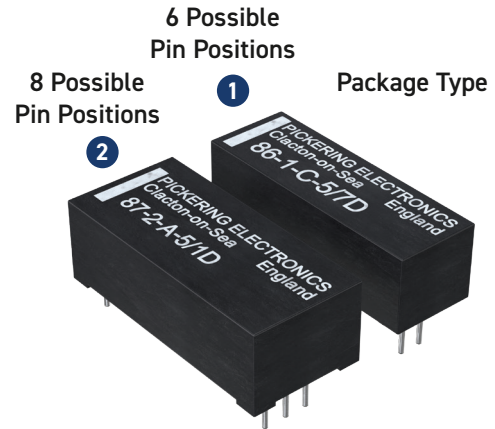


- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Wide range of switch configurations - **1 Form A, 1 Form B, 2 Form A & 1 Form C**
- Dry and mercury wetted switches are available with the same pin configuration and footprint
- **5, 12 or 24 V** coils with or without internal 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 [\(see last page\)](#)



These ranges of reed relays are essentially the same as the dry Series 80 and 85 and the mercury wetted Series 88 and 89 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

Switch Ratings - Mercury Wetted Switches

1 Form A (energize to make)
50 W at 500 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

Note¹: Life Expectancy

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

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 $40 \times 0.4 = 16\%$ 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 86, 87 Coil data and type numbers

Device Type	Type Number	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)
	Series 80	Series 85			
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.

Mercury Reed Relays

Mercury relays should be mounted vertically in the direction of the arrow printed on the package.



Mercury Reed: 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
8	A	50 W	2 A	3 A	500	10 ⁸	Standard Mercury

Note¹: Life Expectancy

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

Mercury Relay: Series 86, 87 Coil data and type numbers

Device Type	Type Number	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)
	Series 86	Series 87			
1 Form A Switch No. 8 Package Type 1	86-1-A-5/8D	87-1-A-5/8D	5	350 Ω	0.07 Ω
	86-1-A-12/8D	87-1-A-12/8D	12	1000 Ω	
	86-1-A-24/8D	87-1-A-24/8D	24	3000 Ω	

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

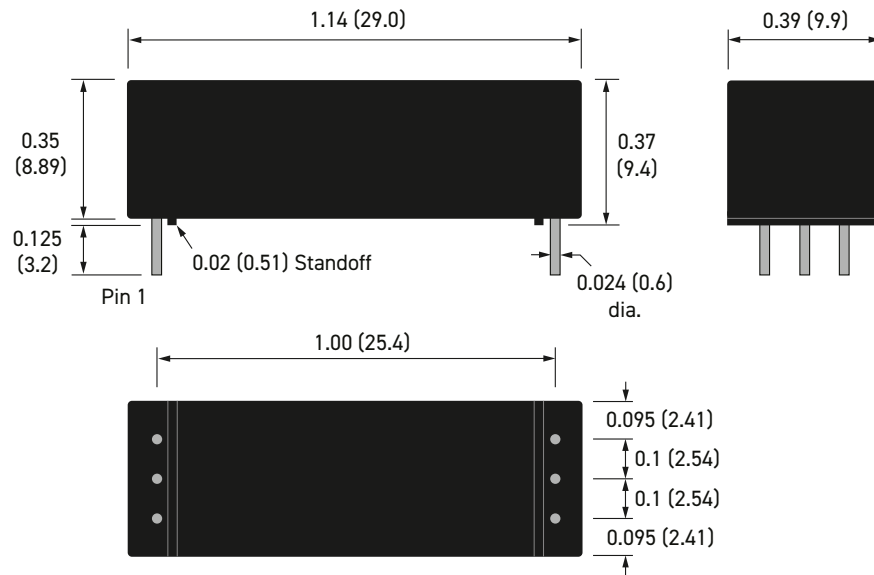
The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

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

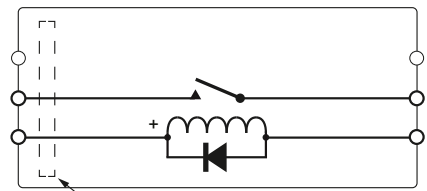
For **FREE** evaluation samples go to: pickeringrelay.com/samples

Pin Configuration, Weight & Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1
6 Pin Position Devices

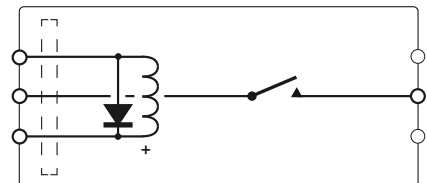


Schematics are shown from **UNDERNEATH** the relay.

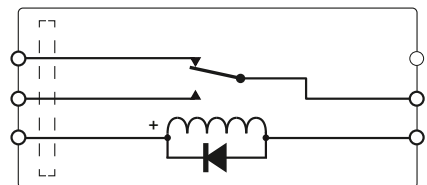


1 Form A (Series 86)
Weight: Typical 5.70 g
 ← Mercury Series 86 this way up

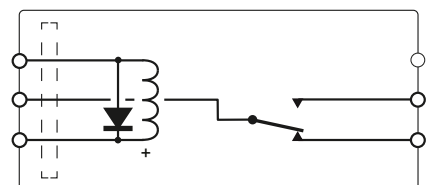
Orientation Bar printed on top face of relay



1 Form A (Series 87)
Weight: Typical 4.40 g
 Mercury Series 87 this way up →



1 Form C (Series 86)
Weight: Typical 5.71 g

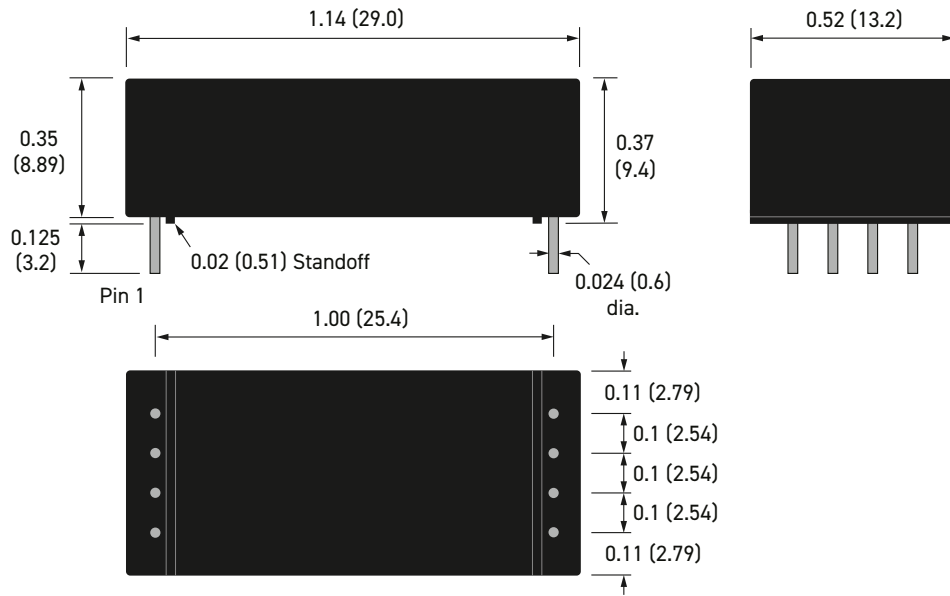


1 Form C (Series 87)
Weight: Typical 5.71 g

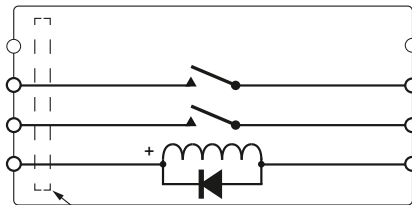
Important: Where the optional internal diode is fitted or for all Form B types, the correct coil polarity must be observed as shown by the + symbol on the schematics.

Pin Configuration, Weight & Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type **2**
8 Pin Position
Devices

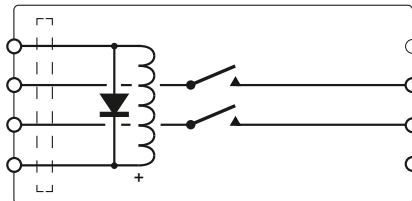


Schematics are shown from **UNDERNEATH** the relay.

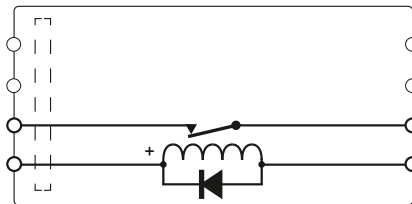


2 Form A (Series 86)
Weight: Typical 6.48 g

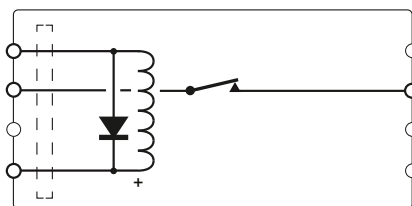
Orientation Bar printed on top face of relay



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)	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)	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)	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	0.25	0.5	0.25
Carry Current (A)		1.2						1.2				
Switch Power (W)		10	10	10	3	10	3	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)		① 2699	② 3599	① 2699	② 3599	① 2699	② 3599	① 2699	② 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

Similar Relays Comparison (Mercury 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		88-1-A	88-1-B	88-2-A	89-1-A	89-1-B	89-2-A	86-1-A	87-1-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)	9.9 (0.39)
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)
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)
Package Volume (mm ³)		2699	3599		2699	3599		① 2699	① 2699
Typical Weights (g)		4.99	8.62	8.81	5.49	8.02	8.81	5.70	4.40
Contact Configuration		1-A (SPST)	1-B (SPNC)	2-A (DPST)	1-A (SPST)	1-B (SPNC)	2-A (DPST)	1-A (SPST)	1-A (SPST)
Reed Switch Type		Mercury Reed			Mercury Reed			Mercury Reed	Mercury Reed
Stand-off Voltage (V)		-	-	-	-	-	-	-	-
Switching Voltage (V)		500			500			500	500
Switching Current (A)		2			2			2	2
Carry Current (A)		3			3			3	3
Switch Power (W)		50			50			50	50

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 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.

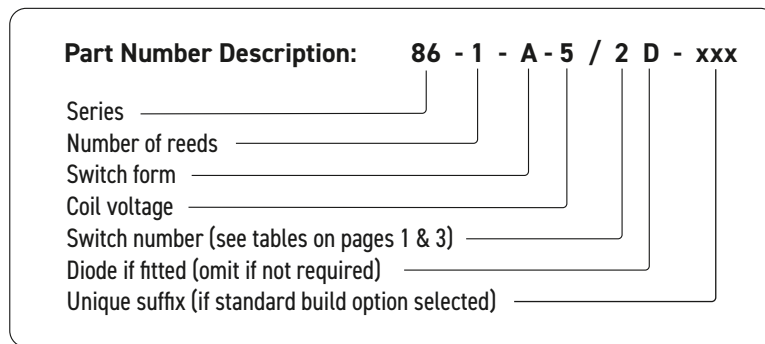
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	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 SLDPRN 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

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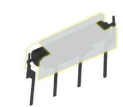
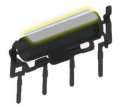


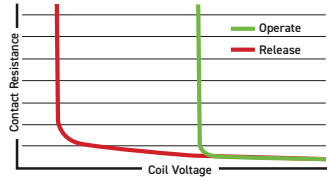

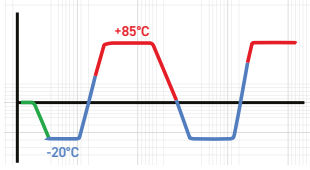

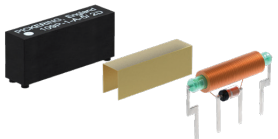

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For a full list of agents, distributors and representatives visit: pickeringrelay.com/agents



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.	Rigid hard moulded reed relays 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.	Dynamic Contact Resistance Test 
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