

- Very High Density Matrix Module
- 20 x 12 Single Pole Matrix Format
- Modules Cascadable to Any Size Using Internal 24 Pole Analogue Bus
- Automatic Isolation Switching for Maximised Performance
- Built-In Switch Self Test with Fault Diagnosis to Component Level
- Switch up to 100 Volts DC, 0.5 Amps (1.2A carry), 20W Max Power
- Ruthenium Reed Relays For Maximum Switching Performance

The 20-510A range of 20 x 12 single pole matrix modules include features such as automatic isolation switching, plug-in expansion and built-in self-test to give complete switching confidence.

Matrix modules are intended for easy construction of large matrix systems; modules may be easily cascaded to form matrices of almost any size. Main applications are for signal routing in ATE systems: between the device under test and the measurement and stimulus instruments.

Connections are made via front panel mounted connectors, with a choice of 96-pin ZIF or 37-pin D-Type connectors for use in low frequency systems.

Larger matrices may be constructed using the internal 24 pole analogue bus. **Isolation Switches** on each module remove all unused columns and rows from the system, hence keeping interconnection capacitance and leakage to an absolute minimum.

### Automatic Self-Test

**Full Self-Test** is performed at power up and at any other time either manually or under program control. **Self-Test** is of particular importance in large systems where relay contact integrity is a very major consideration. In the unlikely event of relay failure (either high on-state or low off-state resistance) the front panel will indicate a fault. The exact fault description is available via the IEEE-488 bus.

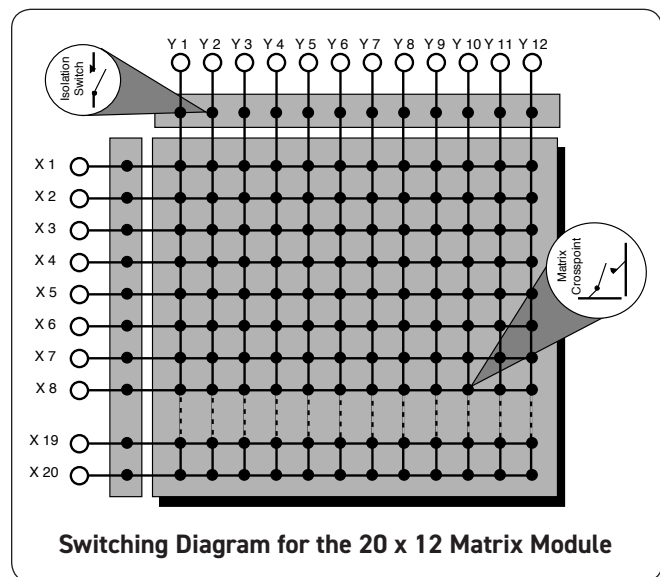
### Creating Larger Matrices - Easily!

Each System 20 interface can directly support matrices with over 5000 crosspoints. Larger sizes are supported using multiple System 20 interface modules.

Large matrices are constructed by interconnecting two or more matrix modules. All such matrix modules must have the same primary address. Their position within the matrix is determined by their bank address, this is set on an additional 5 way dip switch.



**\*Please contact Pickering for alternative PXI/LXI/USB solutions**



Both the X and Y axes have **on-board automatic isolation switches**. In large matrix systems the parasitic capacitance and leakage associated with each crosspoint switch can result in a significant degradation if several matrix modules are interconnected. The isolation switches only switch in those columns and rows on a module that contain an active switch. Thereby keeping matrix capacitance to a minimum. These isolation switches are also used to remove the matrix from the external circuit when performing self-test.

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### Reed Switch Type

**Ruthenium Electro-Plated Reed Relays** offer maximum performance, they are hermetically sealed and offer a very stable, long life relay contact (over  $10^8$  operations) with fast operate time. Alternative types such as electro-mechanical armature relays are lower cost but do not offer the consistent contact resistance, long life, fast switching speed and low level switching capability of a Ruthenium reed relay.

All reed relays are manufactured by our sister company Pickering Electronics: [pickeringrelay.com](http://pickeringrelay.com)

### Specification - TTL Output Drivers

Switch Type:	Ruthenium Reed
Max Voltage:	100V DC
Max Power:	20W
Max Switch Current:	1A
Max Carry Current:	1.2A
On Path Resistance:	<500m $\Omega$
Off Path Resistance:	>10 $^8\Omega$
Differential Thermal Offset:	<20 $\mu$ V
Capacitance	
Open Channel to Ground:	<40pF
Selected Channel to Ground:	<70pF
Open Input to Ground:	4pF
Bandwidth:	5MHz
Isolation (at 1MHz):	>55dB
Crosstalk (at 1MHz):	>55dB
Switching Time:	15ms
Expected Life (Low power):	>1x10 $^9$ operations
Expected Life (Full power):	>1x10 $^6$ operations

### Mechanical Characteristics

All 20-510A model versions are housed in a shielded 6U height (262mm) Eurocard module and are 160mm deep. Panel width for both versions is 1.8 Inches.

### Connectors

Two connector styles are available:

- 96-Pin Rectangular ZIF Connector
- 37-Pin D-Type Connector.

### Operating/Storage Conditions

#### Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 95% non-condensing
Altitude:	5000m

#### Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 95% non-condensing
Altitude:	15000m

A **shielded 24 pole analogue bus** is provided on the System 20 Analogue Backplane so constructing large matrices is very straight forward, no time consuming daisy-chained wiring harnesses etc. Pickering can build large Matrix systems constructed and tested to your exact requirements, please contact sales office for further details.

### Mixed Matrix/Multiplexers Configurations

For some users requiring very large matrix systems the cost of a “full” matrix may prove prohibitive, in many instances a combination of multiplexer input/output and partially filled matrix may prove quite acceptable and could prove to be more effective in terms of both cost and performance. Please contact Pickering to discuss your application in detail.

### Programming

The Matrix module is very easy to program using the Intelligent IEEE-488.2 Interface:

<b>ARESET a</b>	Open all switches on device <b>a</b>
<b>DIAGNOSTIC?</b>	Report any Self Test errors
<b>DELAY t</b>	Force a minimum delay of <b>t</b> milliseconds between two instructions
<b>MCLOSE a, x, y</b>	Close switch at coordinates <b>x, y</b> on matrix <b>a</b>
<b>MOPEN a, x, y</b>	Open switch at coordinates <b>x, y</b> on matrix <b>a</b>
<b>RESET</b>	Open all switches on all modules
<b>VIEW? a</b>	View status of device <b>a</b>

Further matrix control may be achieved using the IEEE-488.2 stored settings commands, these permit the storage and later recall of complex matrix configurations:-

<b>*SAV r</b>	Saves the entire setup of a System 10/20 rack into storage register <b>r</b>
<b>*RCL r</b>	Recalls stored setup of a System 10/20 rack from storage register <b>r</b>

### Self Test Details

Self-Test is invoked at power on (taking up to 60 seconds) and may also be operated under software (**\*TST?**) or via a recessed push button. Self-Test pass is indicated on a front panel LED with a full pass/fail description available using the **DIAGNOSTIC?** command. Self-Test comprises 3 levels:-

1. Logic Test
2. Relay Coil Test
3. Full Contact Test

### 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

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20x12 Matrix, 1-Pole, ZIF Connector	20-510A-021
20x12 Matrix, 1-Pole, D-Type Connector	20-510A-121

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### Limiting Resistors

Built in limiting resistors on each row and column may be fitted, useful in preventing high current inrushes which may damage the reed switch, please specify option -R.

### Product Customization

Pickering System 20 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.

### Mating Connectors & Cabling

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For 37-pin connection accessories for the 20-510A modules please refer to the [90-007D](#) 37-pin D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

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