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40-136 User Manual

PXI High Power Reed Relay Modules



Issue 9.4 March 2021

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ISO 9001
Reg No. FM38792

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For Technical Support please contact Pickering Interfaces either by phone, the website or via e-mail.

WARRANTY

All products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for a period of three years, excluding programmable power supplies, from the date of delivery to the original purchaser. Any product found to be defective within this period will, at the discretion of Pickering Interfaces be repaired or replaced.

Products serviced and repaired outside of the warranty period are warranted for ninety days.

Extended warranty and service are available. Please contact Pickering Interfaces by phone, the website or via e-mail.

ENVIRONMENTAL POLICY

Pickering Interfaces operates under an environmental management system similar to ISO 14001.

Pickering Interfaces strives to fulfil all relevant environmental laws and regulations and reduce wastes and releases to the environment. Pickering Interfaces aims to design and operate products in a way that protects the environment and the health and safety of its employees, customers and the public. Pickering Interfaces endeavours to develop and manufacture products that can be produced, distributed, used and recycled, or disposed of, in a safe and environmentally friendly manner.

Worldwide Technical Support and Product Information

pickeringtest.com

Pickering Interfaces Headquarters

Stephenson Road Clacton-on-Sea CO15 4NL United Kingdom
Tel: +44 (0)1255-687900
E-Mail: sales@pickeringtest.com

USA
Tel: (West) +1 541 471 0700
Tel: (East) +1 781 897 1710
E-mail: ussales@pickeringtest.com

France
Tel +33 9 72 58 77 00
E-mail frsales@pickeringtest.com

Germany
Tel: +49 89 125 953 160
E-mail: desales@pickeringtest.com

Sweden
Tel: +46 340-69 06 69
E-mail: ndsales@pickeringtest.com

Czech Republic
Tel: +420 558 987 613
E-mail: desales@pickeringtest.com

China
Tel: +86 4008 799 765
E-mail: chinasales@pickeringtest.com

PRODUCT SAFETY

SAFETY SYMBOLS

The following safety symbols may be used on the product and throughout the product documentation.

MEANING / DESCRIPTION	SYMBOL
PROTECTIVE EARTH (GROUND) To identify any terminal which is intended for connection to an external conductor for protection against electric shock in case of a fault, or the terminal of a protective earth (ground) electrode.	
DANGEROUS VOLTAGE To indicate hazards arising from dangerous voltages.	
WARNING / CAUTION An appropriate safety instruction should be followed or caution to a potential hazard exists. Refer to the relevant instructions detailed within the product manual.	
HEAVY If this product is heavy reference should be made to the safety instructions for provisions of lifting and moving.	
STATIC SENSITIVE To indicate that static sensitive devices are present and handling precautions should be followed.	

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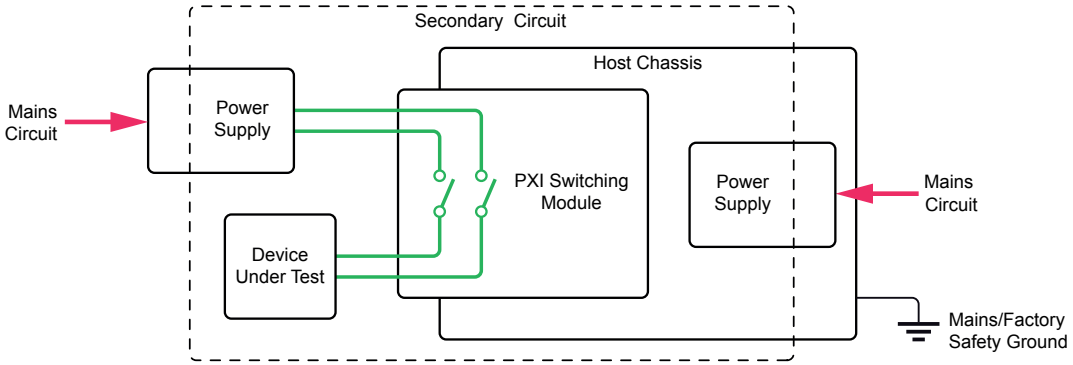
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WARNINGS AND CAUTIONS

WARNING - HAZARDOUS ENVIRONMENTS	SYMBOL
This product is not specifically designed for use in hazardous environments, for example in explosive atmospheres. If the product is to be used in hazardous environments we recommend that the user ensures suitable protective measures are taken.	

WARNING - DANGER OF ELECTRIC SHOCK	SYMBOL
This module may contain hazardous voltages. Before removing the module from the rack remove all supplies and disconnect user I/O signals. Unused slots in the host chassis are populated with blanking plates to prevent access to user I/O signals that may be present. Blanking panels are available to order from Pickering in a variety of slot widths. If the product is not used in this manner for example by using an extender card then additional care must be taken to avoid contact with exposed signals. Not to be used in safety critical circuits, refer to the Pickering Interfaces' terms & conditions of sale. This module must not be used for the switching of Mains Circuits. For the switching of voltages up to the module's full specification, Secondary Circuit power supplies and the Device Under Test must be fully isolated from the Mains Circuit and the safety earth. The host chassis must be correctly installed and be connected to mains or factory safety ground, please refer to your chassis installation manual.  **Diagram Showing Separation Between The Mains Circuit and Secondary Circuit / DUT** For the purposes of this document, a Mains Circuit is an installation classified as Overvoltage Category II up to 300V. Separation between the Secondary Circuit and Mains Circuit is achieved by a transformer in which the primary windings are separated from the secondary windings by reinforced insulation, double insulation, or a screen connected to the protective conductor terminal.	

CAUTION - HANDLING OF ELECTROSTATIC-SENSITIVE DEVICES	SYMBOL
Certain semiconductor devices used in this equipment are liable to damage due to static voltage. Observe the following precautions when handling these devices in their unterminated state, or sub-assemblies containing these devices: 1. Persons removing sub-assemblies from equipment using these devices must be earthed by a wrist strap and a resistor at the point provided on the equipment. 2. Soldering irons used during the repair operations must be low voltage types with earthed tips and isolated from the mains voltage by a double insulated transformer. 3. Outer clothing worn must be unable to generate static charges. 4. Printed Circuit Boards (PCBs) fitted with these devices must be stored and transported in anti-static bags.	

CAUTION - PRODUCT DOCUMENTATION	SYMBOL
Suitably qualified & trained users should ensure that the accompanying documentation is fully read and understood before attempting to install or operate the product.	

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS
All cleaning and servicing requires the equipment to be isolated and disconnected from the power source and user I/O signals (refer to the Maintenance Section). • Appropriate manual handling procedures should be followed as dictated by the weight of the individual module or the combined weight of the modules & chassis. • Should a fault occur with the module or chassis, immediately isolate and disconnect the incoming power to the chassis and the user I/O signals. • Ensure the equipment is installed, operated and maintained by trained and authorised personnel. • For suitably equipped products in the event of an emergency press the red “emergency stop” button situated on the front of the unit.

SECTION 1 - TECHNICAL SPECIFICATION

- From 12 to 32 Power Reed Relays Per Module
- SPST and DPST Configurations
- Ruthenium Reed Relays Suitable For Low Level Signals
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Switch up to 200 V, 1 A with 2.5 A Carry Current, 40 W Max Power
- Fast Operating Speed 250 µs Typical
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by ***eBIRST*** ™
- 3 Year Warranty



Pickering Interfaces 40-136 Power Ruthenium Reed Relay Modules are suitable for applications where ordinary reed relay modules require additional current/voltage capacity. The 40-136 is suitable for voltage up to 200 V and current to 2.5 A. Available in Normally Open (SPST & DPST) configurations. Connections are made via a front panel mounted 50 or 78 pin D-Type connector.

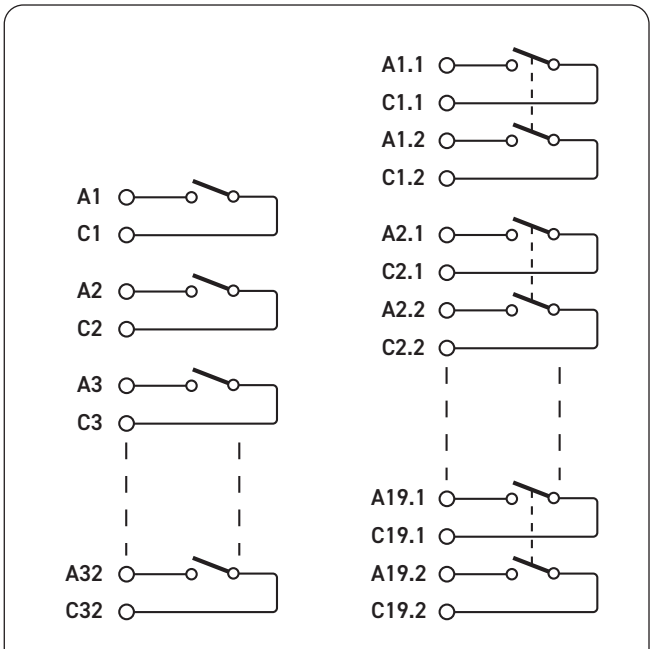
Range Description:

- 40-136-011 16 x SPST 2.5 A Power Ruthenium Reed Relays.
- 40-136-111 25 x SPST 2.5 A Power Ruthenium Reed Relays.
- 40-136-211 32 x SPST 2 A Power Ruthenium Reed Relays.
- 40-136-012 12 x DPST 2.5 A Power Ruthenium Reed Relays.
- 40-136-112 16 x DPST 2 A Power Ruthenium Reed Relays.
- 40-136-212 19 x DPST 2 A Power Ruthenium Reed Relays.

Supported by *eBIRST*

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

For more information go to: pickeringtest.com/ebirst



40-136-211 Power Ruthenium Reed Relay Module - 32 x SPST

40-136-212 Power Ruthenium Reed Relay Module - 19 x DPST

Relay Type

The 40-136 is fitted with ruthenium sputtered power reed relays, these offer very long life with good low level switching performance and excellent contact resistance stability. Spare reed relays are built onto the circuit board to allow easy maintenance with minimum downtime.

All reed relays are manufactured by our Relay Division, for further information please visit: pickeringrelay.com

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	200 V*
Max Power:	40 W
Max Switch Current:	1 A
Max Carry Current:	2 A (-211, -112 & -212) 2.5 A (-011, -111 & -012)
Initial On Path Resistance:	<250 mΩ
Off Path Resistance:	$>10^9$ Ω
Thermal Offset:	<10 µV
Operate Time:	0.5 ms (typical)
Expected Life, low power:	$1x10^9$ operations
Expected Life, high power:	$>1x10^6$ operations

* 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	480 mA (typ 400 mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 220 g (40-136-111/211).
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 D-Type male connector, for pin outs please refer to the operating manual.

- 40-136-011 50-pin D-Type male connector
- 40-136-111 50-pin D-Type male connector
- 40-136-211 78-pin D-Type male connector
- 40-136-012 50-pin D-Type male connector
- 40-136-112 78-pin D-Type male connector
- 40-136-212 78-pin D-Type male connector

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 & Star Trigger are not implemente
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.

Product Order Codes

16 x SPST, Power Ruthenium Reed Relays	40-136-011
25 x SPST, Power Ruthenium Reed Relays	40-136-111
32 x SPST, Power Ruthenium Reed Relays	40-136-211
12 x DPST, Power Ruthenium Reed Relays	40-136-012
16 x DPST, Power Ruthenium Reed Relays	40-136-112
19 x DPST, Power Ruthenium Reed Relays	40-136-212

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 reed relay types
- Mixture of reed 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

Product	Test Tool	Adaptor
40-136-011	93-005-001	Not Required
40-136-012	93-005-001	Not Required
40-136-111	93-005-001	Not Required
40-136-112	93-006-001	Not Required
40-136-211	93-006-001	Not Required
40-136-212	93-006-001	Not Required

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
40-136-011/111/211	91-100-036
40-136-012/112/212	91-100-051

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

Mating Connectors & Cabling

For connection accessories for the 40-136 series please refer to the 90-006D 78-pin D-Type and 90-005D 50-pin D-Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

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

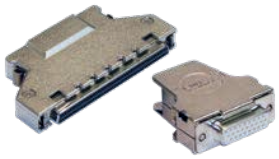


Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:

- 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

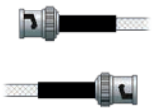
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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



Connectors & Backshells



Multiway 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 to start your design.

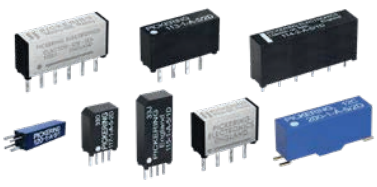


Mass Interconnect

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



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

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

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

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

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

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

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SECTION 2 - TECHNICAL DESCRIPTION

FUNCTIONAL DESCRIPTION

A functional block diagram is provided in Figure 2.1. The High Power Reed Relay Module is powered by +5V and +12V inputs via Compact PCI connector J1. The interface to the user test equipment is via the front panel mounted 50 or 78-pin D type connector, J2. The module comprises a PCB populated with reed relays. The relays are energised via control signals from relay driver U8. The relay driver is addressed by PCI bridge U1, via the control logic, to output the required signal. Module configuration is determined by data stored in EEPROM U8. PCI Bridge U1 is configured by EEPROM U2. At start up the application of the +12V supply to the relays is delayed by a protection circuit comprising transistors Q1 and Q2.

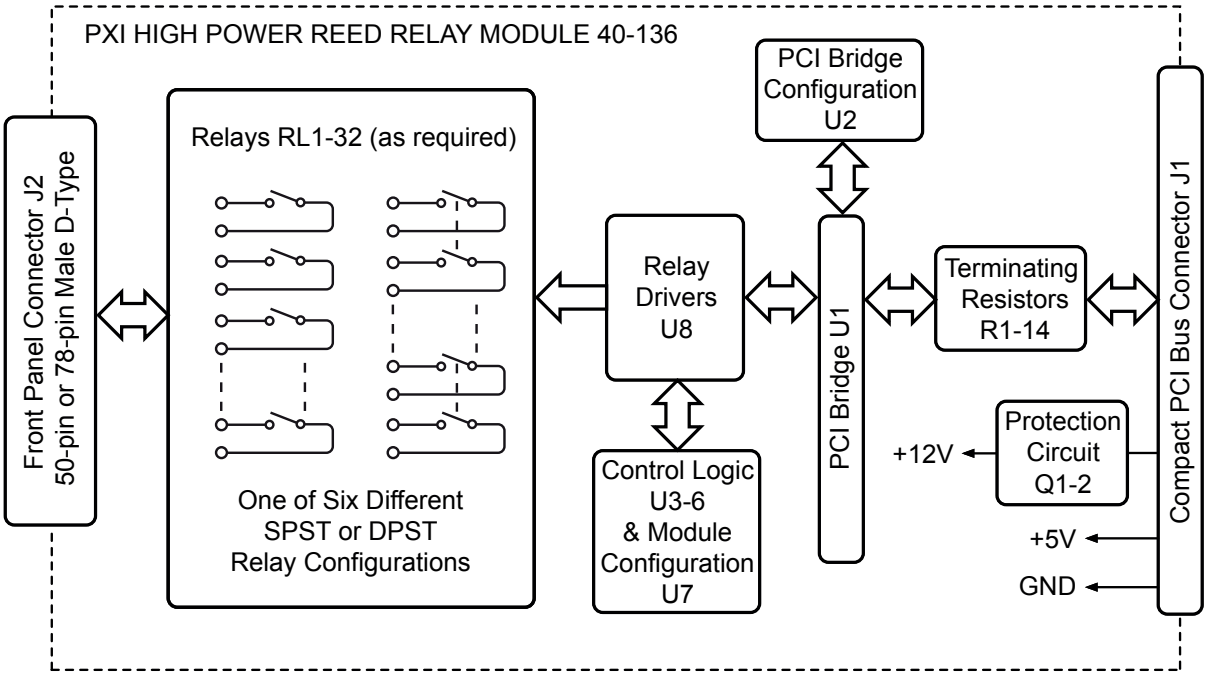


Figure 2.1 - High Power Reed Relay Module (40-136): Functional Block Diagram

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SECTION 3 - INSTALLATION

Refer to the Warnings and Cautions at the front of this manual

Modular products require installation in a suitable PXI/LXI chassis. The module is designed for indoor use only.

PREOPERATION CHECKS (UNPACKING)

1. Check the module for transport damage and report any damage immediately to Pickering Interfaces. Do not attempt to install the product if any damage is evident.
2. Position the chassis relative to any other equipment the module(s) will connect with. Ensure the chassis is not connected to the electrical supply.
3. Ensure that the designated area for the chassis containing the module is of flat and solid construction to withstand and support the combined weight of the module(s) and chassis.

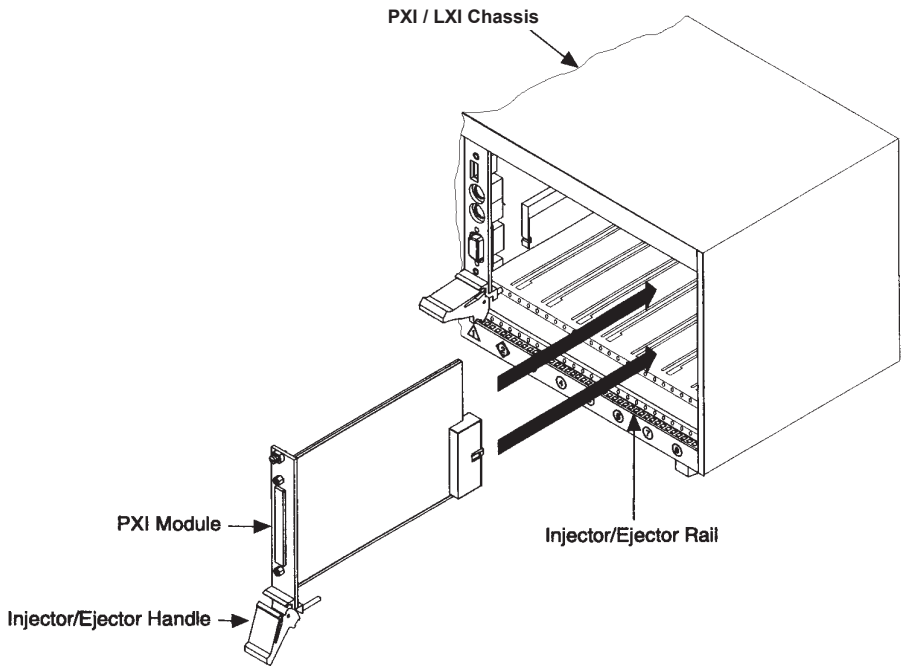


Figure 3.1 - Installing the Module into a PXI/cPCI/LXI Chassis

HARDWARE INSTALLATION
ELECTRICAL CONNECTION (CHASSIS)

1. The chassis must be electrically installed in accordance with local regional electrical codes by a qualified engineer.
2. The chassis must be grounded.

Electrostatic discharge can damage the components on the module. To avoid such damage in handling the board refer to page VII.

Ensure that there is adequate ventilation.

The module should be installed in accordance with the following procedure:

1. Ensure that the system is turned OFF but still connected to mains so that it remains grounded.
2. Choose an appropriate slot in the rack.
3. Remove the blanking plate for the chosen slot.
4. Ensure that the injector/ejector handle is in its downward position. Align the module with the card guides on the top and bottom of the slot.

   Do not raise the injector/ejector handle whilst inserting the module as the module will not insert properly.
5. Hold the handle whilst slowly sliding the module into the card guides until the handle catches on the injector/ejector rail (refer to Figure 3.1).
6. Raise the injector/ejector handle until the module firmly seats into the backplane. The front panel of the module should be flush with the front panel of the chassis.
7. Secure the front panel of the module using both screws to the chassis front panel mounting rails.
8. In a system employing a remote control interface to connect an external controller to a PXI chassis or to link multiple chassis, power-up the system as follows:
   a. For a system comprising an external controller and one chassis, power up the chassis before powering up the external controller.
   b. For a system comprising more than one chassis, turn ON the last chassis in the system followed by the penultimate, etc, and finally turn ON the external controller or chassis containing the system controller.
9. For Pickering Interfaces modular LXI installation there is no requirement to use any particular power up sequence.

SOFTWARE INSTALLATION

First install the appropriate Pickering PXI switch card drivers by running the installer program Setup.exe (provided in a compressed zip file), either from the CD-ROM supplied, or by downloading the latest version from our website **pickeringtest.com** - the recommended method. Setup is accompanied by a ReadMe file containing additional installation information. A single installation covers all cards in the System 40, System 45 and System 50 ranges.

When installation completes, the installed drivers' ReadMe file is offered for display. It can also be displayed later using a shortcut on the Programs>>Pickering menu.

If you are not a LabVIEW user you should choose the "full" version, and once that has been installed run the LabVIEW Runtime Engine installer via the shortcut on the Programs>>Pickering menu. In the absence of LabVIEW the Runtime Engine is required to support the Pickering Test Panels application.

TESTING OPERATION

After installation of the hardware and Pickering PXI Driver software package start the General Soft Front Panel (GSFP) using the desktop icon or via the Start menu (***Start Menu-> Pickering Interfaces Ltd -> General Soft Front Panel***).



Figure 3.2 - General Soft Front Panel Icon

A selector panel will appear, listing all installed Pickering PCI, PXI or LXI switch cards and resistor cards. Click on the card you wish to control, and a graphical control panel is presented allowing operation of the card. Panels can be opened simultaneously for all the installed cards.

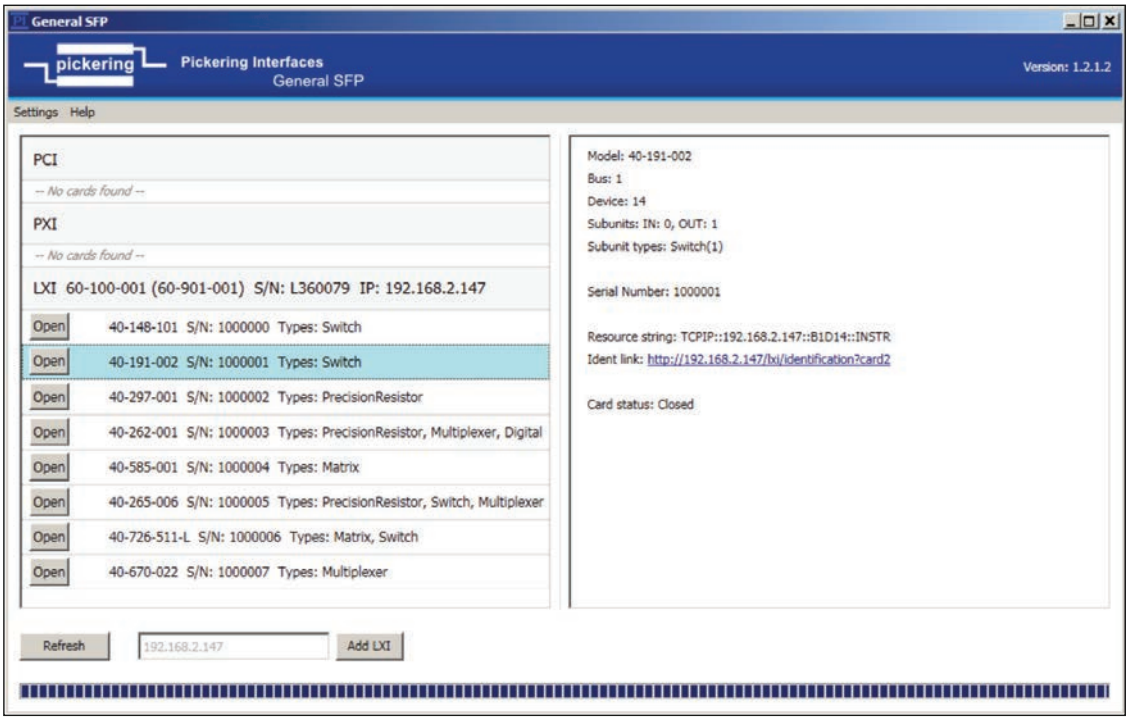


Figure 3.3 - General Soft Front Panel Selector

More details how to use the GSFP can be found in the manual, via menu ***Help\Manual***

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SECTION 4 - PROGRAMMING GUIDE

PROGRAMMING OPTIONS FOR PICKERING INTERFACES PXI MODULES

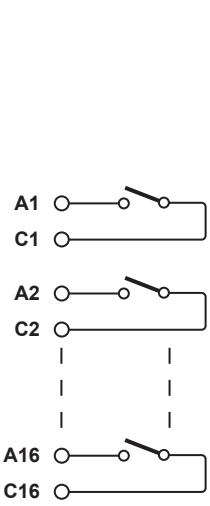
For information on the installation and use of drivers and the programming of Pickering's products in various software environments, please refer to the Software User Manual.

This is available as a download from:
https://www.pickeringtest.com/support/software-drivers-and-downloads

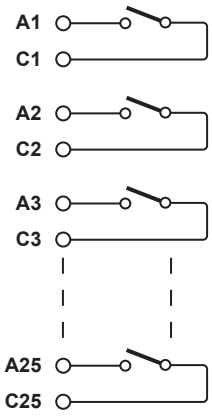
Also, it can be accessed from the DVD supplied with the product:
<DVD_DRIVE>\downloads\Documentation\Software-Manual.pdf

MODULE ARCHITECTURE - SPST VERSIONS

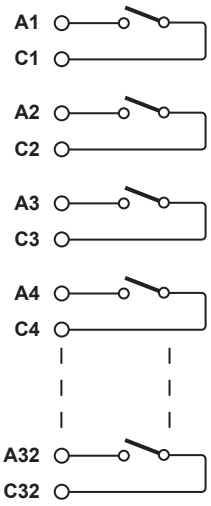
The 40-136-011/111/211 modules are arrays of 16, 25 or 32 uncommitted SPST relays. In the default state, all signal paths are open circuit. Energising a particular relay creates a signal path between the C and A terminals. The relay module's switching architectures are shown in their default state in the diagrams below:



40-136-011 (16 x SPST)



40-136-111 (25 x SPST)



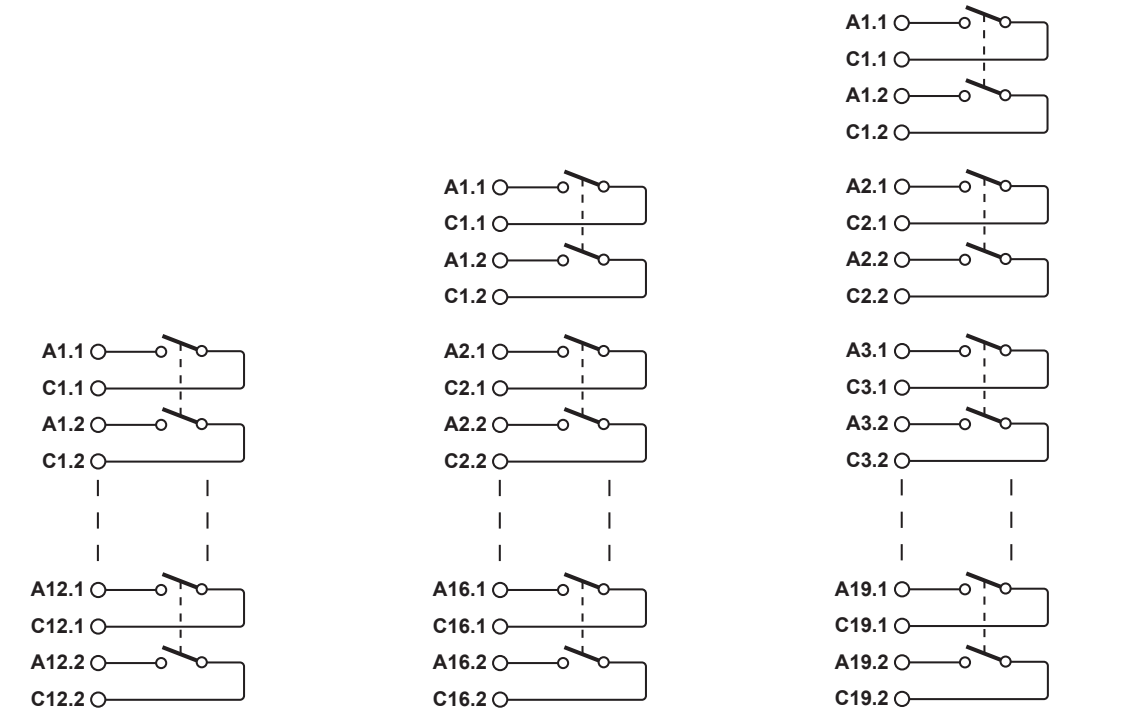
40-136-211 (32 x SPST)

One sub-unit is used to control all the module's relays as shown below. Enabling a particular bit closes the C to A signal path.

Sub-Unit	Bit	40-136-011 Signal Path (with relay energised)	40-136-111 Signal Path (with relay energised)	40-136-211 Signal Path (with relay energised)
1	1	C1 to A1	C1 to A1	C1 to A1
1	2	C2 to A2	C2 to A2	C2 to A2
1	3	C3 to A3	C3 to A3	C3 to A3
1	4	C4 to A4	C4 to A4	C4 to A4
1	5	C5 to A5	C5 to A5	C5 to A5
1	6	C6 to A6	C6 to A6	C6 to A6
1	7	C7 to A7	C7 to A7	C7 to A7
1	8	C8 to A8	C8 to A8	C8 to A8
1	9	C9 to A9	C9 to A9	C9 to A9
1	10	C10 to A10	C10 to A10	C10 to A10
1	11	C11 to A11	C11 to A11	C11 to A11
1	12	C12 to A12	C12 to A12	C12 to A12
1	13	C13 to A13	C13 to A13	C13 to A13
1	14	C14 to A14	C14 to A14	C14 to A14
1	15	C15 to A15	C15 to A15	C15 to A15
1	16	C16 to A16	C16 to A16	C16 to A16
1	17	—	C17 to A17	C17 to A17
1	18	—	C18 to A18	C18 to A18
1	19	—	C19 to A19	C19 to A19
1	20	—	C20 to A20	C20 to A20
1	21	—	C21 to A21	C21 to A21
1	22	—	C22 to A22	C22 to A22
1	23	—	C23 to A23	C23 to A23
1	24	—	C24 to A24	C24 to A24
1	25	—	C25 to A25	C25 to A25
1	26	—	—	C26 to A26
1	27	—	—	C27 to A27
1	28	—	—	C28 to A28
1	29	—	—	C29 to A29
1	30	—	—	C30 to A30
1	31	—	—	C31 to A31
1	32	—	—	C32 to A32

MODULE ARCHITECTURE - DPST VERSIONS

The 40-136-012/112/212 modules are arrays of 12, 16 or 19 uncommitted DPST relays. In the default state, all signal paths are open. Energising a particular relay creates a signal path between the C and A terminals, closing the two poles ".1" and ".2" at the same time. The relay module's switching architectures are shown in their default state in the diagram below:



40-136-012 (12 x DPST) **40-136-112 (16 x DPST)** **40-136-212 (19 x DPST)**

One sub-unit is used to control all the module's relays as shown below. Enabling a particular bit closes the two corresponding C to A signal paths.

Sub-Unit	Bit	40-136-012 Signal Paths (with relay energised)	40-136-112 Signal Paths (with relay energised)	40-136-212 Signal Paths (with relay energised)
1	1	C1.1 to A1.1 & C1.2 to A1.2	C1.1 to A1.1 & C1.2 to A1.2	C1.1 to A1.1 & C1.2 to A1.2
1	2	C2.1 to A2.1 & C2.2 to A2.2	C2.1 to A2.1 & C2.2 to A2.2	C2.1 to A2.1 & C2.2 to A2.2
1	3	C3.1 to A3.1 & C3.2 to A3.2	C3.1 to A3.1 & C3.2 to A3.2	C3.1 to A3.1 & C3.2 to A3.2
1	4	C4.1 to A4.1 & C4.2 to A4.2	C4.1 to A4.1 & C4.2 to A4.2	C4.1 to A4.1 & C4.2 to A4.2
1	5	C5.1 to A5.1 & C5.2 to A5.2	C5.1 to A5.1 & C5.2 to A5.2	C5.1 to A5.1 & C5.2 to A5.2
1	6	C6.1 to A6.1 & C6.2 to A6.2	C6.1 to A6.1 & C6.2 to A6.2	C6.1 to A6.1 & C6.2 to A6.2
1	7	C7.1 to A7.1 & C7.2 to A7.2	C7.1 to A7.1 & C7.2 to A7.2	C7.1 to A7.1 & C7.2 to A7.2
1	8	C8.1 to A8.1 & C8.2 to A8.2	C8.1 to A8.1 & C8.2 to A8.2	C8.1 to A8.1 & C8.2 to A8.2
1	9	C9.1 to A9.1 & C9.2 to A9.2	C9.1 to A9.1 & C9.2 to A9.2	C9.1 to A9.1 & C9.2 to A9.2
1	10	C10.1 to A10.1 & C10.2 to A10.2	C10.1 to A10.1 & C10.2 to A10.2	C10.1 to A10.1 & C10.2 to A10.2
1	11	C11.1 to A11.1 & C11.2 to A11.2	C11.1 to A11.1 & C11.2 to A11.2	C11.1 to A11.1 & C11.2 to A11.2
1	12	C12.1 to A12.1 & C12.2 to A12.2	C12.1 to A12.1 & C12.2 to A12.2	C12.1 to A12.1 & C12.2 to A12.2
1	13	—	C13.1 to A13.1 & C13.2 to A13.2	C13.1 to A13.1 & C13.2 to A13.2
1	14	—	C14.1 to A14.1 & C14.2 to A14.2	C14.1 to A14.1 & C14.2 to A14.2
1	15	—	C15.1 to A15.1 & C15.2 to A15.2	C15.1 to A15.1 & C15.2 to A15.2
1	16	—	C16.1 to A16.1 & C16.2 to A16.2	C16.1 to A16.1 & C16.2 to A16.2
1	17	—	—	C17.1 to A17.1 & C17.2 to A17.2
1	18	—	—	C18.1 to A18.1 & C18.2 to A18.2
1	19	—	—	C19.1 to A19.1 & C19.2 to A19.2

PROGRAMMING THE MODULE

Here are examples of using the drivers with the 40-136-211 (32 x SPST). The other versions operate in the same way but have different numbers of bits in the sub-unit, as outlined on the previous pages.

Using PILPXI

To operate a relay the user could use the simple OpBit command or the WriteSub commands

OpBit

```
DWORD sub_unit = 1;
PIL_OpBit( card_num, sub_unit, 1, 1);   // Operates the A1/C1 relay
PIL_OpBit( card_num, sub_unit, 1, 0);   // Releases the A1/C1 relay
PIL_OpBit( card_num, sub_unit, 6, 1);   // Operates the A6/C6 relay
```

WriteSub

```
// Sub-unit is 32 bits wide, so 1 DWORD is needed to hold the pattern
DWORD data[1];
data[0] = 1;            // Sets lowest bit to 1, A1/C1 relay
PIL_WriteSub( card_num, sub_unit, data);

data[0] = 0x20;         // Sets 6th bit, A6/C6 relay
                        // All other relays are set to off
PIL_WriteSub( card_num, sub_unit, data);
```

Using PIPX40

setChannelState

```
ViUInt32 sub_unit = 1;
pipx40_setChannelState(vi, sub_unit, 1, VI_ON);     // Operates the A1/C1 relay
pipx40_setChannelState(vi, sub_unit, 1, VI_OFF);    // Releases the A1/C1 relay
pipx40_setChannelState(vi, sub_unit, 6, VI_ON);     // Operates the A6/C6 relay
```

setChannelPattern

```
// Sub-unit is 32 bits wide, so 1 ViUInt32 value is needed to hold the entire pattern

ViUInt32 data[1];
data[0] = 1;            // Sets lowest bit to 1, A1/C1 relay
pipx40_setChannelPattern( vi, sub_unit, data);

data[0] = 0x20;         // Sets 6th bit, A6/C6 relay
                        // All other relays are set to off
pipx40_setChannelPattern( vi, sub_unit, data);
```

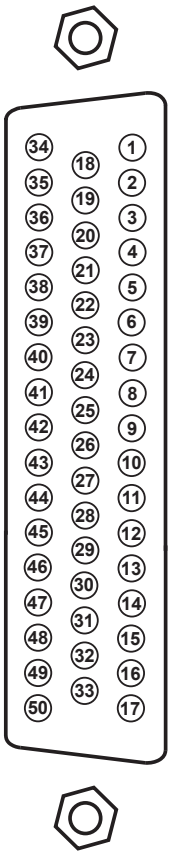
Using pi40iv

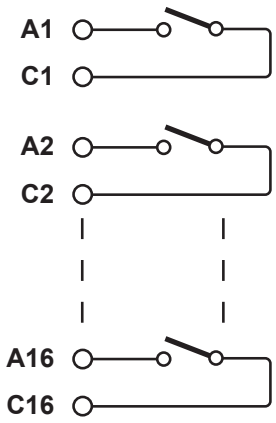
The IVI driver has no special labelling for this card and treats the array of switches as a simple array, labelling the channels using the normal com./ch labelling tags.

```
pi40iv_Connect(vi, com1, ch1);      // Operates the A1/C1 relay
pi40iv_Disconnect(vi, com1, ch1);   // Releases the A1/C1 relay
pi40iv_Connect(vi, com6, ch6);      // Operates the A6/C6 relay
```

The IVI Swtch driver specification contains no bulk setting capabilities.

SECTION 5 - CONNECTOR INFORMATION

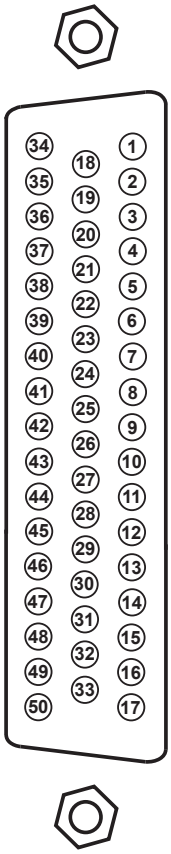


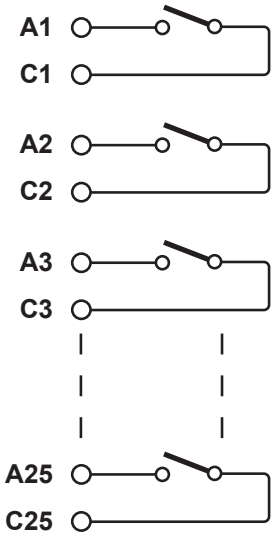


40-136-011 (16 x SPST)

50-pin D-Type Plug					
Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	NC	18	A9	34	A1
2	NC	19	C9	35	C1
3	NC	20	A10	36	A2
4	NC	21	C10	37	C2
5	NC	22	A11	38	A3
6	NC	23	C11	39	C3
7	NC	24	A12	40	A4
8	NC	25	C12	41	C4
9	NC	26	A13	42	A5
10	NC	27	C13	43	C5
11	NC	28	A14	44	A6
12	NC	29	C14	45	C6
13	NC	30	A15	46	A7
14	NC	31	C15	47	C7
15	NC	32	A16	48	A8
16	NC	33	C16	49	C8
17	GND			50	NC

Figure 5.1 - Pinouts: 16xSPST High Power Reed Relay Module 40-136-011 (50-pin male D-type connector viewed from front of module).

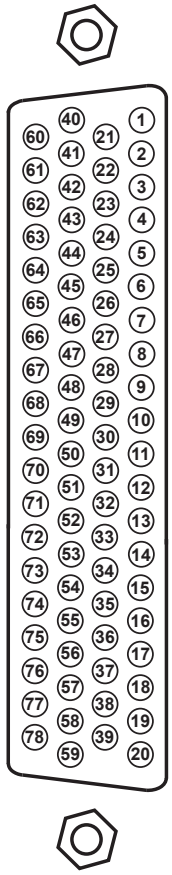


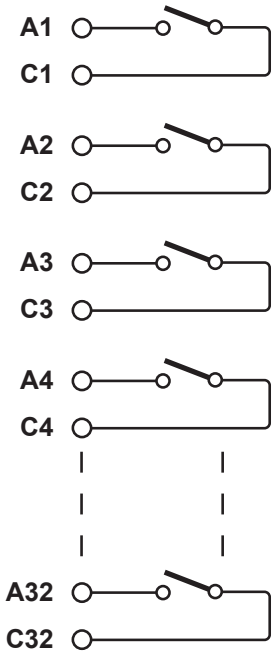


40-136-111 (25 x SPST)

50-pin D-Type Plug					
Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	C17	18	C9	34	A1
2	A18	19	A10	35	C1
3	C18	20	C10	36	A2
4	A19	21	A11	37	C2
5	C19	22	C11	38	A3
6	A20	23	A12	39	C3
7	C20	24	C12	40	A4
8	A21	25	A13	41	C4
9	C21	26	C13	42	A5
10	A22	27	A14	43	C5
11	C22	28	C14	44	A6
12	A23	29	A15	45	C6
13	C23	30	C15	46	A7
14	A24	31	A16	47	C7
15	C24	32	C16	48	A8
16	A25	33	A17	49	C8
17	C25			50	A9

Figure 5.2 - Pinouts: 25xSPST High Power Reed Relay Module 40-136-111 (50-pin male D-type connector viewed from front of module).

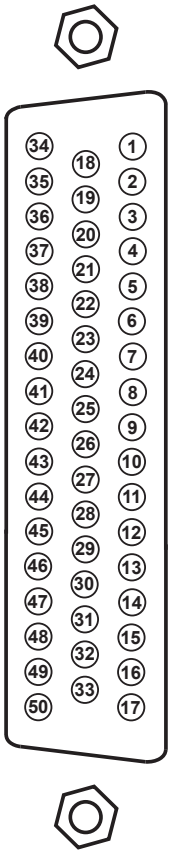


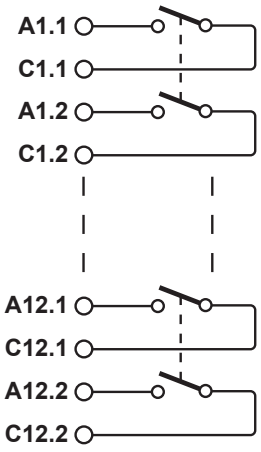


40-136-211 (32 x SPST)

78-pin D-Type Plug							
Pin No.	Signal	Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	A29	21	A20	40	A10	60	A1
2	C29	22	C20	41	C10	61	C1
3	A30	23	A21	42	A11	62	A2
4	C30	24	C21	43	C11	63	C2
5	A31	25	A22	44	A12	64	A3
6	C31	26	C22	45	C12	65	C3
7	A32	27	A23	46	A13	66	A4
8	C32	28	C23	47	C13	67	C4
9	NC	29	A24	48	A14	68	A5
10	NC	30	C24	49	C14	69	C5
11	NC	31	A25	50	A15	70	A6
12	NC	32	C25	51	C15	71	C6
13	NC	33	A26	52	A16	72	A7
14	NC	34	C26	53	C16	73	C7
15	NC	35	A27	54	A17	74	A8
16	NC	36	C27	55	C17	75	C8
17	NC	37	A28	56	A18	76	A9
18	NC	38	C28	57	C18	77	C9
19	NC	39	NC	58	A19	78	NC
20	NC			59	C19		

Figure 5.3 - Pinouts: 32xSPST High Power Reed Relay Module 40-136-211 (78-pin male D-type connector viewed from front of module).

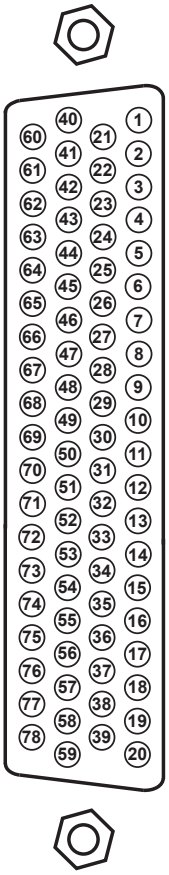


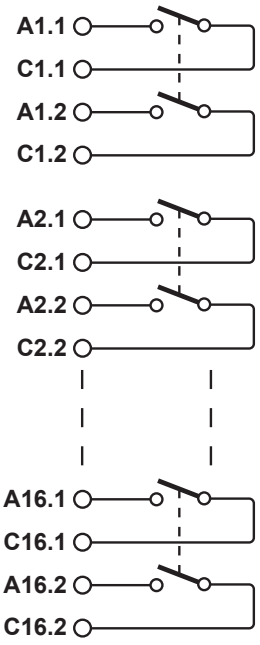


40-136-012 (12 x DPST)

50-pin D-Type Plug					
Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	A9.1	18	A5.1	34	A1.1
2	C9.1	19	C5.1	35	C1.1
3	A9.2	20	A5.2	36	A1.2
4	C9.2	21	C5.2	37	C1.2
5	A10.1	22	A6.1	38	A2.1
6	C10.1	23	C6.1	39	C2.1
7	A10.2	24	A6.2	40	A2.2
8	C10.2	25	C6.2	41	C2.2
9	A11.1	26	A7.1	42	A3.1
10	C11.1	27	C7.1	43	C3.1
11	A11.2	28	A7.2	44	A3.2
12	C11.2	29	C7.2	45	C3.2
13	A12.1	30	A8.1	46	A4.1
14	C12.1	31	C8.1	47	C4.1
15	A12.2	32	A8.2	48	A4.2
16	C12.2	33	C8.2	49	C4.2
17	GND			50	NC

Figure 5.4 - Pinouts: 12xDPST High Power Reed Relay Module 40-136-012 (50-pin male D-type connector viewed from front of module).

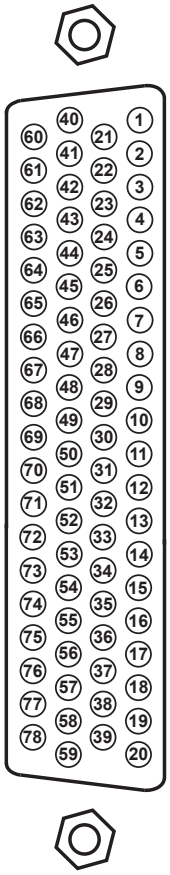


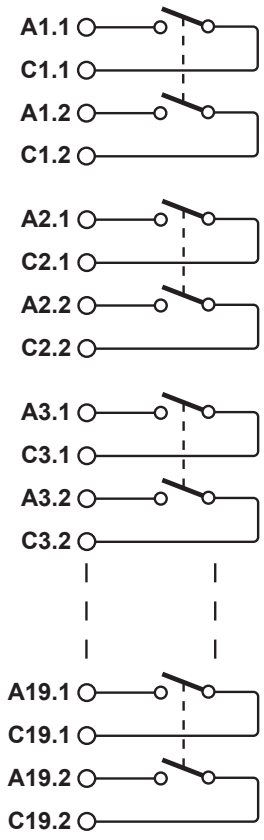


40-136-112 (16 x DPST)

78-pin D-Type Plug							
Pin No.	Signal	Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	A14.1	21	A10.1	40	A5.1	60	A1.1
2	C14.1	22	C10.1	41	C5.1	61	C1.1
3	A14.2	23	A10.2	42	A5.2	62	A1.2
4	C14.2	24	C10.2	43	C5.2	63	C1.2
5	A15.1	25	A11.1	44	A6.1	64	A2.1
6	C15.1	26	C11.1	45	C6.1	65	C2.1
7	A15.2	27	A11.2	46	A6.2	66	A2.2
8	C15.2	28	C11.2	47	C6.2	67	C2.2
9	A16.1	29	A12.1	48	A7.1	68	A3.1
10	C16.1	30	C12.1	49	C7.1	69	C3.1
11	A16.2	31	A12.2	50	A7.2	70	A3.2
12	C16.2	32	C12.2	51	C7.2	71	C3.2
13	NC	33	A13.1	52	A8.1	72	A4.1
14	NC	34	C13.1	53	C8.1	73	C4.1
15	NC	35	A13.2	54	A8.2	74	A4.2
16	NC	36	C13.2	55	C8.2	75	C4.2
17	NC	37	NC	56	A9.1	76	NC
18	NC	38	NC	57	C9.1	77	NC
19	NC	39	NC	58	A9.2	78	NC
20	GND			59	C9.2		

Figure 5.5 - Pinouts: 16xDPST High Power Reed Relay Module 40-136-112 (78-pin male D-type connector viewed from front of module).





40-136-212 (19 x DPST)

78-pin D-Type Plug							
Pin No.	Signal	Pin No.	Signal	Pin No.	Signal	Pin No.	Signal
1	A15.2	21	C10.2	40	C5.2	60	A1.1
2	C15.2	22	A11.1	41	A6.1	61	C1.1
3	A16.1	23	C11.1	42	C6.1	62	A1.2
4	C16.1	24	A11.2	43	A6.2	63	C1.2
5	A16.2	25	C11.2	44	C6.2	64	A2.1
6	C16.2	26	A12.1	45	A7.1	65	C2.1
7	A17.1	27	C12.1	46	C7.1	66	A2.2
8	C17.1	28	A12.2	47	A7.2	67	C2.2
9	A17.2	29	C12.2	48	C7.2	68	A3.1
10	C17.2	30	A13.1	49	A8.1	69	C3.1
11	A18.1	31	C13.1	50	C8.1	70	A3.2
12	C18.1	32	A13.2	51	A8.2	71	C3.2
13	A18.2	33	C13.2	52	C8.2	72	A4.1
14	C18.2	34	A14.1	53	A9.1	73	C4.1
15	A19.1	35	C14.1	54	C9.1	74	A4.2
16	C19.1	36	A14.2	55	A9.2	75	C4.2
17	A19.2	37	C14.2	56	C9.2	76	A5.1
18	C19.2	38	A15.1	57	A10.1	77	C5.1
19	NC	39	C15.1	58	C10.1	78	A5.2
20	GND			59	A10.2		

Figure 5.6 - Pinouts: 19xDPST High Power Reed Relay Module 40-136-212 (78-pin male D-type connector viewed from front of module).

SECTION 6 - TROUBLE SHOOTING

Refer to the Warnings and Cautions at the front of this manual 

INSTALLATION PROBLEMS

The Plug & Play functionality of Pickering switch cards generally ensures trouble-free installation.

If you do experience any installation problems you should first ensure that all cards are properly seated in their slots. Improperly mated cards may go undetected by the operating system, or may be detected as a card of an unknown type. They can also cause the computer to freeze at various stages in the boot sequence.

If your system employs a remote control interface you should check the integrity of all remote control interface links. When the system is powered up, and during Windows start-up, you should expect to see periodic activity on the remote control interface RX/TX (yellow) indicators, clearing to leave only the PWR/LNK (green) LEDs illuminated. The RX/TX indicators should show activity when you attempt to access a card.

DIAGNOSTIC UTILITY

The Pickering Diagnostic Utility (accessible through the Programs>>Pickering>>PXI Utilities menu) generates a diagnostic report of the system's PCI configuration, highlighting any potential configuration problems. Specific details of all installed Pickering switch cards are included. All the installed Pickering switch cards should be listed in the "Pilpxi information" section - if one or more cards is missing it may be possible to determine the reason by referring to the PCI configuration dump contained in the report, but interpretation of this information is far from straightforward, and the best course is to contact Pickering support: support@pickeringtest.com, if possible including a copy of the diagnostic report.

In the "VISA information" section, if VISA is not installed its absence will be reported. This does not affect operation using the Direct I/O driver, and is not a problem unless you wish to use VISA. VISA is a component of National Instruments LabWindows/CVI and LabVIEW, or is available as a standalone environment.

If VISA is present and is of a sufficiently recent version, the section "Pipx40 information" should present a listing similar to "Pilpxi information".

Please note that the Diagnostic Utility cannot access cards if they are currently opened by some other application, such as the Test Panels or Terminal Monitor.

SWITCHING SYSTEM TEST TOOLS

Please refer to Section 7 - Maintenance Information.

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SECTION 7 - MAINTENANCE INFORMATION

Refer to the Warnings and Cautions at the front of this manual 

PERIODIC MAINTENANCE

This product and its corresponding chassis do not require any periodic maintenance.

GENERAL CLEANING

- Isolate the electrical power from the chassis and ensure that no user I/O signals are being applied.
- Wipe the product & chassis surfaces with a clean dry anti-static cloth only.

SOFTWARE UPDATE

For PXI modules operating in a PXI chassis, no module software updates are required. For the latest version of the driver please refer to our web site **pickeringtest.com** where links to our Software Download page will provide the latest version of the driver software for the various programming environments encountered.

For PXI modules which are supported in one of Pickering Interfaces' Modular LXI Chassis (such as the 60-102B and 60-103B) no module software update is required. If the module was introduced after the LXI chassis was manufactured the module may not be recognized, in this case the chassis firmware may need upgrading. This is a simple process which is described in the manual for the Modular LXI Chassis.

SWITCHING SYSTEM TEST TOOLS

We recommend the use of ***eBIRST*** to provide a check of the correct operation of relays and to identify the location of any faulty relay. For more information on ***eBIRST*** click here.

RELAY LOOK-UP TABLES

The following pages provide a cross reference between the signal paths of the product and the physical relays on the PCB. The tables can be used in the fault finding process and should be used in conjunction with the corresponding PCB layout diagrams to identify the position of faulty relays. Users of ***eBIRST*** switching system test tools do not need to use this information to locate faulty relays.

TABLE 7.1 - High Power Reed Relay Module 40-136 Relay Numbering for SPST Versions

Relay Number	40-136-011 Signal Path (with relay energised)	40-136-111 Signal Path (with relay energised)	40-136-211 Signal Path (with relay energised)
RL1	C1 to A1	C1 to A1	C1 to A1
RL2	C2 to A2	C2 to A2	C2 to A2
RL3	C3 to A3	C3 to A3	C3 to A3
RL4	C4 to A4	C4 to A4	C4 to A4
RL5	C5 to A5	C5 to A5	C5 to A5
RL6	C6 to A6	C6 to A6	C6 to A6
RL7	C7 to A7	C7 to A7	C7 to A7
RL8	C8 to A8	C8 to A8	C8 to A8
RL9	Not Fitted	C9 to A9	C9 to A9
RL10	Not Fitted	Not Fitted	C10 to A10
RL11	Not Fitted	Not Fitted	C11 to A11
RL12	Not Fitted	Not Fitted	C12 to A12
RL13	Not Fitted	Not Fitted	C13 to A13
RL14	Not Fitted	Not Fitted	C14 to A14
RL15	Not Fitted	Not Fitted	C15 to A15
RL16	Not Fitted	C10 to A10	C16 to A16
RL17	Not Fitted	C11 to A11	C17 to A17
RL18	Not Fitted	C12 to A12	C18 to A18
RL19	Not Fitted	C13 to A13	C19 to A19
RL20	Not Fitted	C14 to A14	C20 to A20
RL21	Not Fitted	C15 to A15	C21 to A21
RL22	Not Fitted	C16 to A16	C22 to A22
RL23	Not Fitted	C17 to A17	C23 to A23
RL24	C9 to A9	C18 to A18	C24 to A24
RL25	C10 to A10	C19 to A19	C25 to A25
RL26	C11 to A11	C20 to A20	C26 to A26
RL27	C12 to A12	C21 to A21	C27 to A27
RL28	C13 to A13	C22 to A22	C28 to A28
RL29	C14 to A14	C23 to A23	C29 to A29
RL30	C15 to A15	C24 to A24	C30 to A30
RL31	C16 to A16	C25 to A25	C31 to A31
RL32	Not Fitted	Not Fitted	C32 to A32

TABLE 7.2 - High Power Reed Relay Module 40-136 Relay Numbering for DPST Versions

Relay Number	40-136-012 Signal Path (with relay energised)	40-136-112 Signal Path (with relay energised)	40-136-212 Signal Path (with relay energised)
RL1	C1.1 to A1.1 & C1.2 to A1.2	C1.1 to A1.1 & C1.2 to A1.2	C1.1 to A1.1 & C1.2 to A1.2
RL2	C2.1 to A2.1 & C2.2 to A2.2	C2.1 to A2.1 & C2.2 to A2.2	C2.1 to A2.1 & C2.2 to A2.2
RL3	C3.1 to A3.1 & C3.2 to A3.2	C3.1 to A3.1 & C3.2 to A3.2	C3.1 to A3.1 & C3.2 to A3.2
RL4	C4.1 to A4.1 & C4.2 to A4.2	C4.1 to A4.1 & C4.2 to A4.2	C4.1 to A4.1 & C4.2 to A4.2
RL5	C5.1 to A5.1 & C5.2 to A5.2	C5.1 to A5.1 & C5.2 to A5.2	C5.1 to A5.1 & C5.2 to A5.2
RL6	C6.1 to A6.1 & C6.2 to A6.2	C6.1 to A6.1 & C6.2 to A6.2	C6.1 to A6.1 & C6.2 to A6.2
RL7	Not Fitted	C7.1 to A7.1 & C7.2 to A7.2	C7.1 to A7.1 & C7.2 to A7.2
RL8	Not Fitted	C8.1 to A8.1 & C8.2 to A8.2	C8.1 to A8.1 & C8.2 to A8.2
RL9	Not Fitted	Not Fitted	C9.1 to A9.1 & C9.2 to A9.2
RL10	Not Fitted	Not Fitted	C10.1 to A10.1 & C10.2 to A10.2
RL11	Not Fitted	Not Fitted	Not Fitted
RL12	Not Fitted	Not Fitted	Not Fitted
RL13	Not Fitted	Not Fitted	Not Fitted
RL14	Not Fitted	Not Fitted	Not Fitted
RL15	Not Fitted	Not Fitted	Not Fitted
RL16	Not Fitted	Not Fitted	Not Fitted
RL17	Not Fitted	Not Fitted	Not Fitted
RL18	Not Fitted	Not Fitted	Not Fitted
RL19	Not Fitted	Not Fitted	Not Fitted
RL20	Not Fitted	Not Fitted	Not Fitted
RL21	Not Fitted	Not Fitted	Not Fitted
RL22	Not Fitted	Not Fitted	Not Fitted
RL23	Not Fitted	Not Fitted	Not Fitted
RL24	C7.1 to A7.1 & C7.2 to A7.2	C9.1 to A9.1 & C9.2 to A9.2	C11.1 to A11.1 & C11.2 to A11.2
RL25	C8.1 to A8.1 & C8.2 to A8.2	C10.1 to A10.1 & C10.2 to A10.2	C12.1 to A12.1 & C12.2 to A12.2
RL26	C9.1 to A9.1 & C9.2 to A9.2	C11.1 to A11.1 & C11.2 to A11.2	C13.1 to A13.1 & C13.2 to A13.2
RL27	C10.1 to A10.1 & C10.2 to A10.2	C12.1 to A12.1 & C12.2 to A12.2	C14.1 to A14.1 & C14.2 to A14.2
RL28	C11.1 to A11.1 & C11.2 to A11.2	C13.1 to A13.1 & C13.2 to A13.2	C15.1 to A15.1 & C15.2 to A15.2
RL29	C12.1 to A12.1 & C12.2 to A12.2	C14.1 to A14.1 & C14.2 to A14.2	C16.1 to A16.1 & C16.2 to A16.2
RL30	Not Fitted	C15.1 to A15.1 & C15.2 to A15.2	C17.1 to A17.1 & C17.2 to A17.2
RL31	Not Fitted	C16.1 to A16.1 & C16.2 to A16.2	C18.1 to A18.1 & C18.2 to A18.2
RL32	Not Fitted	Not Fitted	C19.1 to A19.1 & C19.2 to A19.2

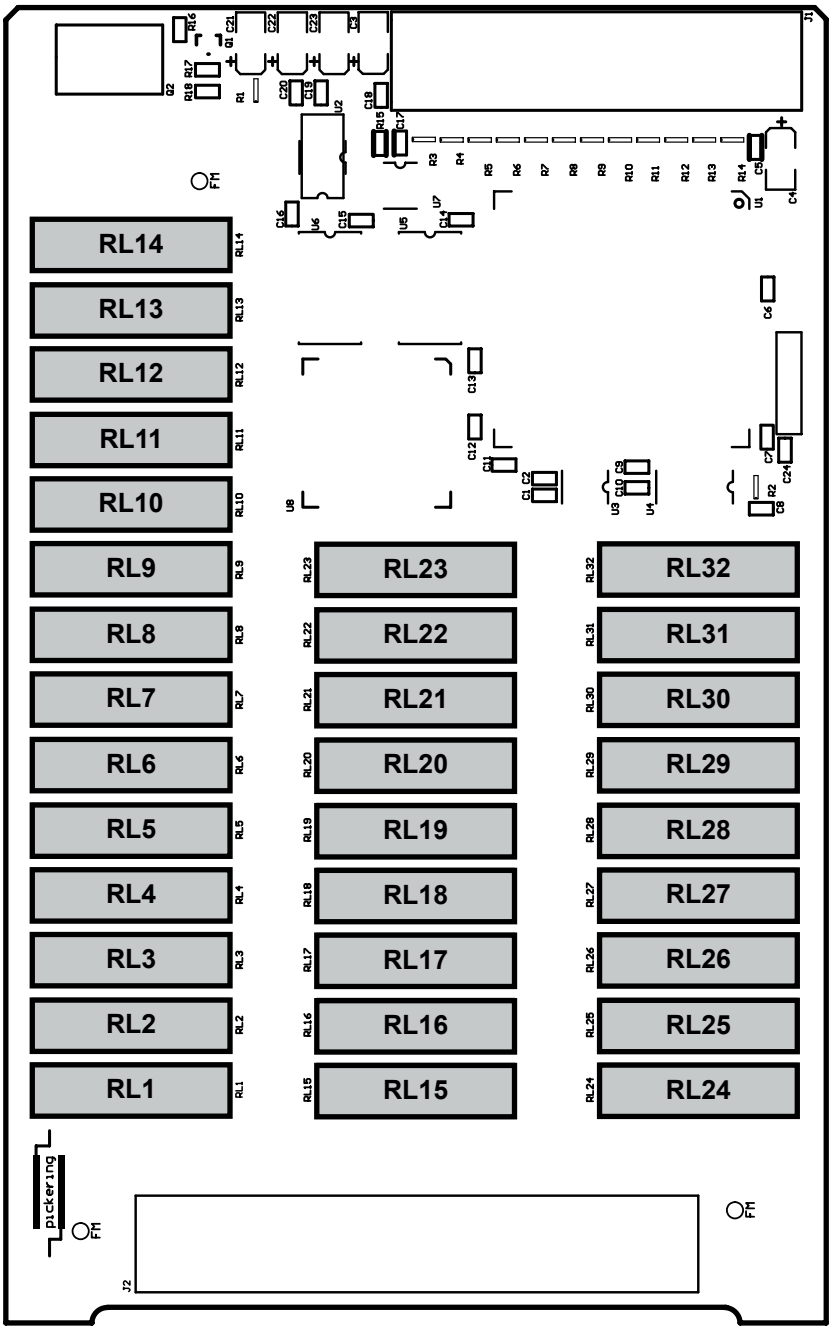


Figure 7.1 - 40-136 Reed Relay Module Component Layout

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