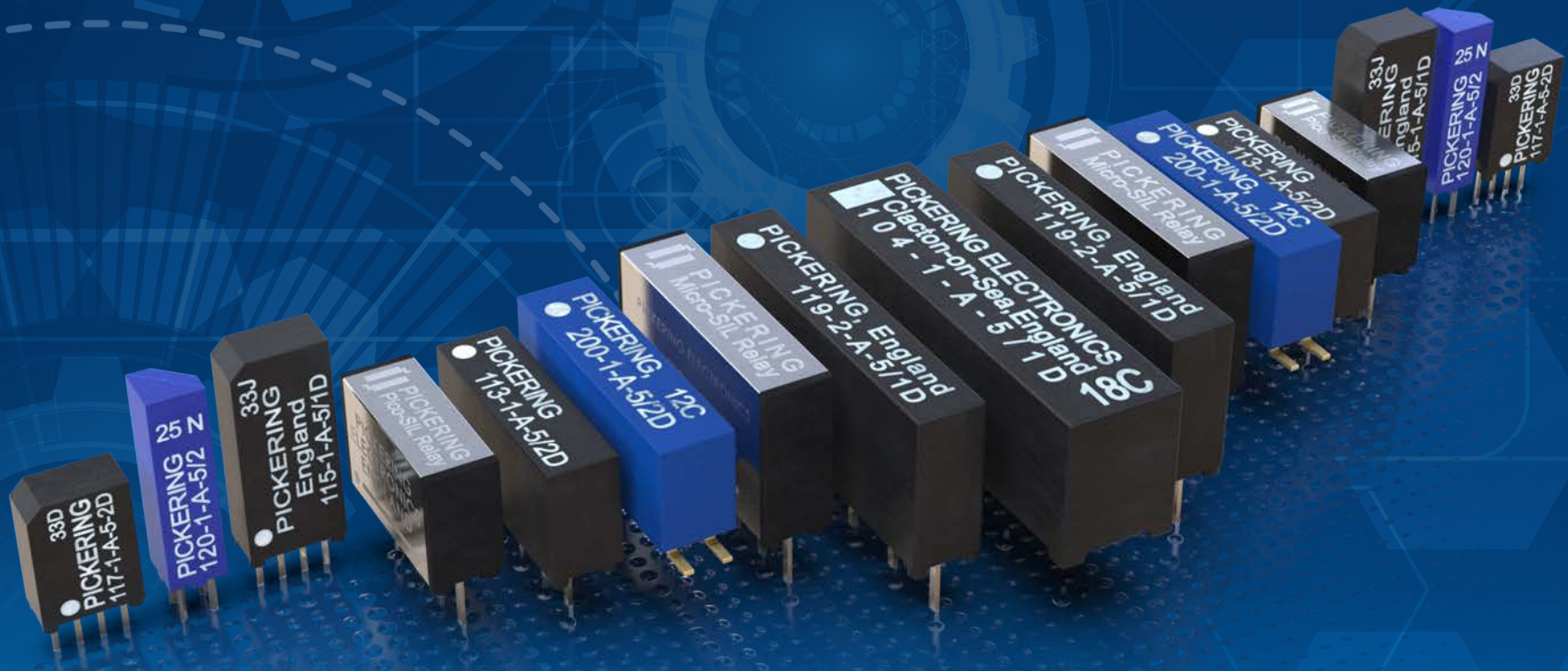


# High Reliability Reed Relays...

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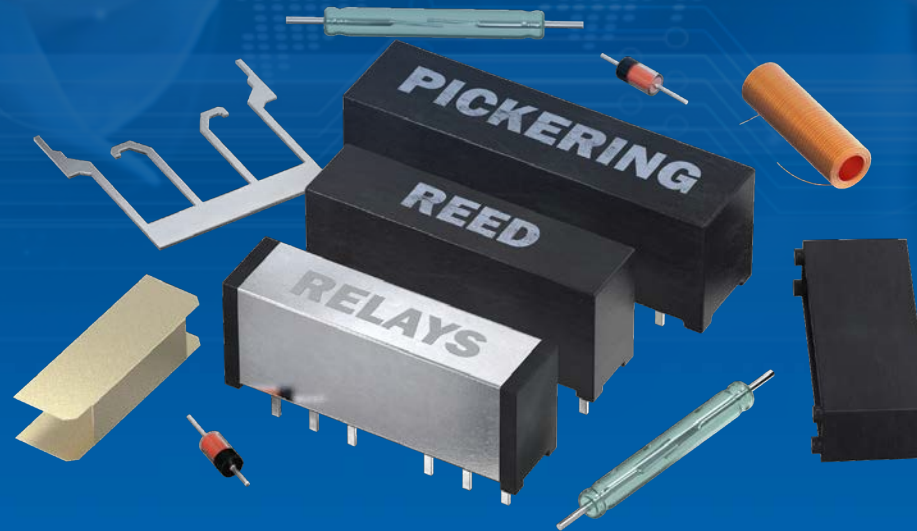
## ...for Automated & Semiconductor Test



[pickeringrelay.com](http://pickeringrelay.com)

# Enhance **System Reliability** and **Precision** with Pickering Reed Relays

Pickering's high-performance reed relays are engineered to meet the rigorous demands of modern engineers, offering unparalleled reliability and precision in critical applications. With their low contact resistance, high isolation, and rapid switching capabilities, these relays ensure accurate signal integrity, making them ideal for use in test and measurement, telecommunications, and semiconductor testing environments. The compact form factor of Pickering's relays allows for an efficient PCB layout, saving valuable space without compromising performance. Additionally, their long operational life and robust design minimize maintenance, reducing downtime and total cost of ownership. For engineers seeking dependable, high-quality switching solutions, Pickering's reed relays are the perfect choice to elevate the performance and reliability of your systems.





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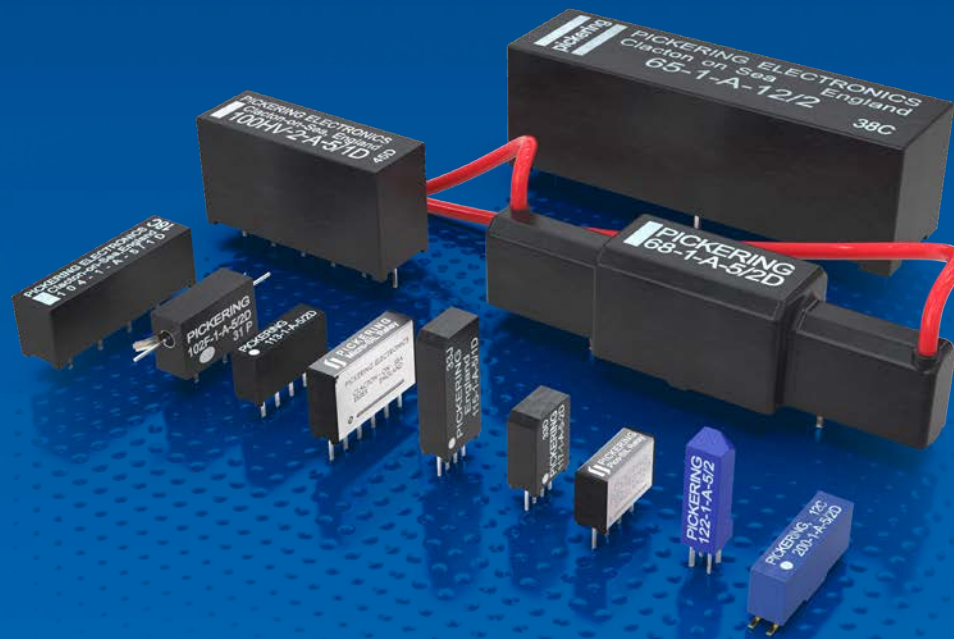
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# The Global Leader in

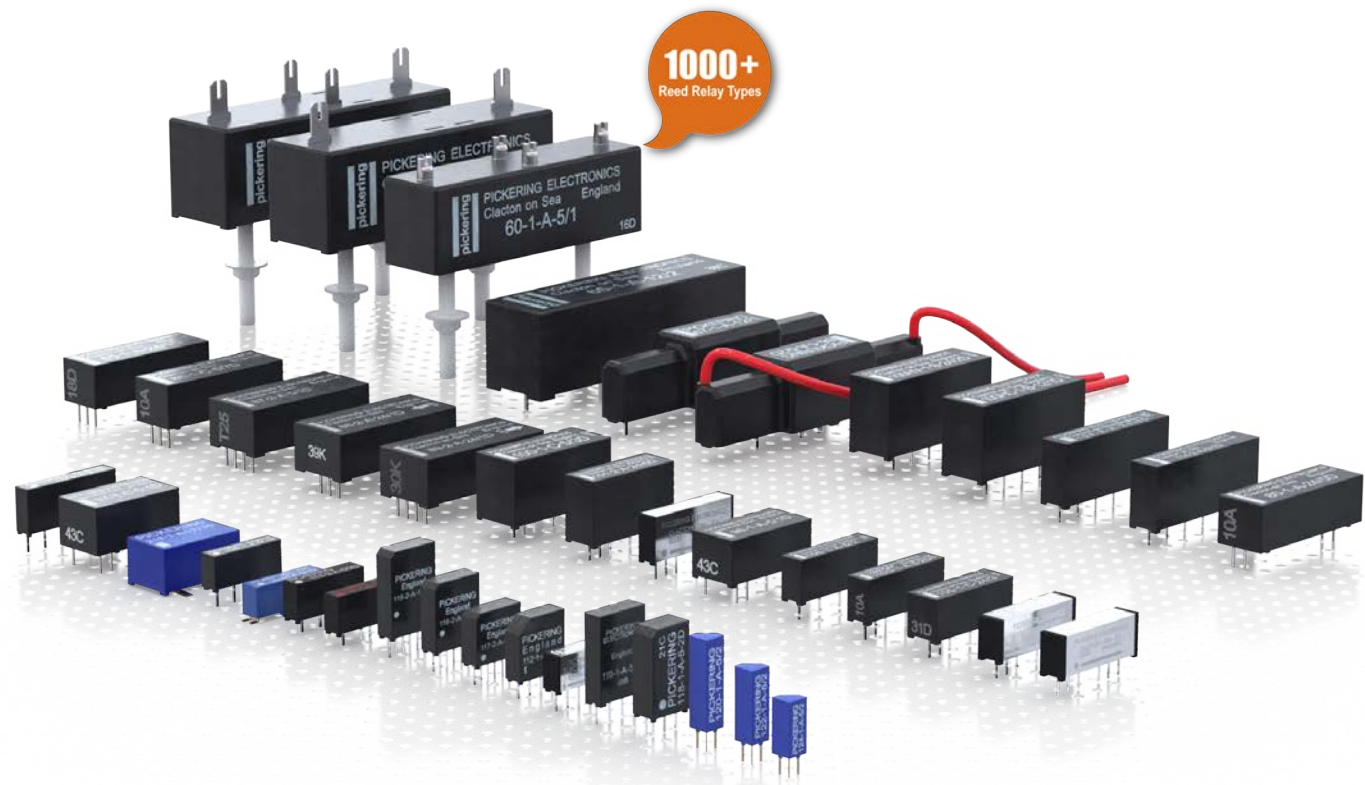
For over 50 years, Pickering has been a leader in designing high-end reed relays tailored specifically for instrumentation and test equipment. Renowned for our cutting-edge Single-in-Line (SIL) relays, which are 85% smaller than those offered by other manufacturers, we provide design engineers with unparalleled compactness and performance. These innovative SIL relays are trusted by leading Automatic Test Equipment (ATE) companies globally, making Pickering the go-to choice for those who demand precision and reliability in their designs. With manufacturing facilities in the United Kingdom and the Czech Republic, and sales and support offices across the Americas, Europe, and Asia, Pickering Electronics is positioned to deliver exceptional quality and service to engineers worldwide.





# The Industry's **Largest Selection** of Reed Relays in **Diverse Package Styles**

Pickering offers the largest range of reed relays available, encompassing a wide variety of popular package styles, including Through-hole (THT), Surface Mount (SMD), Single-in-Line (SIL/SIP), and Dual-in-Line (DIL/DIP), among many other custom designs. Most importantly, each relay is built using only the highest quality reed switches, ensuring exceptional performance and reliability across all applications.



Scan the QR to explore the full range of reed relays. Using the selector tool, you can easily find the best reed relay for your specific application requirements.

# Pickering reed relays are suitable for a **wide range of applications**, including, but not limited to:

- Test and Measurement
- High-density test applications such as:
  - A.T.E. switching matrices or multiplexers
  - High-speed test systems
  - High-end Instrumentation
- High voltage test applications such as:
  - Mixed-signal semiconductor testers
  - High-end cable testers
  - Monitoring systems for mining gas analysis
  - Backplane testers
- Data Acquisition (DAQ)
- Thermocouple Switching
- RF Signal Switching
- RF switched tuneable filters.
- Medical electronic equipment such as:
  - Portable equipment such as defibrillators
  - Electrosurgical generators for electronic scalpels
  - X-ray machines and Computerized tomography (CT)
  - MRI scanners
- Renewable energies such as:
  - Electric Vehicle and Charge Point Testing
  - Monitoring Photovoltaic Efficiency & Fault Detection
- Excellent physics
- In-circuit test equipment
- High voltage instrumentation.
- High-Speed Digital Switching
- High Power applications
- Low capacitance





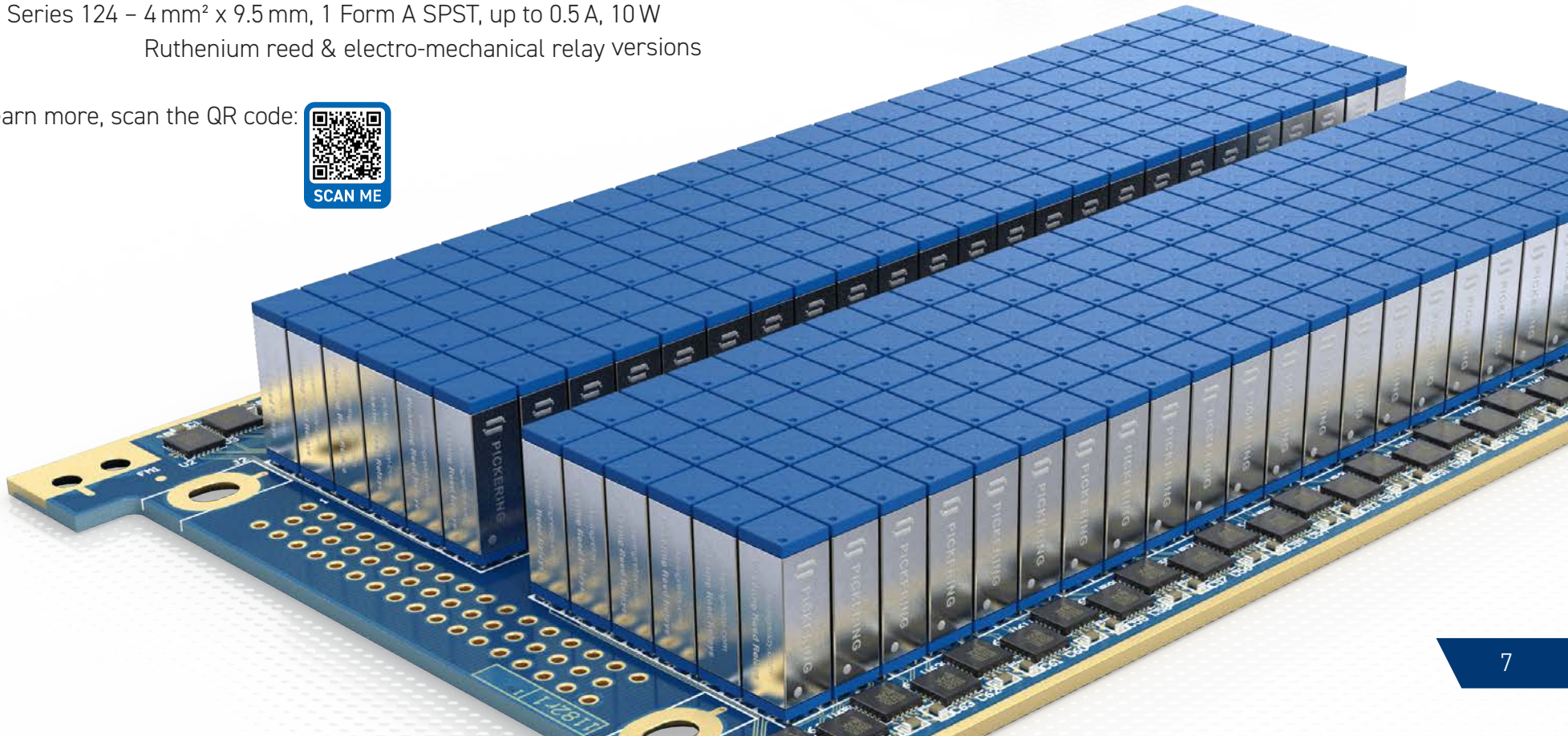
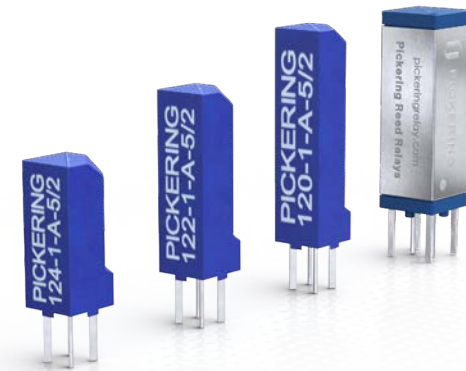
# High Density Reed Relays

At Pickering, we set the standard for high-density reed relays, allowing you to pack up to 80% more relays onto your PCB. Our cutting-edge high-density reed relays deliver exceptional performance, capable of switching up to 1A and 20 W. Available in Single-in-Line (SIL/SIP), Surface Mount, and other popular package styles, these relays provide the flexibility and power you need to optimize your designs and boost efficiency.

Examples of some of **Pickering's smallest reed relays**:

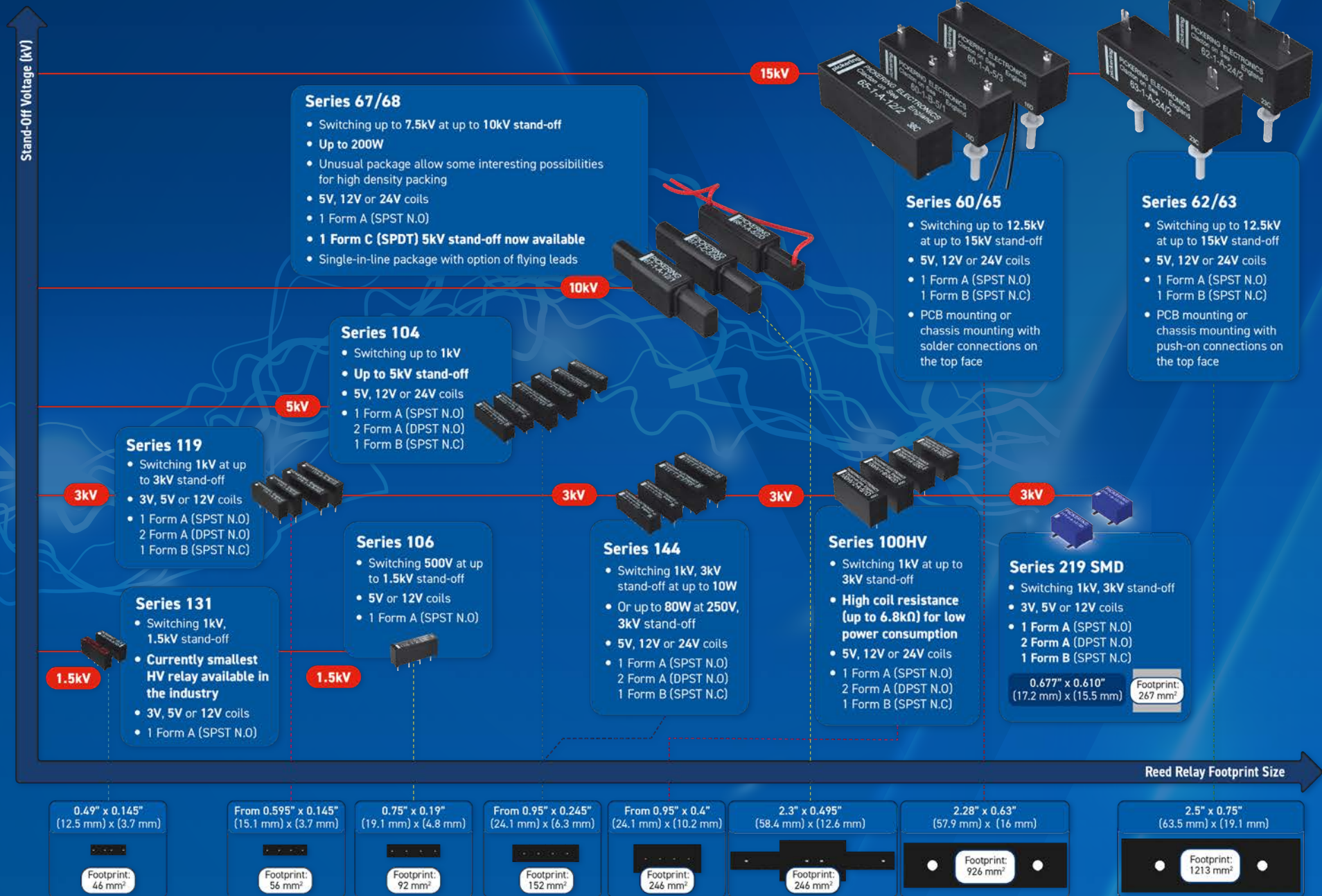
- Series 125 – 5 mm<sup>2</sup> x 15.5 mm, 2 Form A DPST up to 1 A, 20 W
  - Series 120 – 4 mm<sup>2</sup> x 15.5 mm, 1 Form A SPST, up to 1A, 20 W
  - Series 122 – 4 mm<sup>2</sup> x 12.5 mm, 1 Form A SPST, up to 0.5 A, 10 W
  - Series 124 – 4 mm<sup>2</sup> x 9.5 mm, 1 Form A SPST, up to 0.5 A, 10 W
- Ruthenium reed & electro-mechanical relay versions

To learn more, scan the QR code:





# High Voltage Reed Relays

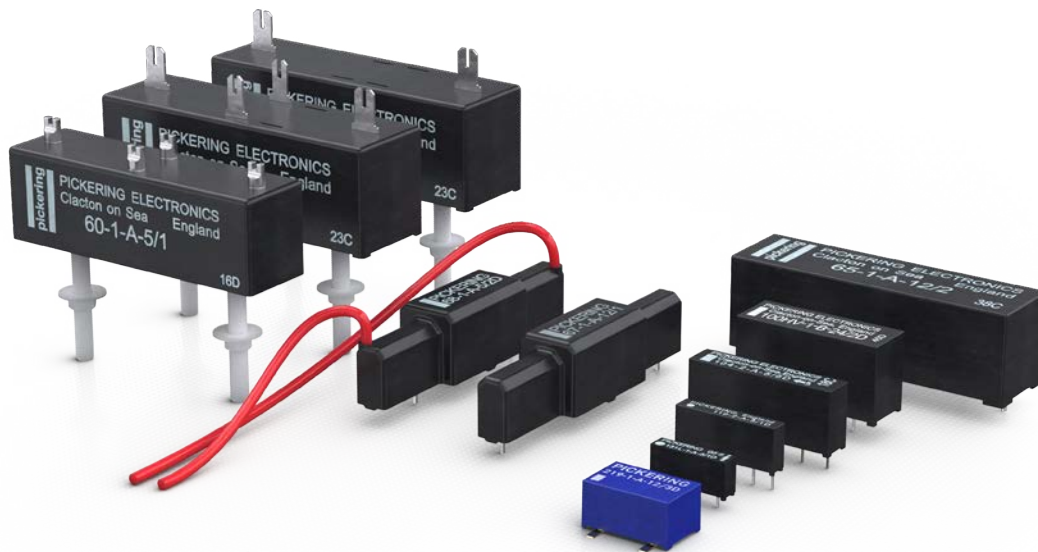


# High Voltage Reed Relays

Our compact relays are engineered to handle impressive voltages, with stand-off capabilities ranging from 1.5 kV to 15 kV and switching voltages up to 12.5 kV at up to 200 W. Choose from versatile configurations including 1 Form A, 2 Form A, 1 Form B, and 1 Form C. We offer various mounting options such as PCB pins, chassis mounts, PCB mounting, and flying leads for high-voltage connections.

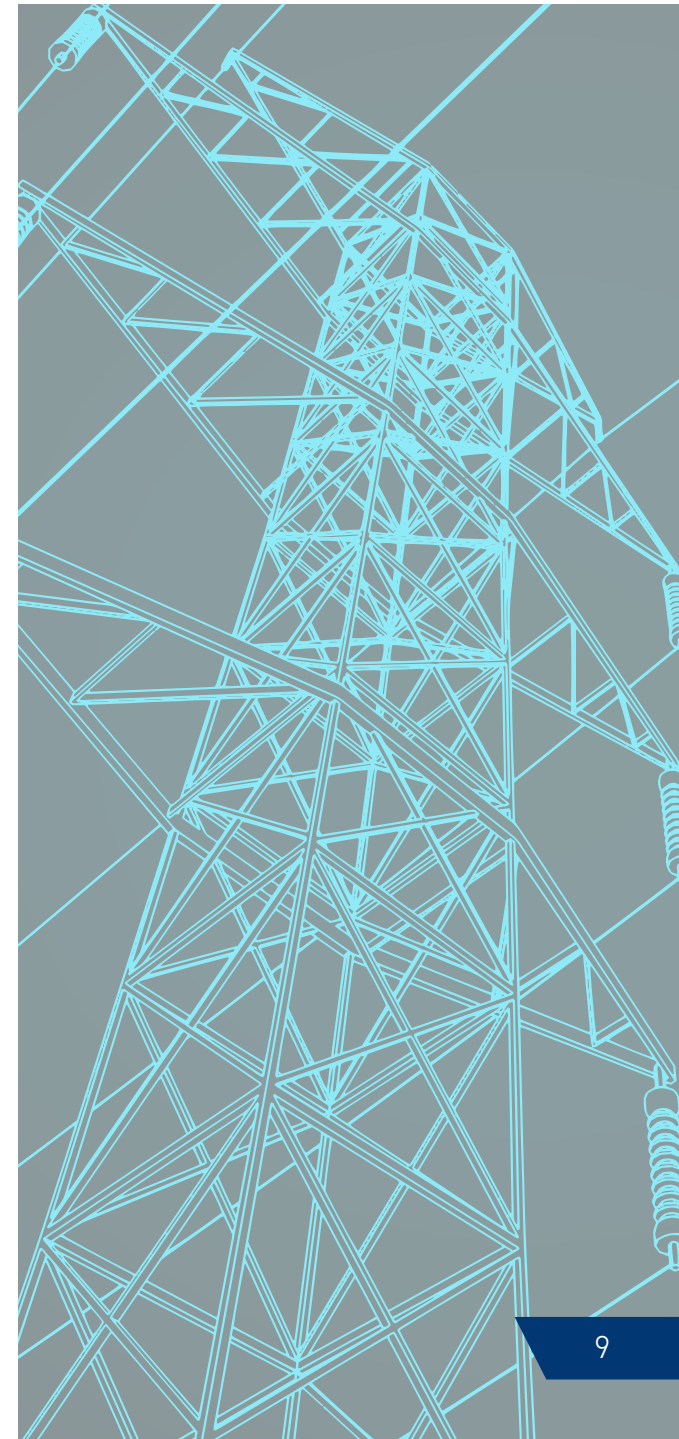
These high-voltage isolation relays are designed for a wide array of applications, including mixed-signal semiconductor testers, advanced cable testers, backplane testers, medical electronics, electric vehicles, solar energy systems, precision physics experiments, in-circuit test equipment, and high-voltage instrumentation.

- Series 219 SMD up to 3 kV
- Series 131 Mini SIL up to 1.5 kV
- Series 119 Mini SIL up to 3 kV
- Series 104 Mini SIL up to 4 kV
- Series 100HV SIL for up to 3 kV
- Series 67 & 68 SIL up to 10 kV
- Series 62 & 63 up to 15 kV
- Series 60 & 65 up to 15 kV



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To learn more, scan the QR code:



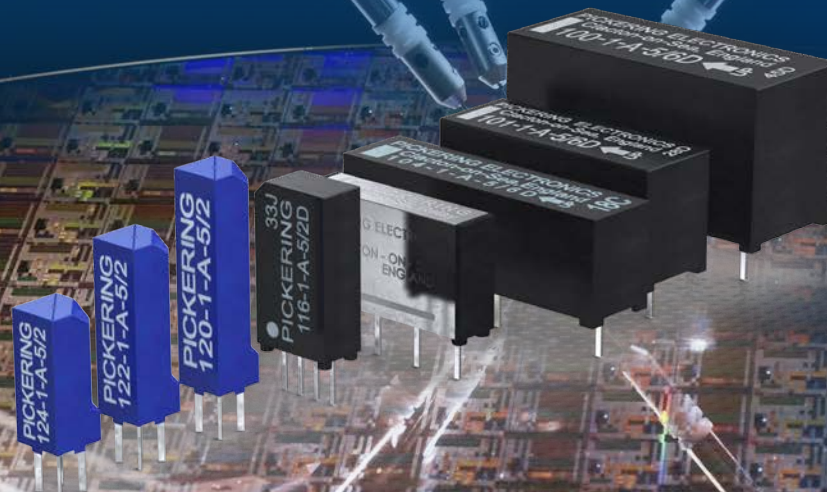


# Reed Relays for Semiconductor Testing

Reed relays are crucial for Semiconductor testing and wafer probe systems due to five key advantages:

1. **Transparency:** They don't affect test conditions or results due to their low ON resistance, high OFF resistance, high isolation, and low leakage current.
2. **Performance:** Capable of handling high voltages and measuring low voltages, reed relays switch quickly (e.g., Pickering Series 124 operates in 80-90  $\mu$ s) and can apply pulsed currents beyond their continuous ratings.
3. **Form Factor:** Compact and space-efficient compared to electromechanical relays, reed relays fit well in dense ATE systems and allow close placement on PCBs.
4. **Reliability:** They offer billions of operations with consistent performance when used within their specifications, ensuring long-term reliability.
5. **Cost-Effectiveness:** Their durability reduces the need for frequent replacements, minimizing maintenance and lowering the total cost of ownership.

Reed relays are thus an optimal choice for ensuring high-quality and efficient semiconductor wafer testing.



To learn more, scan the QR code:





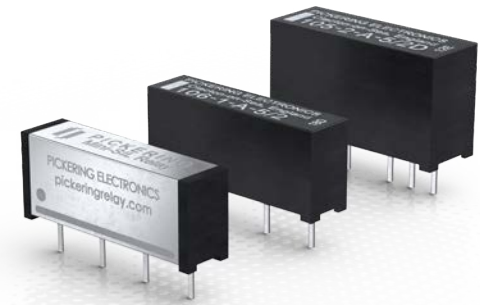
# Reed Relays for General Instrumentation

For General Instrumentation applications where switching is required, reed relays can often be the best solution when compared to other switching technologies. Using the highest-grade reed switches ensures low and stable contact resistance, fast operating times and long life.

Reed switch contacts are sealed in a glass tube with an inert gas or a vacuum ensuring excellent low-level performance whereas, with electromechanical relays, where the contacts are open to the environment, they can be affected by oxidization or dust and debris. And unlike electromechanical relays where the contacts are mechanically moved, the reed switch is operated by the small magnetic deflection of the contact blades, so with no moving parts to wear out, mechanical life can be over 1000 times longer. Compared to semiconductors, the simplicity of a metallic conducting path from a closed reed switch can be preferable, with the advantage of no controlling voltages across the switch path.

Pickering Reed Relays for General Instrumentation offer SPST and DPST normally open, SPST normally closed and SPDT and DPST configurations, all featuring magnetic screening as standard to allow side-by-side stacking. With such a wide range of options, they can provide solutions for many different applications including test equipment, automation control, interfacing and general hardware control, and Pickering can offer customization to meet unique requirements.

- Series 105 – a wide range of switch configurations up to 1A, 20W
- Series 106 – up to 20W + 1.5kV stand-off
- Series 107 – Mu-Metal package up to 20W + RF



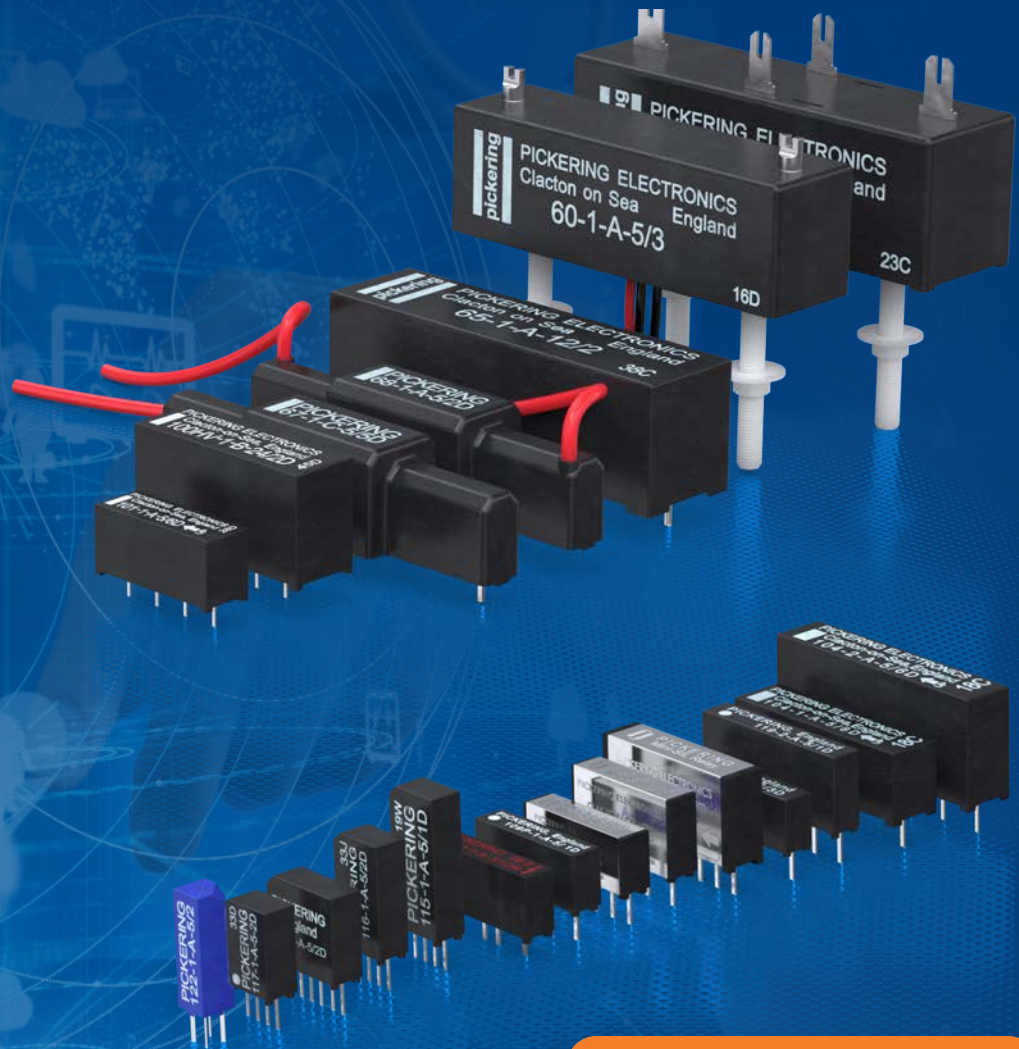
To learn more, scan the QR code:



# Reed Relays for Medical Equipment

Many types of medical equipment can benefit from the use of reed relays. Most standard relays can be used to switch signals and low voltages in non-safety-critical analysis and monitoring equipment, and high-voltage reed relays are suitable for switching high voltages (of up to 12 kV, for Pickering devices) in high-energy scanners.

- Standard size high voltage reed relays up to 12.5 kV, 15 kV stand-off are suitable for use in **defibrillators** and the control circuitry of **electrosurgical equipment**.
- Miniature high voltage reed relays up to 1.5 kV, 5 kV stand-off are suitable for applications where high-voltage signals need to be switched or isolated for safety reasons. Applications include **medical diagnostic, monitoring** and **spectroscopy** equipment.
- Data acquisition & instrumentation reed relays up to 1 A, 20 W are suitable for general signals and lower voltage switching in **medical sensors** and **monitoring** equipment.
- Low coil power reed relays have higher than usual coil resistance, greatly reducing the power required to operate them - making them ideal for use in **portable medical** equipment. A range of switching options is available including excellent low-level performance and, where important, reducing the influence of thermal EMFs.



To learn more, scan the QR code:





# Coaxial Reed Relays

Reed Relays are an excellent choice for RF Signal Switching, RF switched tuneable filters, and High-Speed Digital Switching due to their speed and size when compared to Electromechanical Relays, lower insertion loss and DC capability when compared to Solid State Relays, and hot switching capability when compared with Micro Electromechanical Machines.

- Series 102M up to 1.5 GHz
- Series 103G up to 2 GHz
- Series 109RF up to 2 GHz
- Series 111RF up to 2.5 GHz
- Series 113RF up to 3 GHz
- Series 200RF up to 5 GHz

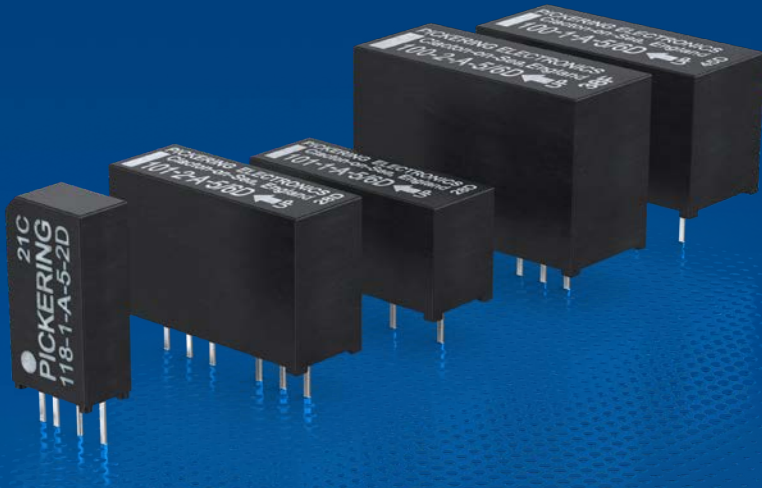


To learn more, scan the QR code:





# Reed Relays for Portable Equipment



With portable and remote monitoring equipment, low power consumption can be very important to preserve battery life. Industry standard 0.2 inches wide Single in Line reed relays are typically 500  $\Omega$  for a 5 V device so requiring 50 mW of power, and small electromechanical relays can require 140 mW or greater. Using the highest quality instrumentation grade reed switches, the high coil resistances reduce any heating effect from the coil giving excellent thermal EMF performance making them an ideal choice for very low signal levels, especially in data acquisition applications.

- Series 100 – Low Thermal EMF of about 1  $\mu$ V or Less
- Series 101 – Direct Drive from CMOS, Coil Resistances up to 6000  $\Omega$
- Series 118 – Miniature SIL very sensitive relays, ideal for applications where low power consumption and a very small footprint is important

To learn more, scan the QR code:

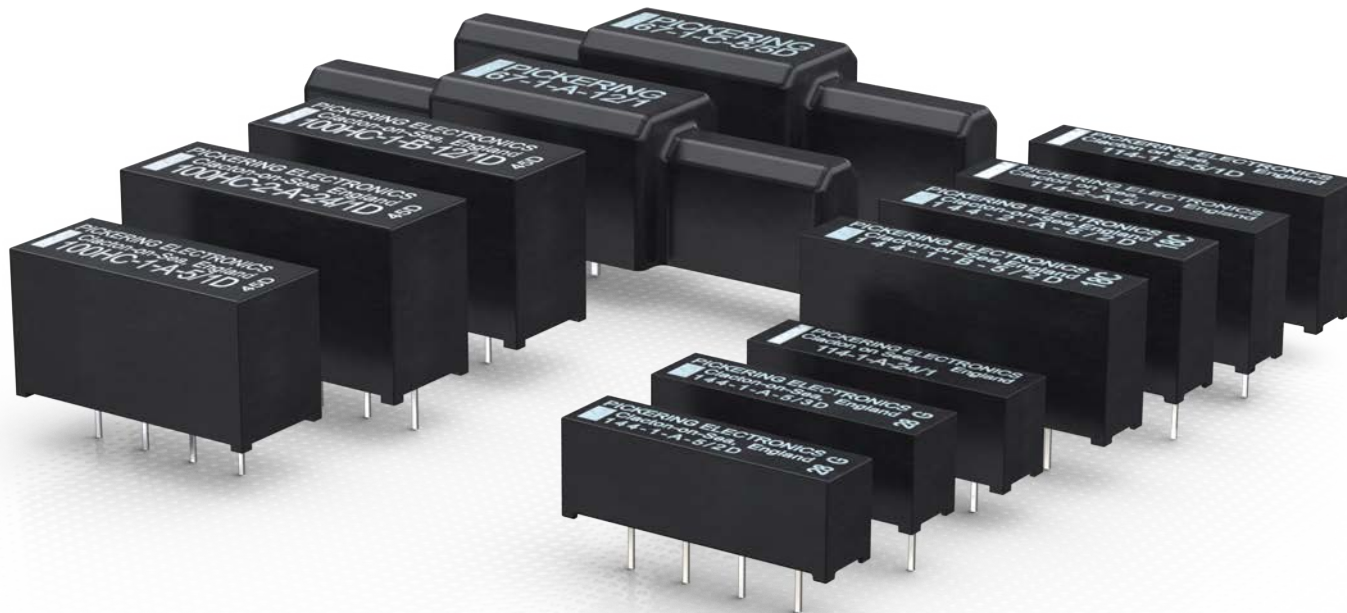


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## Reed Relays for High Power

Reed relays, known for their performance in low-level applications, are also effective in higher power and current-carrying tasks, such as semiconductor testing. They handle a broad range of signals and are used across industries like renewable energy and space. Reed relays offer faster operation, longer lifespan, and better reliability compared to electromechanical and semiconductor switches, with minimal off-state leakage currents and superior standoff capabilities up to 15 kV. These advantages make them a superior choice for improving overall performance, especially in high-voltage and mixed-signal semiconductor testing.

- Series 144 – Up to 80 W, 3 A carry current. HV capability up to 1 kV switching, 3 kV stand-off at up to 10 W
- Series 114 – Up to 40 W, 3 A carry current
- Series 100HC – Up to 40 W, 3 A carry current. Coil Resistances up to 6000  $\Omega$
- Series 67 – Up to 200 W, up to 5 A carry current. HV capability up to 6 kV switching, 8 kV stand-off

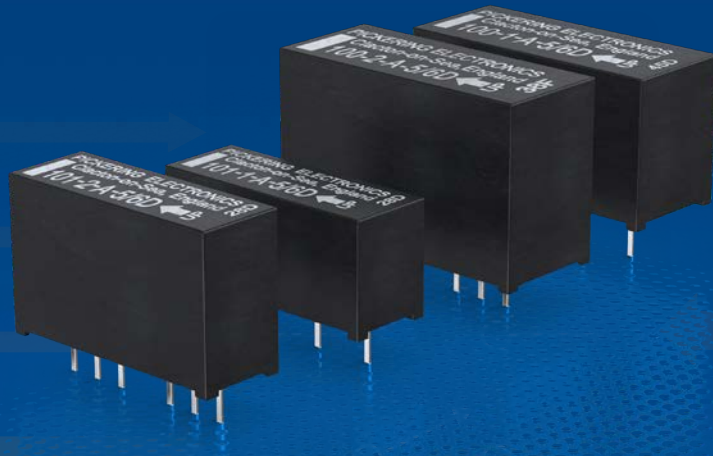


To learn more, scan the QR code:





# Reed Relays for Data Acquisition



In data acquisition (DAQ) applications, various sensors and transducers generate signals, such as voltage from a PV cell or a Hall effect sensor. These signals are conditioned for data loggers or control circuits. Often, multiple sensors are used, making it impractical to have a separate conditioning circuit for each. Instead, sensors are polled, with shared circuitry optimized for different sensor types. Reed relays are ideal for connecting these circuits due to their low thermal EMFs, minimal leakage currents, low capacitance, and hermetically sealed contacts, ensuring reliable performance over up to 1 billion operations.

To learn more, scan the QR code:



Cards/Modules



# Reed Relays for Low Thermal EMF

Pickering's Series 100 and 101 reed relays are designed to minimize thermal EMFs, with internal levels as low as  $1\mu\text{V}$ . This is crucial for low-level or high-accuracy applications, such as switching thermocouples or data acquisition, where thermal EMFs could cause significant errors. The relays reduce the heating effect of the coil, which generates these voltages. The 2 Form A configuration can further reduce EMFs through differential switching. These relays also feature low coil power consumption, making them ideal for portable equipment, and offer various configurations with magnetic screening for compact stacking and long life.

- Series 100 – Low Thermal EMF of about  $1\mu\text{V}$  or less
- Series 101 – Low Thermal EMF of  $3\mu\text{V}$  or less

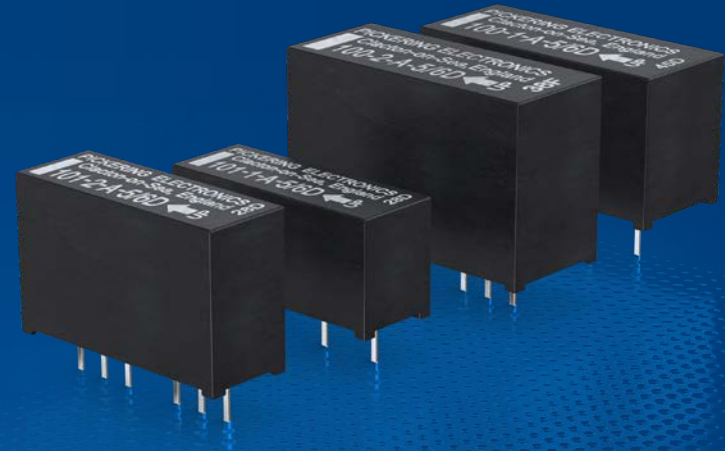


To learn more, scan the QR code:



# Reed Relays for Thermocouple Switching

In data acquisition applications involving thermocouples or low-level signals, thermal EMFs across the switch path can cause significant errors. Pickering's Series 100 and 101 reed relays are optimized to reduce these EMFs, outperforming general-purpose relays. With high coil resistances and efficient heat dissipation, these relays minimize temperature gradients across the switch. Using a 2-pole relay with differential connections further cancels out thermal EMFs, introducing less than 1 microvolt across the relay for accurate measurements. These relays come in various configurations, feature magnetic screening for compact stacking, and have low power consumption, making them suitable for portable equipment.



To learn more, scan the QR code:





# Reed Relays for Direct Drive from CMOS

Pickering's Series 100 and 101 reed relays offer low thermal EMFs for better resolution when switching thermocouples. They are ideal for low-current sources like CMOS or 74HC/HCT logic, where standard reed or electromechanical relays require too much drive current. The Series 100 requires only 1.5 mA, and the Series 101 requires 3.1 mA for a 5 V coil, compared to the 10 mA or more needed by other relays. Both series offer various configurations, high coil resistance for reduced heat, and low power consumption, making them suitable for portable equipment.

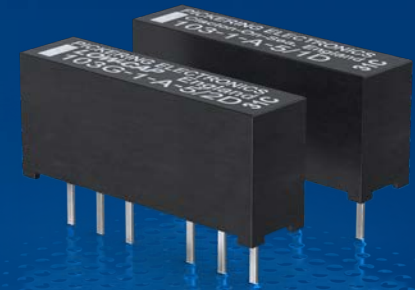


To learn more scan the QR code:



# Reed Relays for Low Capacitance

Pickering's Series 103, 103M, and 103GM Reed Relays are ideal for low capacitance applications, such as wide bandwidth A.T.E. switching matrices and attenuator switching. These relays feature designs that minimize inter-terminal capacitance. The 103 and 103M versions use a shorter coil and low permittivity potting compounds, achieving a closed switch-to-coil capacitance of about 0.4 pF, compared to 2.5 pF in standard relays. The 103G and 103GM versions include a coaxial screen for even lower capacitance, typically 0.1 pF. They also offer magnetic screening for side-by-side stacking and use instrumentation-grade reed switches for reliability and long life.



To learn more, scan the QR code:



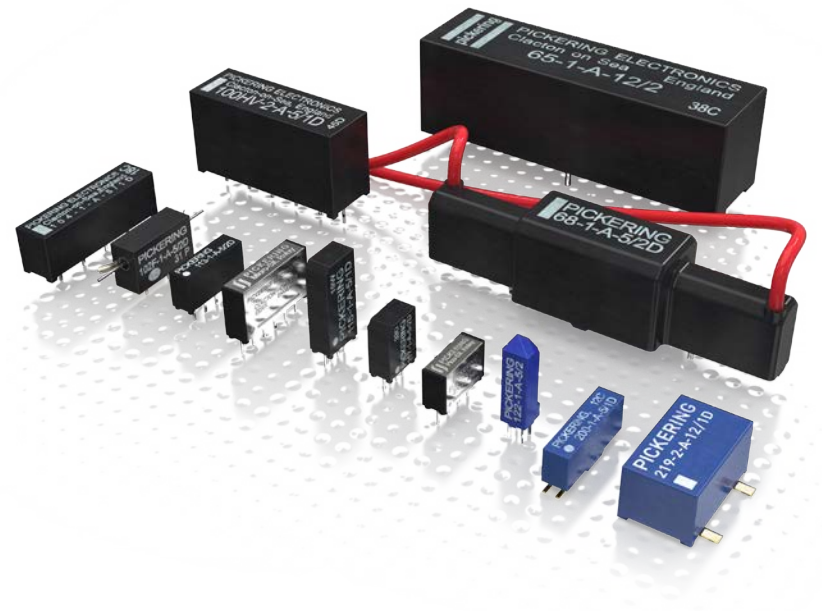


# Standard Build Options & Tailored Custom Relay Solutions

With over 1,000 standard catalogue reed relays to choose from, the chances are we already have the ideal part to meet the exact requirements of your application. If not, we can build and supply a standard part with a few minor variations or we can design, build, and supply a full custom device.

## Additional Testing Service

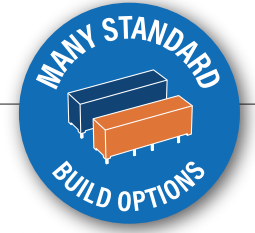
Datasheets are available for all standard parts, with performance characteristics based on extensive testing. While these provide recommendations for ensuring long service life, additional testing can be performed upon request. For instance, if your application uses pulse currents, we can test the relay at your intended duty cycle or advise on safe currents and duty cycles. We also offer highly accelerated life testing (HALT) under your specified load conditions.



To learn more, scan the QR code:



# Standard Part with Additional Build Options



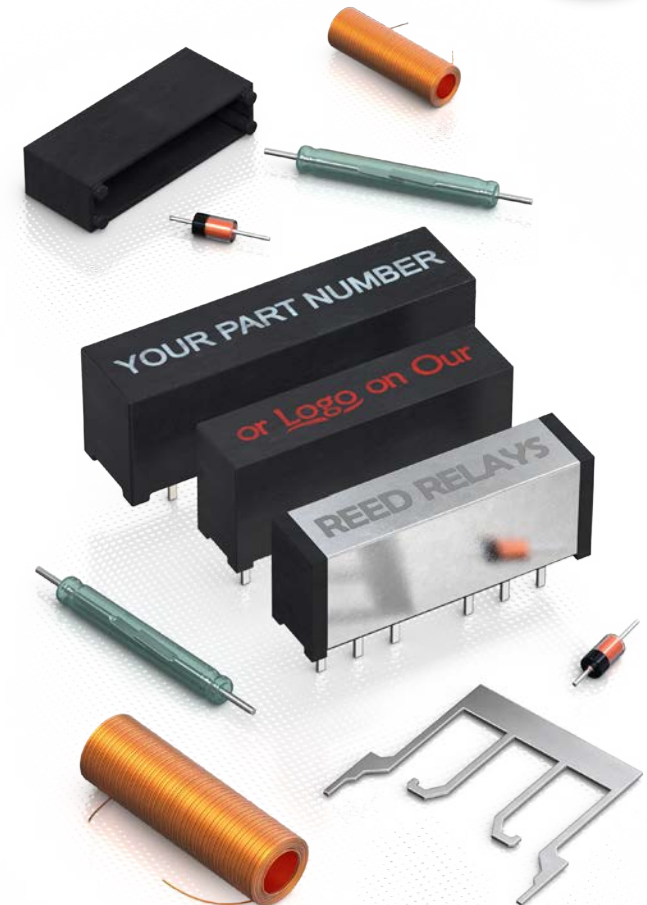
Pickering can offer a standard catalogue reed relay with one or more minor electrical and/or mechanical modifications; changes that our production department can easily make.

We are unlikely to have any devices with build options in stock but, as with standard parts, we can Fast Track orders for quantities of up to 500 pieces.

Build options include:

- Customized operate and/or release times. One way of achieving this is through a specific coil resistance.
- Upgrading the reed switch to accommodate a higher standoff voltage.
- Increased insulation resistance (which can also reduce effects due to temperature changes).
- Different external wire types (flying leads).
- Different ink color and/or your logo on the relay's body.
- Changes to meet certain environmental requirements, such as operating at higher temperatures.

Where pinouts are concerned, a common build option is to have longer pins fitted for mounting the relay on a thicker than normal PCB. Even changing the pin locations is possible, as we have made many custom devices over the years – so we may already have the tooling. However, if new tooling is required the project would be considered full custom.

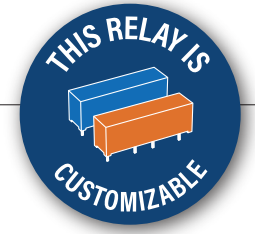


To learn more, scan the QR code:





# Fully Customisable Reed Relays Tailored to Your Needs

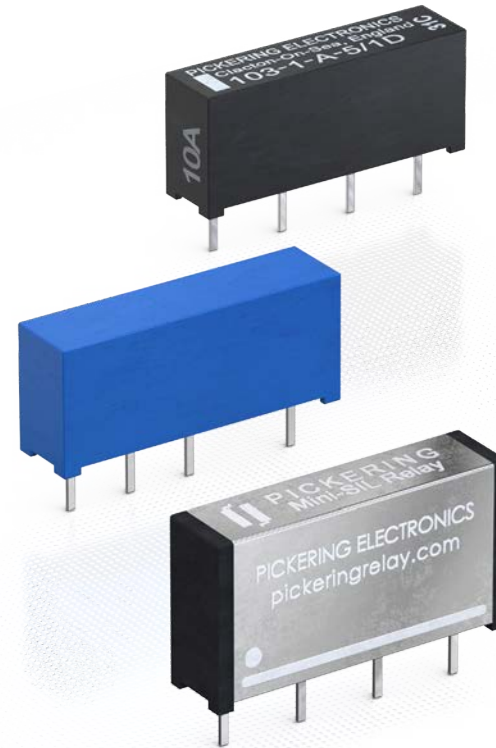


These unique reed relays are typically an evolution of a standard part (with or without build options) that requires engineering design effort, and possibly new tooling, to meet your exact requirements.

3D print versions can quickly be supplied for prototyping purposes, though these may not have the same electrical or mechanical properties as the final build because of the materials used.

Examples of full custom reed relays we have designed and manufactured during recent years include:

- Meeting strict electrical requirements, particularly where high voltage switching is concerned.
- Custom packaging. A bespoke mechanical (body) form factor and/or unique pinouts.
- The production of a device that is mechanically and electrically equivalent to one you have historically sourced elsewhere but which is now obsolete. Plus, we can generally improve on the OEM's design.
- Copper plated reed switches for RF/HF applications.



To learn more, scan the QR code:



# Unique Design

- **Instrumentation Grade Reed Switches** with vacuum sputtered Ruthenium plating to ensure stable, long life up to  $5 \times 10^9$  operations.
  - In comparison, other manufacturers often use low grade Reed Switches with electroplated Rhodium plating resulting in higher, less stable contact resistance.
- **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.
  - In comparison other manufacturers often use bobbins which 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.
- **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 has an interaction of approx. 5%.
  - In comparison, other manufacturers 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. Other manufacturer's screen has an interaction of approx. 30%.
- **SoftCenter™ technology**, provides maximum cushioned protection of the reed switch, minimizing internal lifetime stresses and extending the working life and contact stability.
  - In comparison other manufacturers utilise transfer moulded reed relays (produced using high temperature/pressure), resulting 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.





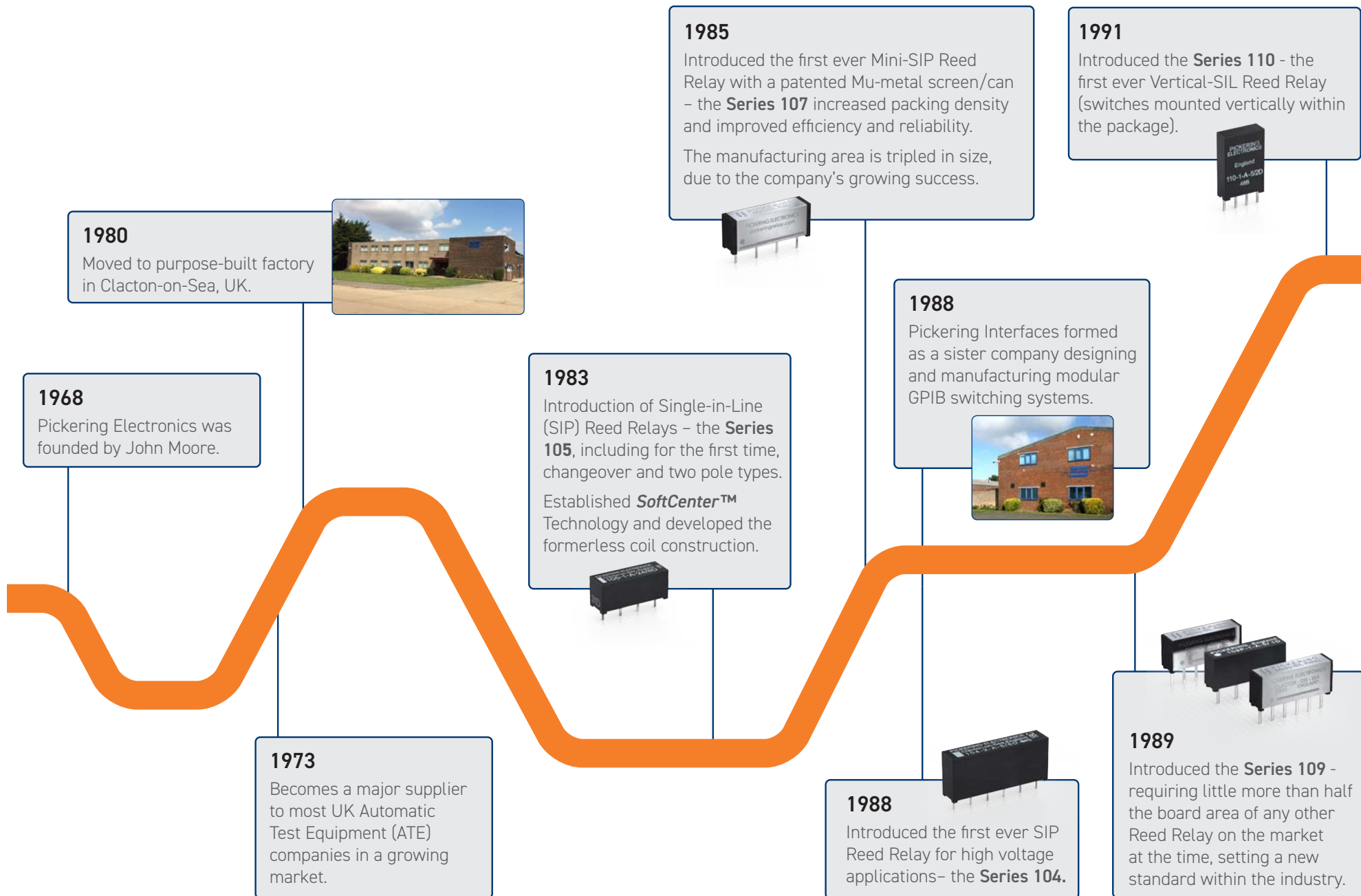
# 100% Testing, Dynamic Analysis, & Rigorous Stress Testing for Consistent Performance



- **100% Dynamic Testing** - 100% testing for all operating parameters including dynamic contact wave-shape analysis with full data scrutiny to maintain consistency.
  - In comparison, other manufacturers conduct simple dc testing or just batch testing which may result in non operational devices being supplied.
- **100% Inspection at Every Stage of Manufacturing** - maintaining high levels of reliability.
  - In comparison, other manufacturers often just conduct limited batch inspection.
- **100% Thermal Cycling** - Stress testing of the manufacturing processes, from -20 °C to +85 °C to -20 °C, repeated 3 times.
  - Other manufacturers rarely include these tests, resulting in field failures.



# Pickering Electronics Timeline





**1994**

Became ISO 9002 (BS 5750) certified.



FM29036

**2002 - 2005**

Introduced the **Series 115, 116 & 117** reed relays - which at the time, took up the minimum PCB space.



**2011**

Published the 'Reed RelayMate' book - a practical book about how reed relays work, how they are constructed and how to interpret their specifications and make best use of them in their applications - now in its 2nd edition.



**2021**

**Series 67-1-C** - expanded the range to include a HV Form C SPDT at 5 kV.

Introduced **Series 100HV & 100HC** - relays featuring very high contact resistance and thermal EMF levels less than 10  $\mu$ V.



**2023**

Introduced **Series 219** HV SMD, offering 1kV switching and 3 kV stand-off.



**2007**

Opened a manufacturing facility in the Czech Republic, which now employs over 150 people.

**2017 to 2019**

Introduced the **Series 120, 122 & 124** 4mm<sup>2</sup>™ product lines - the smallest footprint reed relays currently available. Switching up to 1 A, on a 4 mm x 4 mm pitch.



**2020**

Introduced the **Series 131** - the industry's smallest high voltage reed relay, switching 1 kV and up to 1.5 kV stand-off.



**2022**

Introduced HV **Series 67** - Rated up to 200 W, 6 kV switching with 8 kV stand-off, all in a unique small package.



**2024**

Introduced switch 5 to **Series 104**, creating the industry's first miniature SIP Reed Relay to have up to 5 kV stand-off.

Introduced the high power **Series 144**, switching up to 80 W in a small package. Ideal as a replacement for EMRs or mercury-wetted relays.

Introduced the **Series 125**, the smallest 2 pole reed relays in the industry. Switching up to 1 A, on a 5 mm x 5 mm pitch



# Superior Quality Assurance Standards



At Pickering, we take pride in crafting reed relays for instrumentation applications with only the finest materials. Our commitment to excellence is reflected in our ISO 9001:2015 certification, proudly audited by the British Standards Institution.



Each Pickering relay undergoes rigorous scrutiny throughout the manufacturing process. From continuous inspection to an intense thermal cycling routine, every relay is tested to the highest standards using advanced Automatic Test Equipment (ATE) and specialized equipment. Our detailed ATE test results are meticulously archived and leveraged for Statistical Process Control, ensuring unparalleled reliability and performance.



# Technical Help

Need technical assistance with our relays? Our team of technical experts is here to help you resolve any queries you may have. Don't hesitate to reach out to us for expert guidance and support.

Please email [techsales@pickeringrelay.com](mailto:techsales@pickeringrelay.com) or phone **+44 1255 428141**.







## Contact Us

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



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Scan here to find your local representative



FM 25036

Pickering Electronics maintains a commitment to continuous product development, consequently we reserve the right to vary from the descriptions given in this document.

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Lit-002, Issue 1, Nov 2024



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