

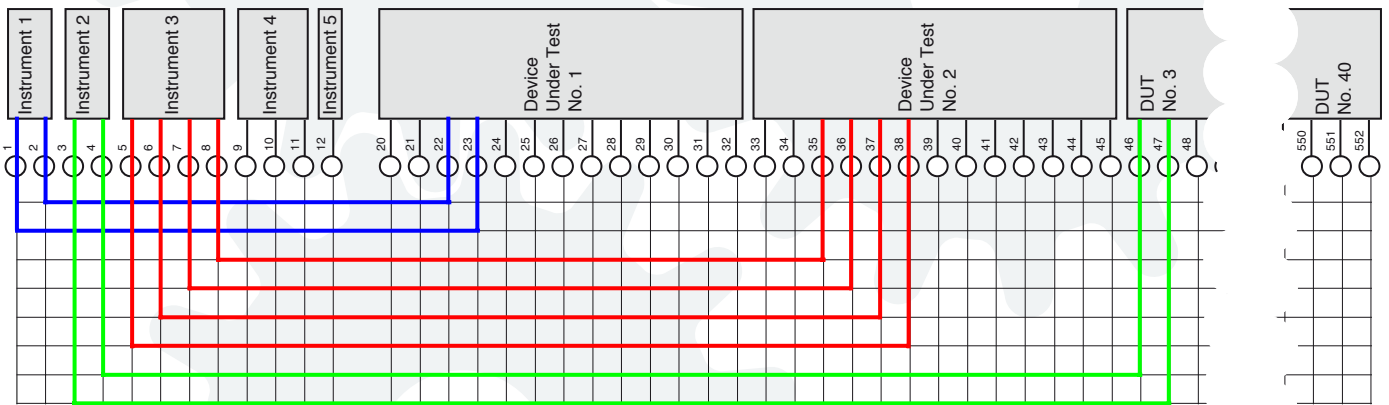


## SELECTING A BRIC MATRIX TYPE AND OPTIONS

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The BRIC module provides a high density matrix that can be supplied in a variety of matrix and architecture forms suitable for a wide variety of applications. The user is offered a great number of potential solutions which can make the selection of the ideal solution. This document explains some of the issues the user needs to consider in selecting the matrix.

Additional assistance can be obtained from Pickering Interfaces by contacting your local sales office.



A typical BRIC matrix in use

## Y AXIS CONNECTIONS

The most effective way of using a matrix system is to make all the connections (test equipment and test target access points) to the X axis. The Y axis is used just to enable connections between different X axis locations. For many applications no other access to the Y connections is required. The standard configuration provides Y axis connection on the first (left hand) card of the module only. If the Y axis is used care must be taken to ensure the Y axis is not connected to anything that might inadvertently reduce the system bandwidth.

For most applications Pickering Interfaces recommends that the Y axis is not externally loaded and daughtercards with Y axis connections are used only when the application demands it.

It should be noted that using just the X axis for connection means that each connection results in the matrix using two relays to make the connection compared to one when the Y axis is used. This results in the DC path resistance being marginally higher for this configuration. In practice PCB track resistance is the largest single contributor to the DC resistance.

## ISOLATION SWITCHES

The standard BRIC module is fitted with isolation switches that disconnect daughtercards from the Y axis backplane if none of the switches on the daughter card are closed. Each line on the Y axis is then only connected to those cards that contain a closed switch, thereby reducing the loading on the analogue connection. For BRIC modules this raises the bandwidth of the connection from 10 MHz if the isolation switches are all closed (or not fitted) to 50 MHz.

The user can specify BRIC modules without the isolation relays fitted, and so reduce the relay count and the DC path resistance, by adding a -R suffix to the part number.



The software drivers allow the isolation relays to be automatically operated, and therefore reducing the software complexity for the user.

For most applications Pickering Interfaces recommends that the isolation relays are not removed.

### SINGLE POLE AND SCREENED RELAYS

For a matrix using single pole relays the relay can connect or disconnect any crossing point of the X and Y axis of the matrix. The single pole unscreened configuration is the simplest and lowest cost relay used in BRIC modules.

The BRIC cards have been designed so that all the different types of relays within the same product range (40-560, 40-561, and 40-562) use the same relay footprint to ensure maximum commonality between the designs.

Single pole reed relays are supplied in two basic configurations – screened and unscreened. The screened version is not available for the 40-560 series since the emphasis is to achieve maximum switch density.



**Reed relay with the optional screening tube. The screen surrounds the glass tube of the reed relay and an insulating layer separates the tube from the driving coil. The coil does not use a former.**

Two blades enclosed in a cylindrical glass envelope form a reed relay. The two blades are formed from a magnetic material so that when an axial magnetic field is applied the tips of the blades are drawn together by the field and form an electrical contact. When the field is removed the blades separate and open the contact.

The cylindrical glass tube can be surrounded by a metal tube that is connected to ground at both ends. It is then identified as a screened relay.

The tube can effect the performance in a variety of ways. For some applications the tube and the relay blades can form a transmission line which helps to reduce loss and VSWR at high frequencies. It can also improve isolation between switches (but not the isolation of the switch itself).

Screened relays are more complicated to manufacture and as a result screened versions will add to the cost of the module.

Screened versions of the BRIC can be ordered by adding the -s suffix to the switch order code on single pole versions of the matrix. Screened versions are not available for 2 pole matrix configurations.

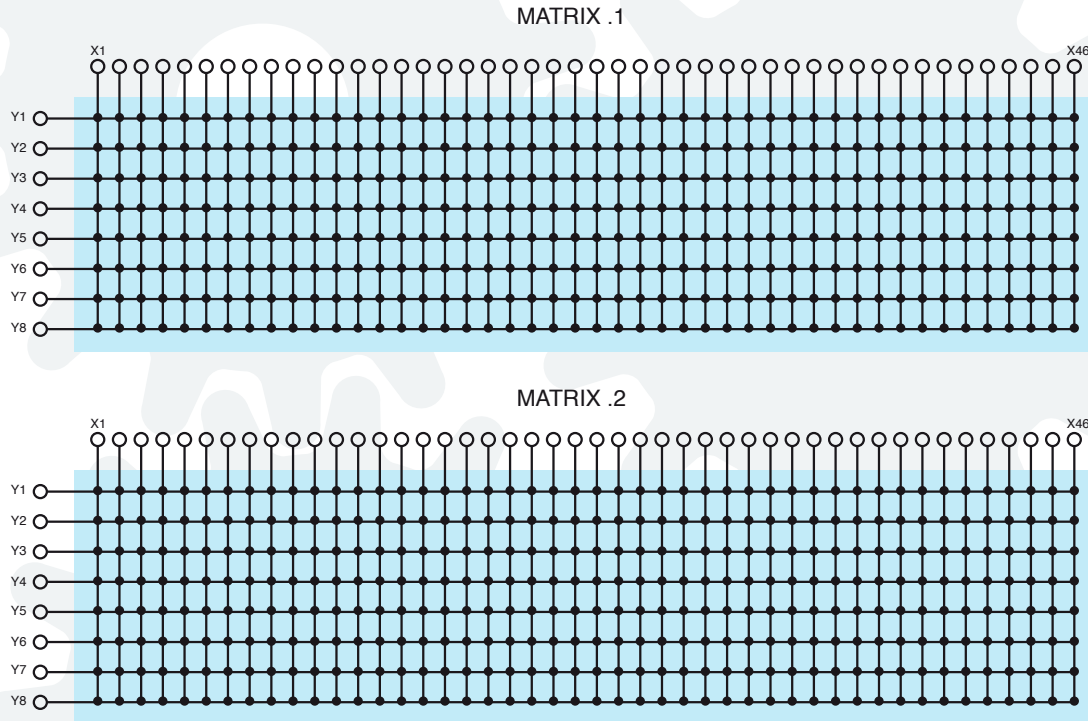
If a screened version is ordered then the screen connection is connected to the front panel connectors such that alternate wires on a ribbon cable connection to the front panel connection are grounded. This ensures that crosstalk in the external wiring is reduced and it reduces the radiated signal of the cable. Using twisted pair connections in the external wiring can improve the performance of the external wiring by further reducing the radiated signal and crosstalk.

Screened versions are best used where many of the connections to the X axis are live and perhaps carry signals rapidly changing with time. The largest benefit of screened configurations in some cases may arise because of the improvement in the external wiring performance.



## TWO POLE MATRIX

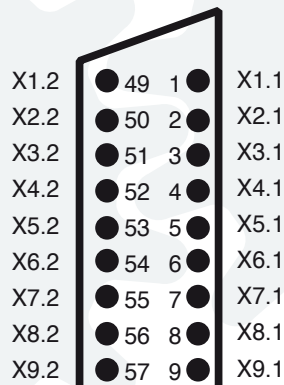
In a two pole matrix each relay contains two isolated switches driven by the same coil. The switches are isolated from each and are connected to separate X and Y connections, but their logical state (open or closed) is always the same since a common coil drives them.



**In 2 pole matrix each relay has two independent switches operating in 2 isolated matrix. The driving circuit operates each matrix so it is always in the same logical state.**

The 2 pole matrix effectively doubles the number of switches available in the module.

If a matrix is described as being 132 by 8 and it is a 2 pole matrix this means that there are two separate 132x8 matrices whose logical state are always the same. It does not offer the same flexibility as two separate matrix having independent logical states or have as low crosstalk as two independent matrix. The two matrix are identified by adding a .1 or a .2 extension to their row (Y) and column (X) identifiers. It doubles the number of connections brought to the module front panel compared to a one pole matrix.



**The two matrices of a 2 pole system are identified by adding a .1 or a .2 extension to their identifiers to show which matrix they are connected to. If (for example) X9.1 is connected to Y4.1 then X9.2 is also connected to X4.2.**



### 4 SLOT AND 8 SLOT BRICS

The BRIC modules can be ordered in either 4 slots or 8 slot configurations, but the 8 slot configuration is able to hold more daughtercards and therefore provide more connections.

Regardless of which size is used the connection to the PXI backplane is made on just the left hand connector (looking from the front). For small chassis with mechanical extensions on the right hand side that means the BRIC can sometimes be used while occupying only one slot of the chassis.

If the wanted matrix size is available in both forms and there is room it may be advantageous to consider 8 slot modules if the test application has a risk of expanding. A BRIC can be expanded in size by purchasing new daughtercards after the initial purchase.

### 3U AND 6U BRICS

The BRIC can be ordered in 3U or 6U heights.

The 6U BRIC will only fit in a 6U chassis and provides switches that have higher power ratings than the switches in 3U modules.

The 3U BRIC can fit in a dual height chassis or be fitted to a 6U chassis with the aid of an adapter.

### SWITCH SPECIFICATION

For BRIC modules designed to operate in 3U systems two switch specifications are offered on some types of matrix. The two pole matrix can use one of two designs of switch that differ in their maximum power handling. Designs from the 40-560 and 40-561 range are rated at 100/150V, 0.5 Amps or 10 Watts (whichever is less) while the 40-562 range is rated at 100/150V, 1 Amp or 20 Watts (which ever is less). The switches differ in performance because the 40-562 uses a relay with a larger mass and a more power efficient coil drive mechanism. The penalty for this increase in performance is the switch is physically larger, so 40-562 solutions have a lower maximum density than 40-561 or 40-560 solutions. The difference in maximum density is illustrated below for BRIC4 modules in a 1 pole matrix.

**Comparison of maximum density of BRIC4 3U modules**

	40-560 max complexity	40-561 max complexity	40-562 max complexity
4 row matrix	N/A	N/A	264x4
8 row matrix	276x8	180x8	132x8
16 row matrix	138x16	90x16	66x16

The 40-560 range is not offered in a 2 pole format (or screened version) so the choices are reduced for this configuration.

**Comparison of maximum density of BRIC4 3U modules 2-pole versions**

	40-560 max complexity	40-561 max complexity	40-562 max complexity
4 row matrix	N/A	N/A	264x4
8 row matrix	N/A	180x8	132x8
16 row matrix	N/A	90x16	66x16

In general if the user is not likely to want the very highest densities of switching modules the 40-562 range is the best choice. When making this choice remember that it also limits the ability of the module to be upgraded at a later date through the use of daughtercards.

BRIC modules designed for 6U systems are identified as the 45-570 range and are supplied with switches capable of 500 V DC, 2 Amps or switching 90 Watts (whichever is less).



### UPGRADING AND MAINTENANCE WITH DAUGHTERCARDS

When BRIC modules are ordered and delivered with a defined size the whole module may not be occupied. At a future date an application may change or the module may be re-used and a larger matrix may be required. In these circumstances Pickering Interfaces can offer daughtercards that can be added to the module to expand the size of the matrix to the limits detailed in the data sheet.

The Daughtercards must have the same number of rows (Y) as the module to which it is fitted.

Daughtercards can also be purchased to quickly replace defective cards in the module. Providing daughtercards simplifies both upgrading and maintaining BRIC switching modules.

It should be noted that the left hand card of each module is different from the remainder of the cards since it carries the Y connection outputs and must be ordered with a (-Y) suffix if the Y axis is needed. Daughtercards with the Y axis enabled can be fitted in place of any of the other cards, but the connector size may be effected.

For more information on the availability of daughtercards contact your Pickering Interfaces representative.

### FRONT PANEL CONNECTORS

The BRIC modules provide a remarkably high level of switch integration that requires the modules to be supplied with high density connectors. The number of pins on the connector is dependent on the complexity of the module selected. Mating connectors can be purchased from the manufacturer or from Pickering Interfaces. Pickering Interfaces can also supply a range of mating cables.

For modules in the 40-560 range the module is supplied with 68 way SCSI Micro D connectors using a 1.27 mm pitch. For Modules with 4 rows (Y) 96 way connectors are used.

For modules in the 40-561 range the left hand connector, which carries the Y axis connections, is a 96 way SCSI Micro D connector. The remainder of the cards use 68 way SCSI Micro D connectors.

For modules in the 40-562 range with 4 rows (Y) the connectors are 96 way SCSI connectors because the connector need to carry the high number of allowed column (X) connections. For modules in the 40-562 range with 8 or 16 rows (Y) the modules are fitted with 68 way SCSI connectors.

### SUMMARY OF THE BRIC PRODUCT RANGE

- All the BRIC modules offer the highest density of PXI switching available.
- The 40-560 range offers the very highest relay density in the smallest volume with the fewest options.
- The 40-561 range offers high density relays with many options, including two pole and screened configurations.
- The 40-562 range offers relays with the highest switching performance of 3U modules but with a lower density than the 40-561 and 40-560 ranges.
- The 45-570 provides a range of modules in a 6U format with the highest power switching capability

The following pages provide tables detailing the Bric Module options.



MODULE PART NUMBERS

**TABLE 1 - Single Pole (X4), (x8) and (x16), 4-Slot and 8-Slot BRIC Modules (40-560-021/121)**

<b>x4 Configuration Options</b>		
	<b>BRIC4 (40-560-021)</b>	<b>BRIC8 (40-560-121)</b>
184x4 Matrix	40-560-021-184x4	40-560-121-184x4
276x4 Matrix	40-560-021-276x4	40-560-121-276x4
368x4 Matrix	40-560-021-368x4	40-560-121-368x4
460x4 Matrix	40-560-021-460x4	40-560-121-460x4
552x4 Matrix	40-560-021-552x4	40-560-121-552x4
644x4 Matrix		40-560-121-644x4
736x4 Matrix		40-560-121-736x4
828x4 Matrix		40-560-121-828x4
920x4 Matrix		40-560-121-920x4
1012x4 Matrix		40-560-121-1012x4
1104x4 Matrix		40-560-121-1104x4
<b>x8 Configuration Options</b>		
	<b>BRIC4 (40-560-021)</b>	<b>BRIC8 (40-560-121)</b>
92x8 Matrix	40-560-021-92x8	40-560-121-92x8
138x8 Matrix	40-560-021-138x8	40-560-121-138x8
184x8 Matrix	40-560-021-184x8	40-560-121-184x8
230x8 Matrix	40-560-021-230x8	40-560-121-230x8
276x8 Matrix	40-560-021-276x8	40-560-121-276x8
322x8 Matrix		40-560-121-322x8
368x8 Matrix		40-560-121-368x8
414x8 Matrix		40-560-121-414x8
460x8 Matrix		40-560-121-460x8
506x8 Matrix		40-560-121-506x8
552x8 Matrix		40-560-121-552x8
<b>x16 Configuration Options</b>		
	<b>BRIC4 (40-560-021)</b>	<b>BRIC8 (40-560-121)</b>
46x16 Matrix	40-560-021-46x16	40-560-121-46x16
69x16 Matrix	40-560-021-69x16	40-560-121-69x16
92x16 Matrix	40-560-021-92x16	40-560-121-92x16
115x16 Matrix	40-560-021-115x16	40-560-121-115x16
138x16 Matrix	40-560-021-138x16	40-560-121-138x16
161x16 Matrix		40-560-121-161x16
184x16 Matrix		40-560-121-184x16
207x16 Matrix		40-560-121-207x16
230x16 Matrix		40-560-121-230x16
253x16 Matrix		40-560-121-253x16
276x16 Matrix		40-560-121-276x16



**TABLE 2 - Single Pole, Screened and Two Pole, (x8) and (x16), 4-Slot and 8-Slot BRIC Modules (40-561-021/121)**

<b>x8 Configuration Options</b>						
	<b>BRIC4 (40-561-021) 1-Pole</b>	<b>BRIC4 (40-561-021-S) Screened</b>	<b>BRIC4 (40-561-022) 2-Pole</b>	<b>BRIC8 (40-561-121) 1-Pole</b>	<b>BRIC8 (40-561-121-S) Screened</b>	<b>BRIC8 (40-561-122) 2-Pole</b>
60x8 Matrix	40-561-021-60x8	40-561-021-S-60x8	40-561-022-60x8	40-561-121-60x8	40-561-121-S-60x8	40-561-122-60x8
90x8 Matrix	40-561-021-90x8	40-561-021-S-90x8	40-561-022-90x8	40-561-121-90x8	40-561-121-S-90x8	40-561-122-90x8
120x8 Matrix	40-561-021-120x8	40-561-021-S-120x8	40-561-022-120x8	40-561-121-120x8	40-561-121-S-120x8	40-561-122-120x8
150x8 Matrix	40-561-021-150x8	40-561-021-S-150x8	40-561-022-150x8	40-561-121-150x8	40-561-121-S-150x8	40-561-122-150x8
180x8 Matrix	40-561-021-180x8	40-561-021-S-180x8	40-561-022-180x8	40-561-121-180x8	40-561-121-S-180x8	40-561-122-180x8
210x8 Matrix				40-561-121-210x8	40-561-121-S-210x8	40-561-122-210x8
240x8 Matrix				40-561-121-240x8	40-561-121-S-240x8	40-561-122-240x8
270x8 Matrix				40-561-121-270x8	40-561-121-S-270x8	40-561-122-270x8
300x8 Matrix				40-561-121-300x8	40-561-121-S-300x8	40-561-122-300x8
330x8 Matrix				40-561-121-330x8	40-561-121-S-330x8	40-561-122-330x8
360x8 Matrix				40-561-121-360x8	40-561-121-S-360x8	40-561-122-360x8
<b>x16 Configuration Options</b>						
	<b>BRIC4 (40-561-021) 1-Pole</b>	<b>BRIC4 (40-561-021-S) Screened</b>	<b>BRIC4 (40-561-022) 2-Pole</b>	<b>BRIC8 (40-561-121) 1-Pole</b>	<b>BRIC8 (40-561-121-S) Screened</b>	<b>BRIC8 (40-561-122) 2-Pole</b>
30x16 Matrix	40-561-021-30x16	40-561-021-S-30x16	40-561-022-30x16	40-561-121-30x16	40-561-121-S-30x16	40-561-122-30x16
45x16 Matrix	40-561-021-45x16	40-561-021-S-45x16	40-561-022-45x16	40-561-121-45x16	40-561-121-S-45x16	40-561-122-45x16
60x16 Matrix	40-561-021-60x16	40-561-021-S-60x16	40-561-022-60x16	40-561-121-60x16	40-561-121-S-60x16	40-561-122-60x16
75x16 Matrix	40-561-021-75x16	40-561-021-S-75x16	40-561-022-75x16	40-561-121-75x16	40-561-121-S-75x16	40-561-122-75x16
90x16 Matrix	40-561-021-90x16	40-561-021-S-90x16	40-561-022-90x16	40-561-121-90x16	40-561-121-S-90x16	40-561-122-90x16
105x16 Matrix				40-561-121-105x16	40-561-121-S-105x16	40-561-122-105x16
120x16 Matrix				40-561-121-120x16	40-561-121-S-120x16	40-561-122-120x16
135x16 Matrix				40-561-121-135x16	40-561-121-S-135x16	40-561-122-135x16
150x16 Matrix				40-561-121-150x16	40-561-121-S-150x16	40-561-122-150x16
165x16 Matrix				40-561-121-165x16	40-561-121-S-165x16	40-561-122-165x16
180x16 Matrix				40-561-121-180x16	40-561-121-S-180x16	40-561-122-180x16



**TABLE 3 - Single Pole, Screened and Two Pole, (x4), (x8) and (x16), 4-Slot and 8-Slot BRIC Modules (40-562-021/121)**

x4 Configuration Options						
	BRIC4 (40-562-021) 1-Pole	BRIC4 (40-562-021-S) Screened	BRIC4 (40-562-022) 2-Pole	BRIC8 (40-562-121) 1-Pole	BRIC8 (40-562-121-S) Screened	BRIC8 (40-562-122) 2-Pole
88x4 Matrix	40-562-021-88x4	40-562-021-S-88x4	40-562-022-88x4	40-562-121-88x4	40-562-121-S-88x4	40-562-122-88x4
132x4 Matrix	40-562-021-132x4	40-562-021-S-132x4	40-562-022-132x4	40-562-121-132x4	40-562-121-S-132x4	40-562-122-132x4
176x4 Matrix	40-562-021-176x4	40-562-021-S-176x4	40-562-022-176x4	40-562-121-176x4	40-562-121-S-176x4	40-562-122-176x4
220x4 Matrix	40-562-021-220x4	40-562-021-S-220x4	40-562-022-220x4	40-562-121-220x4	40-562-121-S-220x4	40-562-122-220x4
264x4 Matrix	40-562-021-264x4	40-562-021-S-264x4	40-562-022-264x4	40-562-121-264x4	40-562-121-S-264x4	40-562-122-264x4
308x4 Matrix				40-562-121-308x4	40-562-121-S-308x4	40-562-122-308x4
352x4 Matrix				40-562-121-352x4	40-562-121-S-352x4	40-562-122-352x4
396x4 Matrix				40-562-121-396x4	40-562-121-S-396x4	40-562-122-396x4
440x4 Matrix				40-562-121-440x4	40-562-121-S-440x4	40-562-122-440x4
484x4 Matrix				40-562-121-484x4	40-562-121-S-484x4	40-562-122-484x4
528x4 Matrix				40-562-121-528x4	40-562-121-S-528x4	40-562-122-528x4
x8 Configuration Options						
	BRIC4 (40-562-021) 1-Pole	BRIC4 (40-562-021-S) Screened	BRIC4 (40-562-022) 2-Pole	BRIC8 (40-562-121) 1-Pole	BRIC8 (40-562-121-S) Screened	BRIC8 (40-562-122) 2-Pole
44x8 Matrix	40-562-021-44x8	40-562-021-S-44x8	40-562-022-44x8	40-562-121-44x8	40-562-121-S-44x8	40-562-122-44x8
66x8 Matrix	40-562-021-66x8	40-562-021-S-66x8	40-562-022-66x8	40-562-121-66x8	40-562-121-S-66x8	40-562-122-66x8
88x8 Matrix	40-562-021-88x8	40-562-021-S-88x8	40-562-022-88x8	40-562-121-88x8	40-562-121-S-88x8	40-562-122-88x8
110x8 Matrix	40-562-021-110x8	40-562-021-S-110x8	40-562-022-110x8	40-562-121-110x8	40-562-121-S-110x8	40-562-122-110x8
132x8 Matrix	40-562-021-132x8	40-562-021-S-132x8	40-562-022-132x8	40-562-121-132x8	40-562-121-S-132x8	40-562-122-132x8
154x8 Matrix				40-562-121-154x8	40-562-121-S-154x8	40-562-122-154x8
176x8 Matrix				40-562-121-176x8	40-562-121-S-176x8	40-562-122-176x8
198x8 Matrix				40-562-121-198x8	40-562-121-S-198x8	40-562-122-198x8
220x8 Matrix				40-562-121-220x8	40-562-121-S-220x8	40-562-122-220x8
242x8 Matrix				40-562-121-242x8	40-562-121-S-242x8	40-562-122-242x8
264x8 Matrix				40-562-121-264x8	40-562-121-S-264x8	40-562-122-264x8
x16 Configuration Options						
	BRIC4 (40-562-021) 1-Pole	BRIC4 (40-562-021-S) Screened	BRIC4 (40-562-022) 2-Pole	BRIC8 (40-562-121) 1-Pole	BRIC8 (40-562-121-S) Screened	BRIC8 (40-562-122) 2-Pole
22x16 Matrix	40-562-021-22x16	40-562-021-S-22x16	40-562-022-22x16	40-562-121-22x16	40-562-121-S-22x16	40-562-122-22x16
33x16 Matrix	40-562-021-33x16	40-562-021-S-33x16	40-562-022-33x16	40-562-121-33x16	40-562-121-S-33x16	40-562-122-33x16
44x16 Matrix	40-562-021-44x16	40-562-021-S-44x16	40-562-022-44x16	40-562-121-44x16	40-562-121-S-44x16	40-562-122-44x16
55x16 Matrix	40-562-021-55x16	40-562-021-S-55x16	40-562-022-55x16	40-562-121-55x16	40-562-121-S-55x16	40-562-122-55x16
66x16 Matrix	40-562-021-66x16	40-562-021-S-66x16	40-562-022-66x16	40-562-121-66x16	40-562-121-S-66x16	40-562-122-66x16
77x16 Matrix				40-562-121-11x16	40-562-121-S-11x16	40-562-122-11x16
88x16 Matrix				40-562-121-22x16	40-562-121-S-22x16	40-562-122-22x16
99x16 Matrix				40-562-121-33x16	40-562-121-S-33x16	40-562-122-33x16
110x16 Matrix				40-562-121-44x16	40-562-121-S-44x16	40-562-122-44x16
121x16 Matrix				40-562-121-55x16	40-562-121-S-55x16	40-562-122-55x16
132x16 Matrix				40-562-121-66x16	40-562-121-S-66x16	40-562-122-66x16



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