INSTALLATION AND OPERATION MANUAL

3 Ø 3 Wire / 3 Ø 4 Wire

SERIES 3A & 4A

AIM ACTIVE HARMONIC CONDITIONERS

25 - 400 AMP CONFIGURATIONS

ACTIVE POWER, INC.

Quality Industrial Power

Specific application to configurations utilizing

Control Logic 501-8859

Configuration 61741-1 through 5, and 61742-1 through 5

Serial Nos. 106 et seq.

DOCUMENT NO. 10M/AHC/3A-4A
ISSUE C

APT AIM Energy, Inc.

AIM TECHNOLOGY

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APRIL 15, 2007

PROPRIETARY STATEMENT

WARRANTY STATEMENT

APT AIM Energy, Inc. warrants each unit to be free of defects in material and workmanship for a period of one year after shipment. Units containing failures that can be reasonably attributed to deficiencies on our part, will be repaired or replaced at our manufacturers plant. Units must be returned, shipment prepaid, by the original buyer. The unit will be returned collect. APT AIM Energy, Inc. is not responsible for consequential damage from the use of its equipment.

EC DECLARATION OF CONFORMITY

In accordance with the EEC Directive 89/336/EEC, (as amended),
the Low Voltage Directive CD 73/23/EEC (as amended),
and by the CE marking directive 93/68/EEC

We, APT AIM Energy, Inc., declare under our sole responsibility that the following electronic power products:

AIM ACTIVE HARMONIC CONDITIONERS - SERIES 3A & 4A
AIM ELECTRONIC VAr COMPENSATORS - SERIES 3A / E-VAr

All variants of the product when installed, used and CE marked in accordance with the instructions provided in the 'Installation and Operational Manual', is in conformity with the following :-

EN50081-2:1993, GENERIC INDUSTRIAL EMISSIONS
EN61000-6-2:1999, GENERI.C INDUSTRIAL IMMUNITY

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Date: 30/06/2003

PATENTS

The AIM Active Harmonic Conditioners are designed and manufactured under one or more of the following patents:

- **US Patent No. 5,397,927**
- **US Patent No. 5,608,276**
- **US Patent No. 5,614,770**

- **Canadian Patent Application No. 2192189**
- **European Patent Application No. 95921541.9**

SAFETY

For the best results with the SERIES 3A & SERIES 4A AIM Conditioners, read this manual carefully before operating the units and follow the instructions. This manual should be kept available for quick reference.

Definitions and Symbols

This “Safety Alert Symbol” is used to identify conditions or practices which could result in personal injury or loss of life, or could result in damage to the equipment or other property.

WARNING

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION

CAUTION statements identify conditions or practices that could result in damage to equipment or property.

NOTE

NOTE references are used to emphasize a particular issue of installation, operation or maintenance.

SAFETY PRECAUTIONS

⚠ **WARNING**	AIM Conditioners are connected to hazardous voltages and potentially lethal voltages are present throughout the AIM Conditioner enclosure.
⚠ **WARNING**	The AIM Conditioner unit should be installed, adjusted and serviced only by qualified electrical personnel familiar with the construction and operation of the unit and the hazards involved. Local and national electrical codes should always be observed.
⚠ **WARNING**	The AIM Conditioner unit must be properly grounded. Loss of ground connection could result in all accessible parts rendering an electrical shock.
⚠ **WARNING**	AIM Conditioners connect to hazardous voltages. Before performing maintenance, make sure the unit is disconnected from the power line and wait at least three minutes for the internal energy storage capacitors to discharge.
⚠ **WARNING**	Current Transformers can render an electric shock when energised if they are not terminated into appropriate loads of do not have built-in voltage limiting.
⚠ **WARNING**	Extreme care should be taken to protect against electrical shock when making measurements or performing maintenance with the unit energised and circuitry exposed. Always work with another person is case an emergency occurs. Make it a practice to use only one hand when making measurements within the unit. Always wear safety glasses when working inside the unit.
⚠ **CAUTION**	The instructions in this Manual should be read and clearly understood before installing, operating or maintaining the SERIES 3A & SERIES 4A AIM Conditioners.
⚠ **CAUTION**	A misinstallation or misapplication of the AIM Conditioner could result in an increase in the non-fundamental frequency current and voltage components on the power lines, increasing the possibility of damage to the power system or equipment connected to the power system.

NOTE

For purposes of this manual a **qualified person** is one who is familiar with the installation, construction and operation of the equipment and the hazards involved. In addition, a qualified person has the following qualifications:

(1) He or she is trained and **authorized** to de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices;

(2) He or she is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices; and

(3) He or she is trained in rendering first aid.

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1.0 GENERAL INFORMATION

1.1 Scope of Manual

This Manual provides information on installation and operation of the 3-phase, 3-wire and 3-phase, 4-wire, **Series 3A & Series 4A** AIM Active Harmonic Conditioners, designed and manufactured by APT AIM Energy, Inc.

1.2 Equipment Description

AIM Conditioners connect across the AC power lines and inject compensative current into the power lines to correct for non-fundamental frequency current and voltage components (such as harmonics) which are the result of "non-linear" loading of the power lines. Such non-fundamental components are commonly produced by electronic power converters, EDP equipment, electronic lighting ballasts and motor speed controllers. For simplicity, these non-fundamental frequency currents are referred to below as "harmonic" currents, even though they may include non-harmonic elements.

The Series 3A AIM Conditioners connect to a 3-phase AC power line with a 3-wire connection and provide compensative currents for 3-wire connected loads. The Series 3A AIM Conditioners have nominal harmonic current ratings of 25, 50, 100, 150, 200, 300 & 400 Arms and operate into power lines with nominal line-to-line voltages of 208, 240, 480 and 600 Vac at 60Hz and 400 Vac at 50Hz (the current ratings at 600 Vac are reduced slightly). The AIM Conditioners also supply a substantial amount of reactive current at the fundamental frequency which provides "VAR" correction for the "lagging" powerfactor elements and loads connected to the system.

The Series 3A AIM Conditioners can also provide beneficial non-fundamental frequency currents for systems with 4-wire connected loads with neutral returns. Although the neutral current can not be affected with a 3-wire connection, the AIM Conditioner can be adapted so that positive and negative sequence harmonic currents are removed and only zero sequence harmonic currents (harmonic currents which return via the neutral line) remain. The result is that each phase will have a harmonic line current equal to one third of the harmonic current in the neutral line. Zero-sequence harmonic currents flowing toward the source can then be attenuated by "shorting out" the currents with a magnetic device, such as a Zig-Zag auto- transformer, which is connected between the phase lines and the neutral line. The degree of attenuation will depend on the impedance of the magnetic device compared with the source impedance for zero-sequence currents.

Series 4A AIM Conditioners are specifically designed for 4-Wire connected loads with neutral return currents. An example of a Series 4A AIM Conditioner is shown in Drawing 50A050-4 Page 2-16. Series 4A AIM Conditioners are available with neutral currents three times the phase cancellation harmonic current.

The Series 3A & 4A AIM Conditioners may be paralleled for increased capacity. Each paralleled unit provides an equal proportion of the compensative current. The series 3A & 4A AIM Conditioners can also be modified to operate in the REDUNDANT Mode, in which the loss of a paralleled Conditioner automatically causes the remaining operating units to increase their compensative current output to adjust for the loss of a unit.

The Series 3A & 4A AIM Conditioners require the use of external current transformers (CT's) to provide signals proportional to the currents flowing to the loads on the 3-phase lines. For the 3-wire load configuration only two CT's are required. Three-wire AIM Conditioners adapted for 4-wire loading require three CT's. Although the LOAD SENSE or "downstream" location of the CT's (between the AIM connection and the loads) is the preferred configuration, the CT's may be located "upstream" (between the source of power and the AIM connection). In this SOURCE SENSE configuration the AIM Conditioners use the internal monitoring of their output currents to determine the load current (source current + AIM current = load current).

The Series 3A & 4A AIM Conditioners draw a small amount of power at the fundamental frequency to make up for power losses in generating the injected currents. The total power required for operation, which includes power for controls and blowers, is typically about 2% of the apparent Volt-Amps supplied by the unit for the 480 Vac application. More details of the losses at the rated KW output can be found in Section 1.3.

The Series 3A & 4A AIM Conditioners provide substantial harmonic current attenuation up to a frequency of 1 kHz. Above 1 kHz the attenuation decreases with increasing frequency, producing a typical attenuation factor of 0.5 at 3 kHz (50th harmonic of 60 Hz). More details on the attenuation versus frequency characteristics can be found in Section 1.3. The AIM Conditioners are not intended to be used for high-frequency "filtering" applications. The AIM Conditioners employ across-the-line capacitors for the "passive" filtering of internally produced high-frequency components (above 20 kHz). These capacitors are monitored for current (rms) and a shutdown will occur should the currents become excessive. Loads which produce high rate-of-rise load currents, such as thyristor controlled power converters with little or no AC-side inductance, may cause the AIM Conditioner to shutdown.

The Series 3A & 4A AIM Conditioners may not be suitable for certain types of loads. As indicated in the preceding paragraph, loads producing substantial amounts of high-frequency current may cause the AIM Conditioner to shutdown. Across-the-line capacitors, such as power factor correction capacitors, if connected across the load (on the "load side" of the AIM Conditioner) will cause an instability leading to the shutdown of the AIM Conditioner. Some types of passive harmonic filters, such as across-the-line resonant "traps", may also cause an instability and shutdown of the AIM Conditioner.

1.3 Electrical Specifications

The principal electrical specifications for the **Series 3A & 4A** AIM Conditioners are listed in Table 1-A:

Table 1-A
Series 3A & 4A AIM Conditioner Ratings

Model Number	Freq Hz	Nominal Voltage	Cancellation Harmonic Current Arms	Corrective Reactive Current Arms	Total Current Injected Arms	Corrective VARs kVARs	Losses @ Rated Output kW
3A025B6xxxx	60	208	25	10	27	3.5	0.5
3A050B6xxxx	60	208	50	19	54	6.9	0.9
3A100B6xxxx	60	208	100	38	107	14.0	1.9
3A150B6xxxx	60	208	150	57	160	20.5	2.8
3A200B6xxxx	60	208	200	76	213	27.3	3.8
3A300B6xxxx	60	208	300	114	321	42	5.7
3A400B6xxxx	60	208	400	144	428	56	7.6
3A025C6xxxx	60	240	25	11	27	4.4	0.5
3A050C6xxxx	60	240	50	21	54	8.8	0.9
3A100C6xxxx	60	240	100	42	108	18.0	1.9
3A150C6xxxx	60	240	150	63	163	26	2.8
3A200C6xxxx	60	240	200	82	216	34	3.8
3A300C6xxxx	60	240	300	126	324	54	5.7
3A400C6xxxx	60	240	400	168	432	72	7.6
3A025F5xxxx	50	400	25	14	29	9.3	0.6
3A050F5xxxx	50	400	50	27	57	19.0	1.0
3A100F5xxxx	50	400	100	54	114	37.0	2.1
3A150F5xxxx	50	400	150	81	170	56.0	3.1
3A200F5xxxx	50	400	200	104	225	72.0	4.2
3A300F5xxxx	50	400	300	162	342	112	6.3
3A400F5xxxx	50	400	400	216	456	150	8.4
3A025G6xxxx	60	480	25	17	30	14.0	0.6
3A050G6xxxx	60	480	50	33	60	27.0	1.1
3A100G6xxxx	60	480	100	65	119	54.0	2.2
3A150G6xxxx	60	480	150	98	179	81.4	3.3
3A200G6xxxx	60	480	200	130	238	108	4.4
3A300G6xxxx	60	480	300	195	357	162	6.6
3A400G6xxxx	60	480	400	260	476	216	8.8
3A022H6xxxx	60	600	22.5	19	29	20.0	0.6
3A045H6xxxx	60	600	45	38	59	39.0	1.1
3A090H6xxxx	60	600	90	75	117	78.0	2.2
3A135H6xxxx	60	600	135	113	176	117	3.3
3A180H6xxxx	60	600	180	150	234	156	4.4
3A300H6xxxx	60	600	270	225	351	234	6.6
3A400H6xxxx	60	600	360	300	468	312	8.8

Note: Only 3A (3Phase 3Wire) models shown. 4A (3Phase 4Wire) models up to 480V are available with neutral currents three times the phase cancellation harmonic current.

Input Voltage Range:	Nominal + 6%, -14% steady state (± 10% at 208 Vac) Nominal + 11%, -19% 20 minutes. (± 15% at 208 Vac) Transient: IEEE 587, Class B
Input Frequency Range:	Nominal ± 5% (± 3Hz at 60Hz)
Interrupting Capacity:	200,000 Amps, fuse.
Peak Harmonic Current:	3 x peak instantaneous
Peak Load Current:	1750 Amps peak instantaneous / 100Amp (example). Above 1750 amps the dynamic range of the current sensing circuitry will be exceeded and "clipping" will occur resulting in the production of undesirable corrective current. The total load current (rms) times the crest factor must be less than 1750 A. Note: A 1237 Arms sinewave has a peak value of 1750 Amps.
Reactive Current Injected:	+ VARS (leading PF) Reactive current is proportional to the line voltage. Typically 15% is supplied by across-the-line capacitors; 85% is supplied by electronic generation.

Control / Display Panel:

Switch:	• ON-OFF / RESET	SEL. SW.
Indicators:	• POWER APPLIED	(white LED)
	• OPERATE	(green LED)
	• AT MAX CAPACITY	(yellow LED)
	• FAULT	(red LED)
	• TEMP. WARNING	(red LED)

Remote readout:

Signals:	• OPERATE • FAULT • POWER APPLIED
Contacts:	Form "C", 1A dc / 24V dc, 0.5A AC / 120V AC

Start-up time:

From application of system voltage: 6 seconds maximum.

Harmonic current attenuation factor I_H (source) / I_H (load)	Harmonic number	Attenuation factor (typical)
	2	0.3
	3	0.2
	4	0.1
	5-7	0.05
	8-11	0.08
	12-15	0.1
	16-21	0.15
	22-27	0.2
	28-33	0.3
	34-41	0.4
	42-51	0.5

NOTE

The attenuation factor, I_H(source)/ I_H(load), applies to the source and load current harmonics observed with the AIM Conditioner operating. The action of the AIM Conditioner in providing compensative harmonic currents has the effect of reducing the effective source impedance for those harmonic currents. The resulting harmonic voltage components are reduced because the "net" harmonic current flowing into the source is reduced. For some non-linear loads, such rectifiers with capacitive-input DC filters, the harmonic current can increase significantly when the source impedance is reduced substantially. The selection of the AIM Conditioner rating should be based, therefore, on what the load harmonic current will be when the AIM Conditioner is operating.

1.4 Environmental Specifications

Temperature:	Enclosure: 0 to +40 degrees C Open Chassis: 0 to +50 degrees C Storage: -30 to +65 degrees C
Altitude:	to 1500 meters (reduced ratings at higher altitudes)
Humidity:	to 95%, non-condensating

1.5 Mechanical Specifications

Dimensions

	CHASSIS ONLY	*ENCLOSURE*
Amps	**Approx. Size (mm) H x W x D**	**Approx. Size (mm) H x W x D**
25	788 x 407 x 313	788 x 407 x 338
50	1220 x 407 x 312	1220 x 407 x 338
100	1897 x 500 x 381	2109 x 610 x 508
150	1897 x 699 x 381	2109 x 813 x 508
200	1897 x 1106 x 381	2109 x 1220 x 508
300	1897 x 1106 x 381	2109 x 1220 x 508
400	1897 x 1106 x 381	2109 x 1220 x 508

	WALL MOUNTING		*FREE STANDING*			*FREE STANDING*	
AIM SIZE	**25 A**	**50 A**	**100 A**	**150 A**	**200 A**	**300 A**	**400 A**
Approx. Weight (kgs)							
• Chassis mount	50	79	170	190	204	250	295
• With enclosure	59	86	272	318	397	443	489
Heat Rejection							
BTU/hr	2049	3757	7,513	11,270	15,026	22,500	30,000
KW	0.6	1.1	2.2	3.3	4.4	6.6	8.8

1.6 Equipment Required But Not Supplied as Part of AIM Unit

Current Transformers (CTs) and associated wiring (CTs optional extra);

Input power disconnecting device (optional extra);

Power wiring;

Signal level cabling;

Fans/blowers, with air filters, to produce the required air flow (chassis mounting option).

1.7 Air Flow Requirement

AIM SIZE	25 Amp	50 Amp	100 Amp	150 Amp	200 Amp	300 Amp	400 Amp
Losses @ Rated Output	0.6KW	1.1KW	2.2KW	3.3KW	4.4KW	6.6KW	8.8KW
Minimum Air Flow Cubic feet per minute	125cfm	250cfm	250cfm	375cfm	500cfm	1,140cfm	1,520cfm
Minimum Air Flow Cubic metre per minute	3.5cmm	7cmm	7cmm	10.5cmm	14cmm	31.92cmm	42.56cmm

2.0 INSTALLATION

2.1 Receiving Inspection and Unpacking

The unit as received should be inspected both before and after uncrating, per the following procedures.

2.1.1 Inspection Prior to Uncrating

The shipping crate should be inspected for any externally visible damage prior to uncrating. If any apparent damage to the crate is noted, the responsible carrier should be contacted. Photographs are often useful in establishing damage to the crate as received.

Claims against the carrier for shipping damage should be filed with the carrier immediately to preserve any claim against the carrier.

2.1.2 Uncrating

AIM Conditioners should be uncrated and inspected promptly upon receipt.

2.1.3 Inspection After Uncrating

Make sure that the proper AIM Conditioner has been received by checking the identification plate for part number, and voltage and frequency configuration.

2.2 Location and Installation

In locating the AIM Conditioner, particular care must be given to cooling air availability and proper mounting to yield optimum performance and reliability. AIM Conditioners should not be installed in locations that are subjected to high temperatures, high humidity, excessive dust or dirt, high vibration or corrosive gases. The mounting surfaces should be made of non-flammable material. Refer to installation illustrations, Pages 2-5 to 2-11 and 2-17 to 2-23, for physical information and mounting details.

2.2.1 Air Flow Requirements

Externally supplied forced-air cooling is required for chassis mounted AIM configurations. The air flow should be sufficient to remove the heat dissipated by the AIM unit while limiting the maximum rise in the temperature of the exhausted air to 10 degrees C.

2.3 Electrical Installation

WARNING

Hazardous Voltages are applied to the AIM Conditioner and potentially lethal voltages may occur throughout the AIM Conditioner enclosure. The AIM Conditioner should be installed, adjusted and serviced by qualified electrical personnel familiar with the construction and operation of the unit and the hazards involved. Local and national electrical codes should always be observed.

WARNING

The AIM Conditioner must be properly grounded. Loss of ground connection could result in all accessible parts rendering an electrical shock.

CAUTION

Make sure the operating voltage and frequency on the AIM Conditioner identification plate are appropriate for the power system.

2.3.1 Power Connection

Refer to Drawing 50A050-3 Page 2-12 and Drawing AIM/SIGINT Page 2-13 for information regarding the electrical wiring of the AIM Conditioner in a typical installation. Drawing AIM/EI3P Page 2-14 shows how the units may be connected and operated in parallel. Drawing 50A050-4 Page 2-16 shows the connections of the 4-wire AIM Conditioner in a 4-Wire system. Individual drawings for each frame size are available on request.

The AIM Conditioners connect across the AC power lines and inject current into the power lines to correct for harmonic currents and voltages components which are the result of the “non-linear” loads connected to the power lines. Although the AIM Conditioner power connection is typically made “upstream” of the load at a point between the source and the load, the power connection may be made “downstream” of the load.

Because the major portion of the output current from the AIM Conditioner involves current components with frequencies above the fundamental frequency, it may be necessary to make adjustments to the ratings of power disconnecting devices and power wiring used for the power connection to the AIM Conditioner. For a conservative estimate, assume that the maximum rated output current listed for the AIM Conditioner unit occurs at a frequency of 400 Hz for the 60 Hz units (330 Hz for the 50 Hz units). The manufacturer for the power disconnecting devices should be consulted for any derating that might apply.

The additional power losses in the conductors due to the increased frequencies (skin effect) is usually small and not a problem for conductor sizes 1/0 AWG and smaller. Typically a 0.9 derating factor is applied to 2/0 AWG conductors at

400 Hz. The paralleling of two smaller conductors may be a practical solution for very high current installations. Because of the paralleling restrictions of NEC section 310-4, paralleling is practical only for 1/0 AWG or larger.

The increased frequency can lead to increased power losses in the walls of metallic conduits. The effect is more pronounced in ferrous materials such as EMT conduit. For the present 3-wire AIM application where the currents are typically balanced, however, field measurements have shown the increased operating temperature of the EMT conduit due to inductive heating to be small. The advantages of Aluminium conduit do not appear to warrant the additional cost. Plastic conduit should not be used. Metal conduit provides additional electromagnetic interference (EMI) attenuation by shielding the conductors and reducing the "antenna" effect.

2.3.2 Current Sensing Transformers

WARNING

Current transformers can render an electrical shock when energized if they are not terminated into appropriate loads or do not have built-in voltage limiting.

The Series 3A & 4A AIM Conditioners require the use of external current transformers (CTs) to provide signals proportional to the currents flowing to the loads on the 3-phase lines. For the 3-wire load configuration, only two CTs are required. Two possible CT configurations are shown in Drawing 50A050-3 Page 2-12. For the preferred "Load Current Sensing" configuration, the CTs are located so as to sense only the load currents. The "A", "B" and "C" power line designation is arbitrary and the phase sequence is not important. CTA must, however, be associated with the power line connecting to the "A" terminal of the Power Disconnect switch. Similarly, CTC must be associated with the power line connecting to the "C" terminal of the Power Disconnect switch.

If necessary the CTs may be located "upstream" of the AIM Conditioner and load where they sense the combination of the load and AIM currents ("Source Current Sensing" configuration). In this configuration the AIM Conditioner uses its internal monitoring of its output current to determine the load current (source current + AIM current =load current).

Some other possible CT installations are shown in Drawing AIM/CTCONF Page 2-15.

The Series 3A & 4A AIM Conditioners use a CT turns ratio of 2000:1. Three types of CTs, differing in hole diameter, are available from APT AIM Energy, Inc. (1000:0.5; 2000:1; 3000:1.5) If necessary, adapter transformers could be provided to accommodate standard available CTs with 5A outputs, e.g. 1000:5.

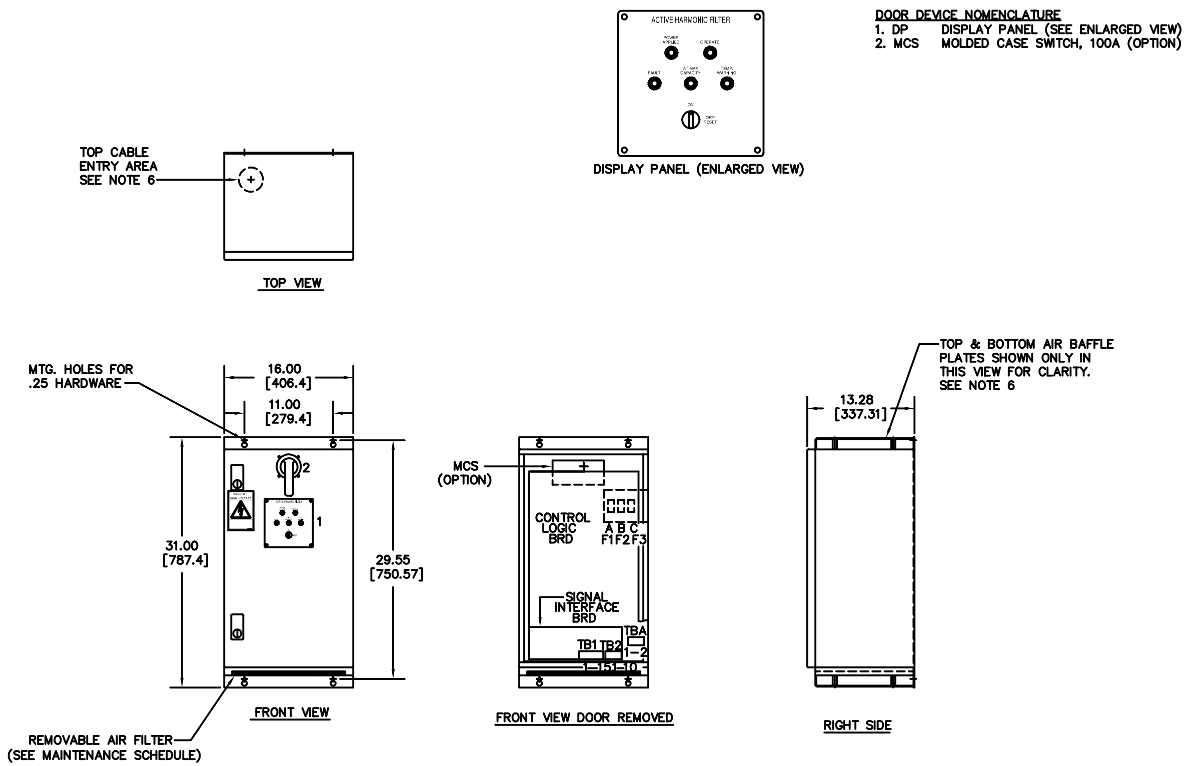
The "signal wires" from the CTs should not be run in the same conduit as the power wiring. Twisting is recommended to reduce undesirable "pick-up" from stray AC magnetic fields. The signal wires from the CTs connect at TB1 located on the Signal Interface PCBD (Assembly A11). It is important that the CTs be properly phased. The MODE PROGRAMMING switch **S1** on the Signal Interface PCBD should be set to the **LOAD** position (right side) for the Load Current Sensing configuration and to the **SOURCE** position (left side) for the Source Current Sensing configuration (Drawing AIM/SIGINT Page 2-13).

The MODE PROGRAMMING switch **S3** should be set the **CLOSED** position (left side) for the single AIM applications. For paralleled AIM conditioners using the same CTs, as shown in Drawing AIM/EI3P Page 2-14, only one of the AIM Conditioners is operated with **S3** in the **CLOSED** position; the other units are operated with **S3** in the **OPEN** position.

> Note: The overall burden of the cable and the AIM measuring equipment should not exceed the available VA of the CT. Please ask for CT data sheet if in doubt.

2.4 EMC Compliant Installation and Configuration

See Appendix 1.



CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 25A TOTAL HARMONIC COMPENSATION (DERATED 22.5A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #12AWG – #2AWG Cu
      2) OPTION – MOLDED CASE SWITCH CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #10AWG – 1/0 Cu @ 75°C
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #14 AWG – #6 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 600W (2049 BTU/HR), REQ'D CFM 125 (3538 LPM)
5. ALLOW 20.0 [508] IN FRONT OF ENCLOSURE FOR DOOR TO OPEN.
6. STANDARD CABLE ACCESS: TOP CABLE ENTRY ONLY.
7. APPROX. WEIGHT: 130 LBS(59 KG)
8. MAXIMIUM 40 DEGREES C AMBIENT.
9. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON BOTTOM AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 025 F 5 – A E3 M F

- F=EMC FILTER OPTION
  X=W/O EMC FILTER OPTION
- M=MOLDED CASE SWITCH (MCS) OPTION, 100A
  X=W/O MOLDED CASE SWITCH OPTION
- E3=NEMA 1/IP20 ENCLOSURE
- 5=50HZ
  6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	3.5	27
C=240V	4.4	27
F=400V	9.3	29
G=480V	14.0	30
H=600V	20.0	29

- 25 AMPS HARMONIC CORRECTION
- 3=3 WIRE
  4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

REVISIONS	A	B	C	D
NO.	08804	08824	09079	09868
	TITLE BLOCK BROUGHT UP TO DATE RAM/RCS 8/8/02	CUSTOMER INFORMATION UPDATED. RAM/RCS 10/8/02	DRAWING UPDATES HFD/RCS 12/18/02	1/7/04 DRAWING UPDATES. WLL/MP

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1° THIRD ANGLE PROJECTION

SCALE 1/8=1 | LAYER XXXX | DATE 7/18/02 | DWGSZ D | DFTR RAM | ENGR GMB

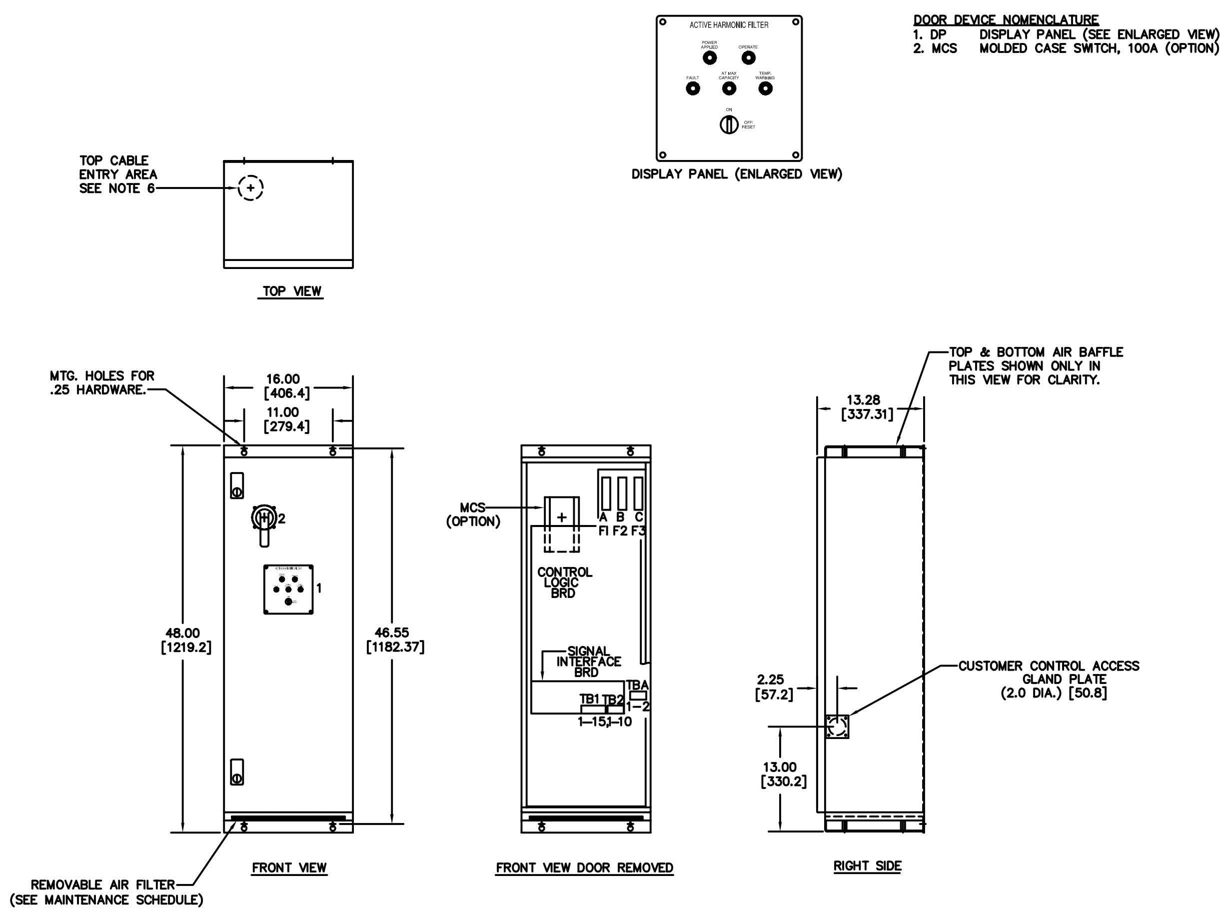
AIM EUROPE

CUSTOMER AIM,EUROPE | CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CABINET 25A – 3W,4W

DWG NO 50A025 | REV D | CAD FILE 50A025D1 | SHEET NO 1 OF 4

DBORDF



CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, −14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 50A TOTAL HARMONIC COMPENSATION (DERATED 45A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 2/0 Cu
      2) OPTION – MOLDED CASE SWITCH CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #10AWG – 1/0 Cu @ 75°C
   D. CONTROL: SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA. #12 AWG WIRE MAX.
   E. GROUND TERMINALS: SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #14 AWG – #6 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 1.1KW (3757 BTU/HR), REQ'D CFM 250 (7080 LPM)
5. ALLOW 20.0 [508] IN FRONT OF ENCLOSURE FOR DOOR TO OPEN.
6. STANDARD CABLE ACCESS: TOP CABLE ENTRY ONLY FOR POWER AND BOTTOM RIGHT SIDE ONLY FOR CONTROL.
7. APPROX. WEIGHT: 190 LBS(86 KG)
8. MAXIMIUM 40 DEGREES C AMBIENT.
9. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON BOTTOM AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 050 F 5 – A E3 M F

- F=EMC FILTER OPTION
  X=W/O EMC FILTER OPTION
- M=MOLDED CASE SWITCH (MCS) OPTION, 100A
  X=W/O MOLDED CASE SWITCH OPTION
- E3=NEMA 1/IP20 ENCLOSURE
- 5=50HZ
  6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	6.9	54
C=240V	8.8	54
F=400V	19.0	57
G=480V	27.0	60
H=600V	39.0	59

- 50 AMPS HARMONIC CORRECTION
- 3=3 WIRE
  4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

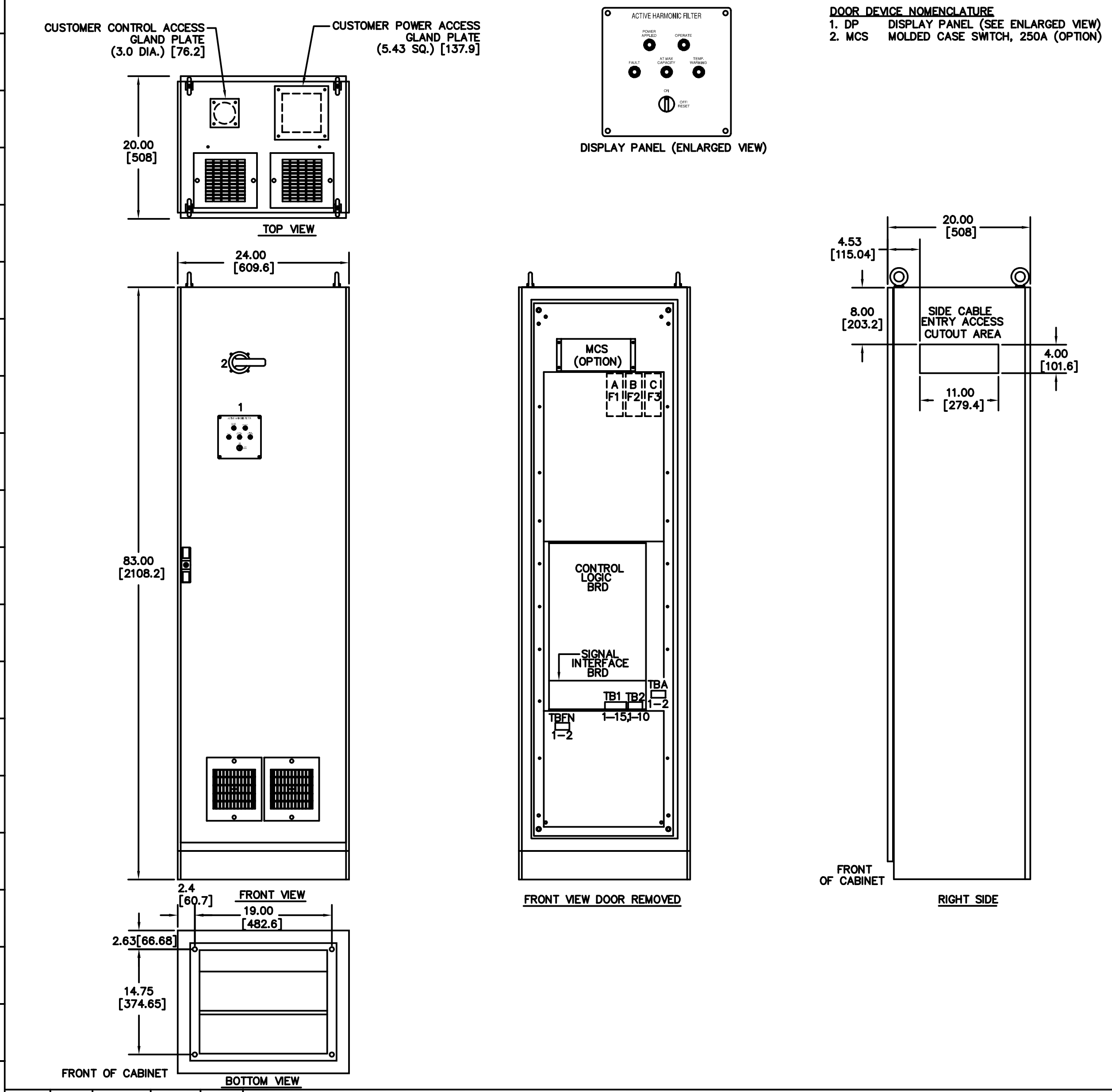
REVISIONS	A	B	C	D
ECO NO.	08804	08824	09079	09785
	TITLE BLOCK BROUGHT UP TO DATE RAM/RCS 8/8/02	CUSTOMER INFORMATION UPDATED. RAM/RCS 10/8/02	DRAWING UPDATES HFD/RCS 12/18/02	12/27/03 DRAWING UPDATES. WLL/MP

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1° THIRD ANGLE PROJECTION

SCALE 1/8=1
LAYER XXXX
DATE 7/18/02
DWGSZ D
DFTR RAM
ENGR GMB

AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CABINET 50A – 3W,4W
DWG NO 50A050 REV D
CAD FILE 50A050D1 SHEET NO 1 OF 4
DBORDF



CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 100A TOTAL HARMONIC COMPENSATION (DERATED 90A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 350 MCM Cu
      2) OPTION – MOLDED CASE SWITCH CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 350MCM Cu @ 75°C
   D. CONTROL: SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS: SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 2.2KW (7513 BTU/HR), REQ'D CFM 250 (7080 LPM)
5. ALLOW 28.0 [711.2] IN FRONT OF ENCLOSURE FOR DOOR TO OPEN.
6. STANDARD CABLE ACCESS: TOP CABLE ENTRY AND TOP RIGHT SIDE
7. APPROX. WEIGHT: 600 LBS(272 KG)
8. MAXIMIUM 40 DEGREES C AMBIENT.
9. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 100 F 5 – A E2 M F

- F=EMC FILTER OPTION
  X=W/O EMC FILTER OPTION
- M=MOLDED CASE SWITCH (MCS) OPTION, 250A
  X=W/O MOLDED CASE SWITCH OPTION
- E2=NEMA 1/IP30 ENCLOSURE
- 5=50HZ
  6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	14.0	107
C=240V	18.0	108
F=400V	37.0	114
G=480V	54.0	119
H=600V	78.0	117

- 100 AMPS HARMONIC CORRECTION
- 3=3 WIRE
  4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

REVISIONS	A	B	C	D
DFTG CODE NO.	08804	08824	09079	09869
	TITLE BLOCK BROUGHT UP TO DATE RAM/RCS 8/8/02	CUSTOMER INFORMATION UPDATED. RAM/RCS 10/10/02	DRAWING UPDATES HFD/RCS 12/18/02	1/10/04 DRAWINGS UPDATED. WLL/MP

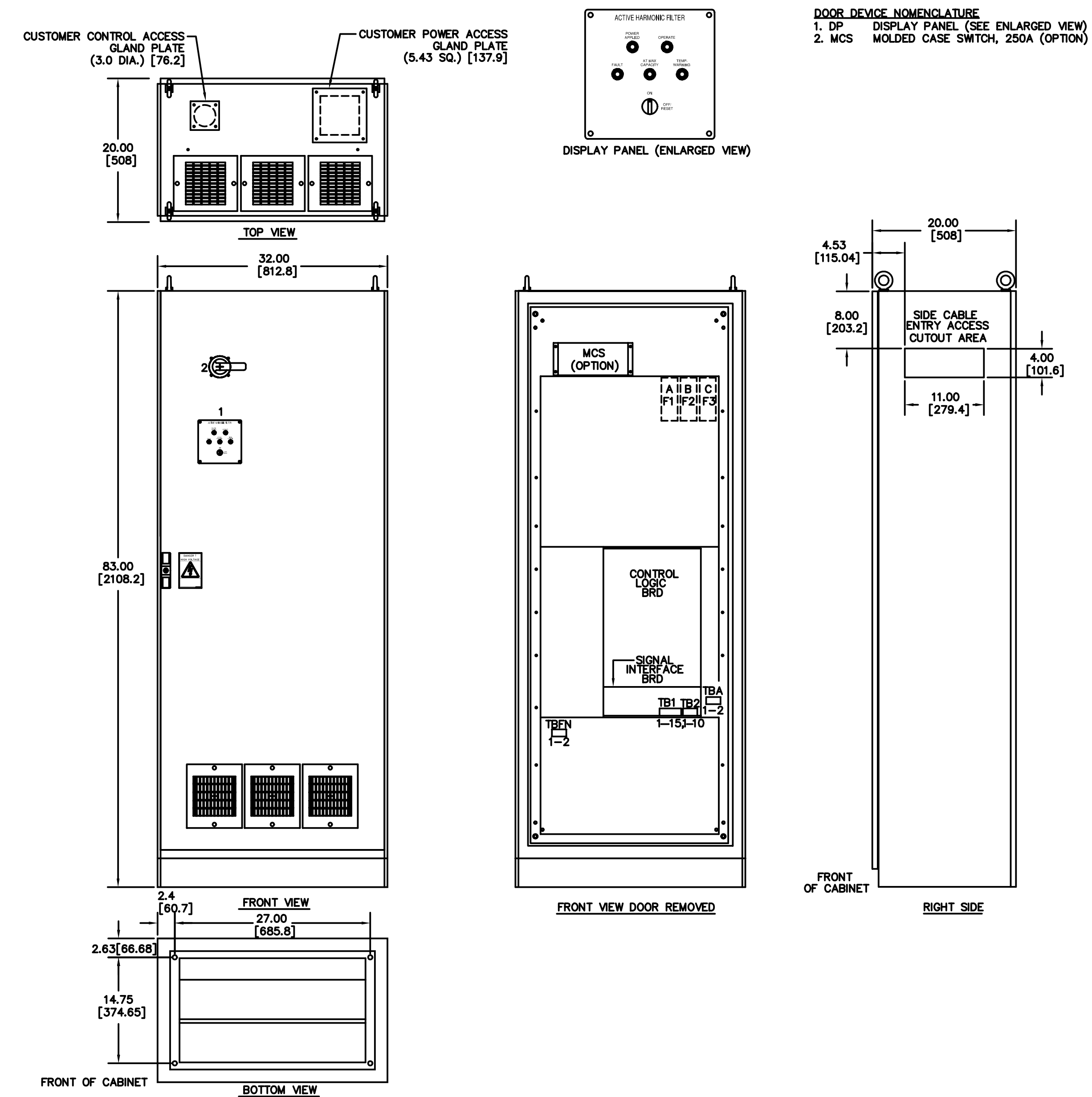
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1° THIRD ANGLE PROJECTION

SCALE 1/8=1 · LAYER XXXX · DATE 7/18/02 · DWGSZ D · DFTR RAM · ENGR GMB

AIM EUROPE · CUSTOMER AIM,EUROPE · CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CABINET 100A – 3W,4W · DWG NO 50A100 · REV D · CAD FILE 50A100D1 · SHEET NO 1 OF 4

DBORDF



CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 150A TOTAL HARMONIC COMPENSATION (DERATED 135A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #2AWG – 600 MCM Cu
      2) OPTION – MOLDED CASE SWITCH CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 350MCM Cu @ 75°C
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 3.3KW (11270 BTU/HR), REQ'D CFM 375 (10613 LPM)
5. ALLOW 28.0 [711.2] IN FRONT OF ENCLOSURE FOR DOOR TO OPEN.
6. STANDARD CABLE ACCESS: TOP CABLE ENTRY AND TOP RIGHT SIDE
7. APPROX. WEIGHT: 700 LBS(318 KG)
8. MAXIMIUM 40 DEGREES C AMBIENT.
9. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 150 F 5 – A E2 M X

M=MOLDED CASE SWITCH (MCS) OPTION, 250A
X=W/O MOLDED CASE SWITCH OPTION

E2=NEMA 1/IP30 ENCLOSURE

5=50HZ
6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	20.5	160
C=240V	26.0	163
F=400V	56.0	170
G=480V	81.4	179
H=600V	117.0	176

150 AMPS HARMONIC CORRECTION

3=3 WIRE
4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

REVISIONS	ECO NO.	DESCRIPTION
A	08804	TITLE BLOCK BROUGHT UP TO DATE RAM/RCS 8/16/02
B	08824	CUSTOMER INFORMATION RAM/RCS 10/11/02
C	09079	DRAWING UPDATES HFD/RCS 12/18/02
D	09870	1/7/04 DRAWING UPDATES WLL/MP

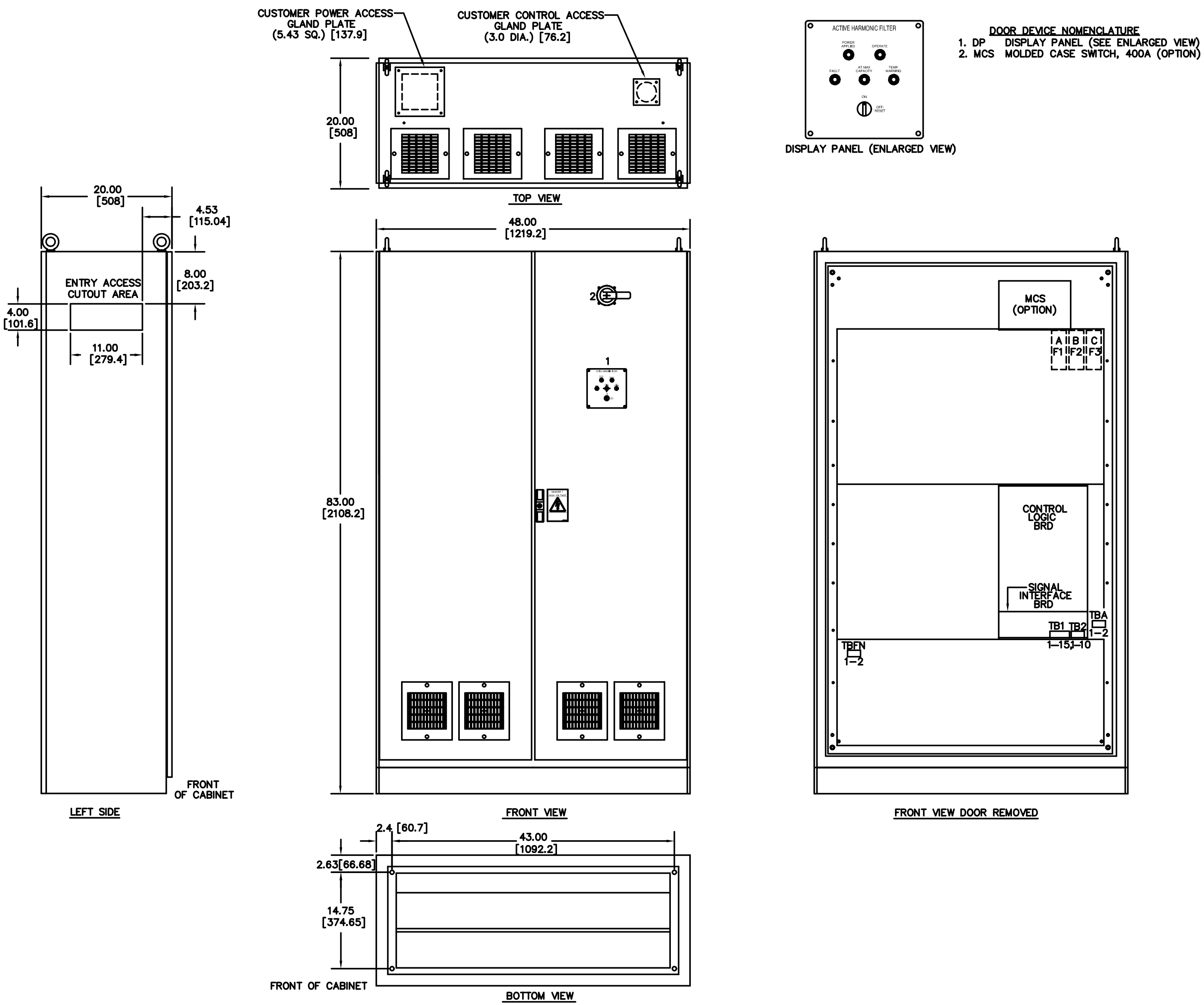
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

SCALE 1/8=1
LAYER XXXX
DATE 7/18/02
DWGD D
DFTR RAM
ENGR GMB

AIM EUROPE

CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CABINET 150A – 3W,4W
DWG NO 50A150 REV D
CAD FILE 50A150D1 SHEET NO 1 OF 4
DBORDF



DOOR DEVICE NOMENCLATURE
1. DP DISPLAY PANEL (SEE ENLARGED VIEW)
2. MCS MOLDED CASE SWITCH, 400A (OPTION)

CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS
      200A TOTAL HARMONIC COMPENSATION
      (DERATED 180A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS:
         SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE
         (1) #2AWG – 600 MCM Cu
      2) OPTION – MOLDED CASE SWITCH CONNECTIONS:
         SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE
         (2) 3/0 AWG – 500MCM Cu @ 75 C
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND.
      INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 4.4KW (15026 BTU/HR), REQ'D CFM 500 (14150 LPM)
5. ALLOW 28.0 [711.2] IN FRONT OF ENCLOSURE FOR DOOR TO OPEN.
6. STANDARD CABLE ACCESS: TOP CABLE ENTRY AND TOP LEFT SIDE
7. APPROX. WEIGHT: 875 LBS(397 KG)
8. MAXIMIUM 40 DEGREES C AMBIENT.
9. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 200 F 5 – A E2 M X

- M=MOLDED CASE SWITCH (MCS) OPTION, 400A
  X=W/O MOLDED CASE SWITCH OPTION
- E2=NEMA 1/IP30 ENCLOSURE
- 5=50HZ
  6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	27.3	213
C=240V	34.0	216
F=400V	72.0	225
G=480V	108.0	238
H=600V	156.0	234

- 200 AMPS HARMONIC CORRECTION
- 3=3 WIRE
  4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

REVISIONS	A	B	C	D
DFTG NO.	08804	08824	09079	09871
	TITLE BLOCK BROUGHT UP TO DATE RAM/RCS 8/16/02	CUSTOMER INFORMATION UPDATED. RAM/RCS 10/16/02	DRAWING UPDATES HFD/RCS 12/18/02	1/7/03 DRAWING UPDATES WLL/MP

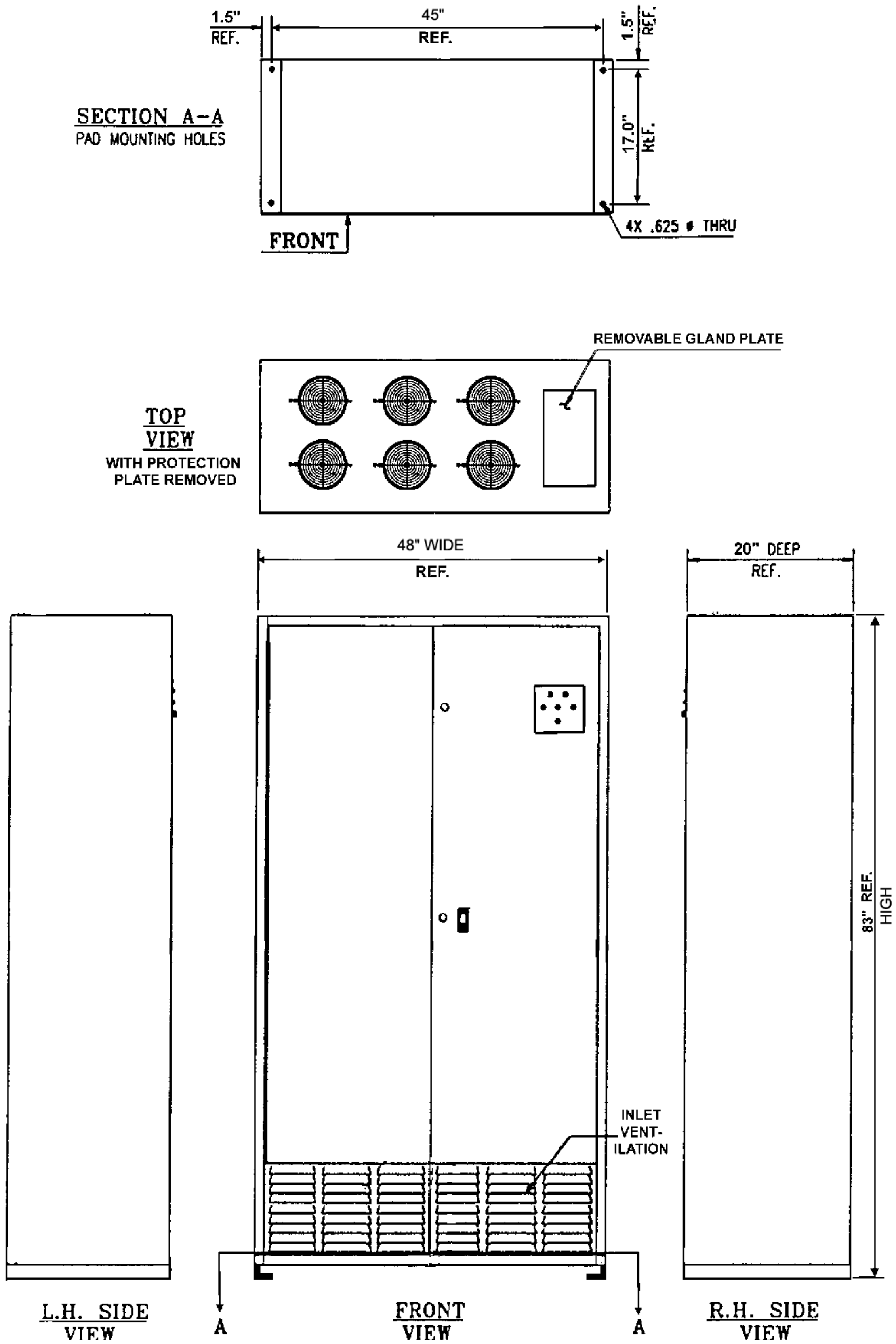
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

SCALE 1/8=1
LAYER XXXX
DATE 7/18/02
DWGSZ D
DFTR RAM
ENGR GMB

AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CABINET 200A – 3W,4W
DWG NO 50A200 REV D
CAD FILE 50A200D1 SHEET NO 1 OF 4

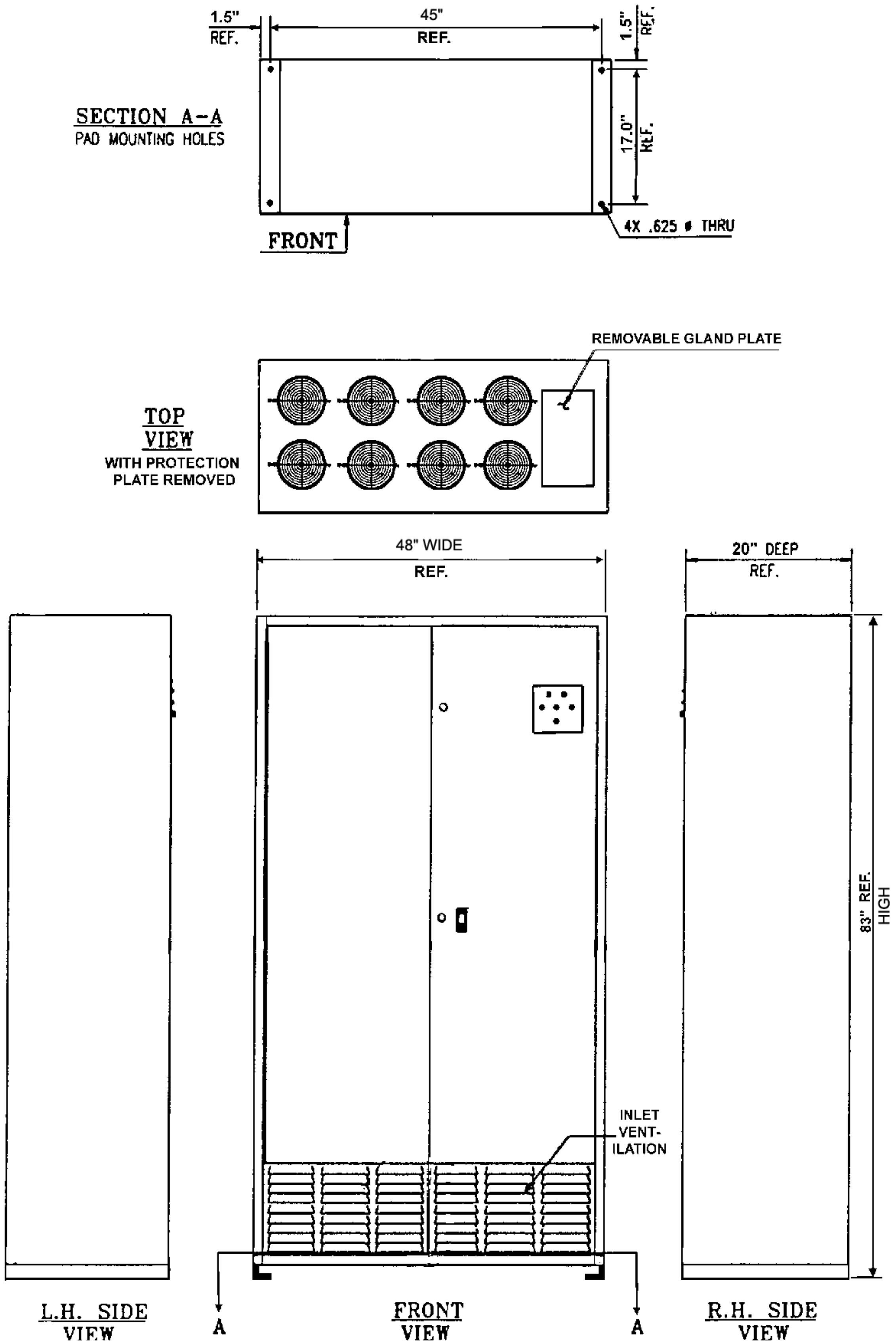
DBORDF



DRAWING AIM/300F

PHYSICAL INSTALLATION DETAILS FOR 300A AIM 3A & 4A SERIES

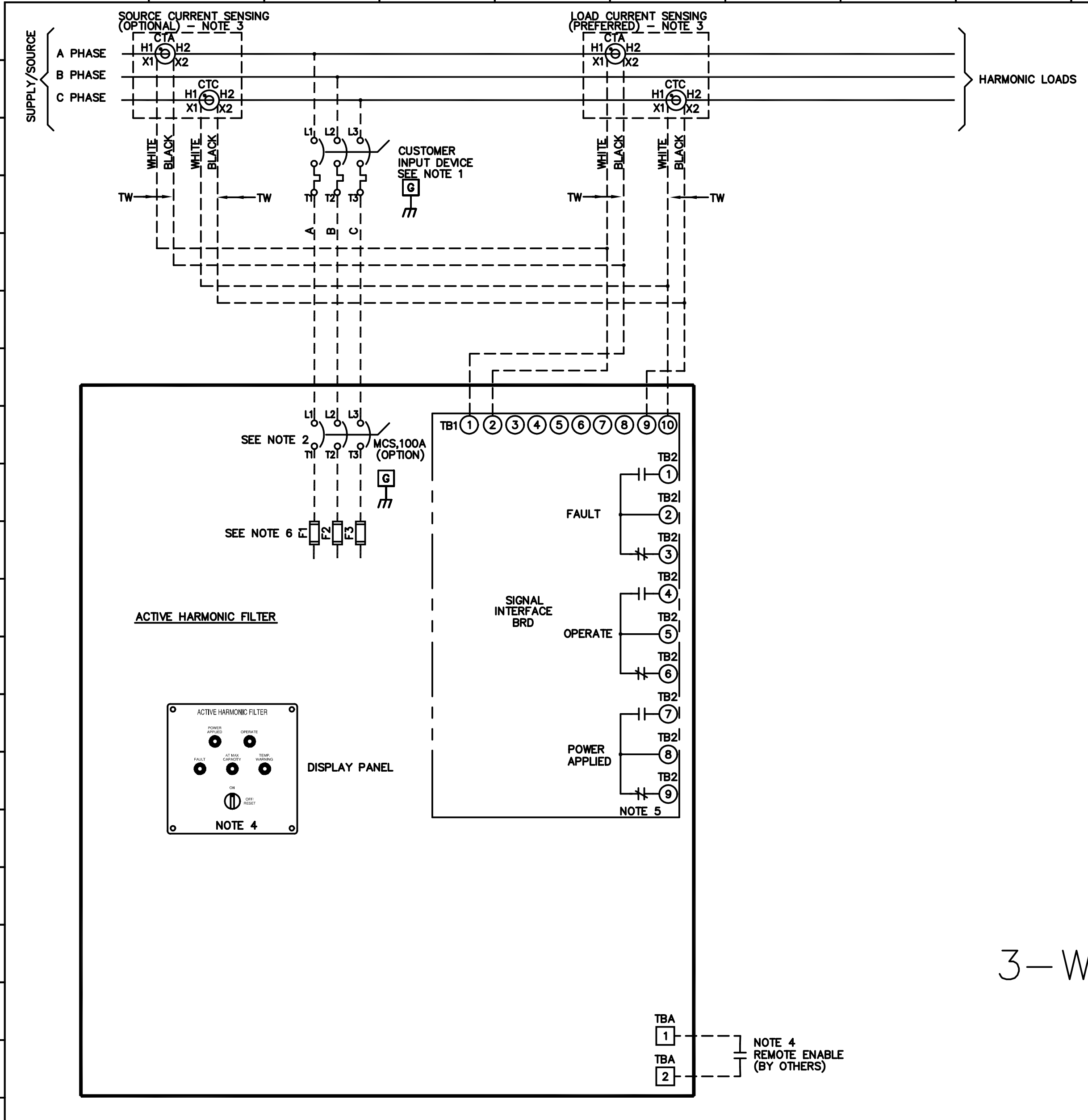
(FREE-STANDING ENCLOSURE)



DRAWING AIM/400F

PHYSICAL INSTALLATION DETAILS FOR 400A AIM 3A & 4A SERIES

(FREE-STANDING ENCLOSURE)



NOTES:

1. CUSTOMER SUPPLIED CIRCUIT BREAKER OR DISCONNECT REQUIRED. FOR A CONSERVATIVE ESTIMATE, ASSUME THAT THE MAXIMUM RATED OUTPUT CURRENT LISTED FOR THE ACTIVE HARMONIC FILTER OCCURS AT 400 HZ. THE MANUFACTURER OF THE DISCONNECT DEVICES SHOULD BE CONSULTED FOR ANY DERATING THAT MIGHT APPLY. TYPICALLY 15%.
2. MOLDED CASE SWITCH OPTION FOR CUSTOMER CONNECTION.
3. WARNING: CURRENT TRANSFORMERS CAN RENDER AN ELECTRICAL SHOCK WHEN ENERGIZED IF THEY ARE NOT TERMINATED INTO APPROPRIATE LOADS OR HAVE THEIR LEADS SHORTED.

   NOTE ORIENTATION OF CT'S! THE "H1" POLARITY DOT MUST POINT TOWARDS THE MAINS.

   USE TWISTED PAIR WIRING.
4. FOR CUSTOMER CONNECTION TO START UNIT WHEN SW1 DISPLAY PANEL CONTROL SWITCH IS IN THE "ON" POSITION. JUMPER IF NOT REQUIRED.
5. DRY CONTACTS FOR CUSTOMER USE, 1.0A @ 120VAC.
6. F1-F3 = HIGH SPEED FUSES FOR SEMICONDUCTOR PROTECTION.

3–WIRE CONFIGURATIONS ONLY

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1° THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	7/24/02
DWGSZ	D
DFTR	RAM
ENGR	GMB
	AIM EUROPE
CUSTOMER	AIM,EUROPE
CUST ORDER NUMBER	STD.
TITLE	ACTIVE HARMONIC FILTER CONNECT.DIA.,50A,3W
DWG NO	50A050
REV	D
CAD FILE	50A050D3
SHEET NO	3 OF 4

REVISIONS | DFTG CODE | NO.

DBORDF

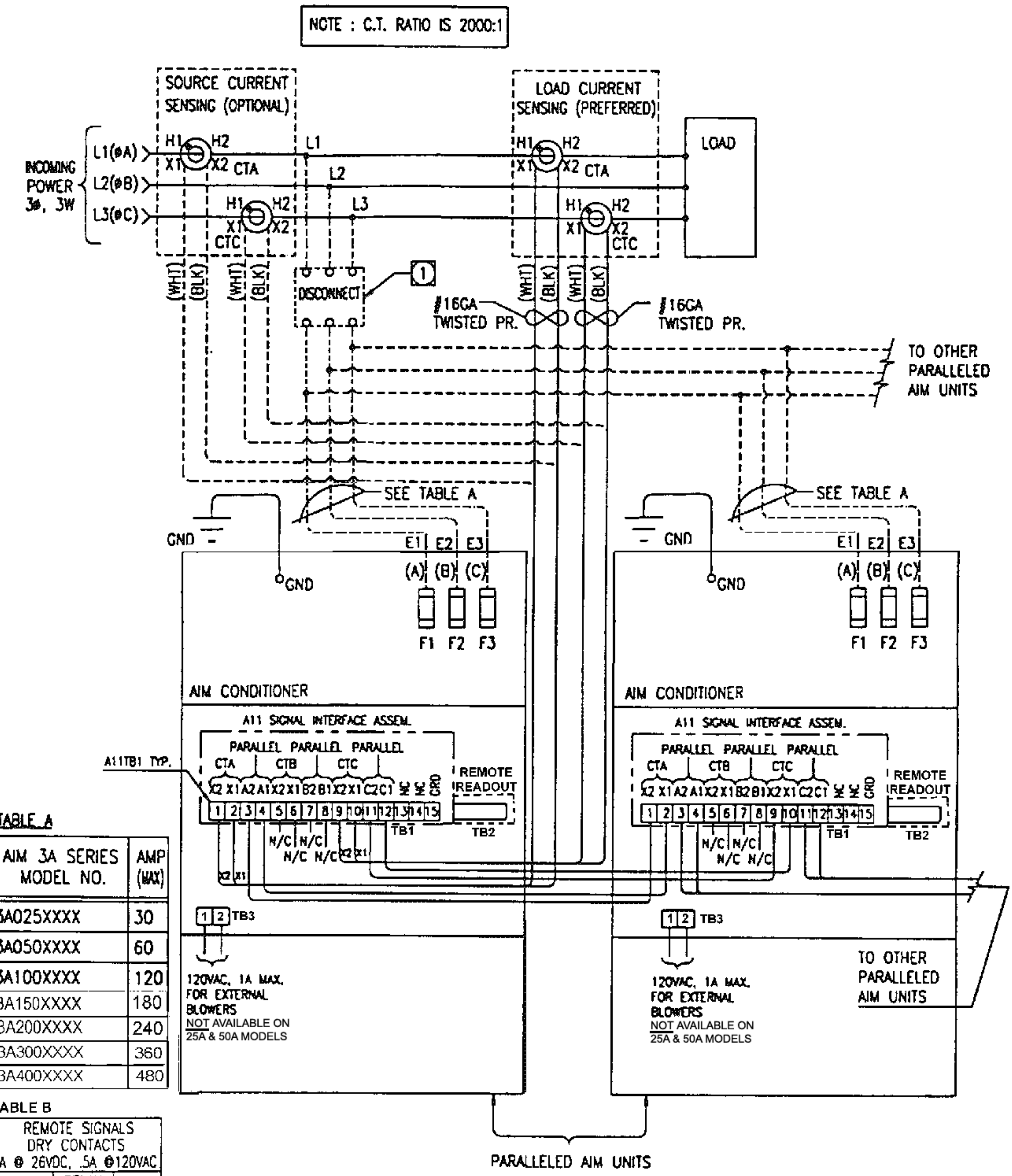


TABLE A

AIM 3A SERIES MODEL NO.	AMP (MAX)
3A025XXXX	30
3A050XXXX	60
3A100XXXX	120
3A150XXXX	180
3A200XXXX	240
3A300XXXX	360
3A400XXXX	480

TABLE B

REMOTE SIGNALS DRY CONTACTS 1A @ 26VDC, .5A @120VAC

STATUS	RELAY CONTACTS	TB2
FAULT	N.O.	1
	COM	2
	N.C.	3
OPERATE	N.O.	4
	COM	5
	N.C.	6
POWER APPLIED	N.O.	7
	COM	8
	N.C.	9

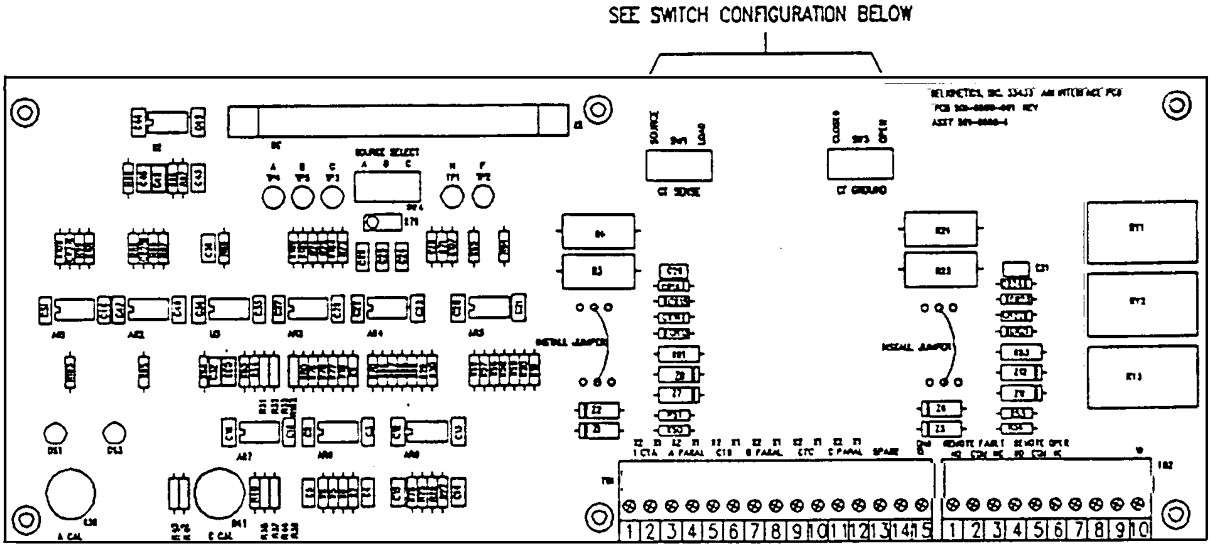
NOTE:

1. MCCB TO BE PROVIDED BY OTHERS:
CIRCUIT BREAKER OR DISCONNECTING DEVICE TO BE DERATED BY AN ADDITIONAL 15% TO ACCOMMODATE FOR THE HIGHER FREQUENCY CURRENT COMPONENTS.

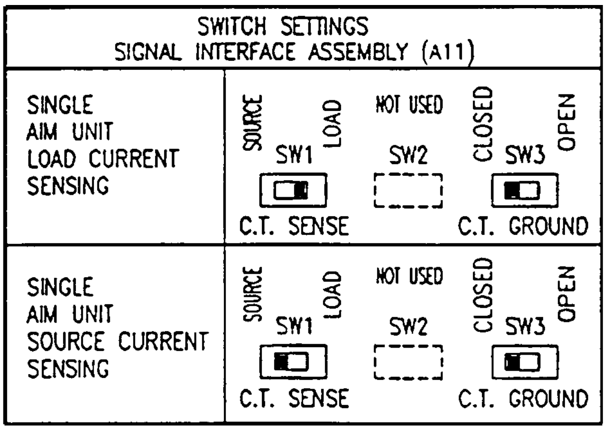
DRAWING AIM/EI3P

ELECTRICAL INSTALLATION AIM 3A SERIES

(FOR PARALLELED UNITS)

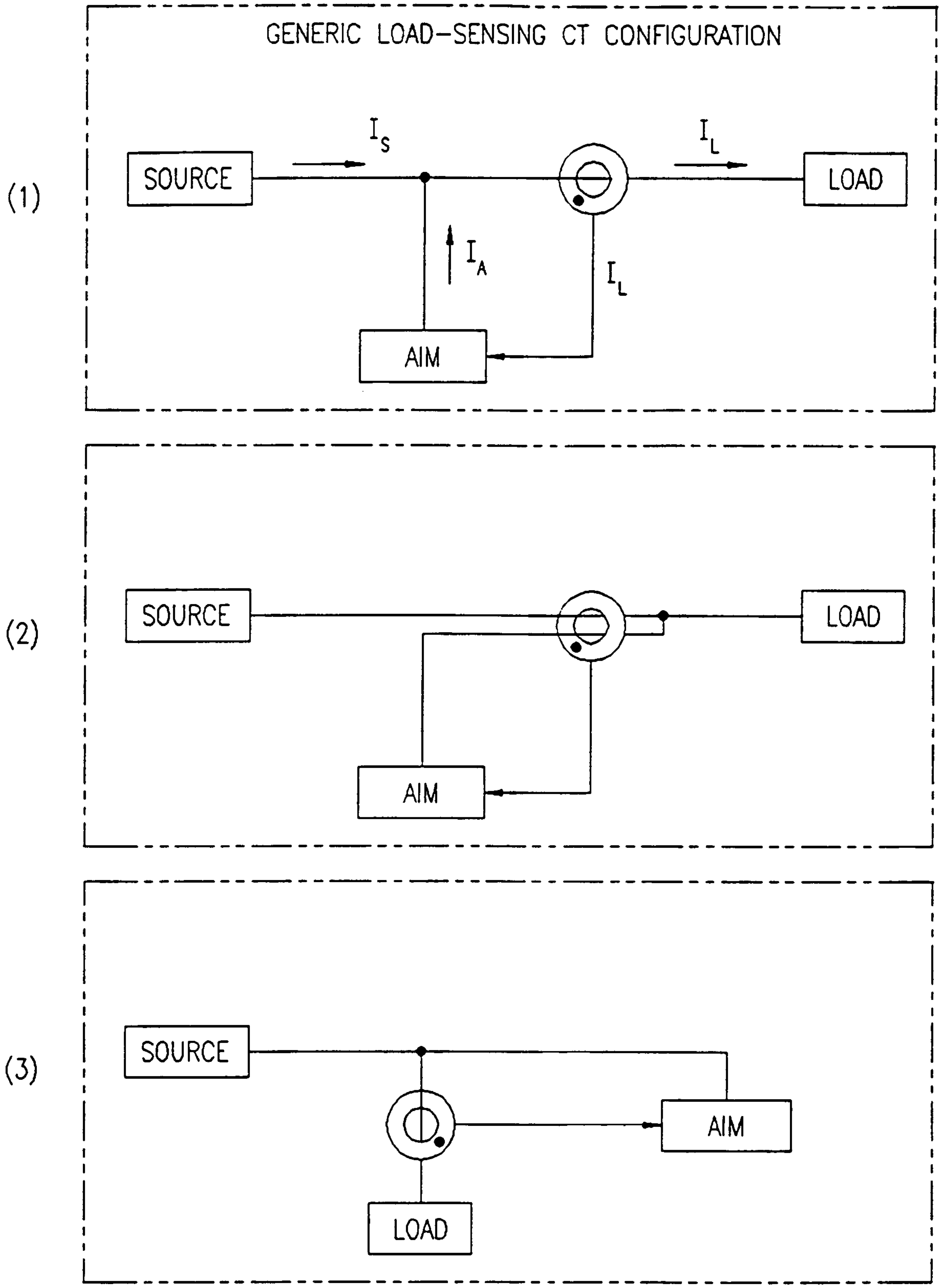


SIGNAL INTERFACE BOARD (A11 ASSEMBLY)



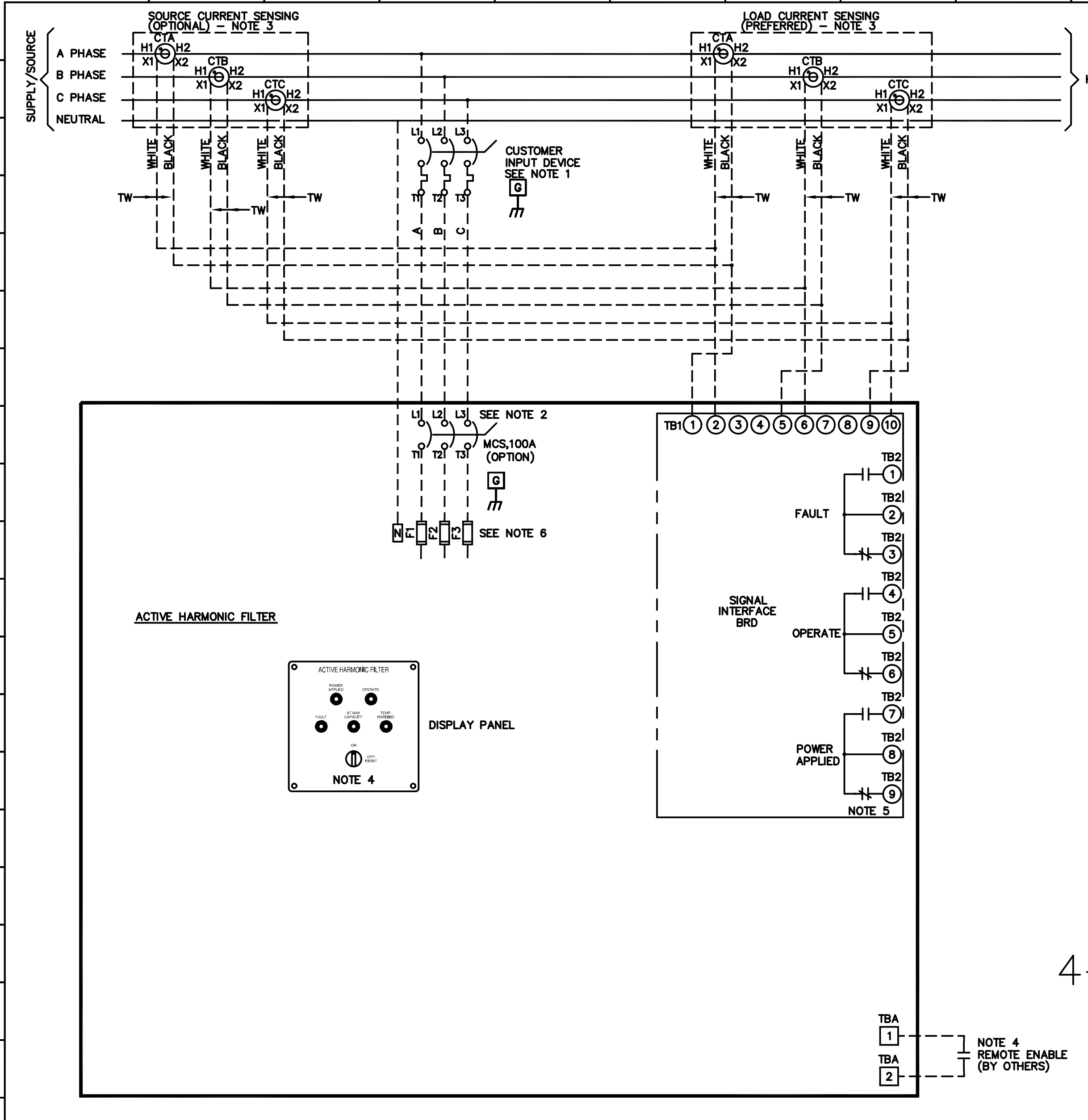
DRAWING AIM/SIGINT

SIGNAL INTERFACE SWITCH CONFIGURATION



DRAWING AIM/CTCONF

ALTERNATIVE LOAD-SENSING CT CONFIGURATIONS



1. CUSTOMER SUPPLIED CIRCUIT BREAKER OR DISCONNECT REQUIRED. FOR A CONSERVATIVE ESTIMATE, ASSUME THAT THE MAXIMUM RATED OUTPUT CURRENT LISTED FOR THE ACTIVE HARMONIC FILTER OCCURS AT 400 HZ. THE MANUFACTURER OF THE DISCONNECT DEVICES SHOULD BE CONSULTED FOR ANY DERATING THAT MIGHT APPLY. TYPICALLY 15%.
2. MOLDED CASE SWITCH OPTION FOR CUSTOMER CONNECTION.
3. WARNING: CURRENT TRANSFORMERS CAN RENDER AN ELECTRICAL SHOCK WHEN ENERGIZED IF THEY ARE NOT TERMINATED INTO APPROPRIATE LOADS OR HAVE THEIR LEADS SHORTED.

   NOTE ORIENTATION OF CT'SI THE "H1" POLARITY DOT MUST POINT TOWARDS THE MAINS.

   USE TWISTED PAIR WIRING.
4. FOR CUSTOMER CONNECTION TO START UNIT WHEN SW1 DISPLAY PANEL CONTROL SWITCH IS IN THE "ON" POSITION. JUMPER IF NOT REQUIRED.
5. DRY CONTACTS FOR CUSTOMER USE, 1.0A @ 120VAC.
6. F1–F3 = HIGH SPEED FUSES FOR SEMICONDUCTOR PROTECTION.

4–WIRE CONFIGURATIONS ONLY

ESD SENSITIVE EQUIPMENT

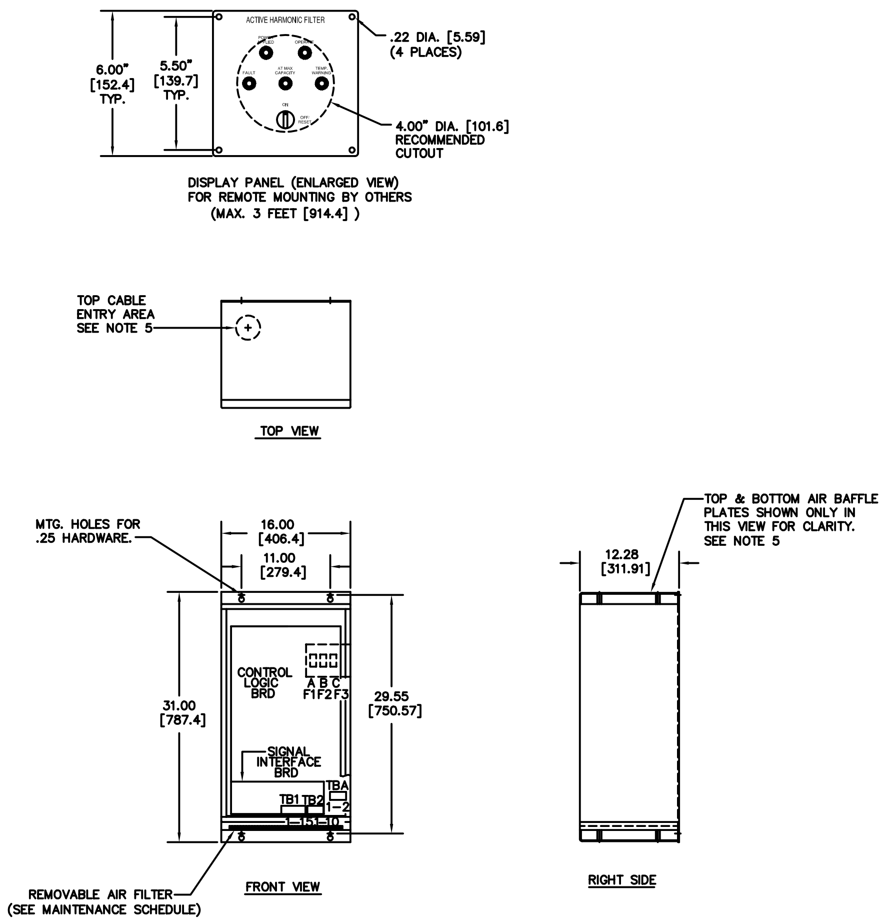
⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.	REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

SCALE	1:1
LAYER	XXXX
DATE	7/24/02
DWGSZ	D
DFTR	RAM
ENGR	GMB
	AIM EUROPE
CUSTOMER	AIM,EUROPE
CUST ORDER NUMBER	STD.
TITLE	ACTIVE HARMONIC FILTER CONNECT.DIA.,50A,4W
DWG NO	50A050
REV	D
CAD FILE	50A050D4
SHEET NO	4 OF 4

DBORDF



CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 25A TOTAL HARMONIC COMPENSATION (DERATED 22.5A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #12AWG – #2AWG Cu
   D. CONTROL: SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA. #12 AWG WIRE MAX.
   E. GROUND TERMINALS: SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #14 AWG – #6 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 600W (2049BTU/HR), REQ'D CFM 125(3538 LPM)
5. STANDARD CABLE ACCESS: TOP CABLE ENTRY ONLY.
6. APPROX. WEIGHT: 110 LBS(50 KG)
7. MAXIMIUM 50 DEGREES C AMBIENT.
8. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 025 F 5 – A CH X F

- F=EMC FILTER OPTION
- X=W/O EMC FILTER OPTION
- CH=CHASSIS
- 5=50HZ
- 6=60HZ
- 25 AMPS HARMONIC CORRECTION
- 3=3 WIRE
- 4=4 WIRE

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	3.5	27
C=240V	4.4	27
F=400V	9.3	29
G=480V	14.0	30
H=600V	20.0	29

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1° THIRD ANGLE PROJECTION

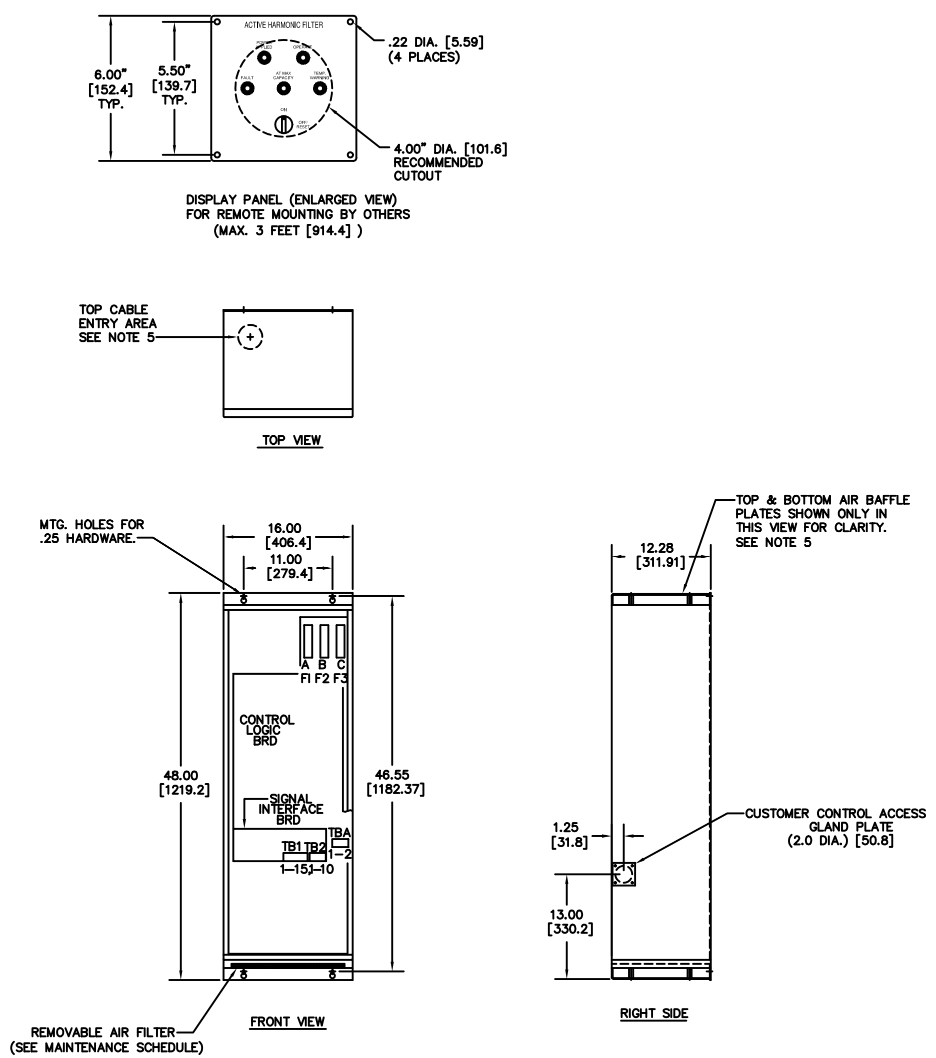
SCALE 1/8=1 | LAYER XXXX | DATE 7/24/02 | DWGSZ D | DFTR RAM | ENGR GMB

AIM EUROPE | CUSTOMER AIM,EUROPE | CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CHASSIS 25A – 3W,4W

DWG NO 50A025 | REV D | CAD FILE 50A025D2 | SHEET NO 2 OF 4

REVISIONS | DFTG CODE | NO.



CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 50A TOTAL HARMONIC COMPENSATION (DERATED 45A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 2/0 Cu
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #14 AWG – #6 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 1.1KW (3757BTU/HR), REQ'D CFM 250(7080LPM)
5. STANDARD CABLE ACCESS: TOP CABLE ENTRY ONLY FOR POWER AND BOTTOM RIGHT SIDE ONLY FOR CONTROL.
6. APPROX. WEIGHT: 175 LBS(79 KG)
7. MAXIMUM 50 DEGREES C AMBIENT.
8. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 050 F 5 – A CH X F

F=EMC FILTER OPTION
X=W/O EMC FILTER OPTION

CH=CHASSIS

5=50HZ
6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	6.9	54
C=240V	8.8	54
F=400V	19.0	57
G=480V	27.0	60
H=600V	39.0	59

50 AMPS HARMONIC CORRECTION

3=3 WIRE
4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

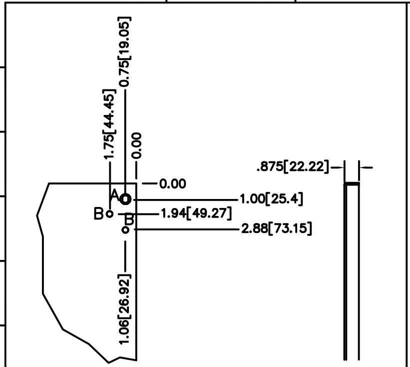
DFTG CODE NO.
REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

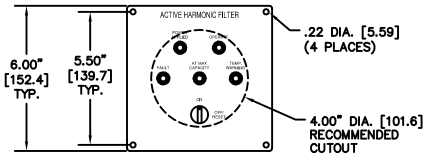
SCALE 1/8=1
LAYER XXXX
DATE 7/24/02
DWGSZ D
DFTR RAM
ENGR GMB

AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

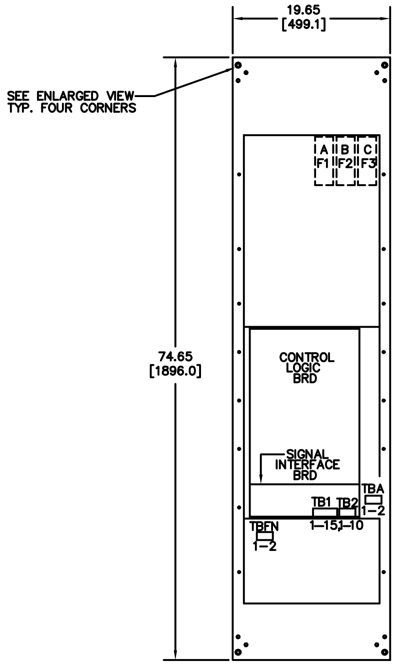
TITLE ACTIVE HARMONIC FILTER OUTLINE,CHASSIS 50A – 3W,4W
DWG NO 50A050
REV D
CAD FILE 50A050D2
SHEET NO 2 OF 4
DBORDF



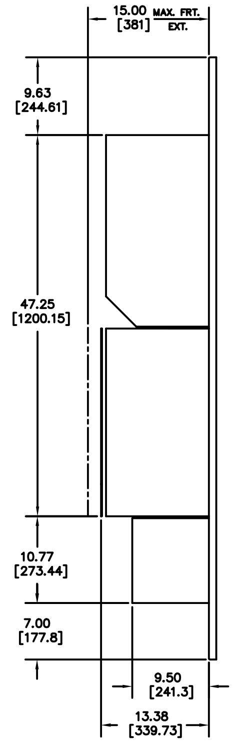
TYP. FOUR CORNERS
(ENLARGED VIEW)
INCHES [MILLIMETERS]
A – 0.625 [15.88] DIA.
B – 0.375 [9.53] DIA.



DISPLAY PANEL (ENLARGED VIEW)
FOR REMOTE MOUNTING BY OTHERS
(MAX. 3 FEET [914.4])



FRONT VIEW



RIGHT SIDE

CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 100A TOTAL HARMONIC COMPENSATION (DERATED 90A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 350 MCM Cu
   D. CONTROL: SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS: SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 2.2KW (7513 BTU/HR), REQ'D CFM 250 (7080 LPM)
5. APPROX. WEIGHT: 375 LBS(170 KG)
6. MAXIMIUM 50 DEGREES C AMBIENT.
7. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 100 F 5 – A CH X F

F=EMC FILTER OPTION
X=W/O EMC FILTER OPTION

CH=CHASSIS

5=50HZ
6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	14.0	107
C=240V	18.0	108
F=400V	37.0	114
G=480V	54.0	119
H=600V	78.0	117

100 AMPS HARMONIC CORRECTION

3=3 WIRE
4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

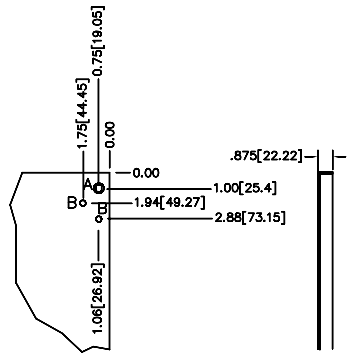
REVISIONS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

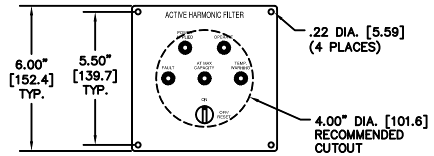
SCALE 1/8=1
LAYER XXXX
DATE 7/24/02
DWGSZ D
DFTR RAM
ENGR GMB

AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

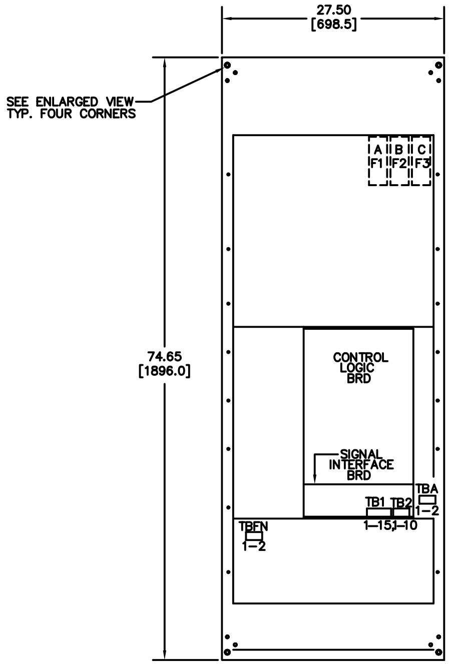
TITLE ACTIVE HARMONIC FILTER OUTLINE,CHASSIS 100A – 3W,4W
DWG NO 50A100 REV D
CAD FILE 50A100D2 SHEET NO 2 OF 4



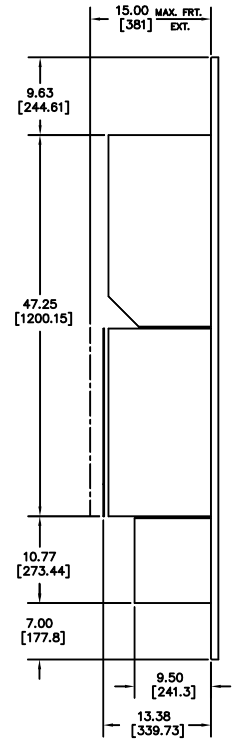
TYP. FOUR CORNERS
(ENLARGED VIEW)
INCHES [MILLIMETERS]
A – 0.625 [15.88] DIA.
B – 0.375 [9.53] DIA.



DISPLAY PANEL (ENLARGED VIEW)
FOR REMOTE MOUNTING BY OTHERS
(MAX. 3 FEET [914.4])



FRONT VIEW



RIGHT SIDE

CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 150A TOTAL HARMONIC COMPENSATION (DERATED 135A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #2AWG – 600 MCM Cu
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 3.3KW (11270 BTU/HR), REQ'D CFM 375 (10613 LPM)
5. APPROX. WEIGHT: 420 LBS(190 KG)
6. MAXIMIUM 50 DEGREES C AMBIENT.
7. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 150 F 5 – A CH X X

CH=CHASSIS
5=50HZ
6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	20.5	160
C=240V	26.0	163
F=400V	56.0	170
G=480V	81.4	179
H=600V	117.0	176

150 AMPS HARMONIC CORRECTION
3=3 WIRE
4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

DFTG CODE NO.	REVISIONS

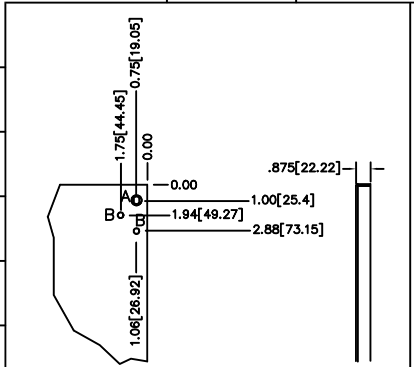
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

SCALE	1/8=1
LAYER	XXXX
DATE	7/24/02
DWGSZ	D
DFTR	RAM
ENGR	GMB

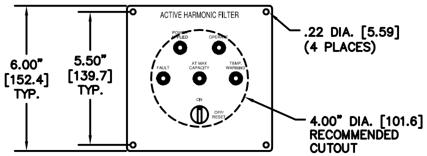
AIM EUROPE

CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

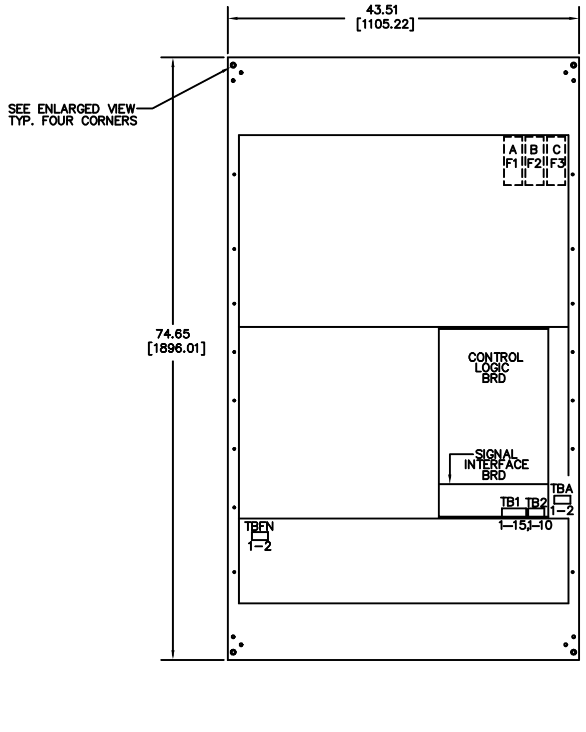
TITLE ACTIVE HARMONIC FILTER OUTLINE,CHASSIS 150A – 3W,4W
DWG NO 50A150 REV D
CAD FILE 50A150D2 SHEET NO 2 OF 4
DBORDF



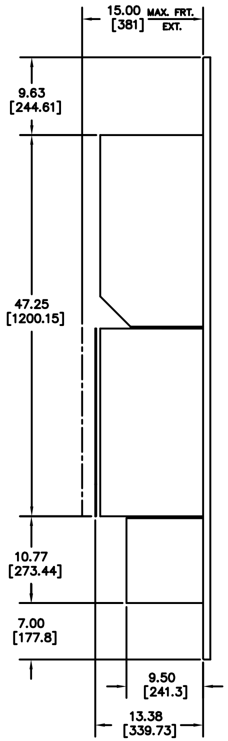
TYP. FOUR CORNERS
(ENLARGED VIEW)
INCHES [MILLIMETERS]
A – 0.625 [15.88] DIA.
B – 0.375 [9.53] DIA.



DISPLAY PANEL (ENLARGED VIEW)
FOR REMOTE MOUNTING BY OTHERS
(MAX. 3 FEET [914.4])



FRONT VIEW



RIGHT SIDE

CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 200A TOTAL HARMONIC COMPENSATION (DERATED 180A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS:
         SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #2AWG – 600 MCM Cu
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND.
      INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 4.4KW (15026 BTU/HR), REQ'D CFM 500 (14150 LPM)
5. APPROX. WEIGHT: 450 LBS(204 KG)
6. MAXIMIUM 50 DEGREES C AMBIENT.
7. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 200 F 5 – A CH X X

CH=CHASSIS
5=50HZ
6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	27.3	213
C=240V	34.0	216
F=400V	72.0	225
G=480V	108.0	238
H=600V	156.0	234

200 AMPS HARMONIC CORRECTION
3=3 WIRE
4=4 WIRE

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

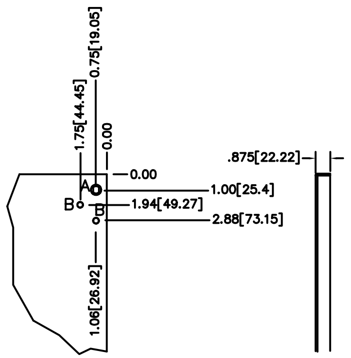
SCALE 1/8=1
LAYER XXXX
DATE 7/24/02
DWGSZ D
DFTR RAM
ENGR GMB

AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CHASSIS 200A – 3W,4W
DWG NO 50A200
REV D
CAD FILE 50A200D2
SHEET NO 2 OF 4

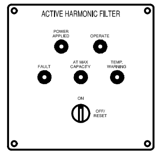
REVISIONS
DFTG CODE NO.

DBORDF

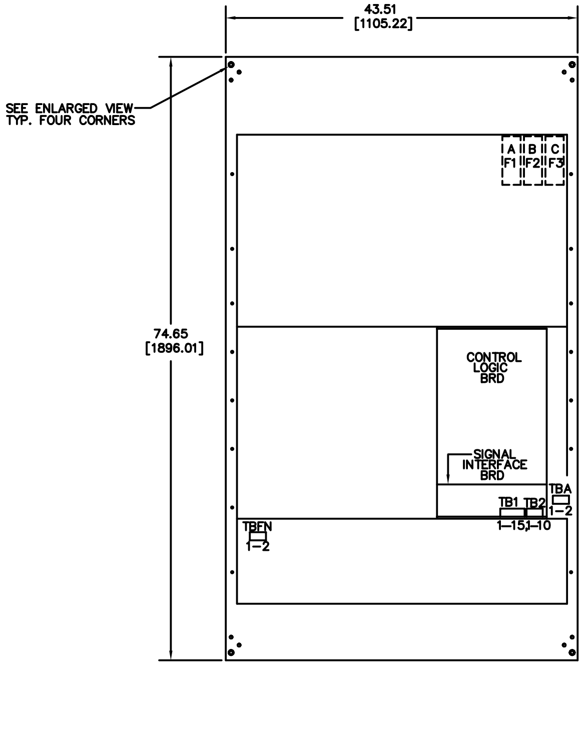


TYP. FOUR CORNERS
(ENLARGED VIEW)
INCHES [MILLIMETERS]

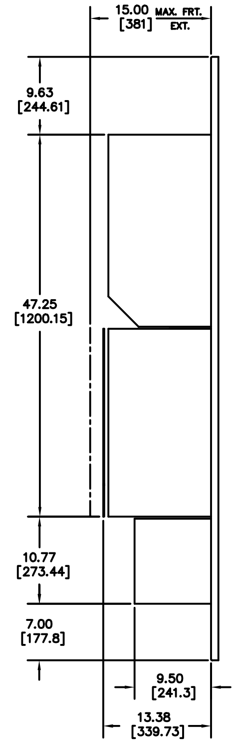
A – 0.625 [15.88] DIA.
B – 0.375 [9.53] DIA.



DISPLAY PANEL (ENLARGED VIEW)
FOR REMOTE MOUNTING BY OTHERS
(MAX. 3 FEET [914.4])



FRONT VIEW



RIGHT SIDE

CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, 238A TOTAL 300A TOTAL HARMONIC COMPENSATION (DERATED 270A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #2AWG – 600 MCM Cu
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND.
      INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 6.3KW REQ'D 1,140 CFM
5. APPROX. WEIGHT: 250 KG
6. MAXIMIUM 50 DEGREES C AMBIENT.
7. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 200 F 5 – A CH X F

- F=EMC FILTER OPTION
  X=W/O EMC FILTER OPTION
- M=MOULDED CASE SWITCH (MCS) OPTION
  X=W/O MOULDED CASE SWITCH OPTION
- CH=CHASSIS
- 5=50HZ
  6=60HZ
- 300 AMPS HARMONIC CORRECTION
- 3=3 WIRE

	POWER FACTOR CORRECTION – KVARS
B=208V	42
C=240V	54
F=400V	112
G=480V	162
H=600V	234

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

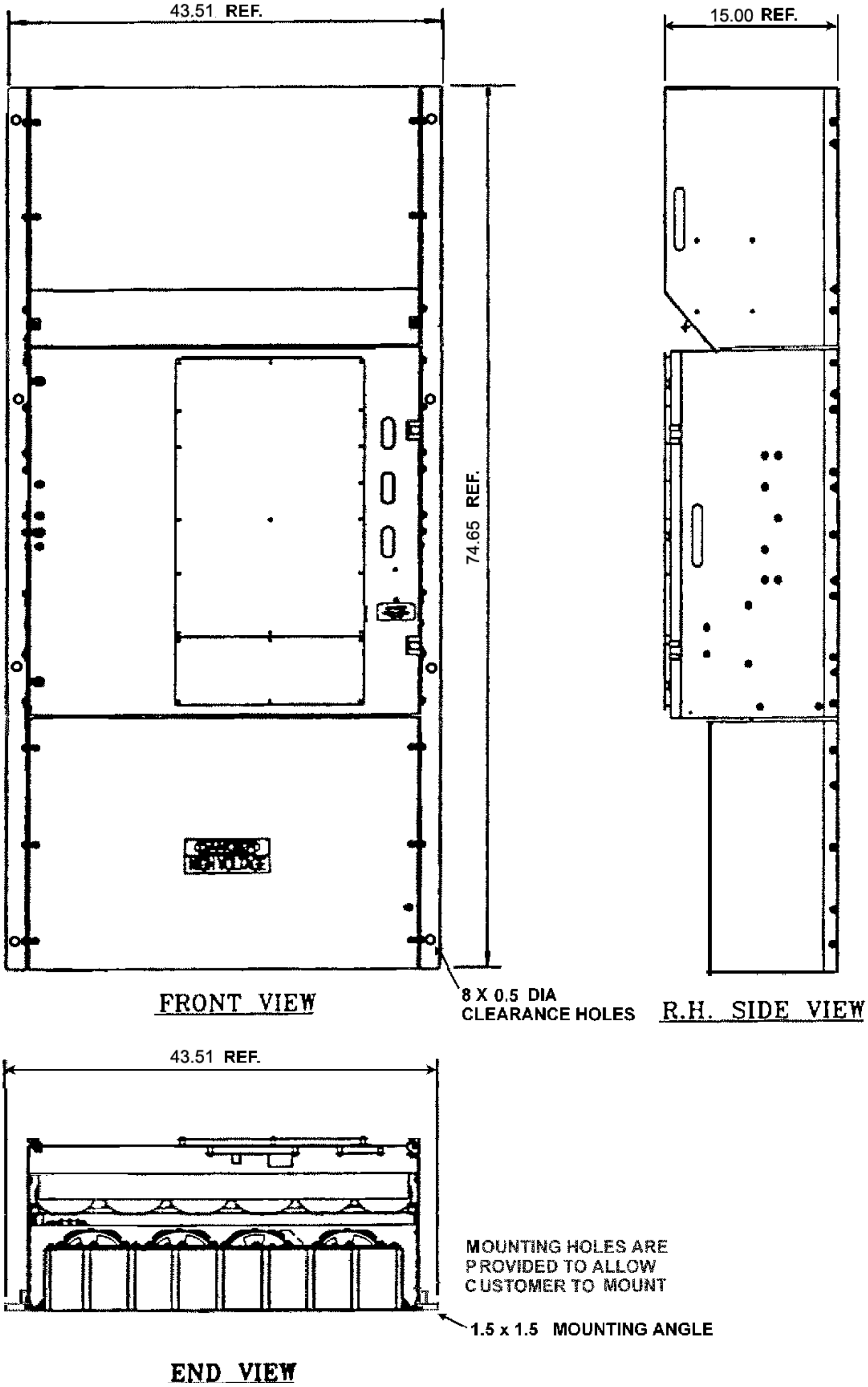
REVISIONS | OPTG CODE | NO.

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994 TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1° THIRD ANGLE PROJECTION

SCALE 1/8=1
LAYER XXXX
DATE 11/03/03
DWGSZ D
DFTR RAM
ENGR GMB

AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

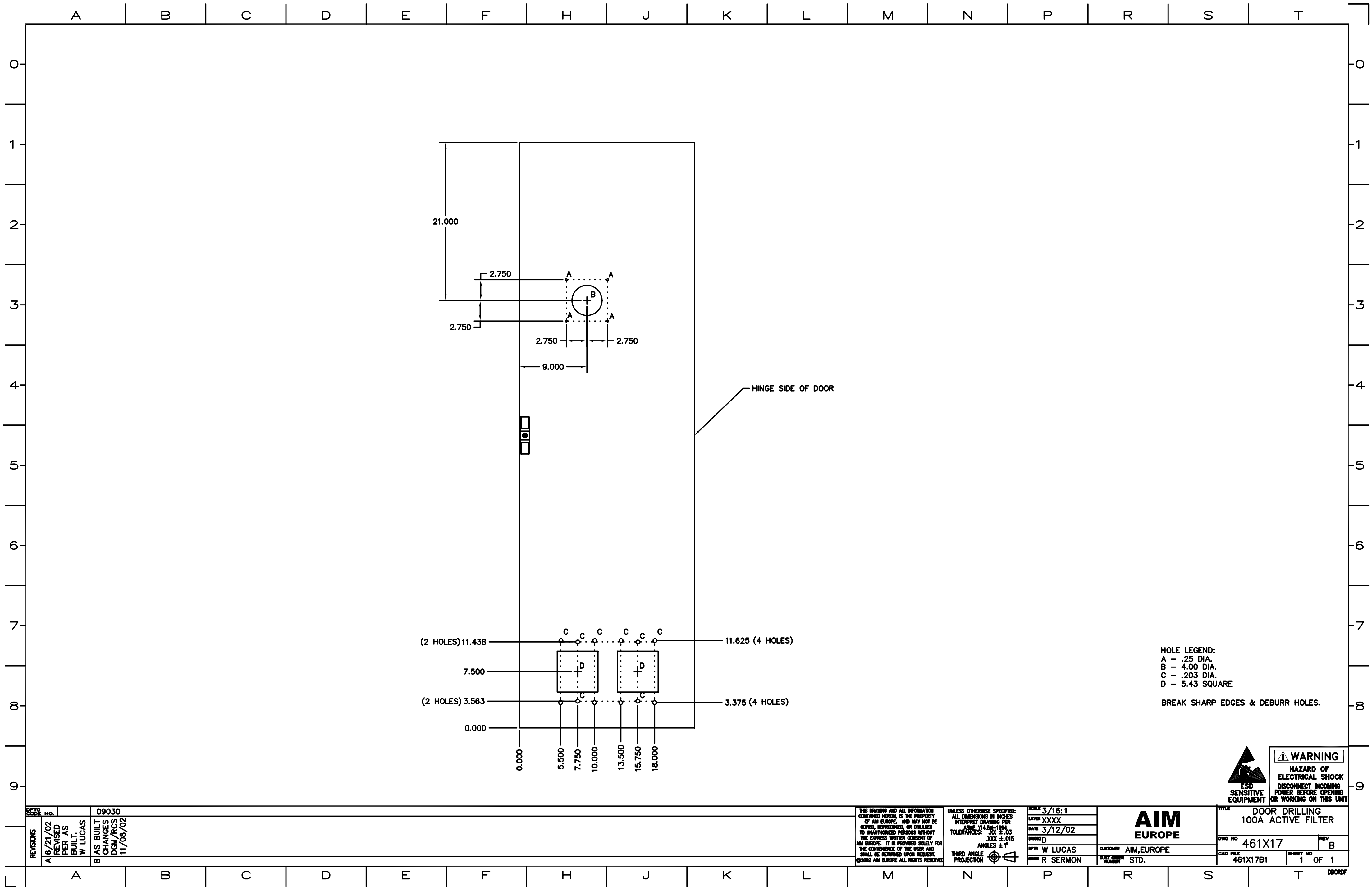
TITLE ACTIVE HARMONIC FILTER OUTLINE,CHASSIS 300A – 3W
DWG NO 50A300 REV C
CAD FILE 50A300C2 SHEET NO 2 OF 4
DBORDF



DRAWING AIM/400C

PHYSICAL INSTALLATION DETAILS FOR 400A AIM 3A & 4A SERIES

(CHASSIS MOUNTED)


HINGE SIDE OF DOOR
21.000
2.750
2.750
2.750
2.750
9.000
A
B
C
D
(2 HOLES) 11.438
7.500
(2 HOLES) 3.563
0.000
11.625 (4 HOLES)
3.375 (4 HOLES)
0.000
5.500
7.750
10.000
13.500
15.750
18.000
HOLE LEGEND:
A – .25 DIA.
B – 4.00 DIA.
C – .203 DIA.
D – 5.43 SQUARE
BREAK SHARP EDGES & DEBURR HOLES.
ESD SENSITIVE EQUIPMENT
WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT
REVISIONS
A 6/21/02 REVISED PER AS BUILT. W LUCAS
B AS BUILT CHANGES DGM/RCS 11/08/02
09030
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION
SCALE 3/16:1
LAYER XXXX
DATE 3/12/02
DFTR W LUCAS
ENGR R SERMON
AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.
TITLE DOOR DRILLING 100A ACTIVE FILTER
DWG NO 461X17
REV B
CAD FILE 461X17B1
SHEET NO 1 OF 1
DBORDF

3.0 OPERATION

WARNING

Under certain circumstances it may be necessary to operate the AIM Conditioner with the door opened or protective covers removed. Extreme care should be taken to protect against electrical shock when it is necessary to make measurements or perform adjustments with the unit energized and circuitry exposed. Always work with another person in case an emergency occurs. Make it a practice to use only one hand when making measurements within the unit. Wear safety glasses or a face shield. Except when making internal observations or measurements, the door and protective covers should be left closed. Never leave the unit unattended with the door open or the covers removed.

3.1 Equipment Familiarization

Refer to the drawings on pages 2-5 to 2-11, and Figure 3-A on Page 3-7 for the layout of the front panel controls and display devices.

3.1.1 Power Disconnect Switch

AIM Conditioners have as an additional option an integral moulded case power disconnect switch which is mechanically interlocked with the enclosure doors. Chassis mounted line fuses also provide protection against abnormally high currents at high interrupting capacity. The disconnect switch, however, includes a tripping mechanism for very high currents. In normal operation the maximum output current is limited electronically well below the rating of the fuses.

The closing of the Power Disconnect switch is the only manual power switching action required. The start-up and operation occurs automatically when the AIM Conditioner is connected to the power lines and the Power Disconnect switch is closed. **The ON-OFF/RESET switch should be placed in the OFF/RESET position before opening the Power Disconnect switch.**

3.1.2 Monitoring Panel

The Monitoring Panel, which includes one control switch and five indicators (LEDs), is shown in Figure 3-A and described below:

ON-OFF/RESET switch: The **ON-OFF/RESET** switch functions with logic-level signals from the internal "control logic" circuit. The switch has two positions: the **OFF/RESET** position and the **ON** position.

When the switch is in the **OFF/RESET** position, the control logic is held in the off or standby state. Control circuits are energized, cooling blowers are powered, and the internal High-Voltage DC Bus is charged (The DC Bus begins to charge, through soft-start resistors, when the power disconnect switch is closed, applying AC line voltage to the AIM Conditioner). Turning the **ON-OFF/RESET** switch to the **OFF/RESET** position will clear most of the "latched" fault indications that may have been produced by a fault occurring while the unit is in the operate (**ON**) mode.

When the **ON-OFF/RESET** switch is turned to the **ON** position, the control logic proceeds automatically through sequential steps leading to the fully operational mode. The following conditions must be met before operation is initiated:

1. Control voltages must be in-range.
2. Voltage must be present on all three phases.
3 The DC Bus must have charged above a threshold value.
4 There must not be excessive voltage on the DC Bus.
5. There must be no "latched faults".
6. The **ON-OFF/RESET** switch must be in the **ON** position.

When the above conditions are satisfied, the power contactors are energized and the output current flow is enabled.

<u>**POWER APPLIED** indicator:</u> The **POWER APPLIED** indicator (white) is lit when there is control power applied to the control logic circuitry. The control power is derived from the AC power lines by a step-down control power transformer providing a nominal 120 Vac for the operation of the logic power supply, blowers and contactor actuating coils. The control power transformer connects between lines L1 (A) and L3 (C) and is fused in both primary and secondary circuits.

! WARNING	**Never assume that AC power line voltage is not applied to the unit merely because the POWER APPLIED indicator is not lit.**

<u>**OPERATE** indicator:</u> The **OPERATE** indicator (green) is lit when the AIM Conditioner is connected to the AC power line (contactors energized) and is operating within suitable limits. Failure of the AIM Conditioner to achieve the operational status generally indicates that one of the initial conditions described above has not been met.

<u>**AT MAX CAPACITY** indicator:</u> The **AT MAX CAPACITY** indicator (yellow) is lit when the rms value of the harmonic current supplied in one of the outputs has reached the rated value for the unit. Electronically controlled linear attenuators reduce the harmonic current signals (from the load sensing CTs) to limit the harmonic current output to the rated rms value. At initial start-up the attenuators start at maximum attenuation. The attenuation is then reduced to provide a soft turn-on of the injected harmonic currents. The **AT MAX CAPACITY**

indicator will be lit during this period (lasting about 1/2 second).

WARNING indicator: The warning indicator (red) is lit when there is over-temperature on the power transistor (IGBT) heatsink. Inadequate airflow produced by an inoperative cooling fan or by a dirty air filter can cause the power transistor heat sink to overheat. It may take a few minutes for the heatsink to cool a few degrees before a reset can be accomplished.

FAULT indicator: The **FAULT** indicator (red) is lit when the AIM Conditioner has been electronically turned off and "latched" off by one or more internal fault conditions. Most of the electronically latched faults can be reset by turning the **ON-OFF/RESET** switch to the **OFF/RESET** position and back to the **ON** position. The **FAULT** indicator is a summary indicator. The determination of the particular shutdown fault condition will most likely require the visual inspection of the LED indicators located on the Control Logic PCBD inside the enclosure. Refer to **Section 4.0** on **Trouble Shooting** for a more detailed description of the fault conditions and for LED identification on the Control Logic PCBD (see Figure 4-A). The latched fault conditions which cause the **FAULT** indicator to be lit and the corresponding Control Logic indicator are:

1. **Temperature Warning Indicator:** The Temperature Warning Indicator (red) is lit when the temperature of the power transistor (IGBT) heatsink reaches over temperature (as does indicator DS9).

2. **Overcurrent in the passive filter (indicator DS11):** Capacitors, which provide shunting of high-frequency currents, are connected across AC power lines by a contactor (K2) in the **OPERATE** mode. An excessively high capacitor current, possibly caused by a high rate-of-rise load current waveform, will trip an over-current relay which in turn sets a fault-shutdown latch on the Control Logic PCBD.

Because the over-current relay uses a thermal sensing element, it may take a few minutes to cool before a reset can be accomplished.

3. **Excessive high-frequency current detected in one of the outputs (indicator DS10):** The output currents from the IGBT power stage are monitored electronically for high-frequency current content. A latched fault-shutdown occurs when the detected current level in one of the phases exceeds a set value. The presence of across-the-line capacitors located on the load side of the AIM connection, which typically causes an instability (oscillation) at few kilohertz, is the usual cause for the tripping. A high-frequency oscillation typically causes an audible "squeal" of about a half second duration. An improperly set current sensing mode switch **(S1** on the Signal Interface PCBD) can also cause a high frequency instability which could cause a trip to occur.

4. **Contactor Error (DS12):** A latched fault-shutdown occurs should main contactor K1 or passive filter K2 fail to energize within 0.2 seconds when

commanded to do so by the control logic signals (sent to the Input Sense PCBD). A probable cause for this condition is the tripping of an auxiliary DC Bus overvoltage detector, which is resident on the Input Sense PCBD (A4), and the resulting removal of control power for the contactor coils. This overvoltage detector is independent of the Control Logic circuitry and can be **reset only by recycling the input voltage to the AIM Conditioner.** (This auxiliary DC Bus overvoltage detector is used only for the 400, 480 and 600 Vac AIM Conditioners).

3.2 Initial Operation of the AIM Conditioner

3.2.1 Power and Control Wiring Verification

A final check of both the power and signal wiring should be made before applying power.

3.2.2 Monitoring

Before applying power to the AIM Conditioner, connect a harmonic distortion analyzer to the source side of AIM Conditioner and load system to monitor the current quality. An oscilloscope with a current probe, if available, is useful in monitoring currents, especially non-harmonic, transient, and high-frequency current components.

3.2.3 Applying Power

With the enclosure door to the AIM Conditioner closed and the **ON-OFF/RESET** switch in the **OFF/RESET** position, apply AC line power to the AIM Conditioner by closing the **Power Disconnect** switch. The **POWER APPLIED** indicator should light and the sound of fans running should be heard as control power is produced.

3.2.4 Checking the CT Phase Monitors

The Signal Interface PCBD (A11) contains monitoring circuitry that compares the phases of the CT signals with the applied voltages for the purpose of detecting reversed-polarity CTs. A reversed CT would cause the AIM Conditioner to generate an output current that would **increase** the harmonic current flowing to the source of power, most likely doubling the harmonic current for line with the reversed-polarity CT.

Some load current must be flowing for the circuits to operate. LED indicators located on the Signal Interface PCBD show the detection of a reversed polarity CT. A CT configuration where the CTs are "cross phased", however, **may not** be detected as an error by this circuitry. Cross phasing of the CTs is where one or both of CTs, CTA and CTC, is not in correct correspondence with its respective ("A" or "C") power line (e.g. CTA is sensing the current on the line connected to the phase B or phase C input terminals of the AIM Conditioner).

To check the CT phases, it will be necessary to open the enclosure door with the Power Disconnect switch on to view the Control Logic. Normally, because of mechanical interlocking, the enclosure door can not be opened without turning the Power Disconnect switch to the OFF position. The door can be opened without turning off the Power Disconnect switch, by a qualified person, by using a screw driver to release the mechanical interlock on the Power Disconnect switch handle mechanism.

⚠ WARNING	**There will be dangerous AC and DC voltages exposed inside the enclosure even with the front panel ON-OFF/REST switch in the OFF/REST position. All appropriate safety precautions should be observed whenever power is applied to the AIM Conditioner.**

⚠ WARNING	**Because the DC Bus capacitors will charge any time the Power Disconnect switch is in the closed (ON) position, always wait a least 3 minutes after turning the Power Disconnect switch off for the capacitors to discharge to safe voltage before contacting any of the wiring or assemblies other then the Control logic and Signal Interface PCBDs.**

Carefully release the Power Disconnect interlock and open the enclosure door, taking care not to extend body or tools inside the enclosure. Examine the Signal Interface PCBD for lit LEDs. Refer to Figure 4-C for LED layout and designation. LED DS1 (red), located at lower left-hand corner, indicates a reversed polarity CT for the "A" phase. LED DS3 (red), located to the right, indicates a reversed polarity CT for the "C" phase. LEDs DS2 and DS5, located left-of-center on the Control Logic PCBD, are normally the only LEDs lit on the Control logic when the **ON-OFF/RESET** switch is the **OFF** position. A "Charged Bus" LED (red), located behind the plate supporting the Control Logic and visible through a small hole near the lower right of the plate, is another lit LED on some AIM models.

If either LED DS1 or DS3 on the Signal Interface PCBD is lit, indicating a reverse CT polarity, corrective action should be taken to reverse the appropriate CT leads. This is most easily accomplished at TB1 on the Signal Interface assembly. See Drawing AIM/SIGINT Page 2-13.

⚠ WARNING

Turn off the power to the AIM Conditioner and allow the three-minute capacitor discharge time before attempting the modification of the CT wiring. Because an open-circuited CT can produce a dangerously high voltage unless terminated or protected internally with voltage limiters, it will be necessary to remove the load currents from the CT during the wire reversal.

3.2.5 Proceeding to the Operate Mode

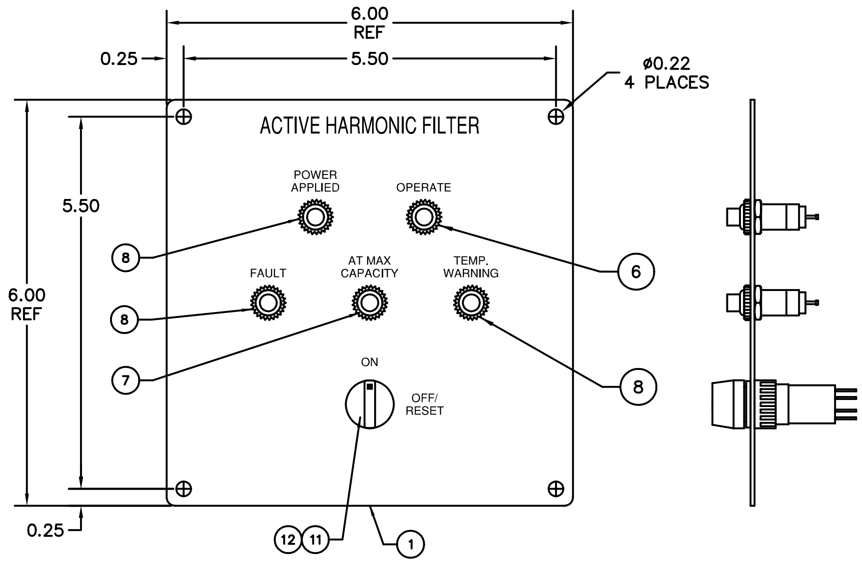
When the proper CT polarities have been verified as described above, close the enclosure safety door, and then rotate the **ON-OFF/RESET** switch to the **ON** position. The sound of contactors being energized should be heard, followed by a low-level buzzing or sizzling sound generated by the produced harmonic-frequency output currents flowing through magnetic devices (filter inductors) located within the unit. Any loud "squealing" sound indicates a system instability. The unit should be turned off immediately by rotating the **ON-OFF/RESET** switch to the **OFF/RESET** position.

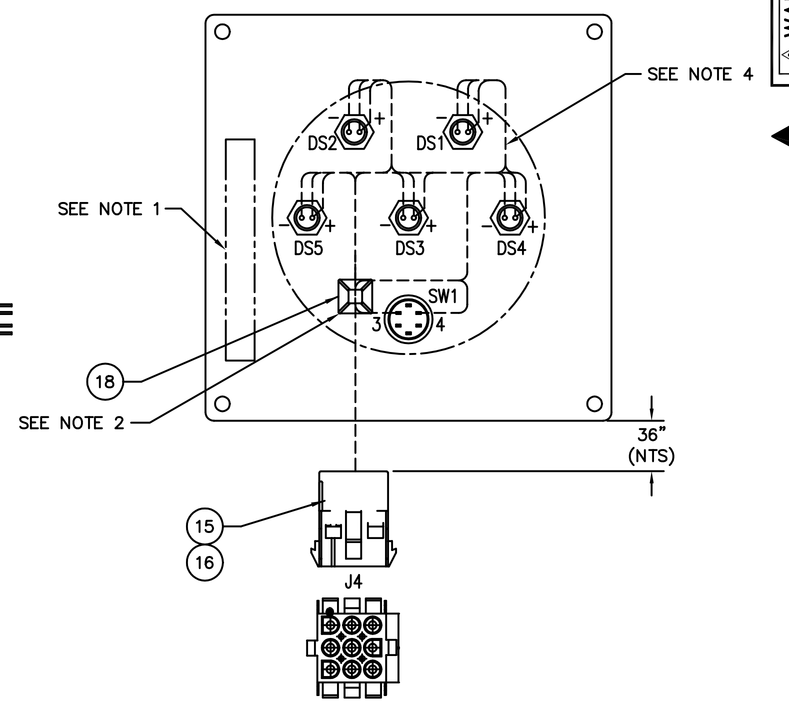
Once the AIM Conditioner is fully operational, the source-side current distortion should be checked. Harmonic currents, when compared with the AIM-off levels, should show a substantial reduction. Minimal reduction or an increase in the harmonic current levels could indicate cross-phased current transformers.

3.3 Performance Evaluation

The AIM Conditioner performance should be evaluated based on the reduction of load-side harmonic current components as compared with the source-side harmonic current components **as measured while the AIM Conditioner is operating.** For most applications there will be a noticeable increase in the load-side harmonics when the AIM Conditioner is operating. Because the AIM Conditioner supplies a substantial level of useful "leading" VARs at the fundamental frequency, the fundamental frequency current components as measured for the source current and load current can differ significantly. For lagging power factor loads, such as phase-control rectifiers, the source-side fundamental frequency current component can be substantially smaller than the load-side component. In this case, the comparison of source-side and load-side distortion readings, where the reading compares the ratio of the harmonic current to the fundamental frequency component, will be a poor indicator of the actual harmonic current reduction.

If harmonic current distortion instrumentation is unavailable, the source-side total, fundamental, and harmonic currents can be measured with the aid of the “harmonic current analyzer circuit” located on the Signal Interface PCBD (A11). See section **4.1.6** for details.





NOTES:

1. IDENTIFY, WHERE INDICATED, WITH PN "363713.00" AND LATEST REV LETTER.
2. TIE MOUNT TO FIT WITHIN A 4.00 DIA AREA (DS3 CENTER POINT).
3. WIRE ASSEMBLY AS SHOWN AND PER WIRE LIST ON THIS SHEET. USE CABLE TIES AS NECESSARY.
4. HIDDEN LINES INDICATE APPROX WIRE ROUTING.

WIRE LIST

WIRE NO.	FROM	TERMINAL	LENGTH	WIRE COLOR	WIRE SIZE	TO	TERMINAL
55A	J4–1	CRIMP	40.00	WHT	#20	DS5–2	SOLDER
55B	DS5–2	SOLDER	3.50	WHT	#20	DS2–2	SOLDER
55C	DS2–2	SOLDER	3.50	WHT	#20	DS3–2	SOLDER
55D	DS3–2	SOLDER	3.50	WHT	#20	DS1–2	SOLDER
55E	DS1–2	SOLDER	3.50	WHT	#20	DS4–2	SOLDER
55F	DS4–2	SOLDER	4.75	WHT	#20	SW1–4	SOLDER
56A	J4–2	CRIMP	43.25	WHT	#20	DS1–1 (+)	SOLDER
57A	J4–3	CRIMP	41.50	WHT	#20	DS2–1 (+)	SOLDER
58A	J4–4	CRIMP	41.00	WHT	#20	DS3–1 (+)	SOLDER
59A	J4–5	CRIMP	43.00	WHT	#20	DS4–1 (+)	SOLDER
60A	J4–6	CRIMP	40.25	WHT	#20	DS5–1 (+)	SOLDER
61A	J4–7	CRIMP	42.50	WHT	#20	SW1–3	SOLDER

FIGURE 3-A

WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

ESD SENSITIVE EQUIPMENT

TITLE: ASSEMBLY PANEL MONITORING UNIT
DWG NO 363713 REV A
CAD FILE 363713A1 SHEET NO 1 OF 1

AIM EUROPE
CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

SCALE 3/4:1
LAYER XXXX
DATE 11/10/01
DWGSZ MGJ
DFTR RCS
ENGR

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

DFTG CODE NO. 08814
REVISIONS
A UPDATE DRAWINGS DJL/RCS 9/3/02

CHBORDF

4.0 TROUBLE SHOOTING

The inability of the AIM Conditioner to function or meet performance expectations generally results from one of the three classes of problems defined below. The following information is intended to permit the user's electrician to correct simple problems and to determine whether a service call is required.

Class 1: These are problems associated with the interaction of the AIM Conditioner with the system to which it is connected. Instabilities caused by across-the-line capacitors on the load side is an example of this class. These problems may require some system reconfiguration in consultation with service personnel.

Class 2: These are problems that might be corrected by changing a switch position on a programming switch or by making a simple adjustment of a potentiometer. The Current Sensing mode switch is an example where an incorrectly set switch can cause a problem. Adjusting one of the "gain pots" to correct for a current transformer sensing error is an example where a "pot" adjustment may solve the problem. These problems can often be solved by qualified on-site personnel.

Class 3: These are problems associated with the malfunction or inoperation of the unit typically the result of failed component or broken connection. These problems generally require a service call.

4.1 Built-in Diagnostic Aids

LED indicators and test points have been provided for aid in fault diagnosis. These indicators and test points are located principally on the Control Logic PCBD (A5). There are also two LED indicators on the Signal Interface board assembly (A11). These are the reversed-phase current transformer indicators discussed in Section 3.2.4 and used in the initial turn-on of the AIM unit.

4.1.1 Control Logic LED Indicators

The LED layout for the Control Logic is shown in Figure 4-A. Most of the LEDs indicate that a fault was detected with the result that the unit was "turned-off " and will require a manual reset action before operation can be re-initiated. The LED indicators and their functions are described below.

DS2: Phase A in Current Limiting. DS2 (red) indicates that the "A" phase harmonic load current (rms) has reached the rated value for the AIM unit and that an electronic attenuator is actively limiting the current to the rated value.

In the **Operate** mode the **AT MAX CAPACITY** indicator is lit when DS2 is lit. DS2 is also lit when the unit is not in the **Operate** mode.

DS5: Phase C in Current Limiting. DS5 (red) indicates that the "C" phase harmonic load current (rms) has reached the rated value for the AIM unit and that an electronic attenuator is actively limiting the current to the rated value. In the **Operate** mode the **AT MAX CAPACITY** indicator is lit when DS5 is lit. DS5 is also lit when the unit is not in the **Operate** mode.

DS7: DC Bus Overvolts (non-latching). DS7 (red) indicates that the DC Bus voltage, as monitored by the Control Logic circuitry, has exceeded a set value (440 Vdc) and that the unit has been set temporally to the off state. The unit will restart when voltage drops below approximately 380 Vdc.

DS8: Improper Control Voltages or Missing Phase (non-latching). DS8 (red) indicates that the + 15 Vdc or –15 Vdc or the + 20 Vdc control voltages are below set values. The + 20 Vdc (which powers the + 15 Vdc voltage regulator) must initially exceed 18 Vdc and then must not fall below 15 Vdc. The + 15 Vdc must exceed 14 Vdc, and the –15 Vdc must exceed –14 Vdc. The control power is derived from the input A-C line-to-line voltage.

DS8 may also indicate that the input 3-phase line voltage is substantially unbalanced. A missing B phase is an example of a substantially unbalanced condition.

DS9: Over-temperature (latching). DS9 (red) indicates that the temperature on the power transistor (IGBT) heatsink has exceeded a set value (90 degrees C) as detected by thermal switch TS1. Inadequate airflow produced by an inoperative cooling fan or by a dirty air filter can cause the power transistor heat sink to overheat. It may take a few minutes for the heatsink to cool a few degrees before a reset can be accomplished.

DS10: Excessive High-Frequency Current (latching). The output currents from the IGBT power stage are monitored electronically for high-frequency current content. A latched fault-shutdown occurs when the detected current level in one of the phases exceeds a set value. The presence of across-the-line capacitors located on the load side of the AIM connection, which typically causes an instability (oscillation) at few kilohertz, is the usual cause for the tripping. A high-frequency oscillation typically causes an audible "squeal" of about a half second duration. An improperly set current sensing mode switch **(S1** on the Signal Interface PCBD) can also cause a high frequency instability which could cause a trip to occur.

DS11: Overcurrent in the Passive Filter (latching). Capacitors, which provide shunting of high-frequency currents, are connected across AC power lines by a contactor (K2) in the **OPERATE** mode. An excessively high capacitor current, possibly caused by a high rate-of-rise load current waveform, will trip an over-current relay which in turn sets a fault-shutdown latch on the Control Logic assembly. Because the over-current relay uses a thermal sensing element, it will take a few minutes to cool before a reset can be accomplished.

DS12: Contactor Error (latching): A latched fault-shutdown occurs should contactor K1 or K2 fail to energize within 0.2 seconds when commanded to do so by the control logic signals (sent to the Input Sense PCBD). A probable cause for this condition is the tripping of an auxiliary DC Bus overvoltage detector, which resides on the Input Sense PCBD (A4), and the resulting removal of control power for the contactor coils. This overvoltage detector is independent of the Control Logic circuitry and can be **reset only by recycling the input voltage to the AIM Conditioner.**

DS13: In Operate Mode. DS13 (green) is lit when the AIM Conditioner is fully operational and generating output currents.

4.1.2 Control Logic Test Points.

Refer to Figure 4-B for identification of the test points located on the Control Logic PCBD. Most of the test points are used for factory testing, setup and calibration. A few of the test points and their signals may be of value for fault diagnosis in the field:

TP57, 58, 59, and 60 connect to the "common" of the logic which is also connected to the chassis of the AIM Conditioner. Unless noted otherwise, measurements are made relative to "common". TP58, 59, and 60 were not available on earlier versions of the Control Logic PCBD.

CAUTION

Test points should only be monitored with high-impedance test instruments such as oscilloscopes and voltmeters. The test probes should have small tips or clips to avoid the shorting of test points to adjacent circuitry or other test points.

TP5: The voltage at TP5 is proportional to the total "A" phase load current as monitored by the unit, with 0.75 volts corresponding to the current rating (25, 50, 100, 150, 200, 300 or 400 Amps) of the particular AIM Conditioner.

TP6: The voltage at TP6 is proportional to the "A" phase load harmonic current (load current with the fundamental frequency component removed) as monitored by the unit, with 0.75 volts corresponding to the current 25, 50, 100, 150, 200, 300 or 400 Amps) of the particular AIM Conditioner.

TP32: The voltage at TP32 is proportional to the total "C" phase load current as monitored by the unit, with 0.75 volts corresponding to the current rating (25, 50, 100, 150, 200, 300 or 400 Amps) of the particular AIM Conditioner.

TP34: The voltage at TP34 is proportional to the "C" phase load harmonic current (load current with the fundamental frequency component removed) as monitored by the unit, with 0.75 volts corresponding to the current rating (25, 50, 100, 150, 200, 300 or 400 Amps) of the particular AIM Conditioner.

TP43: +15 Vdc power supply (14.3 to 15.7 Vdc).

TP44: -15 Vdc power supply (- 14.3 to - 15.7 Vdc)

TP45: + 5 Vdc reference voltage (4.95 to 5.05 Vdc)

TP68: -5 Vdc reference voltage (-4.95 to -5.05 Vdc).

TP46: The voltage at TP46 is proportional to the DC Bus voltage. The calibration is 50 V Bus voltage per volt at TP46. The nominal DC Bus voltage (in the Operate Mode) is 380 Vdc, which corresponds to a voltage of 7.6 Vdc at TP46. Any time AC power is applied to the AIM Conditioner and the AIM Conditioner is not operational, the DC Bus charges via "soft-start" resistors to voltage in the 200 to 325 Vdc range. A DC Bus voltage above a threshold value (typically 75 Vdc) is one of the requirements for the "start up" to be initiated. A low DC Bus voltage generally indicates the failure of an IGBT (shorted) or a Diode (shorted) in the power section. In this situation a service call will generally be necessary.

4.1.3 Control Logic Potentiometers

Refer to Figure 4-B for the identification of the potentiometers located on the Control Logic PCBD. Most of the potentiometers are adjusted during the factory calibration. Single-turn potentiometers R63 and R266 are normally shipped with the settings at "O". Turning up R63 and R266 causes the AIM Conditioner to produce an output current component proportional to, and opposite in phase, to the **harmonic voltage** component on the power lines. This has the effect of "loading" those harmonic voltages (and transients) with an "electronic resistor" which may have a stabilizing effect on some complex systems. This "good" harmonic current drawn from the power line by AIM Conditioner can, however, cause an increase in the **measured** Source-side harmonic current, and may, therefore, give the appearance of poor attenuation of the load generated "bad" harmonic currents.

4.1.4 Control Logic Switch

Refer to Figure 4-B for the identification of the switch located on the Control Logic PCBD. Switch **S1,** located in the upper right of the Control Logic PCBD, is used for a test function and is normally in the **OFF** position. When **S1** is in the **ON** position the "harmonic current" generation is blocked, allowing only fundamental frequency "VAR" current to be produced.

4.1.5 Signal Interface LED Indicators

Refer to Figure 4-C for the identification of the LEDs located on the Signal Interface PCBD. The LEDs are:

DS1: CT "A" Phase Reversed. DS1 (red) indicates that the current signal produced by CTA appears to be opposite in phase to the A-phase-to-neutral voltage (equivalent neutral voltage). Some load current must be flowing for the detector circuit to function. Cross-phased CTs may not show an error.

DS3: CT "C" Phase Reversed. DS1 (red) indicates that the current signal produced by CTA appears to be opposite in phase to the C-phase-to-neutral voltage (equivalent neutral voltage). Some load current must be flowing for the detector circuit to function. Cross-phased CTs may not show an error.

4.1.6 Signal Interface Test Points

The Signal Interface PCBD contains a circuit that provides waveform analysis of the source-side current. An electronic "notch filter" rejects the fundamental frequency component and passes the "distortion current components" (harmonic as well as non-harmonic, transient, and subharmonic components). A signal proportional to the distortion appears at **TP1** and a signal proportional to the fundamental frequency current readings appears at **TP2.** The readings correspond to either phase A or phase C as selected by switch **SW4** on the Signal Interface PCBD. A signal of 1 volt corresponds to the full scale current output of the units i.e. 1 volt = 100Amps for the 100Amp AIM Conditioner or 1 volt = 25 Amps for the 25Amp AIM Conditioner. The "B" phase readings are not available for the 3A Series (3-Wire) AIM Conditioners. The total harmonic distortion can be determined by taking the ratio of the rms voltage at **TP1** to the rms voltage at **TP2.** Since the signal at **TP1** includes components besides harmonics, this distortion reading may be greater than readings produced by instruments that are responsive only to harmonics.

Test point **TP4** provides a reading of the total phase-A source-side current. Test point **TP3** provides a reading of the total phase-C source-side current. The "B" phase total current reading is not available.

4.1.7 Signal Interface Potentiometers

There are three potentiometers on the Signal Interface PCBD:

R36: This pot is used to correct for sensing errors of CTA and to fine tune the phase-A harmonic current attenuation by the AIM Conditioner. The nominal setting for **R36** is **5.0.** The adjustment range provided is approximately ±12%. **R36** may be adjusted to minimize the harmonic current measured at **TP1** (with **SW4** set to the **A** position) or otherwise.

R41: This pot is used to correct for sensing errors of CTC and to fine tune the phase-C harmonic current attenuation by the AIM Conditioner. The nominal setting for **R41** is **5.0.** The adjustment range provided is approximately ±2%. **R41** may be adjusted to minimize the harmonic current measured at **TP1** (with **SW4** set to the **C** position) or otherwise.

R45: This pot is used to correct for sensing errors of CTB, i.e. a 3Phase 4Wire configuration (3 CTs) or a 3Phase 3Wire 3CT 'Z' configuration (special). Use R45 to fine tune the phase –B harmonic current attenuation by the AIM Conditioner. The nominal setting for R45 is 5.0. The adjustment range provided is approximately ± 12%. R45 may be adjusted to minimize the harmonic current measured at TP1 (with SW4 set to the B position) or otherwise.

R79: **R79** adjusts the tuning of the "notch filter" in the distortion analysing circuit and **should not be adjusted** unless the fundamental frequency component observed at **TP1** is more than 2% of the reading at **TP2.** If the fundamental frequency component at **TP1** does exceed 2% of the reading at **TP2, R79** can be adjusted to minimize the fundamental frequency component at **TP1.**

4.1.8 Signal Interface Switches

The Signal Interface PCBD has three Mode Programming Switches, **S1-S3,** and one switch, **S4,** associated with the distortion analysis circuit.

S1: CT SENSE. This slide switch selects the mode of the current sensing. For the Load Sense CT configuration the switch should be set to the **LOAD** (right side) position (see Drawing AIM/SIGINT – Page 2-13). For the Source Sense CT configuration the switch should be set to the **SOURCE** (left side) position.

S2: Not used.

S3: CT GROUND. This slide switch selects the ground location for the CTs. For single AIM applications **S3** should be set to the **CLOSED** position (left side). For paralleled AIM Conditioner using the same CTs, only one of the AIM

Conditioners should be operated with **S3** in the **CLOSED** position; the other units must be operated with **S3** in the **OPEN** position.

4.2 Trouble Shooting Conditions Not Covered by Specific On-Board Indicators

Not all fault conditions are covered by the on-board indicators.

4.2.1 Loss of Control Power

Loss of control power is typically the reason for the loss of the **POWER APPLIED** indicator and the absence of blower noise. Fuses **F4, F5** and **F6** should be checked.

⚠ WARNING	**Turn off the power to the AIM Conditioner and wait at least three minutes for the DC bus capacitors to discharge before attempting to check the fuses.**

4.2.2 The Operate Mode Is Not Initiated

The following conditions must be met before operation is initiated:

1. Control voltages are in-range.
2. Voltage is present on all three phases.
3. The DC Bus is not in an over-voltage state.
4. There are no "latched" faults.
5. The **ON-OFF/RESET** switch has been turned to the **ON** position.
6. The DC Bus has charged above a threshold value.

The first 4 conditions have LED error indications. Investigation of the 6th condition involves measuring the voltage at **TP46.** See discussion of DC Bus voltage measurement at **TP46** in section **4.1.2.** A low DC BUS voltage generally indicates the failure of an IGBT (shorted) or a Diode (shorted) in the power section. In this situation a service call will generally be necessary.

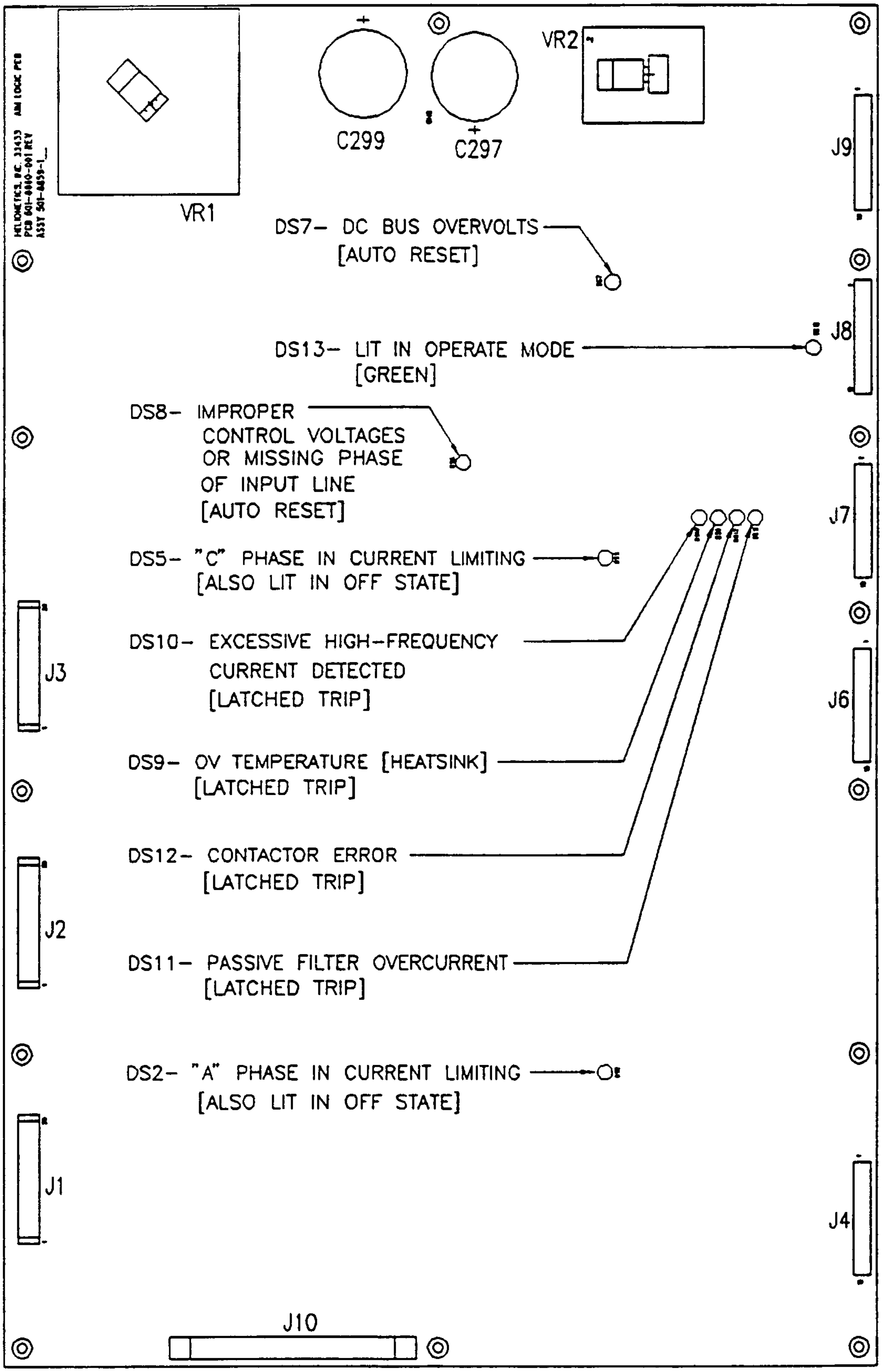


FIGURE 4-A CONTROL LOGIC BOARD, LED INDICATOR IDENTIFICATION

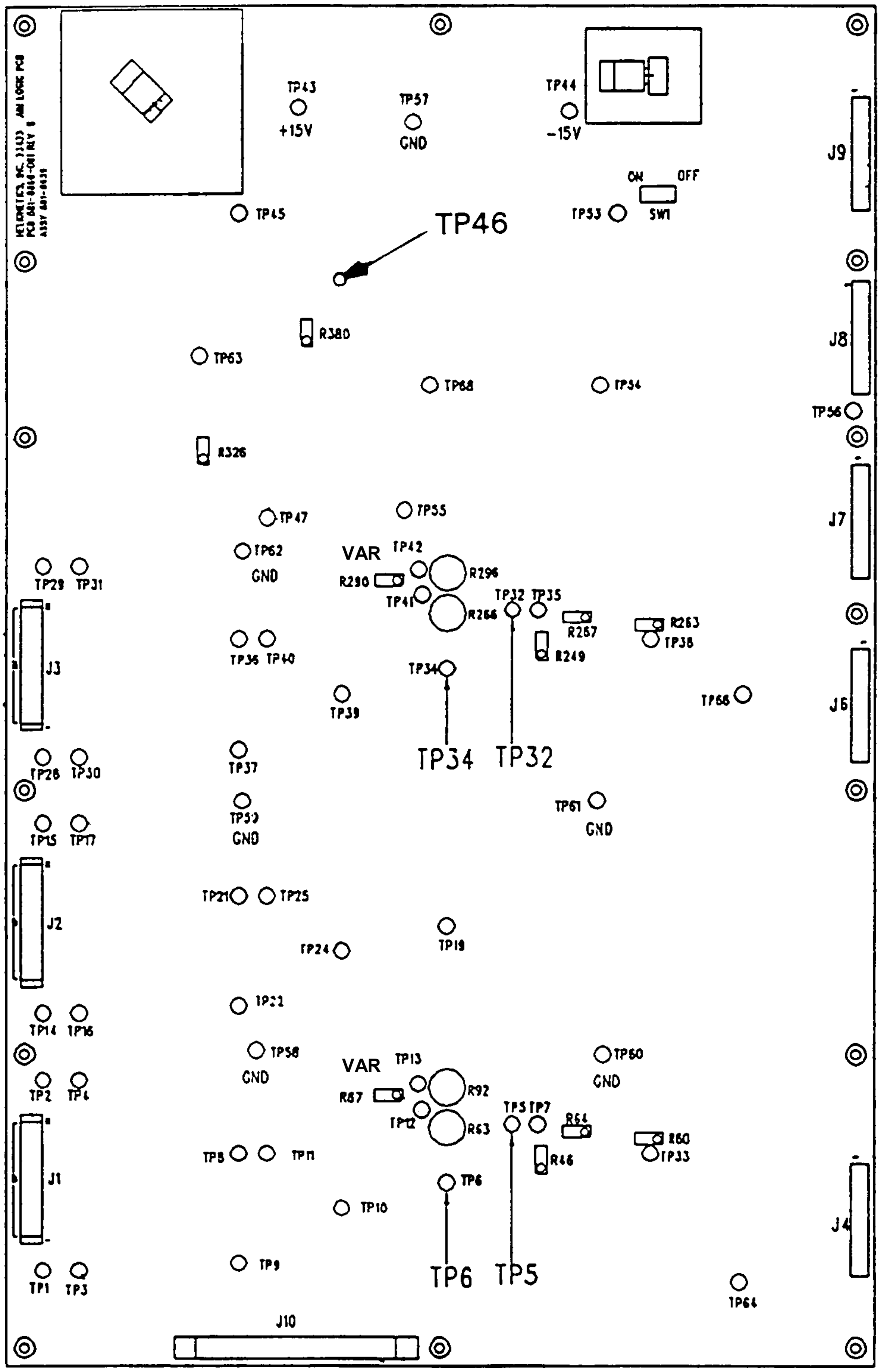


FIGURE 4-B

CONTROL LOGIC BOARD TEST POINTS, SWITCHES AND POTENTIOMETERS IDENTIFICATION

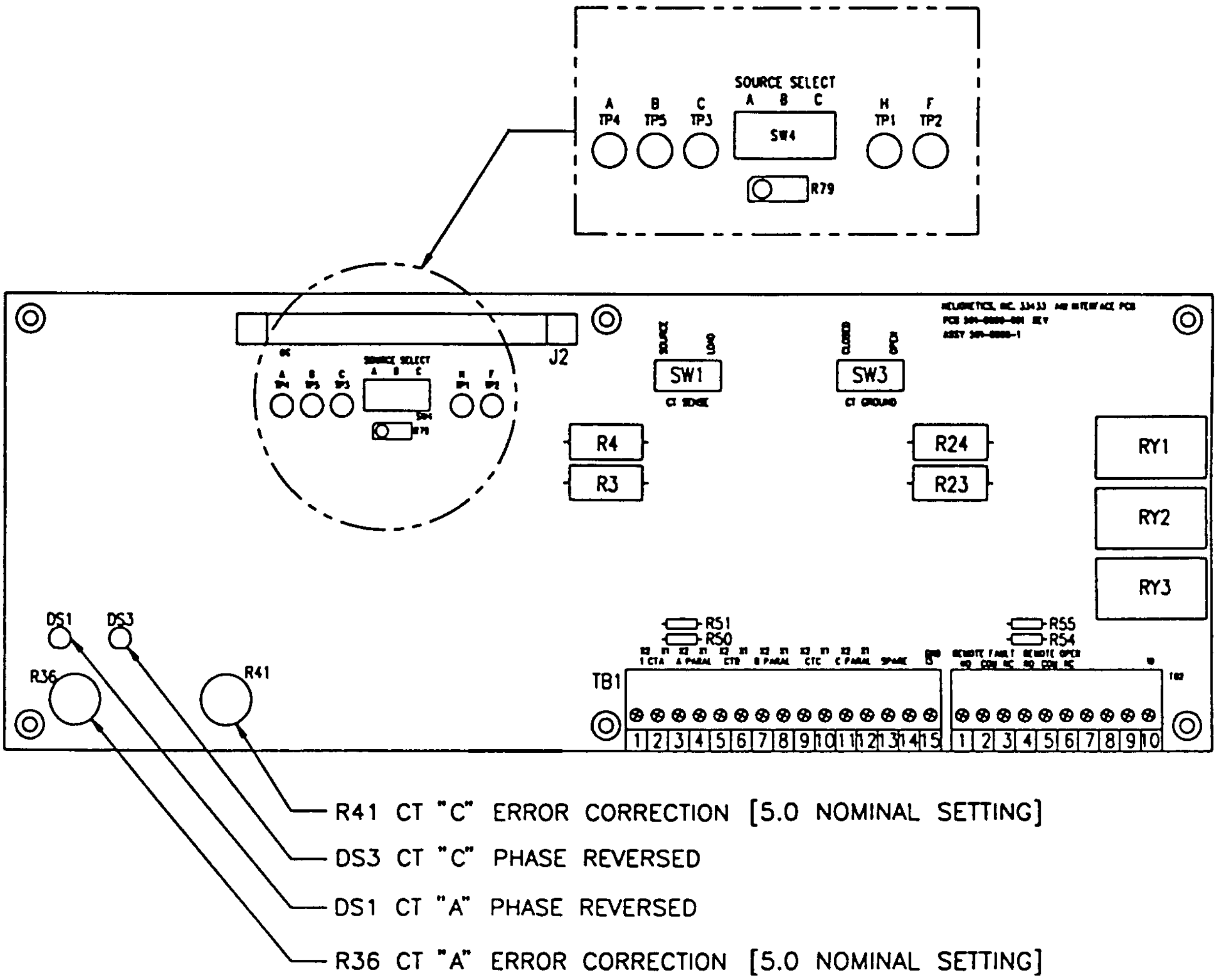


FIGURE 4-C

SIGNAL INTERFACE BOARD LED INDICATORS, TEST POINTS, SWITCHES, AND POTENTIOMETER IDENTIFICATION

5.0 SCHEDULED AND PREVENTIVE MAINTENANCE

5.1 Periodic Inspection

The operation of the unit should be verified periodically by:

1. Verifying that the unit is in the Operate Mode (green OPERATE LED lit)

2. Listening for any unusual sounds.

3. Checking the discharge air for an unusual air flow or temperature rise.

5.2 Air Filter Cleaning

The air filter should be removed and cleaned at least once per year. More frequent service may be required in harsh and dusty environments. The air filter for the AIM Conditioner housed in the free-standing enclosure is only accessible by opening the door of the enclosure.

WARNING	**Turn off the power to the AIM Conditioner and wait at least three minutes for the DC bus capacitors to discharge before attempting to lift out the washable filter element.**

6.0 PRINCIPAL ELECTRICAL AND MECHANICAL ILLUSTRATIONS

The top assembly layout for the Series 3A & 4A AIM Conditioner is shown in Figure 6-A.

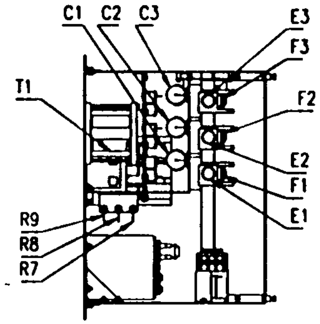
The top level interconnect diagram is shown in Figure 6-B. The interconnect diagram shown refers to a “dash 1” model which operates at a nominal voltage of 480 Vac. The other voltage models have basically similar diagrams. The “tapping” of control transformer **T2** is a notable change.

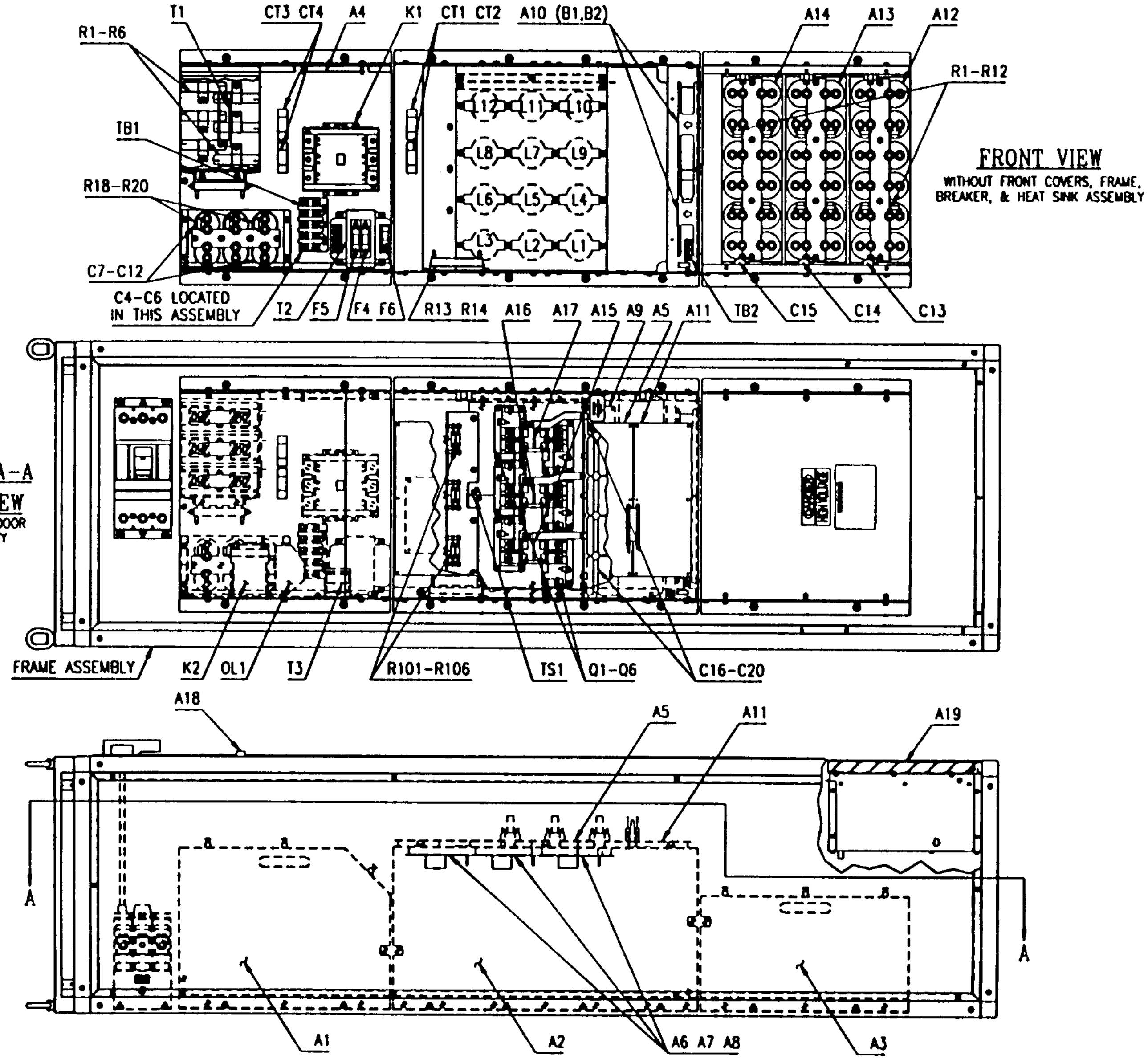
Notable for the component variations are fuses **F4** and **F5**: The fuses are BUSS rejection type FNQ-R:

1.5 A rating for the 480 and 600 volt models.

2.0 A rating for the 400 volt model.

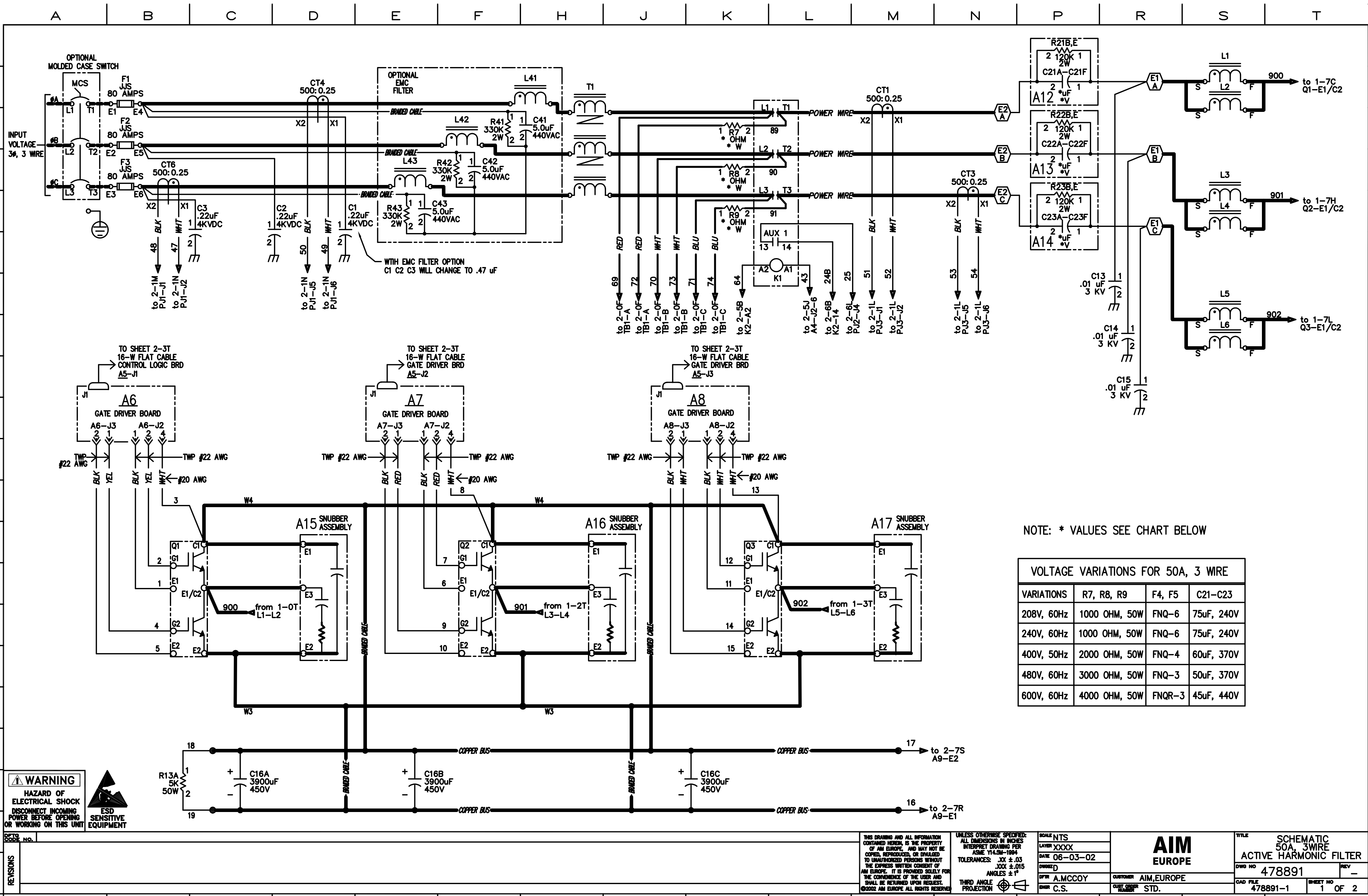
3.0 A rating for the 208 and 240 volt models.





REF.	DESCRIPTION
A1	POWER INTERFACE ASSEMBLY
A2	SOLID STATE POWER ASSEMBLY
A3	A.C. CAPACITOR ASSEMBLY
A4	INPUT SENSE PCBD
A5	CONTROL LOGIC PCBD
A6	DRIVE PCBD
A7	DRIVE PCBD
A8	DRIVE PCBD
A9	D.C. BUS SENSE PCBD
A10	DUAL FAN ASSEMBLY
A11	SIGNAL INTERFACE PCBD
A12	A.C. CAPACITOR BANK #1
A13	A.C. CAPACITOR BANK #2
A14	A.C. CAPACITOR BANK #3
A15	IGBT SNUBBER ASSEMBLY
A16	IGBT SNUBBER ASSEMBLY
A17	IGBT SNUBBER ASSEMBLY
A18	MONITORING ASSEMBLY
A19	EXTERNAL FAN ASSEMBLY
	FRAME ASSEMBLY

FIGURE 6-A MAIN ASSEMBLY IDENTIFICATION , AIM 3A & 4A SERIES 100AMP VERSION ILLUSTRATED



NOTE: * VALUES SEE CHART BELOW

VOLTAGE VARIATIONS FOR 50A, 3 WIRE			
VARIATIONS	R7, R8, R9	F4, F5	C21-C23
208V, 60Hz	1000 OHM, 50W	FNQ-6	75uF, 240V
240V, 60Hz	1000 OHM, 50W	FNQ-6	75uF, 240V
400V, 50Hz	2000 OHM, 50W	FNQ-4	60uF, 370V
480V, 60Hz	3000 OHM, 50W	FNQ-3	50uF, 370V
600V, 60Hz	4000 OHM, 50W	FNQR-3	45uF, 440V

FIGURE 6-B1   PAGE 6-3

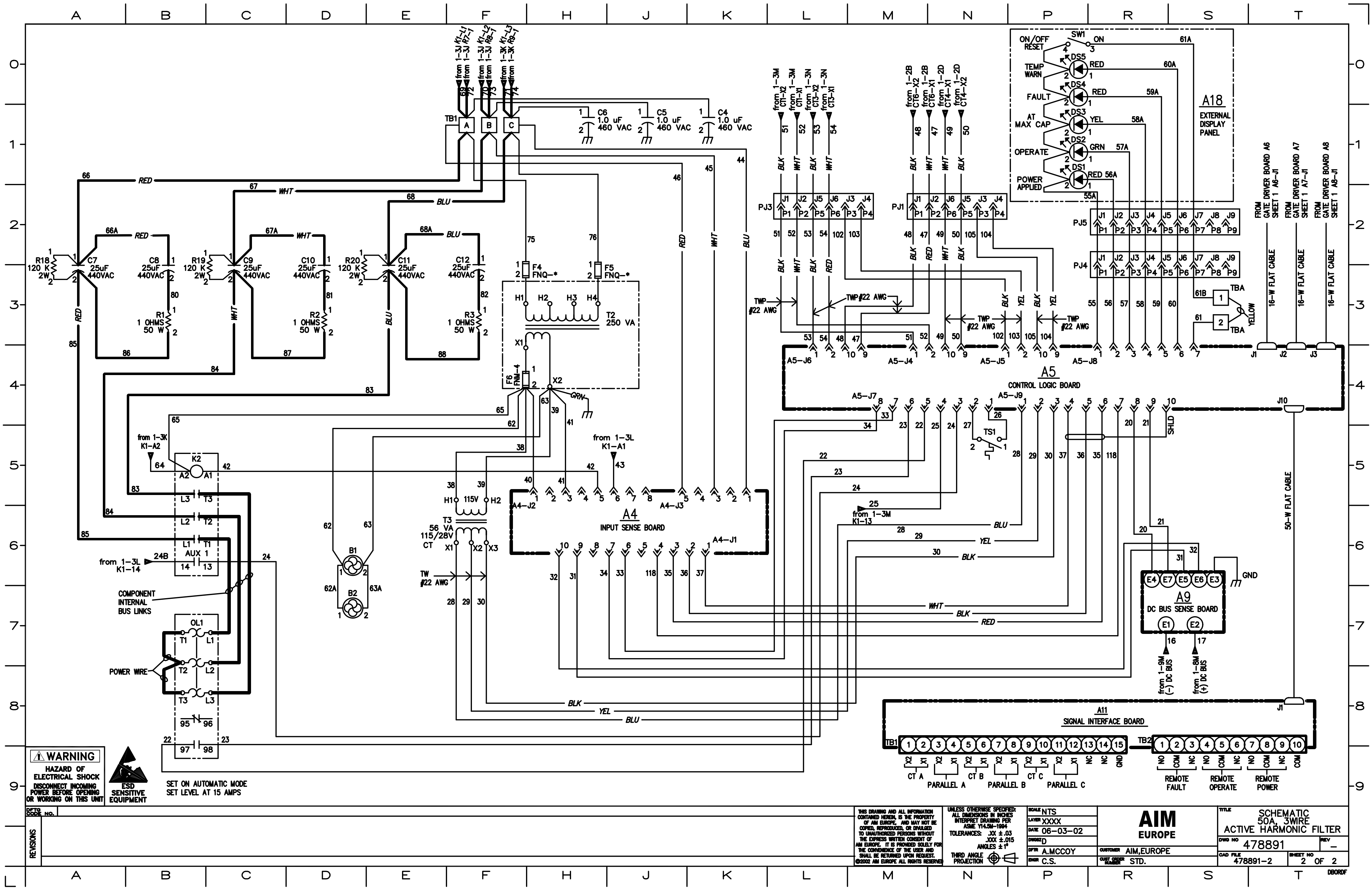


FIGURE 6-B2 PAGE 6-4

7.0 PROCEDURE FOR BRINGING AIM CONDITIONER INTO SERVICE

7.1 MECHANICAL AND VISUAL INSPECTION : NO POWER APPLIED

7.1.1 Check all bolts, nuts, screws, and connections for tightness and inspect for broken or damaged components or cables;

7.1.2 Verify that all panels and barriers are in place. Check for external damage;

7.1.3 Check all capacitors for swelling, leaking, or extruded vents; replace if necessary. Verify all fuses for integrity and rating;

7.1.4 Verify all ribbon cables are secured on printed circuit board;

7.1.5 Clean, vacuum, and clear interior of AIM cabinet of any extra hardware and debris. Clean exterior of cabinet;

7.1.6 Check connections on cooling fan and ensure that it rotates freely;

7.1.7 Verify AIM input disconnect switch in the cabinet is in the OFF/ OPEN position. If unit has an external disconnect switch, ensure that it is OFF;

7.1.8 Verify proper three-phase wiring of system power wires, ground, neutral (4 wire systems) and feeder breaker.

7.1.9 Re-check and verify proper electrical installation as per supplied documentation;

7.1.10 Verify that power wiring conduits are not plastic;

7.1.11 Verify that signal wires from sensing C.T.'s are run in a separate conduit to than power wires

7.2 OPERATIONAL CHECKS : NO POWER APPLIED

7.2.1 Verify that incoming voltages match unit nominal voltage (Confirm with installing electrician);

7.2.2 Check and verify load and source configuration for:

a) Proper C.T.'s locations (C.T.–A on Phase A, C.T.–C on Phase C), polarity and connection.
b) Switch (SW1) on signal interface board is in proper Source or Load Configuration.
c) Mode programming Switch S3 should be set to the closed position for Single AIM applications.

Note: For parallel AIM Conditioner applications using the same C.T.'s only one of the AIM conditioners is operated with S3 in the closed position; the other units are operated in the open position.

7.2.3 Verify C.T. connections are correct on signal interface board. C.T. Phase A, connected to terminal block Phase A, and C.T. Phase C, connected to terminal block C.

Note: For 4Wire applications, Phase B connections will be made to terminal block B.

7.3 ENERGIZING THE AIM CONDITIONER : POWER APPLIED

7.3.1 Verify that on front monitoring panel ON/OFF Reset switch is in the OFF /RESET position.

7.3.2 Check input voltages on source side of AIM input disconnect switch.

7.3.3 Verify that the internal control logic board Switch 1 is in the ON position.

7.3.4 Close AIM input disconnect switch.

7.3.5 Verify that on front monitoring panel, only POWER APPLIED lamp is illuminated. (Note: All lamps will light for one half second when disconnect switch are first closed).

7.3.6 Verify cooling fans are operating and the air flow within cabinet is not impeded.

7.3.7 Turn ON/OFF RESET switch on front monitoring panel to the ON position. Verify that the OPERATE and POWER APPLIED lamps are illuminated.

7.3.8 Check LED's DS1 and DS2 on signal interface board when power is applied. These LED's should **NOT** be lit. If either DS1 (C.T. phase A) or DS3 (C.T. phase C) are lit, there is a reverse C.T. polarity. Action should be taken to correct the appropriate C.T. leads.

CAUTION: Turn off power to AIM conditioner and if possible to the loads since the C.T. signal wires can develop very high voltages when disconnected.

7.3.9 Checking VAR current.
When Switch 1 on the control logic board is in the ON position. AIM unit generates VAR current only.

a) Measure the AIM Phase A current. It should correspond to Table 1-A Page 1-3 in manual. If not, adjust potentiometer R87.

Note: If the input voltage differs from the nominal voltage of the unit, the VAR current should also differ proportionally.
Example: For model 3A090H6XXXX, nominal voltage is 600VAC and VAR current is 75 Amps. If the input voltage is 10% lower (540 VAC) then the VAR current should be 10% lower: 75 Amps - 10% = 67.5 Amps.

b) Measure Phase C VAR current adjust accordingly using potentiometer R290. Phase B VAR should be within 2% of the correct VAR current, on measure.

c) Measure Phase B VAR current. Phase B on 3 Wire systems does not have any adjustment, however if Phase A and Phase C are correctly adjusted, Phase B will be within 2% of the correct VAR current. On 4 Wire systems, Phase B will have its own potentiometer.

Note: Phase A and Phase C adjustments are interrelated and affect each other. Therefore, these adjustments may require to be done a few times.

7.4 TESTING THE HARMONIC CURRENT REDUCTION

Important Note: If the sequence 7.4.1 or 7.4.2 is reversed you may blow the control fuses.

7.4.1 Turn front monitoring panel ON/OFF RESET Switch to the OFF position.

7.4.2 Turn AIM disconnect switch in the cabinet to OFF position.

7.4.3 Turn Switch 1 on control logic board to OFF position.

7.4.4 With the AIM OFF, if possible, turn the load OFF and take source measurements as per 7.5.1. When finished turn the load on.

7.4.5 Measure and record source as per 7.5.2.

7.4.6 Turn AIM disconnect switch to the ON position.

7.4.7 Turn front panel ON/OFF Reset switch to ON.

7.4.8 System contactor should close within six seconds to place conditioner on-line. Power Applied and Operate lamp should be illuminated.

7.4.9 Measure and record load and source as per 7.5.3.1 and 7.5.3.2.

Note: Load current THD will increase from the current measured in 7.4.4 because AIM conditioner works as zero impedance source for harmonic current.

7.4.10 Measure and record AIM conditioner as per 7.5.3.3.

7.5 MEASUREMENTS

Note: a) VAR current must be measured with SW1 ON. SW1 can be switched ON and OFF while AIM is operating.
b) THD refers to Total Harmonic Distortion as a percentage of the Fundamental (THD-F).

7.5.1 AIM OFF, Load OFF (if possible) Source measurements

V (A-B)		I_A RMS		V_ATHD%		I_ATHD%		TPF/A		DPF/A	
V (B-C)		I_B RMS		V_BTHD%		I_BTHD%		TPF/B		DPF/B	
V (C-A)		I_C RMS		V_CTHD%		I_CTHD%		TPF/C		DPF/C	

7.5.2 AIM OFF, Load ON Source = Load measurements

V (A-B)		I_A RMS		V_ATHD%		I_ATHD%		TPF/A		DPF/A	
V (B-C)		I_B RMS		V_BTHD%		I_BTHD%		TPF/B		DPF/B	
V (C-A)		I_C RMS		V_CTHD%		I_CTHD%		TPF/C		DPF/C	

7.5.3 AIM ON, Load ON

7.5.3.1 Load Measurements

V (A-B)		I_A RMS		V_ATHD%		I_ATHD%		TPF/A		DPF/A	
V (B-C)		I_B RMS		V_BTHD%		I_BTHD%		TPF/B		DPF/B	
V (C-A)		I_C RMS		V_CTHD%		I_CTHD%		TPF/C		DPF/C	

7.5.3.2 Source Measurements

V (A-B)		I_A RMS		V_ATHD%		I_ATHD%		TPF/A		DPF/A	
V (B-C)		I_B RMS		V_BTHD%		I_BTHD%		TPF/B		DPF/B	
V (C-A)		I_C RMS		V_CTHD%		I_CTHD%		TPF/C		DPF/C	

7.5.3.3 AIM Measurements

V (A-N)		V (A-B)		I_A RMS		I_ATHD%		I_A RMS		I_AVAR	
V (B-N)		V (B-C)		I_B RMS		I_BTHD%		I_B RMS		I_BVAR	
V (C-N)		V (C-A)		I_C RMS		I_CTHD%		I_C RMS		I_CVAR	

8.0 MODEL IDENTIFICATION SYSTEM

Model Identification: Each AIM Conditioner is identified by a model number, which defines its wire configurations, harmonic current capacity, frequency and enclosure Type.

Example: 3A100F5AE2XXX

3	=	Wire configuration
A	=	Design Generation
100	=	Cancellation Current rating
F	=	Voltage rating
5	=	Frequency rating
A	=	Seller
E2	=	Enclosure type
X	=	Input Device
X	=	Filter
X	=	Special Option

AIM Conditioner Configuration:

Enter one of the following according to the Wire types

Example:Wire type	Code
2 wire	2
3 wire	3
4 wire	4

Cancellation Current rating:-

Enter the amplitude of the cancellation capacity. (place a "0" to the left of any capacity less than 100 Amps)

Example:A Rating	Code
25	025
50	050
100	100

Voltage Rating:-

Enter the code associated with the voltage on which the AIM Conditioner is to be installed.

Example:Voltage rating	Code
120	A
208	B
240	C
277	D
345	E
400	F
480	G
600	H
660	I

Frequency:-

Enter the appropriate code according to the utility frequency.

Example:Hertz	Code
50	5
60	6

Enclosure Type:-

Enter appropriate code for enclosure type desired.

Example:Type	Code
Chassis - no enclosure	CH
NEMA 1	E1
RITTAL	E2
Special	ES

Input Device:-

M = Moulded Case Switch
X = No Input Device

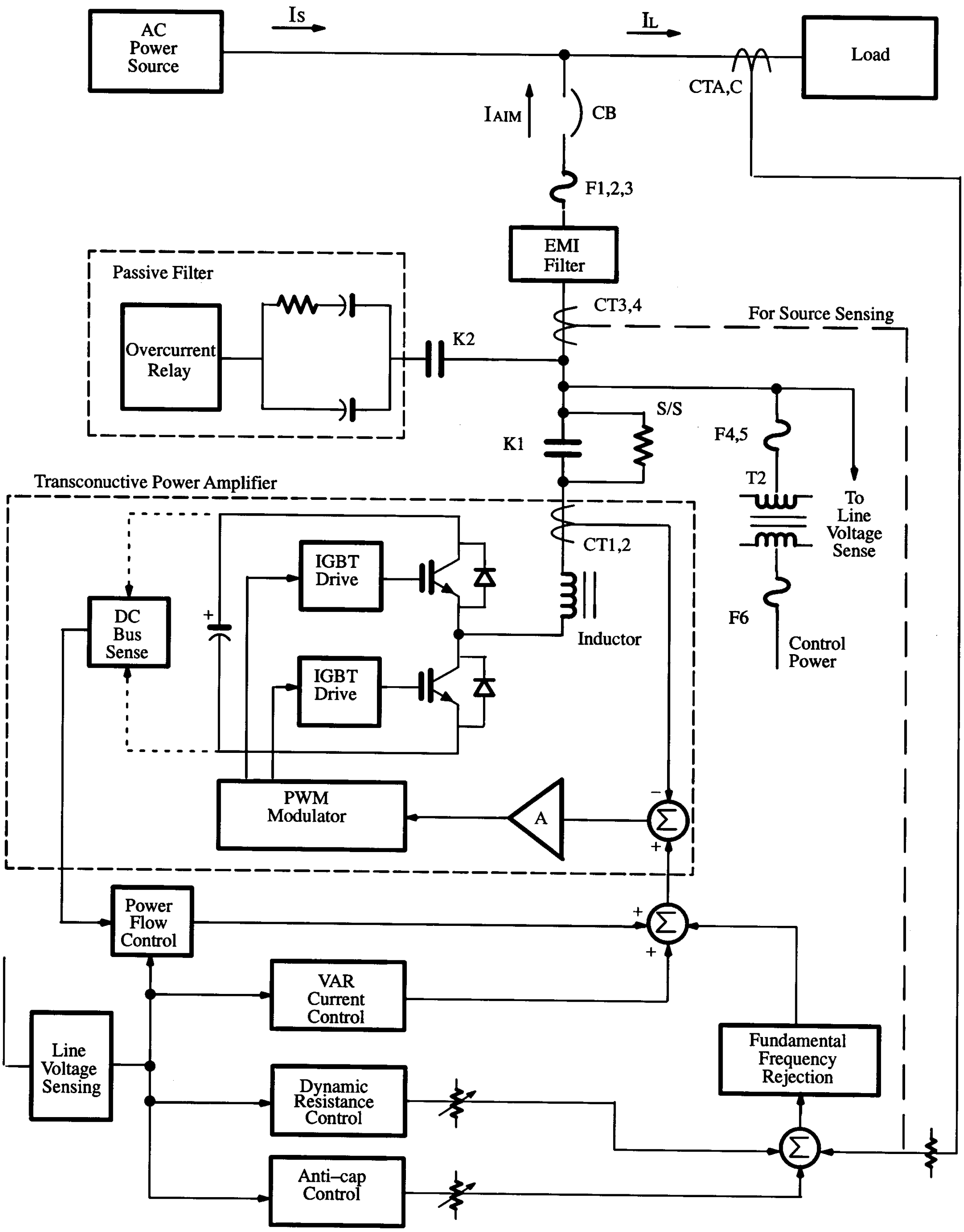
Filter:-

F = EMC Filter
X = EMI Filter only

Special Option:-

i.e. Power Quality Analyzer Display

9.0 SIMPLIFIED SINGLE-LINE BLOCK DIAGRAM



10.0 SPARE PARTS

SPARES MINIMUM

INPUT FUSES
CONTROL FUSES
SET IGBT`S
SNUBBER
1 DRIVER (3W)
2 DRIVERS (4W)

SPARES STANDARD

INPUT FUSES
CONTROL FUSES
SET IGBT`S
NUBBER
1 DRIVER (3W)
2 DRIVERS (4W)
1 CONTROL LOGIC PCB.
1 INPUT SENSE PCB.
1 DC CAPACITOR
1 AC CAPACITOR

SPARES RECOMMENDED

INPUT FUSES
CONTROL FUSES
SET IGBT`S
SNUBBER
1 DRIVER (3W)
2 DRIVERS (4W)
1 CONTROL LOGIC PCB.
1 INPUT SENSE PCB.
1 DC SENSE PCB.
1 INTERFACE PCB.
2 DC CAPACITORS
2 AC CAPACITORS
1 FAN
2 PILOT LIGHTS RED
1 PILOT LIGHTS GREEN
1 PILOT LIGHTS YELLOW

Please refer to individual models for part numbers.

Appendix 1

EMC Compliant Installation and Configuration Guidelines for AIM Active Harmonic Conditioners

Contents

1. Introduction

1.1 Purpose of this guide

This section is a guide to assist the design and installation personnel on the correct installation and operation of the AIM Active Harmonic Conditioners (AHCs) in order to meet the requirements of the European Electro-Magnetic Compatibility (EMC) Directive 89/336/EEC. It gives guidelines which, when followed, will minimise the occurrence of EMC problems and enable a Declaration of Conformity with the Directive to be made for the complete equipment or installation.

The EMC Directive requires electrical and electronic equipment to operate satisfactorily and without problems in an electromagnetic environment. Additionally, the equipment must not disturb or interfere with any other equipment, product or system within its locality.

AHCs are generally immune to all kinds of disturbances, otherwise they would be disturbed by their own disturbances. However emissions, both conducted emissions and radiated emissions require to be considered.

2. EMC “environments”

2.1 Immunity

Electrical and electronic equipment should be immune to high-frequency and low-frequency phenomena. High-frequency phenomena include electrostatic discharge (ESD), fast transient burst, radiating electromagnetic fields, conducted radio frequency disturbance and electrical surges. Typical low-frequency phenomena include mains voltage harmonics, notches and unbalance.

2.2 Emissions

The source of high-frequency emissions from frequency converters for example, is the fast switching of power components such as IGBTs and control electronics. This high-frequency emission can propogate by both conduction and radiation.

2.3 Installation Environments

Every type of system will have different EMC requirements, and it is impossible to cover them all in detail. This guide therefore contains only two sets of generalised EMC control measures aligned to those for inverters, the EMC product standard EN 61800-3.

The measures described in Section 3 , will provide adequate protection for installations not connected to a low-voltage supply network used to supply domestic premises (the ‘second environment’ of EN 61800-3, see Figure 1).

Additional measures, as described in Section 4, may be necessary for installations connected to a low-voltage supply network which also supplies domestic premises (the “first environment” of EN 61800-3, see Figure 1)

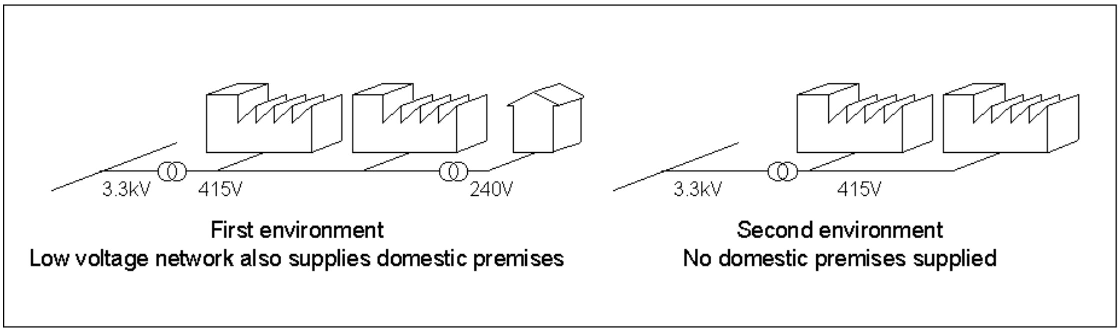


Figure 1: Illustration of EN 61800-3 'first' and 'second' environments

3 Essential EMC Control measures

3.1 Ground plane

Active Harmonic Conditioner installations must incorporate a low-impedance ground plane, which is used as the ground reference for other EMC control measures. Ideally, the ground plane should be a single sheet of metal at least 3 mm thick. If this is not possible, all ground points of an installation must be interconnected with short lengths of braid of minimum 9 mm^2 cross-section.

All places on the ground plane to which contact is made must be treated to ensure minimum contact resistance. In particular, paint and other insulating coatings must be removed or reliably pierced.

3.2 Grounding conductors

Grounding conductors for EMC control must be low impedance, preferably using short, thick, braid material.

3.3 Power EMI filter

A mains EMI Filter is built into all European AIM AHCs at the AHC installation Point of Common Coupling (PCC) to the low voltage supply (e.g. 230 / 400V).

As the conducted emissions from an AHC vary with the length of power cable, the built-in EMI Filter is designed to have sufficient attenuation for a maximum 5 m cable length.

3.4 Cable types

3.4.1 Power cable

It is not essential to use shielded cable for the mains input. However, it is important that all cores of these individual cables (including the ground conductor) are run close together.

The power input cable should be separated by at least 300mm from other power cables i.e. VSD or motor cables. If physical constraints prevent this, shielded cable should be used for the input cable. The cable must be routed as directly as possible to the EMC filter input, and as close as possible to the ground plane.

3.4.2 Control and signal cables

Shielded cable must be used if the cable extends outside of a shielded enclosure, and is advisable for use with sensitive low-level signals within an enclosure. It is recommended that twisted-pair cable should be used for data and analogue signals.

Unused conductors of multi-core cables should be grounded, preferably at both ends, to minimise parasitic coupling to the signal conductors.

Control and signal cables should be segregated by type (analogue, control) and routed separately from each other and at least 300 mm from power cables. This last requirement may be relaxed to 150 mm if shielded cables are used.

3.5 Cable routing

The EMC 'best practice' principles of separation and segregation apply in general, and the following particular rules must be observed.

3.5.1 Cable paths

Paths for signal or control cables should not be routed in parallel with paths for power cables.

3.5.2 Cable crossings

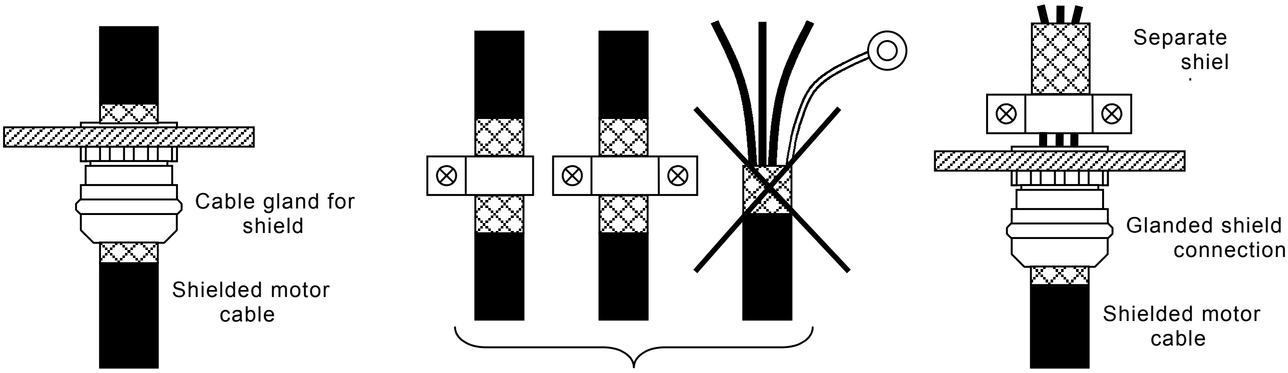
To minimise coupling between them, different cables which cross one another should do so at an angle as close to 90º as possible.

3.6 Cable shield terminations

3.6.1 General

Cable shields must be routed up as close as possible to the equipment to which the cables are connected, and have low impedance ground terminations at both ends.

Ideally, a shielded connector providing a 360° ground connection should be used wherever the cable passes through a grounded plate or partition (Figure 2 a)). Where this is not possible, 360° termination should be achieved by using ‘P’ or ‘U’ clips to the ground plane (Figure 2 b)), as close as possible to the plate or partition. A ‘pigtail’, where the shield conductors are separated from the cable into a bundle which is terminated by itself, does not provide a satisfactory termination.



a) Gland shield termination **b) ‘P’ clip, ‘U’ clip and ‘pigtail’** **c) Separate shield**

Figure 2: Shield terminations

Where it is not convenient to continue a shield through a partition, and the unshielded cable length is greater than 300 mm, a separate braided shield may be fitted over the unshielded portion (Figure 2 c)). This shield should cover as much as possible of the unshielded length, and must be grounded at both ends.

The shields of network cables should generally be grounded at all available connection points, unless the network supplier’s instructions forbid this.

Where a shielded cable passes from a ‘noisy’ to a ‘quiet’ area (for example, from the inside to the outside of a shielded switchgear panel), the shield should be grounded within 100 mm of the transition point, preferably within the ‘noisy’ area.

3.6.2 Prevention of ground loops

In extended installations, where ground potentials may vary (for example, from building to building), physically grounding both ends of the shields of analogue signal cables (and unused conductors of multi-core cables) can result in the generation of power-frequency disturbances because of ‘ground loops’. In these cases, one end should be connected to ground via a capacitor. This will present a high impedance to power frequencies, while allowing the high frequencies to be adequately grounded. The capacitor used must have a low inductance, and be connected with leads as short as possible, so that effective grounding is maintained to as high a frequency as possible.

4 Additional measures for the first environment

Additional measures may be necessary for installations connected to a low-voltage supply network which also supplies domestic premises, described as the “first environment” in EN 61800-3 (see Figure 1 on page 2).

4.1 EMI filter

The EMI Filter fitted to the European AIM AHCs is essential for all installation in the first environment, it provides adequate performance to meet the more severe requirements.

4.2 Enclosure

In order to meet the radiated emission requirements of the first environment, an AHC should usually be mounted within a shielded enclosure. This must provide good shielding performance.

4.2.1 Enclosure material

The enclosure material must be electrically conductive. Steel or Aluminium are commonly used.

4.2.2 Grounding

The enclosure must be electrically connected to the AHC ground plane (see 3.1). The best way to do this is via the screws or studs used to mount the ground plane to the enclosure. If this is not possible, the connection should be made at several distributed points, using short lengths of thick braid material.

4.2.3 Doors

Enclosure doors must be electrically connected to the enclosure body when closed, using conductive gasket material. Care must be taken to ensure that paint or other non-conductive material is removed, so that the gasket makes good contact to both door and enclosure at all points. For safety, an additional wired connection should also be provided.

4.2.4 Other apertures

4.2.4.1 Joints

Joints between fixed sections of an enclosure must be electrically fastened by welds or screws at intervals no greater than 100 mm.

4.2.4.2 Ventilation

Holes in an enclosure should have a maximum dimension (diameter or diagonal) less than 100 mm. If the basic hole is larger than this (for example, for a large cooling fan), it must be covered with a conductive mesh with a mesh size no greater than 50 mm. As with the door, the mesh must make good contact to the enclosure round its periphery.

4.2.5 Cable penetrations

Cables entering or leaving an enclosure must be controlled to ensure that electromagnetic disturbances are not carried from outside to inside or vice-versa. This can be achieved with EMC filters and cable shields, either separately or in combination.

5 Troubleshooting EMC in control systems

Complex control systems consisting of inverters, AHCs, PLC's, sensors, communication networks etc., may experience functional problems even when the overall EMC performance of the system complies with the requirements of the EMC Directive. We can on request, supply a troubleshooting guide illustrating some of the possible coupling paths within such a system, and the EMC control measures that are most suitable for them.

As these 'intra-system' interactions involve other equipment than the AHC, it is not possible to provide specific recommendations. The EMC installation guides or instructions for the other, possibly sensitive, equipment must be applied in conjunction with this guide.

6 EMC Phenomena

6.1 Emissions

Emissions generated can be either conducted or radiated.

6.1.1 Conducted emissions

Normally, only emissions conducted onto the mains supply system are considered, although emissions onto control and signal cables can also be significant. EN 61800-3 sets limits for emissions to the mains, and covers the generation of harmonics and commutation notches as well as high frequency emissions in the frequency range 150 kHz to 30 MHz.

6.1.2 Harmonics

EN 61800-3 refers to EN61000-3-2 for the requirements for emission of harmonics. The EA Engineering Recommendations G5/4 attempts to set target levels for the harmonic currents imposed on a network, which are intended to place limits for the overall voltage distortion in a network at planning levels which are applied to achieve compatibility.

6.1.3 Radiated emissions

EN 61800-3 has limits for radiated emissions in the frequency range 30 to 1 000 MHz.

6.2 Immunity

Immunity to several disturbance phenomena is required by EN 61800-3.

6.2.1 Conducted disturbances

Conducted disturbances are present on the supply system as a result of non-linear loads, switchgear operation, load dumping, lightning strikes (direct or indirect), broadcast and local radio signals, etc. They can also appear on control and data cables, especially if the system extends more than a few metres.

Low frequency disturbances on the mains are harmonics and commutation notches, together with variations in supply voltage and frequency. High frequency disturbances, on control and signal cables as well as on the mains, are continuous RF in the frequency range 150 kHz to 80 MHz, fast transient bursts, and 1,2/50 μs surges.

6.2.2 Radiated disturbances

Radiated disturbances are caused by nearby equipment (generally at low level), broadcast radio and television (significant if close to the transmitter), mobile telephones and walkie-talkies, which can generate substantial field strengths at distances of a few metres.

Immunity levels are specified for radiated fields in the frequency range 80 to 1 000 MHz.

6.2.3 Electro-Static Discharge (ESD)

The separation of electrically dissimilar materials generates electro-static voltages that can be as high as 20 kV. When they are discharged to ground, high currents and electro-magnetic fields are produced, which can cause misoperation of or damage to other equipment.

7 The EMC Directive

The EMC Directive (89/336/EEC) is one of a number of Directives intended to enable the free distribution of goods throughout the European Union (EU). By setting "essential protection requirements" relating to emissions and immunity, it ensures that there are no EMC-related technical barriers to trade between the Member States of the EU. Compliance with these requirements is shown by making a Declaration of Conformity (DoC) and by fixing the "CE Marking".

8 EMC Standards

8.1 Product standard

There is no specific EMC product standard for AHCs, (such as EN 61800-3:1996 for adjustable speed electrical power drive systems – inverters). However European Standard EN 50178-1997 applies where electronic equipment is to be installed or is used in power installations. In all cases within this European Standard a power installation is interacting with the electrical supply systems for controlling, regulating and converting electrical energy.

AIM AHCs are generally intended for 'restricted distribution' for supply to professional installers who are expected to have sufficient EMC expertise to apply appropriate EMC control measures for each installation. The requirements for 'unrestricted distribution' are more severe than those for restricted distribution.

AIM AHCs are again generally intended for restricted distribution and installation in the second environment, and the measures set out in Section 3 of these guidelines will be sufficient for these conditions of use. Installation in the first environment will require additional measure to be taken, as set out in Section 4 of these guidelines.

8.2 Other standards

8.2.1 Product standards

When an AHC is installed into an installation outside the scope of EN 50178:1997, the appropriate standard must be used. This may have requirements that are more severe than those of EN 50178:1997, even where the product is intended for use in the 'second environment', where additional EMC control measures may be necessary.

8.2.2 'Generic' standards

If there is no suitable product standard for the final equipment, the 'Generic' standards should be applied. These consider the installation environment: 1) Domestic, Commercial and Light industrial; or 2) Industrial. There are two standards in each category: for emissions (EN 50081-2) and immunity (EN 61000-6-2).

Appendix 2

TECHNICAL SPECIFICATION REGISTER

DOCUMENT No. TSR/AHC/3A-4A ISSUE A-3

	DOCUMENT NO.	REVISION	DESCRIPTION
25A	TS:3A025F5ACHXF	1	TS: 25A 3Ph 3W AHC Chassis Mount with EMC
	TS:3A025F5AE3MF	1	TS: 25A 3Ph 3W AHC Wall Mount with EMC
	TS:4A025F5ACHXF	1	TS: 25A 3Ph 4W AHC Chassis Mount with EMC
	TS:4A025F5AE3MF	1	TS: 25A 3Ph 4W AHC Wall Mount with EMC
50A	TS:3A050F5ACHXF	0	TS: 50A 3Ph 3W AHC Chassis Mount with EMC
	TS:3A050F5AE3MF	1	TS: 50A 3Ph 3W AHC Wall Mount with EMC
	TS:4A050F5ACHXF	0	TS: 50A 3Ph 4W AHC Chassis Mount with EMC
	TS:4A050F5AE3MF	0	TS: 50A 3Ph 4W AHC Wall Mount with EMC
100A	TS:3A100F5ACHXF	0	TS: 100A 3Ph 3W AHC Chassis Mount with EMC
	TS:3A100F5AE2MF	0	TS: 100A 3Ph 3W AHC Floor Mount with EMC
	TS:4A100F5ACHXF	0	TS: 100A 3Ph 4W AHC Chassis Mount with EMC
	TS:4A100F5AE2MF	0	TS: 100A 3Ph 4W AHC Floor Mount with EMC
150A	TS:3A150F5ACHXF	0	TS: 150A 3Ph 3W AHC Chassis Mount with EMC
	TS:3A150F5AE2MF	0	TS: 150A 3Ph 3W AHC Floor Mount with EMC
	TS:4A150F5ACHXF	0	TS: 150A 3Ph 4W AHC Chassis Mount with EMC
	TS:4A150F5AE2MF	0	TS: 150A 3Ph 4W AHC Floor Mount with EMC
200A	TS:3A200F5ACHXF	0	TS: 200A 3Ph 3W AHC Chassis Mount with EMC
	TS:3A200F5AE2MF	0	TS: 200A 3Ph 3W AHC Floor Mount with EMC
	TS:4A200F5ACHXF	0	TS: 200A 3Ph 4W AHC Chassis Mount with EMC
	TS:4A200F5AE2MF	0	TS: 200A 3Ph 4W AHC Floor Mount with EMC

Appendix 3

DRAWING REGISTER

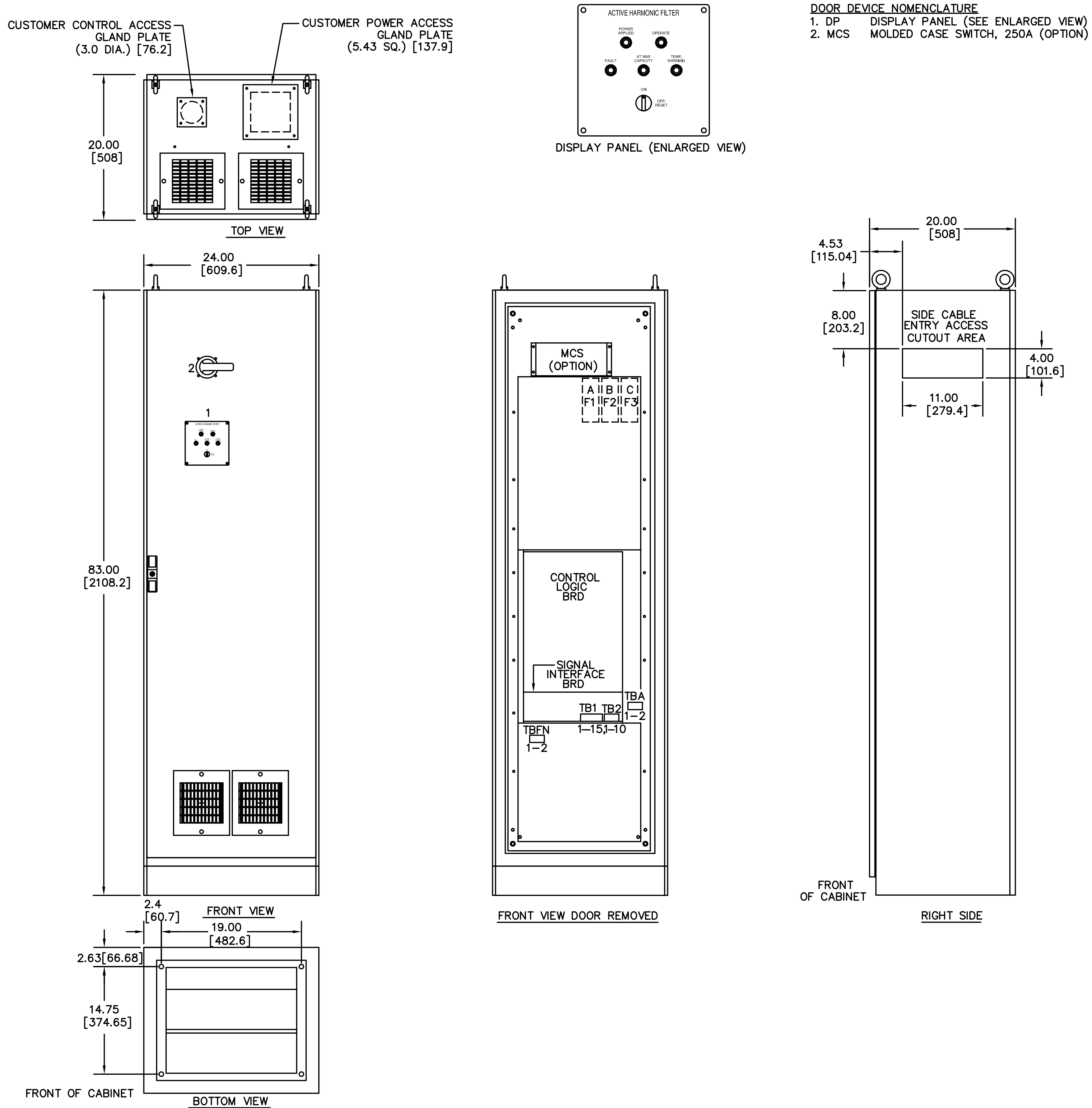
DOCUMENT No. DR/AHC/3A-4A ISSUE A-4

	DRAWING NO.	REVISION	DESCRIPTION
25A	50A025-1	D	Wall Mounted Dimensions / 25A
	50A025-2	D	Chassis Mount Dimensions / 25A
	50A025-3	D	Electrical Installation —3 Wire connections / 25A
	50A025-4	D	Electrical Installation—4 Wire connections / 25A
50A	50A050-1	D	Wall Mounted Dimensions / 50A
	50A050-2	D	Chassis Mount Dimensions / 50A
	50A050-3	D	Electrical Installation—3 Wire connections / 50A
	50A050-4	D	Electrical Installation—4 Wire connections / 50A
100A	50A100-1	D	Enclosure Dimensions / 100 A
	50A100-2	D	Chassis Mount Dimensions / 100 A
	50A100-3	D	Electrical Installation—3 Wire connections / 100A
	50A100-4	D	Electrical Installation—4 Wire connections / 100A
150A	50A150-1	D	Enclosure Dimensions / 150 A
	50A150-2	D	Chassis Mount Dimensions / 150 A
	50A150-3	D	Electrical Installation—3 Wire connections / 150A
	50A150-4	D	Electrical Installation—4 Wire connections / 150A
200A	50A200-1	D	Enclosure Dimensions / 200 A
	50A200-2	D	Chassis Mount Dimensions / 200 A
	50A200-3	D	Electrical Installation—3 Wire connections / 200A
	50A200-4	D	Electrical Installation—4 Wire connections / 200A

DRAWING REGISTER

DOCUMENT No. DR/AHC/3A-4A ISSUE A-4

	SCHEMATIC NO.	REVISION	DESCRIPTION
25A	478899A1	A	Schematic—3 Wire / 25A (Sheet 1 of 2)
	478899A2	A	Schematic—3 Wire / 25A (Sheet 2 of 2)
	478904A1	A	Schematic—4 Wire / 25A (Sheet 1 of 2)
	478904A2	A	Schematic—4 Wire / 25A (Sheet 2 of 2)
50A	478891-1	-	Schematic—3 Wire / 50A (Sheet 1 of 2)
	478891-2	-	Schematic—3 Wire / 50A (Sheet 2 of 2)
	478892-1	A	Schematic—4 Wire / 50A (Sheet 1 of 2)
	478892-2	A	Schematic—4 Wire / 50A (Sheet 2 of 2)
100A	478890D01S	D	Schematic—3 Wire / 100A (Sheet 1 of 2)
	478890D02S	D	Schematic—3 Wire / 100A (Sheet 2 of 2)
	478903D1	D	Schematic—4 Wire / 100A (Sheet 1 of 2)
	478903D2	D	Schematic—4 Wire / 100A (Sheet 2 of 2)
150A	478901S-1	B	Schematic—3 Wire / 150A (Sheet 1 of 2)
	478901S-2	B	Schematic—3 Wire / 150A (Sheet 2 of 2)
	478898-1	-	Schematic—4 Wire / 150A (Sheet 1 of 2)
	478898-2	-	Schematic—4 Wire / 150A (Sheet 2 of 2)
200A	478902-1	-	Schematic—3 Wire / 200A (Sheet 1 of 2)
	478902-2	-	Schematic—3 Wire / 200A (Sheet 2 of 2)
	478905A1	A	Schematic—4 Wire / 200A (Sheet 1 of 2)
	478905A2	A	Schematic—4 Wire / 200A (Sheet 2 of 2)



DOOR DEVICE NOMENCLATURE
1. DP — DISPLAY PANEL (SEE ENLARGED VIEW)
2. MCS — MOLDED CASE SWITCH, 250A (OPTION)

CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 100A TOTAL HARMONIC COMPENSATION (DERATED 90A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 350 MCM Cu
      2) OPTION – MOLDED CASE SWITCH CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 350MCM Cu @ 75°C
   D. CONTROL: SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS: SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 2.2KW (7513 BTU/HR), REQ'D CFM 250 (7080 LPM)
5. ALLOW 28.0 [711.2] IN FRONT OF ENCLOSURE FOR DOOR TO OPEN.
6. STANDARD CABLE ACCESS: TOP CABLE ENTRY AND TOP RIGHT SIDE
7. APPROX. WEIGHT: 600 LBS(272 KG)
8. MAXIMIUM 40 DEGREES C AMBIENT.
9. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 100 F 5 – A E2 M F

- F=EMC FILTER OPTION / X=W/O EMC FILTER OPTION
- M=MOLDED CASE SWITCH (MCS) OPTION, 250A / X=W/O MOLDED CASE SWITCH OPTION
- E2=NEMA 1/IP30 ENCLOSURE
- 5=50HZ / 6=60HZ
- 100 AMPS HARMONIC CORRECTION
- 3=3 WIRE / 4=4 WIRE

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	14.0	107
C=240V	18.0	108
F=400V	37.0	114
G=480V	54.0	119
H=600V	78.0	117

ESD SENSITIVE EQUIPMENT

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

REVISIONS				
OPTG CODE / NO.	08804	08824	09079	09869
	A TITLE BLOCK BROUGHT UP TO DATE RAM/RCS 8/8/02	B CUSTOMER INFORMATION UPDATED. RAM/RCS 10/10/02	C DRAWING UPDATES HFD/RCS 12/18/02	D 1/10/04 DRAWINGS UPDATED. WLL/MP

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

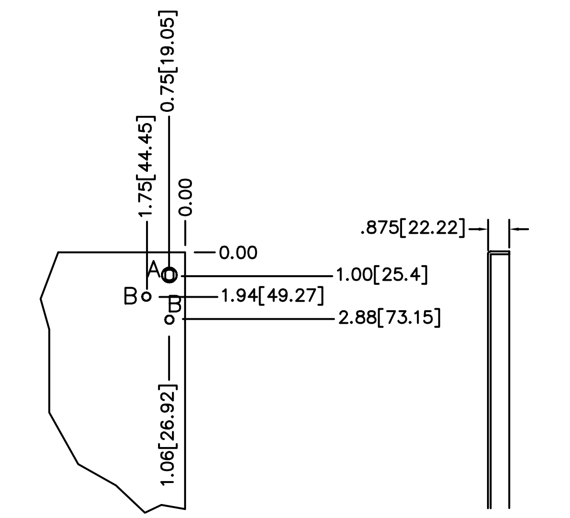
SCALE 1/8=1 · LAYER XXXX · DATE 7/18/02 · DWGSZ D · DFTR RAM · ENGR GMB

APT AIM Energy, Inc. · AIM TECHNOLOGY

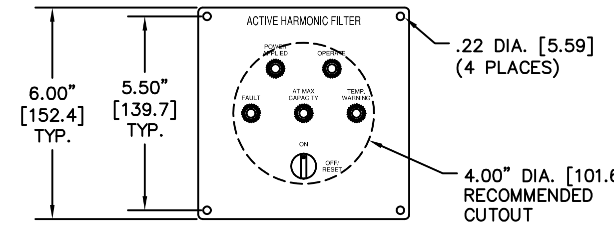
CUSTOMER AIM,EUROPE · CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER OUTLINE,CABINET 100A – 3W,4W
DWG NO 50A100 · REV D
CAD FILE 50A100D1 · SHEET NO 1 OF 4

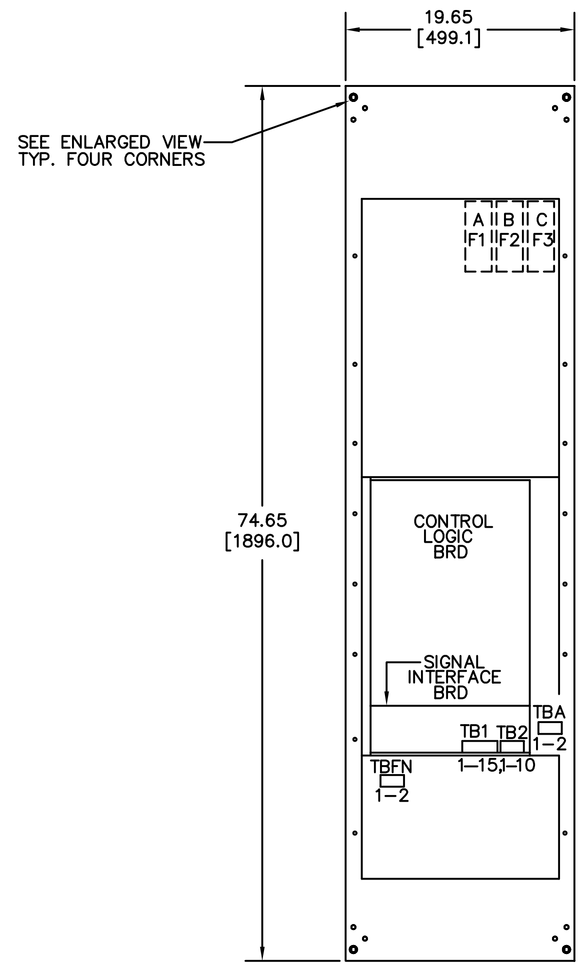
DBORDF



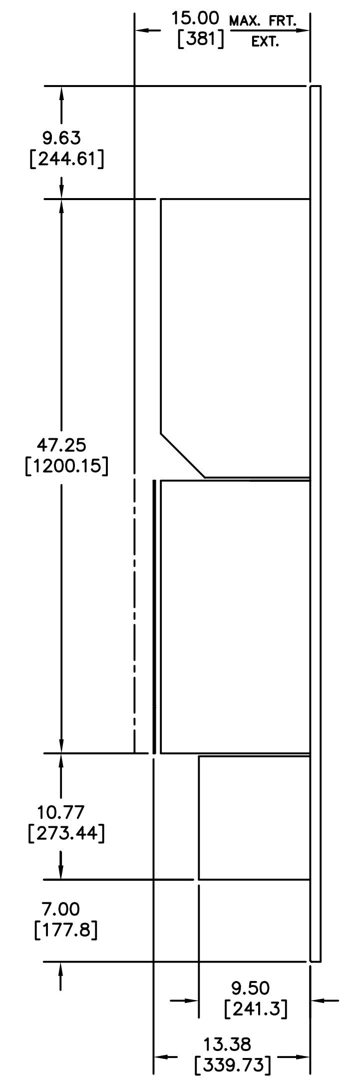
TYP. FOUR CORNERS
(ENLARGED VIEW)
INCHES [MILLIMETERS]
A – 0.625 [15.88] DIA.
B – 0.375 [9.53] DIA.



DISPLAY PANEL (ENLARGED VIEW)
FOR REMOTE MOUNTING BY OTHERS
(MAX. 3 FEET [914.4])



FRONT VIEW



RIGHT SIDE

CUSTOMER INFORMATION

1. PART NUMBER – SEE CONFIGURATOR CHART BELOW.
2. CONNECTIONS:
   A. INSTALLATION OF THE ACTIVE HARMONIC FILTER (AHF) AND ASSOCIATED EQUIPMENT SHALL BE IN ACCORDANCE WITH CURRENT AND APPLICABLE LOCAL, NATIONAL ELECTRIC CODE (NEC) AND/OR INTERNATIONAL ELECTRIC CODES. SEPARATE CONDUIT FOR CONTROL AND POWER WIRING IS REQUIRED.
   B. INPUT POWER: (SEE CHART) VAC, +6%, –14%, 3 PHASE, (SEE CHART) HZ, (SEE CHART) MAX AMPS 100A TOTAL HARMONIC COMPENSATION (DERATED 90A @ 600V)
      1) TERMINAL/FUSE BLOCK CONNECTIONS: SOLDERLESS PRESSURE LUGS ON TERMINALS L1,L2,L3 WIRE RANGE (1) #6AWG – 350 MCM Cu
   D. CONTROL:
      SOLDERLESS PRESSURE SCREW TERMINAL ON SIGNAL INTERFACE BRD AND TERMINAL BLOCK, TBA, TBFN. #12 AWG WIRE MAX.
   E. GROUND TERMINALS:
      SOLDERLESS PRESSURE LUG ON TERMINAL GND. INPUT AND OUTPUT WIRE RANGE #8 AWG – #2 AWG.
3. DIMENSIONS ARE IN INCHES [MILLIMETER]
4. MAXIMUM LOSSES OF 2.2KW (7513 BTU/HR), REQ'D CFM 250 (7080 LPM)
5. APPROX. WEIGHT: 375 LBS(170 KG)
6. MAXIMIUM 50 DEGREES C AMBIENT.
7. PRECAUTIONS:
   A). LETHAL VOLTAGES ON ALL COMPONENTS. EXERCISE CARE WHEN POWER IS ON. POWER MAY BE PRESENT FROM REMOTE SOURCES.
   B). DO NOT BLOCK AIR INLET OR EXHAUST ON FRONT AND TOP OF UNIT.
   C). READ OPERATION AND MAINTENANCE MANUAL BEFORE OPERATING AND SERVICING THIS EQUIPMENT.

3 A 100 F 5 – A CH X F

- F=EMC FILTER OPTION
- X=W/O EMC FILTER OPTION
- CH=CHASSIS
- 5=50HZ
- 6=60HZ

	POWER FACTOR CORRECTION – KVARS	MAX AMPS
B=208V	14.0	107
C=240V	18.0	108
F=400V	37.0	114
G=480V	54.0	119
H=600V	78.0	117

- 100 AMPS HARMONIC CORRECTION
- 3=3 WIRE
- 4=4 WIRE

ESD SENSITIVE EQUIPMENT

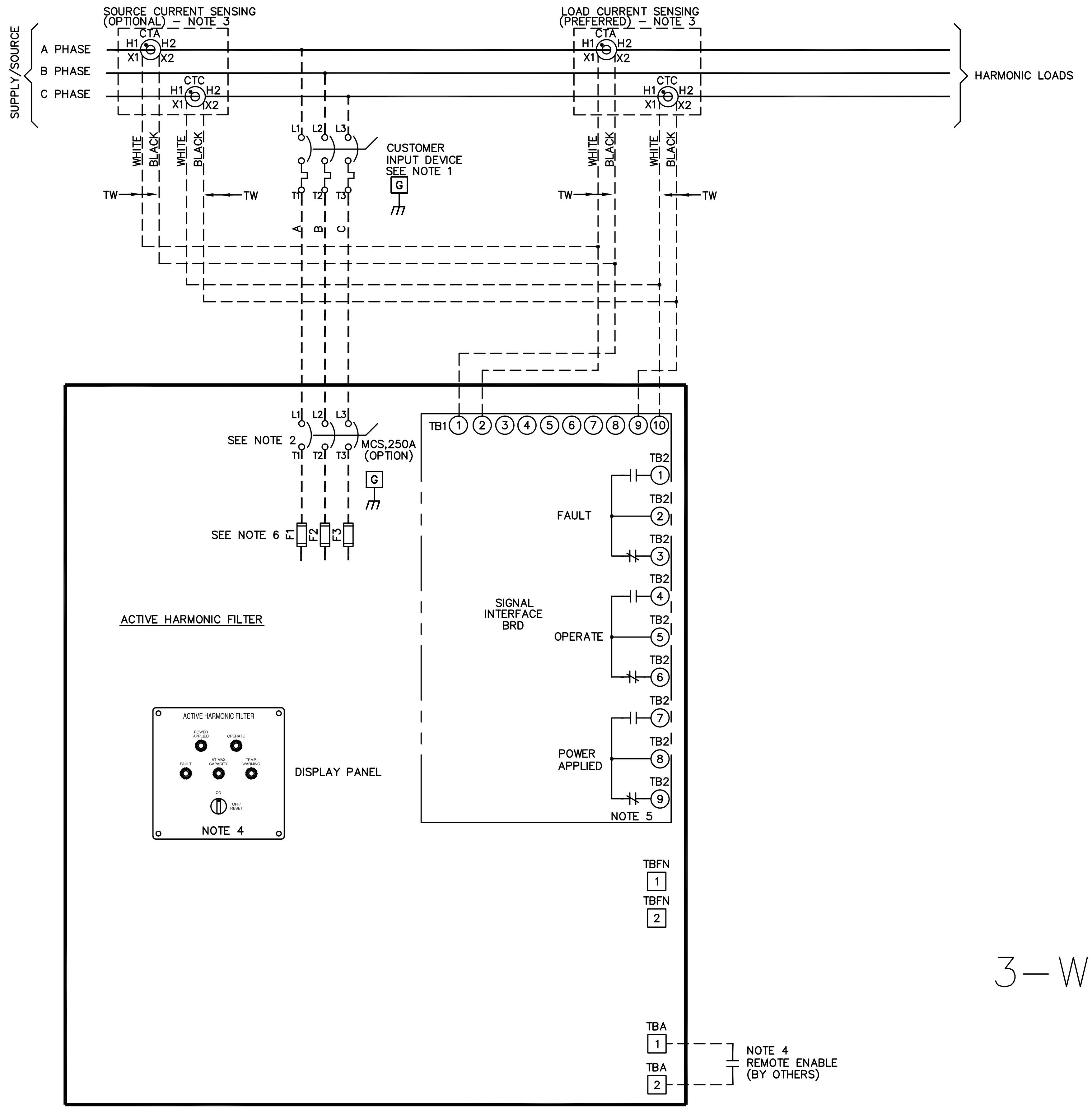
⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE	1/8=1
LAYER	XXXX
DATE	7/24/02
DWGSZ	D
DFTR	RAM
ENGR	GMB
CUSTOMER	AIM,EUROPE
CUST ORDER NUMBER	STD.
TITLE	ACTIVE HARMONIC FILTER OUTLINE,CHASSIS 100A – 3W,4W
DWG NO	50A100
REV	D
CAD FILE	50A100D2
SHEET NO	2 OF 4

APT AIM Energy, Inc.
AIM TECHNOLOGY

DFTG CODE NO.
REVISIONS
DBORDF



NOTES:

1. CUSTOMER SUPPLIED CIRCUIT BREAKER OR DISCONNECT REQUIRED. FOR A CONSERVATIVE ESTIMATE, ASSUME THAT THE MAXIMUM RATED OUTPUT CURRENT LISTED FOR THE ACTIVE HARMONIC FILTER OCCURS AT 400 HZ. THE MANUFACTURER OF THE DISCONNECT DEVICES SHOULD BE CONSULTED FOR ANY DERATING THAT MIGHT APPLY. TYPICALLY 15%.
2. MOLDED CASE SWITCH OPTION FOR CUSTOMER CONNECTION.
3. WARNING: CURRENT TRANSFORMERS CAN RENDER AN ELECTRICAL SHOCK WHEN ENERGIZED IF THEY ARE NOT TERMINATED INTO APPROPRIATE LOADS OR HAVE THEIR LEADS SHORTED.

   NOTE ORIENTATION OF CT'S! THE "H1" POLARITY DOT MUST POINT TOWARDS THE MAINS.

   USE TWISTED PAIR WIRING.
4. FOR CUSTOMER CONNECTION TO START UNIT WHEN SW1 DISPLAY PANEL CONTROL SWITCH IS IN THE "ON" POSITION. JUMPER IF NOT REQUIRED.
5. DRY CONTACTS FOR CUSTOMER USE, 1.0A @ 120VAC.
6. F1–F3 = HIGH SPEED FUSES FOR SEMICONDUCTOR PROTECTION.

3–WIRE CONFIGURATIONS ONLY

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

ESD SENSITIVE EQUIPMENT

OPTG CODE	NO.
REVISIONS	

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

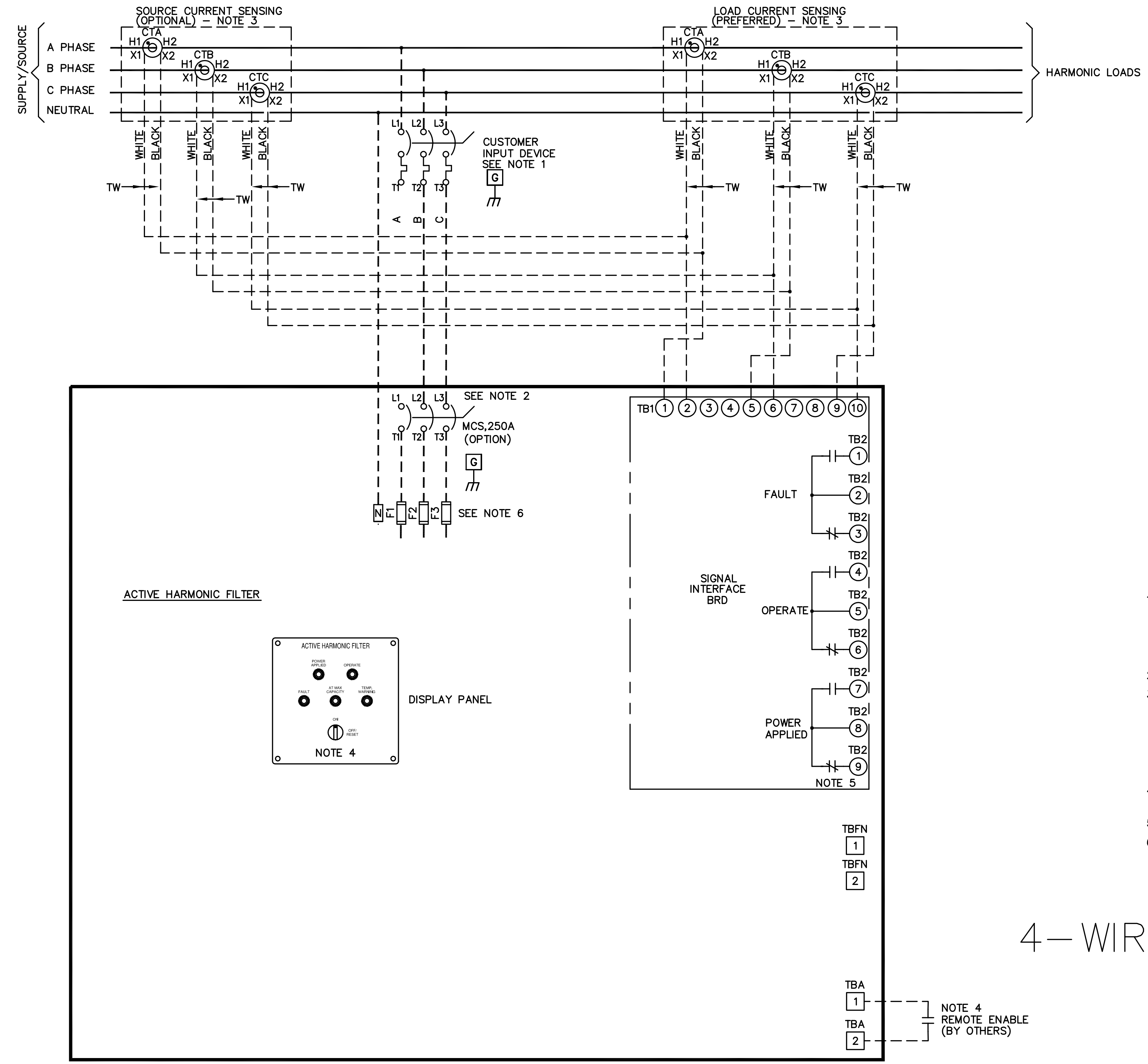
SCALE	1:1
LAYER	XXXX
DATE	7/24/02
DWGSZ	D
DFTR	RAM
ENGR	GMB

APT AIM Energy, Inc.
AIM TECHNOLOGY

CUSTOMER	AIM,EUROPE
CUST ORDER NUMBER	STD.

TITLE	ACTIVE HARMONIC FILTER CONNECT.DIA.,100A,3W	
DWG NO	50A100	REV D
CAD FILE	50A100D3	SHEET NO 3 OF 4

DBORDF



1. CUSTOMER SUPPLIED CIRCUIT BREAKER OR DISCONNECT REQUIRED.
   FOR A CONSERVATIVE ESTIMATE, ASSUME THAT THE MAXIMUM RATED OUTPUT CURRENT LISTED FOR THE ACTIVE HARMONIC FILTER OCCURS AT 400 HZ. THE MANUFACTURER OF THE DISCONNECT DEVICES SHOULD BE CONSULTED FOR ANY DERATING THAT MIGHT APPLY. TYPICALLY 15%.
2. MOLDED CASE SWITCH OPTION FOR CUSTOMER CONNECTION.
3. WARNING: CURRENT TRANSFORMERS CAN RENDER AN ELECTRICAL SHOCK WHEN ENERGIZED IF THEY ARE NOT TERMINATED INTO APPROPRIATE LOADS OR HAVE THEIR LEADS SHORTED.

   NOTE ORIENTATION OF CT'S! THE "H1" POLARITY DOT MUST POINT TOWARDS THE MAINS.
   USE TWISTED PAIR WIRING.
4. FOR CUSTOMER CONNECTION TO START UNIT WHEN SW1 DISPLAY PANEL CONTROL SWITCH IS IN THE "ON" POSITION. JUMPER IF NOT REQUIRED.
5. DRY CONTACTS FOR CUSTOMER USE, 1.0A @ 120VAC.
6. F1–F3 = HIGH SPEED FUSES FOR SEMICONDUCTOR PROTECTION.

4–WIRE CONFIGURATIONS ONLY

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

ESD SENSITIVE EQUIPMENT

OPTG CODE NO.

REVISIONS

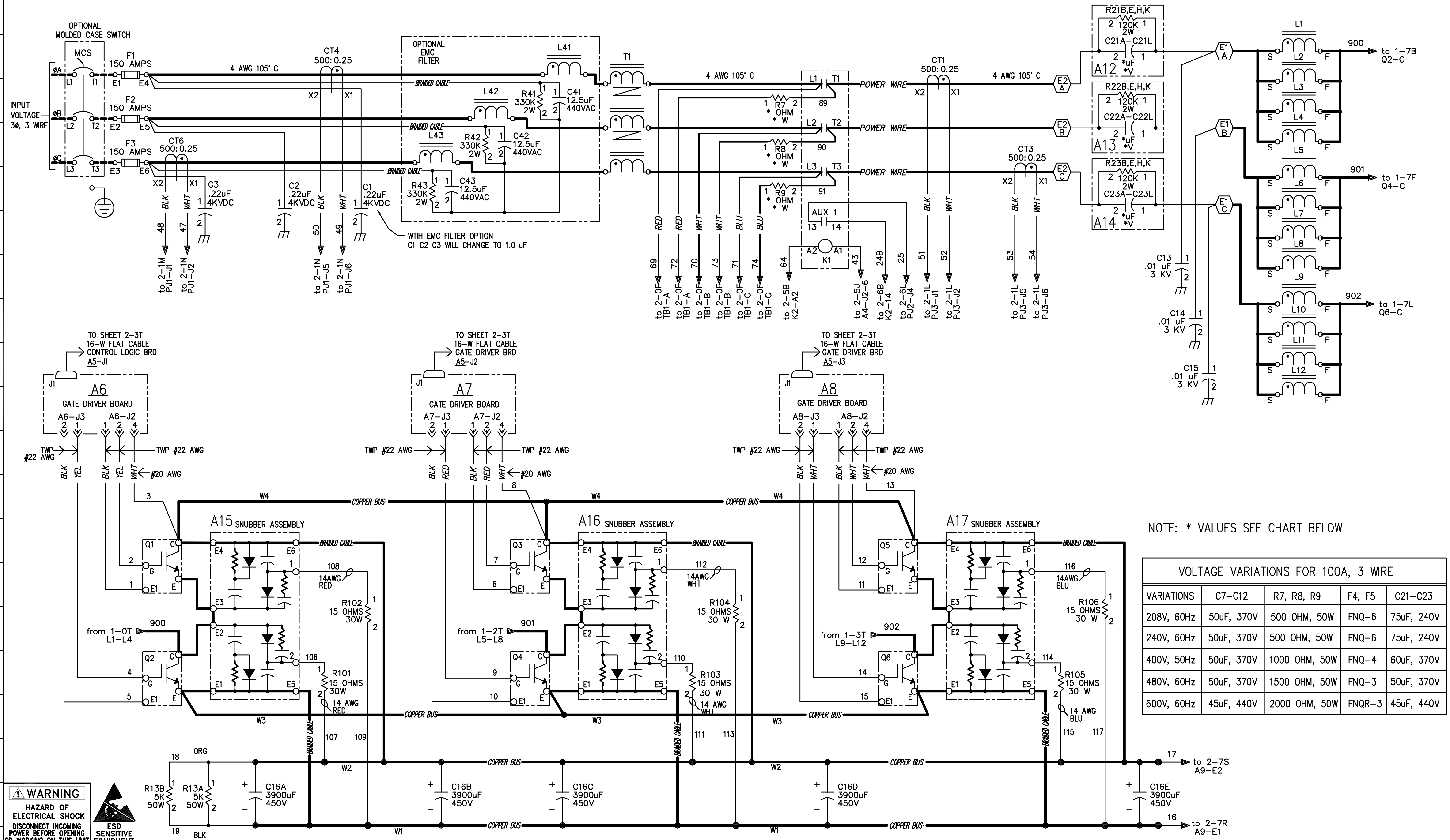
UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M–1994
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE 1:1
LAYER XXXX
DATE 7/24/02
DWGSZ D
DFTR RAM
ENGR GMB

APT AIM Energy, Inc.
AIM TECHNOLOGY

CUSTOMER AIM,EUROPE
CUST ORDER NUMBER STD.

TITLE ACTIVE HARMONIC FILTER CONNECT.DIA.,100A,4W
DWG NO 50A100
REV D
CAD FILE 50A100D4
SHEET NO 4 OF 4
DBORDF



NOTE: * VALUES SEE CHART BELOW

VOLTAGE VARIATIONS FOR 100A, 3 WIRE				
VARIATIONS	C7-C12	R7, R8, R9	F4, F5	C21-C23
208V, 60Hz	50uF, 370V	500 OHM, 50W	FNQ-6	75uF, 240V
240V, 60Hz	50uF, 370V	500 OHM, 50W	FNQ-6	75uF, 240V
400V, 50Hz	50uF, 370V	1000 OHM, 50W	FNQ-4	60uF, 370V
480V, 60Hz	50uF, 370V	1500 OHM, 50W	FNQ-3	50uF, 370V
600V, 60Hz	45uF, 440V	2000 OHM, 50W	FNQR-3	45uF, 440V

⚠ WARNING
HAZARD OF ELECTRICAL SHOCK
DISCONNECT INCOMING POWER BEFORE OPENING OR WORKING ON THIS UNIT

ESD SENSITIVE EQUIPMENT

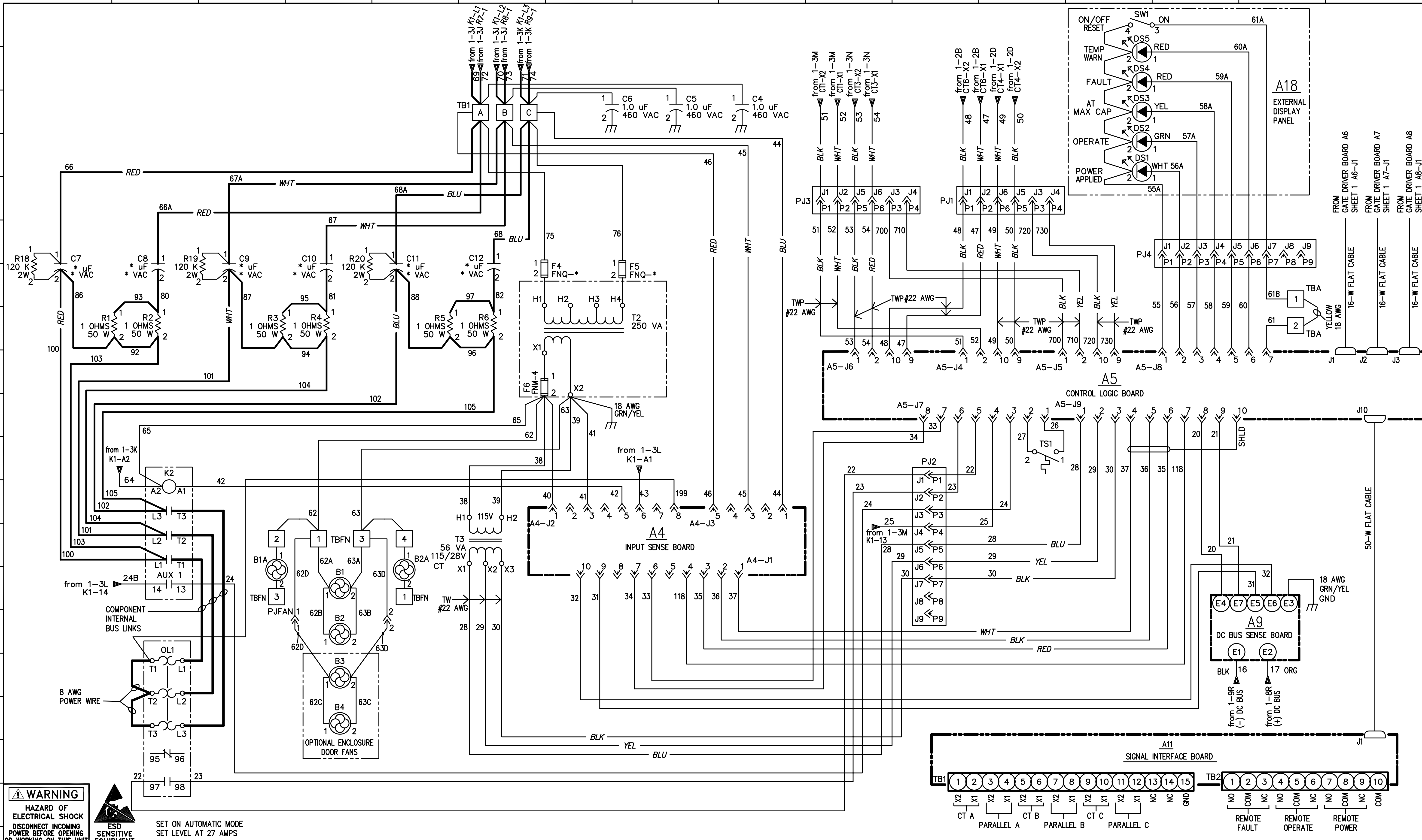
REVISIONS	A	B	C	D	E
OPTG CODE NO.	09030	09131	09166	09850	10469
	11/6/02 REVISED PER AS BUILT. W LUCAS	CHANGED VALUE OF FUSE F6 DJL/RCS 1/7/03	2/24/03 ADDED EXTRA FANS. W LUCAS	2/20/04 ADDED WIRE 199 W LUCAS	9/28/04 ADDED NOTES FOR CLARIFICATION. W LUCAS

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994
TOLERANCES: .XX ± .03 .XXX ± .015 ANGLES ± 1°
THIRD ANGLE PROJECTION

SCALE NTS
LAYER XXXX
DATE 6-3-02
DWGSZ D
DFTR A.MCCOY
ENGR C.SERMON

ASIRobicon Industrial Power Control
CUSTOMER ROBICON STD
CUST ORDER NUMBER

TITLE SCHEMATIC 100A, 3 WIRE ACTIVE HARMONIC FILTER
DWG NO 478890S
REV E
CAD FILE 478890E01S
SHEET NO 1 OF 2
DBORDF



OFTG CODE	NO.
REVISIONS	

UNLESS OTHERWISE SPECIFIED: ALL DIMENSIONS IN INCHES INTERPRET DRAWING PER ASME Y14.5M-1994
TOLERANCES: .XX ±.03 .XXX ±.015 ANGLES ±1°
THIRD ANGLE PROJECTION

SCALE	NTS
LAYER	XXXX
DATE	6-3-02
DWGSZ	D
DFTR	A.MCCOY
ENGR	C.SERMON

ASIRobicon Industrial Power Control

CUSTOMER	ROBICON STD
CUST ORDER NUMBER	
TITLE	SCHEMATIC 100A, 3 WIRE ACTIVE HARMONIC FILTER
DWG NO	478890S
REV	E
CAD FILE	478890E02S
SHEET NO	2 OF 2

DBORDF