

TOWN OF GREENWICH
PURCHASING DEPARTMENT
101 Field Point Road
Greenwich, CT 06830
203 622-7881

NO.: 7561

ISSUE DATE: 05/06/2020

DEADLINE DATE: 06/02/2020

DEADLINE TIME: 2:00 P.M.

REQUEST FOR BID

REQUEST FOR PROPOSAL

PREBID CONFERENCE: _____

TIME AND DATE: _____

LOCATION: _____

ITEM/CATEGORY SURPLUS SALE OF ELECTRICAL VFD CAPACITY FILTERS

LOCATION GREENWICH, CT

PREQUALIFICATION

STANDARDS/SPECIFICATIONS (ATTACHED)

INSURANCE REQUIRED (SEE ATTACHED)

PLEASE NOTE:

1. Sealed Bids/Proposals are due at the Town of Greenwich Purchasing Department on date noted. NO bids/proposals will be accepted after the date and time specified above. Whether the bid/ proposal is sent by mail or commercial express service, the bidder/proposer shall be responsible for actual delivery of the bid/proposal to the PURCHASING DEPARTMENT before the deadline time. Bids/proposals received after the deadline time will not be considered. PLEASE CLEARLY INDICATE BID/PROPOSAL NUMBER ON LOWER LEFT-HAND CORNER OF ENVELOPE.
2. BIDS/PROPOSALS ARE NOT ACCEPTED BY FAX OR E-MAIL.
3. COMPANY NAME AND ADDRESS MUST CONFORM ON ALL DOCUMENTS INCLUDING INSURANCE DOCUMENTS. A POST OFFICE BOX ADDRESS IS NOT ACCEPTABLE.
4. Bid/Proposal number must appear on all bids and related correspondence.
5. The Town of Greenwich is exempt from Federal and State Taxes.
6. The Town will consider an alternate bid only if bidders have been permitted to provide an alternate bid. An alternate bid must be clearly identified as such in order to be considered by the Town.
7. Stated prices are to be FOB destination inside delivery, unless otherwise specified herein.
8. Terms and Conditions indicated on reverse.



Edyta Jolicoeur, Buyer I

An Affirmative Action/Equal Opportunity Employer, M/F/H

Terms and Conditions

Bidders shall familiarize themselves with all provisions of the specifications and shall not at any time after submitting bid, dispute any of the specifications or assert that there was any misunderstanding in regard to the furnishing and delivering of the items called for in the proposal.

The Town of Greenwich reserves the right to issue addenda as needed on bids/proposals.

The Town of Greenwich reserves the right to reject any and all bids not deemed to be in the best interest of the Town of Greenwich, or to accept that bid which appears to be in the best interest of the Town of Greenwich. The Town of Greenwich reserves the right to waive any informalities in or reject any or all bids, or any part of any bid.

References to a particular trade name or manufacturer's catalog or model number are made for descriptive purposes to guide the bidder in interpreting the requirements of the Town of Greenwich. They should not be construed as, nor are they intended to exclude proposals on other types of materials, equipment and supplies. However, the bidder, if awarded a contract will be required to furnish the particular item referred to in the specification or description unless a departure or substitution is clearly noted and described in the proposal.

Respondents shall provide one proposal and bidders one bid price for each specified required line item with no more than one total lump sum bid, unless allowed to do otherwise by the solicitation. Respondents shall provide no more than one bid reply unless allowed by the solicitation. Bidders shall not include in their prices any Federal or State taxes from which the Town of Greenwich is exempt.

The successful bidder/s shall indemnify the Town of Greenwich against all losses, claims, actions and judgments brought or recovered against the contractor or the Town of Greenwich. Any respondent that takes exception to the insurance requirements set forth by the Town of Greenwich Risk Manager shall be deemed unresponsive.

No proposal shall be received from, or contract awarded to, any person, firm or corporation who is in default or in debt to the Town of Greenwich for non-performance of any contract, or who is a defaulter as surety or otherwise from any obligation to the Town of Greenwich.

Bids must be signed in ink by the vendor. No bids shall be made in pencil. Any bids showing any erasures or alterations must be initialed by the bidder in ink. Failure to sign and give all information requested in the proposal may result in the bid being rejected.

Quantities as listed on the bid sheets are estimated for bidding purposes only. Award of contract shall be for the quantities actually ordered as needed during the contract period. However, the Town of Greenwich reserves the right to increase or decrease the quantities by 10%.

Unit prices quoted shall be net exclusive of all taxes, and must include all transportation, delivery and unloading costs; fully prepaid F.O.B. destination in place inside delivery. Debris, if any, removed.

The Town of Greenwich reserves the right to make awards on an item by item, total or lump sum basis. Where an award is made on an item by item basis, the unit price prevails. The Town reserves the right to make award in best interest of its own operation. All awards are contingent upon certification by the Town Comptroller that funds are available in appropriate accounts.

It is understood that prices shall hold firm and prevail for the actual quantities required or ordered as needed during the life of the contract whether more or less than estimated quantities. Unit prices shall not be subject to any increase during the life of the contract.

All deliveries are to be made within the time period specified in the bid proposal upon receipt of written purchase order or authorized verbal requests except as may be otherwise arranged by Supplier and Purchaser. Receipt of contract is not authority to ship. Emergency deliveries are to be made within twenty-four (24) hours from receipt of a telephone request from the Town of Greenwich. All deliveries are to be made on business weekdays between the hours of 9:00 A.M. and 4:00 P.M. except as may be otherwise arranged by the Supplier and Purchaser.

In the event deliveries are not made as specified to a Town delivery point, the Town of Greenwich shall reserve the right to purchase any such bid item on the open market and to charge any increase in price paid over the current contract price to the account of the vendor.

All bids will be awarded or rejected within sixty (60) days of bid opening date or for the stated period of validity, if different. Therefore, bidder agrees that prices will remain firm for acceptance for that period.

Terms of payment to the Contractor shall be net/30 days after receipt of invoice and acceptance and approval of the services by the Town of Greenwich.

The contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The contractor, however, will take affirmative action to insure that minority group members are employed and are not discriminated against during employment. Such actions shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship.

The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract of understanding, a notice advising the labor union or worker's representative of the contractors' commitments under this specification and under rules, regulations and orders promulgated by the State.

"Affirmative Action" means procedures which establish hiring and employment goals, timetables, and practices to be implemented, with good faith efforts, for minority group members.

"Minority Group Members" as identified in EEO-4 reports shall mean Black, Hispanic, Asian or Pacific Islanders, American Indian, and Alaskan Natives.

The contractor or subcontractor offers and agrees to assign to the public purchasing body all right, title and interest in and to all causes of action it may have under Section 4 of the Clayton Act, 15 U.S.C. Section 15, or under Chapter 624 of the General Statutes of Connecticut, arising out of the purchase of services, property or intangibles of any kind pursuant to a public purchase contract or subcontract. This assignment shall be made and become effective at the time the public purchasing body awards or accepts such contract, without further acknowledgment by the parties.

TOWN OF GREENWICH, CT
REQUEST FOR BID #7561 DEADLINE: 06/02/2020 AT 2:00 PM
SURPLUS SALE OF ELECTRICAL VFD CAPACITY FILTERS

BACKGROUND

The Town of Greenwich Purchasing Department, on behalf of the Sewer Division of the Department of Public Works, is seeking bids for the sale of Electrical VFD Capacity Filters on a “As Is, Where Is” basis. The Town makes no guarantee as to the condition of the Capacity Filters.

See attached pictures, **Exhibit B**, for the condition of the Filters:

Exhibit B – Three (3) Electrical VFD Capacity Filters

The Town makes no guarantees or promises as to the usefulness, functionality, or safety of the Capacity Filters.

DESCRIPTION OF THE CAPACITY FILTERS

Harmonic Filter Capacitor Assembly
MTE Corporation
CAT. No. M-2021 Part No. CAPPANEL-003
Quantity: 3

The Capacity Filters will be sold as one lot. See **Exhibit C** for catalogue information of various components.

SURPLUS SALE PROCESS

Bidders shall respond to this RFB by completing and returning the Reply Sheet to the Purchasing Department before the deadline. Bids are not accepted by fax or e-mail. Bidder shall be responsible for actual delivery of the bid via mail or commercial express service to the **Town of Greenwich Purchasing Department** before the deadline. Please submit bids in a sealed envelope and clearly indicate **RFB#7561** on the lower left-hand corner of the envelope.

Payment for the Capacity Filters shall be in the form of a certified check or a bank check made out to: “Town of Greenwich”, in the full amount of the selling price, and shall be delivered to the Purchasing Department by the successful Bidder within **seven (7) business days after notification of award**.

The Town of Greenwich Bill of Sale shall be signed by the successful Bidder and the Town within **seven (7) business days after notification of award**. A copy of a Bill of Sale is attached as **Exhibit A**.

The successful Bidder shall remove the Capacity Filters at their own risk, within four (4) days of signing the Bill of Sale. **If the Bidder is unable to pick up the Capacity Filters, the Bidder will be responsible for the cost of the shipping charges and arranging to have someone on site to package the Capacity Filters for shipment and arranging for inside pick up and removal.**

Any questions relating to this RFB shall be addressed to Edyta Jolicoeur, Buyer I, at Edyta.Jolicoeur@greenwichct.org before **by 11:00 A.M. Tuesday, May 19th, 2020.**

ISSUANCE OF ADDENDA

The Town of Greenwich reserves the right to amend this solicitation by addenda. Addenda will be posted to the Town's website (www.greenwichct.gov/bids) up to 48 hours in advance of the bid/proposal's due date and time. **It is the bidder's responsibility to check the Town's website for addenda.** If in the Town's opinion revisions are of such a magnitude, the deadline for this solicitation may be extended in an addendum. In addition, addenda can change specifications, reply sheets, and times and dates for prebid meetings as well as due dates/deadlines for questions and bids/proposals. **No notification of addenda issuance will be made other than on the Town's website.**

TOWN OF GREENWICH, CT
REQUEST FOR BID #7561 DEADLINE: 06/02/2020 AT 2:00 PM
SURPLUS SALE OF ELECTRICAL VFD CAPACITY FILTERS
REPLY SHEET (Page 1 of 1)

Bidders shall indicate below the Total Price:

Three (3) Electrical VFD Capacity Filters \$ _____

BIDDER'S NAME: _____

ADDRESS: _____

TELEPHONE #: _____

FAX #: _____

E-MAIL ADDRESS: _____

AUTHORIZED SIGNATURE: _____

PRINT NAME: _____

BILL OF SALE

THE TOWN OF GREENWICH, CT HEREBY SELLS TO:

Description of items sold:

TOTAL AMOUNT OF SALE: \$ _____

THE CAPACITY FILTERS ARE BEING SOLD "AS IS", "WHERE IS". THE TOWN OF GREENWICH DOES NOT GUARANTEE THE SAFETY OR CONDITION OF THE CAPACITY FILTERS.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, THAT HAVE BEEN MADE OR ARE BEING MADE BY THE TOWN OF GREENWICH WITH REGARD TO THE CAPACITY FILTERS. THE BUYER OF THE CAPACITY FILTERS WAIVES ANY CLAIM OF LIABILITY AGAINST THE TOWN OF GREENWICH FOR DAMAGES OR INJURIES CAUSED OR OCCASIONED BY THE CAPACITY FILTERS.

THE BUYER AGREES TO INDEMNIFY, DEFEND AND HOLD HARMLESS THE TOWN OF GREENWICH, ITS AGENTS, SERVANTS AND EMPLOYEES, AGAINST ALL LOSSES, CLAIMS, ACTIONS AND JUDGMENTS BROUGHT AGAINST THE BUYER OR THE TOWN OF GREENWICH, ITS AGENTS, SERVANTS AND EMPLOYEES, CONCERNING THE SALES TRANSACTION OR THE CAPACITY FILTERS WHICH HAVE BEEN PURCHASED FROM THE TOWN OF GREENWICH BY THIS BILL OF SALE AND CONTRACT.

BY THIS BILL OF SALE, THE BUYER AGREES FOR HIMSELF AND HIS AGENTS, SERVANTS AND EMPLOYEES, AND HIS AND THEIR SUCCESSORS, VENDEES AND ASSIGNS, THAT HE AND THEY WILL NOT USE THE ITEMS PURCHASED BY THIS BILL OF SALE TO PARTICIPATE IN ANY GOVERNMENTAL FUNCTIONS OF THE TOWN OF GREENWICH, WHETHER EMERGENCY OR OTHERWISE.

BUYER'S SIGNATURE _____ Date: _____

TOWN OF GREENWICH
PURCHASING AGENT _____ Date: _____



Harmonic Filter Capacitor Assembly
MTE Corporation
CAT. No. M-2021
Part No. CAPPANEL-003
Quantity: 3



Harmonic Filters
MTE Corporation
CAT. No. M3-0050PD-12
50 HP; 3 Phase; 60 Hz; 480V
Quantity: 3





MTE Corporation
No. ML0082G085
82A Max; 3 Phase Reactors;
600V Max.
Part of the Filters shown
above



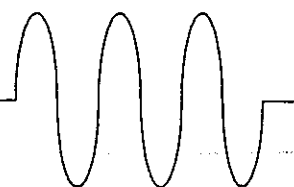
KLR Series Line Reactors
Trans Coil Inc. (TCI)
Model No. KLR 110ACB
3 Phase; 60 Hz; 600V Max.; 110 A
Quantity: 3



MATRIX FILTER TM

SERIES A

USER MANUAL



PART NO. INSTR - 002
REL. 011018

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IMPORTANT USER INFORMATION

NOTICE

The MTE Corporation Matrix Filter is designed for harmonic mitigation of six 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.

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1. 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 1, 2 and 3 on terminal block 1TB. 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).

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 THE DRIVE 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.

2. INTRODUCTION

This manual was specifically developed to assist in the installation, interconnection and operation of the MTE Corporation Matrix 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 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 has accumulated on the internal components of the filter before applying power.

Repair/Exchange Procedure

MTE Corporation requires a Returned 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 call us for assistance at:

Phone: 262-253-8200

FAX: 262-253-8222

3. MODEL NUMBER CODES

Standard series A model number codes are of the form MA-BCDEFG-XY with the number coded as outlined below.

Character	Description	Code
M	Always M for Matrix Filter	
A	Designates number of input phases	1 Single phase 3 Three phase
B	Characters B through E designate the Horsepower rating of the filter using four digits with leading zeros	<i>Example: 0075 is a 75 Hp filter</i>
C		
D		
E		
F	Indicates mechanical configuration	N Nema1
		R Reactive components only
		M Magnetic components only
		P Panel mounted
		W Weather proof
		D Dust tight
		H Hose down
G	Designates input voltage and frequency	A 208-240 v / 60Hz
		B 240 v / 50 Hz
		C 380-415 v / 50 Hz
		D 480 v / 60 Hz
		E 600 v / 60 Hz
		F 690 v / 50 Hz
		G 690 v / 60 Hz
		H 120 v / 60 Hz
		J
		K
	L 277 v / 60Hz	
XY	Designates filter guaranteed harmonic current performance	12 is 12% THID
		8 is 8% THID

4. SPECIFICATIONS

Ratings

480 VAC Three Phase Input Filter Ratings (Panel Mounted)								
THID Rating			12%			8%		
HP	Maximum Input Amps RMS	Maximum Output Amps RMS	Efficiency (Typical) (%)	Power Dissipation @ Rated HP (Typical) (Watts)	Weight (lbs)	Efficiency (Typical) (%)	Power Dissipation @ Rated HP (Typical) (Watts)	Weight (lbs)
3	6	6	97	47	27	98	40	37
5	9	10	98	66	35	98	63	42
7.5	13	14	98	98	35	98	98	42
10	16	18	98	114	45	98	108	60
15	24	27	98	166	50	98	170	75
20	31	34	98	204	85	98	212	100
25	39	43	98	275	85	98	257	100
30	46	51	98	295	105	98	323	130
40	60	66	98	390	125	98	374	155
50	75	82	98	475	150	98	506	190
60	89	97	98	586	150	98	584	190
75	110	121	98	659	200	98	655	250
100	143	157	98	837	215	98	838	280
125	179	197	98	971	250	98	1051	305
150	207	228	99	1018	275	99	1057	340
200	276	304	98	1521	380	98	1775	600
250	347	382	99	1767	450	98	1889	675
300	415	457	99	1994	575	99	2099	750

Service Conditions

Load: 6 pulse variable torque rectifier only

Input voltage: 480 VAC +/- 10%, 60 ± 0.75 Hz, 3 phase

Input voltage line unbalance: 1% maximum

Maximum source impedance: 6.00%

Minimum source impedance: 1.5%

Service Factor: 1.00

SPECIFICATIONS – continued

Ambient Temperature

Operating: -40 to +50 degrees C (panel mounted construction)
Storage: -40 to +90 degrees C

Altitude: 0 to 3300 Feet above sea level. Refer to Figure 1 for altitude derating.

Relative Humidity: 0 to 95% non -condensing

Agency Approvals

UL-508C File E180243 Component Recognized
(3-1000 HP, 120 VAC through 600 VAC
50, 50/60, 60 HZ Three Phases

CAN/CSA C22, 2 No. 14-95

Performance

Total Harmonic Current Distortion:

Standard: 12% maximum no load to full load

Optional: 8% maximum no load to full load

Standby Current:

Without Optional Capacitor Contactor: Refer to Table 1

With Optional Capacitor Contactor: Refer to Drive Users Manual

12% Filter Voltage Regulation with nominal 480 volts RMS source

Maximum output voltage at no load: 502 volts RMS, 710 volts peak

Maximum PCC* voltage with 6.00% source impedance at no load: 490 volts RMS, 693 volts peak

Minimum output voltage at full load: 460 volts RMS, 600 volts peak

8% Filter Voltage Regulation with nominal 480 volts RMS source

Maximum output voltage at no load: 502 volts RMS, 710 volts peak

Maximum PCC voltage with 6.00% source impedance at no load: 490 volts RMS, 693 volts peak

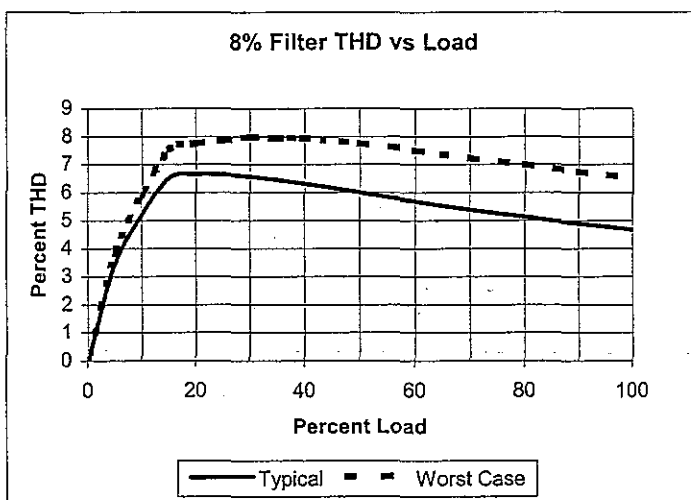
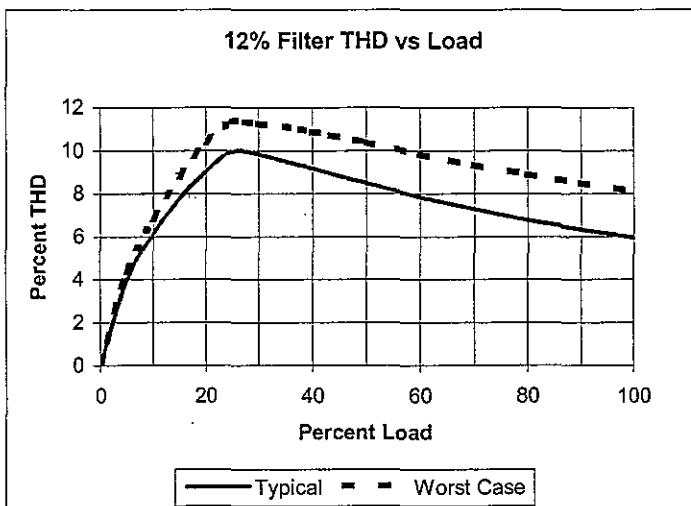
Minimum output voltage at full load: 460 volts RMS, 600 volts peak

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

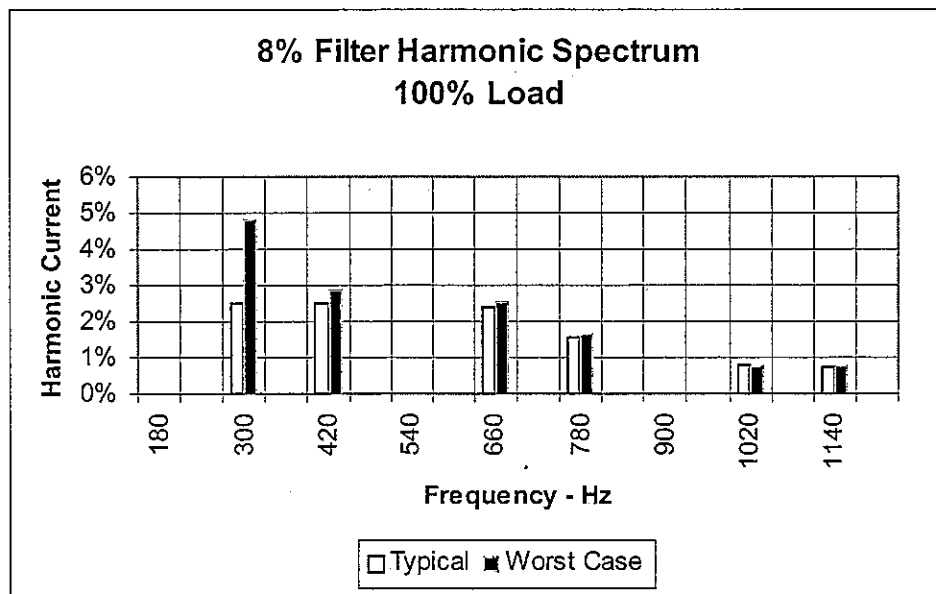
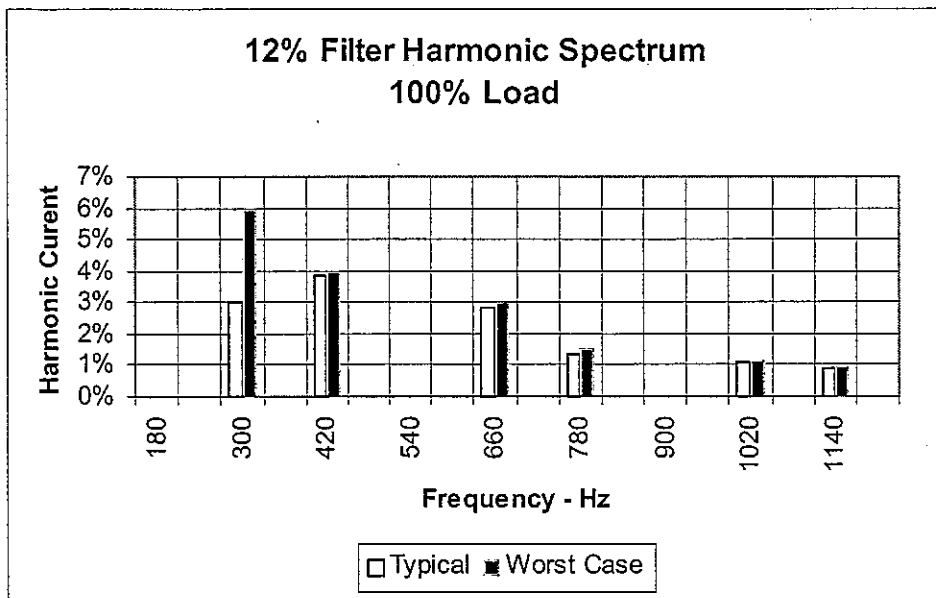
SPECIFICATIONS - continued

**Table 1. 480 VAC Three Phase Input Filters
 Standby Current Ratings Without Optional Capacitor Contactor**

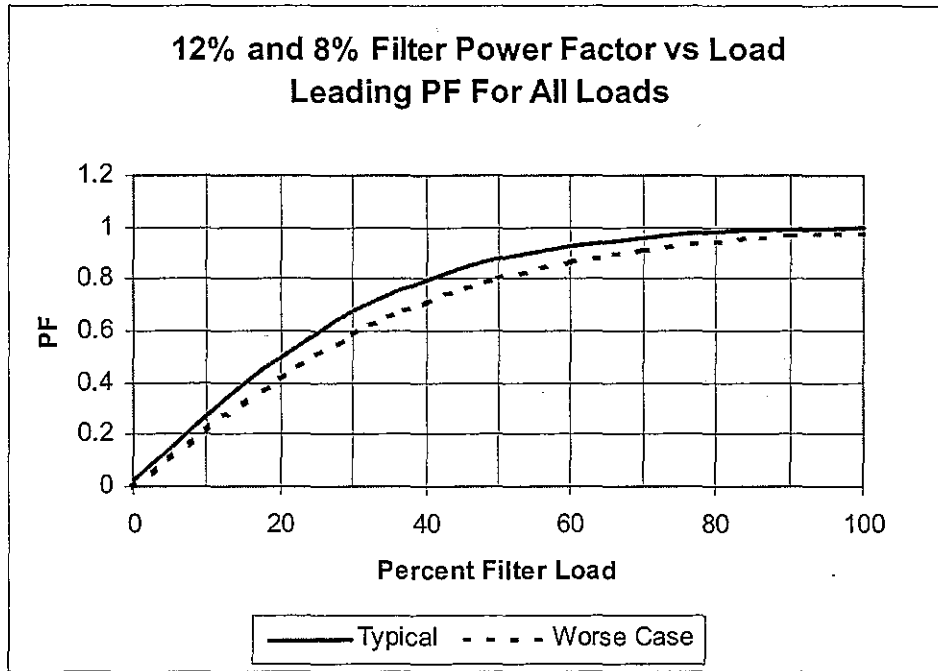
HP	Standby Current (Typical) Amps RMS	HP	Standby Current (Typical) Amps RMS	HP	Standby Current (Typical) Amps RMS
3	1.7	25	11.0	100	41.0
5	2.3	30	16.0	125	64.0
7-1/2	4.0	40	16.0	150	81.0
10	4.5	50	23.0	200	101.0
15	7.9	60	23.0	250	121.0
20	11.0	75	27.0	300	148.0



SPECIFICATIONS – continued



SPECIFICATIONS - continued

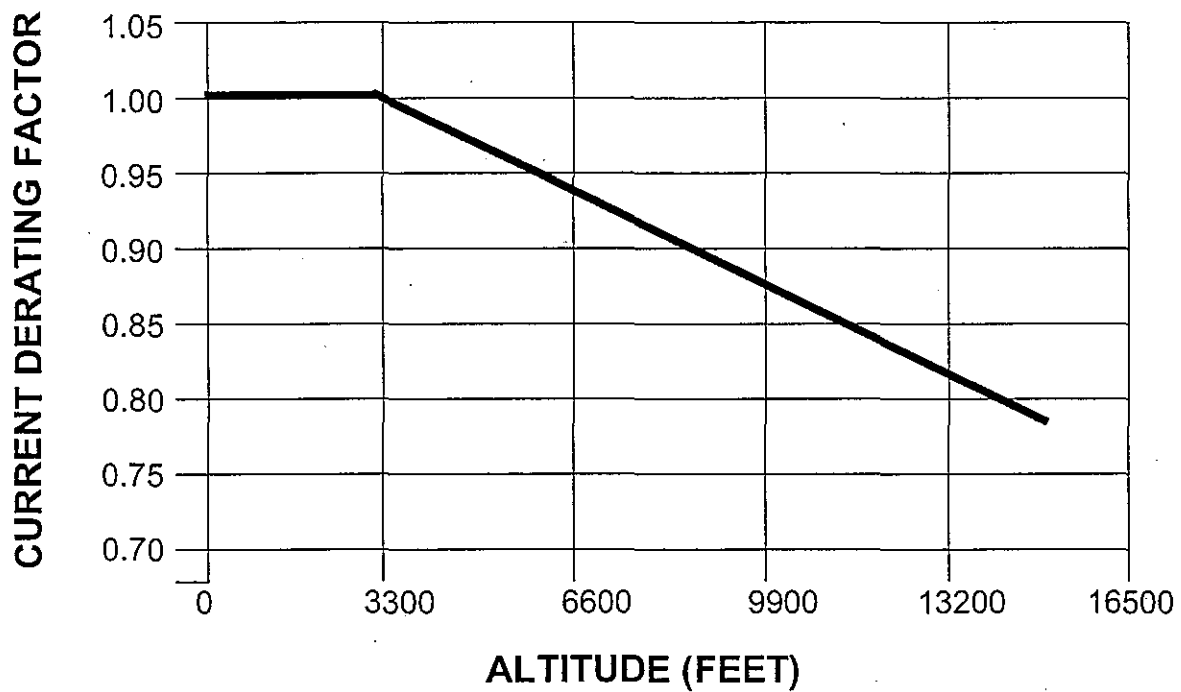


Performance With Unbalanced Line Voltage (Typical)

All Components at Nominal Values
 and Worse Case Service Conditions

	12% Filter 100% Load	8% Filter 100% Load
Nominal THID	5.85%	4.71%
1% Unbalance	6.09%	4.92%
2% Unbalance	6.64%	5.46%
3% Unbalance	7.45%	6.29%
12% Filter 30% Load 8% Filter 30% Load		
Nominal THID	9.38%	6.42%
1% Unbalance	9.79%	6.90%
2% Unbalance	10.97%	8.13%
3% Unbalance	12.66%	9.80%

Figure 1. Altitude Derating Curve



5. INSTALLATION INSTRUCTIONS

Filter Installation

Panel mounted filters are designed for mounting in the vertical plane in the customer's enclosure. Include the power dissipation of the filter along with all the other components located in the panel to determine the internal temperature rise and cooling requirements of the enclosure.

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.

The Matrix Filters are supplied as sub-panel and panel mountable components that are designed to be mounted in a vertical position on a main panel located within an appropriate electrical enclosure. Allow minimum side clearances of four (4) inches and vertical clearances of six (6) inches for proper heat dissipation and access. Figures 2 through 11 contain outline drawings for the various ratings and show proper mounting orientation.

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.

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 100,000 rms symmetrical amperes at 480 volts when protected by Bussman type JJS, KTK, KTK - R, SPP or T class fuses.

For 480VAC applications rated 15 Hp and below, interconnection between the filter, its power source, and the drive is shown in Figure 12. 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. Table 2 lists the wire range and terminal torque requirements for the power input and output connections by horsepower rating.

For 480 VAC filters rated 20 Hp or more, the filter reactors are supplied on a sub-panel and the filter capacitors are supplied on one or more assemblies. Refer to Figure 13 for the interconnection diagram. The capacitor assembly should be located in the lowest temperature regions of the enclosure – generally toward the bottom – and the reactor assembly may be located in any region where the ambient temperature does not exceed 50 degrees C. Size the conductors interconnecting the reactor and capacitor assemblies to carry the current shown in Table 3. For terminal specifications on the capacitor assembly, refer to Table 4.

**INSTALLATION
 INSTRUCTIONS – continued**

**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.

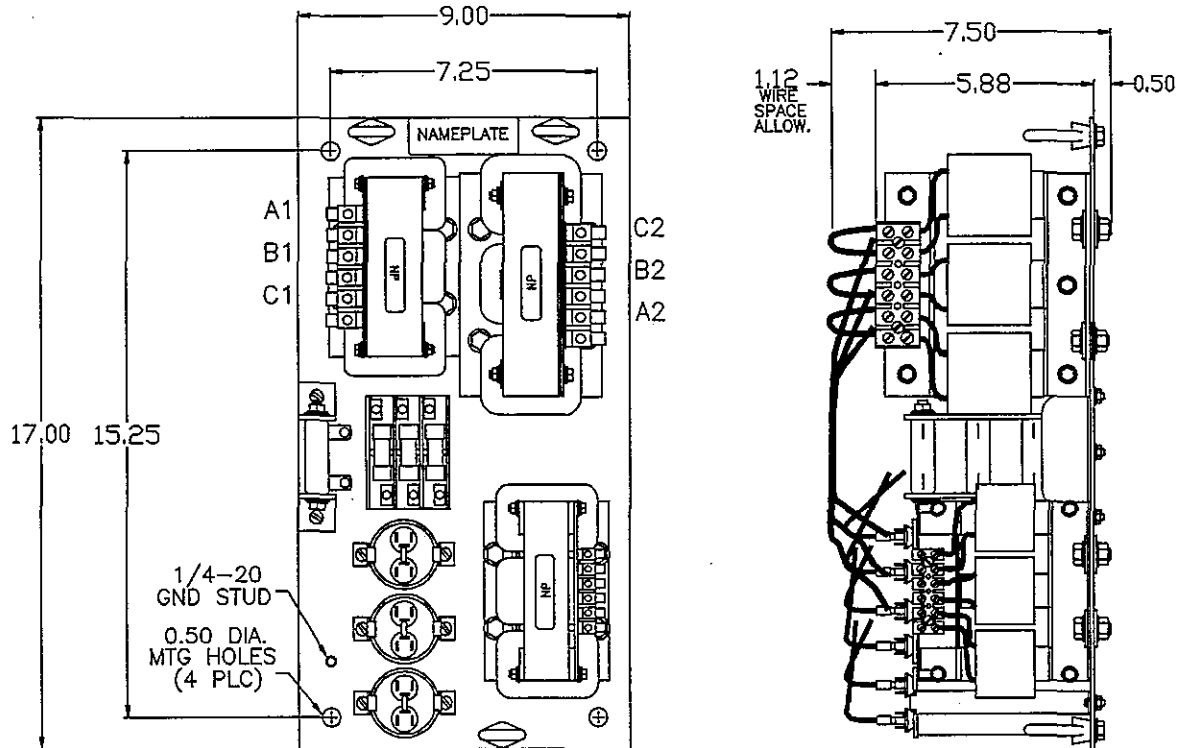
Table 2. Input and Output Terminal Specifications

Filter Rating(HP)	Input Terminals		Output Terminals	
	Wire Range (AWG)	Terminal Torque (in-lbs)	Wire Range (AWG)	Terminal Torque (in-lbs)
3	22 -14	4.5	22 – 14	4.5
5	22 - 14	4.5	22 – 14	4.5
7.5	22 - 14	4.5	22 – 5	16
10	22 - 5	16	22 – 5	16
15	22 - 5	16	22 – 5	16
20	22 - 5	16	18 – 4	20
25	22 - 5	16	18 – 4	20
30	18 – 4	20	18 – 4	20
40	18 – 4	20	6-4 2-0	45 50
50	6-4 2-0	45 50	6-4 2-0	45 50
60	6-4 2-0	45 50	6-4 2-0	45 50
75	6-4 2-0	45 50	6-4 2-0	45 50
100	6-4 2-0	45 50	2-0000	150
125	2 – 0000	150	2 – 0000	150
150	2 – 0000	150	2 – 0000	150
200	2-0000	150	00 000-0000 250-350 MCM 500 MCM	180 250 325 375
250	00 000-0000 250-350 MCM 500 MCM	180 250 325 375	00 000-0000 250-350 MCM 500 MCM	180 250 325 375
300	00 000-0000 250-350 MCM 500 MCM	180 250 325 375	00 000-0000 250-350 MCM 500 MCM	180 250 325 375

INSTALLATION INSTRUCTIONS – continued

Figure 2. 3 – 10 HP, 480 VAC Outline Drawing

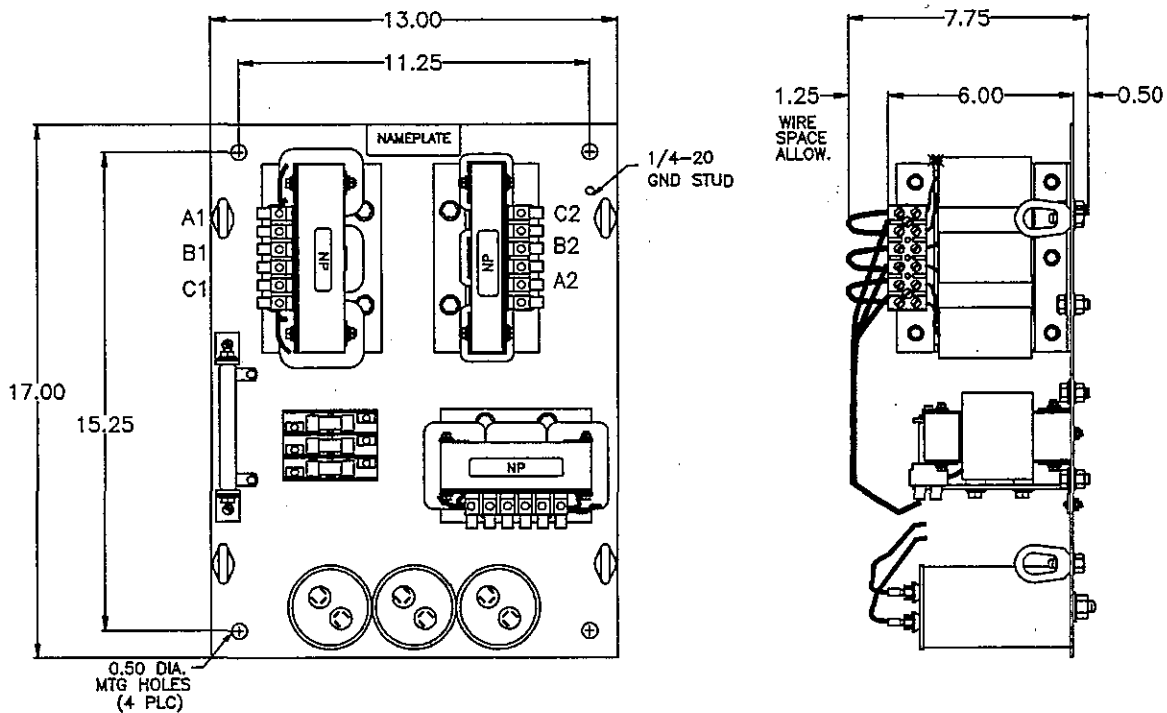
All dimensions are in inches



INSTALLATION INSTRUCTIONS – continued

Figure 3. 15 HP, 480 VAC Outline Drawing

All dimensions are in inches

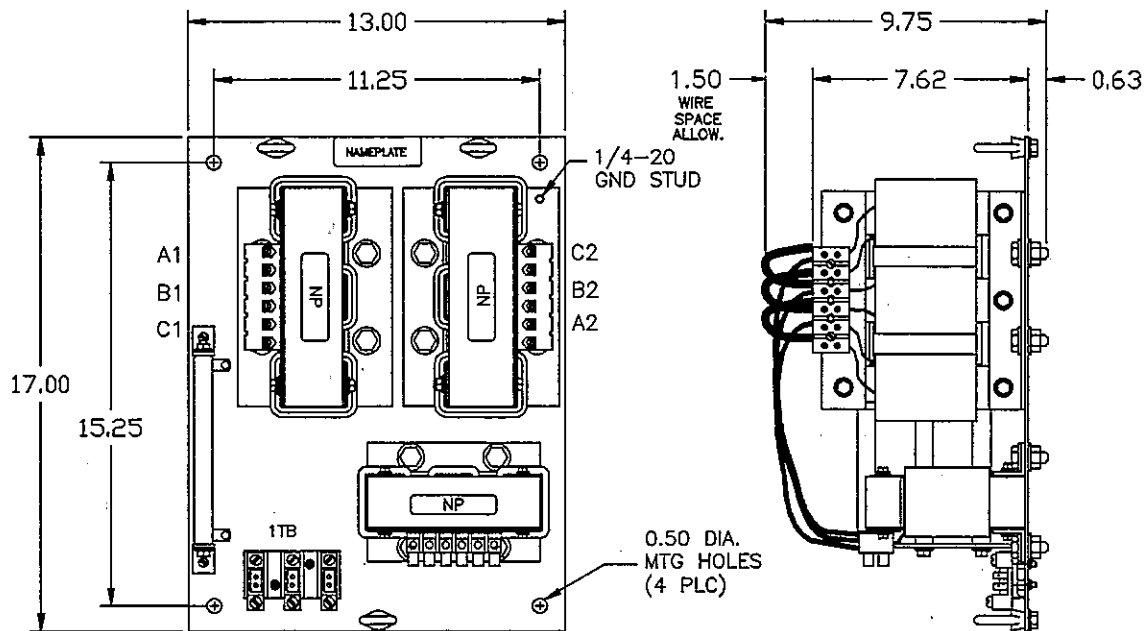


INSTALLATION INSTRUCTIONS – continued

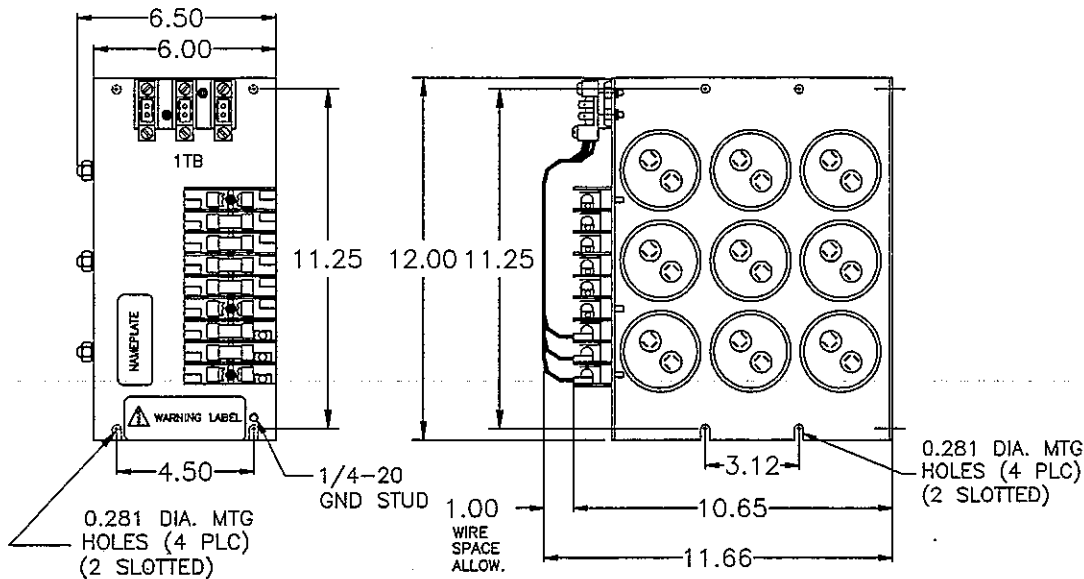
Figure 4. 20 - 40 HP, 480 VAC Outline Drawing

All dimensions are in inches

REACTOR ASSEMBLY



CAPACITOR ASSEMBLY

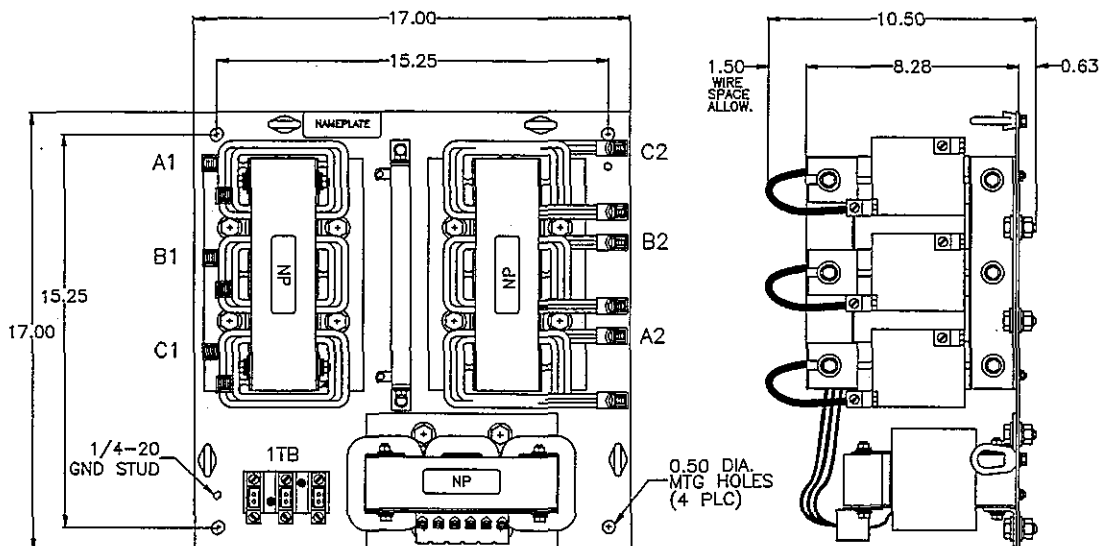


NOTE: CAPACITOR ASSEMBLY MAY BE MOUNTED IN EITHER PLANE

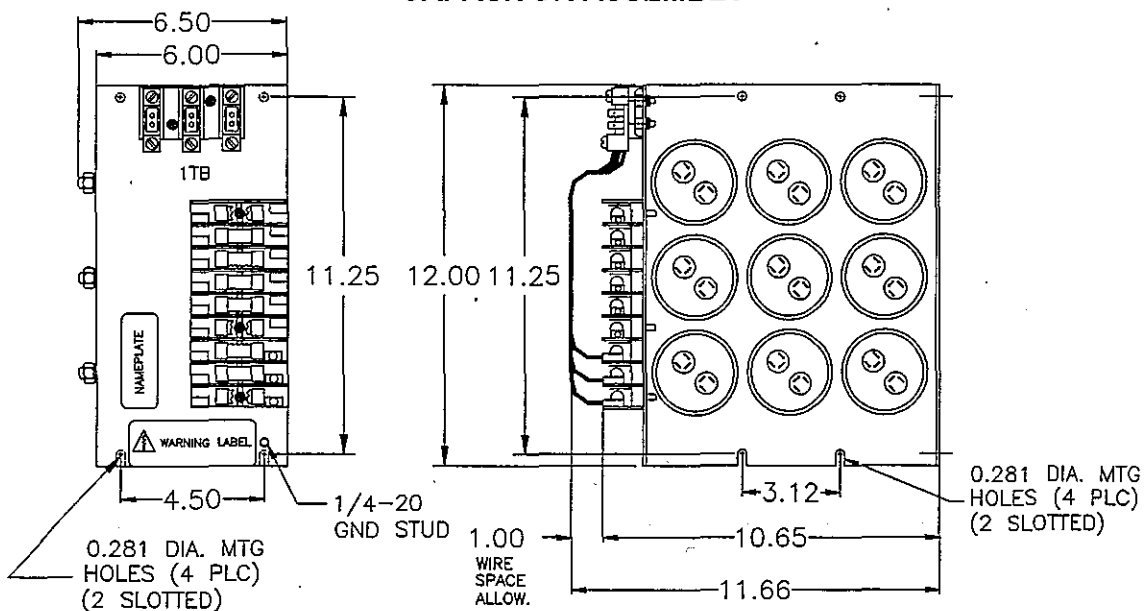
INSTALLATION INSTRUCTIONS – continued

Figure 5. 50 - 60 HP, 480 VAC Outline Drawing
 All dimensions are in inches

REACTOR ASSEMBLY



CAPACITOR ASSEMBLY



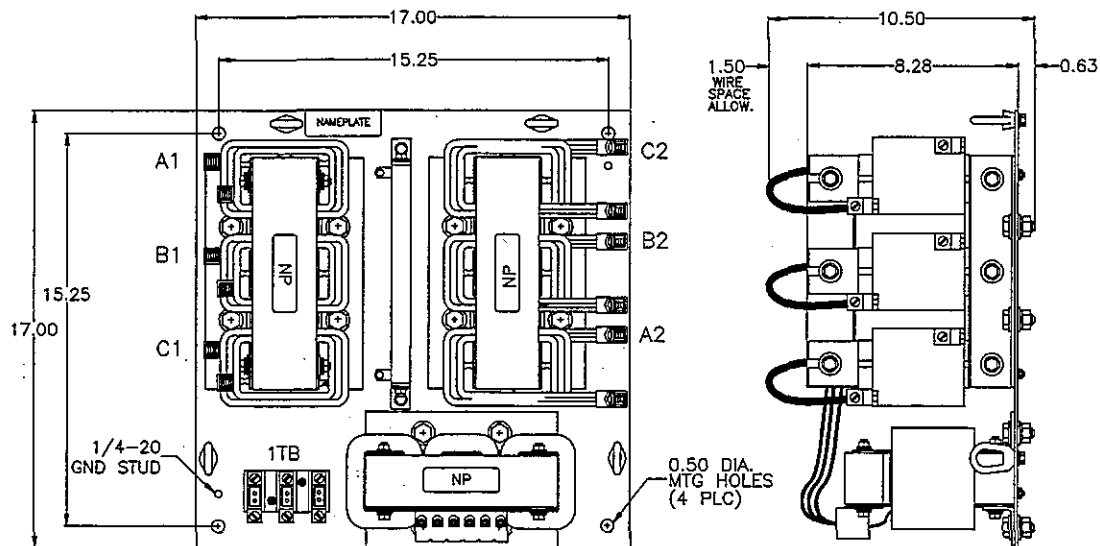
NOTE: CAPACITOR ASSEMBLY MAY BE MOUNTED IN EITHER PLANE

INSTALLATION INSTRUCTIONS – continued

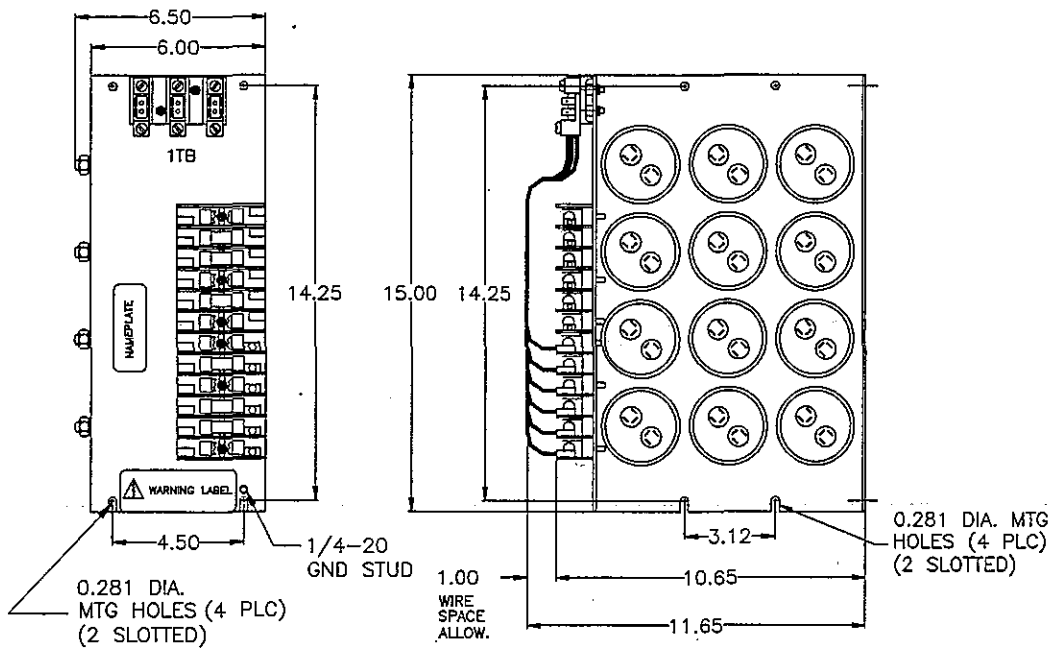
Figure 6. 75 HP, 480 VAC Outline Drawing

All dimensions are in inches

REACTOR ASSEMBLY



CAPACITOR ASSEMBLY



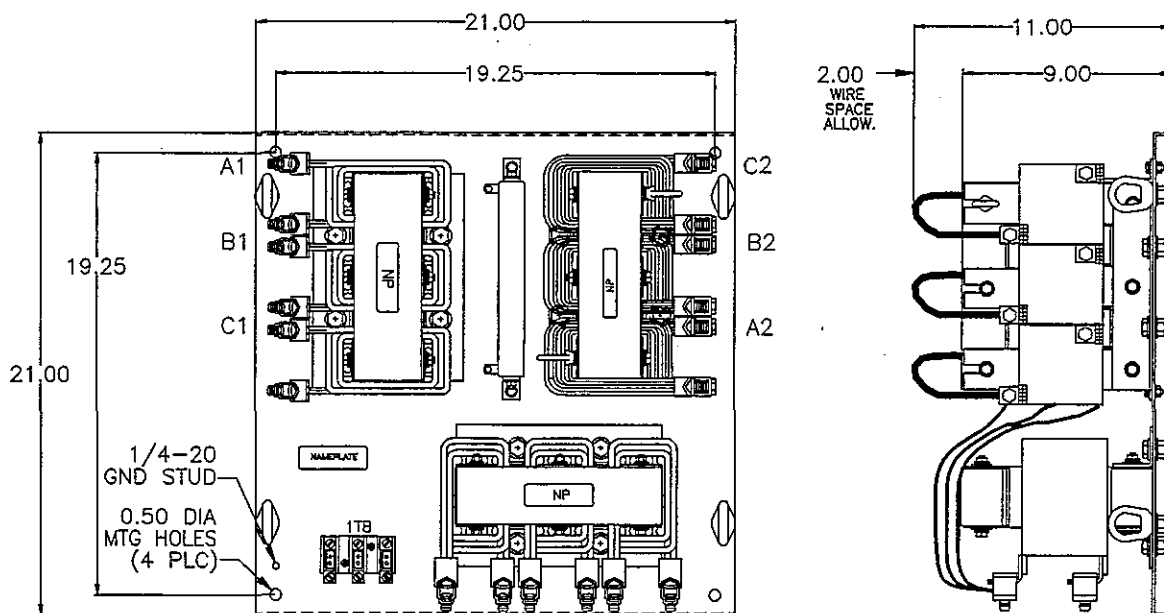
NOTE: CAPACITOR ASSEMBLY MAY BE MOUNTED IN EITHER PLANE

INSTALLATION INSTRUCTIONS – continued

Figure 7. 100 HP, 480 VAC Reactor Assembly Outline Drawing

All dimensions are in inches

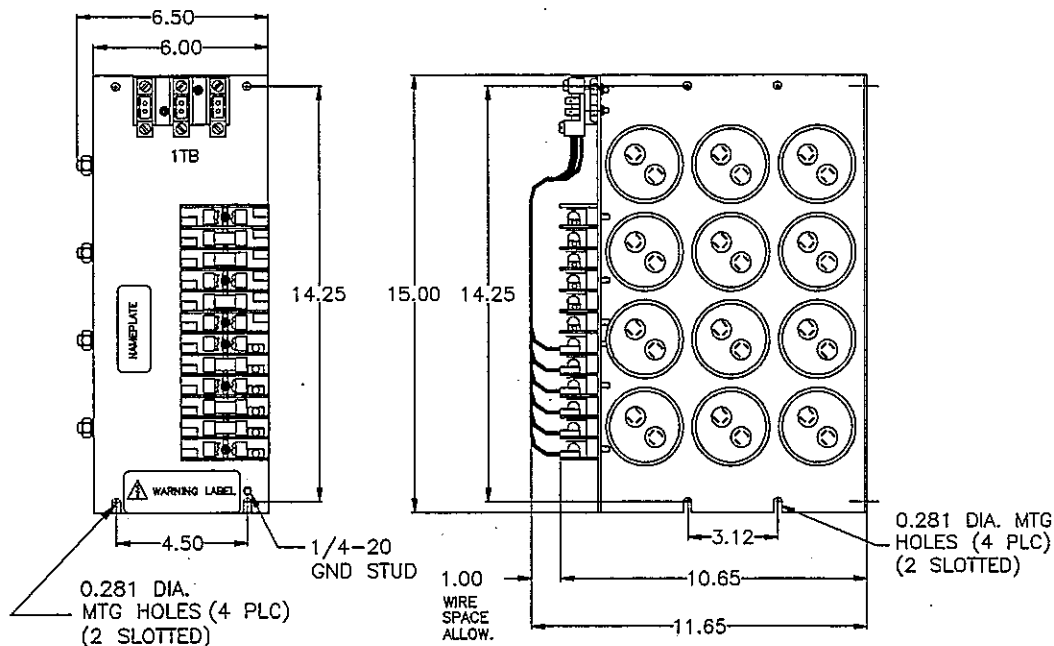
REACTOR ASSEMBLY



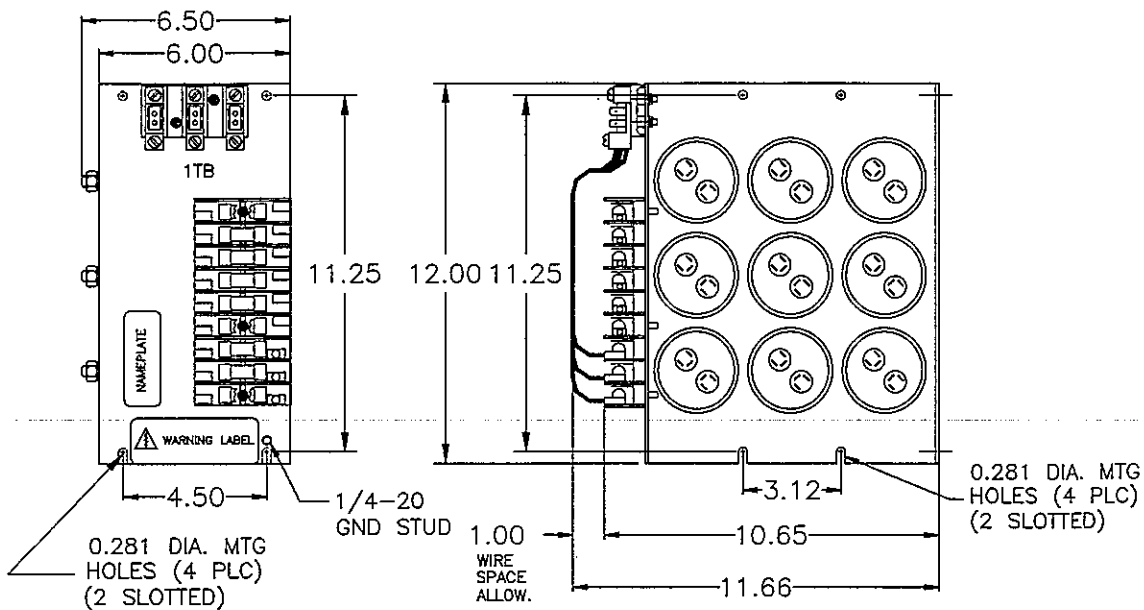
INSTALLATION INSTRUCTIONS – continued

Figure 8. 100 HP, 480 VAC Capacitor Assembly Outline Drawing

All dimensions are in inches



NOTE: TWO CAPACITOR ASSEMBLIES REQUIRED

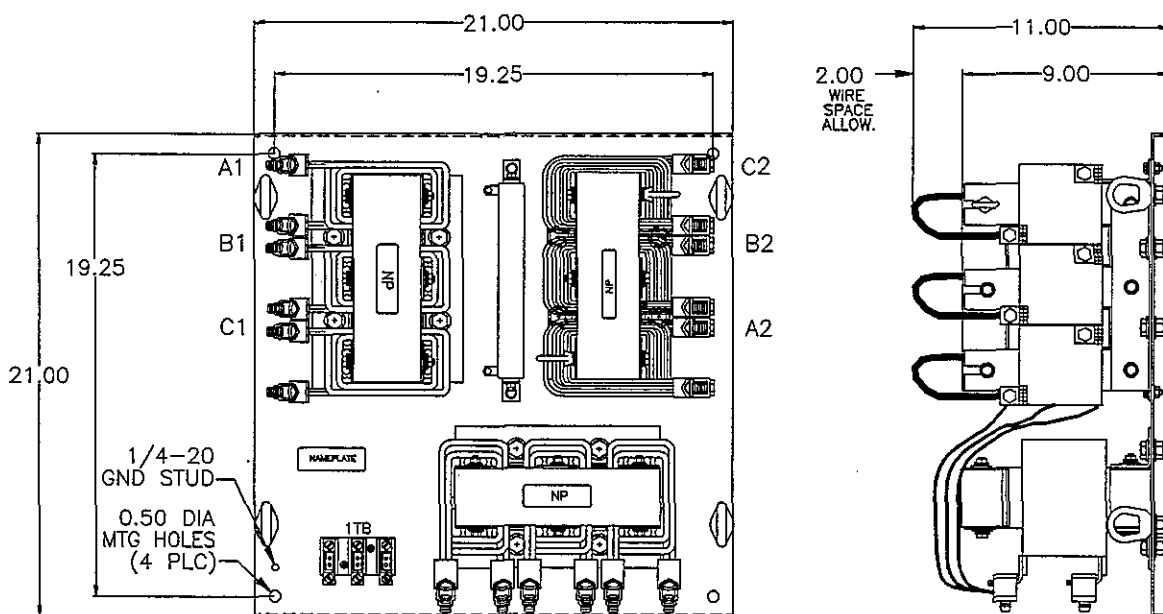


INSTALLATION INSTRUCTIONS – continued

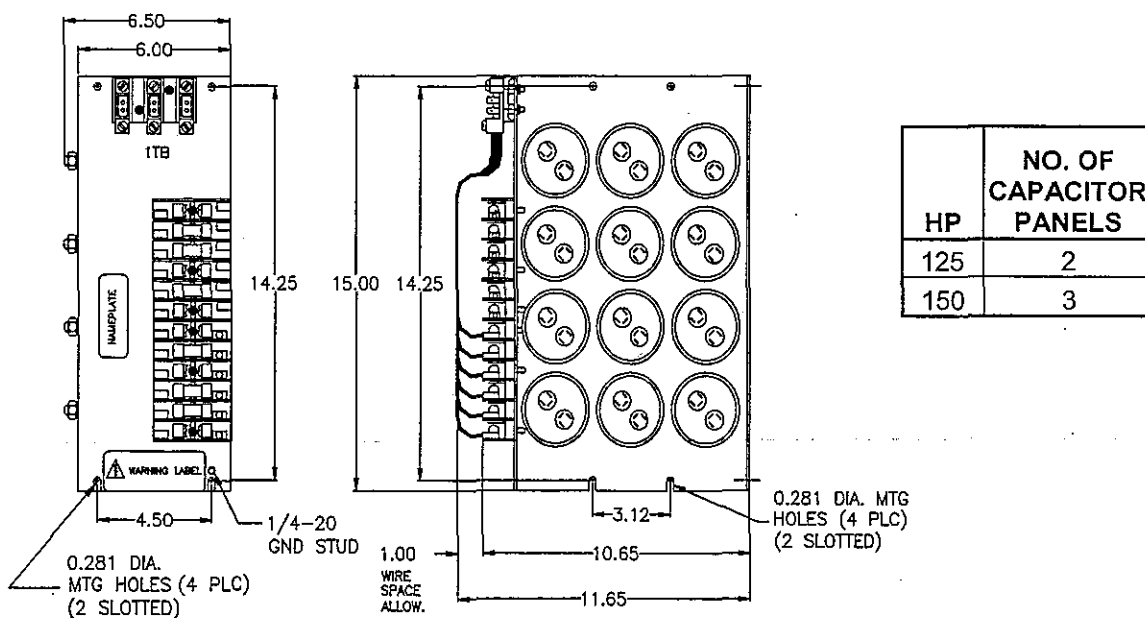
Figure 9. 125 - 150 HP, 480 VAC Outline Drawing

All dimensions are in inches

REACTOR ASSEMBLY



NOTE: SEE TABLE FOR NUMBER OF CAPACITOR ASSEMBLIES

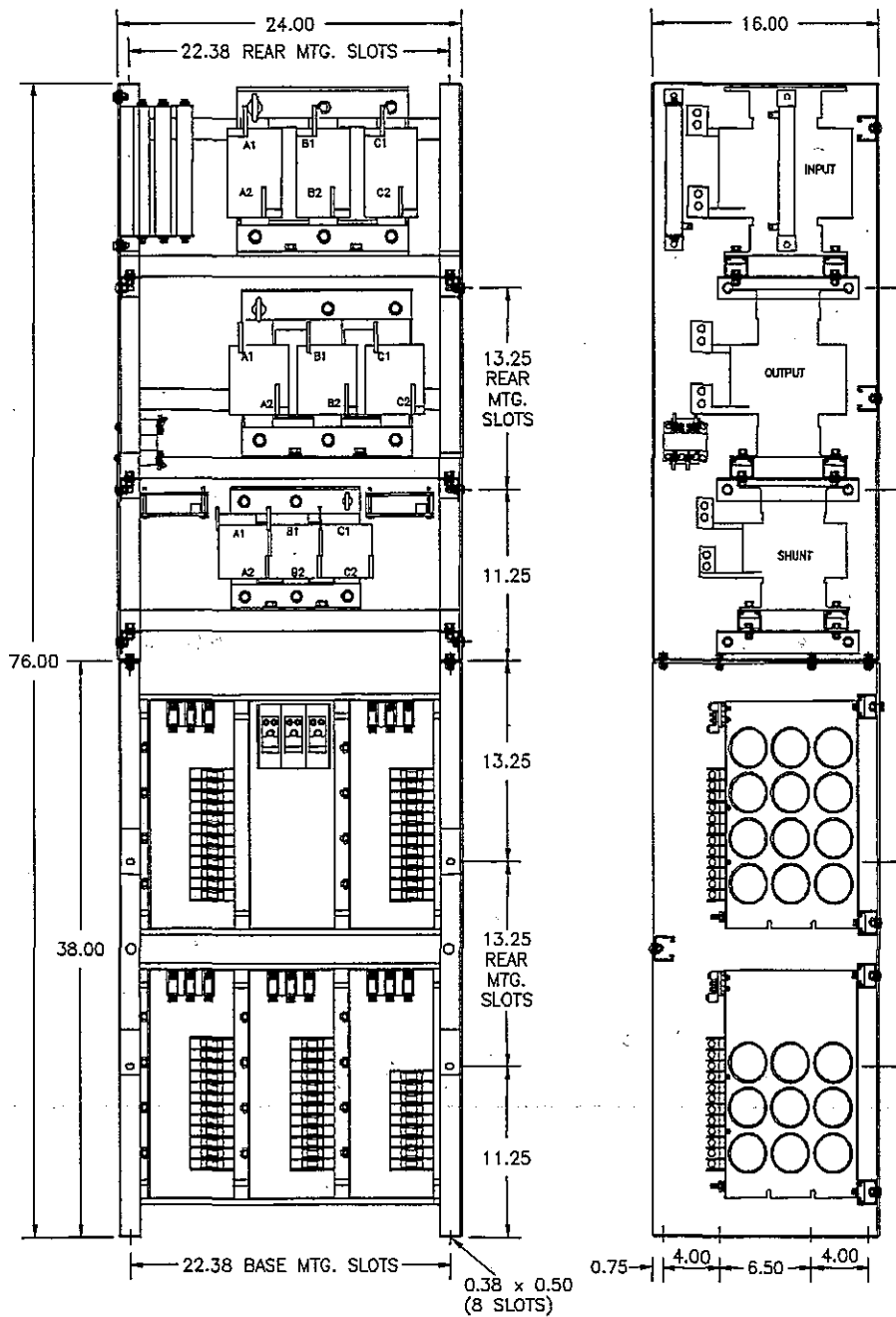


NOTE: CAPACITOR ASSEMBLY MAY BE MOUNTED IN EITHER PLANE

INSTALLATION INSTRUCTIONS – continued

Figure 10. 200 - 300 HP, 480 VAC Vertical Mounting Outline Drawing

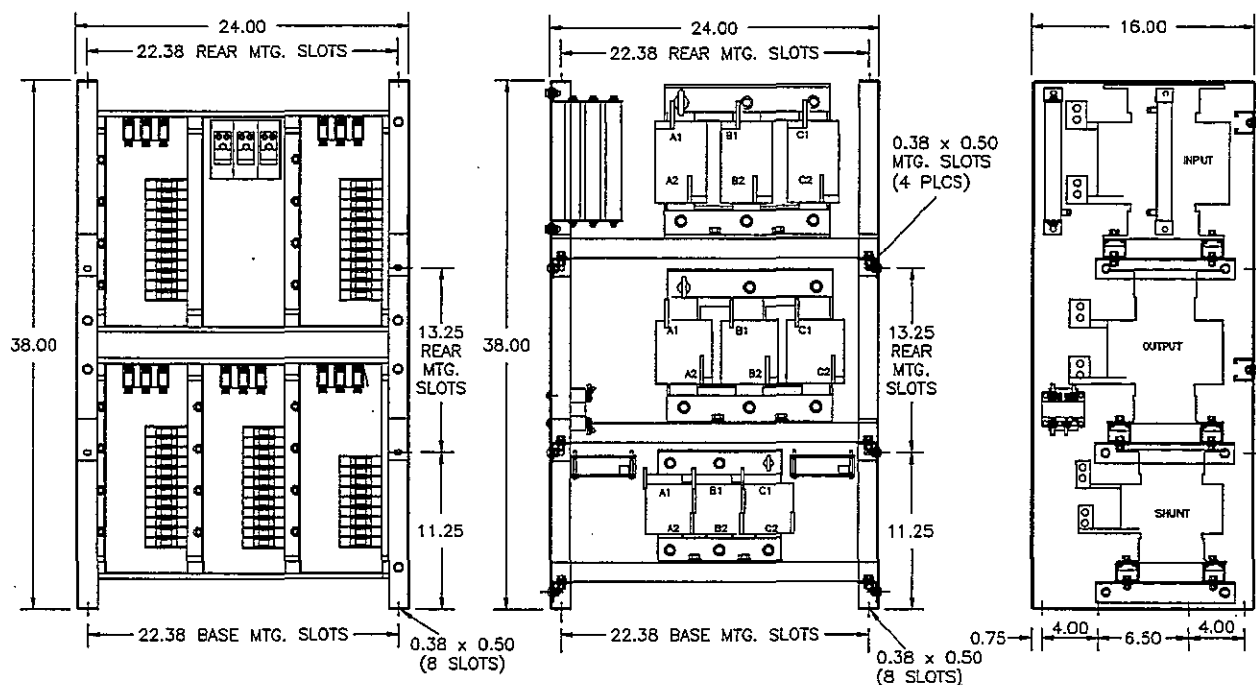
All dimensions are in inches



INSTALLATION INSTRUCTIONS – continued

Figure 11. 200 - 300 HP, 480 VAC Horizontal Mounting Outline Drawing

All dimensions are in inches

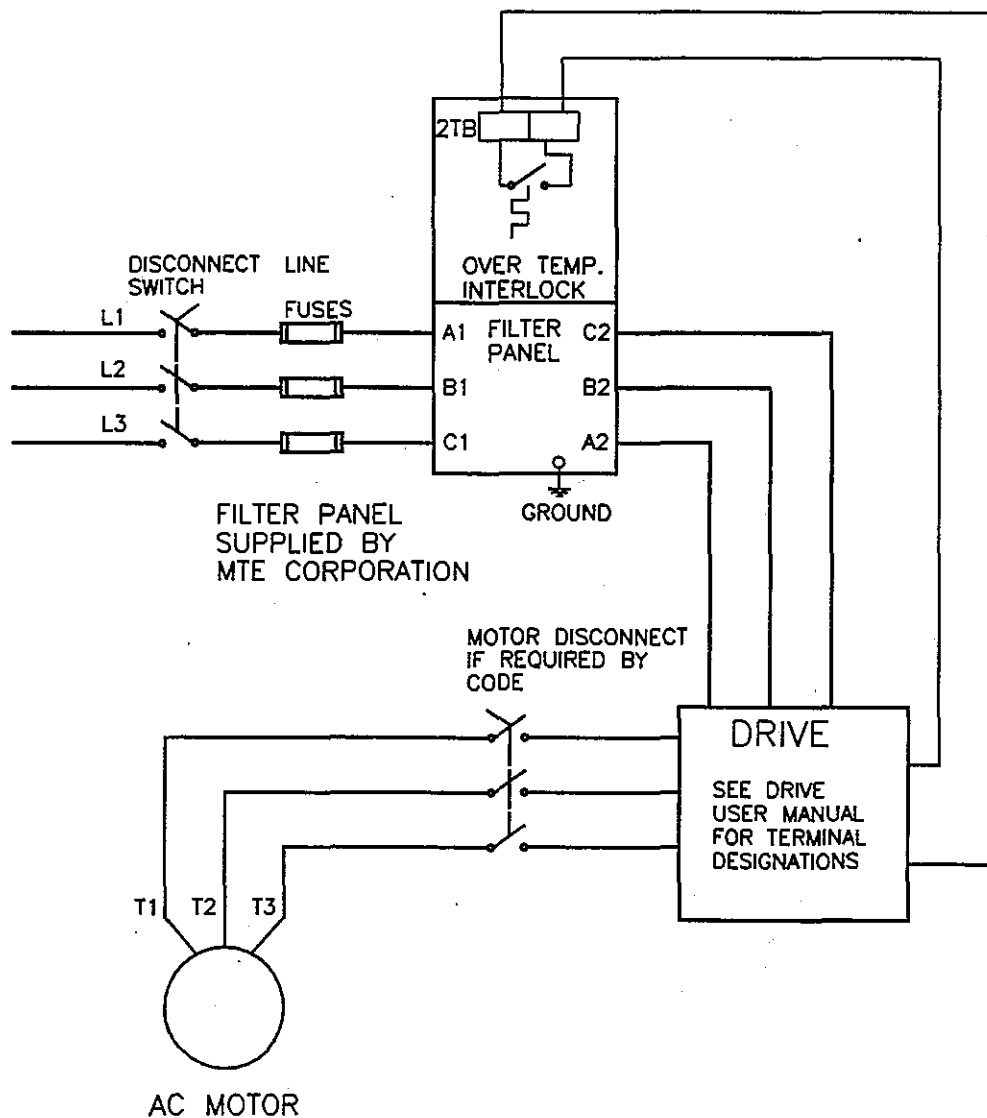


480 VAC Matrix Filters rated 200 HP through 300 HP, are constructed from a reactor assembly and a capacitor assembly. These assemblies are designed to be mounted vertically. The reactor assembly may be mounted above the capacitor assembly as shown in Figure 10 or the assemblies may be mounted separately as shown in Figure 11. The capacitor assembly should be located in the lowest temperature regions of the enclosure – generally toward the bottom.

The reactor and capacitor assemblies are shipped vertically oriented bolted and banded front-to-back to a common pallet. Wiring is provided to complete the electrical connection between these two assemblies when mounted vertically as shown in Figure 10.

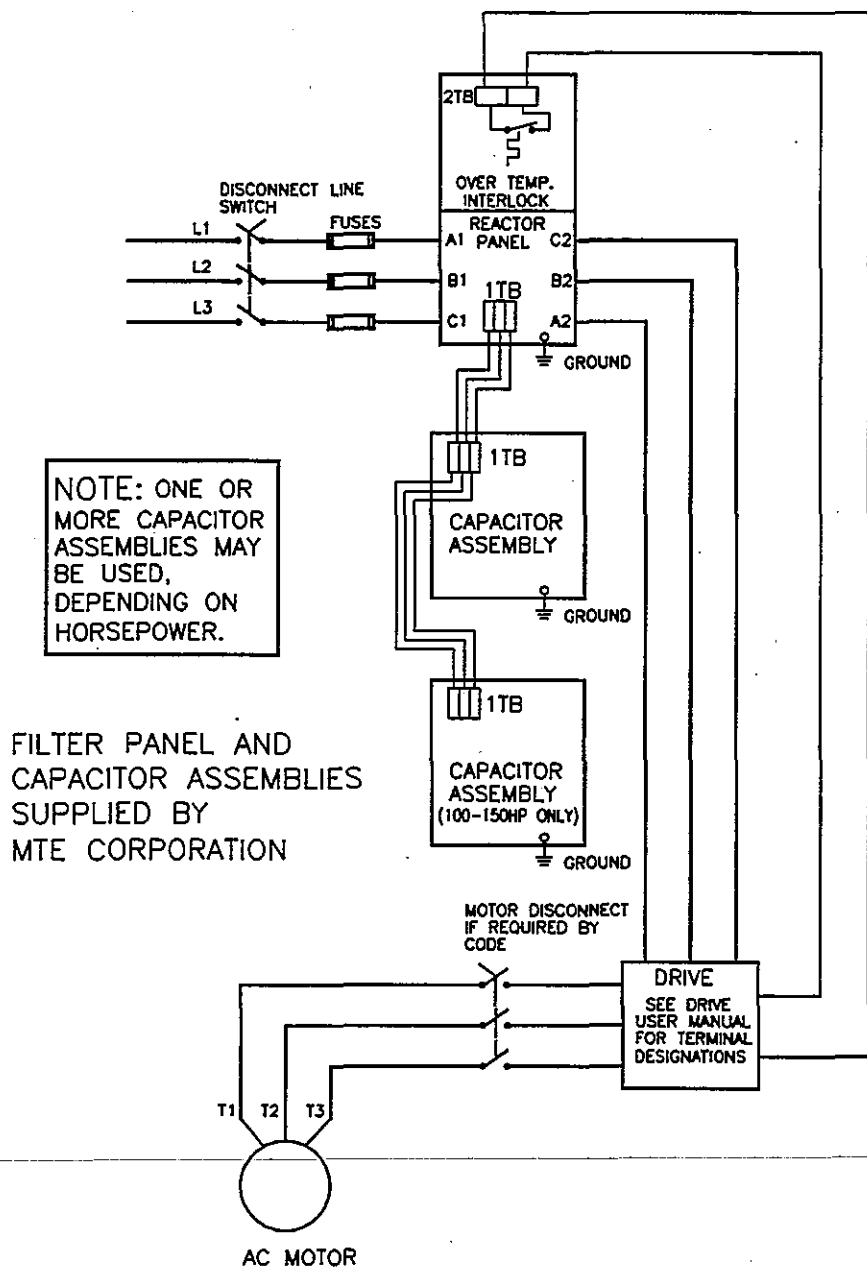
INSTALLATION INSTRUCTIONS – continued

Figure 12. 3 – 15 HP Interconnection Diagram



INSTALLATION INSTRUCTIONS – continued

Figure 13. 20 – 300 HP Interconnection Diagram



INSTALLATION INSTRUCTIONS – continued

Table 3. Capacitor Assembly Current Ratings

HP	Current Rating (Amps RMS)	HP	Current Rating (Amps RMS)
20	13	100	50
25	13	125	79
30	20	150	100
40	20	200	124
50	28	250	149
60	28	300	182
75	34		

Table 4. Capacitor Assembly Terminal Specifications

Filter Rating (HP)	Capacitor Terminals <i>NOTE: Two terminals per phase</i>	
	Wire Range (AWG)	Terminal Torque (in lbs)
20 – 150 HP	14 – 10	35
	8	40
	4 – 6	45
	1/0 – 3	50
200 – 300 HP	6-00	120

6. FILTER DESCRIPTION

The MTE Matrix Filter is a low pass filter containing proprietary technology which makes it particularly useful for harmonic mitigation of adjustable speed drives. Figure 14 shows a block diagram of the filter. Three phase AC power is connected to the input section which contains a three phase AC reactor and circuitry which inhibits oscillation of the filter with the AC power system. The center leg consists of a series reactor and capacitor bank. Because of the capacitor bank the filter operates with leading power factor at all loads, but unlike trap filters the MTE Matrix Filter does not produce significant voltage rise at the point of common coupling with the power system. The standard 12% filter output section consists of an AC output reactor.

The 8% filter is comprised of a standard 12% filter plus an additional output reactor.

Matrix filters are horsepower and current rated. Current ratings have been established on the basis of 115% of the NEC 480 VAC motor ratings. Because the filter operates at near unity power factor, a motor drive system fed by a Matrix Filter and operating at rated horsepower will draw significantly less current than the filters rated input current. For a drive system with a typical efficiency of .85 and a Matrix Filter with an efficiency of .98, the power into the filter is $(1/.98)(1/.85)(746)(HP)$ where HP is

the motor horsepower rating. The filter input power is also equal to $(\sqrt{3})(Line\ Current)(Line\ to\ Line\ Voltage)$. Equating these two quantities and then calculating the line current as a percent of rated filter current for 10 HP, 100HP, and 300HP for 480 VAC results in the following data.

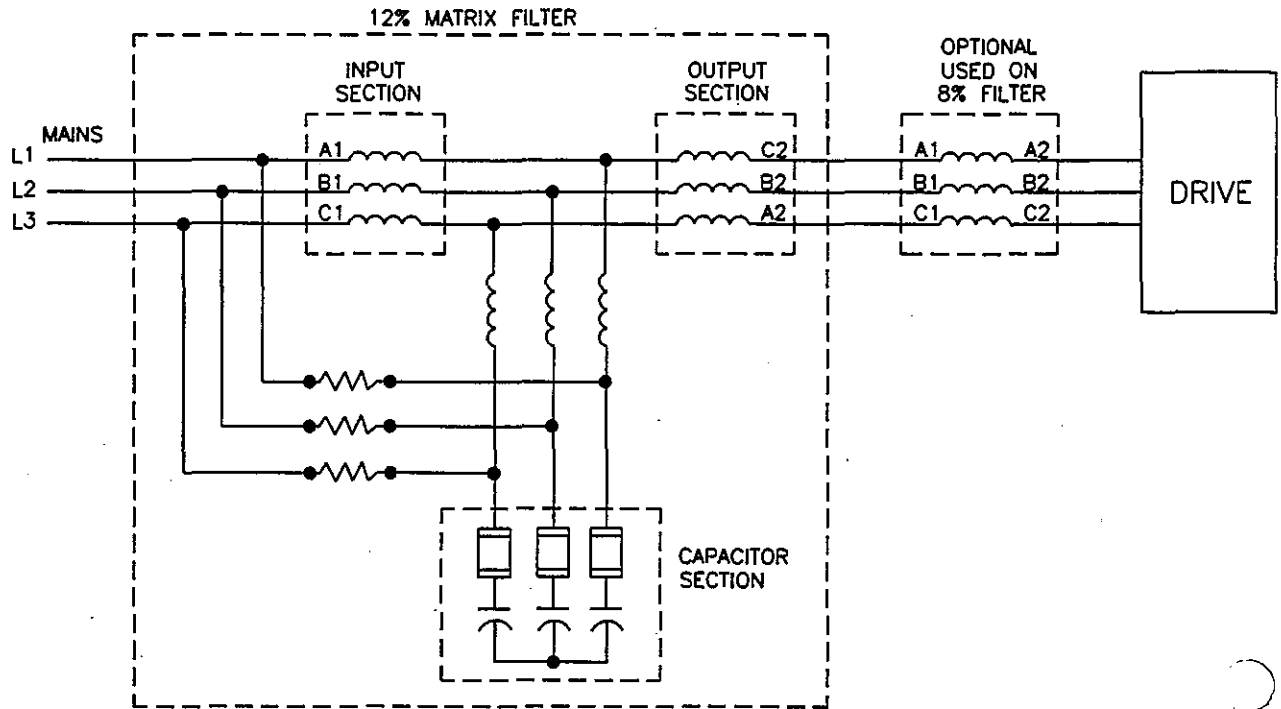
HP	Rated Filter Current %
10	67
100	75
300	78

Filter enclosures have been designed to accommodate filter power dissipation at rated horsepower. Filters mounted on open panels are designed to carry rated current.

Select a matrix filter to match the horsepower rating of the drive. For multiple drive applications, the horsepower rating of the filter should be equal to the total horsepower ratings of the drives. For example, select a 100 Hp filter to feed three 30Hp and one 10 Hp drives. Multiple drives fed from a single filter may be operated independently.

Because the filter supplies harmonic currents required by the drive, linear loads (such as space heaters, incandescent lighting and AC motors operated across the line) should not be connected to the output of the filter .

Figure 14. Block Diagram



7. 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 1, 2 and 3 on terminal block 1TB. 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 installation and connection instructions in Chapter 5.

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 (A1, B1, C1) of the filter.
7. Confirm that line voltage is present at the output terminals (A2, B2, C2) of the filter.
8. Disconnect the filter from the utility.
9. Connect the filter output to the drive.
10. 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.

CAUTION

Damage to equipment may occur if the drive startup procedures are not observed.

8. TROUBLESHOOTING

WARNING

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 block diagram is shown in Figure 14, and a list of potential problems and solutions are listed below.

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 1, 2 and 3 on terminal block 1TB. 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 - continued

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:	Harmonic current distortion exceeds 12% on one or more input phases.
Possible cause:	One or more capacitor fuses have blown.
Solution:	Verify the continuity of capacitor fuses in all three phases. Replace as necessary.
Possible cause:	On filters rated 20HP and above, the capacitor assembly has not been connected.
Solution:	Check interconnection of capacitor assembly with reactor panel (Figure 13).
Possible cause:	A capacitor has failed.
Solution:	Inspect the tops of all capacitors for bowing. Replace failed capacitors. Also replace the fuse in series with the failed capacitor.
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.

TROUBLESHOOTING - continued

PROBLEM:	Harmonic current distortion exceeds 8% on one or more phases.
Possible cause:	The output reactor required for an 8% filter was not installed. (See Figure 14.)
Solution:	Install the required output reactor.
Possible cause:	One or more capacitor fuses have blown.
Solution:	Verify the continuity of capacitor fuses in all three phases. Replace as necessary.
Possible cause:	On filters rated 20 HP and above, the capacitor assembly has not been connected.
Solution:	Check interconnection of capacitor assembly with reactor panel (Figure 13).
Possible cause:	A capacitor has failed.
Solution:	Inspect the tops of all capacitors for bowing. Replace failed capacitors. Also replace the fuse in series with the failed capacitor.
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.

TROUBLESHOOTING – continued

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 in Chapter 3 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 in Chapter 3 for tolerances.