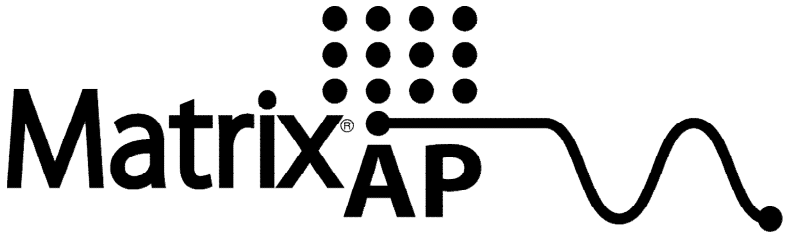
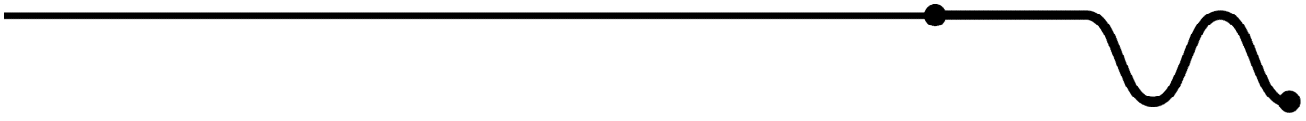
MTE
AN SL INDUSTRIES COMPANY



400 Volts, 50HZ
480 Volts, 60HZ
600 Volts, 60HZ

USER INSTALLATION MANUAL

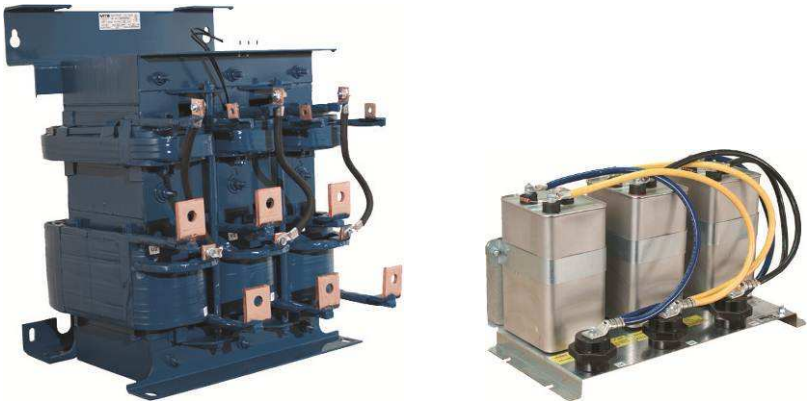


FORM: MAP-UIM-E
REL. July 2013
REV. 015

IMPORTANT USER INFORMATION

NOTICE

The MTE Corporation Matrix® AP Harmonic Filter is designed for harmonic mitigation of 6-pulse inverter drives supplying variable torque loads in a wide variety of applications. The suitability of this filter for a specific application must therefore be determined by the customer. In no event will MTE Corporation assume responsibility or liability for any direct or consequential damages resulting from the use or application of this filter. Nor will MTE Corporation assume patent liability with respect to the use of information, circuits or equipment described in this instruction manual. The Matrix AP Harmonic Filter uses a patent pending Adaptive Passive Harmonic Mitigating Reactor (AP HMR) technology to limit full load current distortion to less than 5% THID and 8% at 30% load.



MAPP0320D

TABLE OF CONTENTS

IMPORTANT SAFETY INFORMATION

WARNING

ONLY A QUALIFIED ELECTRICIAN CAN CARRY OUT THE ELECTRICAL INSTALLATION OF THIS FILTER

WARNING

High voltage is used in the operation of this filter. Use Extreme caution to avoid contact with high voltage when operating, installing or repairing this filter.

INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

After removing power, allow at least five minutes to elapse and verify that the capacitors have discharged to a safe level before contacting internal components. Connect a DC voltmeter across the capacitor terminals. Start with the meter on the highest scale and progressively switch to a lower scale as the indicated voltage falls below the maximum value of the scale used.

WARNING

The opening of the branch circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electrical shock, current-carrying parts and other components of the filter should be examined and replaced if damaged.

WARNING

An upstream disconnect/protection device must be used as required by the National Electrical Code (NEC) or governing authority.

IMPORTANT SAFETY INFORMATION, CONT.

WARNING

Even if the upstream disconnect/protection device is open, the drive down stream of the filter may feed back high voltage to the filter. The drive safety instructions must be followed.

INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED

WARNING

The filter must be grounded with a grounding conductor connected to all grounding terminals.

WARNING

Only spare parts obtained from MTE Corporation or an authorized MTE distributor can be used.

WARNING

Loose or improperly secured connections may damage or degrade filter performance. Visually inspect and secure all electrical connections before power is applied to the filter.

Introduction

This manual was specifically developed to assist in the installation and interconnection operation of the MTE Corporation Matrix AP Harmonic Filter.

This manual is intended for use by personnel experienced in the operation and maintenance of electronic drives. Because of the high voltages required by the filter and drive and the potential dangers presented by rotating machinery, it is essential that all personnel involved in the operation and maintenance of this filter know and practice the necessary safety precautions for this type of equipment. Personnel should read and understand the instructions contained in this manual before installing, operating or servicing the filter and the drive to which the filter is connected.

Upon Receipt of this Filter:

The MTE AP Harmonic Matrix Filter has been subjected to demanding factory tests before shipment. Carefully inspect the shipping container for damage that may have occurred in transit. Then unpack the filter and carefully inspect for any signs of damage. Save the shipping container for future transport of the filter.

In the event of damage, please contact and file a claim with the freight carrier involved immediately.

If the equipment is not going to be put into service upon receipt, cover and store the filter in a clean, dry location. After storage, ensure that the equipment is dry and that no condensation or dirt has accumulated on the internal components of the filter before applying power.

Repair/Exchange Procedure

MTE Corporation requires a Return Material Authorization Number before it can accept any filters that qualify for return or repair. If problems or questions arise during installation, setup, or operation of the filter, please contact MTE for assistance at:

Phone: 262-253-8200

FAX: 262-253-8222

Specifications:

Service Conditions

Load: 6-pulse variable torque rectifier only

Input voltage(s): 480V Version (PN#'s MAPxxxxxD) - 480 VAC +/- 10%, 60 ± 0.75 Hz, 3 phase
400V Version (PN#'s MAPxxxxxC) - 400 VAC +/- 10%. 50 ± 0.75 Hz. 3 phase
600V Version (PN#'s MAPxxxxxE) - 600 VAC +/- 10%. 60 ± 0.75 Hz. 3 phase

Input voltage line unbalance: 1% maximum to ensure performance guarantee.

Maximum source impedance: 6.00% to ensure performance guarantee.
Matrix AP works with Gensets that have source impedance of ~ 15%

Minimum source impedance: 1.5%

Service Factor: 1.00

Overload: 150% for 1 minute duration with 10% output voltage reduction of nominal of voltage.

Ambient Temperature (Operating) Refer to figure 4A for temperature de-rating.

Enclosed Filters:	320A and above:	-40 to +45 degrees C
	Below 320A:	-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.

Relative Humidity: 0 to 95% non-condensing

Over Voltage: Category ll

Agency Approvals

UL and cUL listed to UL508 Type MX and CSA-C22.2 No 14-95
File E180243 (3 – 1000 HP, 120VAC through 600 VAC 50, 50/60, 60 Hz Three Phase
CE Marked, 400VAC 50 Hz

Notes (SCCR):

The Short Circuit Current Rating (SCCR) is not required under Exception No.1 of UL508A SB4.2.1 effective 4/25/06. This exception also applies to all the Contactor Options (002, 009, 012, and similar), where the Contactors are separated from the Main Power path by exempt components (such as Reactors) of sufficient Impedance, which is assured in case of the Reactors that are integral components of our Filter.

Performance

Total Harmonic Current Distortion:

8% MAX at 30% load, 5% MAX at FULL LOAD

Enclosures

MTE enclosures are designed to provide a degree of protection for electrical components and prevent incidental personnel contact with the enclosed equipment. Depending on the enclosure selected, these enclosures meet the requirements of NEMA 1, 2 or 3R.

An approximate cross reference guide between NEMA, UL, CSA and IEC enclosure follows.

Type 1 NEMA / IEC IP20 enclosure**:**
Are designed for indoor use and will provide protection against contact with the enclosed equipment.

Type 2 NEMA / IEC IP20 enclosure:
Are designed for indoor use and will provide protection against contact with the enclosed equipment and provide a degree of protection against limited amounts of falling water and dirt.

Type 3R NEMA / IEC IP21 enclosure:
Are designed for outdoor use primarily to provide protection against contact with the enclosed equipment and provide a degree of protection against falling rain, sleet, and external ice formation.

Warranty

Three years from the date of shipment.

Over Temperature Switch Ratings

Table 1

NC Switch opens at 180 Deg. +/- 5 deg C		
Current Amps	**Voltage**	**Contact Load**
6	120 AC	Resistive Loads
3	120 AC	Inductive Loads
3	240 AC	Resistive Loads
2.5	240 AC	Inductive Loads
8	12 VDC	Resistive Loads
4	24 VDC	Resistive Loads

INSTALLATION INSTRUCTIONS

Matrix Filters are supplied in the following mechanical configurations:

Open Panel Mount

Floor mounted general purpose NEMA 2, & 3R cabinets

Select a well-ventilated, dust-free area away from direct sunlight, rain or moisture. Do not install in or near a corrosive environment. Avoid locations where the filter would be subjected to excessive vibrations.

Panel mounted filters are designed for mounting in the vertical plane within the customer's enclosure. Panel mount units consist of a Harmonic Mitigating Reactor (HMR) and one or more capacitor panel modules referred to as cap-panels on drawings and diagrams.

Mount the Harmonic Mitigating Reactor and capacitor module(s) in a location where the ambient temperature does not exceed 50 degrees C. For sufficient ventilation, a general guideline is to allow a side clearance of four (4) inches and a vertical clearance of six (6) inches for proper heat dissipation and access. Minimum clearances depend heavily on airflow within the enclosure.

WARNING

Do not install capacitor assembly above/near the Harmonic Mitigating Reactor. Premature or catastrophic failure may occur.

The capacitor panel must be located in the lowest temperature regions of the enclosure – generally toward the bottom and away from high temperature components.

Figures 10 – 35 contain outline drawings for the various ratings and show mounting orientation with bolt patterns.

Include the power dissipation of the filter along with all the other components located in the enclosure to determine the internal temperature rise and cooling requirements of the enclosure.

General purpose NEMA 2, and NEMA 3R enclosed filters are designed for floor mounting in the vertical plane in an environment suitable for the enclosure type. Do not install in or near a corrosive environment. Avoid locations where the filter would be subjected to excessive vibrations. Allow a minimum side and back clearance of eight (8) inches and front clearance of thirty-six (36) inches for proper heat dissipation and access.

Refer to Article 430 Table 430.91 of the National Electrical code for the selection of the appropriate enclosure Type Number for your application.

MATRIX AP 400 VOLTS, 50Hz

Ratings

Watts loss

Table 10

Maximum Output Amps RMS	Efficiency (Typical) (%)	400V Power Dissipation @ Rated Current (Typical) (Watts)
6	97.5%	114
8	97.6%	149
11	97.9%	180
14	98.1%	206
21	98.6%	235
27	98.7%	266
34	98.8%	298
44	98.9%	356
52	99.0%	388
66	99.1%	459
83	99.1%	565
103	99.2%	660
128	99.0%	973
165	99.2%	1,030
208	99.2%	1,263
240	99.2%	1,423
320	99.4%	1,450
403	99.4%	1,816
482	99.5%	2,008
636	99.5%	2,359
786	99.6%	2,604
850	99.6%	2,974
1000	99.5%	3,954
1200	99.6%	4,136

MATRIX AP 400 VOLTS, 50Hz

Regulation table

Table 11

FILTER VOLTAGE REGULATION		400 VAC
MAXIMUM OUTPUT VOLTAGE AT NO LOAD	RMS PEAK	418 591
MINIMUM OUTPUT VOLTAGE AT FULL LOAD	RMS PEAK	384 543
*MAXIMUM PCC VOLTAGE WITH 6% SOURCE IMPEDANCE	RMS PEAK	408 577

***Note:** PCC is the point of common coupling with the power distribution system

MATRIX AP 400 VOLTS, 50Hz

Capacitor Currents

Table 12

Filter Current Rating Amps RMS	Capacitor Current **400V** (Typical) Amps RMS
6	2.145
8	3.52
11	4.84
14	5.39
21	7.48
27	10.23
34	13.145
44	15.983
52	19.25
66	24.904
83	31.196
103	38.071
128	43.978
165	55.033
208	72.666
240	80.63
320	104.709
403	138.82
482	157.553
636	218.581
786	271.865
850	299.255
1000	341.11
1200	420

Note: Ratings are based on IEC AC-3 specifications.

MATRIX AP 400 VOLTS, 50Hz

Open Style Size and Weights

Table 13

Amps rating	Catalog Part Number	Total Weight Lbs.	HMR Size Inches	HMR Ref. Figure	Cap-Panel P.N.	Capacitor / Capacitor assemblies size Inches	Cap Ref. Figure
6	MAPP0006C	16	8.7"H X 8"W X 5.5"D	Figure 10	CAP-350TP	7.5"H X 2.9"D	Figure 20
8	MAPP0008C	17	8.7"H X 8"W X 5.5"D	Figure 10	CAP-351TP	7.5"H X 2.9"D	Figure 20
11	MAPP0011C	26	9.9"H X 9"W X 4.8"D	Figure 10	CAP-352TP	7.5"H X 2.9"D	Figure 20
14	MAPP0014C	30	9.8"H X 9"W X 5.25"D	Figure 10	CAP-353TP	7.5"H X 3.9"D	Figure 20
21	MAPP0021C	47	11.7"H X 10.5"W X 6.6"D	Figure 10	CAP-342TP	7.5"H X 3.9"D	Figure 20
27	MAPP0027C	52	11.7"H X 10.5"W X 7"D	Figure 10	CAP-354TP	7.5"H X 4.6"D	Figure 20
34	MAPP0034C	62	11.7"H X 10.5"W X 7.6"D	Figure 10	CAP-355TP	9.1"H X 4.6"D	Figure 20
44	MAPP0044C	74	11.7"H X 10.5"W X 8"D	Figure 10	CAP-356TP	9.1"H X 4.6"D	Figure 20
52	MAPP0052C	94	14"H X 12"W X 9"D	Figure 11	CAP-357TP	10.6"H X 4.6"D	Figure 20
66	MAPP0066C	107	14"H X 12"W X 9"D	Figure 11	CAP-358TP	10.6"H X 4.6"D	Figure 20
83	MAPP0083C	135	14"H X 12"W X 10.9"D	Figure 11	CAP-359TP	10.6"H X 4.6"D	Figure 20
103	MAPP0103C	145	14"H X 12"W X 10.82"D	Figure 11	CAP-360TP	10.6"H X 4.6"D	Figure 20
128	MAPP0128C	165	20"H X 15.25"W X 10.7"D	Figure 12	594	6.9"H X 16.3"W X 7.6"D	Figure 21
165	MAPP0165C	223	20"H X15.25"W X 11.75"D	Figure 12	544	7.9"H X 16.3"W X 7.6"D	Figure 21
208	MAPP0208C	237	20"H X 15.25"W X 11.85"D	Figure 12	543	8.9"H X 16.3"W X7.6"D	Figure 21
240	MAPP0240C	327	20"H X 15.25"W X 12.75"D	Figure 12	595	7.9"H X 16.3"W X 7.6"D	Figure 21
320	MAPP0320C	390	20"H X 15.25"W X 14.8"D	Figure 12	596	10.7" X 16.3"W X 7.6"D	Figure 21
403	MAPP0403C	433	23.25"H X 15.25"W X13.86"D	Figure 13	597	11.5H" X 16.3" X 7.6"D	Figure 21
482	MAPP0482C	483	23.25"H X 15.25"W X14.77"D	Figure 13	595	7.9"H X 16.3"W X 7.6"D	Figure 21
					595	7.9"H X 16.3"W X 7.6"D	Figure 21
636	MAPP0636C	736	26"H X 24"W X 16.5"D	Figure 15	596	10.7" X 16.3"W X 7.6"D	Figure 21
					596	10.7" X 16.3"W X 7.6"D	Figure 21
786	MAPP0786C	911	26"H X 24"W X 17.8"D	Figure 15	597	11.5H" X 16.3" X 7.6"D	Figure 21
					597	11.5H" X 16.3" X 7.6"D	Figure 21
850	MAPP0850C	983	26"H X 24"W X 20.3"D	Figure 15	596	10.7" X 16.3"W X 7.6"D	Figure 21
					596	10.7" X 16.3"W X 7.6"D	Figure 21
					595	7.9"H X 16.3"W X 7.6"D	Figure 21
1000	MAPP1000C	1137	26"H X 24"W X 21.7"D	Figure 15	598	10.7H" X 16.3" X 7.6"D	Figure 21
					598	10.7H" X 16.3" X 7.6"D	Figure 21
					598	10.7H" X 16.3" X 7.6"D	Figure 21
1200	MAPP1200C	1297	26"H X 24"W X 22.2"D	Figure 15	597	11.5H" X 16.3" X 7.6"D	Figure 21
					597	11.5H" X 16.3" X 7.6"D	Figure 21
					597	11.5H" X 16.3" X 7.6"D	Figure 21

MATRIX AP 400 VOLTS, 50Hz

Enclosed Unit Size and Weights

Table 14

Filter Amps	NEMA 2	Enclosure	Weight	NEMA 3R	Enclosure	Weight	Figure
6	MAPG0006C	CAB-12AP2	65	MAPW0006C	CAB-12AP3	73	Figure 30
8	MAPG0008C	CAB-12AP2	65	MAPW0008C	CAB-12AP3	73	Figure 30
11	MAPG0011C	CAB-12AP2	75	MAPW0011C	CAB-12AP3	82	Figure 30
14	MAPG0014C	CAB-12AP2	81	MAPW0014C	CAB-12AP3	88	Figure 30
21	MAPG0021C	CAB-12AP2	97	MAPW0021C	CAB-12AP3	105	Figure 30
27	MAPG0027C	CAB-12AP2	104	MAPW0027C	CAB-12AP3	111	Figure 30
34	MAPG0034C	CAB-12AP2	115	MAPW0034C	CAB-12AP3	123	Figure 30
44	MAPG0044C	CAB-12AP2	127	MAPW0044C	CAB-12AP3	135	Figure 30
52	MAPG0052C	CAB-17AP2	174	MAPW0052C	CAB-17AP3	181	Figure 31
66	MAPG0066C	CAB-17AP2	186	MAPW0066C	CAB-17AP3	194	Figure 31
83	MAPG0083C	CAB-17AP2	210	MAPW0083C	CAB-17AP3	217	Figure 31
103	MAPG0103C	CAB-17AP2	221	MAPW0103C	CAB-17AP3	228	Figure 31
128	MAPG0128C	CAB-26AP2	361	MAPW0128C	CAB-26AP3	374	Figure 32
165	MAPG0165C	CAB-26AP2	429	MAPW0165C	CAB-26AP3	442	Figure 32
208	MAPG0208C	CAB-26AP2	444	MAPW0208C	CAB-26AP3	457	Figure 32
240	MAPG0240C	CAB-26AP2	476	MAPW0240C	CAB-26AP3	489	Figure 32
320	MAPG0320C	CAB-26APD2	643	MAPW0320C	CAB-26APD3	675	Figure 33
403	MAPG0403C	CAB-26APD2	637	MAPW0403C	CAB-26APD3	669	Figure 33
482	MAPG0482C	CAB-42AP2	734	MAPW0482C	CAB-42AP3	739	Figure 34
636	MAPG0636C	CAB-42AP2	1111	MAPW0636C	CAB-42AP3	1116	Figure 34
786	MAPG0786C	CAB-42AP2	1260	MAPW0786C	CAB-42AP3	1264	Figure 34
850	MAPG0850C	CAB48AP2	1685	MAPW0850C	CAB-48AP3	1726	Figure 35
1000	MAPG1000C	CAB48AP2	1837	MAPW1000C	CAB-48AP3	1878	Figure 35
1200	MAPG1200C	CAB48AP2	1883	MAPW1200C	CAB-48AP3	1924	Figure 35

Note: *Weight is shown in pounds*

MATRIX AP 400 VOLTS, 50Hz

MOUNTING PATTERNS

AP HMR Bolt Hole Mounting Patterns

Table 15

Part Number	Lbs.	Overall Size	Rear Mount Centerline	Base Mount Centerline	Mounting Holes	Figure
MAPP0006C	16	8.7”H X 8”W X 5.5”D	7”A X 7.2”B	2.8”C X 7.2”E	.28” DIA	Figure 10
MAPP0008C	17	8.7”H X 8”W X 5.5”D	7”A X 7.2”B	2.8”C X 7.2”E	.28” DIA	Figure 10
MAPP0011C	26	9.9”H X 9”W X 4.8”D	8.2”A X 8.2”B	2.75”C X 8.2”E	.28” DIA	Figure 10
MAPP0014C	30	9.8”H X 9”W X 5.25”D	8.15”A X 8.2”B	3.25”C X 8.2”E	.28” DIA	Figure 10
MAPP0021C	47	11.7”H X 10.5”W X 6.6”D	9.8”A X 9.7”B	3.5”C X 9.7”E	.28” DIA	Figure 10
MAPP0027C	52	11.7”H X 10.5”W X 7”D	9.9”A X 9.7”B	4”C X 9.7”E	.28” DIA	Figure 10
MAPP0034C	62	11.7”H X 10.5”W X 7.6”D	9.8”A X 9.7”B	4.5”C X 9.7”E	.28” DIA	Figure 10
MAPP0044C	74	11.7”H X 10.5”W X 8”D	9.8”A X 9.7”B	5”C X 9.7”E	.28” DIA	Figure 10
MAPP0052C	94	14”H X 12”W X 9”D	12”A X 11”B	5.4”C X 11”E	.340” DIA	Figure 11
MAPP0066C	107	14”H X 12”W X 9”D	12”A X 11”B	5.9”C X 11”E	.340” DIA	Figure 11
MAPP0083C	133	14”H X 12”W X 10.9”D	11.96''A x 11''B	6.5”C X 11”E	.340” DIA	Figure 11
MAPP0103C	144	14”H X 12”W X 10.8”D	12.05'A x 11''B	6.5”C X 11”E	.340” DIA	Figure 11
MAPP0128C	149	20”H X 15.25”W X 10.7”D	17.37”A X 14”B	6”C X 14”E	.413” DIA	Figure 12
MAPP0165C	257	20”H X15.25”W X 11.75”D	17.32”A X 14”B	7”C X 14”E	.413” DIA	Figure 12
MAPP0208C	270	20”H X 15.25”W X 11.85”D	17.47”A X 14”B	7”C X 14”E	.413” DIA	Figure 12
MAPP0240C	310	20”H X 15.25”W X 12.75”D	17.51”A X 14”B	8”C X 14”E	.413” DIA	Figure 12
MAPP0320C	397	20”H X 15.25”W X 14.8”D	17.55”A X 14”B	10”C x 14”E	.413” DIA	Figure 12
MAPP0403C	433	23.25”H X 15.25”W X13.86”D	20.64”A X 14”B	9.2”C x 14”E	.413” DIA	Figure 13
MAPP0482C	483	23.3”H X 15.25”W X14.77”D	20.60”A X 14”B	10.06”C X 14”E	.413” DIA	Figure 13
MAPP0636C	793	26”H X 24”W X 16.5”D	N/A	9.15”C X 22”E	1” DIA	Figure 15
MAPP0786C	970	26”H X 24”W X 17.8”D	N/A	10.65”C X 22”E	1” DIA	Figure 15
MAPP0850C	1070	26”H X 24”W X 20.03”D	N/A	10.65”C X 22”E	1” DIA	Figure 15
MAPP1000C	1213	26”H X 24”W X 21.7”D	N/A	12.15”C X 22”E	1” DIA	Figure 15
MAPP1200C	1365	26”H X 24”W X 22.2”D	N/A	13.65”C X 22”E	1” DIA	Figure 15

Use the above table and referenced figures to establish suitable reactor mounting.

MATRIX AP 400 VOLTS, 50Hz

Capacitor and Cap-panel Bolt Hole Mounting Patterns

Table 16

Part Number	CAP P.N.	Weight Lbs.	Overall Size	Rear Mount Centerline	Mounting Holes	Figure
MAPP0006C	CAP-350TP	1.8	7.5"H X 2.9"D	N/A	M12 STUD	Figure 20
MAPP0008C	CAP-351TP	2.2	7.5"H X 2.9"D	N/A	M12 STUD	Figure 20
MAPP0011C	CAP-352TP	2.3	7.5"H X 2.9"D	N/A	M12 STUD	Figure 20
MAPP0014C	CAP-353TP	2.64	7.5"H X 3.9"D	N/A	M12 STUD	Figure 20
MAPP0021C	CAP-342TP	3.2	7.5"H X 3.9"D	N/A	M12 STUD	Figure 20
MAPP0027C	CAP-354TP	4.0	7.5"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0034C	CAP-355TP	4.1	9.1"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0044C	CAP-356TP	5.0	9.1"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0052C	CAP-357TP	6.0	10.6"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0066C	CAP-358TP	6.0	10.6"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0083C	CAP-359TP	6.45	10.6"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0103C	CAP-360TP	6.45	10.6"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0128C	594	16	6.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0165C	544	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0208C	543	20	8.9"H X 16.3"W X7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0240C	595	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0320C	596	23	10.7" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0403C	597	23	11.5" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0482C	595	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	595	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0636C	596	23	10.7" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	596	23	10.7" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0786C	597	23	11.5" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	597	23	11.5" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0850C	596	23	10.7" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	596	23	10.7" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	595	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP1000C	598	23	10.7" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	598	23	10.7" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	598	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP1200C	597	23	11.5" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	597	23	11.5" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	597	23	11.5" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21

Note: *Units above 403 amps require multiple parallel cap panels.*

MATRIX AP 480 VOLTS, 60Hz

Ratings

Watts loss

Table 20

Maximum Output Amps RMS	Efficiency (Typical) (%)	480V Power Dissipation @ Rated Current (Typical) (Watts)
6	97.5%	122
8	97.6%	158
11	97.9%	192
14	98.1%	220
21	98.6%	251
27	98.7%	283
34	98.8%	318
44	98.9%	379
52	99.0%	413
66	99.1%	488
83	99.1%	600
103	99.2%	702
128	99.0%	1,035
165	99.2%	1,096
208	99.2%	1,343
240	99.2%	1,514
320	99.4%	1,543
403	99.4%	1,932
482	99.5%	2,137
636	99.5%	2,509
786	99.6%	2,771
850	99.6%	3,163
1000	99.5%	4,206
1200	99.6%	4,400

MATRIX AP 480 VOLTS, 60Hz

Regulation table

Table 21

FILTER VOLTAGE REGULATION		480 VAC
MAXIMUM OUTPUT VOLTAGE AT NO LOAD	RMS PEAK	502 710
MINIMUM OUTPUT VOLTAGE AT FULL LOAD	RMS PEAK	460 600
*MAXIMUM PCC VOLTAGE WITH 6% SOURCE IMPEDANCE	RMS PEAK	490 693

Note: PCC is the point of common coupling with the power distribution system

MATRIX AP 480 VOLTS, 60Hz

Capacitor Currents

Table 22

Filter Current Rating Amps RMS	Capacitor Current **480V** (Typical) Amps RMS
6	1.98
8	2.64
11	3.7
14	4.62
21	6.93
27	9.24
34	11.8
44	14.52
52	17.16
66	22.16
83	29.2
103	34.7
128	39.8
165	53.2
208	64.8
240	72.7
320	94.5
403	132.3
482	141.8
636	195.6
786	245.0
850	265.9
1000	308.6
1200	355.2

Note: Ratings are based on IEC AC-3 specifications.

MATRIX AP 480 VOLTS, 60Hz

Open Style Size and Weights

Table 23

Amps rating	Catalog Part Number	Total Weight Lbs.	HMR Size Inches	HMR Ref. Figure	Cap-Panel P.N.	Capacitor / Capacitor assemblies size Inches	Cap Ref. Figure
6	MAPP0006D	16	8.7"H X 8"W X 5.5"D	Figure 10	CAP-338TP	7.5"H X 2.9"D	Figure 20
8	MAPP0008D	17	8.7"H X 8"W X 5.5"D	Figure 10	CAP-339TP	7.5"H X 2.9"D	Figure 20
11	MAPP0011D	26	9.9"H X 9"W X 4.8"D	Figure 10	CAP-349TP	7.5"H X 2.9"D	Figure 20
14	MAPP0014D	30	9.8"H X 9"W X 5.25"D	Figure 10	CAP-340TP	7.5"H X 2.9"D	Figure 20
21	MAPP0021D	47	11.7"H X 10.5"W X 6.6"D	Figure 10	CAP-341TP	7.5"H X 3.9"D	Figure 20
27	MAPP0027D	52	11.7"H X 10.5"W X 7"D	Figure 10	CAP-342TP	7.5"H X 3.9"D	Figure 20
34	MAPP0034D	62	11.7"H X 10.5"W X 7.6"D	Figure 10	CAP-343TP	7.5"H X 3.9"D	Figure 20
44	MAPP0044D	74	11.7"H X 10.5"W X 8"D	Figure 10	CAP-344TP	7.5"H X 4.6"D	Figure 20
52	MAPP0052D	94	14"H X 12"W X 9"D	Figure 11	CAP-345TP	9.2"H X 4.6"D	Figure 20
66	MAPP0066D	107	14"H X 12"W X 9"D	Figure 11	CAP-346TP	9.2"H X 4.6"D	Figure 20
83	MAPP0083D	135	14"H X 12"W X 10.9"D	Figure 11	CAP-347TP	10.6"H X 4.6"D	Figure 20
103	MAPP0103D	145	14"H X 12"W X 10.82"D	Figure 11	CAP-348TP	10.6"H X 4.6"D	Figure 20
128	MAPP0128D	165	20"H X 15.25"W X 10.7"D	Figure 12	555	6.9"H X 16.3"W X 7.6"D	Figure 21
165	MAPP0165D	223	20"H X15.25"W X 11.75"D	Figure 12	557	6.9"H X 16.3"W X 7.6"D	Figure 21
208	MAPP0208D	237	20"H X 15.25"W X 11.85"D	Figure 12	545	7.9"H X 16.3"W X7.6"D	Figure 21
240	MAPP0240D	327	20"H X 15.25"W X 12.75"D	Figure 12	544	7.9"H X 16.3"W X 7.6"D	Figure 21
320	MAPP0320D	390	20"H X 15.25"W X 14.8"D	Figure 12	543	8.9" X 16.3"W X 7.6"D	Figure 21
403	MAPP0403D	433	23.25"H X 15.25"W X13.86"D	Figure 13	562	10.7" X 16.3" X 7.6"D	Figure 21
482	MAPP0482D	483	23.25"H X 15.25"W X14.77"D	Figure 13	544	7.9"H X 16.3"W X 7.6"D	Figure 21
					544	7.9"H X 16.3"W X 7.6"D	Figure 21
636	MAPP0636D	736	26"H X 24"W X 16.5"D	Figure 15	543	8.9" X 16.3"W X 7.6"D	Figure 21
					543	8.9" X 16.3"W X 7.6"D	Figure 21
786	MAPP0786D	911	26"H X 24"W X 17.8"D	Figure 15	562	10.7" X 16.3" X 7.6"D	Figure 21
					562	10.7" X 16.3" X 7.6"D	Figure 21
850	MAPP0850D	983	26"H X 24"W X 20.3"D	Figure 15	543	8.9" X 16.3"W X 7.6"D	Figure 21
					543	8.9" X 16.3"W X 7.6"D	Figure 21
					544	7.9"H X 16.3"W X 7.6"D	Figure 21
1000	MAPP1000D	1137	26"H X 24"W X 21.7"D	Figure 15	543	8.9" X 16.3"W X 7.6"D	Figure 21
					543	8.9" X 16.3"W X 7.6"D	Figure 21
					561	10.7" X 16.3" X 7.6"D	Figure 21
1200	MAPP1200D	1297	26"H X 24"W X 22.2"D	Figure 15	562	10.7" X 16.3" X 7.6"D	Figure 21
					562	10.7" X 16.3" X 7.6"D	Figure 21
					562	10.7" X 16.3" X 7.6"D	Figure 21

MATRIX AP 480 VOLTS, 60Hz

Enclosed Unit Size and Weights

Table 24

Filter Amps	NEMA 2	Enclosure	Weight	NEMA 3R	Enclosure	Weight	Figure
6	MAPG0006D	CAB-12AP2	64	MAPW0006D	CAB-12AP3	72	Figure 30
8	MAPG0008D	CAB-12AP2	65	MAPW0008D	CAB-12AP3	73	Figure 30
11	MAPG0011D	CAB-12AP2	74	MAPW0011D	CAB-12AP3	82	Figure 30
14	MAPG0014D	CAB-12AP2	79	MAPW0014D	CAB-12AP3	87	Figure 30
21	MAPG0021D	CAB-12AP2	97	MAPW0021D	CAB-12AP3	105	Figure 30
27	MAPG0027D	CAB-12AP2	101	MAPW0027D	CAB-12AP3	109	Figure 30
34	MAPG0034D	CAB-12AP2	112	MAPW0034D	CAB-12AP3	120	Figure 30
44	MAPG0044D	CAB-12AP2	125	MAPW0044D	CAB-12AP3	133	Figure 30
52	MAPG0052D	CAB-17AP2	172	MAPW0052D	CAB-17AP3	179	Figure 31
66	MAPG0066D	CAB-17AP2	185	MAPW0066D	CAB-17AP3	192	Figure 31
83	MAPG0083D	CAB-17AP2	209	MAPW0083D	CAB-17AP3	217	Figure 31
103	MAPG0103D	CAB-17AP2	313	MAPW0103D	CAB-17AP3	321	Figure 31
128	MAPG0128D	CAB-26AP2	333	MAPW0128D	CAB-26AP3	347	Figure 32
165	MAPG0165D	CAB-26AP2	392	MAPW0165D	CAB-26AP3	406	Figure 32
208	MAPG0208D	CAB-26AP2	405	MAPW0208D	CAB-26AP3	419	Figure 32
240	MAPG0240D	CAB-26AP2	489	MAPW0240D	CAB-26AP3	503	Figure 32
320	MAPG0320D	CAB-26APD2	630	MAPW0320D	CAB-26APD3	656	Figure 33
403	MAPG0403D	CAB-26APD2	673	MAPW0403D	CAB-26APD3	700	Figure 33
482	MAPG0482D	CAB-42AP2	702	MAPW0482D	CAB-42AP3	710	Figure 34
636	MAPG0636D	CAB-42AP2	1077	MAPW0636D	CAB-42AP3	1084	Figure 34
786	MAPG0786D	CAB-42AP2	1252	MAPW0786D	CAB-42AP3	1260	Figure 34
850	MAPG0850D	CAB48AP2	1386	MAPW0850D	CAB-48AP3	1393	Figure 35
1000	MAPG1000D	CAB48AP2	1640	MAPW1000D	CAB-48AP3	1647	Figure 35
1200	MAPG1200D	CAB48AP2	1700	MAPW1200D	CAB-48AP3	1707	Figure 35

Note: *Weight is shown in pounds*

MATRIX AP 480 VOLTS, 60Hz

MOUNTING PATTERNS

AP HMR Bolt Hole Mounting Patterns

Table 25

Part Number	Lbs.	Overall Size	Rear Mount Centerline	Base Mount Centerline	Mounting Holes	Figure
MAPP0006D	16	8.7”H X 8”W X 5.5”D	7”A X 7.2”B	2.8”C X 7.2”E	.28” DIA	Figure 10
MAPP0008D	17	8.7”H X 8”W X 5.5”D	7”A X 7.2”B	2.8”C X 7.2”E	.28” DIA	Figure 10
MAPP0011D	26	9.9”H X 9”W X 4.8”D	8.2”A X 8.2”B	2.75”C X 8.2”E	.28” DIA	Figure 10
MAPP0014D	30	9.8”H X 9”W X 5.25”D	8.15”A X 8.2”B	3.25”C X 8.2”E	.28” DIA	Figure 10
MAPP0021D	47	11.7”H X 10.5”W X 6.6”D	9.8”A X 9.7”B	3.5”C X 9.7”E	.28” DIA	Figure 10
MAPP0027D	52	11.7”H X 10.5”W X 7”D	9.9”A X 9.7”B	4”C X 9.7”E	.28” DIA	Figure 10
MAPP0034D	62	11.7”H X 10.5”W X 7.6”D	9.8”A X 9.7”B	4.5”C X 9.7”E	.28” DIA	Figure 10
MAPP0044D	74	11.7”H X 10.5”W X 8”D	9.8”A X 9.7”B	5”C X 9.7”E	.28” DIA	Figure 10
MAPP0052D	94	14”H X 12”W X 9”D	12”A X 11”B	5.4”C X 11”E	.340” DIA	Figure 11
MAPP0066D	107	14”H X 12”W X 9”D	12”A X 11”B	5.9”C X 11”E	.340” DIA	Figure 11
MAPP0083D	133	15.7”H X 12”W X 10.7”D	11.96"A x 11"B	6.5”C X 11”E	.340” DIA	Figure 11
MAPP0103D	144	15.7”H X 12”W X 11.1”D	12.05'A x 11"B	6.5”C X 11”E	.340” DIA	Figure 11
MAPP0128D	149	20”H X 15.25”W X 10.7”D	17.37”A X 14”B	6”C X 14”E	.413” DIA	Figure 12
MAPP0165D	257	20”H X15.25”W X 11.75”D	17.32”A X 14”B	7”C X 14”E	.413” DIA	Figure 12
MAPP0208D	270	20”H X 15.25”W X 11.85”D	17.47”A X 14”B	7”C X 14”E	.413” DIA	Figure 12
MAPP0240D	310	20”H X 15.25”W X 12.75”D	17.51”A X 14”B	8”C X 14”E	.413” DIA	Figure 12
MAPP0320D	397	20”H X 15.25”W X 14.8”D	17.55”A X 14”B	10”C x 14”E	.413” DIA	Figure 12
MAPP0403D	433	23.25”H X 15.25”W X13.86”D	20.64”A X 14”B	9.2”C x 14”E	.413” DIA	Figure 13
MAPP0482D	483	23.3”H X 15.25”W X14.37”D	20.60”A X 14”B	10.06”C X 14”E	.413” DIA	Figure 13
MAPP0636D	793	26”H X 24”W X 16.5”D	N/A	9.15”C X 22”E	1” DIA	Figure 15
MAPP0786D	970	26”H X 24”W X 17.8”D	N/A	10.65”C X 22”E	1” DIA	Figure 15
MAPP0850D	1070	26”H X 24”W X 20.3”D	N/A	10.65”C X 22”E	1” DIA	Figure 15
MAPP1000D	1213	26”H X 24”W X 21.7”D	N/A	12.15”C X 22”E	1” DIA	Figure 15
MAPP1200D	1365	26”H X 24”W X 22.2”D	N/A	13.65”C X 22”E	1” DIA	Figure 15

Use the above table and referenced figures to establish suitable reactor mounting.

MATRIX AP 480 VOLTS, 60Hz

Capacitor and Cap-panel Bolt Hole Mounting Patterns

Table 26

Part Number	CAP P.N.	Weight Lbs.	Overall Size	Rear Mount Centerline	Mounting Holes	Figure
MAPP0006D	CAP-338TP	1.8	7.5"H X 2.9"D	N/A	M12 STUD	Figure 20
MAPP0008D	CAP-339TP	1.95	7.5"H X 2.9"D	N/A	M12 STUD	Figure 20
MAPP0011D	CAP-349TP	2.1	7.5"H X 2.9"D	N/A	M12 STUD	Figure 20
MAPP0014D	CAP-340TP	2.3	7.5"H X 2.9"D	N/A	M12 STUD	Figure 20
MAPP0021D	CAP-341TP	2.65	7.5"H X 3.9"D	N/A	M12 STUD	Figure 20
MAPP0027D	CAP-342TP	3.2	7.5"H X 3.9"D	N/A	M12 STUD	Figure 20
MAPP0034D	CAP-343TP	3.7	7.5"H X 3.9"D	N/A	M12 STUD	Figure 20
MAPP0044D	CAP-344TP	4.0	7.5"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0052D	CAP-345TP	4.1	9.2"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0066D	CAP-346TP	5.0	9.2"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0083D	CAP-347TP	6.0	10.6"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0103D	CAP-348TP	6.45	10.6"H X 4.6"D	N/A	M12 STUD	Figure 20
MAPP0128D	555	16	6.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0165D	557	16	6.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0208D	545	18	7.9"H X 16.3"W X7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0240D	544	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0320D	543	20	8.9" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0403D	562	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0482D	544	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	544	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0636D	543	20	8.9" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	543	20	8.9" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0786D	562	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	562	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP0850D	543	20	8.9" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	543	20	8.9" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	544	18	7.9"H X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP1000D	543	20	8.9" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	543	20	8.9" X 16.3"W X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	561	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
MAPP1200D	562	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	562	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21
	562	23	10.7" X 16.3" X 7.6"D	3.77"A x 15.81"B	.280" DIA	Figure 21

Note: Units above 403 amps require multiple parallel cap panels.
Use the above table and referenced figures to establish suitable Cap-panel mounting.

MATRIX AP 600 VOLTS, 60Hz

Ratings

Watts loss

Table 30

Maximum Output Amps RMS	Efficiency (Typical) (%)	600V Power Dissipation @ Rated Current (Typical) (Watts)
6	97.6%	150
8	97.8%	183
11	98.2%	205
14	98.3%	250
21	98.7%	285
27	98.9%	304
34	99.0%	366
44	99.1%	395
52	99.1%	494
66	99.0%	655
83	99.1%	718
103	99.0%	1085
128	99.2%	1090
165	99.3%	1285
208	99.3%	1431
240	99.3%	1624
320	99.4%	2021
403	99.5%	2208
482	99.5%	2481
636	99.6%	2884
786	99.6%	3368

MATRIX AP 600 VOLTS, 60Hz

Regulation table

Table 31

FILTER VOLTAGE REGULATION		600 VAC
MAXIMUM OUTPUT VOLTAGE AT NO LOAD	RMS PEAK	627 885
MINIMUM OUTPUT VOLTAGE AT FULL LOAD	RMS PEAK	575 750
*MAXIMUM PCC VOLTAGE WITH 6% SOURCE IMPEDANCE	RMS PEAK	612 864

***Note:** PCC is the point of common coupling with the power distribution system

MATRIX AP 600 VOLTS, 60Hz

Capacitor Currents

Table 32

Filter Current Rating Amps RMS	Capacitor Current **600V** (Typical) Amps RMS
6	1.98
8	2.64
11	3.7
14	4.62
21	6.93
27	9.24
34	11.8
44	14.52
52	17.16
66	22.16
83	29.2
103	34.7
128	39.8
165	53.2
208	64.8
240	72.7
320	94.5
403	132.3
482	141.8
636	195.6
786	245.0

Note: Ratings are based on IEC AC-3 specifications.

MATRIX AP 600 VOLTS, 60Hz

Open Style Size and Weights

Table 33

Amps rating	Catalog Part Number	Total Weight Lbs.	HMR Size Inches	HMR Ref. Figure	Cap-Panel P.N.	Capacitor / Capacitor assemblies size Inches	Cap Ref. Figure
6	MAPP0006E	17	8.7”H X 8”W X 5.5”D	Figure 10	CAP-361TP	7.5”H X 2.9”D	Figure 20
8	MAPP0008E	26	9.8”H X 9”W X 4.8”D	Figure 10	CAP-362TP	7.5”H X 2.9”D	Figure 20
11	MAPP0011E	30	9.8”H X 9”W X 5.3”D	Figure 10	CAP-363TP	7.5”H X 2.9”D	Figure 20
14	MAPP0014E	47	11.7”H X 10.5”W X 6.6”D	Figure 10	CAP-364TP	7.5”H X 3.9”D	Figure 20
21	MAPP0021E	52	11.7”H X 10.5”W X 7.1”D	Figure 10	CAP-365TP	7.5”H X 3.9”D	Figure 20
27	MAPP0027E	62	11.7”H X 10.5”W X 7.6”D	Figure 10	CAP-366TP	7.5”H X 4.6D	Figure 20
34	MAPP0034E	74	11.7”H X 10.5”W X 8.1”D	Figure 10	CAP-367TP	7.5”H X 4.6”D	Figure 20
44	MAPP0044E	94	14”H X 12”W X 9.89”D	Figure 11	CAP-368TP	9.14”H X 4.6”D	Figure 20
52	MAPP0052E	107	14”H X 12”W X 10.3”D	Figure 11	CAP-369TP	9.14”H X 4.6”D	Figure 20
66	MAPP0066E	135	14”H X 12”W X 11”D	Figure 11	CAP-370TP	10.6”H X 4.6”D	Figure 20
83	MAPP0083E	140	14.1”H X 12”W X 11”D	Figure 11	CAP-371TP	10.6”H X 4.6”D	Figure 20
103	MAPP0103E	165	20”H X 15.3”W X 10.7”D	Figure 12	567	6.9”H X 16.3”W X 7.6”D	Figure 21
128	MAPP0128E	223	20”H X 15.3”W X 11.7”D	Figure 12	568	6.9”H X 16.3”W X 7.6”D	Figure 21
165	MAPP0165E	237	20.1”H X15.3”W X 11.9”D	Figure 12	570	6.9”H X 16.3”W X 7.6”D	Figure 21
208	MAPP0208E	337	20.1”H X 15.3”W X 13.4”D	Figure 12	572	7.9”H X 16.3”W X7.6”D	Figure 21
240	MAPP0240E	433	20”H X 15.3”W X 16.1”D	Figure 14	574	8.9”H X 16.3”W X 7.6”D	Figure 21
320	MAPP0320E	477	23.3”H X 15.3”W X 15.7”D	Figure 12	576	10.7” X 16.3”W X 7.6”D	Figure 21
403	MAPP0403E	483	23.3”H X 15.3”W X16.1”D	Figure 13	578	11.5” X 16.3” X 7.6”D	Figure 21
482	MAPP0482E	736	25.8”H X 24”W X16.7”D	Figure 16	574	8.9”H X 16.3”W X 7.6”D	Figure 21
					574	8.9”H X 16.3”W X 7.6”D	Figure 21
636	MAPP0636E	911	25.9”H X 24”W X 18.2”D	Figure 16	576	10.7” X 16.3”W X 7.6”D	Figure 21
					576	10.7” X 16.3”W X 7.6”D	Figure 21
786	MAPP0786E	1137	25”H X 24”W X 19.5”D	Figure 16	578	11.5” X 16.3” X 7.6”D	Figure 21
					578	11.5” X 16.3” X 7.6”D	Figure 21

MATRIX AP 600 VOLTS, 60Hz

Enclosed Unit Size and Weights

Table 34

Filter Amps	NEMA 2	Enclosure	Weight	NEMA 3R	Enclosure	Weight	Figure
6	MAPG0006E	CAB-12AP2	65	MAPW0006E	CAB-12AP3	73	Figure 30
8	MAPG0008E	CAB-12AP2	74	MAPW0008E	CAB-12AP3	82	Figure 30
11	MAPG0011E	CAB-12AP2	79	MAPW0011E	CAB-12AP3	87	Figure 30
14	MAPG0014E	CAB-12AP2	97	MAPW0014E	CAB-12AP3	105	Figure 30
21	MAPG0021E	CAB-12AP2	101	MAPW0021E	CAB-12AP3	109	Figure 30
27	MAPG0027E	CAB-12AP2	112	MAPW0027E	CAB-12AP3	120	Figure 30
34	MAPG0034E	CAB-12AP2	125	MAPW0034E	CAB-12AP3	133	Figure 30
44	MAPG0044E	CAB-17AP2	172	MAPW0044E	CAB-17AP3	179	Figure 31
52	MAPG0052E	CAB-17AP2	185	MAPW0052E	CAB-17AP3	192	Figure 31
66	MAPG0066E	CAB-17AP2	209	MAPW0066E	CAB-17AP3	217	Figure 31
83	MAPG0083E	CAB-17AP2	313	MAPW0083E	CAB-17AP3	338	Figure 31
103	MAPG0103E	CAB-26AP2	333	MAPW0103E	CAB-26AP3	358	Figure 32
128	MAPG0128E	CAB-26AP2	392	MAPW0128E	CAB-26AP3	417	Figure 32
165	MAPG0165E	CAB-26AP2	405	MAPW0165E	CAB-26AP3	430	Figure 32
208	MAPG0208E	CAB-26AP2	489	MAPW0208E	CAB-26AP3	514	Figure 32
240	MAPG0240E	CAB-26APD2	630	MAPW0240E	CAB-26APD3	656	Figure 33
320	MAPG0320E	CAB-26APD2	673	MAPW0320E	CAB-26APD3	700	Figure 33
403	MAPG0403E	CAB-42AP2	702	MAPW0403E	CAB-42AP3	710	Figure 34
482	MAPG0482E	CAB-42AP2	1077	MAPW0482E	CAB-42AP3	1085	Figure 34
636	MAPG0636E	CAB-42AP2	1252	MAPW0636E	CAB-42AP3	1260	Figure 34
786	MAPG0786E	CAB-48AP2	1640	MAPW0786E	CAB-48AP3	1647	Figure 35

Note: Weight is shown in pounds.

MATRIX AP 600 VOLTS, 60Hz

MOUNTING PATTERNS

AP HMR Bolt Hole Mounting Patterns

Table 35

Part Number	Lbs.	Overall Size	Rear Mount Centerline	Base Mount Centerline	Mounting Holes	Figure
MAPP0006E	17	8.7”H X 8”W X 5.5”D	7”A X 7.2”B	2.8”C X 7.2”E	.28” DIA	Figure 10
MAPP0008E	26	8.7”H X 8”W X 5.5”D	8.2”A X 8.2”B	2.8”C X 8.2”E	.28” DIA	Figure 10
MAPP0011E	30	9.9”H X 9”W X 4.8”D	8.1”A X 8.2”B	3.3”C X 8.2”E	.28” DIA	Figure 10
MAPP0014E	47	9.8”H X 9”W X 5.25”D	9.9”A X 9.7”B	3.5”C X 9.7”E	.28” DIA	Figure 10
MAPP0021E	52	11.7”H X 10.5”W X 6.6”D	9.9”A X 9.7”B	4”C X 9.7”E	.28” DIA	Figure 10
MAPP0027E	62	11.7”H X 10.5”W X 7”D	9.9”A X 9.7”B	4.5”C X 9.7”E	.28” DIA	Figure 10
MAPP0034E	74	11.7”H X 10.5”W X 7.6”D	9.9”A X 9.7”B	5”C X 9.7”E	.28” DIA	Figure 10
MAPP0044E	94	11.7”H X 10.5”W X 8”D	12”A X 11”B	5.9”C X 11”E	.28” DIA	Figure 11
MAPP0052E	107	14”H X 12”W X 9”D	11.6”A X 11”B	6.4”C X 11”E	.340” DIA	Figure 11
MAPP0066E	135	14”H X 12”W X 9”D	11.8”A X 11”B	6.9”C X 11”E	.340” DIA	Figure 11
MAPP0083E	140	15.7”H X 12”W X 10.7”D	11.6''A x 11''B	6.9”C X 11”E	.340” DIA	Figure 11
MAPP0103E	165	15.7”H X 12”W X 11.1”D	17.1 x 14''B	6”C X 14”E	.340” DIA	Figure 12
MAPP0128E	223	20”H X 15.25”W X 10.7”D	17”A X 14”B	7”C X 14”E	.413” DIA	Figure 12
MAPP0165E	237	20”H X15.25”W X 11.75”D	17.4”A X 14”B	7”C X 14”E	.413” DIA	Figure 12
MAPP0208E	337	20”H X 15.25”W X 11.85”D	17.2”A X 14”B	8”C X 14”E	.413” DIA	Figure 12
MAPP0240E	433	20”H X 15.25”W X 12.75”D	17.3”A X 14”B	10”C X 14”E	.413” DIA	Figure 14
MAPP0320E	477	20”H X 15.25”W X 14.8”D	20.4”A X 14”B	10”C x 14”E	.413” DIA	Figure 14
MAPP0403E	483	23.25”H X 15.25”W X13.86”D	20.9”A X 14”B	10”C x 14”E	.413” DIA	Figure 14
MAPP0482E	736	23.3”H X 15.25”W X14.37”D	N/A	9.2”C X 22”E	.413” DIA	Figure 16
MAPP0636E	911	26”H X 24”W X 16.5”D	N/A	10.7”C X 22”E	1” DIA	Figure 16
MAPP0786E	1137	26”H X 24”W X 17.8”D	N/A	12.2”C X 22”E	1” DIA	Figure 16

Use the above table and referenced figures to establish suitable reactor mounting.

MATRIX AP 600 VOLTS, 60Hz

Capacitor and Cap-panel Bolt Hole Mounting Patterns

Table 36

Part Number	CAP P.N.	Weight Lbs.	Overall Size	Rear Mount Centerline	Mounting Holes	Figure
MAPP0006E	CAP-361TP	1.8	7.5”H X 2.9”D	N/A	M12 STUD	Figure 20
MAPP0008E	CAP-362TP	1.95	7.5”H X 2.9”D	N/A	M12 STUD	Figure 20
MAPP0011E	CAP-363TP	1.95	7.5”H X 2.9”D	N/A	M12 STUD	Figure 20
MAPP0014E	CAP-364TP	3.35	7.5”H X 2.9”D	N/A	M12 STUD	Figure 20
MAPP0021E	CAP-365TP	3.4	7.5”H X 3.9”D	N/A	M12 STUD	Figure 20
MAPP0027E	CAP-366TP	4.6	7.5”H X 3.9”D	N/A	M12 STUD	Figure 20
MAPP0034E	CAP-367TP	4.8	7.5”H X 3.9”D	N/A	M12 STUD	Figure 20
MAPP0044E	CAP-368TP	5.4	7.5”H X 4.6”D	N/A	M12 STUD	Figure 20
MAPP0052E	CAP-369TP	5.5	9.2”H X 4.6”D	N/A	M12 STUD	Figure 20
MAPP0066E	CAP-370TP	6.2	9.2”H X 4.6”D	N/A	M12 STUD	Figure 20
MAPP0083E	CAP-371TP	6.5	10.6”H X 4.6”D	N/A	M12 STUD	Figure 20
MAPP0103E	567	16	10.6”H X 4.6”D	N/A	M12 STUD	Figure 20
MAPP0128E	568	16	6.9”H X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0165E	570	16	6.9”H X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0208E	572	18	7.9”H X 16.3”W X7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0240E	574	20	7.9”H X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0320E	576	23	8.9” X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0403E	578	25	10.7” X 16.3” X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0482E	574	20	7.9”H X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
	574	20	7.9”H X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0636E	576	23	8.9” X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
	576	23	8.9” X 16.3”W X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
MAPP0786E	578	25	10.7” X 16.3” X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21
	578	25	10.7” X 16.3” X 7.6”D	3.77”A x 15.81”B	.280” DIA	Figure 21

Note: Units above 403 amps require multiple parallel cap panels.
Use the above table and referenced figures to establish suitable Cap-panel mounting.

AP HMR MOUNTING & TERMINAL LOCATIONS

AP HMR 6 - 44 Amp (400V & 480V)

AP HMR 6 – 34 Amp (600V)

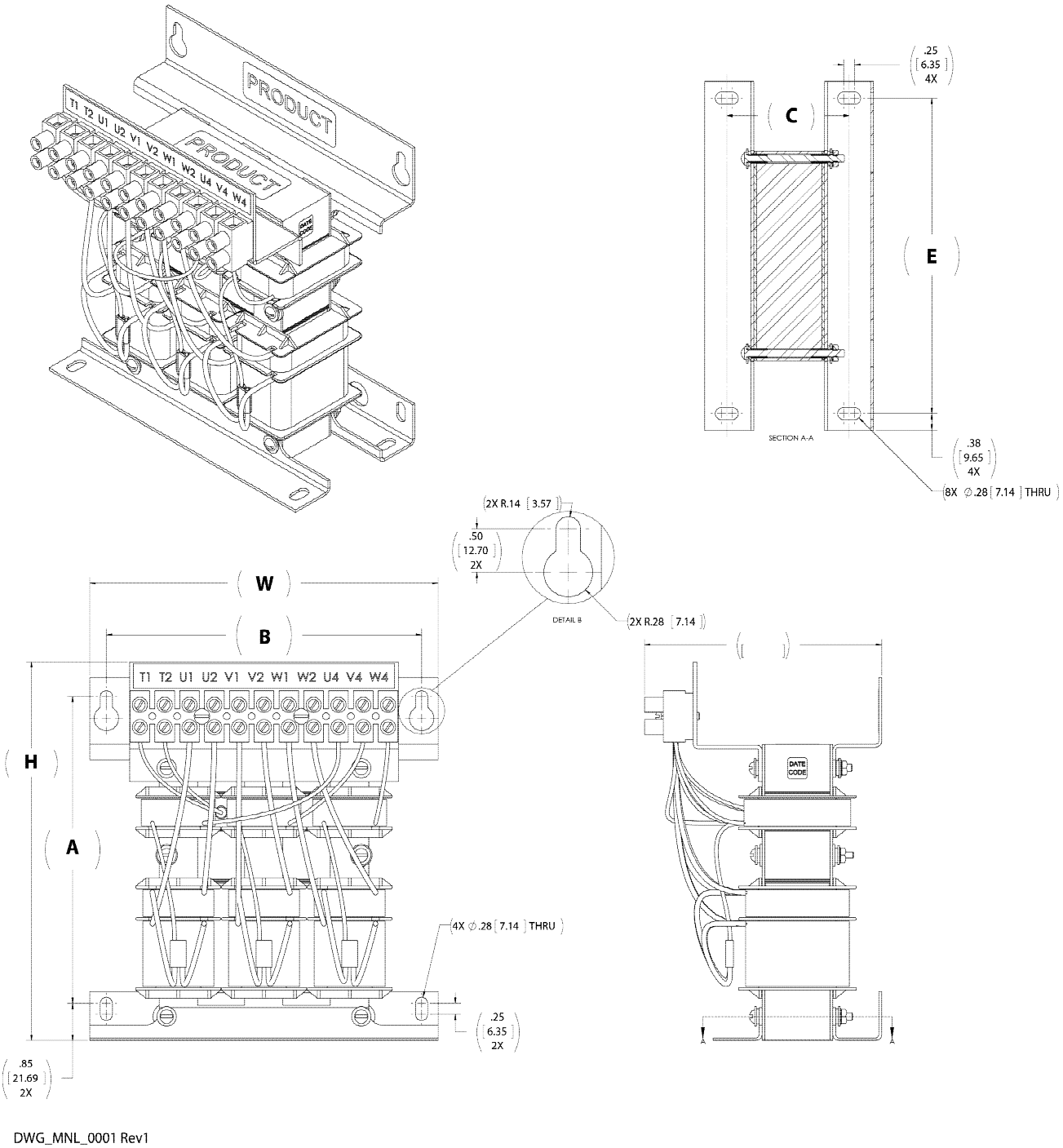


Figure 10

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

AP HMR MOUNTING & TERMINAL LOCATIONS

AP HMR 52 - 103 Amp (400V & 480V)
AP HMR 44 – 83 Amp (600V)

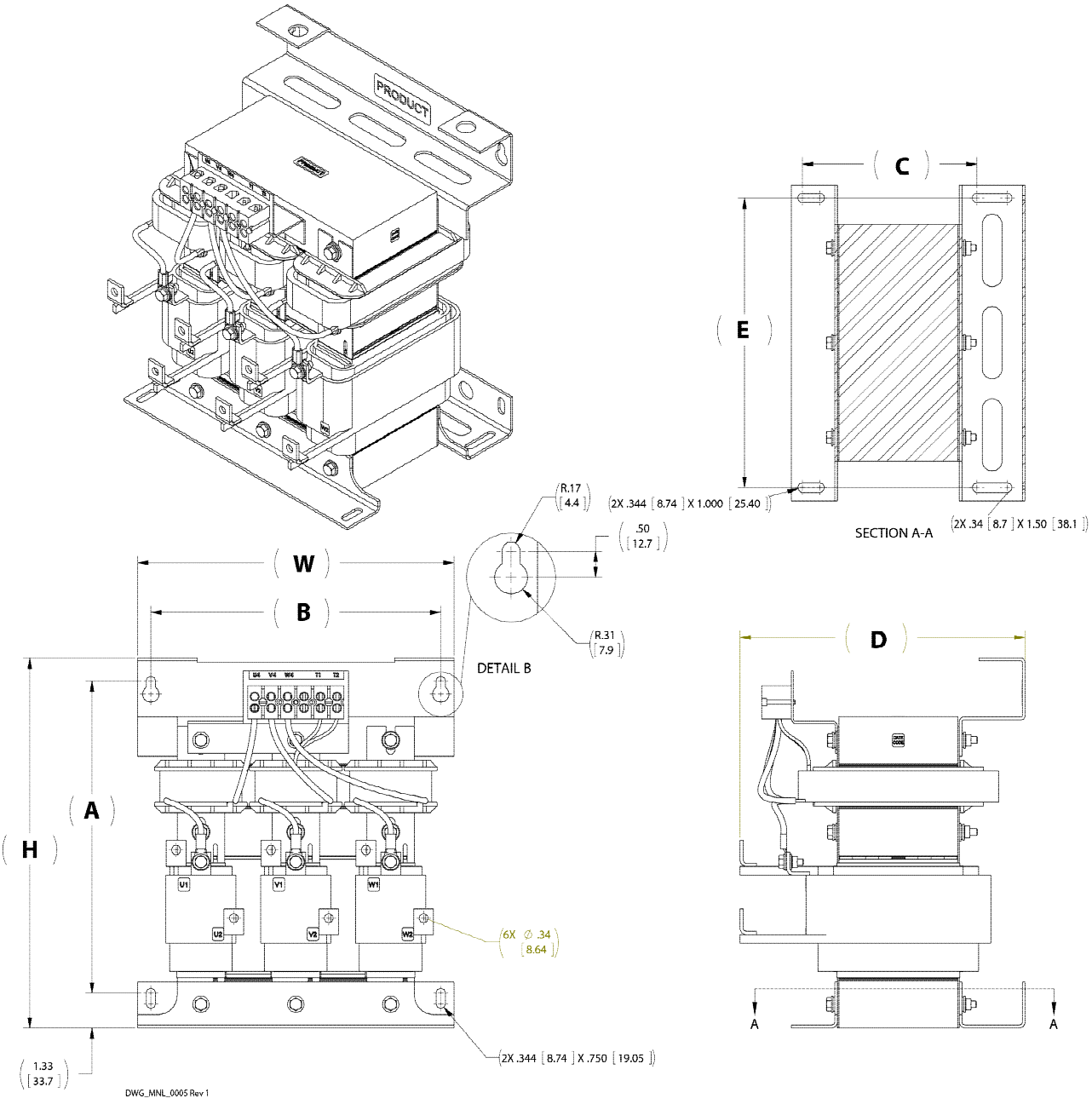


Figure 11

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

AP HMR MOUNTING & TERMINAL LOCATIONS

AP HMR 128 - 320 Amp (400V & 480V)
AP HMR 103 – 208 Amp (600V)

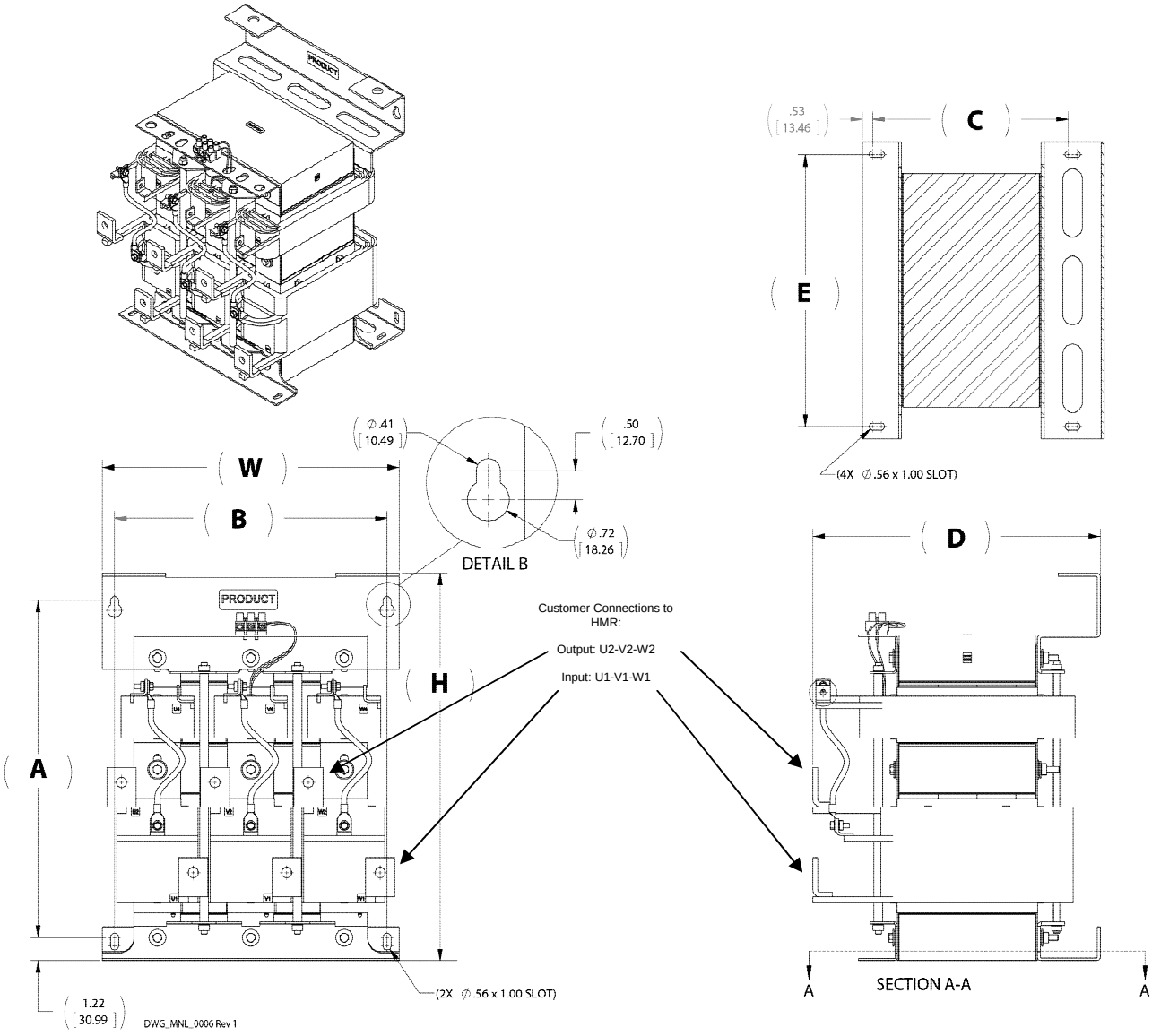


Figure 12

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

AP HMR MOUNTING & TERMINAL LOCATIONS

AP HMR 403 - 482 Amp (400V & 480V)

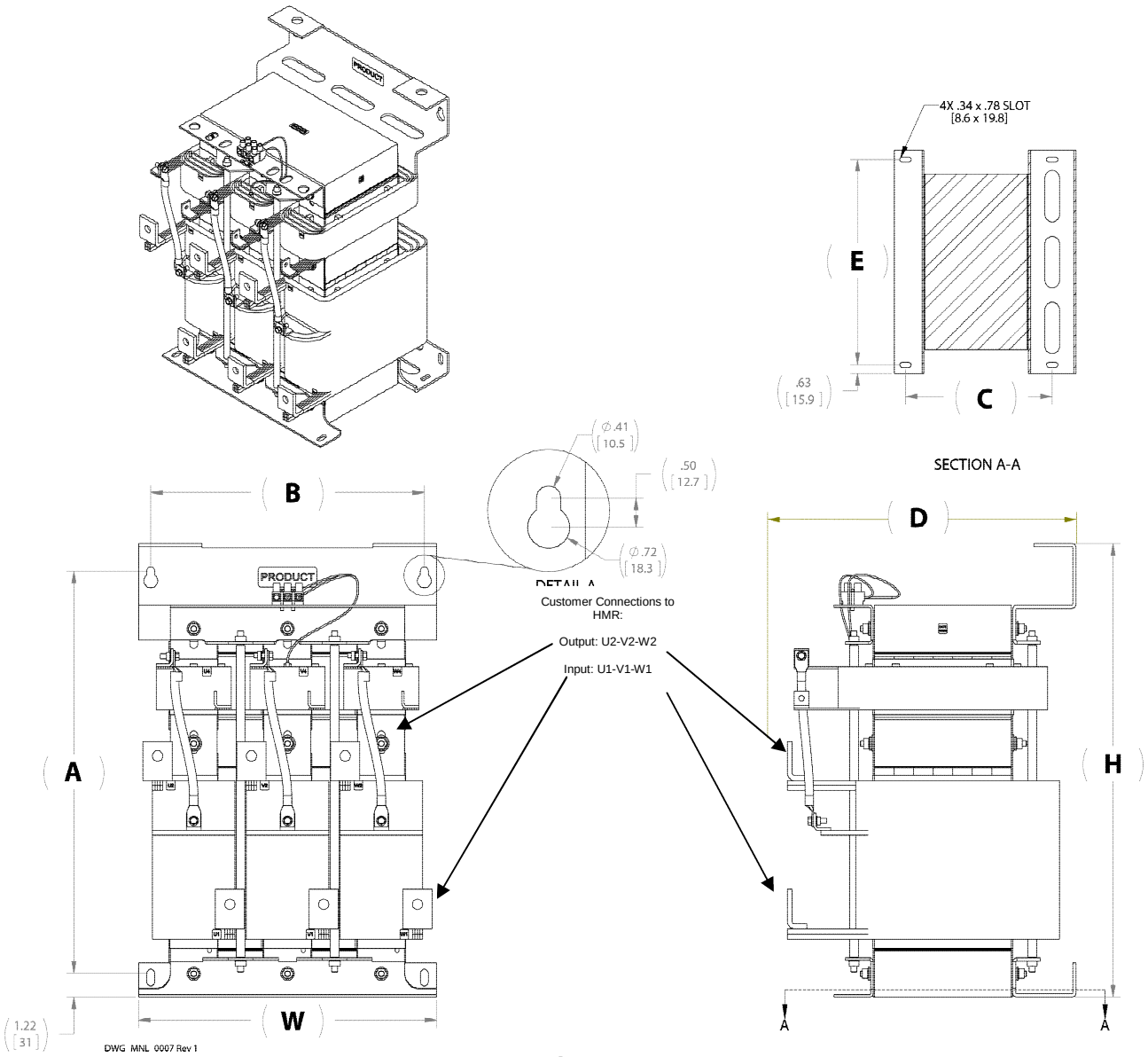


Figure 13

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

AP HMR MOUNTING & TERMINAL LOCATIONS

AP HMR 240 – 403 Amp (600V)

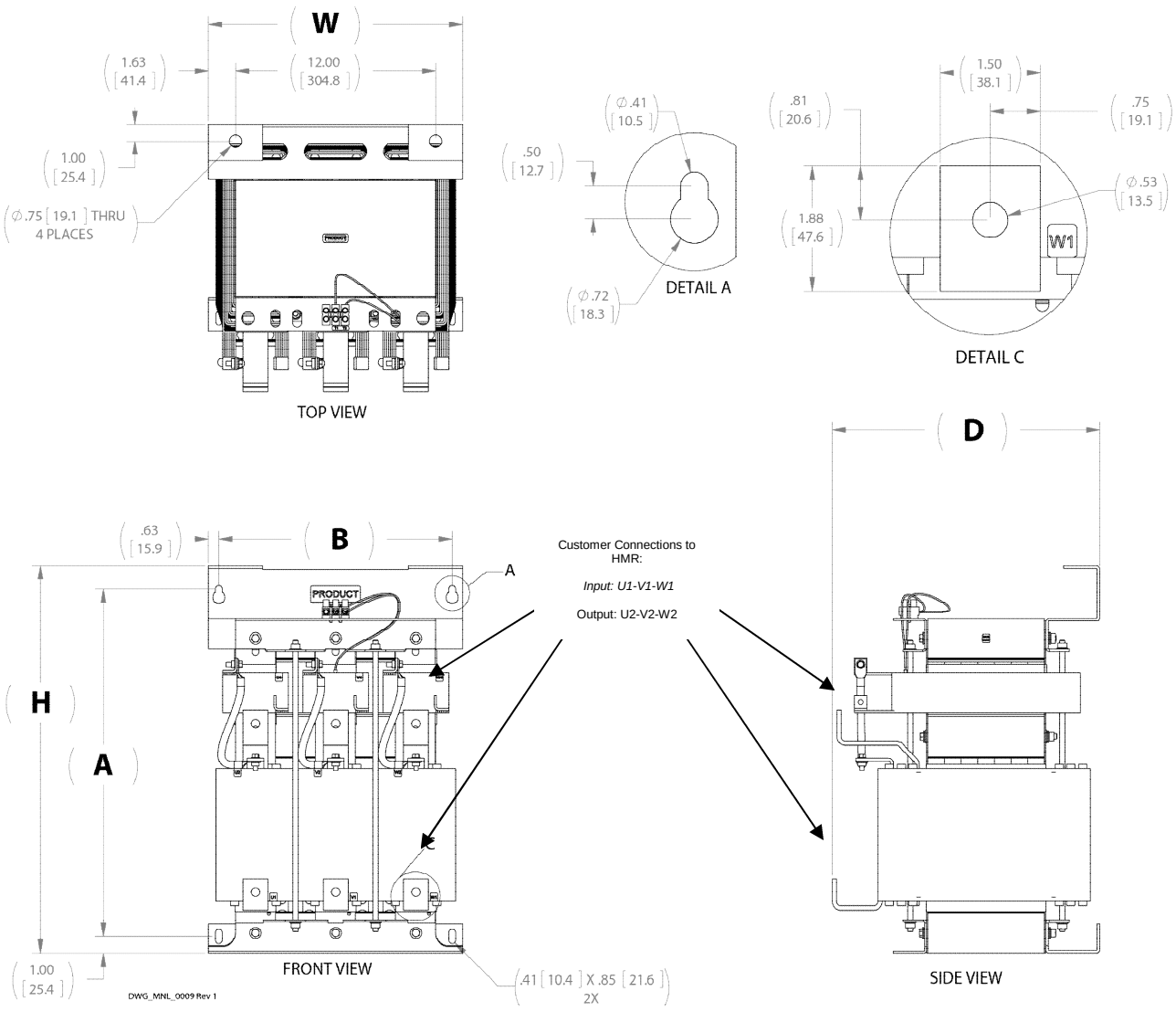


Figure 14

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

AP HMR MOUNTING & TERMINAL LOCATIONS

AP HMR 636 - 1200 Amp (400V & 480V)

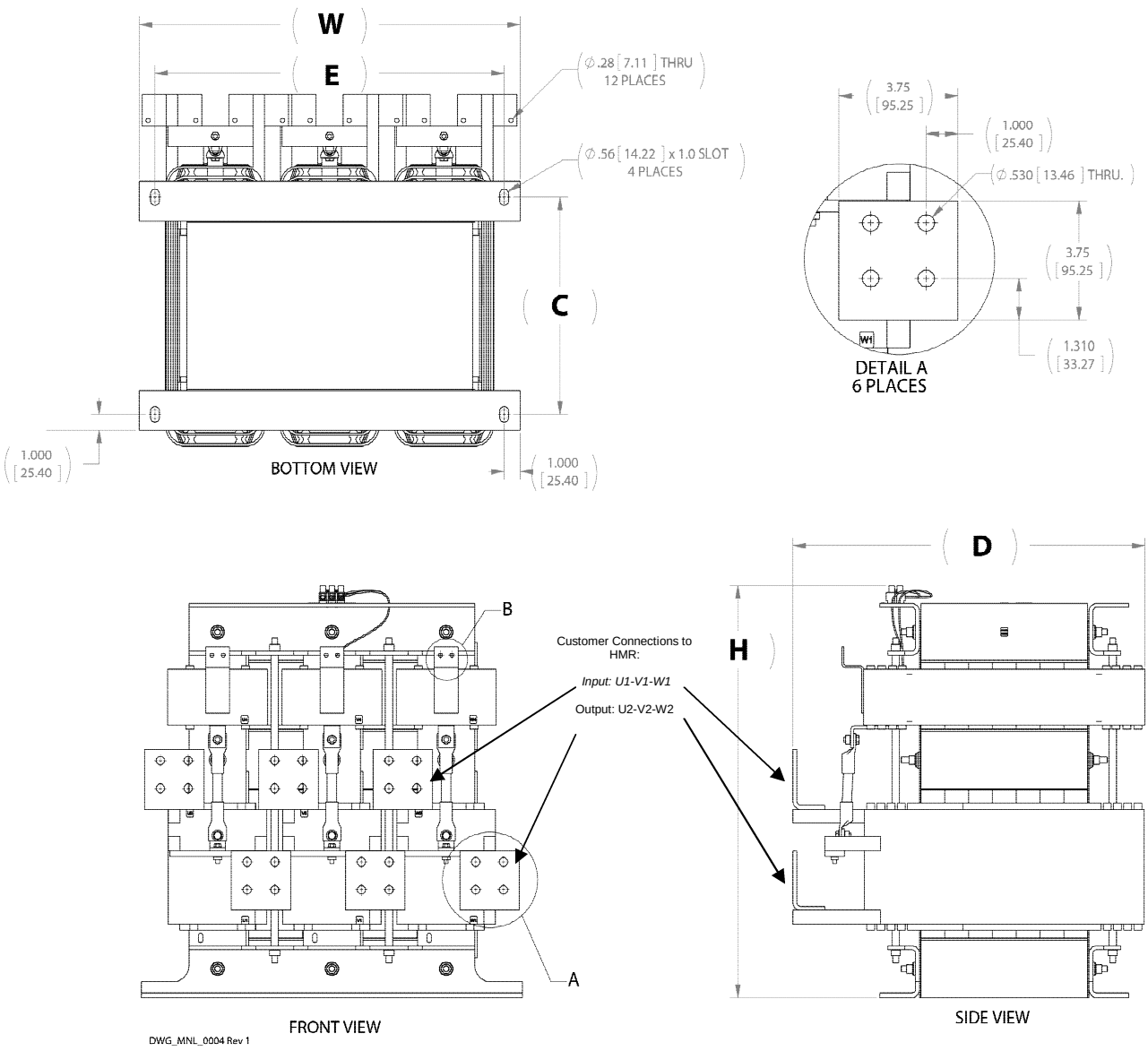


Figure 15

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

AP HMR MOUNTING & TERMINAL LOCATIONS

AP HMR 482 – 786 Amp (600V)

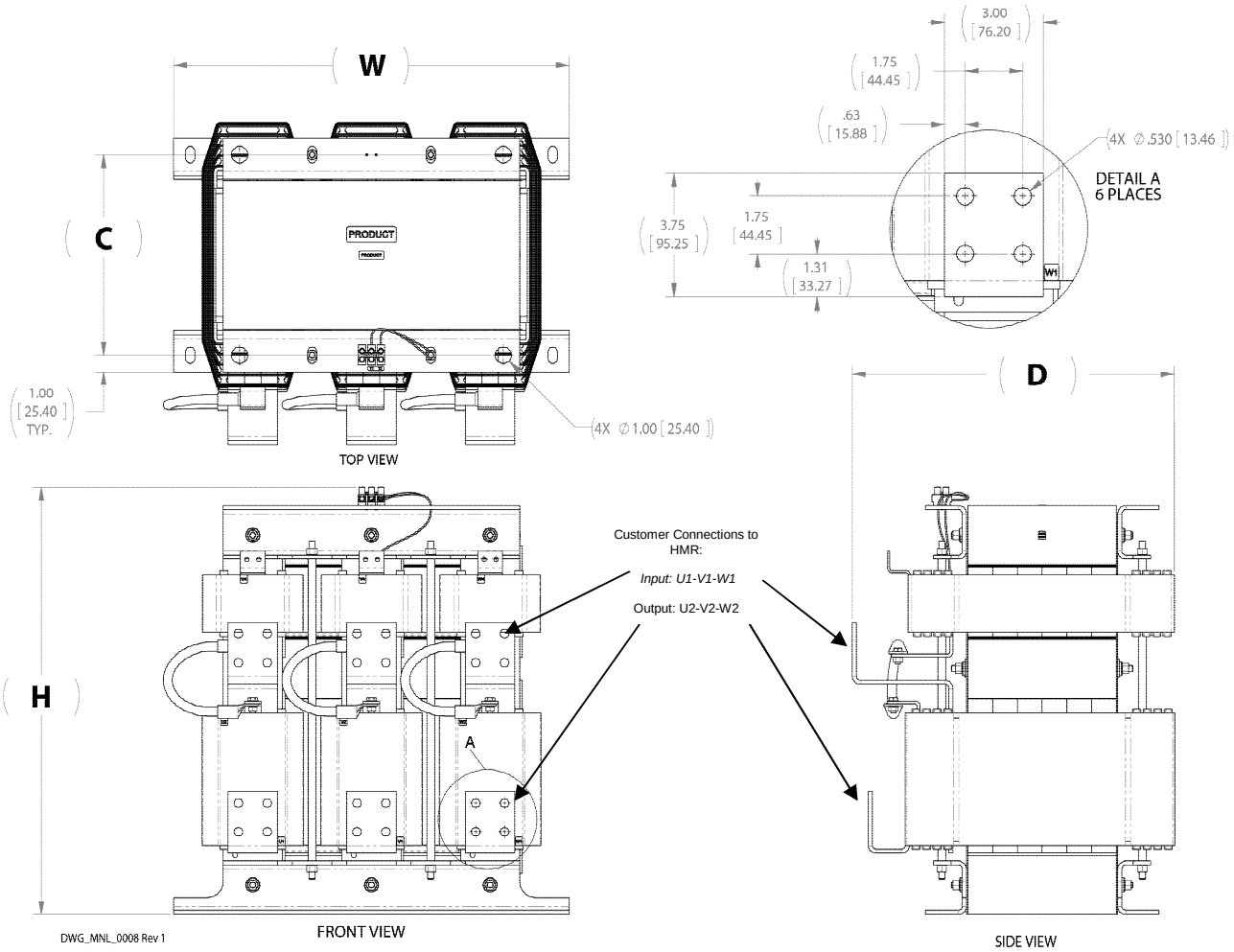


Figure 16

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

CAP-ASSEMBLY MOUNTING & TERMINAL LOCATIONS

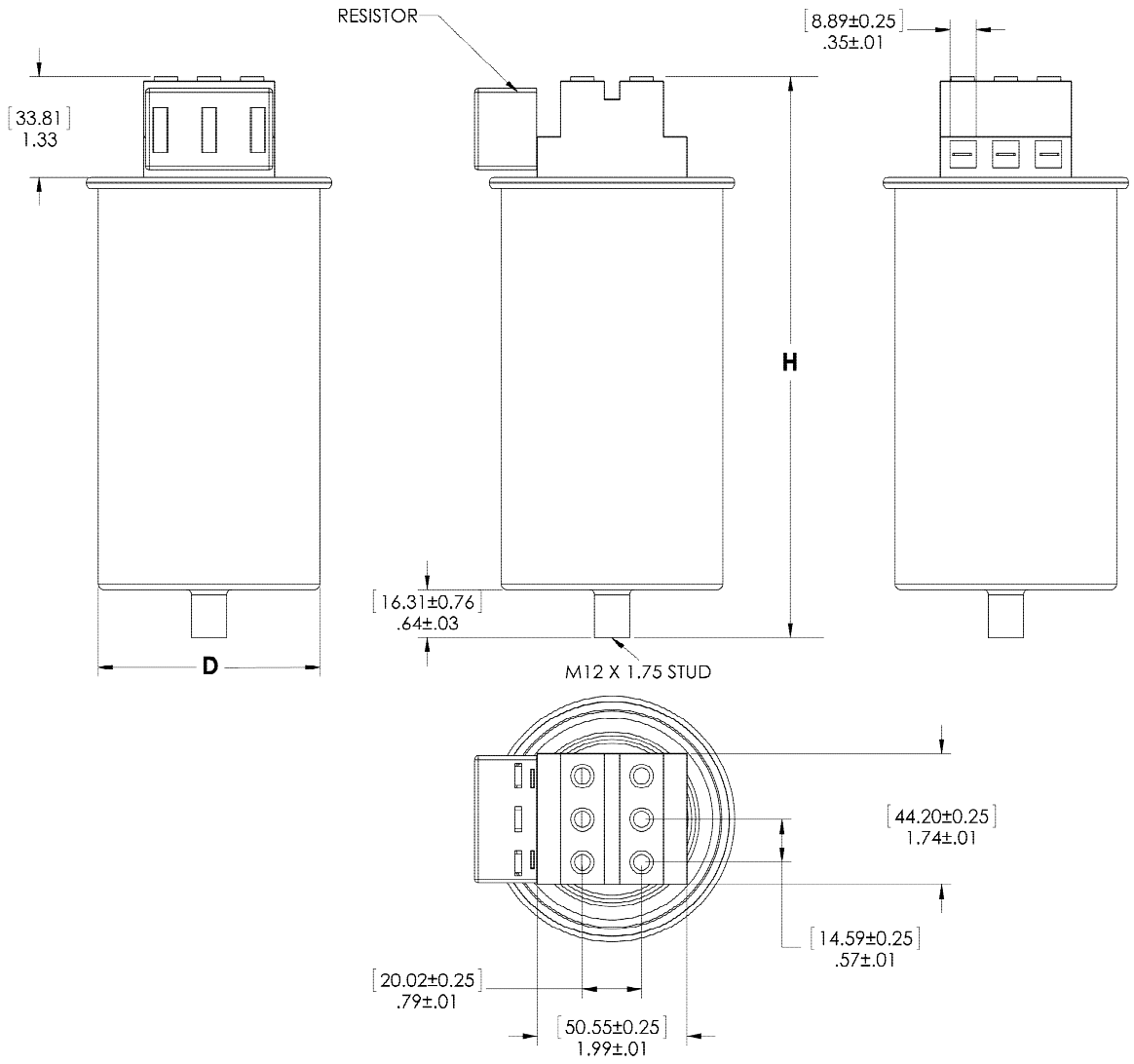


Figure 20 1 - Three Phase Capacitor

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

Note: *Height of capacitor will vary depending on the size of the filter.*

CAP-ASSEMBLY MOUNTING & TERMINAL LOCATIONS

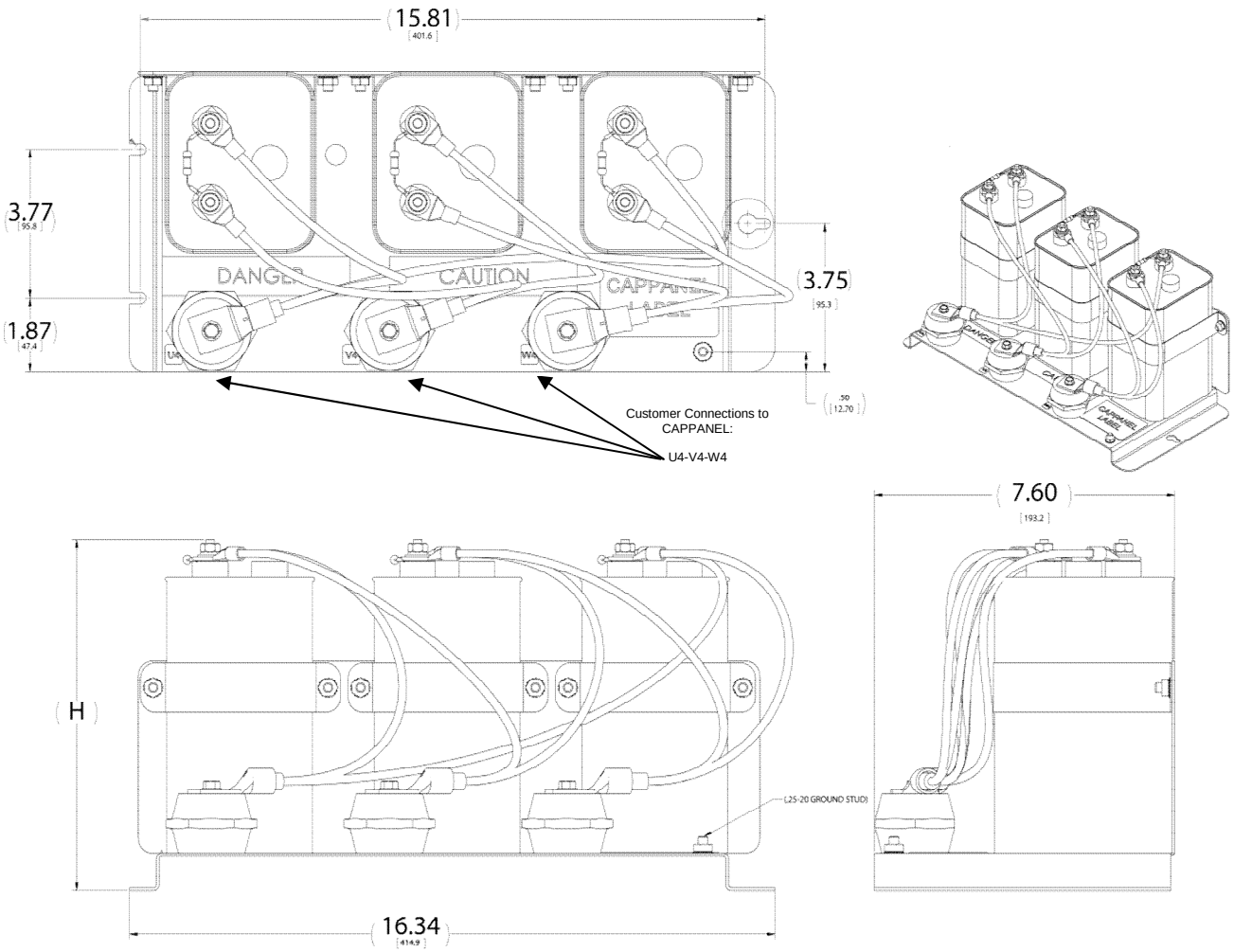


Figure 21 3 – High Current Capacitor Panel

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

Note: *Height of capacitors will vary depending on the size of the filter.*

ENCLOSED UNIT INTERNAL DETAILS

CAB-12AP

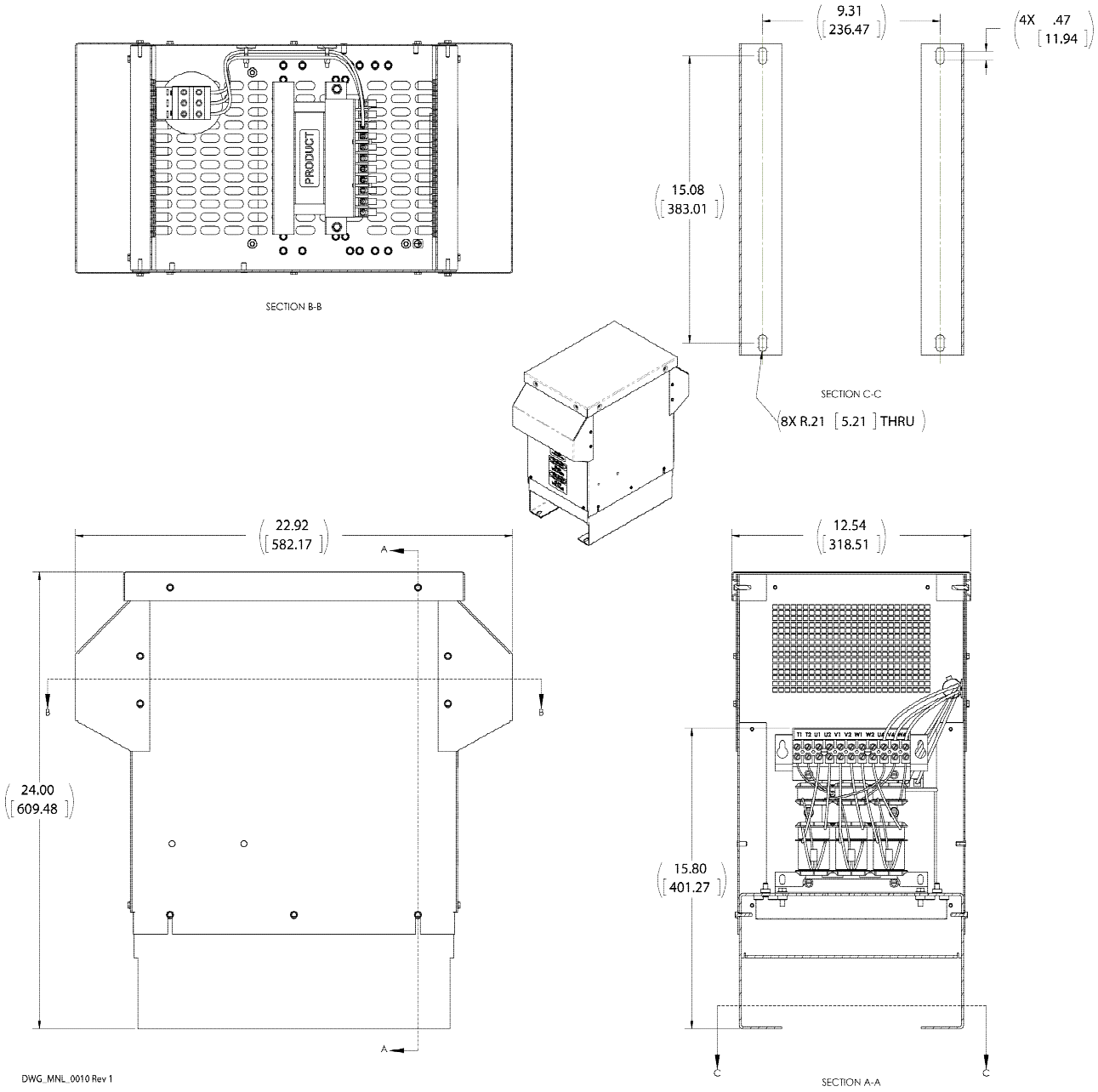


Figure 30

Refer to the MTE website, www.mtecorp.com, for detailed specifications.
Capacitor placement shown for illustrative purposes only.

ENCLOSED UNIT INTERNAL DETAILS

CAB-17AP

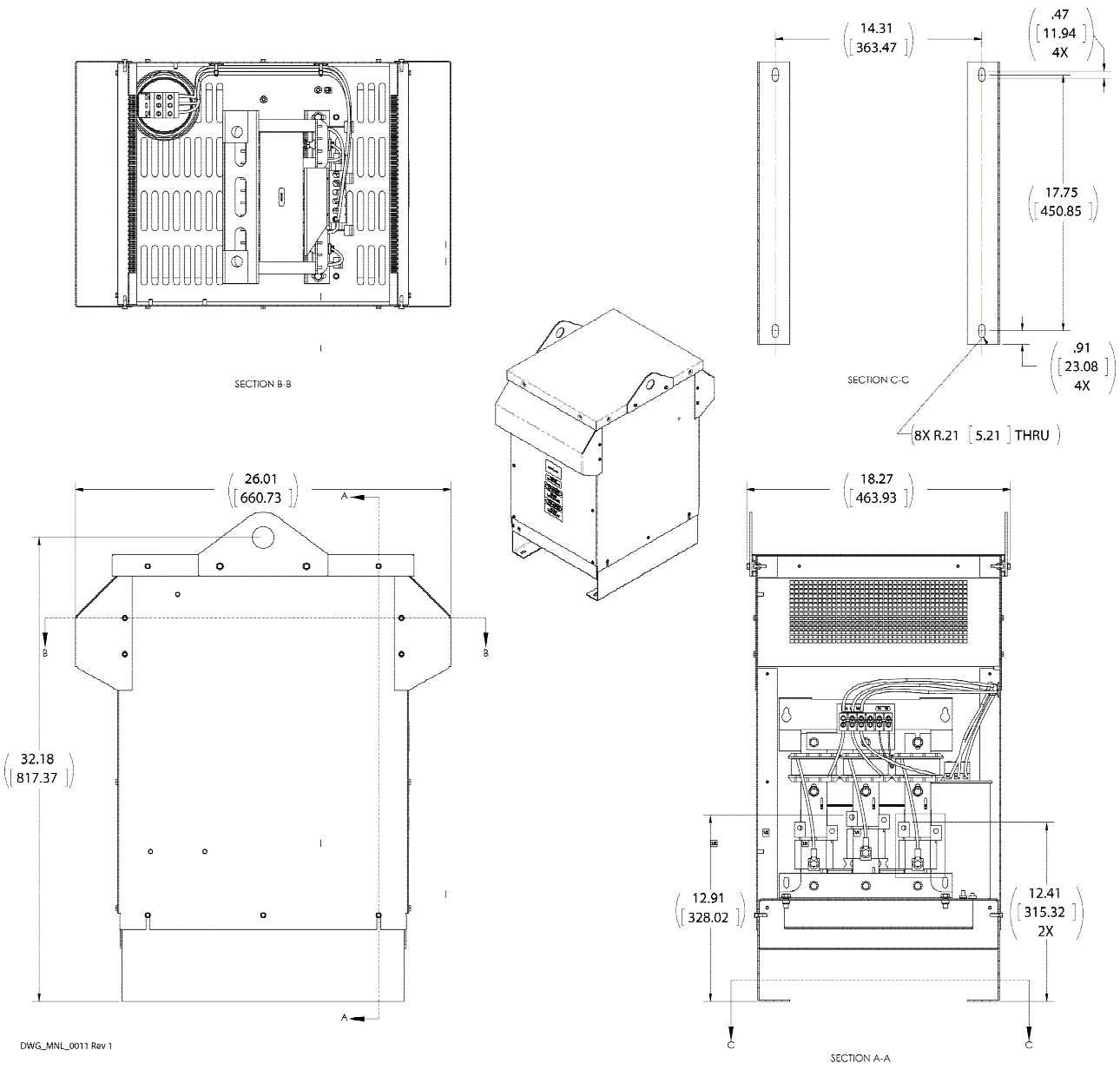


Figure 31
Refer to the MTE website, www.mtecorp.com, for detailed specifications.
Capacitor placement shown for illustrative purposes only.

ENCLOSED UNIT INTERNAL DETAILS

CAB-26AP

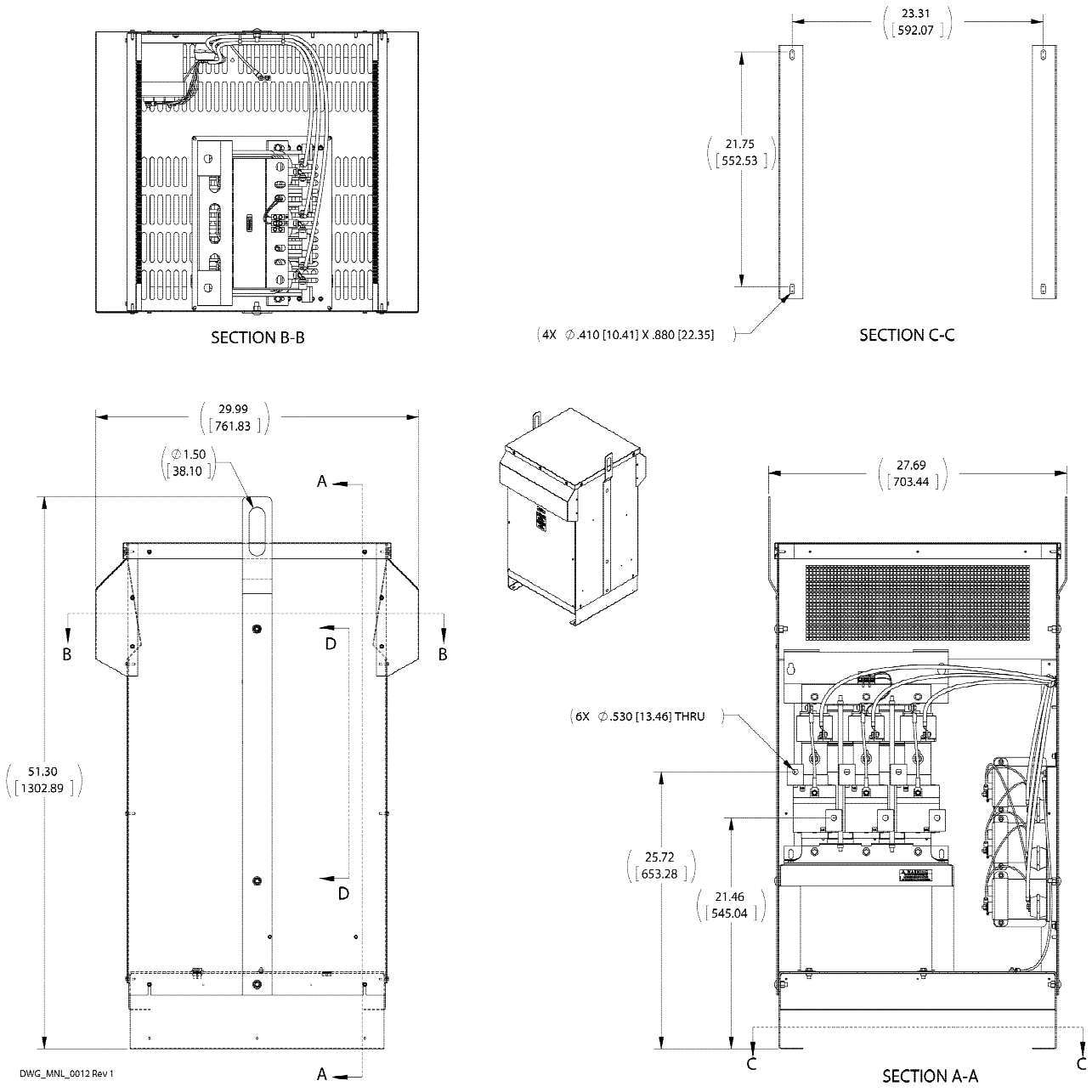


Figure 32

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

ENCLOSED UNIT INTERNAL DETAILS

CAB-26APD

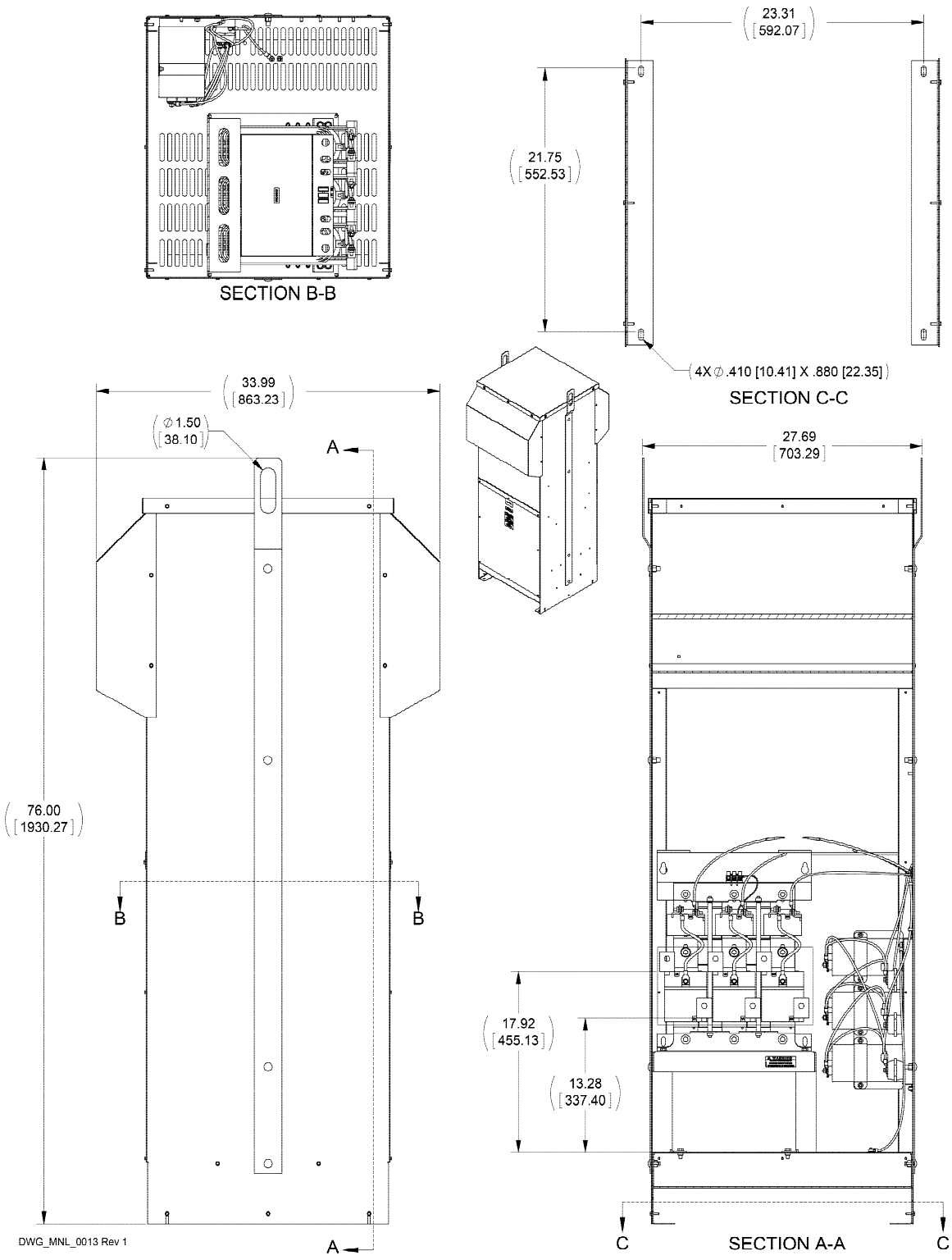


Figure 33

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

ENCLOSED UNIT INTERNAL DETAILS

CAB-42AP

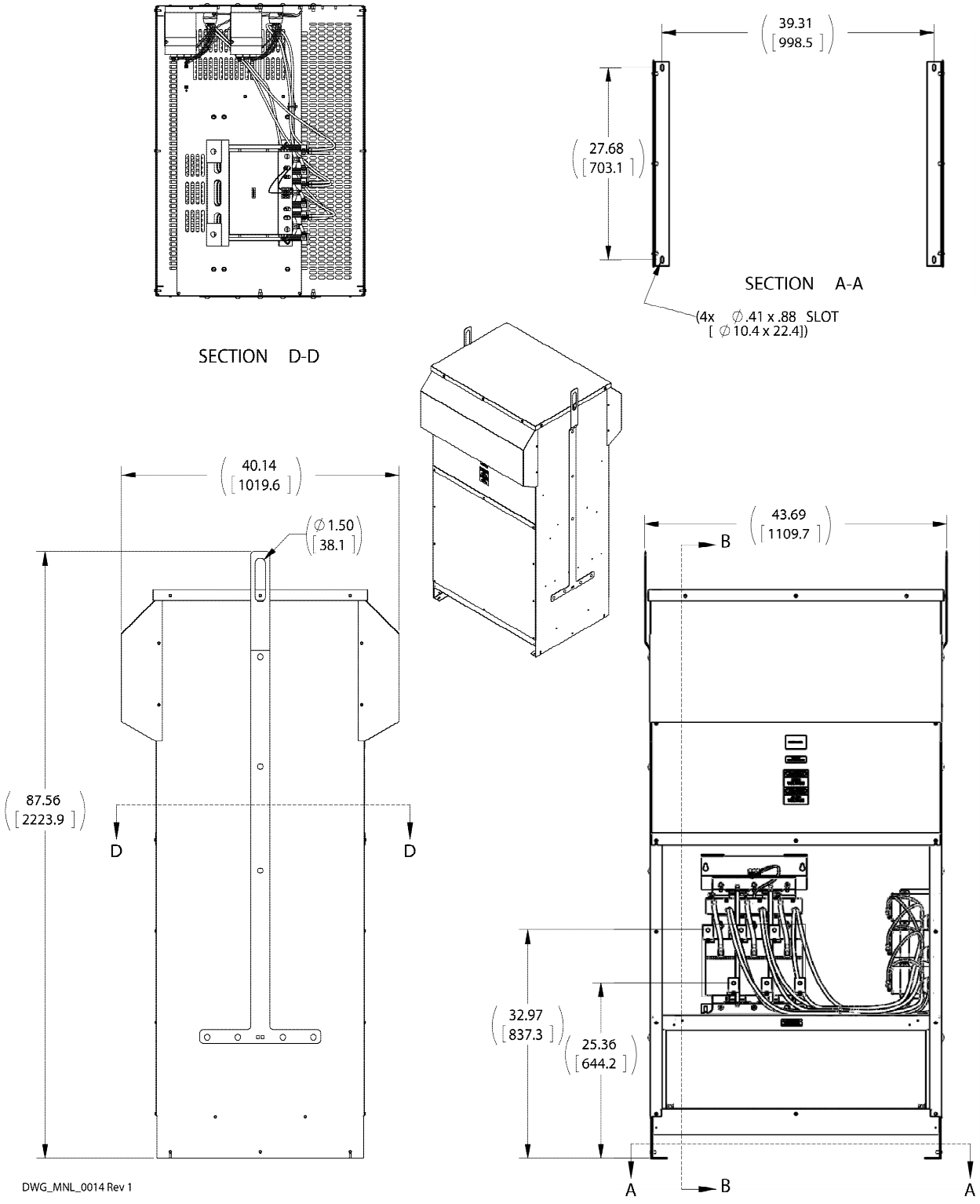


Figure 34

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

ENCLOSED UNIT INTERNAL DETAILS

CAB-48AP

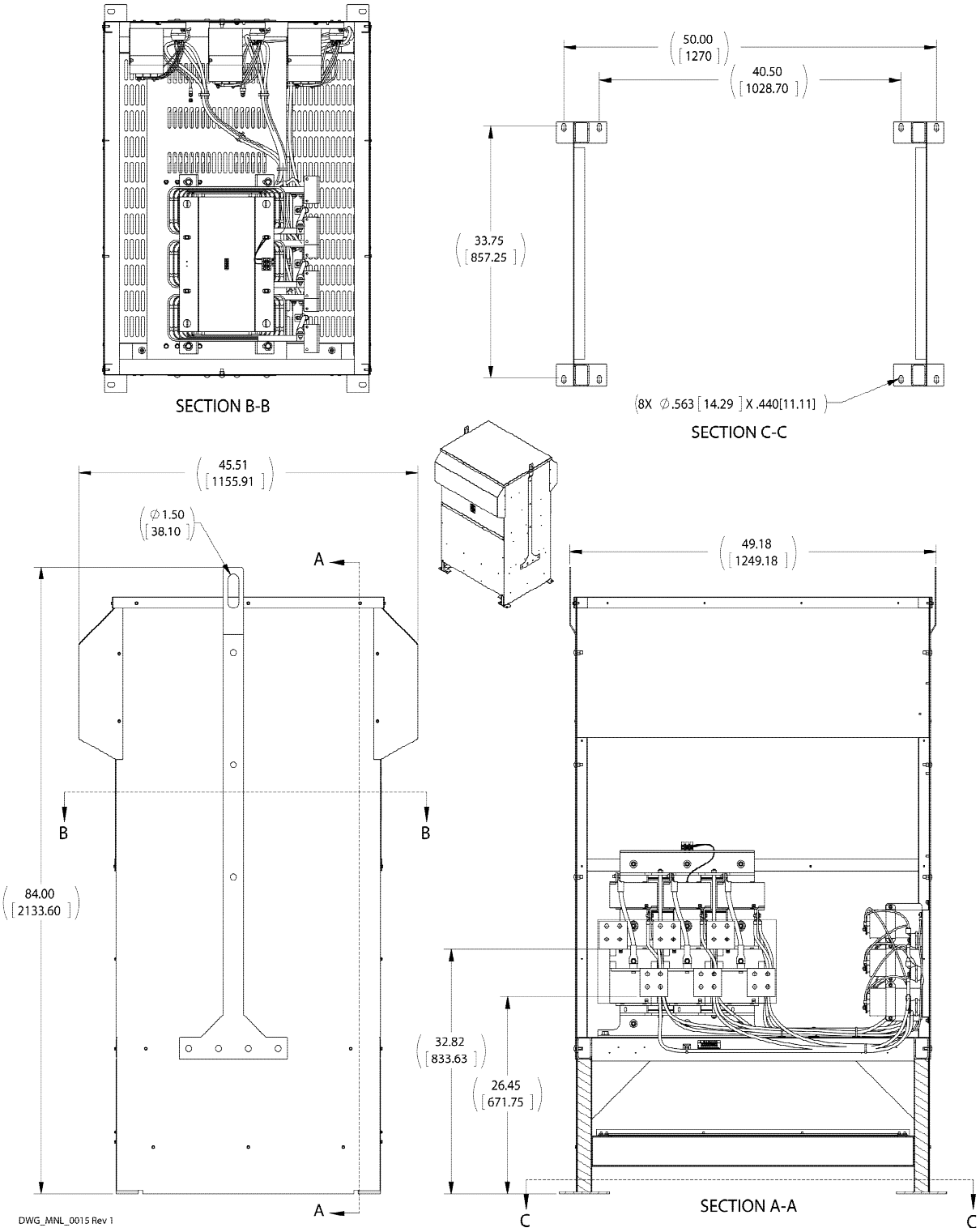


Figure 35

Refer to the MTE website, www.mtecorp.com, for detailed specifications.

Power Wiring Connection

WARNING

Input and output power wiring to the filter should be performed by authorized personnel in accordance with the NEC and all local electrical codes and regulations.
Cable lugs and mounting hardware are provided by the customer.

Verify that the power source to which the filter is to be connected is in agreement with the nameplate data on the filter. A fused disconnect switch or circuit breaker should be installed between the filter and its source of power in accordance with the requirements of the NEC and all local electrical codes and regulations. Refer to the drive user manual for selection of the correct fuse rating and class.

The filter is suitable for use on a circuit capable of delivering not more than 100K RMS symmetrical amperes at 480 volts maximum when protected by type J, T or RK1 class fuses or a circuit breaker having an interrupting rating not less than 100K RMS symmetrical amperes, 480 volts maximum.

For panel mounted filter applications, interconnection between the filter, its power source, the cap-panels, and the drive is shown in Figure 40. Table 37 lists the wire range and terminal torque requirements as a function of filter current ratings. Use table 37 for selecting conductors that interconnect the HMR and capacitor assemblies. Filters that use multiple cap-panels share total cap current shown on tables 12 and 32.

Refer to the drive user manual for instructions on interconnecting the drive and motor and the correct start-up procedures for the drive.

The filter is designed for use with copper conductors with a minimum temperature rating of 75 degrees C.

For filters supplied in general purpose NEMA 2 & 3R cabinets, interconnection between the filter, its power source, and the drive is shown in Figure 41. Refer to Figures 10 to 15 for the location of input, output, ground, and over temperature switch terminals. Table 37 lists the wire range and terminal torque requirements as a function of filter current ratings. Refer to the drive user manual for instructions on interconnecting the drive and motor and the correct start-up procedures for the drive.

Wiring checks

Using Figure 42, visually check the wired components to confirm, verify, and correct wiring. Then, with a multi meter check phase to phase isolation using the 100 K ohm range. The multi meter will read the parallel equivalent of the bleeder resistors after the capacitors initially charge. All phase to phase resistance values should be the same.

WARNING

Any extremely low or high resistance readings indicate a mis-wire and may result in damage to filter components if not corrected.

Check for the following faults:

Capacitor shorted
Capacitor bus not connected
Capacitor bus to chassis short
Paralleling wiring errors

Power Wiring Connection, Cont.

Grounding and Ground Fault Protection

The filter must always be grounded with a grounding conductor connected to all ground terminals.

Due to high leakage currents associated with variable frequency drives, ground fault protective devices do not necessarily operate correctly when placed ahead of a Matrix Filter feeding a drive. When using this type of device, its function should be tested in the actual installation.

Mounting Location of Live Parts in NEMA 3R Enclosures - Filters 128A and Larger

WARNING

No live parts shall be mounted below 8 inches from the bottom of the enclosure

To ensure proper cooling, NEMA 3R enclosures for Matrix AP filters 128 amp and larger do not contain splash guards in the bottom of the enclosure.

Over Temperature Switch

The temperature switch is provided to annunciate adverse filter heating. Damage to the filter or drive may be avoided by interlocking this switch to shut down the drive or illuminate a service light; see figures 40 and 41 for connection diagrams. Read the vendor drive manual for details in using interlock inputs.

Input and Output Terminal Specifications

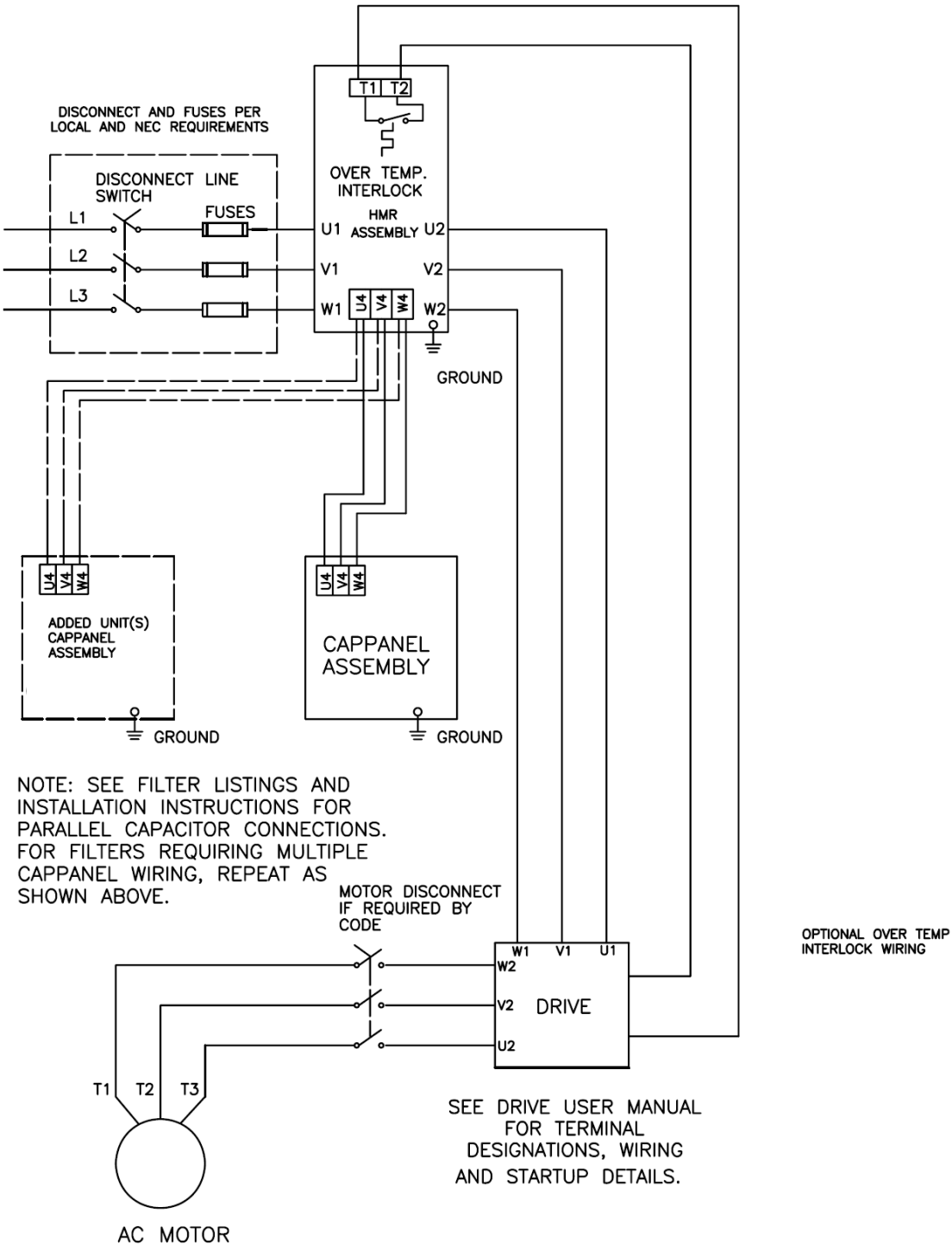
Table 37

Filter Rating (Amps)	AP HMR Terminals			Cap-panel Terminals U4-V4-W4				
	Input /Output Power U1-V1-W1 / U2-V2-W2		U4-V4-W4 interconnect cappanel	400V Capacitor/ CAPPANEL Part Number	480V Capacitor/ CAPPANEL Part Number	600V Capacitor/ CAPPANEL Part Number	Minimum Interconnect Wire Gauge (AWG)	Terminal Torque (in-lbs.)
	Wire Range (AWG)	Terminal Torque (in-lbs.)	Terminal Torque (in-lbs.)					
6	14 – 6	16	16	CAP-350TP	CAP-338TP	CAP-361TP	14	23
8	14 – 6	16	16	CAP-351TP	CAP-339TP	CAP-362TP	14	23
11	14 – 6	16	16	CAP-352TP	CAP-349TP	CAP-363TP	14	23
14	14 – 6	16	16	CAP-353TP	CAP-340TP	CAP-364TP	14	23
21	14 – 6	16	16	CAP-342TP	CAP-341TP	CAP-365TP	14	23
27	14 – 6	16	16	CAP-355TP	CAP-342TP	CAP-366TP	14	23
34	14 – 6	16	20	CAP-343TP	CAP-343TP	CAP-367TP	12	23
44	18 – 4	16	20	CAP-356TP	CAP-344TP	CAP-368TP	12	23
52	Flat copper tab	N/A	20	CAP-357TP	CAP-345TP	CAP-369TP	10	23
66	Flat copper tab	N/A	50	CAP-358TP	CAP-346TP	CAP-370TP	10	23
83	Flat copper tab	N/A	16	CAP-359TP	CAP-347TP	CAP-371TP	10	23
103	Flat copper tab	N/A	16	CAP-360TP	CAP-348TP	567	8	23
128	Flat copper tab	N/A	N/A	594	555	568	8	60
165	Flat copper tab	N/A	N/A	544	557	570	6	60
208	Flat copper tab	N/A	N/A	543	545	572	4	60
240	Flat copper tab	N/A	N/A	595	544	574	4	60
320	Flat copper tab	N/A	N/A	596	543	576	2	60
403	Flat copper tab	N/A	N/A	597	562	578	1/0	60
482	Flat copper tab	N/A	N/A	595	544	574	4	60
			N/A	595	544	754	4	60
636	Flat copper tab	N/A	N/A	596	543	576	2	60
			N/A	596	543	576	2	60
786	Flat copper tab	N/A	N/A	597	562	578	1/0	60
			N/A	597	562	578	1/0	60
850	Flat copper tab	N/A	N/A	596	543	N/A	2	60
			N/A	596	543	N/A	2	60
			N/A	595	544	N/A	4	60
1000	Flat copper tab	N/A	N/A	598	543	N/A	2	60
			N/A	598	543	N/A	2	60
			N/A	598	561	N/A	2	60
1200	Flat copper tab	N/A	N/A	597	562	N/A	1/0	60
			N/A	597	562	N/A	1/0	60
			N/A	597	562	N/A	1/0	60

Note: Cap-panel interconnect wiring specification according to UL508 75° C Table.
Note: To prevent flexing or bending of the coil windings attached to AP HMR Flat copper terminal tabs, use two wrenches to tighten customer provided cable mounting hardware.

Open Panel Unit Interconnection Diagram

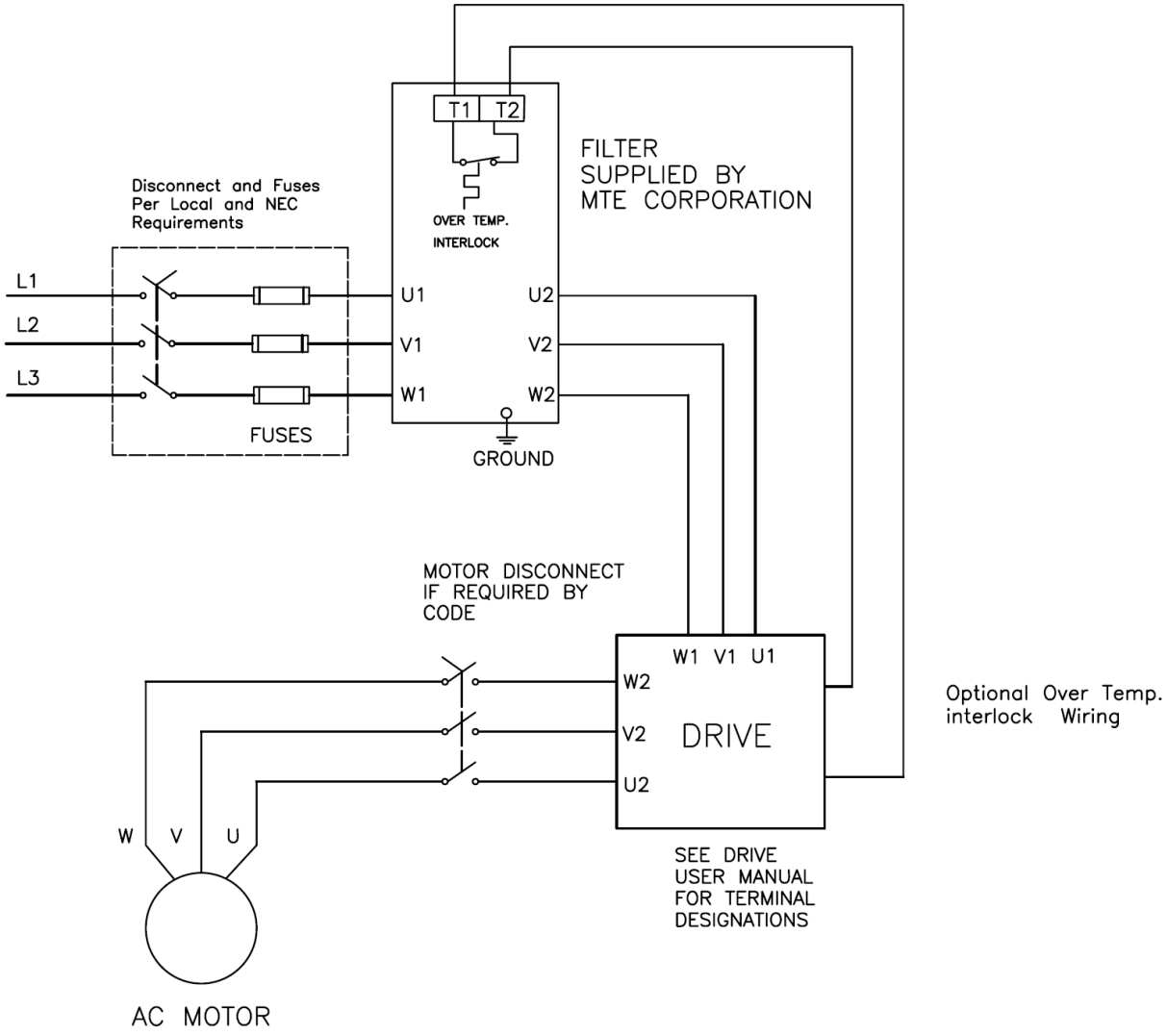
Figure 40



Enclosed Unit Interconnection Diagram

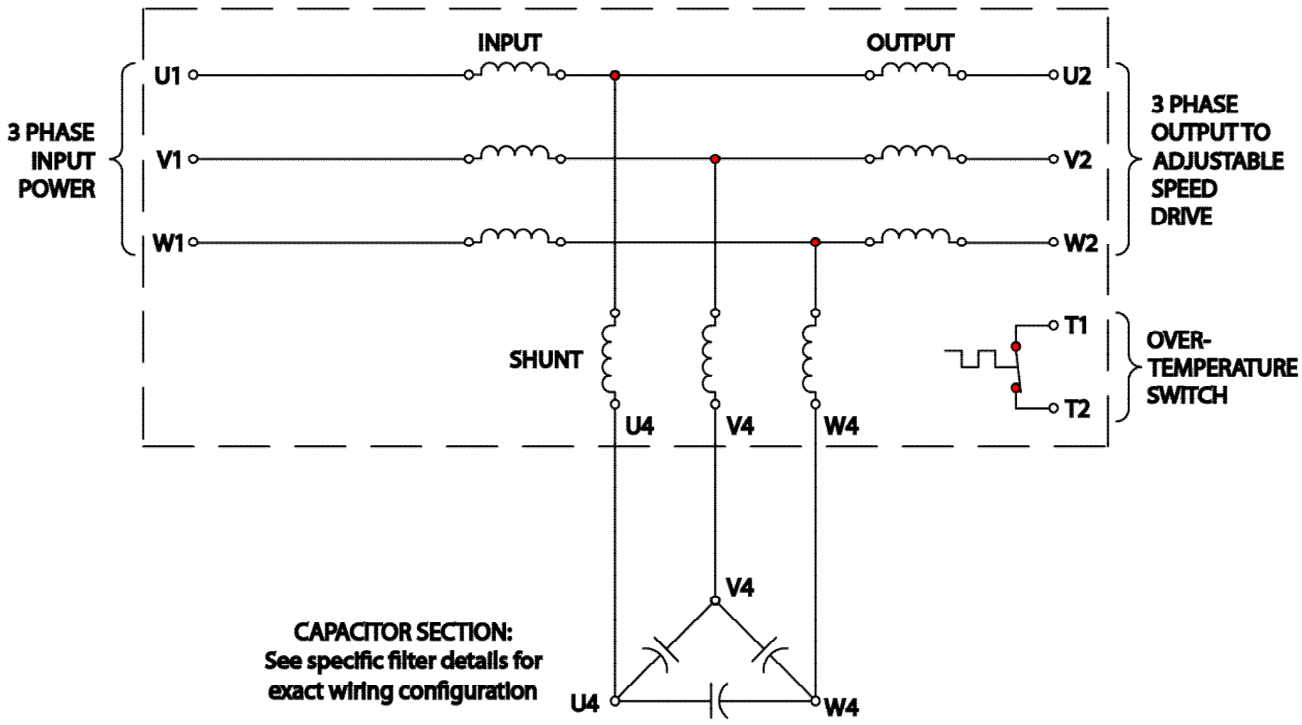
Figure 41

Matrix AP Harmonic Filter



Matrix AP Basic Schematic Diagram

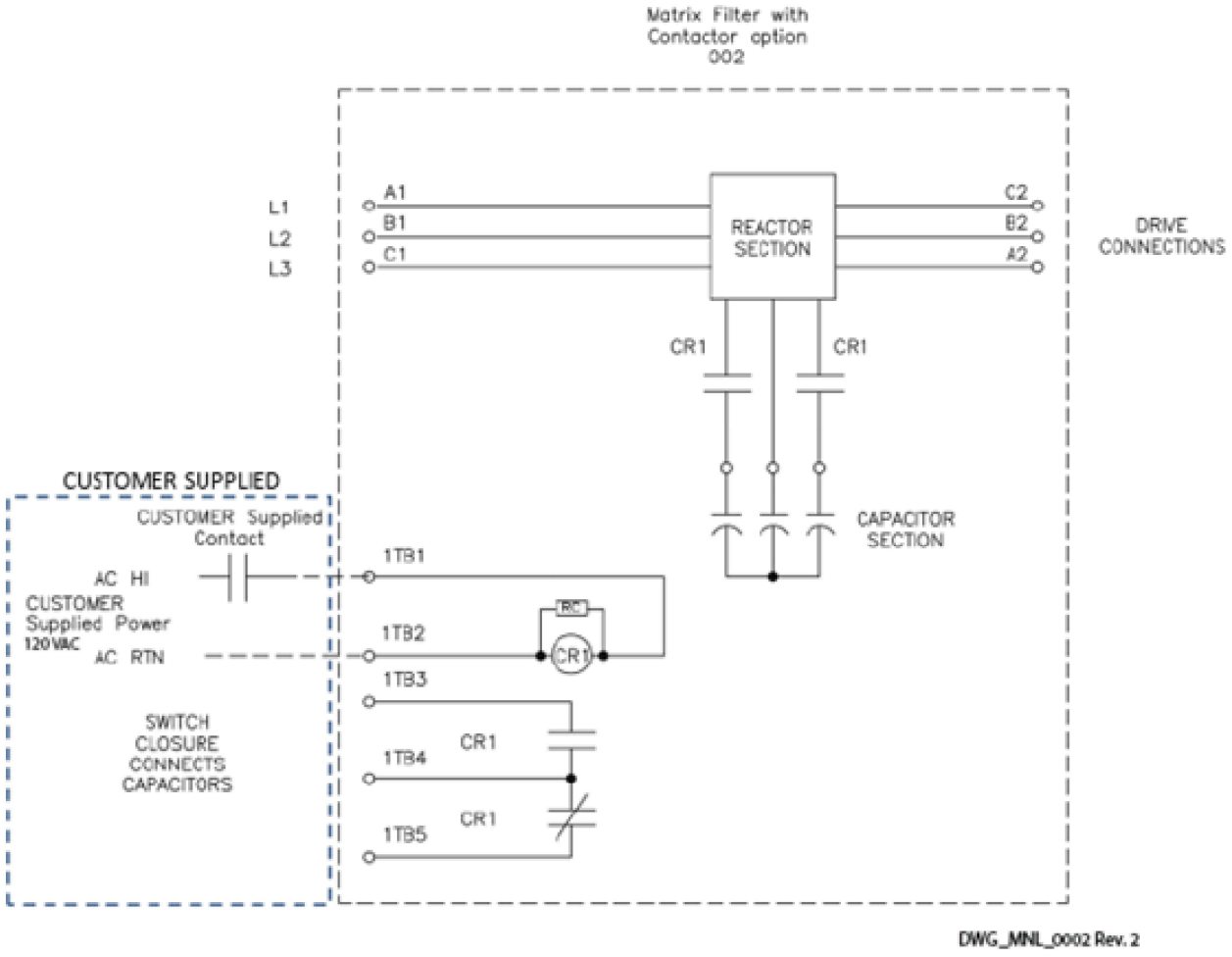
Figure 42



Contactor Options

Option -002
Capacitor Contactor

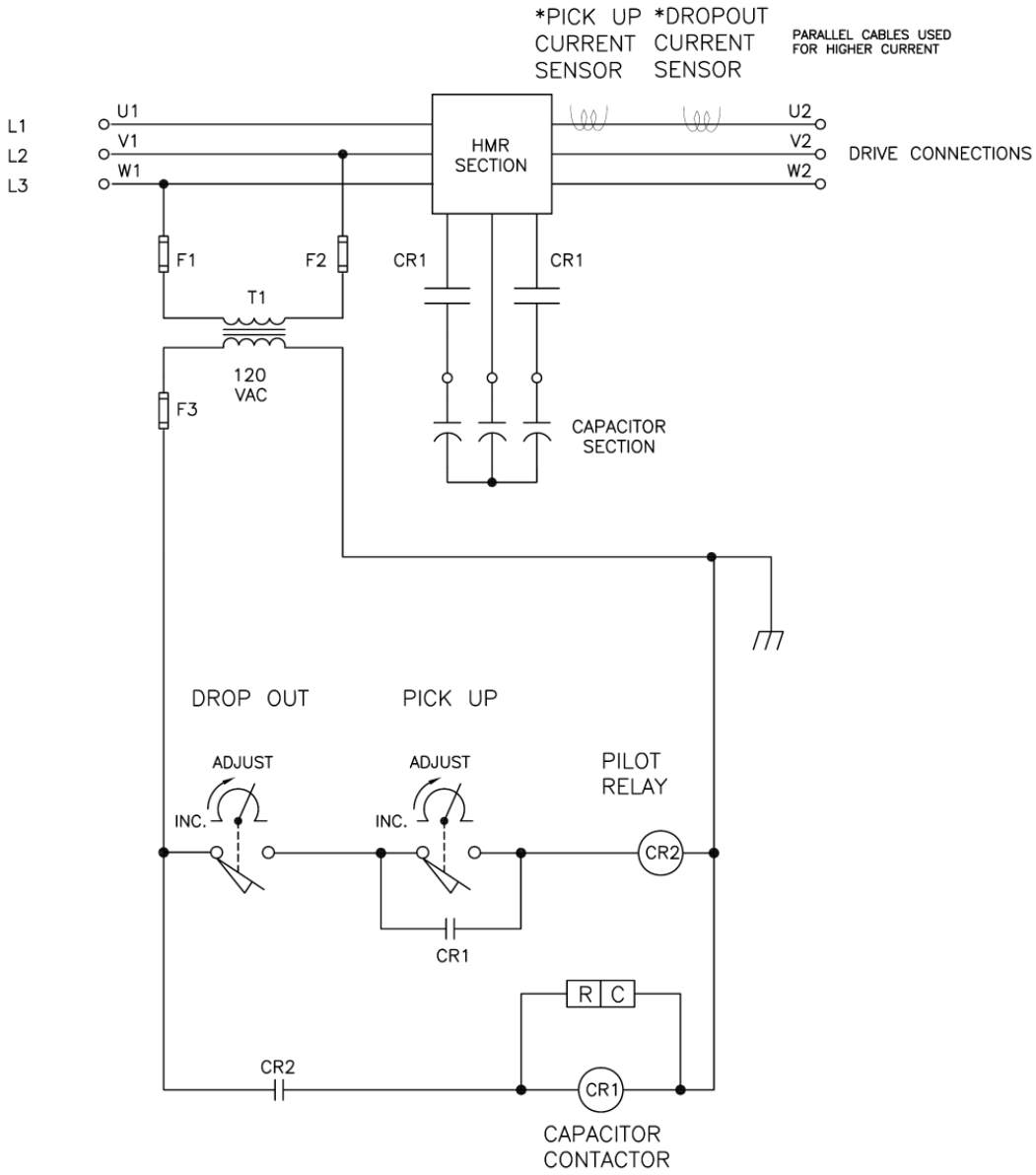
This option provides a contactor to disconnect the filter capacitor bank when the drive is not running. The contactor is supplied with NO/NC auxiliary contacts. The contactor coil and auxiliary contacts are wired to a customer terminal block. See page 53 for contactor coil switching characteristics. This option is provided pre-wired complete for enclosed filters and as loose parts for open panel filters.



The above contactor option diagram is provided to help understand the circuit function and does not reflect actual circuit wiring.

Option -009
Capacitor Contactor with adjustable pick up and drop out

This option provides a contactor to disconnect the filter capacitor bank based on the motor load current. Two current operated switches provide independent adjustment of the pick-up and drop current levels. The switches are preset at the factory for pick up at 35% and drop out at 20% of the filter output current rating. The switches are each field adjustable over a 0 – 100% current range. This option is only available for enclosed filters.

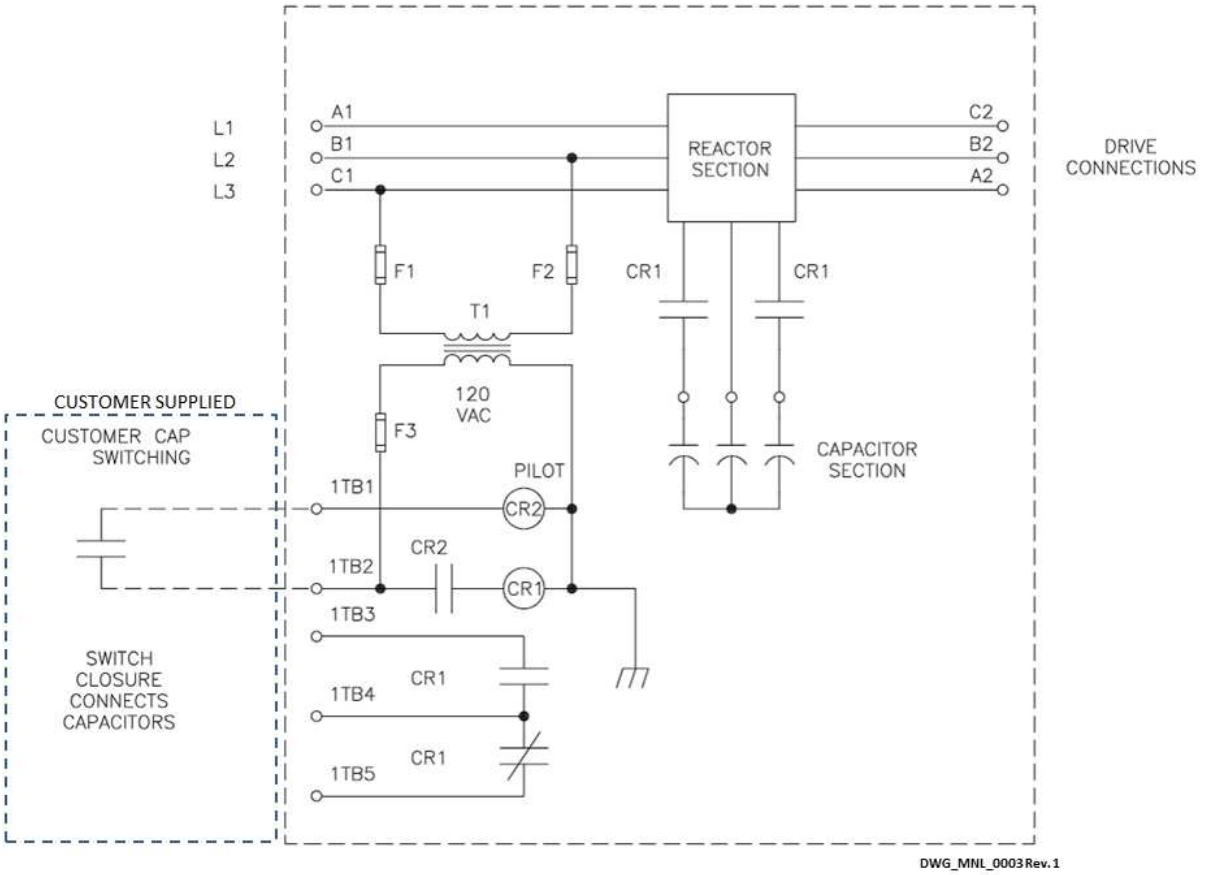


The above contactor option diagram is provided to help understand the circuit function and does not reflect actual circuit wiring.

Option -012

Capacitor contactor with control transformer

This option provides a control transformer to power the capacitor contactor. The contactor is provided with NO/NC auxiliary contacts. For filter ratings 165 amps and above a pilot relay is also provided to limit inrush current below 0.60 amps. Connections are wired to a customer terminal block. This option is only available for enclosed filters.



The above contactor option diagram is provided to help understand the circuit function and does not reflect actual circuit wiring.

Contactor coil switching currents

Table 50

Option 002

The following table indicates the 120 VAC 50/60 Hz current required to switch and hold the various size contactors used in Matrix Filter capacitor switching and bypass options. This data is provided to select the proper switch rating to remotely control the contactor and is consistent for the 400V, 480V, and 600V units.

Contactor Currents for 120 VAC 60 Hz coils.

Matrix filter current Rating AMPS	Capacitor Contactor Option 002 AMPS	
	INRUSH	***SEALED***
6	0.341	0.054
8	0.341	0.054
11	0.341	0.054
14	0.341	0.054
21	0.341	0.054
27	0.341	0.054
34	0.341	0.054
44	0.341	0.054
52	0.341	0.054
66	0.341	0.054
83	0.341	0.054
103	0.341	0.054
128	0.922	0.064
165	1.70	0.304
208	1.70	0.304
240	2.00	0.42
320	1.41	0.025
403	1.41	0.025
482	2.08	0.036
636	2.08	0.036
786	3.75	0.036
850	3.75	0.036
1000	3.75	0.036
1200	3.75	0.036

STARTUP

Safety Precautions

Before startup, observe the following warnings and instructions:

WARNING

Internal components of the filter are at line potential when the filter is connected to the utility. This voltage is extremely dangerous and may cause death or severe injury if you come in contact with it.

WARNING

After disconnecting the utility power, wait at least 5 minutes before doing any work on the filter connections. After removing power, allow at least five minutes to elapse and verify that the capacitors have discharged to a safe level before contacting internal components. Connect a DC voltmeter across the capacitor terminals. Start with the meter on the highest scale and progressively switch to a lower scale as the indicated voltage falls below the maximum value of the scale used.

Sequence of Operation

1. Read and follow safety precautions.
2. After installation, ensure that:
   - All filter ground terminals are connected to ground.
   - Power wiring to the utility, drive and motor is in accordance with the power wiring connection diagrams shown in installation instructions section. Use the guidelines of table 30 for power and cap-panel wire gauges.
3. Check that moisture has not condensed on the filter components. If moisture is present, do not proceed with startup until the moisture has been removed.
4. Disconnect the filter output from the drive.
5. Connect the filter to the utility.

WARNING

Use extreme caution to avoid contact with line voltage when checking for power. INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

6. Confirm that line voltage is present at the input terminals (U, V1, W1) of the filter.
7. Confirm that line voltage is present at the output terminals (U2, V2, W2) of the filter and that it is less than or equal to 1.05 times the input voltage.
8. Using a clamp on Amp meter, check input phase currents to verify they are within a 5% match to each other. Use 50% of the values from Tables 12 and 22.
9. Remove power and verify **that NO VOLTAGE** is present on the filter terminals.
10. Connect the filter output to the drive.
11. Refer to the drive user manual for the drive startup procedure. Observe all safety instructions in the drive user manual.

WARNING

INJURY OR DEATH MAY RESULT IF THE DRIVE SAFETY PRECAUTIONS ARE NOT OBSERVED. DAMAGE TO EQUIPMENT MAY OCCUR IF THE DRIVE STARTUP PROCEDURES ARE NOT OBSERVED

TROUBLESHOOTING

WARNING

When properly installed, this equipment has been designed to provide maximum safety for operating personnel. However, hazardous voltages exist within the confines of the enclosure. Servicing should therefore be performed by qualified personnel only and in accordance with OSHA Regulations.

To aid in troubleshooting, a schematic diagram is shown in Figure 42 and a list of potential problems and solutions are listed on next page.

WARNING

High voltage is used in the operation of this filter. Use Extreme caution to avoid contact with high voltage when operating, installing or repairing this filter. INJURY OR DEATH MAY RESULT IF SAFETY PRECAUTIONS ARE NOT OBSERVED.

After removing power, allow at least five minutes to elapse and verify that the capacitors have discharged to a safe level before contacting internal components. Connect a DC voltmeter across the capacitor terminals. Start with the meter on the highest scale and progressively switch to a lower scale as the indicated voltage falls below the maximum value of the scale used.

Troubleshooting, Cont.

MTE Matrix AP Harmonic Filter Field Checks

1. Read and understand the voltage appropriate MTE Matrix Filter user manual. These manuals may be downloaded from the ***www.mtecorp.com*** web site. Locate figures and drawings for your particular filter and identify the terminal locations.
2. Disconnect all power and remove input power wiring from U1, V1, W1 terminals.
3. Remove VFD drive power connections from filter terminals U2, V2, W2 and any contactor or temperature switch wiring. (For filters using control transformers: remove power fuses on top of transformer.)
4. Visually inspect filter terminals and wiring lugs for signs of heat and corrosion. ***Contact factory if any wires appear to be missing or cut!***
5. Inspect the U4, V4, W4 capacitor interconnect terminals and wiring.
6. Visually inspect all capacitors for signs of case deformation, bowing of the top, leaking oil or terminal damage. Note the CAP- # and date code of any damaged capacitors.
7. Using a multi meter set to read 100K ohms check:
    a. Phase to phase U1-V1-W1-U1 (mechanically activate contactor if present) after reactor and caps charge reading should be about 40K (total equivalent breeder resistance value) and should be the same for each phase. Open circuit or very low readings indicate a problem.
    b. Phase to chassis U1- case, V1-case, W1- case; low readings indicate a ground fault problem.
8. Ensure the “disconnect” is safe, then wire the utility power to U1, V1, W1.
9. Apply power and verify that proper output voltage is present on U2, V2, and W2.
10. Using a clamp on amp meter read the filter input current:
    a. Readings will be 0.5 of the capacitor current listed in tables 12 (400V), 22 (480V) and 32 (600V) for the listed filter current in the user manual (mechanically activate the contactor if the filter is equipped with one). Readings should be the same (+/- 5%) for all phase currents; ***contact the factory if currents are out of tolerance!***
    b. Open contactor readings will show zero current for all phases.
11. Disconnect filter power and wire the VFD to U2, V2, and W2 as well as any control wiring to the filter contactor or temperature switch. Replace any control transformer fuses. Follow the drive power startup guidelines in the drive manufacturer’s user manual.

PROBLEM:	**Line voltage is not present at the filter output terminals.**
Possible cause:	Power to the filter is turned off.
Solution:	Turn power on.
Possible cause:	One or more external line fuses are blown.
Solution:	Verify the continuity of line fuses in all phases. Replace as necessary.

PROBLEM:	**Full Load Harmonic current distortion exceeds 5% on one or more phases at full load.**
Possible cause:	The capacitor assembly has not been connected.
Solution:	Check interconnection of capacitor assembly with AP HMR (Figure 40 & 42).
Possible cause:	A capacitor has failed.
Solution:	Inspect the tops of all capacitors for bowing. Replace failed capacitors.
Possible cause:	Source impedance is less than 1.5%.
Solution	Add a minimum 1.5% impedance line reactor to the filter input.
Possible cause:	Input source voltage harmonic distortion.
Solution	Identify equipment causing harmonic voltage distortion and add filters as required or accept elevated THVD.
Possible cause:	Line voltage unbalance exceeds 1%.
Solution:	Balance input line voltage to 1% or less.

PROBLEM:	**Filter output voltage is not within specification**
Possible cause:	Filter input voltage is not within specification.
Solution:	Check the AC input line voltage and verify that it is within tolerance. Refer to the filter service conditions and performance specifications for tolerances.
Possible cause:	Source impedance is out of tolerance.
Solution:	Verify that the source impedance is within tolerance. Refer to the filter service conditions and performance specifications for tolerances.
Possible cause:	One or more Capacitors is damaged.
Solution:	Visually check capacitor top for distortion or doming. Check for shorts or open caps. Replace failed capacitors.
Possible cause:	Drive set up parameter does not allow for input filter
Solution:	Consult drive manufacturer to update setup to accommodate input filter.
Possible cause:	Input voltage subject to extreme transients such as switching between two voltage sources. Drive faults on over or under voltage.
Solution:	Source switching is not recommended without proper phase synchronizing or allowing reasonable time delay before transfer to new source.