AN SL POWER ELECTRONICS COMPANY

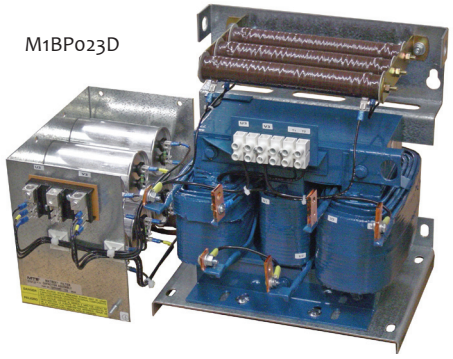
Single Phase Matrix® Filters

12% THID - High Performance & Easy to Install

MTE M1 SERIES B SINGLE PHASE MATRIX® FILTERS reduce harmonics to 12% THID of total harmonic current distortion on virtually any kind of four pulse rectifier supply. These power supplies are commonly found in electronic equipment such as adjustable speed motor drives, welders, battery chargers, servo drives and other electronic equipment. Harmonic distortion has become an increasing concern for power companies, industrial, and residential users of electrical (especially electronic) equipment and specifying engineers alike. Harmonics disrupt communication equipment, degrade electronic reliability, reduce system efficiency and equipment productivity.

ADVANCED PATENTED HARMONICS SOLUTION PROVIDES BEST VALUE and HIGHEST PROTECTION - Single Phase Matrix® Filters allow users to achieve superior attenuation of harmonics when used with single phase drives or four pulse rectifier power supplies. The new patent pending Reactor optimizes the technology for smaller packaging, requiring less floor or panel space than other Filter schemes. Matrix® Filters provide protection against voltage spikes that could cause over voltage tripping or damage to input power components while preventing current harmonics from adversely affecting upstream circuit breakers, fuses, conductors, and transformers.

GUARANTEED RESULTS - Unlike other harmonic filter technologies, the performance of MTE Matrix Harmonic Filters is guaranteed! On AC variable frequency, variable torque drive applications (fans & pumps), Matrix filters will meet the guaranteed maximum levels of THID (total harmonic current distortion) at full load. Additionally, Matrix filters will not cause power system resonance nor attract harmonics from other non-linear loads.


M1BP023D

No system analysis is required to select and apply Matrix® Filters

UL Listed (UL-508)
Matrix Harmonic filters are UL Listed
(File E180243) for both USA and Canada.

PRODUCT SELECTION: See MTE M1 Single Phase Matrix® Filter Selection Brochure or visit the MTE website at www.mtecorp.com for Single Phase Matrix selection guides and option details.

INSTALLATION OPTIONS: Matrix Harmonic Filters are available in a variety of enclosure options. The standard enclosure meets the requirements of both Nema 1 & Nema 2. The Nema 3R provides weather protection and is available in optional stainless or galvanized steel construction. Optional Serpent/Rodent screens can be added to block small animals from entering enclosures. For maximum flexibility, Matrix filters are also offered as open modular construction for integration into customer enclosures and panels.

ELECTRICAL OPTIONS: Various contactor options may be added to the Matrix® Filter to provide for load dependent leading KVAR cancellation to enhance compatibility with standby power and support service requirements.

Typical uses include:
- Mission Critical Facilities
- AC variable frequency drives
- DC adjustable speed drives
- Electronic welders
- Battery chargers
- Fans and Pumps
- Water Treatment Facilities
- Induction Heating Equipment

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Part Number Code: M1 B X ___ Y _ __
- Product Code Matrix Series D
- Series B
- Type: P Panel Mnt, G General Purpose NEMA2, W Weather NEMA3R
- Current Rating: 006 6 amps, 055 55 amps
- Voltage Frequency Code: A 240VAC 60Hz, D 480VAC 60Hz
- Enclosure Options
- Contactor Options

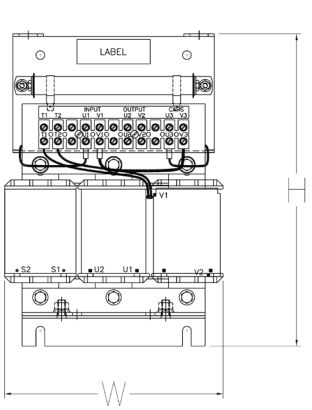
MTE M1 Matrix® Filter Selection Tables

THE GLOBAL POWER QUALITY RESOURCE

Selection Table Single Phase Matrix® Filter Selection Tables - 240VAC

240 Volts 3 PH Motor HP	Filter Current rating	Open Panel						Enclosed units			Watts
		Cat. PN	weight Lbs	Magnetics size	Figure Ref.	Cappanel size	Figure Ref.	NEMA 1-2 Cat. PN	NEMA 3R Cat. PN	CAB	
0.5	4	M1BP004A	13	9.2"H x6"W x 5.8"D	1	5.4"H x 5.6"W x 5.6"D	3	M1BG004A	M1BW004A	CAB-12C	81
0.75	6	M1BP006A	14	9.2"H x6"W x 6.1"D	1	5.4"H x 5.6"W x 5.6"D	3	M1BG006A	M1BW006A	CAB-12C	91
1	8	M1BP008A	15	9.2"H x6"W x 6.4"D	1	5.4"H x 5.6"W x 5.6"D	3	M1BG008A	M1BW008A	CAB-12C	102
1.5	11	M1BP011A	19	10.1"H x 7.3"W x 5.8"D	1	5.4"H x 5.6"W x 5.6"D	3	M1BG011A	M1BW011A	CAB-12C	117
2	13	M1BP013A	20	10.1"H x 7.3"W x 6.3"D	1	5.4"H x 5.6"W x 5.6"D	3	M1BG013A	M1BW013A	CAB-12C	128
3	16	M1BP016A	21	10.1"H x 7.3"W x 6.3"D	1	5.4"H x 5.6"W x 5.6"D	3	M1BG016A	M1BW016A	CAB-12C	143
5	25	M1BP025A	43	12.8"H x 7.5"W x 6.8"D	1	5.4"H x 5.6"W x 5.6"D	3	M1BG025A	M1BW025A	CAB-17C	190
7.5	36	M1CP036A	70	17.8"H x 17"W x 5.3"D	2	5.4"H x 5.6"W x 5.6"D	3	M1CG036A	M1CW036A	CAB-17C	265
10	45	M1CP045A	59	17.8"H x 17"W x 5.3"D	2	5.4"H x 5.6"W x 5.6"D	3	M1CG045A	M1CW045A	CAB-17C	327
15	70	M1CP070A	95	17.8"H x 17"W x 5.3"D	2	5.4"H x 5.6"W x 5.6"D	3	M1CG070A	M1CW070A	CAB-20C	537
20	90	M1CP090A	106	17.8"H x 17"W x 6.8"D	2	8"H x 7.3"W x 11"D	4	M1CG090A	M1CW090A	CAB-20C	623
25	110	M1CP110A	125	17.8"H x 21"W x -"D	2	8"H x 7.3"W x 11"D	4	M1CG110A	M1CW110A	CAB-20C	654
30	130	M1CP130A	151	17.8"H x 21"W x -"D	2	8"H x 7.3"W x 11"D	4	M1CG130A	M1CW130A	CAB-20C	736
40	182	M1CP182A	212	contact factory	2	8"H x 7.3"W x 11"D	4	M1CG182A	M1CW182A	CAB-26C	1006
50	220	M1CP220A	250	contact factory	2	8"H x 7.3"W x 11"D	4	M1CG220A	M1CW220A	CAB-26C	1204

Note: Figures are for general reference only. Contact the factory or visit the website for the latest CAD files .



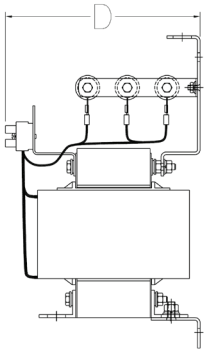
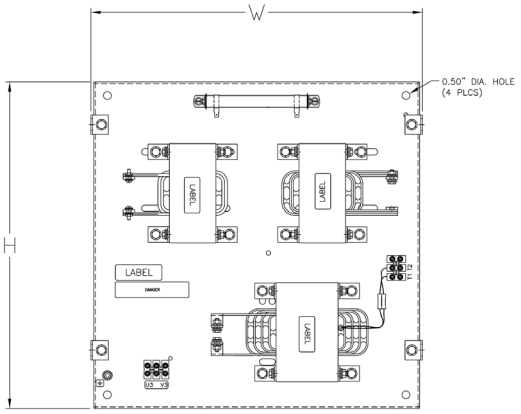


Figure 1



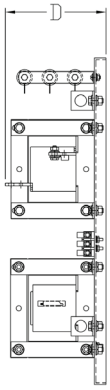
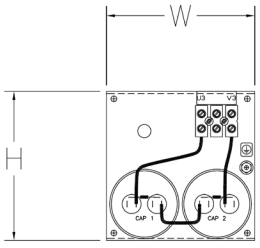


Figure 2



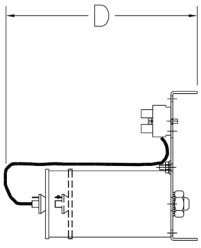
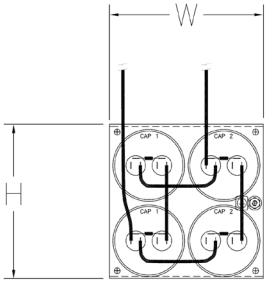


Figure 3



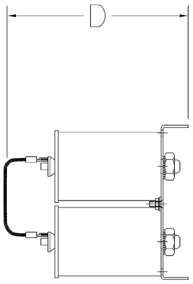


Figure 4

Selection Table Single Phase Matrix® Filter Selection Tables - 480VAC

480 Volts 3 PH Motor HP	Filter Current rating	Open Panel						Enclosed units			Watts
		Cat. PN	weight Lbs	Magnetics size	Figure Ref.	Cappanel size	Figure Ref.	NEMA 1-2 Cat. PN	NEMA 3R Cat. PN	CAB	
0.5	2	M1BP002D	13	12.9"H x 7.5"W x 7.6"D	1	5.6"H x 5.6"W x 7.3"D	3	M1BG002D	M1BW002D	CAB-12C	79
0.75	3	M1BP003D	14	12.9"H x 7.5"W x 8"D	1	5.6"H x 5.6"W x 7.3"D	3	M1BG003D	M1BW003D	CAB-12C	89
1	4	M1BP004D	15	12.9"H x 7.5"W x 8.3"D	1	5.6"H x 5.6"W x 7.3"D	3	M1BG003D	M1BW003D	CAB-12C	99
1.5	5	M1BP005D	19	10.1"H x 7.3"W x 5.8"D	1	5.6"H x 5.6"W x 7.3"D	3	M1BG005D	M1BW005D	CAB-12C	109
2	6	M1BP006D	20	10.1"H x 7.3"W x 6"D	1	5.6"H x 5.6"W x 7.3"D	3	M1BG005D	M1BW005D	CAB-12C	119
3	8	M1BP008D	21	10.1"H x 7.3"W x 6.3"D	1	5.6"H x 5.6"W x 7.3"D	3	M1BG008D	M1BW008D	CAB-12C	139
5	13	M1BP013D	43	12.8"H x 7.5"W x 6.8"D	1	5.6"H x 5.6"W x 8.2"D	3	M1BG013D	M1BW013D	CAB-17C	189
7.5	18	M1BP018D	53	12.8"H x 7.5"W x 7.8"D	1	5.6"H x 5.6"W x 8.2"D	3	M1BG018D	M1BW018D	CAB-17C	240
10	23	M1BP023D	56	12.8"H x 7.5"W x 8.3"D	1	5.6"H x 5.6"W x 8.2"D	3	M1BG023D	M1BW023D	CAB-17C	290
15	34	M1CP034D	89	contact factory	2	8"H x 7.3"W x 12"D	3	M1CG034D	M1CW034D	CAB-20C	392
20	44	M1CP044D	120	contact factory	2	8"H x 7.3"W x 12"D	4	M1CG044D	M1CW044D	CAB-20C	604
25	55	M1CP055D	150	contact factory	2	12"H x 7.3"W x 12"D	4	M1CG055D	M1CW055D	CAB-20C	663
30	66	M1CP066D	179	contact factory	2	12"H x 7.3"W x 12"D	4	M1CG066D	M1CW066D	CAB-20C	708
40	91	M1CP091D	190	contact factory	2	15"H x 7.3"W x 12"D	4	M1CG091D	M1CW091D	CAB-26C	991
50	110	M1CP110D	230	contact factory	2	15"H x 7.3"W x 12"D	4	M1CG110D	M1CW110D	CAB-26C	1046
75	155	M1CP155D	355	contact factory	2	15"H x 7.3"W x 12"D	4	M1CG155D	M1CW155D	CAB-26D	1584

Selection Guide Usage

Select Matrix single phase filters based on input drive current when used with a specific motor. Filters for variable torque AC drives that power three phase motors rated 3hp – 30hp should be sized based on an increase motor FLA of 66% over the NEC listing or motor name plate data. Please note that typical drive manufactures will recommend an inverter which is twice the normal size to account for operational differences when powered from single phase. MTE's selection tables take into account the higher input current for single to three phase operation. To make a selection choose the horsepower of the motor that is connected to the VFD.

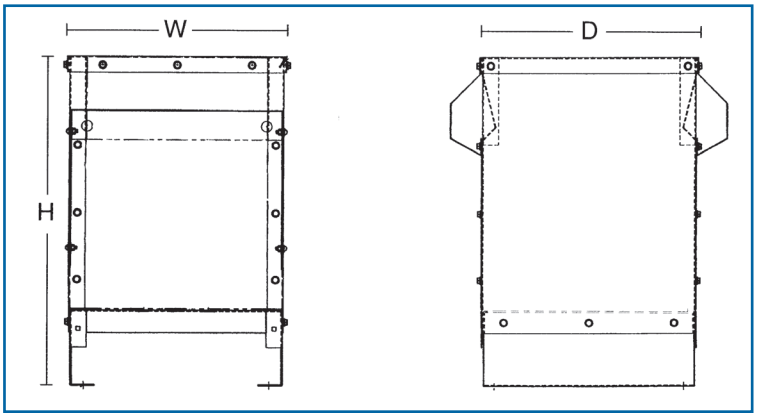
Option 002 **- Capacitor Removal by Contactor**

The capacitor contactor option is recommended for generator applications where the KVA rating of the generator is less than 1.20 times the KVA rating of the Matrix filter. Calculate the KVA rating of the Matrix Filter based on the input voltage rating and the output current rating. Contactor is sized to the filter capacitor current as listed in the user manual. This option provides a contactor to disconnect the filter capacitor bank when the drive is not running and removes the capacitive KVAR loading during light loads to stabilize generator operation. The contactor coil and auxiliary contacts are wired to a customer terminal block. See page Matrix single phase user manual for contactor coil switching characteristics. Please note that a 120V 60Hz power source is required for this option.

Multiple Drives on One Filter

Where a single filter is used to feed multiple drives, the output current rating of the filter should be selected to equal the total current rating of the individual drives when calculated according to the instructions above.

Type	Size inches	3R Depth	Weight
CAB-12C	24"'H x 13"W x 18"D	23"	74#
CAB-17C	31"'H x 18"W x 21"D	26"	96#
CAB-20C	47"'H x 21"W x 25"D	30"	180#
CAB-26C	47"'H x 27"W x 25"D	30"	205#
CAB-26D	72"'H x 27"W x 25"D	40"	256#



Product Specifications - Single Phase Matrix® Filter

Refer to The Single Phase Matrix® M1 Series B User Manual for Detailed Specifications

Matrix Filters are designed to operate and will achieve guaranteed performance under the follow conditions:

Load: 4 pulse rectifier, capacitor based DC bus and inverter drive loads
Input voltage: Nominal voltage VAC +/- 10%, 1 Phase
Maximum harmonic background voltage distortion: 1%
Frequency: Nominal Frequency + /- 0.75 Hz
Maximum source impedance: 6.00%
Minimum source impedance: 1.5%
Service Factor: 1.00

Ambient Operating Temperature:
Enclosed Filters: -40 to +40 degrees C
Open Panel Filters: -40 to +50 degrees C

Storage Temperature: -40 to +90 degrees C

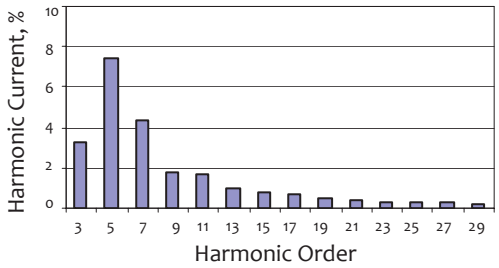
Altitude: 0 to 3300 Feet above sea level without derating

Relative Humidity: 0 to 95% non-condensing

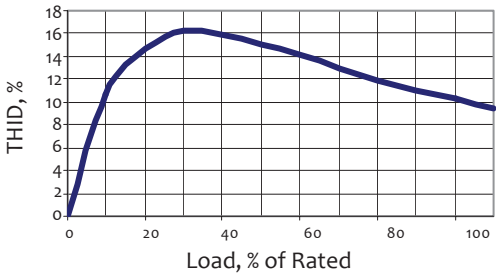
Agency Approvals:
UL and cUL Listed: UL508 and CSA-C22.2 No 14-95
File E180243 (3HP to 30HP, 240VAC to 480VAC, 50Hz, 50/60Hz, & 60 Hz)

Performance:
Total Harmonic Current Distortion: 12% Maximum at full load guaranteed

12% Single Phase Matrix Filter
Harmonic Spectrum for 100% Load



12% Single Phase Matrix Filter
Typical THID vs. Load



Performance Guarantee

Select & install the appropriate Matrix Harmonic Filter in a variable torque AC variable frequency drive application, within our published system limits & we guarantee that the input current distortion will be less than or equal to 12% THID for M1 Series filters at full load. If a properly sized & installed filter fails to meet its specified THID level, MTE will provide the necessary modifications or replacement filter at no charge. TDD will typically be even lower than THID.

Matrix filters can also provide similar performance in other drive applications such as constant torque, DC drives & other phase controlled rectifiers, but actual THID levels can vary by load and/or speed & therefore cannot be guaranteed. Consult factory for assistance when applying Matrix filters on these types of equipment

MINIMUM SYSTEM REQUIREMENTS:
The guaranteed performance levels of this filter will be achieved when the following system conditions are met:
Source impedance: 1.5% minimum to 6.0% max
Frequency: 60Hz ± 0.75Hz
System Voltage: Nominal System Voltage ±10%
Background Voltage Distortion: 1.0% THVD.
NOTE: The presence of background voltage distortion will cause motors & other linear loads to draw harmonic currents. Additional harmonic currents may flow into the Matrix filter if there is harmonic voltage distortion already on the system.

For Technical Support: appengrg@mtecorp.com
For Sales Support: sales@mtecorp.com

World Headquarters
N83 W13330 Leon Road
Menomonee Falls
Wisconsin 53052
Toll Free 1-800-455-4MTE
Phone: (262) 253-8200
Fax: (262) 253-8222

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