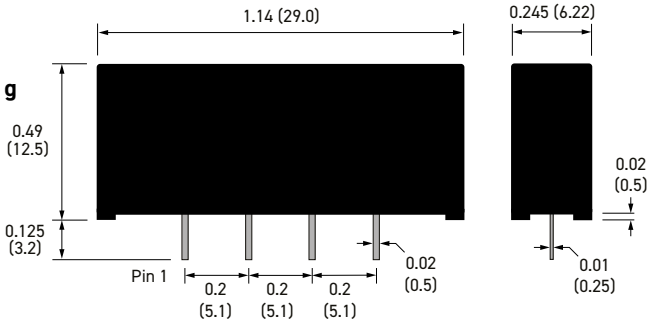


1 Form A

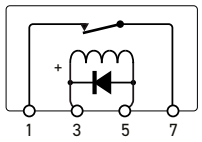


Package Type 2

Weight: Typical 3.61 g

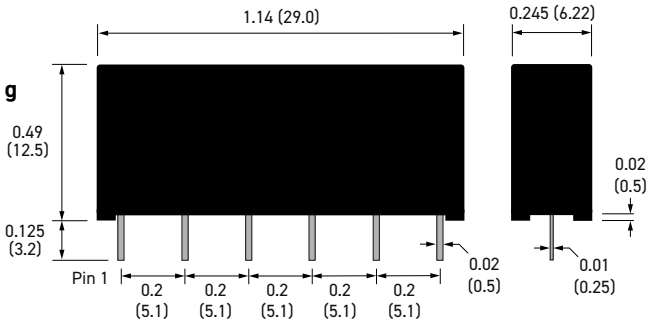


1 Form B (see Note)

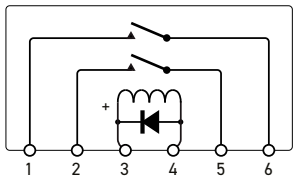


Package Type 3

Weight: Typical 3.68 g



2 Form A

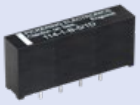
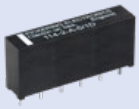


Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Due to the presence of an internal biasing magnet, Form B relays have a higher level of magnetic interaction than Form A types. A space of 0.4 inches minimum should therefore be left between adjacent parts.

Similar Relays Comparison

If the Series 114 is unsuitable for your application, Pickering also manufactures another series of reed relays with similar characteristics, but in different package sizes.

Series Name		114-1-A	114-1-B	114-2-A	100HC-1-A	100HC-1-B	100HC-2-A
Physical Outline							
Depth	**mm (inches)**	6.3 (0.245)	6.3 (0.245)		10.2 (0.40)	10.2 (0.40)	
Width		24.1 (0.95)	29.0 (1.14)		24.1 (0.95)	29.0 (1.14)	
Height		8.2 (0.32)	12.5 (0.49)		12.7 (0.50)	15.2 (0.60)	
Package Volume (**mm³**)		❶ 1245	❷ 2284	❸ 2284	3122	4496	4496
Typical Weights (**g**)		2.07	3.61	3.68	6.99	8.75	8.75
Contact Configuration		1-A (SPST)	1-B (SPNC)	2-A (DPST)	1-A (SPST)	1-B (SPNC)	2-A (DPST)
Reed Switch Type		Dry			Dry		
Stand-off Voltage (**V**)		500			500		
Switching Voltage (**V**)		200 DC/240 AC RMS			200 DC/240 AC RMS		
Switching Current (**A**)		1			1		
Carry Current (**A**)		3			3		
Switch Power (**W**)		40			40		

Reed Relay Selection Tool

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Standard Build Options

The Series 114 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging possibility	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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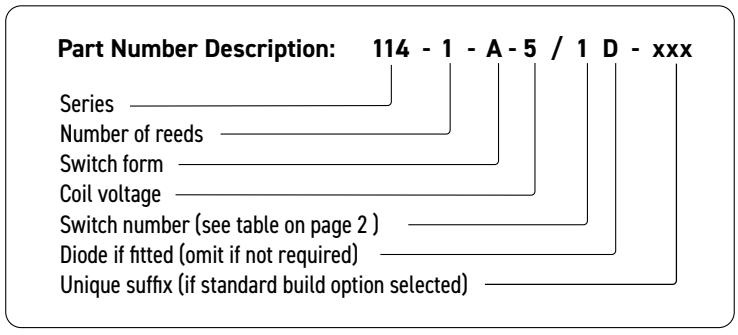

Help

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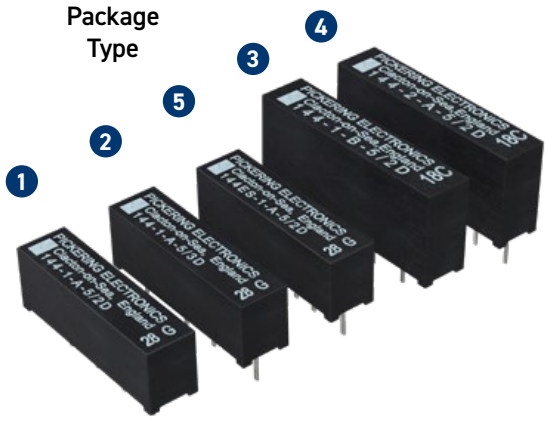
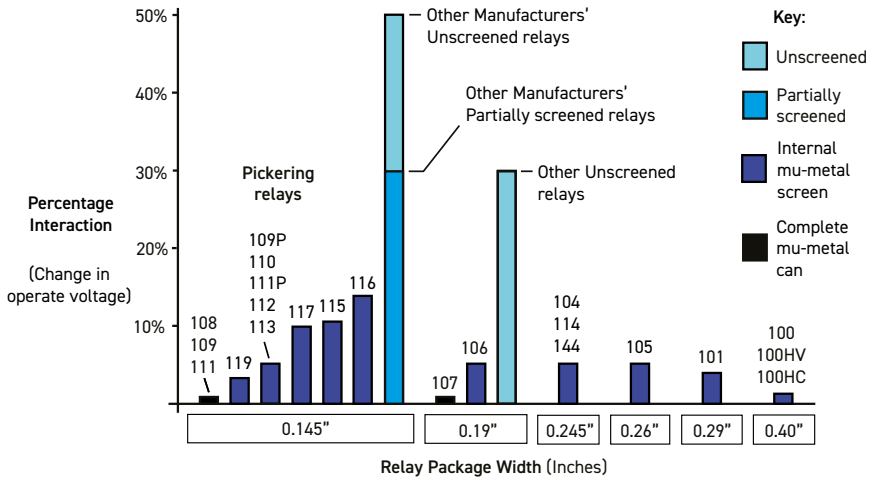
- **1 A** switching at up to **80 W**
- **2 A** switching at up to **60 W**
- Up to **3 kV** stand-off
- Switching Voltage **1000 VDC** up to **10 W**
- Up to **3 A** continuous carry current
- Small size. Stacking on **0.25 Inches** pitch
- Internal mu-metal magnetic screen
- Optional electrostatic screen
- **1 Form A**, **2 Form A** & **1 Form B** configurations
- **5 V**, **12 V** or **24 V** Coils with optional internal diode
- Additional build options are available including many pin configurations
- Many benefits compared to industry standard relays
- Suitable for high power applications and in many cases, may be used as an alternative to mercury wetted reed relays or miniature electromechanical relays



The Series 144 reed relays are ideal for mixed signal semiconductor testers, photovoltaic and EV applications, mining gas analysis, medical electronics, in-circuit test equipment, high voltage instrumentation, and much more. In many cases they can also be an alternative to mercury wet reed relays or miniature electromechanical relays, where the low level performance and high isolation can be a significant advantage.

The Series 144 feature sputtered ruthenium contacts instead of the more common rhodium associated with higher power reed relays. This combines their ability to switch higher power with excellent low level performance, making them the ideal choice where both high power and low level switching is required. The range also features an internal mu-metal screen to eliminate problems that would otherwise be experienced due to magnetic interaction when they are closely stacked, and an optional electrostatic shield between the switch and coil to minimise noise between the coil drive and high voltage circuits.

With a maximum switching voltage of 1000 VDC up to 10 W and the option of 2 or 3 kV DC standoff makes these relays suitable for a very wide range of applications. The 3 kV versions having an increased clearance between the switch and the coil pins to accommodate the higher voltage. For information on the recommended spacing between high voltage parts please see page 3.



Magnetic Interaction

This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	2 Form A (energize to make)
2000 VDC min stand-off Up to1000 VDC switching* Up to 80 W switching*	2000 VDC min stand-off Up to1000 VDC switching* Up to 80 W switching*	2000 VDC min stand-off Up to1000 VDC switching* Up to 80 W switching*
3000 VDC min stand-off Up to1000 VDC switching* Up to 80 W switching*	-	-

* See contact ratings.

Dry Reed: Series 144 switch ratings - contact ratings for each switch type

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])	Operate time inc bounce (max)	Release time	Special features
2	A or B	80 W	1 A	3 A	250	2000	10^8	1.0 ms	0.5 ms	High voltage
	A or B	60 W	2 A	3 A	250	2000	10^8	1.0 ms	0.5 ms	High voltage
	A or B	10 W	10 mA	3 A	1000	2000	10^8	1.0 ms	0.5 ms	High voltage
3	A	80 W	1 A	3 A	250	3000	10^8	1.0 ms	0.5 ms	High voltage
	A	60 W	2 A	3 A	250	3000	10^8	1.0 ms	0.5 ms	High voltage
	A	10 W	10 mA	3 A	1000	3000	10^8	1.0 ms	0.5 ms	High voltage

For more information for the Series 144 switching specifications, see our application guide Determining Switching Specifications.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages - Standard

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

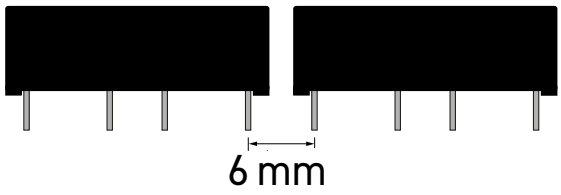
Environmental Specification/Mechanical Characteristics

In the table below, 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.

Standard Operating Temperature Range	-20 °C to +85 °C
Standard Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Recommended Spacing for High Voltage Parts

For high voltages, the recommended space between pins is 2 mm per 1 kV stand-off voltage. For example, the 3 kV version of the 144 should have a gap of 6 mm between the pins.



Dry Relay: Series 144 Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 2 (2 kV) Package Type 1 *	144-1-A-5/2D	5	200Ω	0.15Ω	10^{12}Ω	10^{12}Ω	2.5pF	0.1pF
	144-1-A-12/2D	12	750Ω					
	144-1-A-24/2D	24	2000Ω					
1 Form A Switch No. 3 (3 kV) Package Type 2	144-1-A-5/3D	5	200Ω	0.15Ω	10^{12}Ω	10^{12}Ω	2.5pF	0.1pF
	144-1-A-12/3D	12	750Ω					
	144-1-A-24/3D	24	2000Ω					
1 Form B Switch No. 2 (2 kV) Package Type 3	144-1-B-5/2D	5	300Ω	0.20Ω	10^{12}Ω	10^{12}Ω	2.5pF	0.1pF
	144-1-B-12/2D	12	1000Ω					
	144-1-B-24/2D	24	2200Ω					
2 Form A Switch No. 2 (2 kV) Package Type 4	144-2-A-5/2D	5	100Ω	0.20Ω	10^{12}Ω	10^{12}Ω	See Note[3]	See Note[3]
	144-2-A-12/2D	12	350Ω					
	144-2-A-24/2D	24	1000Ω					

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

* Package Type 2 available, contact Pickering for more details.

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Dry Relay: Series 144 (Electrostatic Shield) Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[3])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A (ES Shielded) Switch No. 2 (2 kV) Package Type 5	144ES-1-A-5/2D	5	50Ω	0.15Ω	10^{12}Ω	10^{12}Ω	2.5pF	0.1pF
	144ES-1-A-12/2D	12	400Ω					
	144ES-1-A-24/2D	24	1200Ω					
1 Form A (ES Shielded) Switch No. 3 (3 kV) Package Type 5	144ES-1-A-5/3D	5	50Ω	0.15Ω	10^{12}Ω	10^{12}Ω	2.5pF	0.1pF
	144ES-1-A-12/3D	12	400Ω					
	144ES-1-A-24/3D	24	1200Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Washing Guidelines

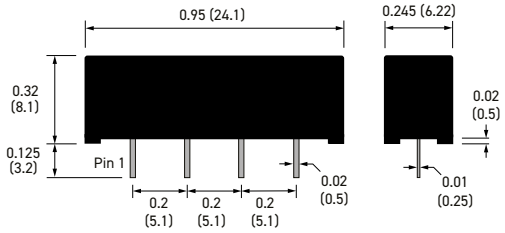
Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

For FREE evaluation samples go to: pickeringrelay.com/samples

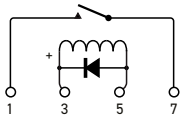
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **1**

Weight: Typical 2.06 g



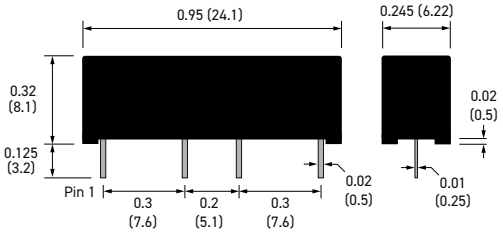
1 Form A



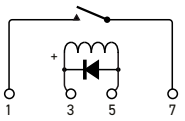
Switch No. 2 (2 kV stand-off)

Package Type **2**

Weight: Typical 2.06 g



1 Form A

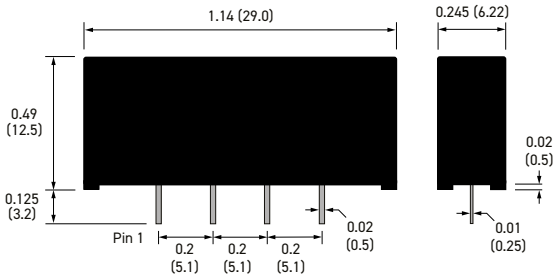


Switch No. 3 (3 kV stand-off)

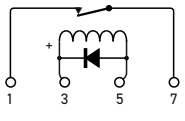
Additional Build Options:
Switch No. 2 (2 kV stand-off)

Package Type **3**

Weight: Typical 3.75 g



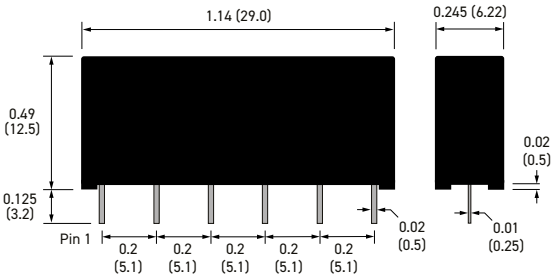
1 Form B
(see Note)



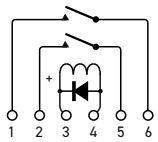
Switch No. 2 (2 kV stand-off)

Package Type **4**

Weight: Typical 3.70 g



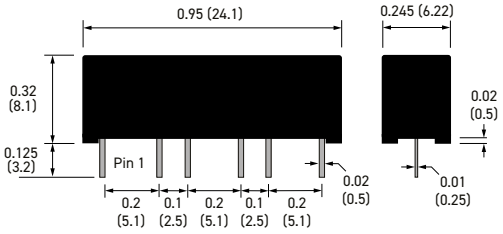
2 Form A



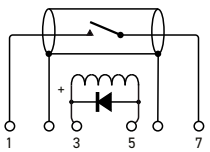
Switch No. 2 (2 kV stand-off)

Package Type **5**

Weight: Typical 1.94 g



1 Form A
Coaxial

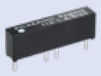
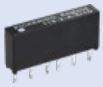


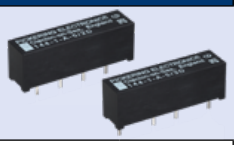
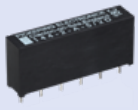
Switch No. 2 (2 kV stand-off)
Switch No. 3 (3 kV stand-off)

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.

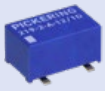
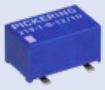
Similar Relays Comparison

If the Series 144 is unsuitable for your application, Pickering also manufactures five other series of reed relays with similar characteristics, but in different package sizes.

Series Name		131-1-A	119-1-A			119-2-A	119-1-B		104-1-A & 104HT-1-A						104ES-1-A		
Physical Outline																	
Depth	mm (inches)	3.7 (0.145)	3.7 (0.145)						6.3 (0.245)								
Width		12.5 (0.49)	15.1 (0.595)			20.1 (0.79)	15.1 (0.595)		24.1 (0.95)								
Height		6.6 (0.26)	6.6 (0.26)			8.9 (0.35)	8.9 (0.35)		8.2 (0.32)								
Package Volume (mm^3)		306	369		491	662	498		1245			1245		1245	1245		
Typical Weights (**g**)		0.58	0.67		0.74	1.06	0.89		2.06			2.06		2.06	1.94		
Contact Configuration		1-A (SPST)	1-A (SPST)			2-A (DPST)	1-B (SPNC)		1-A (SPST)						1-A (SPST)		
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	1500	2000	3000	1500	1500	2000	1500	2000	1500	3000	4000	5000	1500	2000	3000
Switching Voltage (**V**)		1000	1000						1000		500	1000 (1500)			1000	1000	1000
Switching Current (**A**)		0.7	0.7						1		2	1			1	1	1
Carry Current (**A**)		1.25	1.25						1.5		3	1.5			1.5	1.5	1.5
Switch Power (**W**)		10	10						25		50	25 (3)			25	25	25

Series Name		104-1-B		104-2-A			144-1-A		144-1-B	144-2-A	144ES-1-A	
Physical Outline												
Depth	mm (inches)	6.3 (0.245)					6.3 (0.245)		6.3 (0.245)	6.3 (0.245)	6.3 (0.245)	
Width		29 (1.14)					24.1 (0.95)		29.0 (1.14)	29.0 (1.14)	24.1 (0.95)	
Height		12.5 (0.49)					8.2 (0.32)		12.5 (0.49)	12.5 (0.49)	8.2 (0.32)	
Package Volume (mm^3)		2284		2284			❶ 1245	❷ 1245	❸ 2284	❹ 2284	❺ 1245	
Typical Weights (**g**)		3.75		3.70			2.06	2.06	3.75	3.70	1.94	1.94
Contact Configuration		1-B (SPNC)		2-A (DPST)			1-A (SPST)	1-A (SPST)	1-B (SPNC)	2-A (DPST)	1-A (SPST)	1-A (SPST)
Reed Switch Type		Dry	Dry	Dry	Dry	Mercury Wetted	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	1500	2000	1500	2000	3000	2000	2000	2000	3000
Switching Voltage (**V**)		1000		1000		500	1000 (250)	1000 (250)	1000 (250)	1000 (250)	1000 (250)	1000 (250)
Switching Current (**A**)		1		1		2	2 (1 / 0.01)		2 (1 / 0.01)	2 (1 / 0.01)	2 (1 / 0.01)	
Carry Current (**A**)		1.5		1.5		3	3		3	3	3	
Switch Power (**W**)		25		25		50	80 (60 / 10)		80 (60 / 10)	80 (60 / 10)	80 (60 / 10)	

Series Name		100HV-1-A			100HV-1-B		100HV-2-A	
Physical Outline								
Depth	**mm (inches)**	10.2 (0.40)			10.2 (0.40)		10.2 (0.40)	
Width		24.1 (0.95)			29 (1.14)		29 (1.14)	
Height		12.7 (0.50)			15.2 (0.60)		15.2 (0.60)	
Package Volume (**mm³**)		3122		3122	4496		4496	
Typical Weights (**g**)		6.99			8.75		8.75	
Contact Configuration		1-A (SPST)			1-B (SPNC)		2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500	2000	1500	2000
Switching Voltage (**V**)		1000			1000		1000	
Switching Current (**A**)		1			1		1	
Carry Current (**A**)		1.5			1.5		1.5	
Switch Power (**W**)		25			25		25	

Series Name		219-1-A			219-2-A		219-1-B	
Physical Outline								
Depth	**mm (inches)**	10.5 (0.42) Body, 13.8 (0.55) Across Legs						
Width		17.2 (0.677)						
Height		8.5 (0.34)						
Package Volume (**mm³**)		1535			1535		1535	
Typical Weights (**g**)		2.12			2.39		2.19	
Contact Configuration		1-A (SPST)			2-A (DPST)		1-B (SPNC)	
Reed Switch Type		Dry	Dry	Dry	Dry		Dry	Dry
Stand-off Voltage (**V**)		1500	2000	3000	1500		1500	2000
Switching Voltage (**V**)		1000						
Switching Current (**A**)		0.7						
Carry Current (**A**)		1.25						
Switch Power (**W**)		10						

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 144 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

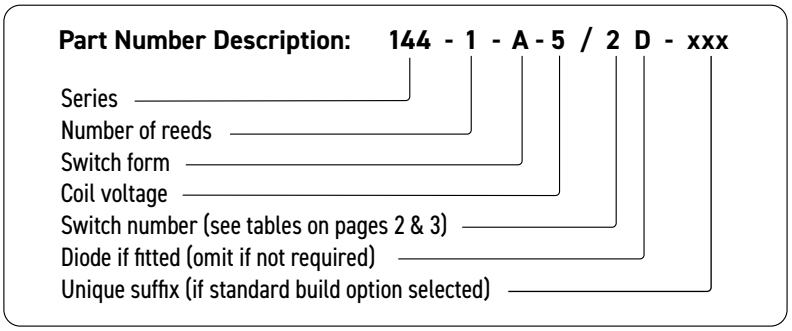
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging possibility	Operate or de-operate time
Equivalents to competitors discontinued parts	Pulse capability
	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models

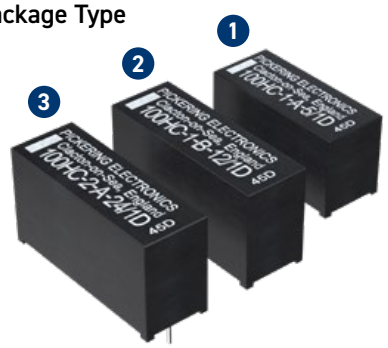


Help

If you need any technical advice or other help, 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

- Up to **3 A** continuous carry current
- **1 A** switching at up to **40 W**
- Highest quality instrumentation grade switches
- High coil resistance of up to **6000 Ω** for low power consumption
- Thermal EMF levels less than 10 µV
- Stacking on **0.40 Inches** pitch
- 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
- **5** , **12** or **24 V** coils with optional internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Suitable for high power applications and in many cases, may be used as an alternative to mercury wetted reed relays

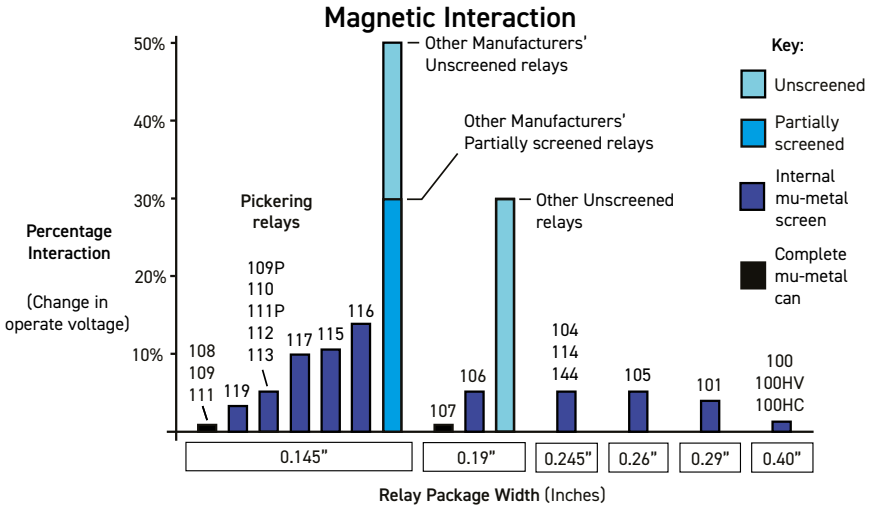
Package Type



The Series 100HC Form A versions offer higher coil resistances than the similar specification Series 114, the greater winding space allowing for the use of switches rated to 3 A continuous carry current and even higher levels in pulsed current applications.

Featuring sputtered ruthenium contacts, this also makes them suitable for low level or 'dry' switching applications and the reduced heating effect from the higher coil resistances gives them thermal EMF performance less than 10 µV.

The range features an internal mu-metal screen to minimize problems that would otherwise be experienced due to magnetic interaction when they are closely stacked. Form A versions may be stacked side-by-side. Due to the fact that the Form B types feature an internal biasing magnet, a gap of 0.4 inches minimum should be left between adjacent relays.



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	2 Form A (energize to make)
200 VDC or 240 VAC at 40 W 500 V min stand-off	200 VDC or 240 VAC at 40 W 500 V min stand-off	200 VDC or 240 VAC at 40 W 500 V min stand-off

Dry Reed: Series 100HC switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current (see Note[2])	Max. switching volts	Min. stand-off volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A or B	40 W	1.0 A	3.0 A	200 VDC 240 VAC RMS	500	10^8	2.0 ms	1.0 ms	General purpose

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. IIn abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Note[2]: Carry Current

The maximum continuous carry current of 3 Amps can be increased where current pulses are used, the level being dependant on the pulse duration and the duty cycle. For advice, please contact Pickering.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 100HC Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[5])		Capacitance (typical) (see Note[3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1	100HC-1-A-5/1D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.1 pF
	100HC-1-A-12/1D	12	2000 Ω					
	100HC-1-A-24/1D	24	6000 Ω					
1 Form B, Switch No. 1 Package Type 2	100HC-1-B-5/1D	5	300 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.1 pF
	100HC-1-B-12/1D	12	1000 Ω					
	100HC-1-B-24/1D	24	4000 Ω					
2 Form A, Switch No. 1 Package Type 3	100HC-2-A-5/1D	5	300 Ω	0.25 Ω	10^{12} Ω	10^{12} Ω	See Note[4]	See Note[4]
	100HC-2-A-12/1D	12	1000 Ω					
	100HC-2-A-24/1D	24	4000 Ω					

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

Note[3]: Capacitance across open switch

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

Note[4]: Capacitance values

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

Note[5]: Insulation resistance

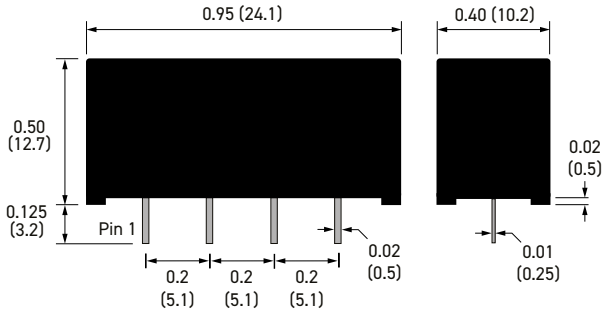
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

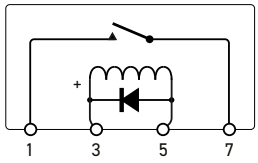
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 6.99 g

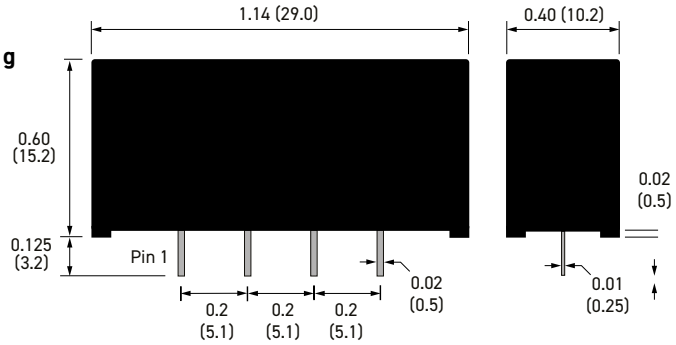


1 Form A

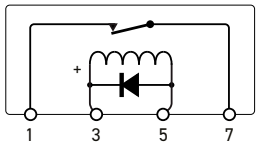


Package Type 2

Weight: Typical 6.99 g

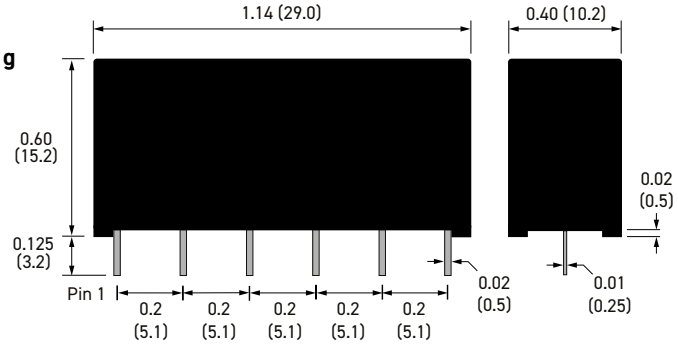


1 Form B (see Note)

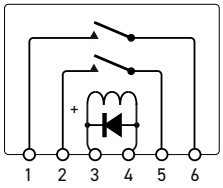


Package Type 3

Weight: Typical 8.75 g



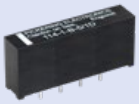
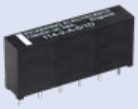
2 Form A



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.

Similar Relays Comparison

If the Series 100HC is unsuitable for your application, Pickering also manufactures another series of reed relays with similar characteristics, but in different package sizes.

Series Name		114-1-A	114-1-B	114-2-A	100HC-1-A	100HC-1-B	100HC-2-A
Physical Outline							
Depth	**mm (inches)**	6.3 (0.245)	6.3 (0.245)		10.2 (0.40)	10.2 (0.40)	
Width		24.1 (0.95)	29.0 (1.14)		24.1 (0.95)	29.0 (1.14)	
Height		8.2 (0.32)	12.5 (0.49)		12.7 (0.50)	15.2 (0.60)	
Package Volume (**mm³**)		1245	2284	2284	❶ 3122	❷ 4496	4496
Typical Weights (**g**)		2.07	3.61	3.68	6.99	8.75	8.75
Contact Configuration		1-A (SPST)	1-B (SPNC)	2-A (DPST)	1-A (SPST)	1-B (SPNC)	2-A (DPST)
Reed Switch Type		Dry			Dry		
Stand-off Voltage (**V**)		500			500		
Switching Voltage (**V**)		200 DC/240 AC RMS			200 DC/240 AC RMS		
Switching Current (**A**)		1			1		
Carry Current (**A**)		3			3		
Switch Power (**W**)		40			40		

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Standard Build Options

The Series 100HC Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

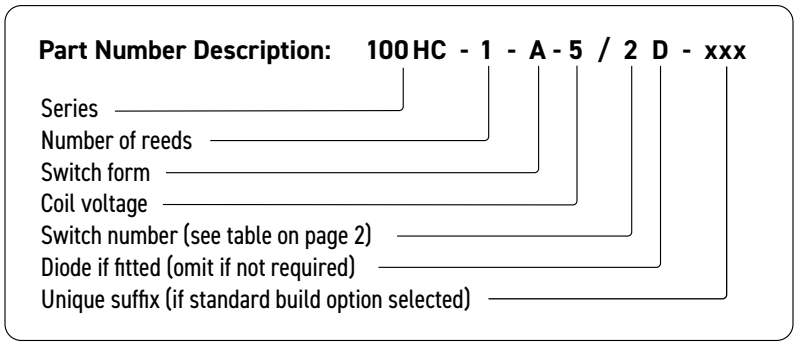
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Different stand-off or switching voltage
Custom packaging possibility	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Up to **15 W** switching
- Highest quality instrumentation grade switches
- Sputtered ruthenium switches rated at **10 W, 0.5 A** or **15 W, 1.0 A**
- Plastic package with internal mu-metal magnetic screen
- Take up minimum board area of only **0.2 x 0.33** Inches; conserving PCB space
- Insulation resistance **$>10^{12}$ Ω**
- **3 V** or **5 V** coils with a resistance **up to 2200 Ω** and optional internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)
- Very sensitive relays ideal for portable equipment or other applications where low power consumption is required

1 **Package Type**

Two switch types are available. Switch type number 1 is better suited for general purpose applications. Switch type 2 is better suited to low level or 'cold' switching.

These relays feature internal mu-metal magnetic screens. Mu-metal has the advantage of a high permeability and low magnetic remanence and eliminates problems that would otherwise occur due to magnetic interaction. Relays of this size without magnetic screening would be totally unsuitable for applications where dense packing is required. To learn more visit: pickeringrelay.com/magnetic-interaction

Switch Ratings - Dry Switches

1 Form A (energize to make)
15 W at 200 V
10 W at 200 V

Series 118 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A	15 W	1.0 A	1.2 A	200	10^9	0.6 ms	0.35 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10^9	0.6 ms	0.35 ms	Low level

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Dry Relay: Series 118 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2, 3])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 1	118-1-A-5/1D	5	1500 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3.0 pF	0.14 pF
1 Form A Switch No. 2 Package Type 1	118-1-A-3/2D	3	1000 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3.0 pF	0.14 pF
	118-1-A-5/2D	5	2200 Ω					

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

Note[2]: Switch to coil capacitance

Due to the asymmetrical internal construction of the relay, the capacitance to the coil from one switch connection is approximately half the capacitance of the other switch connection, pin 3 is lower. In some applications this feature may be used to advantage for example, in a multiplexer where it is desirable to minimize the capacitance of the common connection to maximize bandwidth.

Note[3]: Capacitance across open switch

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

Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

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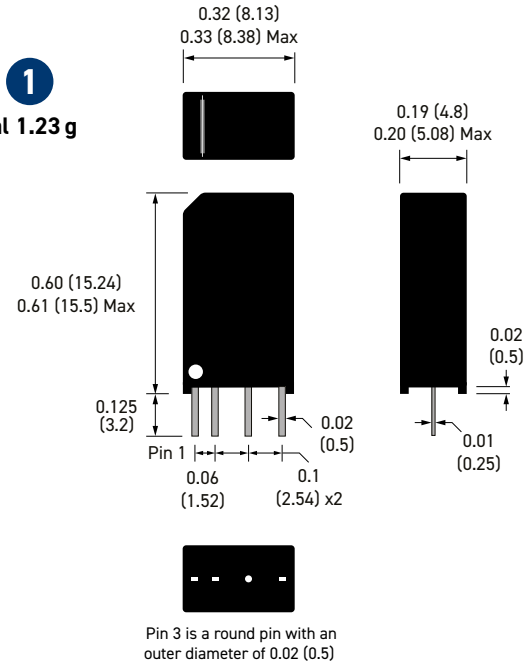
For different values, latest specifications and product details, please contact your local Pickering sales office.

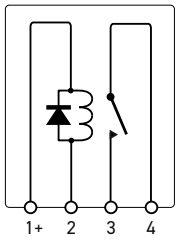
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 1.23 g



1 Form A



Important: Where the optional internal diode is fitted the correct coil polarity must be observed, as shown by the + symbol on the schematics. Pin 1 is the positive connection.

Similar Relays Comparison

The Series 118 is unique in the Pickering range of reed relays. Pickering do not manufacture another series of relays with similar characteristics.

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Standard Build Options

The Series 118 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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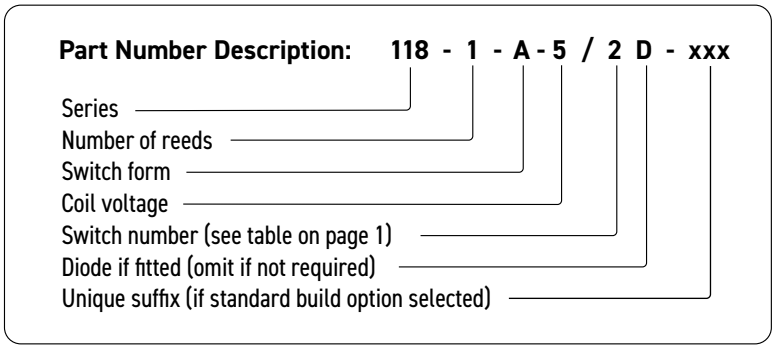

Help

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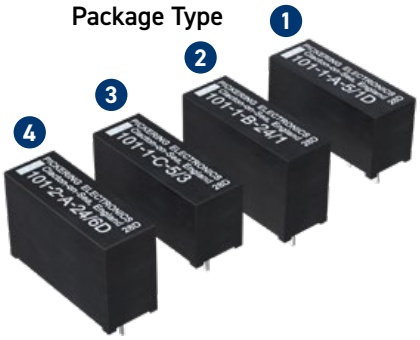
- Direct drive from **74HC** or **HCT**
- Stacking on **0.3 inches** pitch
- Highest quality instrumentation grade dry switches
- Board space may be saved by eliminating the need for drivers
- Encapsulated in plastic package with internal mu-metal magnetic screen
- **1 Form A**, **2 Form A**, **1 Form B** & **1 Form C** configurations
- Two Pole relay requires the same board area as the single pole type
- Insulation resistance **$>10^{12}\,\Omega$** for dry **Form A** devices
- **3 V**, **5 V**, **12 V** or **24 V** Coils with optional internal diode
- Additional Build options are available
- Many benefits compared to industry standard relays (see here)



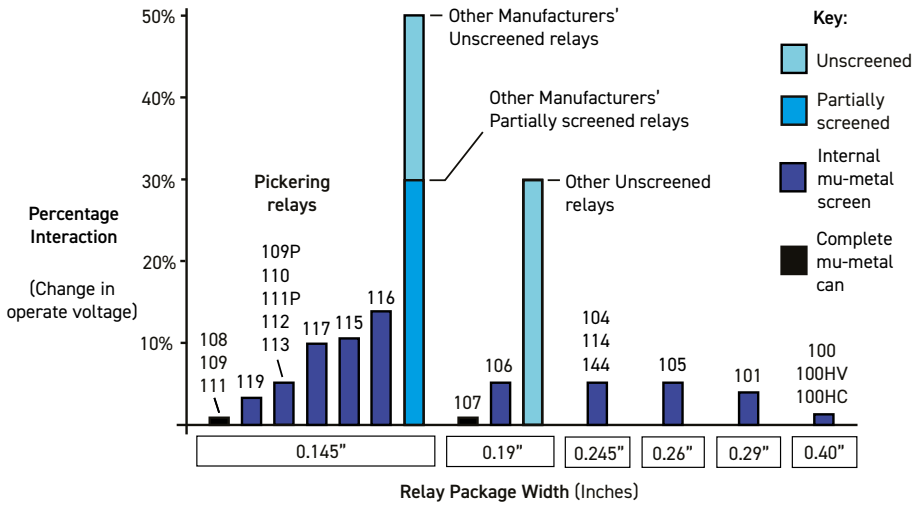
The Series 101 have very high coil resistances. 5 V dry versions may be driven directly from 74HC or 74HCT logic without the need for additional drivers.

74HC logic will drive up to 4 mA at 5 V, therefore a coil resistance of 1600 Ω is desirable to avoid running the IC at its maximum rating; 1600 Ω is the coil resistance of the single pole dry Series 101.

The switches in the 2 Form A version are vertically stacked so the relay requires the same board area as the 1 Form A type.

A special 1 Form A, 5 V version is available with an even higher coil resistance of 3000 Ω. This is particularly suited to applications such as battery powered portable equipment as it requires a coil current of only 1.7 mA. This part, the 101-1-A-5/17 or 17D has the advantage of a lower level of thermal EMF of 3 µV or less. Other special parts are also available that may be operated from 3 V logic.

Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (changeover)	2 Form A (energize to make)
Up to 1 A switching at 20 W	Up to 1 A switching at 20 W	0.25 A switching at 3 W	Up to 1 A switching at 20 W

Dry Reed: Series 101 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A or B	20 W (*15 W)	1.0 A	1.2 A	200	10^9	1.0 ms	0.75 ms	General purpose
2	A or B	10 W	0.5 A	1.2 A	200	10^9	1.0 ms	0.75 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.25 ms	1.0 ms	Change over
4	A	10 W	0.5 A	1.2 A	500	10^8	1.0 ms	0.75 ms	1000 V stand-off

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 101 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 (*Note 15 W for 3 V coil) Package Type 1	101-1-A-3/1D *	3	800 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	101-1-A-5/1D	5	1600 Ω					
	101-1-A-12/1D	12	6000 Ω					
	101-1-A-24/1D	24	6000 Ω					
1 Form A Switch No. 2 Package Type 1	101-1-A-3/2D	3	1600 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	101-1-A-5/2D	5	1600 Ω					
	101-1-A-12/2D	12	6000 Ω					
	101-1-A-24/2D	24	6000 Ω					
1 Form A HV Switch No. 4 Package Type 1	101-1-A-5/4D	5	1600 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	101-1-A-12/4D	12	6000 Ω					
	101-1-A-24/4D	24	6000 Ω					
1 Form B, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 2	101-1-B-5/1D *	5	3000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	101-1-B-12/1D	12	6000 Ω					
	101-1-B-24/1D	24	6000 Ω					
1 Form B Switch No. 2 Package Type 2	101-1-B-5/2D	5	3000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	101-1-B-12/2D	12	6000 Ω					
	101-1-B-24/2D	24	6000 Ω					
1 Form C Switch No. 3 Package Type 3	101-1-C-3/3D	3	700 Ω	0.20 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	101-1-C-5/3D	5	1600 Ω					
	101-1-C-12/3D	12	6000 Ω					
	101-1-C-24/3D	24	6000 Ω					
2 Form A, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 4	101-2-A-5/1D *	5	1000 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	101-2-A-12/1D	12	3000 Ω					
	101-2-A-24/1D	24	6000 Ω					
2 Form A Switch No. 2 Package Type 4	101-2-A-3/2D	3	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	101-2-A-5/2D	5	1000 Ω					
	101-2-A-12/2D	12	3000 Ω					
	101-2-A-24/2D	24	6000 Ω					
1 Form A, Switch No. 2 (Special Extra Sensitive Version) Package Type 1	101-1-A-5/17D	5	3000 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

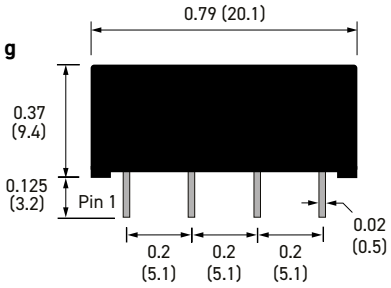
Note[4]: Insulation resistance

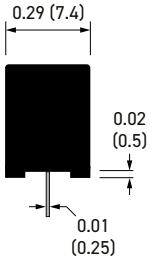
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

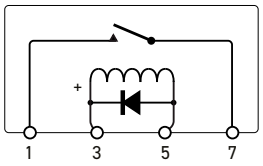
Package Type 1

Weight: Typical 2.92 g



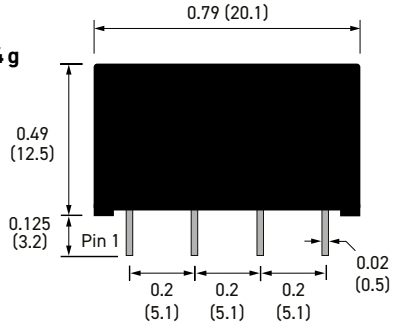


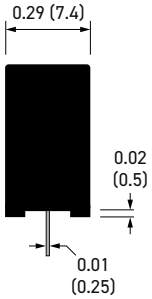
1 Form A



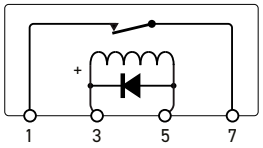
Package Type 2

Weight: Typical 3.34 g



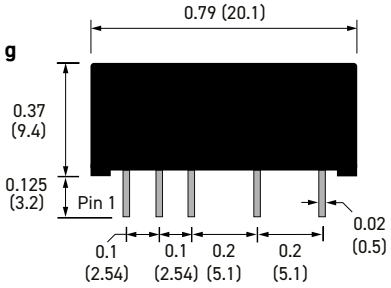


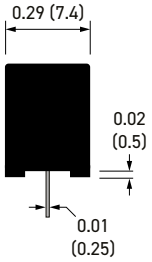
1 Form B (see Note)



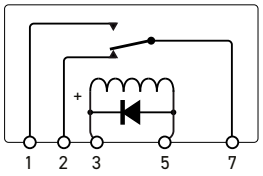
Package Type 3

Weight: Typical 3.03 g



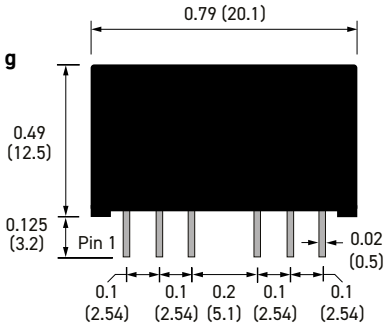


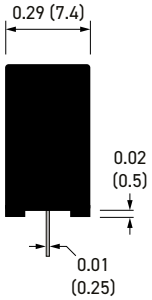
1 Form C



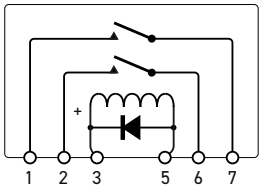
Package Type 4

Weight: Typical 3.45 g





2 Form A



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.

Similar Relays Comparison

If the Series 101 is unsuitable for your application, Pickering also manufactures another series of reed relays with similar characteristics, but in different package sizes.

Series Name		100-1-A			100-1-B	100-1-C	100-2-A	101-1-A			101-1-B	101-1-C	101-2-A	
Physical Outline														
Depth	mm (inches)	10.2 (0.40)			10.2 (0.40)	10.2 (0.40)	10.2 (0.40)	7.4 (0.29)			7.4 (0.29)	7.4 (0.29)	7.4 (0.29)	
Width		24.1 (0.95)			24.1 (0.95)	24.1 (0.95)	24.1 (0.95)	20.1 (0.79)			20.1 (0.79)	20.1 (0.79)	20.1 (0.79)	
Height		12.7 (0.50)			15.2 (0.60)	12.7 (0.50)	15.2 (0.60)	9.4 (0.37)			12.5 (0.49)	9.4 (0.37)	12.5 (0.49)	
Package Volume (mm³)		3122			3737	3122	3737	① 1399			② 1860	1399	1860	
Typical Weights (g)		7.07			8.82	6.65	8.89	2.92			3.34	3.03	3.45	
Contact Configuration		1-A (SPST)			1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)			1-B (SPNC)	1-C (SPDT)	2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (V)		-	-	1000	-	-	-	-	-	1000	-	-	-	-
Switching Voltage (V)		200	200	500	200	200	200	200	200	500	200	200	200	200
Switching Current (A)		1.0	0.5	0.5	1D: 1.0 2D: 0.5	0.25	1D: 1.0 2D: 0.5	1.0	0.5	0.5	1D: 1.0 2D: 0.5	0.25	1.0	0.5
Carry Current (A)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (W)		20 (15)	10	10	1D: 20(15) 2D: 10	3	1D: 20(15) 2D: 10	20 (15)	10	10	1D: 20(15) 2D: 10	3	20 (15)	10

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

Mercury Relays

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The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Standard Build Options

The Series 101 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

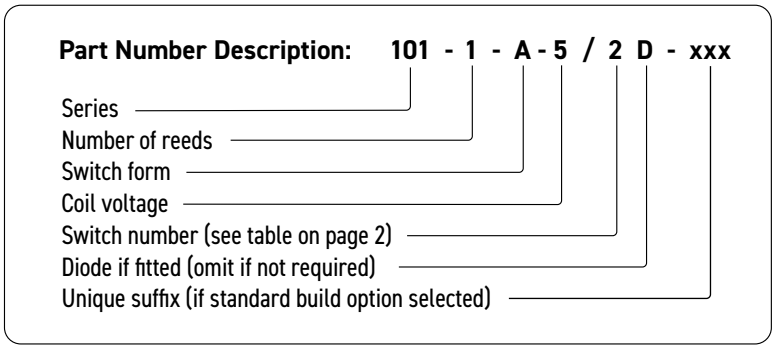
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

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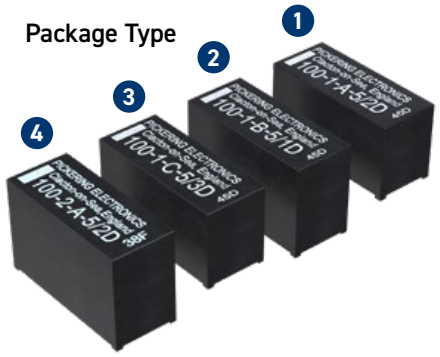
- Direct drive from CMOS
- Highest quality instrumentation grade switches
- Thermal EMF about **1 µV** or Less
- Low power consumption, ideal for portable equipment
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- **1 Form A**, **2 Form A**, **1 Form B** & **1 Form C** configurations
- Two pole relay requires the same board area as the single pole type
- Dry switches
- Insulation resistance **>10^{12} Ω** for Dry Form A devices
- **3 V**, **5 V**, **12 V** or **24 V** coils with optional internal diode
- Suitable for data acquisition or thermocouple switching
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



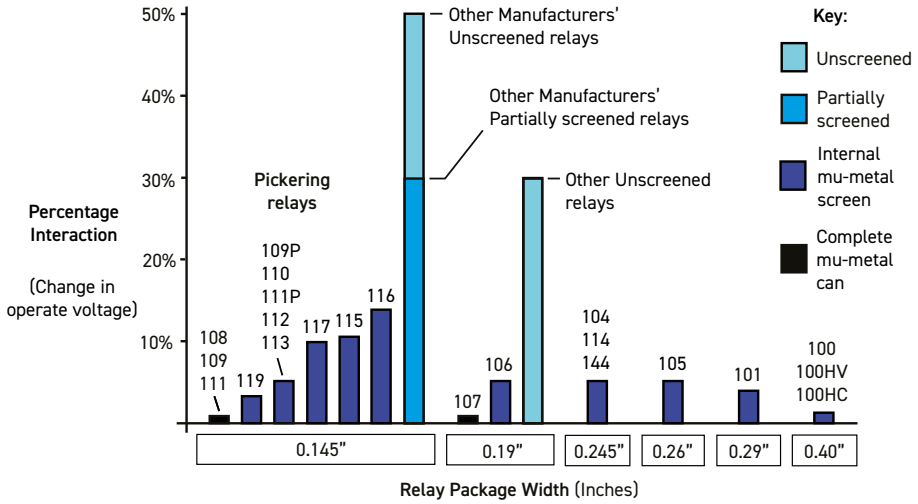
The Pickering Series 100 is a complete range of Single-in- Line (SIL) reed relays primarily intended for direct drive from 4000B CMOS or NMOS logic or similar low current sources.

They are also useful for applications where conservation of current is important, for example, battery powered equipment.

If you do not require quite such high coil resistances or if a slightly smaller device is desired, please look also at our Series 101 which may be driven directly by 74HC or 74HCT logic.

Other special parts are also available that may be operated from 3 V logic, please contact our Sales Office for further information.

Magnetic Interaction



This chart demonstrates the percentage changes in operate voltage due to magnetic interaction depending on the level of magnetic screening offered from the relay package. For more information on magnetic interaction **click here**.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (changeover)	2 Form A (energize to make)
Up to 1.0 A switching at 20 W 10 W at 500 V	Up to 1.0 A switching at 20 W	0.25 A switching at 3 W	Up to 1.0 A switching at 20 W

Dry Reed: Series 100 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A or B	20 W (*15 W)	1.0 A	1.2 A	200	10^8	1.0 ms	1.0 ms	General purpose
2	A or B	10 W	0.5 A	1.2 A	200	10^8	1.0 ms	1.0 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^8	1.0 ms	1.0 ms	Change over
4	A	10 W	0.5 A	1.2 A	500	10^8	1.75 ms	1.75 ms	1000 V stand-off

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Dry Relay: Series 100 Coil data and type numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 1	100-1-A-5/1D *	5	3300 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	3.5 pF	0.1 pF
	100-1-A-12/1D	12	6800 Ω					
	100-1-A-24/1D	24	6800 Ω					
1 Form A Switch No. 2 Package Type 1	100-1-A-3/2D	3	2000 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	3.5 pF	0.1 pF
	100-1-A-5/2D	5	3300 Ω					
	100-1-A-12/2D	12	6800 Ω					
	100-1-A-24/2D	24	6800 Ω					
1 Form A HV Switch No. 4 Package Type 1	100-1-A-5/4D	5	2200 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	3 pF	0.1 pF
	100-1-A-12/4D	12	6800 Ω					
	100-1-A-24/4D	24	6800 Ω					
1 Form B, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 2	100-1-B-5/1D *	5	2700 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	100-1-B-12/1D	12	6000 Ω					
	100-1-B-24/1D	24	6000 Ω					
1 Form B Switch No. 2 Package Type 2	100-1-B-5/2D	5	2700 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	100-1-B-12/2D	12	6000 Ω					
	100-1-B-24/2D	24	6000 Ω					
1 Form C Switch No. 3 Package Type 3	100-1-C-5/3D	5	3300 Ω	0.20 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	100-1-C-12/3D	12	6800 Ω					
	100-1-C-24/3D	24	6800 Ω					
2 Form A, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 4	100-2-A-5/1D *	5	2700 Ω	0.20 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	100-2-A-12/1D	12	6000 Ω					
	100-2-A-24/1D	24	6000 Ω					
2 Form A Switch No. 2 Package Type 4	100-2-A-5/2D	5	2700 Ω	0.18 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	100-2-A-12/2D	12	6000 Ω					
	100-2-A-24/2D	24	6000 Ω					

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

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

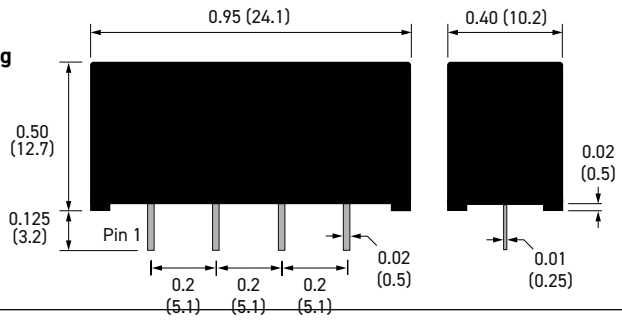
Note[4]: Insulation resistance

Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

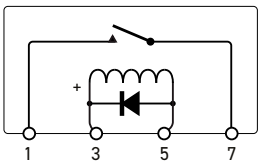
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 7.07 g

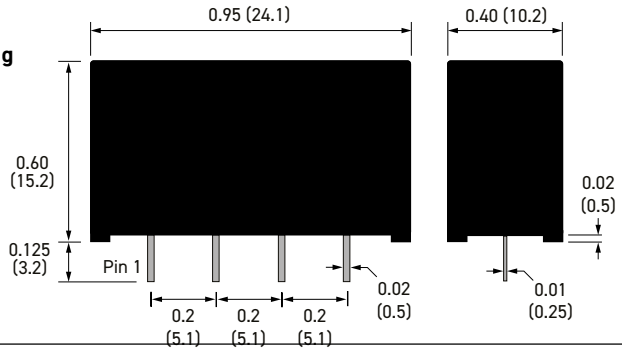


1 Form A

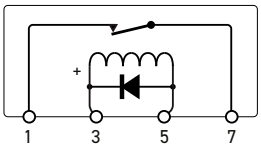


Package Type 2

Weight: Typical 8.82 g

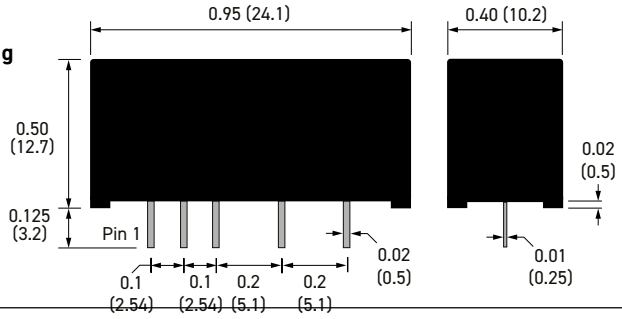


1 Form B (see Note)

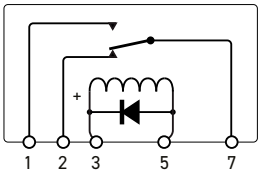


Package Type 3

Weight: Typical 6.65 g

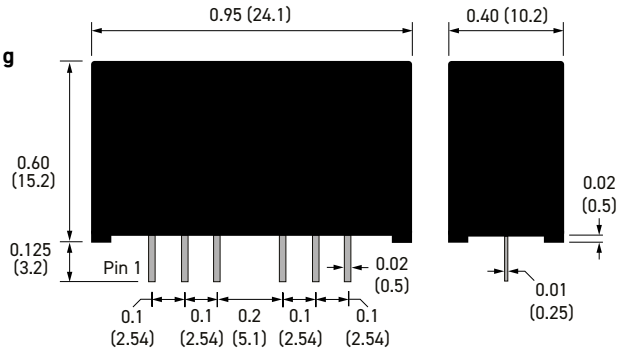


1 Form C

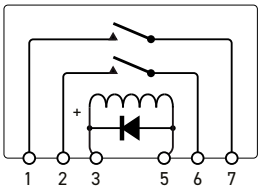


Package Type 4

Weight: Typical 8.89 g



2 Form A



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.

Similar Relays Comparison

If the Series 100 is unsuitable for your application, Pickering also manufactures another series of reed relays with similar characteristics, but in different package sizes.

Series Name		100-1-A			100-1-B	100-1-C	100-2-A	101-1-A			101-1-B	101-1-C	101-2-A	
Physical Outline														
Depth	mm (inches)	10.2 (0.40)			10.2 (0.40)	10.2 (0.40)	10.2 (0.40)	7.4 (0.29)			7.4 (0.29)	7.4 (0.29)	7.4 (0.29)	
Width		24.1 (0.95)			24.1 (0.95)	24.1 (0.95)	24.1 (0.95)	20.1 (0.79)			20.1 (0.79)	20.1 (0.79)	20.1 (0.79)	
Height		12.7 (0.50)			15.2 (0.60)	12.7 (0.50)	15.2 (0.60)	9.4 (0.37)			12.5 (0.49)	9.4 (0.37)	12.5 (0.49)	
Package Volume (**mm³**)		❶ 3122			❷ 3737	❸ 3122	❹ 3737	1399			1860	1399	1860	
Typical Weights (**g**)		7.07			8.82	6.65	8.89	2.92			3.34	3.03	3.45	
Contact Configuration		1-A (SPST)			1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)			1-B (SPNC)	1-C (SPDT)	2-A (DPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		-	-	1000	-	-	-	-	-	1000	-	-	-	-
Switching Voltage (**V**)		200	200	500	200	200	200	200	200	500	200	200	200	200
Switching Current (**A**)		1.0	0.5	0.5	1D: 1.0 2D: 0.5	0.25	1D: 1.0 2D: 0.5	1.0	0.5	0.5	1D: 1.0 2D: 0.5	0.25	1.0	0.5
Carry Current (**A**)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		20 (15)	10	10	1D: 20(15) 2D: 10	3	1D: 20(15) 2D: 10	20 (15)	10	10	1D: 20(15) 2D: 10	3	20 (15)	10

Mercury Relays

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Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
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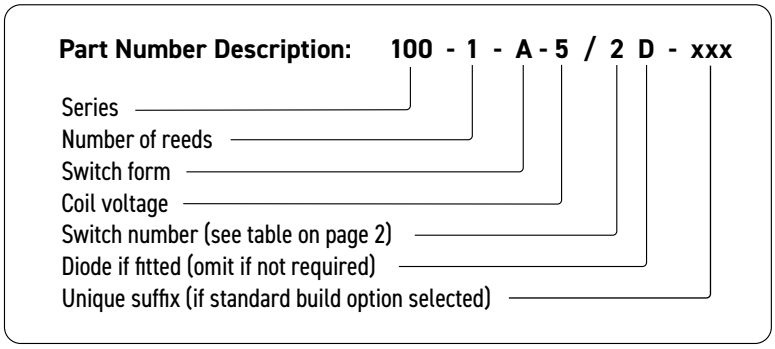

Help

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- Direct drive from **74HC** or **HCT**
- PIN compatible with standard dil relays
- Board space may be saved by eliminating drivers
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Wide range of switch configurations - **1 Form A**, **1 Form B**, **2 Form A** & **1 Form C**
- Dry switches
- **5**, **12** or **24 V** coils with or without internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

1 **Package Type**

The Pickering Series 98 is a range of Dual-In-Line relays, electrically equivalent to the Series 101 CMOS drive, Single-In-Line types, but pin compatible with standard DIL relays.

74HC logic will drive up to 4 mA at 5 V which means that a nominal coil resistance of 1600 Ω is required to avoid running the IC at its maximum rating; 1600 Ω is the coil resistance of the single pole dry Series 98. A special model with an even higher coil resistance of 3000 Ω is also available, our type number 98-1-A-5/17D (the D suffix indicates an internal diode).

It is often possible to replace TTL ICs with their equivalent CMOS ones and replace standard DIL relays with Pickering Series 98, to obtain the benefits of CMOS without any circuit or PCB redesign.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (change-over)	2 Form A (energize to make)
10 W at 200 V 10 W at 300 V 15 W at 200 V	15 W at 200 V	3 W at 200 V	10 W at 200 V 15 W at 200 V

Dry Reed - Series 98 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Operate time inc bounce (max)	Release time	Special features
1	A or B	15 W	1.0 A	1.2 A	200	10^8	1.0 ms	0.75 ms	General purpose
2	A	10 W	0.5 A	1.2 A	200	10^8	1.0 ms	0.75 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.25 ms	1.0 ms	Change-over
4	A	10 W	0.5 A	1.2 A	300	10^8	1.0 ms	0.75 ms	500 V stand-off

Switch no.2 is particularly good for switching low currents and/or voltages. It is the ideal switch for A.T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch no.1 is more suitable.

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive), or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Mercury Relays

Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

Dry Reed - Coil Data and Type Numbers

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 1	98-1-A-5/1D	5	1600 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	98-1-A-12/1D	12	6000 Ω					
	98-1-A-24/1D	24	6000 Ω					
1 Form A Switch No. 2 Package Type 1	98-1-A-5/2D	5	1600 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	98-1-A-12/2D	12	6000 Ω					
	98-1-A-24/2D	24	6000 Ω					
1 Form A HV Switch No. 4 Package Type 1	98-1-A-5/4D	5	1600 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.0 pF	0.1 pF
	98-1-A-12/4D	12	6000 Ω					
	98-1-A-24/4D	24	6000 Ω					
1 Form B Switch No. 1 Package Type 1	98-1-B-5/1D	5	3000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	98-1-B-12/1D	12	6000 Ω					
	98-1-B-24/1D	24	6000 Ω					
1 Form C Switch No. 3 Package Type 1	98-1-C-5/3D	5	1600 Ω	0.20 Ω	10^{12} Ω	10^{10} Ω	See Note[3]	See Note[3]
	98-1-C-12/3D	12	6000 Ω					
	98-1-C-24/3D	24	6000 Ω					
2 Form A Switch No. 1 Package Type 1	98-2-A-5/1D	5	1000 Ω	0.17 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	98-2-A-12/1D	12	3000 Ω					
	98-2-A-24/1D	24	6000 Ω					
2 Form A Low Level Switch No. 2 Package Type 1	98-2-A-5/2D	5	1000 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	98-2-A-12/2D	12	3000 Ω					
	98-2-A-24/2D	24	6000 Ω					
1 Form A (Special Extra Sensitive Version) Switch No. 2 Package Type 1	98-1-A-5/17D	5	3000 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF

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

Note[2]: Capacitance across open switch

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

Note[3]: Capacitance values

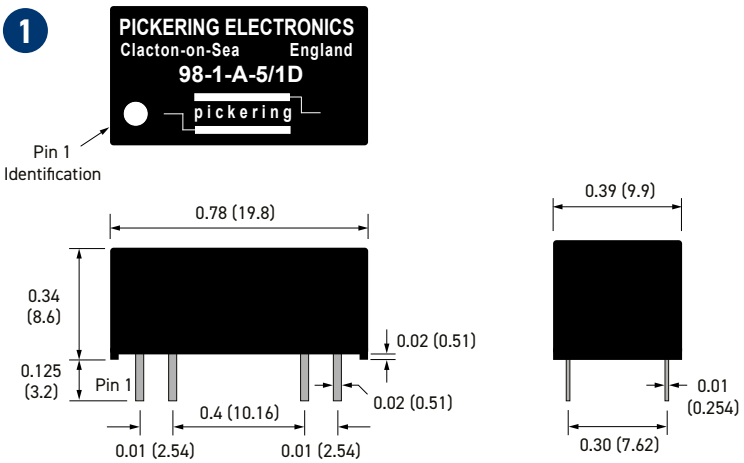
The value will depend upon on the mode of connection/guarding of unused terminals. Please contact technical sales for details.

Note[4]: Insulation resistance

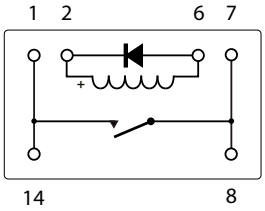
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

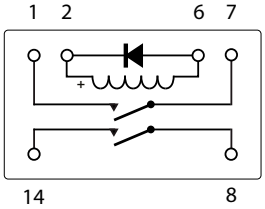
Package Type 1



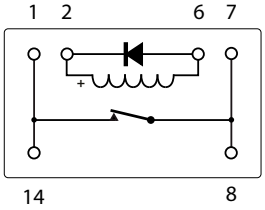
Schematics are shown from **UNDERNEATH** the relay.



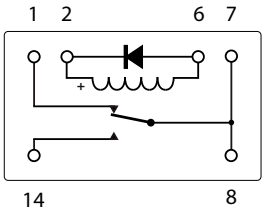
1 Form A
Weight: Typical 3.38 g



2 Form A
Weight: Typical 3.20 g



1 Form B
Weight: Typical 2.98 g



1 Form C
Weight: Typical 3.2 g

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.

Similar Relays Comparison

If the Series 98 is unsuitable for your application, Pickering also manufactures another series of reed relays with similar characteristics, but in a different package size.

Series Name		97-1-A		97-2-A	97-1-B	97-1-C	98-1-A			98-2-A	98-1-B	98-1-C
Physical Outline												
Depth	mm (inches)	10.7 (0.42)					9.9 (0.39)					
Width		18.8 (0.74)					19.8 (0.78)					
Height		9.4 (0.37)					8.6 (0.34)					
Package Volume (mm^3)		1891					❶ 1686					
Typical Weights (**g**)		2.93		2.80	3.01	2.95	3.38			3.20	2.98	3.20
Contact Configuration		1-A (SPST)		2-A (DPST)	1-B (SPNC)	1-C (SPDT)	1-A (SPST)			2-A (DPST)	1-B (SPNC)	1-C (SPDT)
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		-	500	-	-	-	-	-	500	-	-	-
Switching Voltage (**V**)		200	300	200	200	200	200	200	300	200	200	200
Switching Current (**A**)		0.5	0.5	0.5	0.5	0.25	1.0	0.5	0.5	0.5	1.0	0.25
Carry Current (**A**)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		10	10	10	10	3	15	10	10	10	15	3

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

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For different values, latest specifications and product details, please contact your local Pickering sales office.

For FREE evaluation samples go to: pickeringrelay.com/samples

Standard Build Options

The Series 98 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

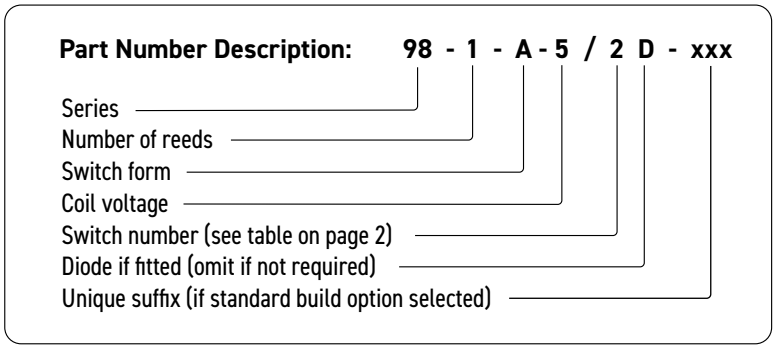
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

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- Up to **10 W** switching
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Wide range of switch configurations - **1 Form A**, **1 Form B**, **2 Form A** & **1 Form C**
- Dry switches
- **5**, **12** or **24 V** coils with or without internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see here)

1 **Package Type**

The Series 97 is a range of reed relays with pins in the popular Dual-in-Line format.

Being encapsulated in a plastic package using a very high resistivity epoxy resin gives the device several advantages over the more usual moulded construction. The reed switches are not subjected to the high temperatures and pressures of the transfer moulding process with the inherent risk of damage to the sensitive glass to metal seals. .

If higher coil resistance levels are required, please look at our Series 98 DIL relays which may be driven directly from 74HC or 74HCT CMOS logic.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (change-over)	2 Form A (energize to make)
10 W at 200 V 10 W at 300 V	10 W at 200 V	3 W at 200 V	10 W at 200 V

Dry Reed - Series 97 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Special features
1	A or B	10 W	0.5 A	1.2 A	200	10^8	General purpose
3	C	3 W	0.25 A	1.2 A	200	10^7	Change-over
4	A	10 W	0.5 A	1.2 A	300	10^8	500 V stand-off

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. For an end of life contact resistance specification of 1Ω, switching low loads (10 V at 10 mA resistive), or when 'cold' switching, typical life is approx 1 x 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Mercury Relays

Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

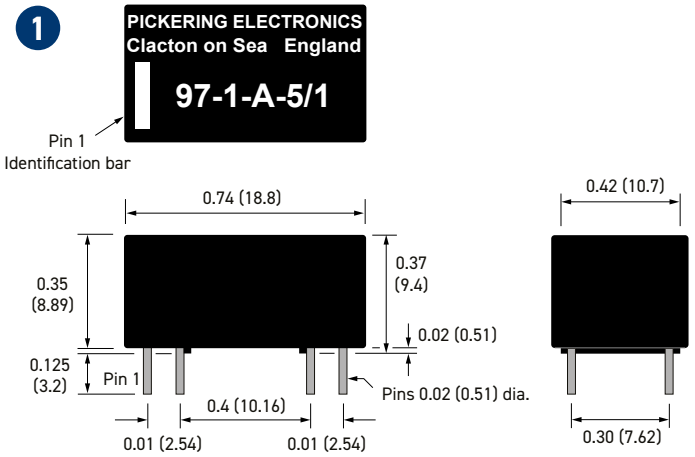
Dry Reed - Series 97 Coil data and type numbers

Device Type	Type Number Series 97	Coil (V)	Coil resistance	Max. contact resistance (initial)
1 Form A Switch No. 1 Package Type 1	97-1-A-5/1D	5	500 Ω	0.15 Ω
	97-1-A-12/1D	12	1000 Ω	
	97-1-A-24/1D	24	3000 Ω	
1 Form A HV Switch No. 4 Package Type 1	97-1-A-5/4D	5	500 Ω	0.15 Ω
	97-1-A-12/4D	12	1000 Ω	
	97-1-A-24/4D	24	3000 Ω	
1 Form B Switch No. 1 Package Type 1	97-1-B-5/1D	5	1000 Ω	0.15 Ω
	97-1-B-12/1D	12	3000 Ω	
	97-1-B-24/1D	24	3000 Ω	
1 Form C Switch No. 3 Package Type 1	97-1-C-5/3D	5	500 Ω	0.20 Ω
	97-1-C-12/3D	12	1000 Ω	
	97-1-C-24/3D	24	3000 Ω	
2 Form A Switch No. 1 Package Type 1	97-2-A-5/1D	5	500 Ω	0.17 Ω
	97-2-A-12/1D	12	1000 Ω	
	97-2-A-24/1D	24	3000 Ω	

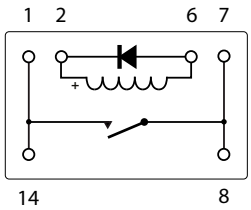
When an internal diode is required, the suffix D is added to the part number as shown in the table.

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

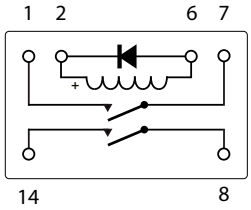
Package Type 1



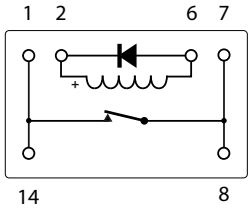
Schematics are shown from **UNDERNEATH** the relay.



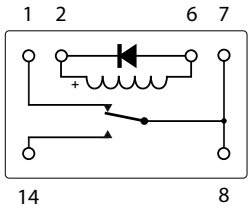
1 Form A
Weight: Typical 2.93 g



2 Form A
Weight: Typical 2.80 g



1 Form B
Weight: Typical 3.02 g



1 Form C
Weight: Typical 2.95 g

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.

Similar Relays Comparison

If the Series 97 is unsuitable for your application, Pickering also manufactures another series of reed relays with similar characteristics, but in a different package size.

Series Name		97-1-A		97-2-A	97-1-B	97-1-C	98-1-A			98-2-A	98-1-B	98-1-C
Physical Outline												
Depth	mm (inches)	10.7 (0.42)					9.9 (0.39)					
Width		18.8 (0.74)					19.8 (0.78)					
Height		9.4 (0.37)					8.6 (0.34)					
Package Volume (mm^3)		1 1891					1686					
Typical Weights (**g**)		2.93		2.80	3.01	2.95	3.38			3.20	2.98	3.20
Contact Configuration		1-A (SPST)		2-A (DPST)	1-B (SPNC)	1-C (SPDT)	1-A (SPST)			2-A (DPST)	1-B (SPNC)	1-C (SPDT)
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
Stand-off Voltage (**V**)		-	500	-	-	-	-	-	500	-	-	-
Switching Voltage (**V**)		200	300	200	200	200	200	200	300	200	200	200
Switching Current (**A**)		0.5	0.5	0.5	0.5	0.25	1.0	0.5	0.5	0.5	1.0	0.25
Carry Current (**A**)		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (**W**)		10	10	10	10	3	15	10	10	10	15	3

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

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For FREE evaluation samples go to: pickeringrelay.com/samples

Standard Build Options

The Series 97 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

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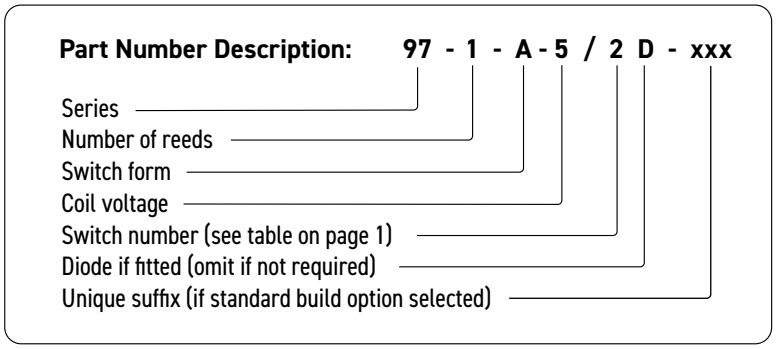

Help

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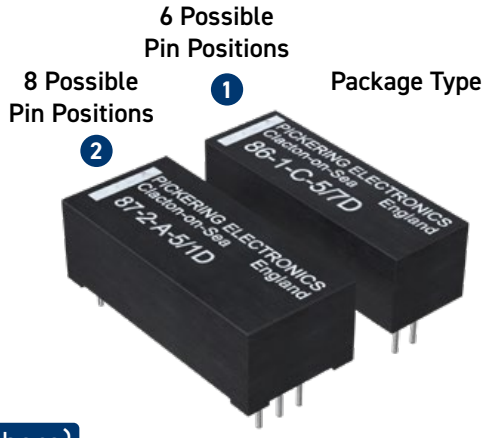
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Wide range of switch configurations - **1 Form A**, **1 Form B**, **2 Form A** & **1 Form C**
- Dry switches
- **5**, **12** or **24 V** coils with or without internal diode
- Switching up to **10 W**, **0.5 A**
- Up to **6000 Ω** coil resistance
- Additional build options are available
- Many benefits compared to industry standard relays (see here)



These ranges of reed relays are essentially the same as the dry Series 80 and 85 but with coil resistances between 2 and 3 times higher. This feature is particularly useful when using large numbers of relays, to reduce overall current requirements and heating effects, or when the available coil drive power is restricted, for example, in battery operated equipment.

Many special resistances are available, and relays can be designed to customers specific requirements.

These Pickering reed relays fit straight onto P.C. boards with pins on 0.1 inch grid. They are completely protected, being encapsulated with plastic covers. All relays are fitted with internal magnetic screens to avoid stray magnetic interaction between adjacent relays.

The Series 86 and 87 are electrically identical ranges but offer alternative pin configurations.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (change-over)	2 Form A (energize to make)
10 W at 200 V	10 W at 200 V	3 W at 200 V	10 W at 200 V

Series 86, 87 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Special features
1	A or B	10 W	0.5 A	1.2 A	200	10^8	General purpose
7	C	3 W	0.25 A	1.2 A	200	10^7	Change-over

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 1×10^9 ops. At the maximum load (resistive), typical life is 1×10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Mercury Relays

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Series 86, 87 Coil data and type numbers

Device Type	Type Number Series 80	Type Number Series 85	Coil (V)	Coil resistance	Max. contact resistance (initial)
1 Form A Switch No. 1 Package Type 1	86-1-A-5/1D	87-1-A-5/1D	5	1000 Ω	0.15 Ω
	86-1-A-12/1D	87-1-A-12/1D	12	3000 Ω	
	86-1-A-24/1D	87-1-A-24/1D	24	6000 Ω	
1 Form B Switch No. 1 Package Type 2	86-1-B-5/1D	87-1-B-5/1D	5	1000 Ω	0.15 Ω
	86-1-B-12/1D	87-1-B-12/1D	12	3000 Ω	
	86-1-B-24/1D	87-1-B-24/1D	24	6000 Ω	
1 Form C Switch No. 7 Package Type 1	86-1-C-5/7D	87-1-C-5/7D	5	1000 Ω	0.20 Ω
	86-1-C-12/7D	87-1-C-12/7D	12	3000 Ω	
	86-1-C-24/7D	87-1-C-24/7D	24	6000 Ω	
2 Form A Switch No. 1 Package Type 2	86-2-A-5/1D	87-2-A-5/1D	5	1000 Ω	0.15 Ω
	86-2-A-12/1D	87-2-A-12/1D	12	3000 Ω	
	86-2-A-24/1D	87-2-A-24/1D	24	6000 Ω	

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

Reed Relay Selection Tool

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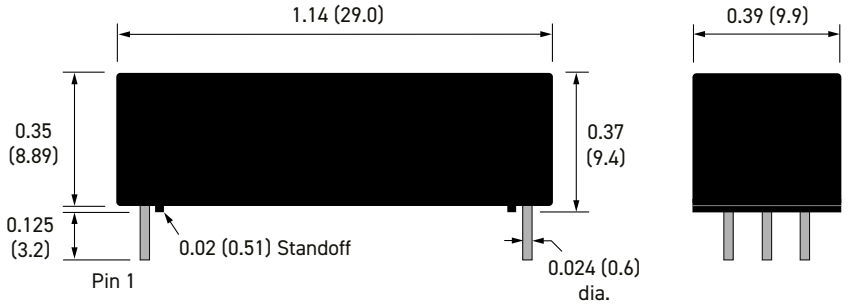
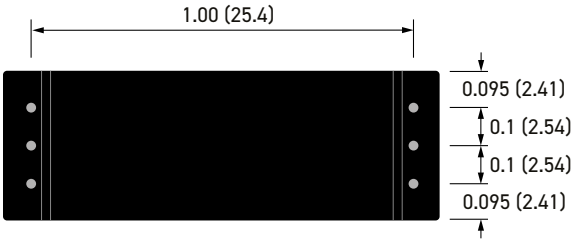
For FREE evaluation samples go to: pickeringrelay.com/samples

Pin Configuration, Weight & Dimensional Data (dimensions in inches, millimeters in brackets)

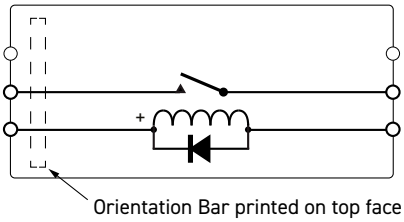
Package Type **1**

6 Pin Position Devices

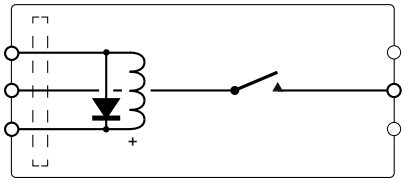




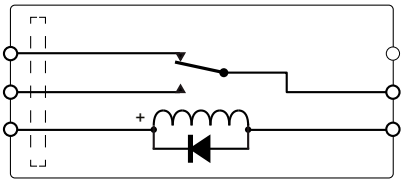
Schematics are shown from **UNDERNEATH** the relay.



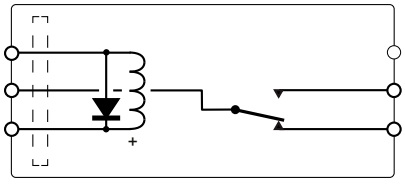
1 Form A (Series 86)
Weight: Typical 5.70 g



1 Form A (Series 87)
Weight: Typical 4.40 g



1 Form C (Series 86)
Weight: Typical 5.71 g



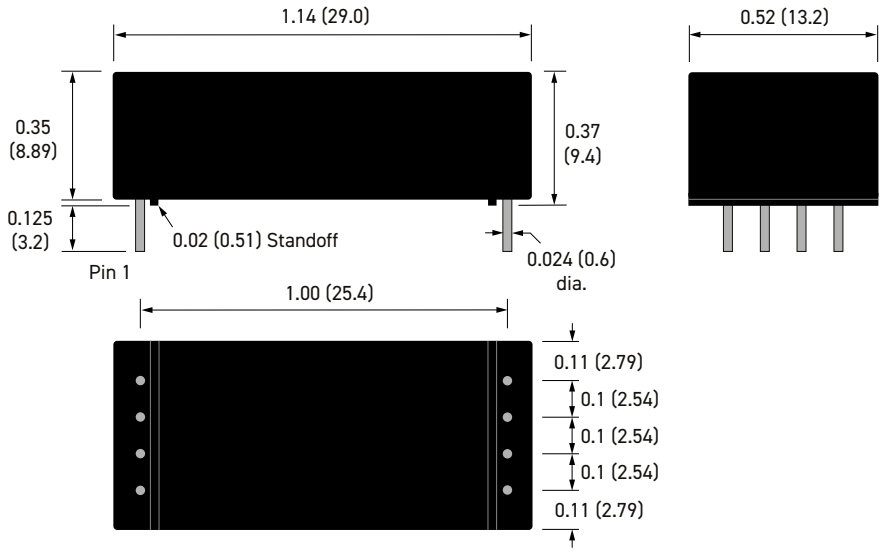
1 Form C (Series 87)
Weight: Typical 5.71 g

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.

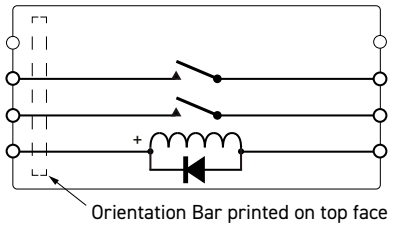
Pin Configuration, Weight & Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **2**

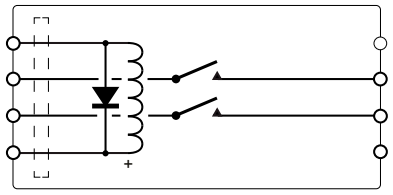
8 Pin Position Devices



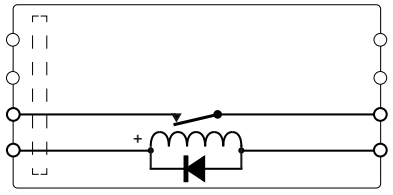
Schematics are shown from **UNDERNEATH** the relay.



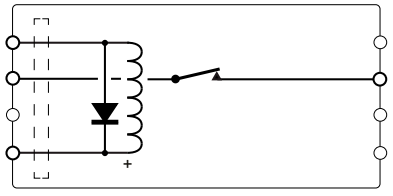
2 Form A (Series 86)
Weight: Typical 6.48 g



2 Form A (Series 87)
Weight: Typical 7.18 g



1 Form B (Series 86)
Weight: Typical 8.05 g

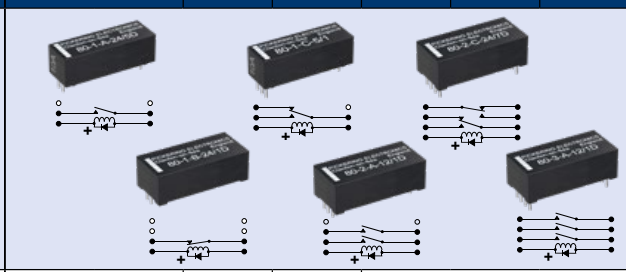
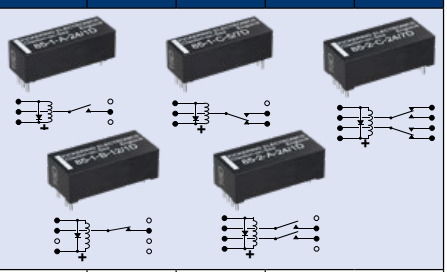


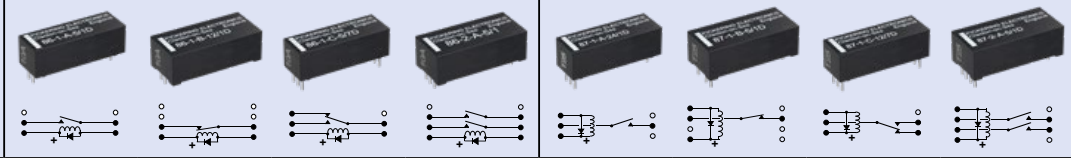
1 Form B (Series 87)
Weight: Typical 8.05 g

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.

Similar Relays Comparison (Dry Relays)

If the Series 86 and 87 are unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics and package sizes, but differing leg positions.

Series Name		80-1-A		80-1-B	80-1-C	80-2-A	80-2-C	80-3-A	85-1-A	85-1-B	85-1-C	85-2-A	85-2-C
Physical Outline including Pin Positions and Schematic													
Depth	mm (inches)	9.9 (0.39)		13.2 (0.52)	9.9 (0.39)	13.2 (0.52)			9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)	
Width		29.0 (1.14)		29.0 (1.14)	29.0 (1.14)	29.0 (1.14)			29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	
Height		9.4 (0.37)		9.4 (0.37)	9.4 (0.37)	9.4 (0.37)			9.4 (0.37)	9.4 (0.37)	9.4 (0.37)	9.4 (0.37)	
Package Volume (mm^3)		2699		3599	2699	3599			2699	3599	2699	3599	
Typical Weights (**g**)		4.74		9.27	4.69	6.48	5.58	6.55	4.85	9.27	4.69	7.18	7.45
Contact Configuration		1-A (SPST)		1-B (SPNC)	1-C (SPDT)	2-A (DPST)	2-C (DPDT)	3-A (3PST)	1-A (SPST)	1-B (SPNC)	1-C (SPDT)	2-A (DPST)	2-C (DPDT)
Reed Switch Type		Dry							Dry				
Stand-off Voltage (**V**)		-	1000	-	-	-	-	-	-	-	-	-	-
Switching Voltage (**V**)		200	500	200					200				
Switching Current (**A**)		0.5	0.5	0.5	0.25	0.5	0.25	0.5	0.5	0.5	0.25	0.5	0.25
Carry Current (**A**)		1.2							1.2				
Switch Power (**W**)		10	10	10	3	10	3	10	10	10	3	10	3

Series Name		86-1-A	86-1-B	86-1-C	86-2-A	87-1-A	87-1-B	87-1-C	87-2-A
Physical Outline including Pin Positions and Schematic									
Depth	mm (inches)	9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)
Width		29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)
Height		9.4 (0.37	9.4 (0.37)	9.4 (0.37	9.4 (0.37)	9.4 (0.37	9.4 (0.37)	9.4 (0.37	9.4 (0.37)
Package Volume (mm^3)		❶ 2699	❷ 3599	❶ 2699	❷ 3599	❶ 2699	❷ 3599	❶ 2699	❷ 3599
Typical Weights (**g**)		5.70	8.05	5.71	6.48	4.40	8.05	5.71	7.18
Contact Configuration		1-A (SPST)	1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)	1-B (SPNC)	1-C (SPDT)	2-A (DPST)
Reed Switch Type		Dry				Dry			
Stand-off Voltage (**V**)		-	-	-	-	-	-	-	-
Switching Voltage (**V**)		200				200			
Switching Current (**A**)		0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.5
Carry Current (**A**)		1.2				1.2			
Switch Power (**W**)		10	10	3	10	10	10	3	10

Standard Build Options

The Series 86 and 87 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

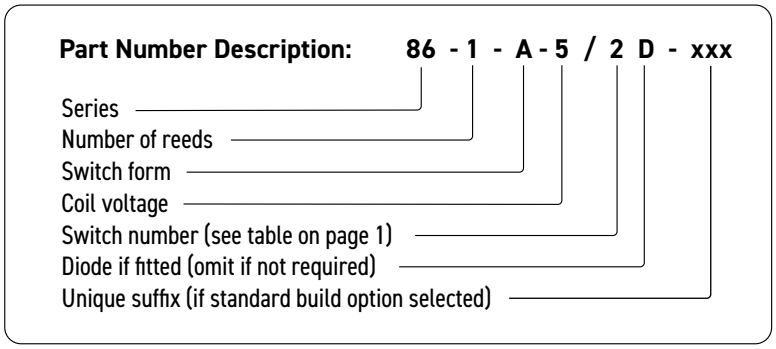
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Wide range of switch configurations
- Dry switches
- **5**, **12** or **24 V** coils with or without internal diode
- **5 V** dry devices may be driven directly from TTL
- Additional build options are available
- Many Benefits Compared to Industry Standard Relays (see here)

6 Possible Pin Positions 1

8 Possible Pin Positions 2

Package Type

Many special coil resistances are available, and relays can be designed to customers specific requirements. These Pickering relays fit straight onto P.C. boards with pins on the popular 0.1 inch grid.
The Series 80 and 85 are electrically similar ranges but with alternative pin configurations.

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form B (energize to break)	1 Form C (change-over)	2 Form A (energize to make)	2 Form C (change-over)	3 Form A (energize to break)
10 W at 200 V 10 W at 500 V	10 W at 200 V	3 W at 200 V	10 W at 200 V	3 W at 200 V	10 W at 200 V

Series 80, 85 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note[1])	Special features
1	A or B	10 W	0.5 A	1.2 A	200	10^8	General purpose
5	A	10 W	0.5 A	1.2 A	500	10^8	1000 V stand-off
7	C	3 W	0.25 A	1.2 A	200	10^7	Change-over

Note[1]: Life Expectancy
Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any load conditions.

Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V
24 V	18 V	2.4 V

Environmental Specification/Mechanical Characteristics

In the table below, 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.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click here for more information.

Mercury Relays

Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

Series 80, 85 Coil data and type numbers

Device Type	Type Number Series 80	Type Number Series 85	Coil (V)	Coil resistance	Max. contact resistance (initial)
1 Form A Switch No. 1 Package Type 1	80-1-A-5/1D	85-1-A-5/1D	5	500 Ω	0.15 Ω
	80-1-A-12/1D	85-1-A-12/1D	12	1000 Ω	
	80-1-A-24/1D	85-1-A-24/1D	24	3000 Ω	
1 Form A HV Switch No. 5 (1 kV) Package Type 1	80-1-A-5/5D	Not Available	5	500 Ω	0.15 Ω
	80-1-A-12/5D		12	1000 Ω	
	80-1-A-24/5D		24	3000 Ω	
1 Form B Switch No. 1 Package Type 2	80-1-B-5/1D	85-1-B-5/1D	5	1000 Ω	0.15 Ω
	80-1-B-12/1D	85-1-B-12/1D	12	3000 Ω	
	80-1-B-24/1D	85-1-B-24/1D	24	3000 Ω	
1 Form C Switch No. 7 Package Type 1	80-1-C-5/7D	85-1-C-5/7D	5	500 Ω	0.20 Ω
	80-1-C-12/7D	85-1-C-12/7D	12	1000 Ω	
	80-1-C-24/7D	85-1-C-24/7D	24	3000 Ω	
2 Form A Switch No. 1 Package Type 2	80-2-A-5/1D	85-2-A-5/1D	5	500 Ω	0.15 Ω
	80-2-A-12/1D	85-2-A-12/1D	12	1000 Ω	
	80-2-A-24/1D	85-2-A-24/1D	24	3000 Ω	
2 Form C Switch No. 7 Package Type 2	80-2-C-5/7D	85-2-C-5/7D	5	375 Ω	0.20 Ω
	80-2-C-12/7D	85-2-C-12/7D	12	1000 Ω	
	80-2-C-24/7D	85-2-C-24/7D	24	3000 Ω	
3 Form A Switch No. 1 Package Type 2	80-3-A-5/1D	Not Available	5	375 Ω	0.15 Ω
	80-3-A-12/1D		12	1000 Ω	
	80-3-A-24/1D		24	3000 Ω	

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

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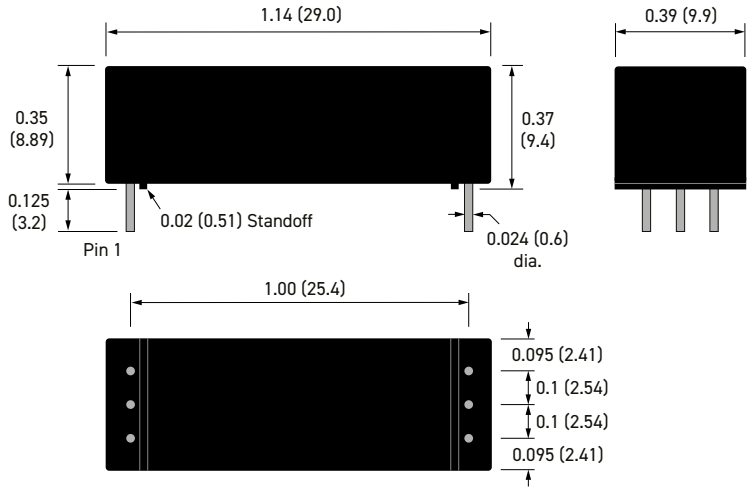
Pin Configuration, Weight & Dimensional Data (dimensions in inches, millimeters in brackets)

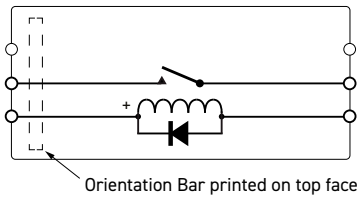
Package Type **1**

6 Pin Position Devices

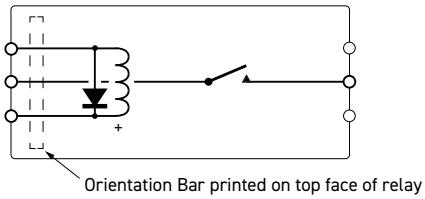


Schematics are shown from **UNDERNEATH** the relay.

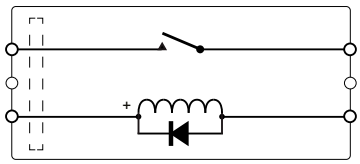
1 Form A (Series 80)



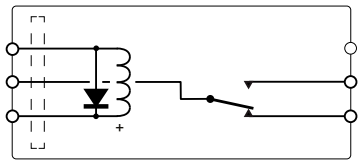
1 Form A (Series 85)



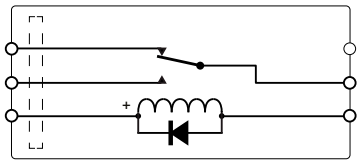
1 Form A (Series 80 High Voltage Switch No. 5)



1 Form C (Series 85)



1 Form C (Series 80)



Weights: Typical

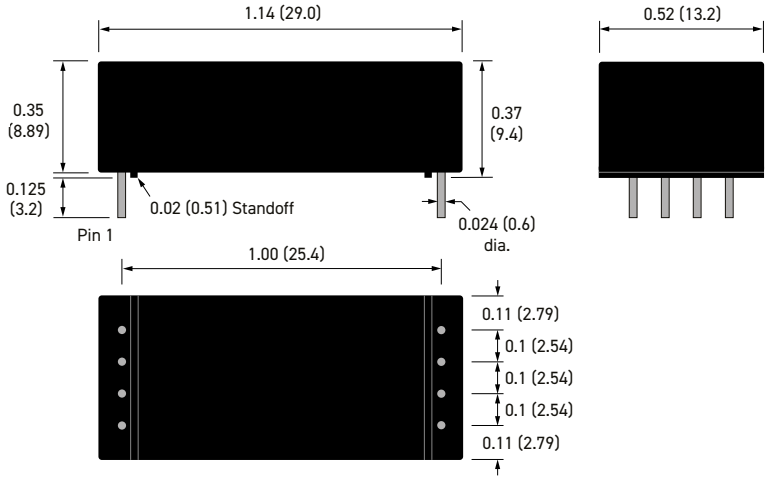
80-1-A	**4.85 g**	**85-1-A**	**4.85 g**
80-1-C	**4.69 g**	**85-1-C**	**4.69 g**

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.

Pin Configuration, Weight & Dimensional Data (dimensions in inches, millimeters in brackets)

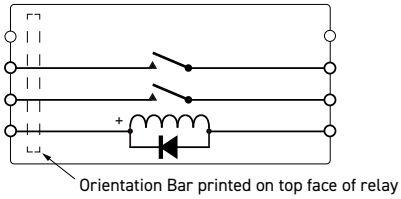
Package Type **2**

8 Pin Position Devices

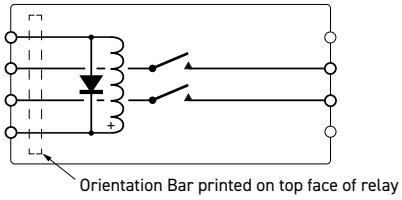


Schematics are shown from **UNDERNEATH** the relay.

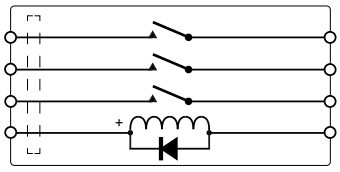
2 Form A (Series 80)



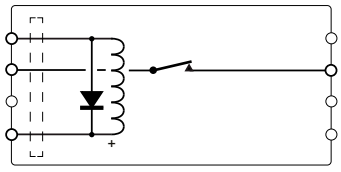
2 Form A (Series 85)



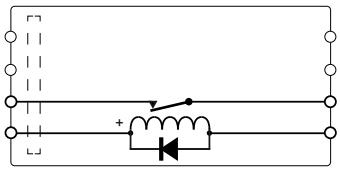
3 Form A (Series 80 only)



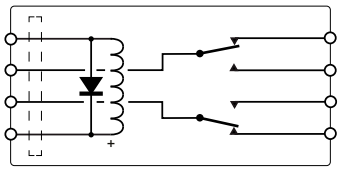
1 Form B (Series 85)



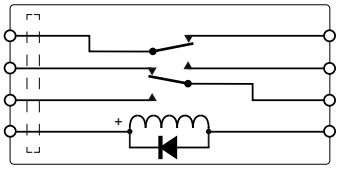
1 Form B (Series 80)



2 Form C (Series 85)



2 Form C (Series 80)



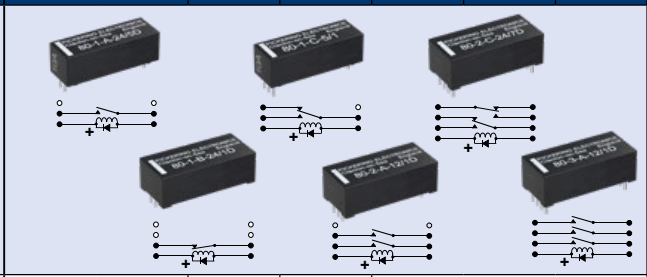
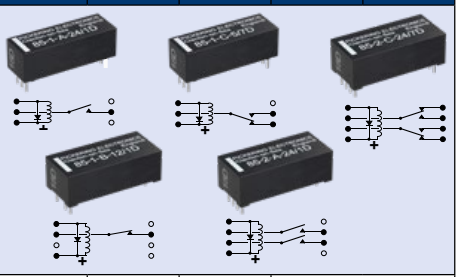
Weights: Typical

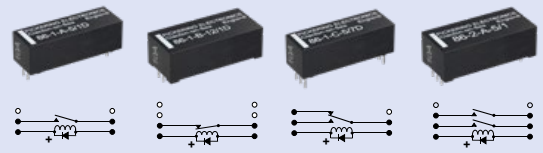
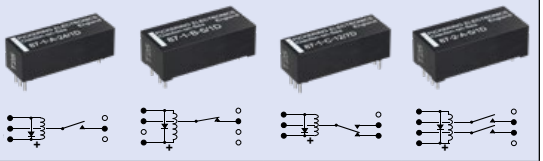
80-2-A	**6.48 g**	**85-2-A**	**7.18 g**
80-3-A	**6.55 g**	**85-1-B**	**9.27 g**
80-1-B	**9.27 g**	**85-2-C**	**7.45 g**
80-2-C	**5.58 g**		

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.

Similar Relays Comparison (Dry Relays)

If the Series 80 and 85 are unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics and package sizes, but differing leg positions.

Series Name		80-1-A		80-1-B	80-1-C	80-2-A	80-2-C	80-3-A	85-1-A	85-1-B	85-1-C	85-2-A	85-2-C
Physical Outline including Pin Positions and Schematic													
Depth	mm (inches)	9.9 (0.39)		13.2 (0.52)	9.9 (0.39)	13.2 (0.52)			9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)	
Width		29.0 (1.14)		29.0 (1.14)	29.0 (1.14)	29.0 (1.14)			29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	
Height		9.4 (0.37)		9.4 (0.37)	9.4 (0.37)	9.4 (0.37)			9.4 (0.37)	9.4 (0.37)	9.4 (0.37)	9.4 (0.37)	
Package Volume (mm^3)		1 2699		2 3599	1 2699	2 3599			1 2699	2 3599	1 2699	2 3599	
Typical Weights (**g**)		4.74		9.27	4.69	6.48	5.58	6.55	4.85	9.27	4.69	7.18	7.45
Contact Configuration		1-A (SPST)		1-B (SPNC)	1-C (SPDT)	2-A (DPST)	2-C (DPDT)	3-A (3PST)	1-A (SPST)	1-B (SPNC)	1-C (SPDT)	2-A (DPST)	2-C (DPDT)
Reed Switch Type		Dry							Dry				
Stand-off Voltage (**V**)		-	1000	-	-	-	-	-	-	-	-	-	-
Switching Voltage (**V**)		200	500	200					200				
Switching Current (**A**)		0.5	0.5	0.5	0.25	0.5	0.25	0.5	0.5	0.5	0.25	0.5	0.25
Carry Current (**A**)		1.2							1.2				
Switch Power (**W**)		10	10	10	3	10	3	10	10	10	3	10	3

Series Name		86-1-A	86-1-B	86-1-C	86-2-A	87-1-A	87-1-B	87-1-C	87-2-A
Physical Outline including Pin Positions and Schematic									
Depth	mm (inches)	9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)	9.9 (0.39)	13.2 (0.52)
Width		29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)	29.0 (1.14)
Height		9.4 (0.37	9.4 (0.37)	9.4 (0.37	9.4 (0.37)	9.4 (0.37	9.4 (0.37)	9.4 (0.37	9.4 (0.37)
Package Volume (mm^3)		2699	3599	2699	3599	2699	3599	2699	3599
Typical Weights (**g**)		5.70	8.05	5.71	6.48	4.40	8.05	5.71	7.18
Contact Configuration		1-A (SPST)	1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)	1-B (SPNC)	1-C (SPDT)	2-A (DPST)
Reed Switch Type		Dry				Dry			
Stand-off Voltage (**V**)		-	-	-	-	-	-	-	-
Switching Voltage (**V**)		200				200			
Switching Current (**A**)		0.5	0.5	0.25	0.5	0.5	0.5	0.25	0.5
Carry Current (**A**)		1.2				1.2			
Switch Power (**W**)		10	10	3	10	10	10	3	10

Standard Build Options

The Series 80 and 85 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

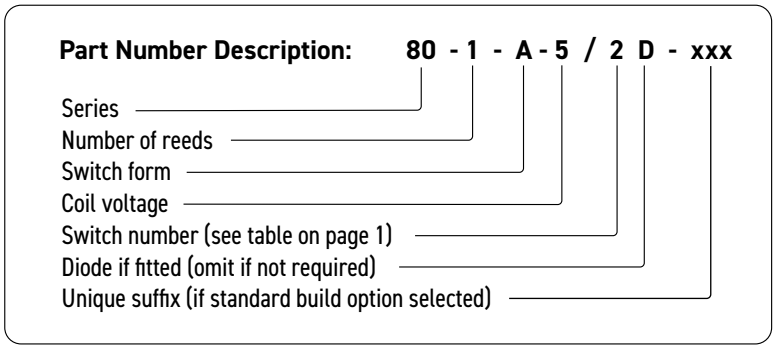
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements

Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: pickeringrelay.com/contact

3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRT formats can be downloaded from the website: pickeringrelay.com/3d-models



Help

If you need any technical advice or other help, 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

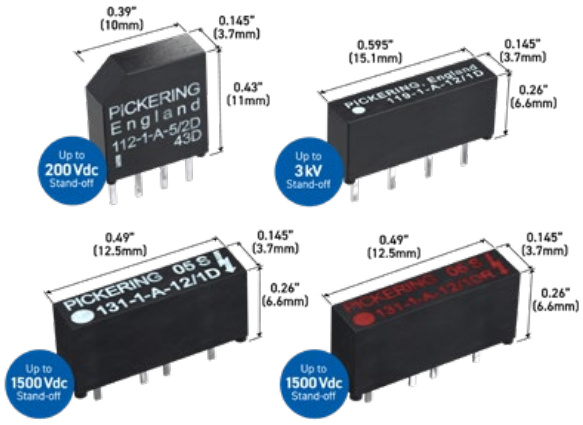
Custom Reed Relays

As well as the relays detailed in this catalog, Pickering also manufacture many thousands of special model relays, designed to meet our customer's particular requirements.

If you do not see what you require in our standard Series ranges, please contact our technical sales team (techsales@pickeringrelay.com) who will be happy to work with you and design a specific 'one of a kind' reed relay.

Features

- Special pin configurations or pin lengths
- Special print with customers own number or logo
- Custom packaging
- Controlled capacitance
- Controlled thermal emf
- Operate voltage
- Coil resistance, especially low power options
- Specific contact resistance requirements, including stability
- Switch life under specific loads
- Pin forming
- Specific operate & release times
- Specific environmental requirements



- A semiconductor manufacturer had used the Pickering Series 112 for many years in its products, yet now needed a small higher voltage version. The 119 high voltage relay was reduced in size and red text applied to meet their requirement. It was named the Series 131.

Custom Plastic Packages - Screened and Unscreened

- Copper plated switches for RF/HF applications
- 1 and 2 Form A available

- Specialized Applications, for example, current operated relays

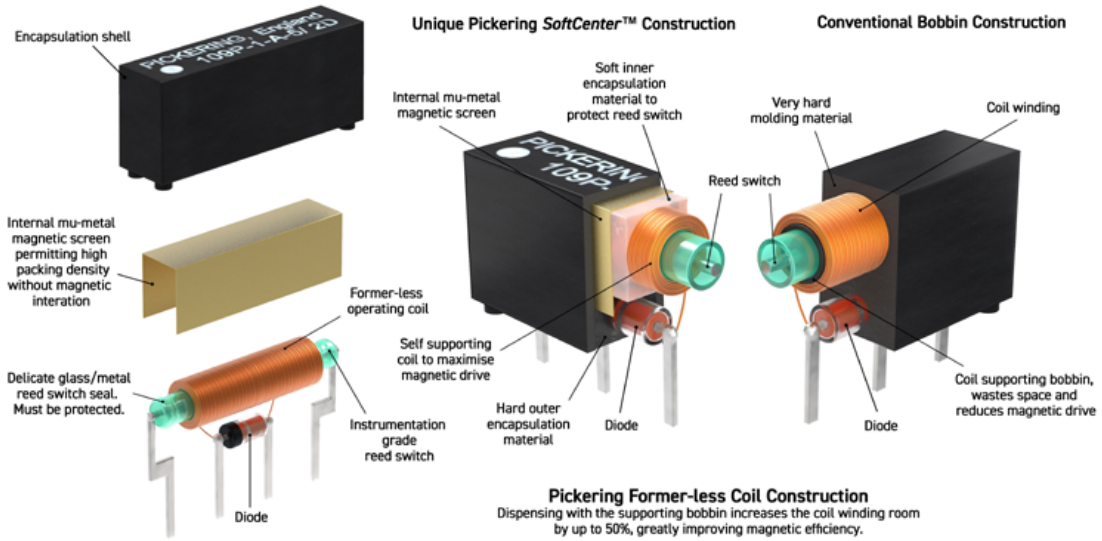
- Standard parts with custom pinouts or pin length

- Standard Catalog parts tested to a higher specification. For example, the Series 104 has been modified for applications requiring an increased voltage specification

SoftCenter™ Technology

Pickering Reed Relays are encapsulated using a soft inner material to cushion the reed switch capsule. The very hard compounds used by most other manufacturers can cause stresses that can potentially damage the reed switch and degrade contact resistance stability and life expectation. Pickering relay ***SoftCenter***™ construction stops this.

Typical Pickering Construction using Former-less Coils and our *SoftCenter*™ technology



Former-less Coil Winding

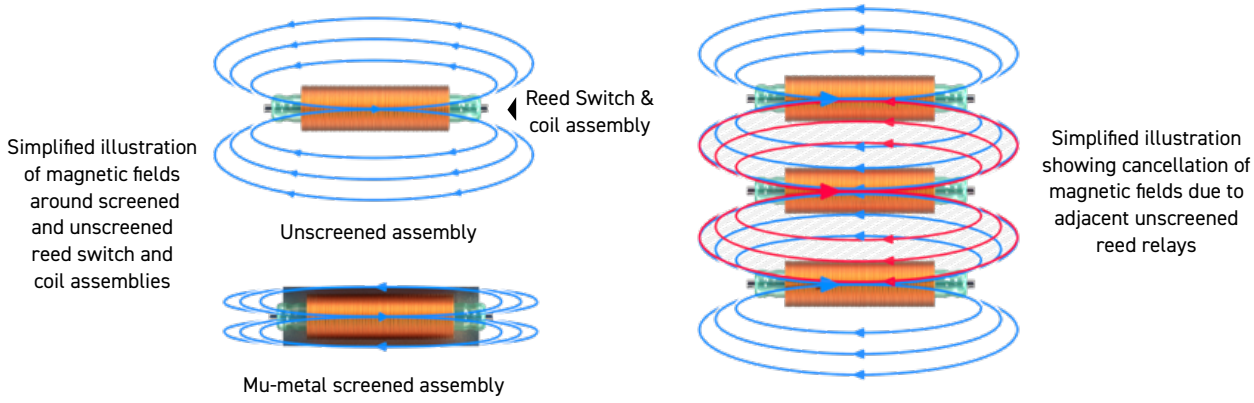
All our Reed Relays are constructed using our ***SoftCenter***™ technology, which uses a soft inner material to reduce stresses on the reed switch. In addition, contact life and more reliable contact resistance are achieved by our use of Former-less coil winding. Our Former-less coils are manufactured using a fully automated process that provides consistent output quality and repeatability. So what is Former-less Coil Winding and what advantages does it give you? Looking at the above diagram you can see that former-less winding greatly increases the winding 'window', providing the following advantages:

- A much higher magnetic drive level and better magnetic coupling as the smaller diameter of the inner turns are more efficient (more turns per Ohm).
- The number of Ampere Turns (AT) is increased - Reed switches are usually rated in sensitivity by an Ampere Turn number, for example, an AT rating of 15 AT is twice as sensitive as one with a 30 AT. Because the 30 AT switch needs more magnetic drive there is much more 'restoring force', which is the ability to open when the coil drive is turned off. This in turn extends the working life of the reed switch many times.

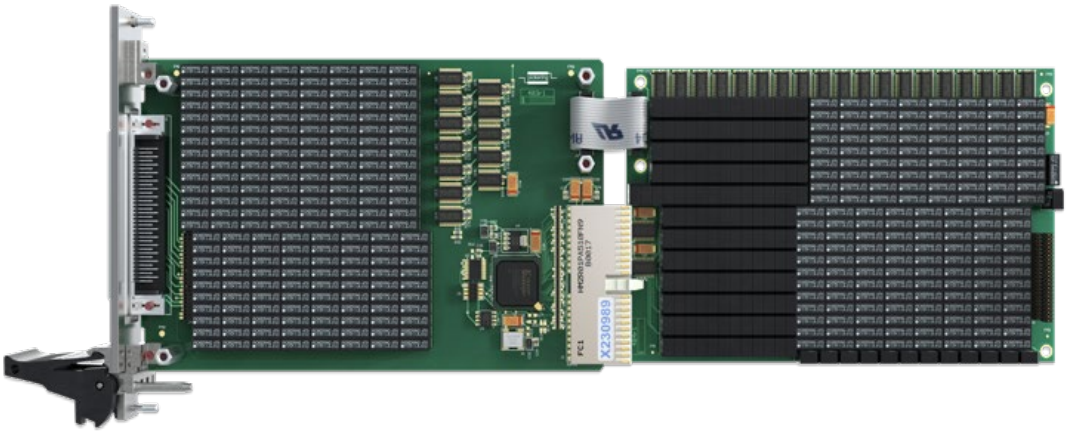
Learn more about ***SoftCenter*** Technology and Former-less Coil Winding here: **pickeringrelay.com/softcenter**

Magnetic Interaction

The switch contacts in a reed relay are operated by the magnetic field generated by the coil which is wound around the hermetically sealed switch capsule. When these relays are stacked close together, the field from adjacent relays will partially oppose the magnetic field from the relay alongside, reducing its sensitivity. This means that a higher coil voltage will be required to operate it. For very small relays, this increase could be as high as 40% which means that it may not be possible to operate the relay at its normal coil voltage. Look at the magnetic field illustrations below.



Our relays are fitted with a Mu-metal magnetic screen rather than one made of steel because of its high permeability and very low magnetic remanence. This screen concentrates the magnetic field, greatly improving the device's efficiency and reliability and allowing side by side stacking to maximize density. The high packing densities that can be achieved when using our reed relays is illustrated below on a PXI High Density Reed Relay Matrix Module from our sister company Pickering Interfaces.



This module uses 360 Pickering Series 111P relays, plus 156 Pickering Series 117 relays. A total of 516 Reed Relays.

Magnetic screening is absolutely essential for reed relays mounted on a close pitch!

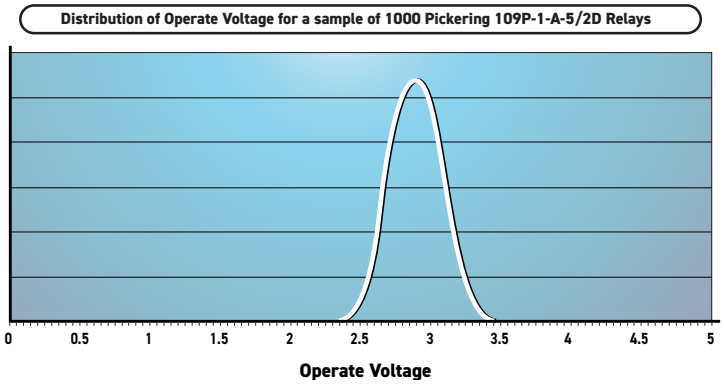
To learn more about magnetic interaction visit: **pickeringrelay.com/magnetic-interaction**

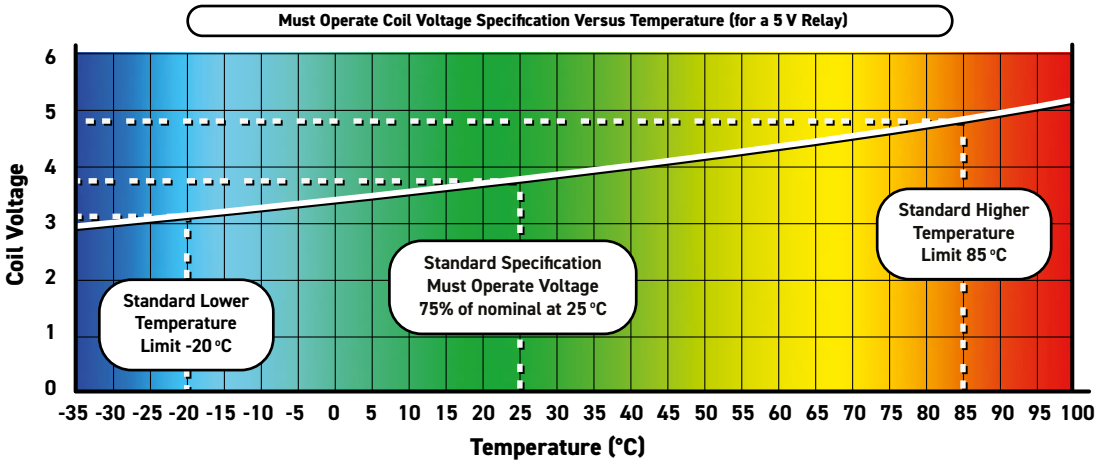
Temperature Effects

Reed Relays are sometimes considered a mundane component by design engineers and often little thought is given to their operating parameters. One of these parameters is operating temperature and failure to consider its effects can lead to the possibility of the relay not operating at high temperatures.

The relay's reed switch is operated by a magnetic field generated by a coil which is wound around it using copper wire. Copper has a positive coefficient of resistance of approximately 0.4% per °C and its resistance will increase with temperature at this rate. As the resistance increases, the current and therefore the level of magnetic field will fall.

The industry standard 'Must Operate Voltage' sometimes called the 'Pull-In Voltage' is 75% of nominal and usually quoted at 25 °C. For a 5 V relay this would be equal to 3.75 V, although in practice it will be lower than this figure. The first graph shows the actual distribution of Operate Voltages for a batch of 1000 Pickering relays. In the second graph you can see how this operate voltage figure will change with temperature.





Remember that there will also be a voltage drop in the relay driver that needs to be taken into account. It can be clearly seen that at higher temperatures it is possible that the relay will not operate at its nominal coil drive voltage. For Reed Relays other than those manufactured by Pickering, magnetic interaction with adjacent relays will also need to be considered.

Pickering are able to supply Reed Relays with an increased magnetic drive level to accommodate higher temperatures if requested and also have sensitive 3 V coil versions in many ranges.

For more information on temperature effects and increasing the temperature range of reed relays see:
pickeringrelay.com/pdfs/Increasing-operating-temperature-range.pdf

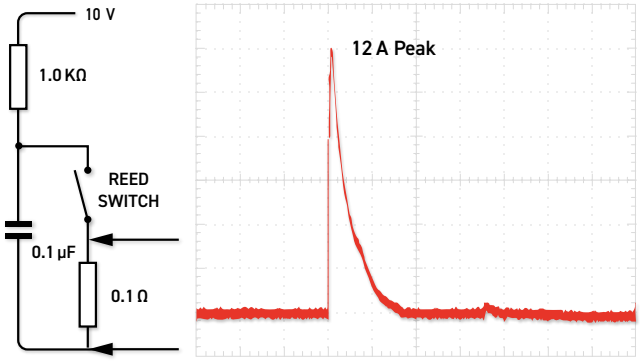
Contact Abuse

High current or high power inrushes are the most damaging and most frequent cause of contact damage. Reed Relays have specified maximum Current, Voltage and Power ratings. The Power figure is simply the product of the voltage across the open contacts before closure and the instantaneous current as they first make.

We at Pickering have lost count of the number of times that we have heard something like "I was only switching 5 V at 50 mA onto this CMOS logic board" when the user has completely disregarded the current inrush into the liberal sprinkling of decoupling capacitors and several micro-Farads of reservoir capacitance on that board.

Do not rely on electronic current limiting of power supplies only, to protect relay contacts. Electronic current limiting takes a finite time to react and there are often decoupling capacitors on the output of a power supply. There is nothing better than resistive current limiting.

As well as inrushes due to charging capacitive loads, discharging capacitors can be an even greater issue as the current is often only limited by the resistance of the reed switch and PC tracks. Even capacitors charged to quite low voltages can cause current inrushes of tens of amps and although they may be for microseconds only, they can cause damage to small reed switches.



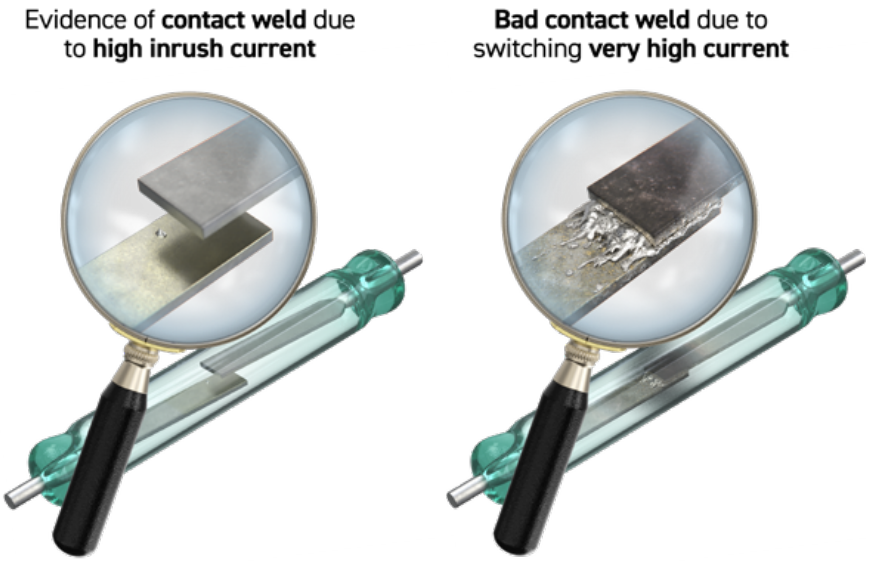
Typical current inrush when discharging a 0.1 µF capacitor at 10 V through a Reed Switch and 0.1 Ω resistor.

As voltages increase for some applications, inrushes can become an even greater issue, for example when discharging cables after high voltage proof testing. The energy stored in a capacitance is equal to ½ CV^2 Joules so will increase with the square of voltage. Increasing from 10 V to 1000 V will increase the stored energy by 10,000 times.

If you have ever had a relay contact stick closed, only to free with a slight tap, or had a longer than expected release time, more than likely, it is caused by a micro-weld due to a current inrush.

'Hot' versus 'Cold' Switching

Reed Relays generally have a higher Carry Current rating than their 'hot' Switching Current rating. It is usually during 'hot' switching where contact damage occurs due to the resulting arc across the contacts as they open or close. A severe current overload will quickly melt the contact area causing the two surfaces to fuse together creating a hard weld as soon as the contact closes. Less severe current inrushes will cause a milder weld or gradually build up a 'pip' on one contact and erode a 'crater' on the other according to the direction of current flow. These can eventually lock together. Arcs can occur when contacts open, particularly when the load is inductive and Back EMFs from inductive loads should always be limited, usually by a simple diode in the case of DC loads or by a Snubber or Varistor in the case of AC loads.



One way to reduce or remove these issues is to 'Cold' switch. This is a common technique in Test Instrumentation, where the current or voltage stimulus is not applied to the switch until after the relay has been operated and contact bounce finished. In the same way, the stimulus is removed before the contact is opened. In this way there will be no arcing or switched current inrushes and the relay will achieve maximum life, often into billions of operations.

When calculating the delay time between switching on the relay coil and applying the current to the switch, it is important to consider the effects of high ambient temperature if this is likely to be encountered. The maximum operate time and bounce figures given on the data sheets are at a 25 °C ambient level. At higher temperatures, the resistance of the coil winding will increase at a rate of 0.4% per °C, this being the coefficient of resistance of the copper coil wire. There will therefore be a corresponding fall in coil current and the level of the magnetic field that is generated to operate the reed switch. This lower drive level will increase the operate time slightly. The timing figures on Pickering data sheets are normally quite conservative so this is unlikely to be an issue up to the normal ambient specification of 85 °C. However, if there is any additional self-heating within the relay due to a high carry current and the switch resistance (I^2R Watts), it will be necessary to consider this and allow a little more time before turning on the current through the switch.

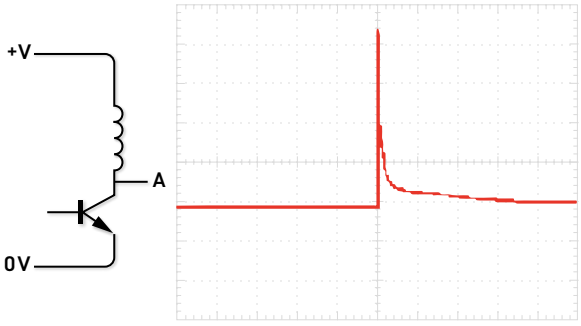
Please contact Pickering Application Engineers at techsales@pickeringrelay.com for further help if required.

Why place a diode across a relay coil?

In the majority of relay applications, a diode is connected across the relay coil, this could be either externally fitted or commonly integral within the relay. Some relay driver ICs may also include an internal diode so another will not be necessary.

A reed relay operating coil usually comprises of many hundreds or even thousands of turns of wire wound around a reed switch (effectively a ferro-magnetic core). This operating coil therefore forms an inductor. When a current flows through this coil, a magnetic field is generated which operates the reed switch. The problem arises when the current through this inductive coil is switched off. This will usually be performed by a semiconductor switch of some sort. The collapsing magnetic field will produce a substantial voltage transient in its effort to disperse the stored energy in the inductor and oppose the sudden change of current flow. This voltage transient can sometimes be equal to many hundreds of volts and is commonly referred to as a Back EMF. If not suppressed, this will be equal to –L x di/dt where L is the inductance of the coil in Henrys and di/dt is the rate of change of current. If the current is reduced quickly, di/dt will be a high figure, resulting in a high level of Back EMF. If the current is reduced slowly, di/dt will be smaller resulting in a lower Back EMF figure but a longer release delay time which may not be desirable.

The diagram below shows a common method of driving a relay coil using an open collector NPN driver transistor.

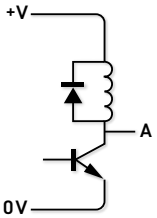


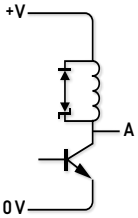
When the transistor is turned on, it will pull Point A to near 0 V turning on the relay. When the transistor is turned off, the stored energy in the inductor will generate a Back EMF pulse. This pulse will be of the opposite voltage polarity to that which was used to energize the coil. You will see from the oscilloscope display that there is a very large voltage spike which can be hundreds of volts more positive than the supply rail.

If not limited, this voltage spike can quite easily damage the semiconductor driver and interfere with the controlling electronics due to the electrical noise generated.

Limiting the Back EMF and the Effect on Release Time

The most usual method of limiting this Back EMF voltage to protect the driver, is by the use of a diode connected across the coil as shown in this circuit. When the driver output at A, rises above the coil supply voltage, the diode conducts and clamps the Back EMF voltage to the Forward Voltage figure of the diode (Vf = 0.7 V for a typical silicon diode) so the driver will only be subjected to the supply line voltage plus 0.7 V. Ideally, this diode should be inside the relay or very close to the coil terminals to avoid the risk of RFI as this current is carried along printed circuit tracks.





A consequence of using a simple diode in this way is to increase the opening or release time of the relay as the magnetic field will be retained until the energy is dissipated, limited by the coil resistance. The release time of a reed relay is quite fast so this is rarely an issue but in some instances, a faster release time is desired. Using the circuit shown with a Zener diode in series with a normal diode will achieve this by clamping the Back EMF to the Zener voltage plus 0.7 V. As an example, a small reed relay might have a typical release time of around 120 µs with a simple diode clamp and this could fall to perhaps 50 µs if a 6.2 volt Zener is added in this way.

Actuate time
The time between the application of the coil voltage and the operation of the relay contact. Some manufacturers include bounce while others exclude it so caution is needed with this term. Pickering prefer to specify Operate time and Bounce time. See these terms.

Ampere-turns
A convenient measure of magnetic field level. Reed switch sensitivity is usually measured in Ampere-Turns (AT). The magnetic drive from the relay operating coil can be calculated in AT, simply the product of the number of wire turns on the coil and the current flowing through it.

Bias magnet
A permanent magnet which is added to a relay. Most commonly this technique is used to create a Form B (energize to break) relay. The magnet operates the reed switch and the field from the coil cancels the field from the magnet causing the switch to open when energized. The technique is also sometimes used to create a bi-stable or latching relay.

Bounce time
Contact Bounce is the intermittent opening of switch contacts occurring after the initial closure of the contacts due to mechanical rebound.

Breakdown voltage
The breakdown voltage is the maximum level that can be applied to the open switch contact before breakdown occurs. The level is primarily determined by the size of the contact gap and the type of inert gas used within the reed switch capsule. High voltage reed switches are normally in a vacuum. (See also Stand-off voltage).

Carry current
The maximum continuous current that can be carried by the switch contact after it has operated and contact bounce has ceased. This figure is usually higher than the switching current. There are other factors that determine this figure but the main one is the heating effect of the current and switch resistance (I^2R).

Coaxial shield
Usually in the form of a copper tube around the reed switch with a connection at each end of the device. Most commonly used to create a relay intended for high frequency or high speed digital applications with a 50 Ohms characteristic impedance.

Coil
An assembly consisting of many turns of wire which surrounds the reed switch. The magnetic field generated by the current flowing through this coil causes the operation of the reed switch.

Coil power
The power in Watts, required to operate the relay. This is the product of the current drawn and the coil voltage. Some sensitive Pickering relays have power levels of less than 10 mW.

Coil resistance
The nominal coil resistance of the relay operating coil and is usually specified at 25 °C. The coil resistance will increase with temperature at a rate of approximately 0.4% per °C, this being the coefficient of resistance of the copper coil winding. With increasing temperature and increasing coil resistance, the level of magnetic field generated by the coil will become lower as the current falls but this can sometimes be accommodated by increasing the coil voltage. This is the main factor that determines the upper temperature specification of the relay.

Coil voltage
The normal DC operating voltage of the relay coil.

Cold switching
The technique of applying the current through the switch contacts after the switch has operated and all bounce has ceased. The switch current is then removed before the switch is opened. If possible cold switching is preferred as there will be no switching current surges or arcing. This will maximize contact life.

Contact rating
A Reed Relay has a specification for the voltage, current and power that can be switched. The power rating is the product of the voltage across the open contact immediately before the contact is closed and the initial current switched when the contact first makes.

Contact resistance
The DC resistance of the closed contacts measured at the device terminals. Measurement is made after all contact bounce has ceased and the switch is in a stable state. The term is in reality a misnomer, as only a portion of this figure is due to the resistance of the switch contact point itself. The major part of this figure will be the nickel-iron switch connection leads and the lead-frame on which the relay is constructed. Only the resistance at the contact point will increase with life, the rest will be constant.

Contact
The switch contact is the area of the ferro-magnetic reed switch blades that come together to complete the electrical circuit when the coil is operated. This contact area is usually plated, galvanically or by vacuum deposition, with a suitable material, usually rhodium or ruthenium. In the case of very high voltage switches, it is usually tungsten due to its high melting temperature and resistance to welding due to arcing.

Duty cycle
The ratio of energized to de-energized time.

Electrostatic shield
A wrap of material, usually copper, between the switch and the operating coil. This is usually connected to one pin and to an earth connection to minimize the capacitive coupling of noise between the coil and the signal on the switch contacts.

Form A
Normally Open, Energize to Make switch configuration. A relay with a single switch would be known as a 1 Form A type or sometimes, Single Pole Single Throw (SPST). A relay with two switches would be a 2 Form A type or Double Pole Single throw (DPST).

Form B
Normally Closed, Energize to Break switch configuration. A relay with a single switch would be known as a 1 Form B type or sometimes, Single Pole Single Throw Normally Closed (SPST Normally Closed).

Form C
Change-over configuration. Each switch has three connections, a Common (or Wiper), a Normally Open (NO) and a Normally Closed (NC). When the relay is energized, the common connection will move from the NC contact to the NO contact with a break before make action. A single switch relay is known as a 1 Form C type or Single Pole Double Throw (SPDT) and a two switch version is a 2 Form C or Double Pole Double Throw (DPDT).

Form D
Change-over configuration. This is unusual for a reed relay but is more common with electromechanical relays. It is like the Form C above but with a make before beak action.

Former-less coil

A construction method used extensively by Pickering, where the more usual coil supporting bobbin is eliminated and a self-supporting coil is used. The extra room that this makes available within the relay allows either a smaller package, a higher coil resistance or the use of less sensitive reed switches with inherently higher operating and restoring forces. These are all major advantages of this construction method.

Hermetic seal

With respect to Reed Relays, this usually refers to the glass to metal seal of the Reed Switch capsule itself. The capsule contains either an inert gas, usually nitrogen or in the case of high voltage reeds, a vacuum. The integrity of this seal is of paramount importance.

Hot switching

An arrangement where the voltage to be switched is present at the open contact before the coil is energized and the resultant current is actually switched by the contact as it closes.

Inrush current

The current initially switched when the load is first connected to the source. A high inrush current can sometimes flow through the relay contact when switching a non-linear load. Current surges into capacitive loads can be very damaging and high inrush currents should be avoided.

Insulation resistance

The DC resistance between two specified points. In reed relays this figure is normally specified for both the resistance across the open switch and for the resistance between the switch and the coil connections. The figure is usually very high, in the region of 10^{12} Ohms (1 TOhm) or higher. This figure is normally measured at 25 °C and may fall slightly at higher temperatures.

Life expectancy

The average number of cycles that a relay will achieve under specified load conditions before the contacts fail due to sticking or excessive contact resistance. Usually expressed as Mean Cycles Before Failure (MCBF) rather than as Mean Time Before Failure (MTBF). Life depends on many factors, the type and level of load, current, voltage, power and the end of life criteria if contact resistance is critical.

Magnetic interaction

The effect of a relay being influenced by the magnetic field from an adjacent, energized relay. The magnetic field from unscreened relays can partially cancel those from adjacent relays, severely changing their operate sensitivity beyond their normal specification limits. A magnetic screen will reduce or eliminate this issue.

Magnetic screen

A ferromagnetic shield, either inside or on the exterior of a relay to reduce the magnetic coupling to adjacent parts. Pickering magnetic screens are mu-metal rather than steel. Mu-metal is preferable due to its high permeability and low magnetic remanence and will eliminate issues due to magnetic interaction between relays.

Mercury wetted relay

A form of reed relay in which the reed contacts are wetted by a film of mercury obtained by capillary action from a mercury pool within the reed switch capsule. This techniques removes all contact bounce and generally gives a higher power rating. Traditional mercury wetted relays have to be mounted close to vertical so that the mercury drains correctly but versions with a slightly different construction and a reduced mercury content are available that can be used in any position. Mercury relays are not favoured today due to the restrictions of the RoHS Directive.

Must operate voltage

The specification for the DC voltage applied to the coil at which the relay must have operated. The industry standard for this figure is 75% of its nominal coil voltage at 25 °C, that is for example, 3.75 V for a 5 V relay and 9 V for a 12 V relay. In reality, there will be a good margin on this figure and it will accommodate temperature effects on the coil resistance up to 85 °C. Relay driver voltage drops should always be considered in the design process.

Must release voltage

The specification for the DC voltage applied to the coil above which the relay must have reverted to its un-operated state. The industry standard for this figure is 10% of its nominal coil voltage at 25 °C.

Operate time

The time value measured from the energization of the coil to the first contact closure (Form-A) or the contact opening (Form-B). When considering operate delay times, contact bounce must also be considered. Pickering will normally specify Operate Time Including Bounce as this is the important figure. (See also Actuate time and Bounce time).

Operate voltage

The actual measured coil voltage at which a contact changes from its un-energized condition to its operated state. This voltage will change with temperature as the coil resistance changes. (See Coil resistance for explanation).

Release voltage

The actual measured coil voltage at which the contact returns to its de-energized state after the coil drive voltage is removed.

***SoftCenter*™**

A Trademark belonging to Pickering Electronics describing the construction using a soft inner encapsulation material to protect the delicate glass/metal seal of the reed switch capsule.

Stand-off voltage

The stand-off voltage is the maximum voltage specification for the open switch contact and should not be exceeded. This level is primarily determined by the size of the contact gap and the type of inert gas used within the reed switch capsule. High voltages reed switches are normally in a vacuum. (See also Breakdown voltage).

Switching current

The maximum current that can be hot-switched by a relay. The constraints of the rated contact power and voltage should be considered also. (See Contact rating).

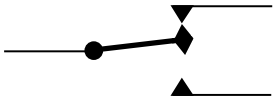
Switching voltage

The maximum voltage that can be hot-switched by a relay. The constraints of the rated contact power and current should be considered also. (See Contact rating).

BASIC CIRCUIT SCHEMATICS

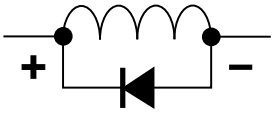
Form A - Energise to Make

Form B - Energise to Break

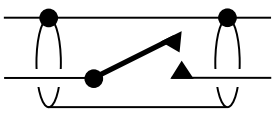


Form C - Change-over

Operating Coil

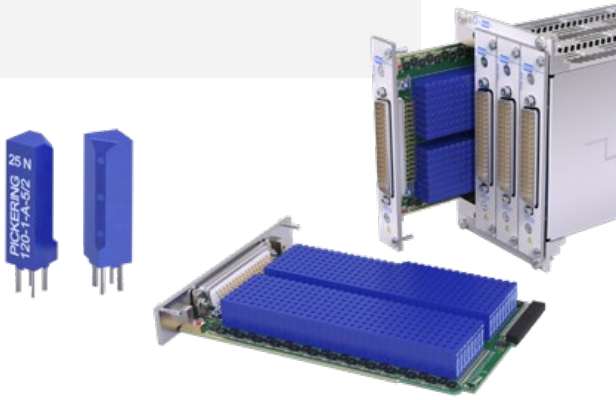


Operating Coil with Diode



Form A Coaxial - Energize to Make

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 optimized assembly that minimizes 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.

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