40-295/296
Programmable Resistor Module

- Highest Density Resistor Module
- Configurable To 8, 12, 16 or 24-Bit Resolution
- Up To 18 Channels of 8-Bit Resolution
- Up To 10 Channels of 16-Bit Resolution
- Provides Fully Isolated Variable Resistors
- Configure As Adjustable Resistor Or Potentiometer
- Built-In Non-Volatile Parametric Memory For Calibration Data
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Up to 2000 Value Changes Per Second
- Special Versions With Non Standard Resistors Built To Order
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8 Plus Soft Front Panel
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-295 is a Programmable Resistor module with up to 18 channels of 8 bit resolution resistor chains in a single 3U PXI module. The flexible architecture allows the module to also be supplied as 12-bit, 16-bit or 24-bit resolution versions for applications requiring finer resolution, greater resistance range or higher channel count. The module is ideal for simulating the sensors for control and management systems under test, allowing the user to verify system response in design verification or manufacturing test applications.

The programmable resistors can be configured as potentiometers with a wiper connection, model 40-296, simulating the response to external adjustable components.

Versions with other resistor values can be provided to meet the requirements for specific applications. Each resistor chain includes an offset resistor that can be used to set the minimum resistance value.

If versions are required with different resistor ranges than those shown, please contact the Pickering Interface's Sales Office for assistance.

The module is available in a variety of densities that allow the user to select the most appropriate solution in terms of density and cost for every application. The high channel count in each module ensures that large systems can be simulated with minimal PXI slot occupancy.

All switches use instrument grade reed relays with low thermal offset voltage to ensure accurate operation under all conditions and a long service life.

To give maximum accuracy each resistor chain has on-board E^{2}PROM, this allows accurate calibration data to be recorded for each resistor in the chain.

The module is supplied with VISA drivers and a soft front panel.

Resolution	Resistance Range	Configuration	Number Per Module
8-Bit	0Ω to 255Ω	 Resistor	10 or 18
12-Bit	0Ω to 4kΩ		5 or 10
16-Bit	0Ω to 65kΩ		5 or 10
24-Bit	0Ω to 16MΩ		3 or 6
8-Bit	0Ω to 255Ω Wiper	 Potentiometer	5 or 9
12-Bit	0Ω to 4kΩ Wiper		2 or 4
16-Bit	0Ω to 65kΩ Wiper		2 or 4
24-Bit	0Ω to 16MΩ Wiper		1 or 3

Programmable Resistor Module Options Overview

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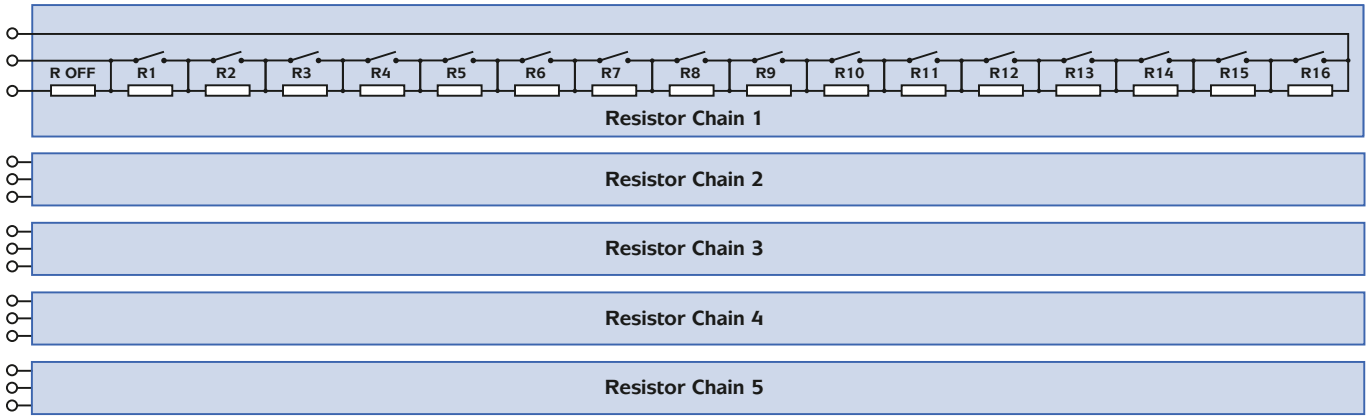
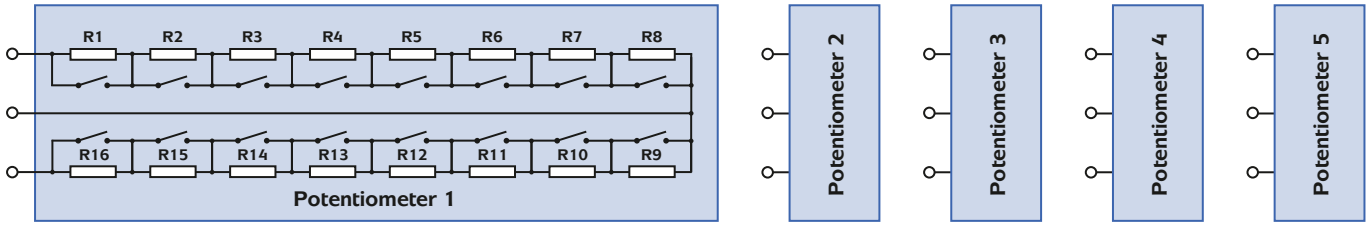


Schematic for 5 x 16 bit Resistor Module 40-295-021-5/16



Schematic for 5 x 8 bit Potentiometer Module 40-296-021-5/8

Relay Type

The 40-295/296 is fitted with Reed Relays (Sputtered Ruthenium type), these offer very long life with good low level switching performance and excellent contact resistance stability.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Power Requirements

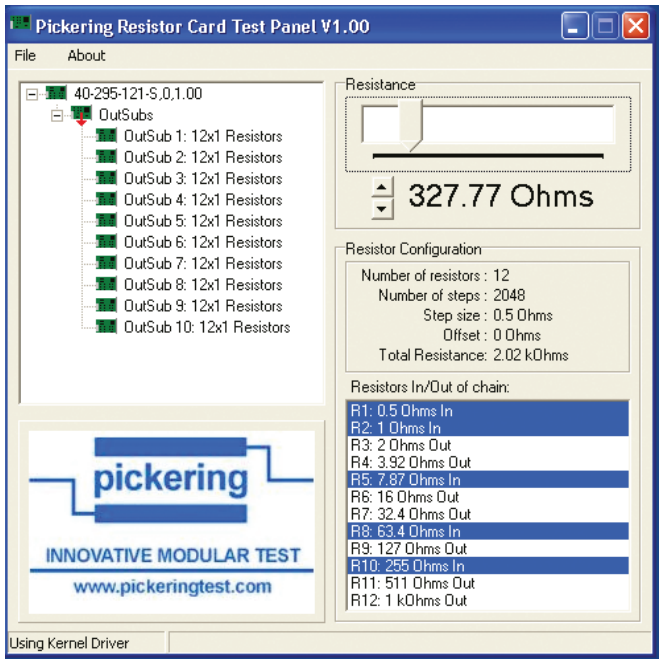
+3.3V	+5V	+12V	-12V
0	1.85A (typ 450mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-295-021-3/24)
240g (40-295-021-10/8)
340g (40-295-121-10/16)
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 37-way male D-type connector.

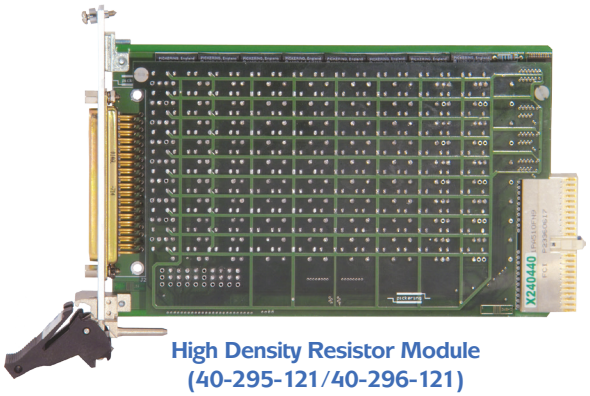


40-295 Soft Front Panel

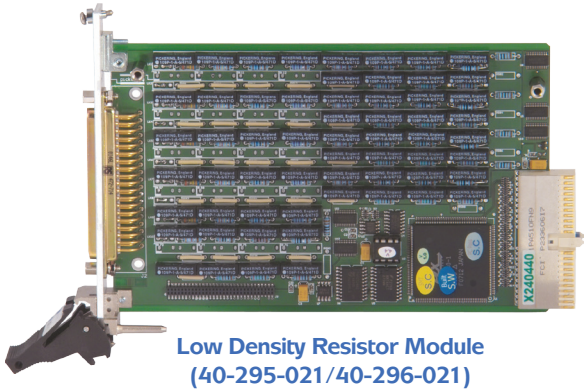
Programmable Resistor Specification

Max Switch Voltage:	100V
Resolution	1Ω
† Accuracy of Fitted Resistor:	±0.5% (0 to 1MΩ) ±1% (>1MΩ)
Residual Resistance, typical: (when chain resistance is set to 0Ω)	1Ω (8-bit) 1.5Ω (12-bit) 2Ω (16-bit) 3Ω (24-bit)
Max Power: Max Switch Current: Max Carry Current:	0.5W 0.5A 1.0A
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 >1x10^8 operations >1x10^6 operations

† Overall accuracy of module is a combination of the fitted resistor accuracy and the relay/track resistance that makes up the residual path resistance.



High Density Resistor Module
(40-295-121/40-296-121)



Low Density Resistor Module
(40-295-021/40-296-021)

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Resistor Module Order Codes

10 x 8 Bit (0Ω to 255Ω)	**40-295-021-10/8**
18 x 8 Bit (0Ω to 255Ω)	**40-295-121-18/8**
5 x 12 Bit (0Ω to 4kΩ)	**40-295-021-5/12**
10 x 12 Bit (0Ω to 4kΩ)	**40-295-121-10/12**
5 x 16 Bit (0Ω to 65kΩ)	**40-295-021-5/16**
10 x 16 Bit (0Ω to 65kΩ)	**40-295-121-10/16**
3 x 24 Bit (0Ω to 16MΩ)	**40-295-021-3/24**
6 x 24 Bit (0Ω to 16MΩ)	**40-295-121-6/24**

Potentiometer Module Order Codes

5 x 8 Bit Pot (0Ω to 255Ω Wiper)	**40-296-021-5/8**
9 x 8 Bit Pot (0Ω to 255Ω Wiper)	**40-296-121-9/8**
2 x 12 Bit Pot (0Ω to 4kΩ Wiper)	**40-296-021-2/12**
4 x 12 Bit Pot (0Ω to 4kΩ Wiper)	**40-296-121-4/12**
2 x 16 Bit Pot (0Ω to 65kΩ Wiper)	**40-296-021-2/16**
4 x 16 Bit Pot (0Ω to 65kΩ Wiper)	**40-296-121-4/16**
1 x 24 Bit Pot (0Ω to 16MΩ Wiper)	**40-296-021-1/24**
3 x 24 Bit Pot (0Ω to 16MΩ Wiper)	**40-296-121-3/24**

Mating Connectors & Cabling

For connection accessories for the 40-295/296 please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Programming

Pickering provide kernel, IVI and VISA (NI and Agilent) drivers which are compatible with 32/64-bit versions of Windows including XP, Vista, 7 and 8 operating systems. 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:

- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Agilent** VEE
- **Mathworks** Matlab
- **Marvin** ATE Easy
- **MTQ Testsolutions** Tecap
- **Tecap Switching**

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.

Operating/Storage Conditions

Operating Conditions

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

Storage and Transport Conditions

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

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.
Uses 33MHz 32-bit backplane interface.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

PXI & LXI Chassis Compatibility

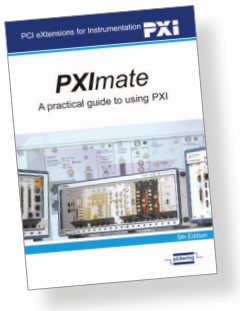
Compatible with all chassis conforming to the 3U PXI and 3U cPCI specification. Compatible with Legacy and Hybrid peripheral slots in a 3U PXI Express chassis.
Compatible with Pickering Interfaces LXI Modular Chassis. For information on driving your switching solution in an LXI environment refer to the LXI Product Catalog.

Latest Details

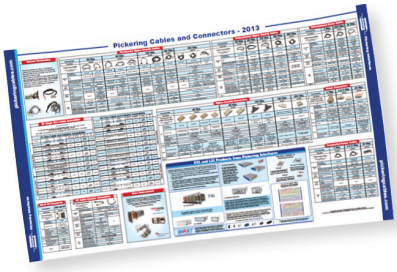
Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

Please refer to the 200 page Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. Available in either print or as a download.
Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

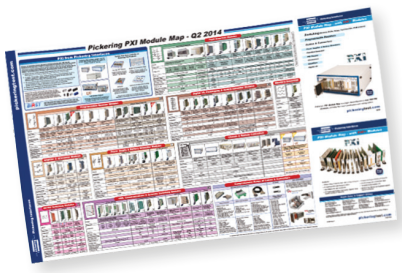
"**The Big PXI Catalog**" gives full details of Pickering's entire range of PXI switch modules, instrument modules and support products.
At over 500 pages, the Big PXI Catalog is available on request or can be downloaded from the Pickering website.



Ever wondered what PXI is all about?
Pickering Interfaces' "**PXImate**" explains the basics of PXI and provides useful data for engineers working on switch based test systems.
The PXImate is available free on request from the Pickering website.



The "**Cables & Connectors Map**" - outlines the cable and connector options available for all PXI Modules.



The "**PXI Module Map**" - a simple fold-out selection guide to all Pickering's 1000+ PXI Modules.