

- 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 [\(see last page\)](#)
- 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.



Text color option

## Switch Ratings - Dry Switches

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

## 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 <sup>1</sup> )	Min. stand-off volts	Life expectancy ops typical (see Note <sup>2</sup> )	Operate time inc bounce (max)	Release time	Special features
1 (L)	A	10W	0.7A	1.25 A	1000	1000	10 <sup>8</sup>	0.5 ms	0.2 ms	High voltage
1	A	10W	0.7A	1.25 A	1000	1500	10 <sup>8</sup>	0.5 ms	0.2 ms	High voltage

### Note<sup>1</sup>: 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<sup>2</sup>: Life Expectancy

The life of a reed relay depends upon the switch load and the end of life criteria. For example, 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<sup>8</sup> ops. At higher voltages and the maximum load (resistive), typical life is 1 x 10<sup>7</sup> 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 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 1 Ohm. 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
3V	2.25V	0.3V
5V	3.75V	0.5V
12V	9V	1.2V

### 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  $40 \times 0.4 = 16\%$  to maintain the required magnetic drive level. Please contact [sales@pickeringrelay.com](mailto: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

### 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 <sup>4</sup> )		Capacitance (typical) (see Note <sup>3</sup> )	
					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 <sup>12</sup> Ω	10 <sup>12</sup> 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 <sup>12</sup> Ω	10 <sup>12</sup> 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.

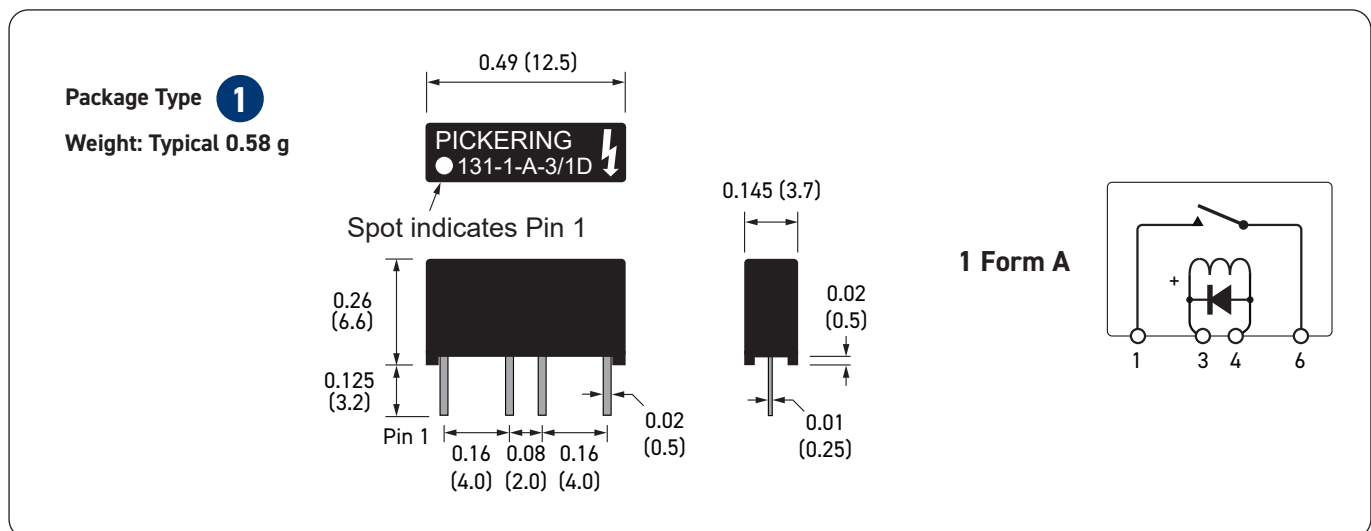
#### Note<sup>3</sup>: Capacitance across open switch

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

#### Note<sup>4</sup>: 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](http://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 (mm <sup>3</sup> )		1 306		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			1000	500	1000			
Switching Current (A)		0.7		0.7						0.7			1	2	1			
Carry Current (A)		1.25		1.25						1.25			1.5	3	1.5			
Switch Power (W)		10		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)																
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 <sup>3</sup> )		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	1000	500	1000			1000		1000				
Switching Current (A)		1	1	1	1	1	1	2	1			1		1				
Carry Current (A)		1.5	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	25	50	25			25		25				

### 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](http://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.

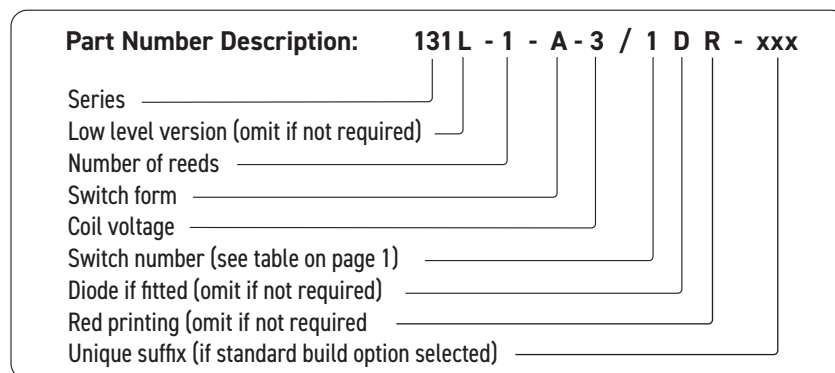
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Very low capacitance possibility
Custom packaging possibility	Different stand-off or switching voltage
	Operate or de-operate time
	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](http://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](http://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](mailto:techsales@pickeringrelay.com)

### Contact Us

UK Headquarters - email: [sales@pickeringrelay.com](mailto:sales@pickeringrelay.com) | Tel. +44 1255 428141

USA - email: [ussales@pickeringrelay.com](mailto:ussales@pickeringrelay.com) | Tel. +1 781 897 1710

Germany - email: [desales@pickeringtest.com](mailto:desales@pickeringtest.com) | Tel. +49 89 125 953 160

France - email: [frsales@pickeringtest.com](mailto:frsales@pickeringtest.com) | Tel. +33 9 72 58 77 00

Nordic - email: [ndsales@pickeringtest.com](mailto:ndsales@pickeringtest.com) | Tel. +46 340 69 06 69




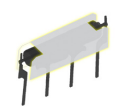
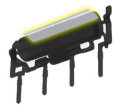


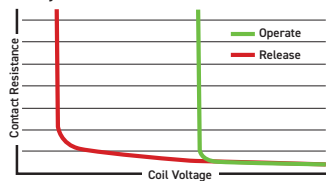

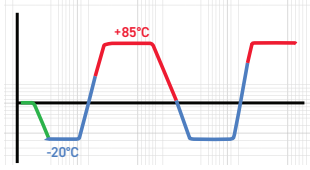

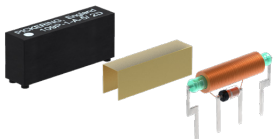

Czech Republic: [czsales@pickeringtest.com](mailto:czsales@pickeringtest.com) | Tel. +420 558-987-613

China - email: [chinasales@pickeringtest.com](mailto:chinasales@pickeringtest.com) | Tel. +86 4008 799 765

For a full list of agents, distributors and representatives visit: [pickeringrelay.com/agents](http://pickeringrelay.com/agents)



# 10 Key Benefits of Pickering Reed Relays

Key Benefit	Pickering Reed Relays	Typical Industry Reed Relays	
<b>1</b> 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.	
<b>2</b> 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
<b>3</b> 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. <b>Pickering Mu-Metal magnetic screen - interaction approx. 5%</b>	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. <b>Typical industry screen - interaction approx. 30%</b>	  X-Ray of Pickering mu-metal magnetic screen      X-Ray of typical industry magnetic screen
<b>4</b> SoftCenter™ Technology	<b>SoftCenter™</b> 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
<b>5</b> 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.	<b>Dynamic Contact Resistance Test</b> 
<b>6</b> 100% Inspection at Every Stage of Manufacturing	Inspection at every stage of manufacturing maintaining high levels of quality.	Often limited batch inspection.	
<b>7</b> 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.	
<b>8</b> 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.	
<b>9</b> 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.	
<b>10</b> 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](http://pickeringrelay.com/10-key-benefits)