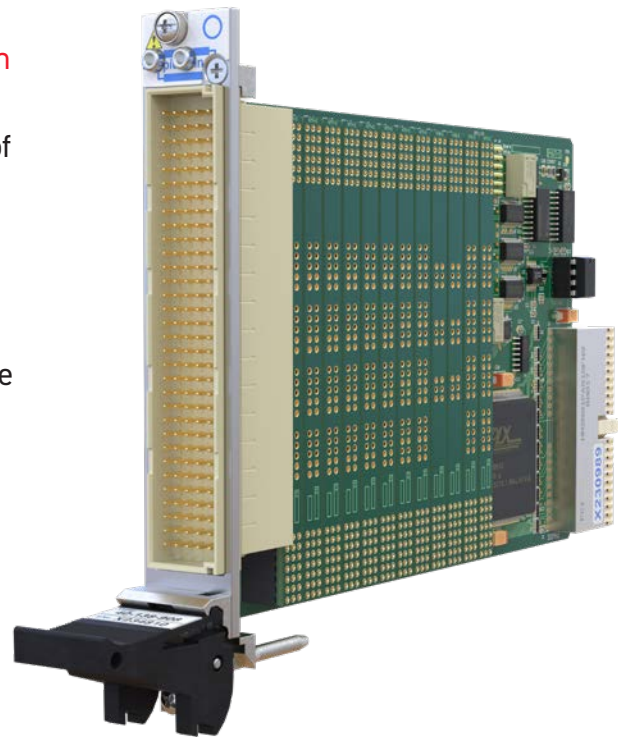


- **Versatile Cell-based Design Allows Slot-Saving High Density Mixed Configurations**
- Mixed Relay Configurations With Any Combination of SPST, DPST, SPDT & DPDT
- Maximum Current 2 A Hot or Cold Switching
- Switch up to 300 VDC/250 VAC and up to 60 W Max Power
- Reduced Cost Partially Populated Versions Available
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by **eBIRST™**
- 3 Year Warranty



The 40-138 2A Relay Series is suitable for applications requiring medium power switching with high density. Featuring 2A current capacity and voltages to 300VDC/250VAC, the 40-138 provides a broad selection of mixed relay types for greater flexibility.

The module consists of 13 cells which can be specified as empty or populated with one relay type. The available types are:

- SPST (Single Pole Single Throw) - 6 per cell.
- DPST (Double Pole Single Throw) - 3 per cell.
- SPDT (Single Pole Double Throw) - 4 per cell.
- DPDT (Double Pole Double Throw) - 2 per cell.

The permissible arrangement of cells is shown in the configuration example overleaf.

Mixed configurations are very useful for high density and/or low cost applications where optimum usage must be made of all relays, and where few PXI slots are available.

The 40-138 can be used for replacing legacy VXI or custom switch cards where mixed relay types have been deployed.

Connections are made via a front panel mounted 160 pin DIN 41612 high density connector. We also provide a wide range of connector and cabling solutions, please refer to our web site for more information.

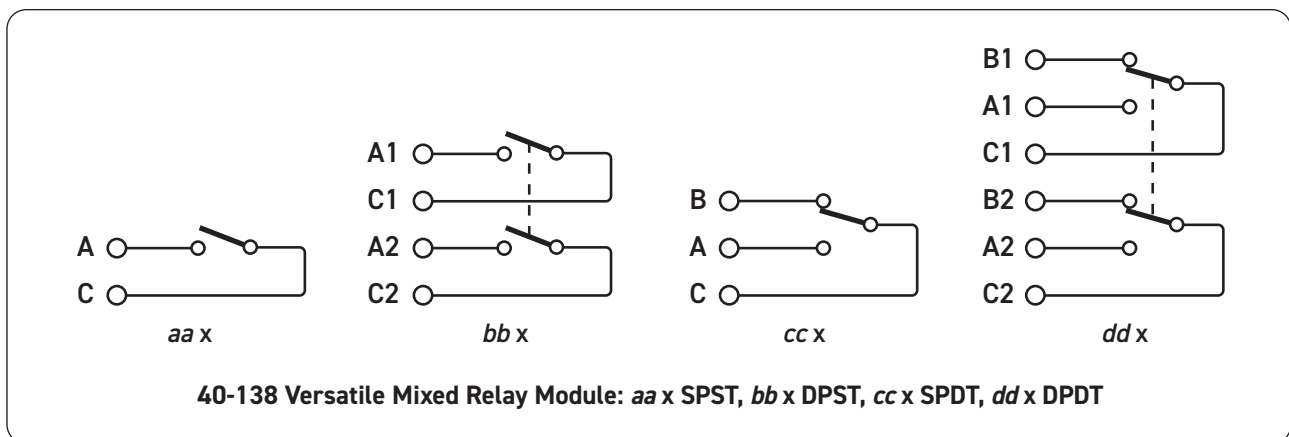
Typical applications will be found in Automotive, Aerospace, Military and Power Cell Testing applications.

**Note:** If a configuration is required with only one switch type, please refer to the data sheet for the 40-139. This offers high density low cost solutions with 2A electro-mechanical relays.

### Supported by eBIRST

eBIRST switching system test tools simplify fault-finding by quickly testing the system and graphically identifying the faulty relay.

For more information go to: [pickeringtest.com/ebirst](http://pickeringtest.com/ebirst)



## 40-138 Mixed Relay Configurator

When ordering a configuration of mixed relays, each cell can be set to be populated by SPST, DPST, SPDT or DPDT. The part number is in the form **40-138-aa-bb-cc-dd** where:

- **aa** is the number of SPST relays (multiples of 6)
- **bb** is the number of DPST relays (multiples of 3)
- **cc** is the number of SPDT relays (multiples of 4)
- **dd** is the number of DPDT relays (multiples of 2)

For further assistance consult the Operating Manual, web site or contact sales office.

Relay Type	Cells 1 to 13	Cell 13 custom build†
SPST	6 per cell	8
DPST	3 per cell	4
SPDT	4 per cell	4
DPDT	2 per cell	2

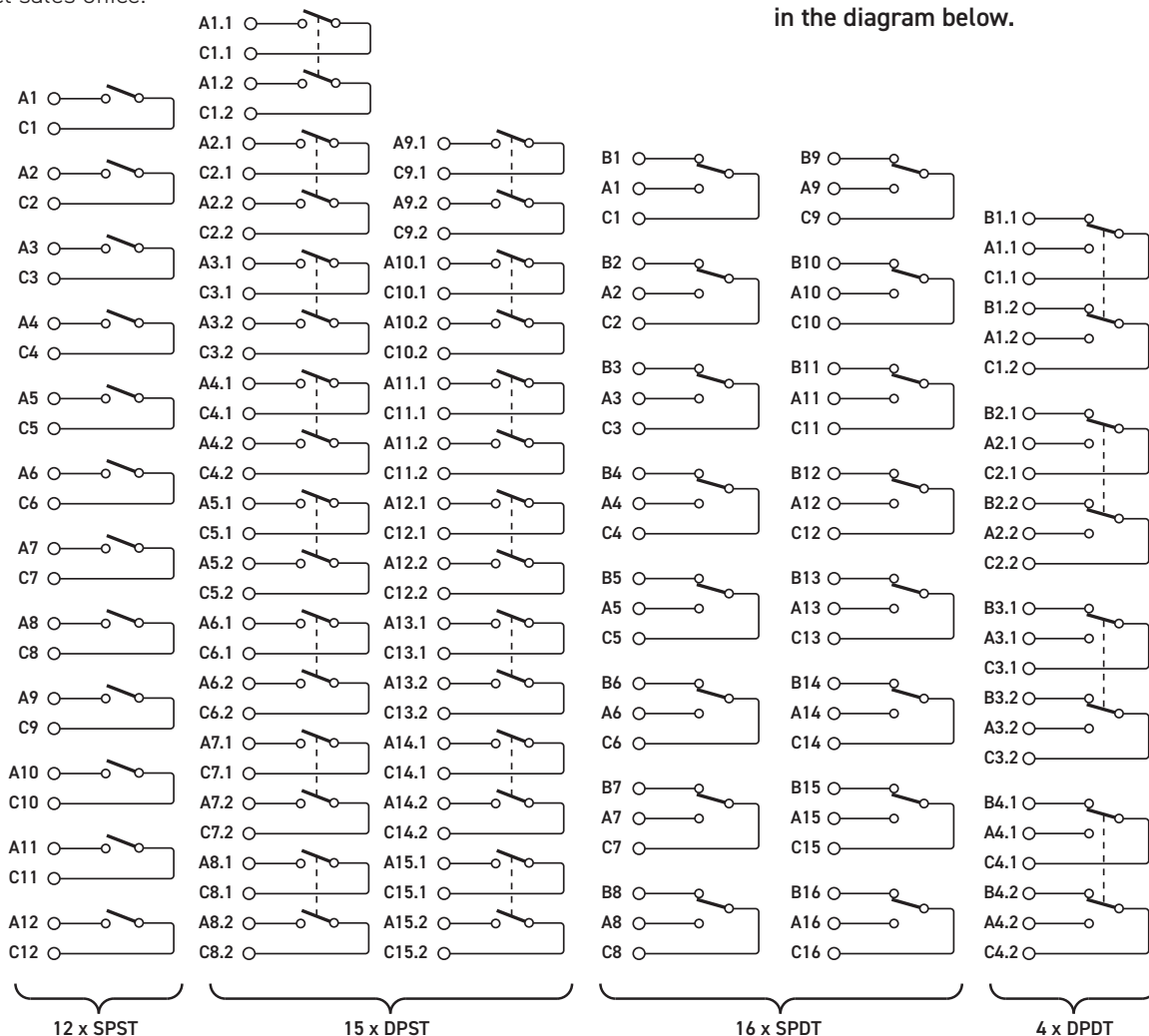
† Note: Cell 13 is configured as the same size as other cells except on custom builds.

### 40-138 Mixed Relay Configuration Example

A typical mixed relay example is shown in the following table where the specified configuration is; 12 x SPST, 15 x DPST, 16 x SPDT and 4 x DPDT. This corresponds to the order code: **40-138-12-15-16-4**. SPST switches are always installed in the lowest cell number and DPDT are always installed in the highest populated cell number. For further assistance please contact sales office.

Relay Type	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Cell 6	Cell 7	Cell 8	Cell 9	Cell 10	Cell 11	Cell 12	Cell 13	Total
SPST	6	6	6	6	6	6	6	6	6	6	6	6	8	12
DPST	3	3	3	3	3	3	3	3	3	3	3	3	4	15
SPDT	4	4	4	4	4	4	4	4	4	4	4	4	4	16
DPDT	2	2	2	2	2	2	2	2	2	2	2	2	2	4

Cell Occupancy Table - the above configuration is shown in the diagram below.



Schematic Diagram for the 40-138 Module With an Example Mixed Relay Configuration (40-138-12-15-16-4)

## Relay Type

The 40-138 series modules are fitted with electro-mechanical signal relays with palladium-ruthenium, gold covered contacts.

The module is of a single circuit board construction and uses through hole relays (not SMT relays) so field maintenance is greatly simplified. A spare relay is built onto the circuit board to allow easy maintenance with minimum downtime.

## Switching Specification (all versions)

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300 VDC/250 VAC*
Max Power:	62.5 VA, 60 W from 30 V to 220 VDC, 30 W to 300V DC (resistive load)
Max Switch Current:	2 A
Max Continuous Carry Current:	2 A
Max Pulsed Carry Current	
Example (for single switch path):	6 A for 100 ms (up to 10% duty cycle)
Initial On Path Resistance:	<500 mΩ (1 A measurement condition) <600 mΩ (10 mA measurement condition)
Off Path Resistance:	>10 <sup>9</sup> Ω
Minimum Voltage:	100 μV
Thermal Offset:	<10 μV
Operate Time:	<3 ms
Expected Life (operations)	
Very low power signal load:	>10 <sup>8</sup>
Low power load (2 W):	>1.5x10 <sup>7</sup> (0.1 A 20 VDC)
Medium power load (30 W):	>5x10 <sup>6</sup> (1 A, 30 VDC)
Full power load (60 W):	>1x10 <sup>5</sup> (2 A, 30 VDC) >1x10 <sup>5</sup> (0.1 A, 300 VDC)

\* For full voltage rating, signal sources to be switched must be fully isolated from mains supply and safety earth.

## Power Requirements

+3.3 V	+5 V	+12 V	-12 V
0	2.6 A max (80 relays energised)	0	0

## Mechanical Characteristics

Single slot 3 U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

## Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 160-pin male DIN 41612 connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

## Operating/Storage Conditions

### Operating Conditions

Operating Temperature:	0 °C to +55 °C
Humidity:	Up to 90% non-condensing
Altitude:	5000 m

### Storage and Transport Conditions

Storage Temperature:	-20 °C to +75 °C
Humidity:	Up to 90% non-condensing
Altitude:	15000 m

## PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses a 33 MHz 32-bit backplane interface.

## Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2010, EMC Immunity EN61326-1:2013, Emissions EN55011:2009+A1:2010.

## Mixed Relay Configuration Product Order Codes

Part numbers are in the form: **40-138-aa-bb-cc-dd**

Where: aa is the number of SPST  
bb is the number of DPST  
cc is the number of SPDT  
dd is the number of DPDT

Please note that these configurations are shipped with product codes in the form of '**40-138-XXX**', where '**XXX**' contains digits reflecting the specific manufacturing build.

## Product Customization

Pickering modules are designed and manufactured on our own flexible manufacturing lines, giving complete product control and enabling simple customization to meet very specific requirements.

Customization can include:

- Alternative relay types
- Mixture of relay types
- Alternative number of relays
- Different performance specifications

All customized products are given a unique part number, fully documented and may be ordered at any time in the future. Please contact your local sales office to discuss.

## Support Products

### eBIRST Switching System Test Tool

This product is supported by the *eBIRST* test tools which simplify the identification of failed relays, the required *eBIRST* tools are below. For more information go to:

[pickeringtest.com/ebirst](http://pickeringtest.com/ebirst)

Product	Test Tool	Adaptor
40-139	93-002-001	93-002-410

### Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

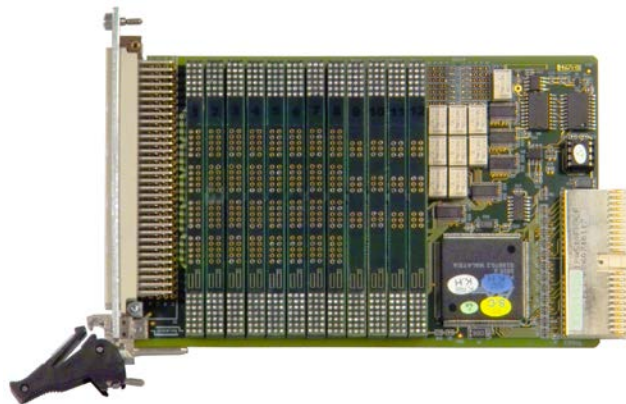
Product	Relay Kit
40-138-XXX	91-100-001

(where XXX are three digits that correspond to the specific manufacturing build of the module)

For further assistance, please contact your local Pickering sales office.

## Mating Connectors & Cabling

For connection accessories for the 40-138 series please refer to the [90-001D](#) 160-pin DIN 41612 Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



**40-138 Module Side View**

## Chassis Compatibility

This PXI module must be used in a suitable chassis. It is compatible with the following chassis types:

- All chassis conforming to the 3U PXI and 3U Compact PCI (cPCI) specification
- Legacy and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis
- Pickering Interfaces LXI or LXI/USB Modular Chassis

## Chassis Selection Guide

### Standard PXI or hybrid PXIe Chassis from any Vendor:

- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization



### Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation
- Independence from Windows operating system



## Connectivity Solutions

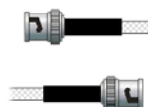
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed to mechanically and electrically mate to our modules.



Connectors & Backshells



Multiwire Cable Assemblies



RF Cable Assemblies



Connector Blocks

We also offer customized cabling and have a free online **Cable Design Tool** that can be used to create custom cable solutions for many applications. Visit: [pickeringtest.com/cdt](http://pickeringtest.com/cdt) to start your design.

## Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for a PXI or LXI based test system. Our modules are fully supported by both Virginia Panel and MacPanel.



## Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our Relay Division. These instrument grade reed relays feature **SoftCenter™** technology, ensuring long service life and repeatable contact performance. To learn more, please go to: [pickeringrelay.com](http://pickeringrelay.com)



## Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions. For a list of all supporting operating systems, please see: [pickeringtest.com/os](http://pickeringtest.com/os)

The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

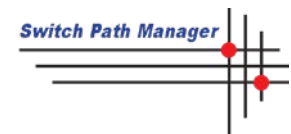
- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Keysight** VEE and OpenTAP
- **Mathworks** Matlab
- **Marvin** ATEasy
- **MTQ Testsolutions** Tecap Test & Measurement Suite

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.

To learn more about software drivers and development environments, please go to: [pickeringtest.com/software](http://pickeringtest.com/software)

## Signal Routing Software

Our signal routing software, Switch Path Manager, automatically selects and energizes switch paths through Pickering switching systems. Signal routing is performed by simply defining test system endpoints to be connected together, greatly accelerating Test System software development. To learn more, please go to: [pickeringtest.com/spm](http://pickeringtest.com/spm)



## Diagnostic Relay Test Tools

**eBIRST** Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

To learn more, please go to: [pickeringtest.com/ebirst](http://pickeringtest.com/ebirst)



## Three Year Warranty & Guaranteed Long-Term Support

All standard products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available for all our modules and systems with various levels to suit your requirements. Although we offer a 3-year warranty as standard, we also include guaranteed long-term support—with a history of supporting our products for typically 15-20 years. To learn more, please go to: [pickeringtest.com/support](http://pickeringtest.com/support)

## Available Product Resources

We have a large library of product resources including success stories, product and support videos, articles and white papers as well as application specific product brochures to assist when looking for the switching, simulation and connection solutions you need. We have also published handy reference books on Switching Technology and for the PXI and LXI standards.



To view, download or request any of our product resources, please visit: [pickeringtest.com/resources](http://pickeringtest.com/resources)