Power Management Module 30 to 300 kVA Owner's Manual

MGE
UPS SYSTEMS

IMPORTANT SAFETY INSTRUCTION

SAVE THESE INSTRUCTIONS - This manual contains important instructions for the PMM that must be followed during installation, operation, and maintenance of the PMM and its auxiliary equipment.

WARNING

OPENING ENCLOSURES EXPOSES HAZARDOUS VOLTAGES.
ALWAYS REFER SERVICETO QUALIFIED PERSONNEL ONLY.

WARNING

As standards, specifications, and designs are subject to change, please ask for confirmation of the information given in this publication.

This manual is a controlled document, pages should not individually

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Power Management Module
30 to 300 kVA
Owner's Manual

For service call
1 - 800 - GETS - EPE

86-501524-00

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1660 Scenic Avenue
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MGE
UPS SYSTEMS

Power Management Module 30 to 300 kVA Owner's Manual

Warranty

Seller warrants to the Ultimate Purchaser (the purchaser who buys for use, and not for resale) that all products furnished under this order and which are manufactured by Seller will conform to final specifications, drawings, samples and other written descriptions approved in writing by Seller, and will be free from defects in materials and workmanship. These warranties shall remain in effect for period of twelve (12) months after delivery to the Ultimate Purchaser. But if the Seller installs the equipment or supplies technical direction of installation by contract, said one year shall run from the completion of installation, provided installation is not unreasonably delayed by Ultimate Purchaser. Parts replaced or repaired in the warrant period shall carry the unexpired portion of the original warranty. A unit placed with the Purchaser on consignment and then later purchased will be warranted for twelve (12) months from the time the Seller receives notification of the Purchaser's intent to purchase said consigned item. The foregoing in its entirety is subject to the provision that in no case will the total warranty period extend beyond 18 months from date Seller ships equipment from point of manufacture.

The liability of Seller hereunder is limited to replacing or repairing at Seller's factory or on the job site at Seller's option, any part or parts which have been returned to the Seller and which are defective or do not conform to such specifications, drawings or other written descriptions; provided that such part or parts are returned by the Ultimate Purchaser within ninety (90) days after such defect is discovered. The Seller shall have the sole right to determine if the parts are to be repaired at the job site or whether they are to be returned to the factory for repair or replacement. All items returned to Seller for repair or replacement must be sent freight prepaid to its factory. Purchaser must obtain Seller's Return Goods Authorization prior to returning items. The above conditions must be met if warranty is to be valid. Seller will not be liable for any damage done by unauthorized repair work, unauthorized replacement parts, from any misapplication of the item, or for damage due to accident, abuse, or Act of God.

In no event shall the Seller be liable for loss, damage, or expense directly or indirectly arising from the use of the units, or from any other cause, except as expressly stated in this warranty. Seller makes no warranties, express or implied, including any warranty as to merchantability or fitness for a particular purpose or use. Seller is not liable for and Purchaser waives any right of action it has or may have against Seller for any consequential or special damages arising out of any breach of warranty, and for any damages Purchaser may claim for damage to any property or injury or death to any person arising out of its purchase of the use, operation or maintenance of the product. Seller will not be liable for any labor subcontracted or performed by Purchaser for preparation of warranted item for return to Seller's factory or for preparation work for field repair or replacement. Invoicing of Seller for labor either performed or subcontracted by Purchaser will not be considered as a liability by the Seller.

This warranty shall be exclusive of any and all other warranties express or implied and may be modified only by a writing signed by an officer of the Seller. This warranty shall extend to the Ultimate Purchaser but to no one else. Accessories supplied by Seller, but manufactured by others, carry any warranty the manufacturers have made to Seller and which can be passed on to Ultimate Purchaser.

Seller makes no warranty with respect to whether the products sold hereunder infringe any patent, U.S. or foreign, and Buyer represents that any specially ordered products do not infringe any patent. Buyer agrees to indemnify and hold Seller harmless from any liability by virtue of any patent claims where Buyer has ordered a product conforming to Buyer's specifications, or conforming to Buyer's specific design.

Buyer has not relied and shall not rely on any oral representation regarding the Product sold hereunder and any oral representation shall not bind Seller and shall not be part of any warranty.

There are no warranties which extend beyond the description on the face hereof. In no event shall MGE UPS Systems, Inc. be responsible for consequential damages or for any damages except as expressly stated herein.

Service and Factory Repair - Call 1 - 800 - 438 - 7373

Direct questions about the operation, repair, or servicing of this equipment to MGE UPS Systems, Inc. Customer Support Services. Include the part number, assembly number, and serial number of the unit in any correspondence. Should you require factory service for your equipment, contact MGE UPS Systems, Inc. Customer Support Services and obtain a Return Materials Authorization (RMA) prior to shipping your unit. Never ship equipment to MGE UPS Systems, Inc. without first obtaining an RMA.

Proprietary Rights Statement

Revision History

Revision: A00 New Release 04/98
A01 ECN - 001694 01/01

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How to use this manual

This manual has been designed for ease of use and easy location of information.

To quickly find the meaning of terms used within the text, look to the Glossary.

This manual uses Noteboxes to convey important information. Noteboxes come in four varieties:

WARNING

A WARNING notebox indicates information provided to protect the user and service personnel against safety hazards and/or possible equipment damage.

CAUTION

A CAUTION notebox indicates information provided to protect the user and service personnel against possible equipment damage.

IMPORTANT

An IMPORTANT notebox indicates information provided as an operating instruction or as an operating tip.

NOTE

A NOTE notebox indicates information provided as an operating tip or an equipment feature.

Introduction

1.0 Scope

This manual provides information required for installation, operation, and maintenance of the Power Management Module. Please read this manual thoroughly before installing and operating your PMM. Retain this manual for future reference.

The manual is divided into four sections:

Section I - Introduction
This section introduces the PMM (see Figure 1-1), including a general description of the system and its internal components, a description of available options, and system specifications.

Section II - Installation
This section describes installation of the PMM, including receiving, handling, and storage procedures; prerequisites to installation; installation procedures; and start-up procedures.

Section III - Operation
This section presents operating information for the PMM, including an overview of the system, its components, and their function; a description of the indicators and controls, and their function; and operational sequences to be followed for all conditions of normal, emergency, and maintenance operation.

Section IV - Maintenance
This section describes maintenance of the PMM, including preventive maintenance, troubleshooting, and information about replacement parts.

A Glossary in the rear of the manual provides definitions of terms used within the text. An Index is included to find specific topics of interest.

1.1 System description

The PMM is capable of serving as a power distribution center for most types of loads. The PMM takes input power and distributes that power to load devices. The PMM monitors the supplied power. Models with isolation transformer electrically isolate the load. A single-line diagram is shown in Figure 1-2.

Fig. 1-1 **Models PM126 & PM168 PMM pictorial**

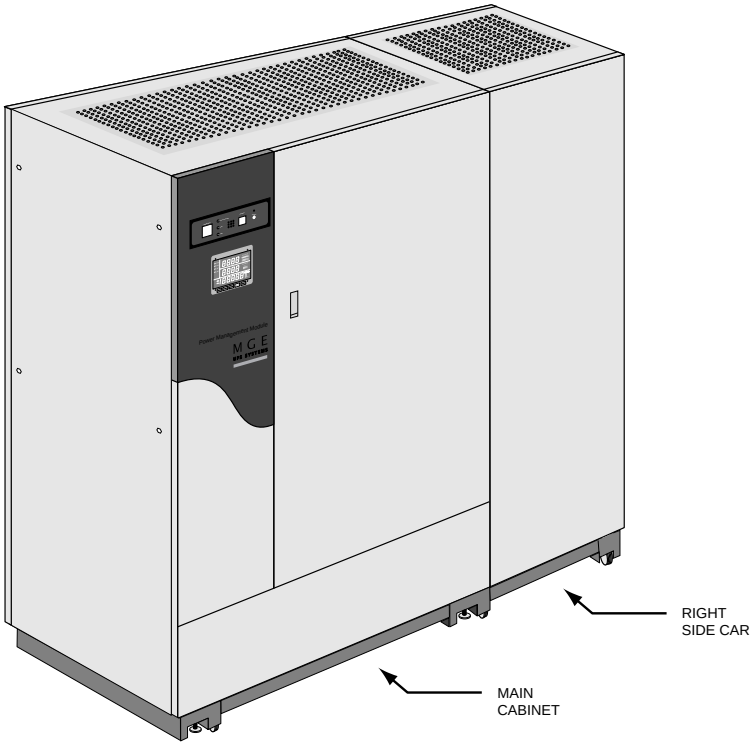


Fig. 1-2 **Models PM210 & PM252 PMM pictorial**

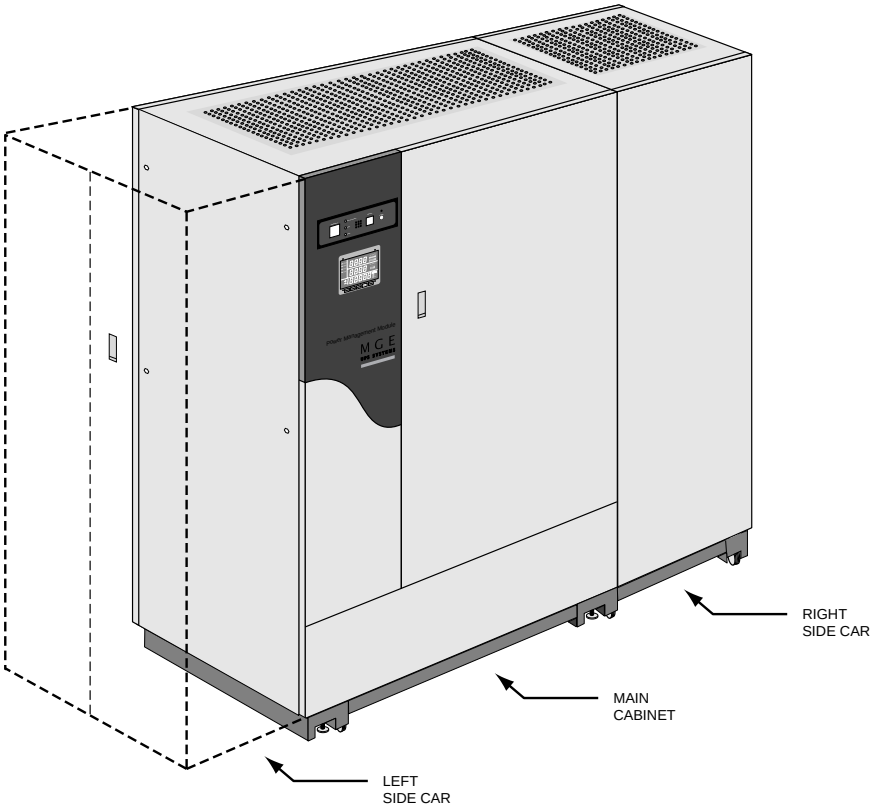


Fig. 1-3 **Location of major internal components**

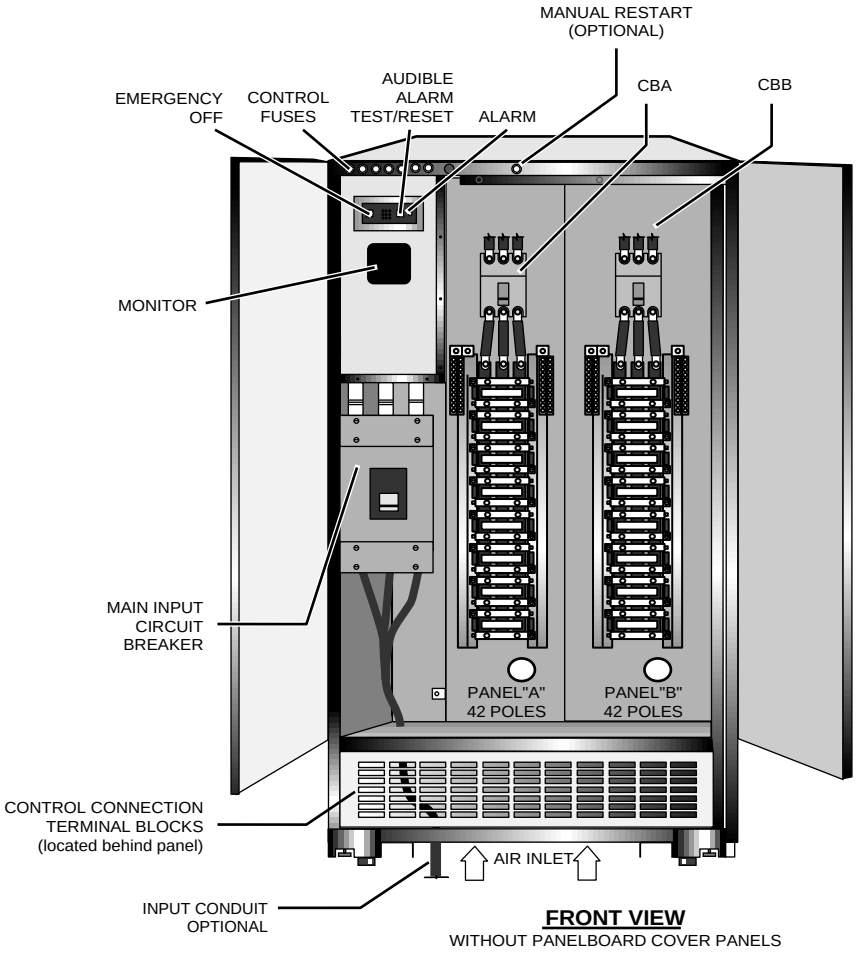
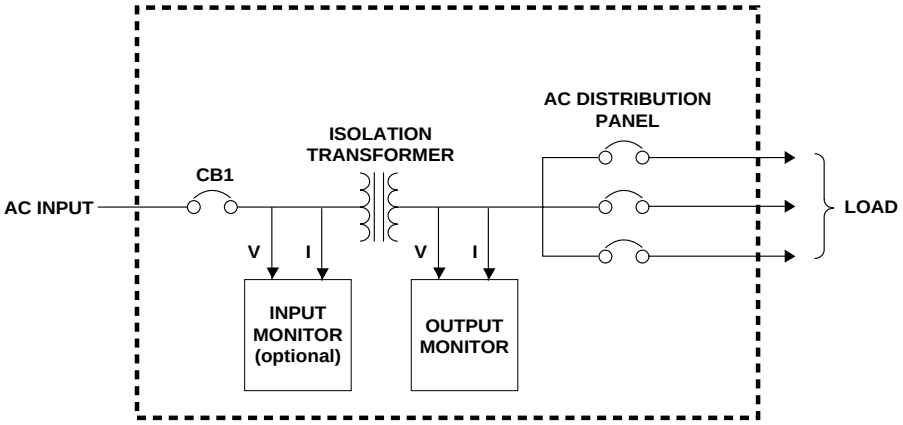


Fig. 1-4 **Single-line Diagram**



For most applications, the PMM is completely self-contained within a single enclosure. The enclosure may house an optional monitor, and up to six 42-pole distribution panelboards (for a total of 252 poles). One of the panelboards may be substituted by larger molded-case circuit breakers (up to four 225 amps maximum).

The PMM is available in power ranges from 30 kVA to 300 kVA, with a wide range of models and options that include:

- J. Box input with lightning surge arrestor
- Transient suppression plate
- Transient voltage suppression system (TVSS)
- Isolation transformer
- Isolated ground bus
- Floor stand
- 5-wire input
- Molded-case circuit breaker
- Manual restart
- Seismic bracing
- Top cable access
- Remote EPO pushbutton, column or wall-mounted

The PMM is Listed for Safety by Underwriter's Laboratories, Inc., (UL) under UL Standard 1950 for Information Technology equipment, CUL CSA950, and meets the standards for the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

Model number information, along with associated power, size, and heat load data, is given in Table 1-1.

1.2 Major Components

The following is a description of the major components of the PMM. Refer to Figure 1-3.

Circuit Monitor and Indicators

Figure 1-3 shows the external view of the unit with the monitor, switches and the LED indicators.

The meter is a three-phase, digital multi-function power monitor providing simultaneous displays, remote capabilities and optional power quality analysis. It measures every electrical power function including: voltage, current, frequency, KW, KVAR, KVA, PF, total KWH, and total harmonic distortion. Some functions are optional (refer to table 1-2)

'Emergency power off' (EPO) switch shuts down the PMM thereby disconnecting all power downstream of the input circuit breaker.

Audible alarm test/reset switch will silence the audible alarm until a new alarm occurs. It also functions as an LED/lamp test.

EPO activated/xfmr shutdown' LED is triggered and latched by pressing the EPO switch or when the transformer temperature reaches 195°C.

'TVSS alarm' is triggered by the optional transient voltage suppression system.

'Xfmr Overtemp' is triggered when the transformer temperature reaches 180°C and latched on when temperature reaches 195° C.

'Alarm'' LED is triggered by any fault condition from the power monitor or by an external dry contact.

Table 1-1 **PMM Characteristics**

kVA	Model Nos.	Voltage Input	INPUT AMPS	OUTPUT AMPS	BTU PER HR	SHIPPING WEIGHT, LBS PM042	PM084	PM126	PM168
030	PM...-12-030	120/208V	83A	83A	600	‡		‡	‡
	PM...-22-030	208V	87A	83A	3500	840	840	‡	‡
	PM...-42-030	480V	38A	83A	3500	840	‡	‡	‡
050	PM...-22-050	208V	144A	139A	5800	950	950	‡	‡
	PM...-42-050	480V	63A	139A	5800	950	950	‡	‡
075	PM...-22-075	208V	215A	208A	8000	‡	990	‡	‡
	PM...-42-075	480V	93A	208A	8000	‡	990	1190	1200
	PM...-62-075	600V	75A	208A	8000	‡	990	1190	1200
100	PM...-22-100	208V	286A	278A	8500	‡	1140	‡	‡
	PM...-42-100	480V	124A	278A	8500	‡	1140	1280	1290
	PM...-62-100	600V	99A	278A	8500	‡	1140	1280	1290
125	PM...-22-125	208V	357A	347A	9800	‡	1185	‡	‡
	PM...-42-125	480V	155A	347A	9800	‡	1185	1550	1560
	PM...-62-125	600V	124A	347A	9800	‡	1185	1550	1560
150	PM...-22-150	208V	425A	417A	11800	‡	‡	‡	‡
	PM...-42-150	480V	185A	417A	11800	‡	‡	1740	1750
	PM...-62-150	600V	143A	417A	11800	‡	‡	1740	1750
200	PM...-42-200	480V	247A	555A	13425	‡	‡	1880	1890
225	PM...-42-225	480V	279A	625A	13825	‡	‡	2060	2070

‡ consult factory
NOTE: 300kVA models, consult factory.

Table 1-2 **Display and Alarm Indicators**

INDICATOR/ ANNUNCIATION:	M0	M1(Basic)	M2 (ADV)	M3 (PL)
Buzzer/'Horn	Std	Std	Std	Std
Alarm Silence	Std	Std	Std	Std
Illuminated EPO Button	Std	Std	Std	Std
Transformer High Temperature Alarm	Std	Std	Std	Std
Transformer Over Temperature Alarm and Shutdown	Std	Std	Std	Std
POWER MONITOR DISPLAY:				
Output voltage Line to Line	N/A	Std	Std	Std
Output voltage Line to Neutral	N/A	Std	Std	Std
Output current	N/A	Std	Std	Std
Neutral current	N/A	Std	Std	Std
Ground current	N/A	N/A	N/A	Std
kVA	N/A	Std	Std	Std
kW	N/A	N/A	Std	Std
Frequency	N/A	Std	Std	Std
Voltage and Amps Max/Min Demand	N/A	Std	Std	Std
Voltage, Amps, KWH Max/Min Demand	N/A	N/A	Std	Std
Power Factor	N/A	N/A	Std	Std
K-Factor	N/A	N/A	Std	Std
KVA H	N/A	N/A	Std	Std
KVAR H Consumption	N/A	N/A	N/A	Std
KW H Consumption	N/A	N/A	Std	Std
Above and below Limits	N/A	Std	Std	Std
Harmonics to the 31st order @	N/A	N/A	Std@	Std

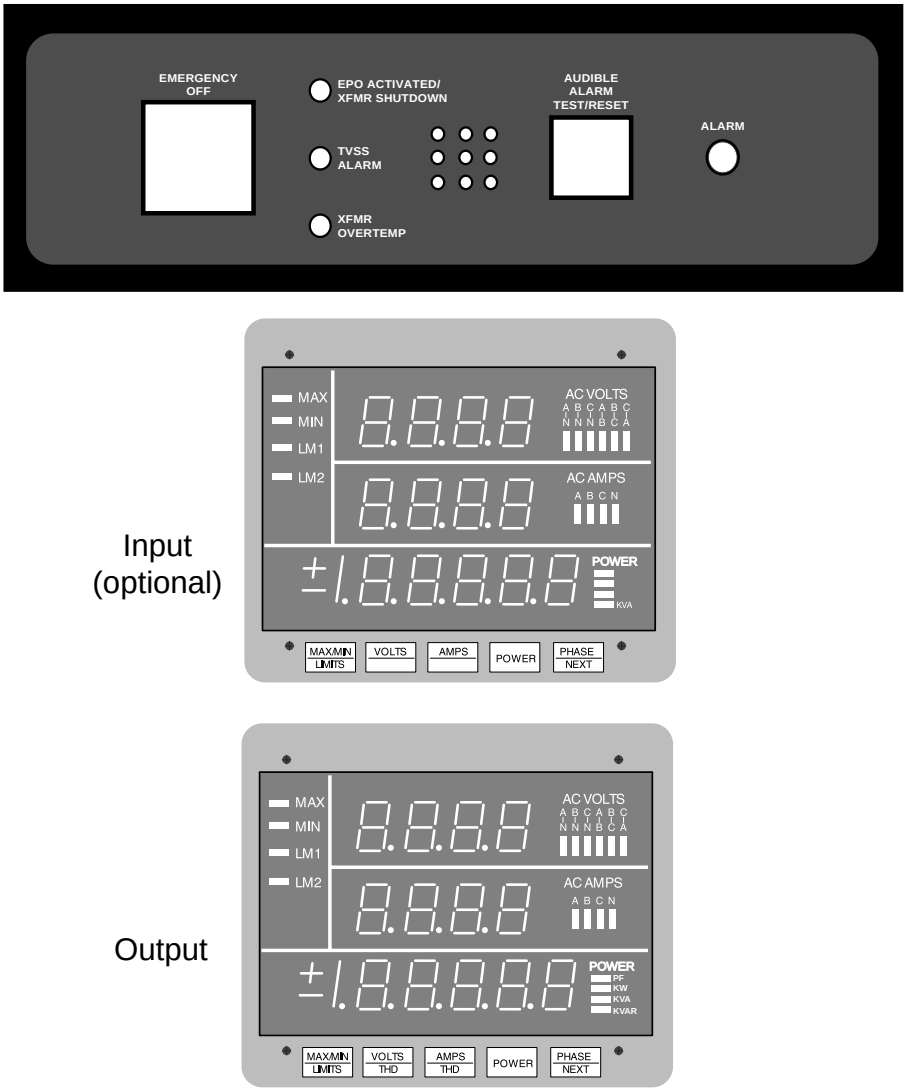
Table 1-2 continued on next page

Table 1-2 **continued**

INDICATOR/ ANNUNCIATION:	M0	M1(Basic)	M2 (ADV)	M3 (PL)
POWER ALARMS AND/OR SHUTDOWN:				
Overvoltage alarm or shutdown	N/A	Std	Std	Std
Undervoltage alarm or shutdown	N/A	Std	Std	Std
Phase Loss alarm and shutdown	N/A	Std	Std	Std
Unbalance voltage	N/A	Std	Std	Std
Output Over/Under Current Alarm	N/A	Std	Std	Std
Neutral Over/Under Current Alarm	N/A	Std	Std	Std
Over/Under Frequency Alarm	N/A	Std	Std	Std
Phase Rotation Alarm	N/A	Std	Std	Std
Over/Under KVA	N/A	N/A	Std	Std
Over % THD	N/A	N/A	Std	Std
Over/Under Power Factor/KVAR Lag or Lead	N/A	N/A	Std	Std
CONTROL:				
Emergency Power Off (EPO)	Std	Std	Std	Std
Remote Emergency Power Off (REPO) Terminals	Std	Std	Std	Std
COMMUNICATION:				
Auxiliary form C contacts for external shutdown or alarm	Opt	Std	Std	Opt
Form C KYZ pulse	N/A	N/A	Std*	Std *
RS232 Remote Communication	N/A	Opt	Opt	Std
EI Bus	N/A	N/A	Std	N/A
ModBus protocol	N/A	N/A	Std	Std
Analog output (up to 10 channels): 0 - 1 mA	N/A	N/A	Opt	N/A
RS485 Multi-drop communication for Centralization Monitoring	N/A	N/A	Opt	N/A

* Disabled at factory.
@ Harmonics capture software included.
RMD software included.

Fig. 1-5 **Front panel**



1.3 Model Numbering

The model number of the unit, located (where), can be parsed to indicate important parameters of the PMM. Possible values are shown in figure 1-5.

Fig. 1-6 **Nomenclature of PMM**

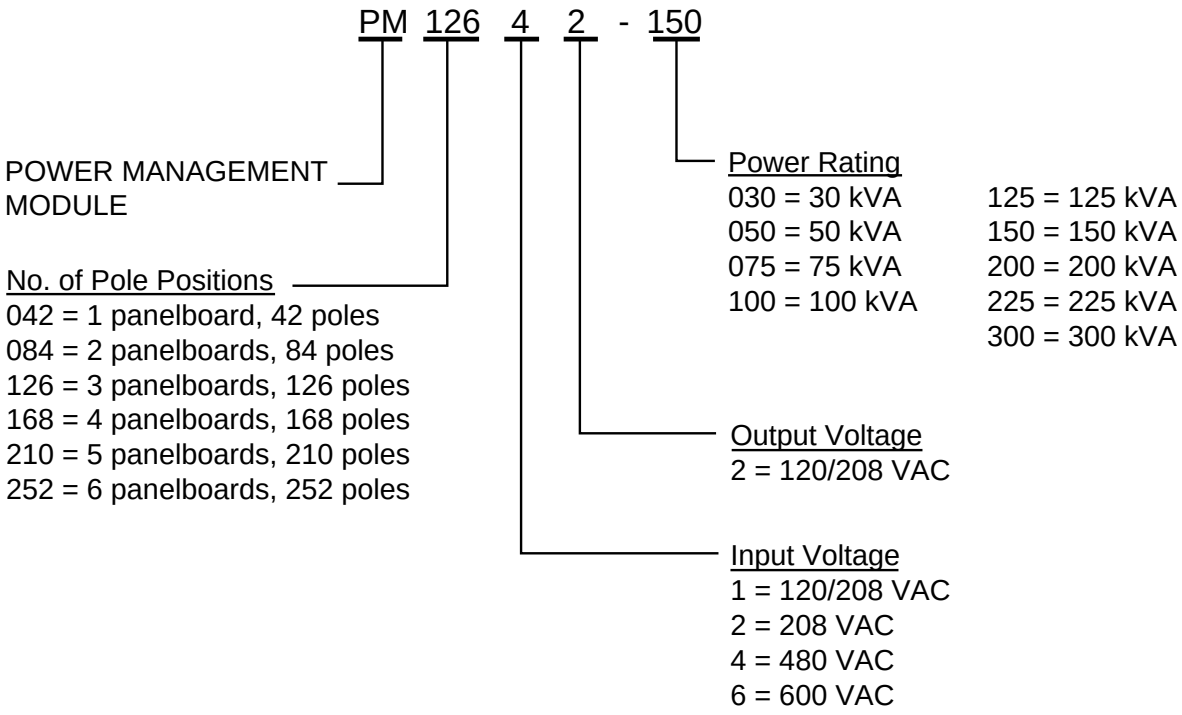
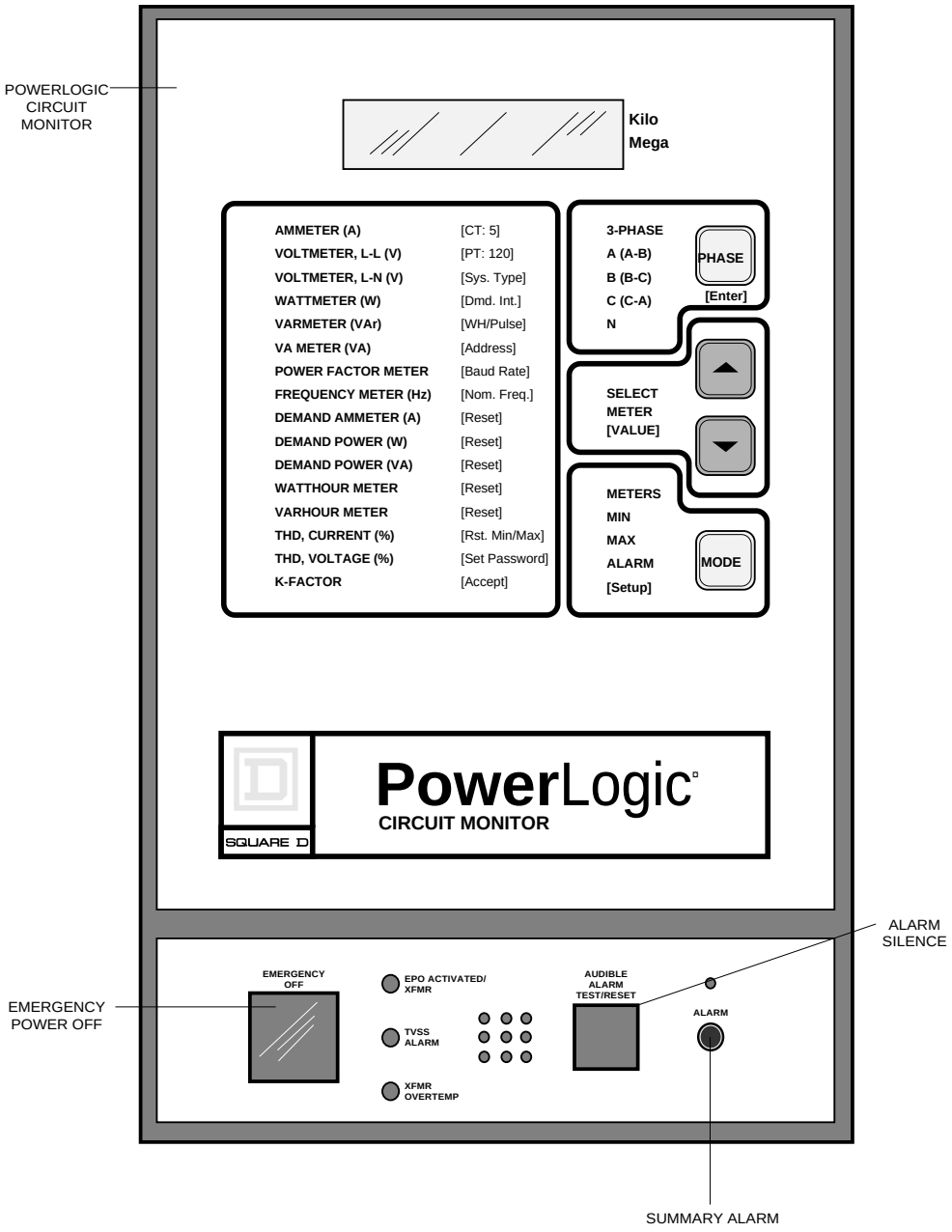


Fig. 1-7 **Optional Powerlogic Monitor**



1.4 Options

Most options must be specified at the time of the original order for factory installation. Some options can be field installed; contact your MGE Sales Representative for further information.

Junction box (J-Box)

Junction box (J-Box), which can be floor or wall mounted, provides power connection points for the input of the PMM.

Lightning surge arrestor

Lightning surge arrestor is installed in a power junction box. It is used to protect the PMM and the transformer primary against extremely high- and short-duration voltage spikes impressed on the utility power by lightning strikes or similar abnormalities. The lightning arrestor conducts surges to ground and away from the PMM. The lightning surge arrestor can discharge 20,000 amperes up to eight times for 20 µseconds for each discharge.

Transient suppression plate

Transient suppression plate is used to minimize the effects of high frequency electrical noise. The plate, ten square feet (one square meter), is mounted in direct contact with the masonry floor. The transient suppression plate and the reinforcement bars (rebars) of the masonry form a capacitor, shunting high frequency electrical noise, through the rebar, to earth ground.

Transient voltage suppression system (TVSS)

Transient voltage suppression system (TVSS),which is connected to the output (secondary) side of the main isolation transformer, is used to clip voltage transients. Installed internally in the PMM.

Isolated ground bus

Isolated ground bus provides a termination point for the second ground wire from isolated ground receptacles. Installed internally in the PMM.

Floor stand

Floor stand is used in applications where a raised floor installation is not possible and top or side conduit landings cannot be used.

Distribution cables

Distribution cables include an appropriately sized circuit breaker (bolt-on or plug-in, as specified); phase, neutral and ground conductors, as required; receptacle(s) as specified; and sealed, liquid-tight flexible conduit in the length specified. Cables are colored blue and are UL listed for use per section 645 of the National Electrical Code (ANSI/NFPA 70, latest issue).

Distribution circuit breakers

Distribution circuit breakers can be factory installed. Up to 150 A/3 pole circuit breakers can be installed on panelboard B. All other panelboards accept 1-, 2-, or 3-pole circuit breakers rated up to 100A/3 pole.

Remote emergency power off (REPO)

Remote emergency power off (REPO) station makes it possible to disconnect power to the DPS 2500 from a remote location in an emergency. When the REPO is activated, it trips the main input circuit breaker. The PMM shuts down, along with all connected loads. Any number of REPO stations can be connected as required.

5-wire input

5-wire input is used in installations where 3 phase, neutral, and ground connections are required.

Seismic bracing

Seismic bracing is available to secure the frame of the PMM to the floor for installations where such strengthening is required.

Main frame circuit breaker

Main frame circuit breaker can be installed in place of panelboard B. Up to four 225 Ampere main frame circuit breakers can be installed.

Manual Restart

The manual restart can be enabled by closing the switch located on top of the unit. See fig 1-3. If the manual restart is enabled (switch closed) and if the input power to PMM is removed for more than two seconds, then the main input breaker of the PMM will open automatically. If the manual restart is disabled (switch open), then the main input breaker of the PMM will remain closed after the input power is removed.

1.5 Specifications

AC input ratings

Voltage:	see Section 1-3
Phase:	3Ø, 3 wire plus ground
Frequency:	60 Hz (4 wire for 208/120 V without transformer)

AC output ratings

Voltage:	208/120 VAC
Phase:	3Ø, 4 wire plus ground
Frequency:	60 Hz

Environmental Characteristics

Temperature	
Operating:	
30 to 150 kVA	-10° C to 40° C (14° F. to 104° F.)
200 to 300 kVA	-10° C to 35° C (14° F. to 95° F.)
Non-operating:	-40° C to 60° C (-40° F to 140° F)
Altitude:	
Operating:	152 meters below to 2,134 meters above sea level (500 feet below to 7,000 feet above sea level) without derating
Non-operating:	152 meters below to 7,620 meters above sea level (500 feet below to 25,000 feet above sea level)
Relative humidity:	
Operating:	10 to 90% non-condensing
Non-operating:	10 to 70% condensing
Acoustic noise level:	50 dB (typical, 'A' weighting at four feet from the front of the cabinet)
Cable Access and landing:	Bottom Optional: top

Installation

2.0 Scope

This section describes installation of the PMM, including receiving, handling, and storage procedures, prerequisites to installation, installation procedures, and start-up procedures.

2.1 Receiving

Before accepting the shipment from the freight carrier, inspect the exterior surfaces of shipping container(s), packaging, and equipment for damage that may have occurred during transit. If the shipping containers or equipment show evidence of damage, note the damage on the receiving document (bill of lading) prior to signing for receipt of equipment.

The equipment should be unpacked immediately after receipt, and inspected again for damage to external painted panels and doors and to determine if any internal damage (broken components, disconnected wiring, loose connections, etc.) has occurred. Verify that the equipment nameplate corresponds with the equipment ordered.

Damage claims should be filed directly with the carrier. Replacements for damaged components can be ordered by calling 1-800-GETS-EPE.

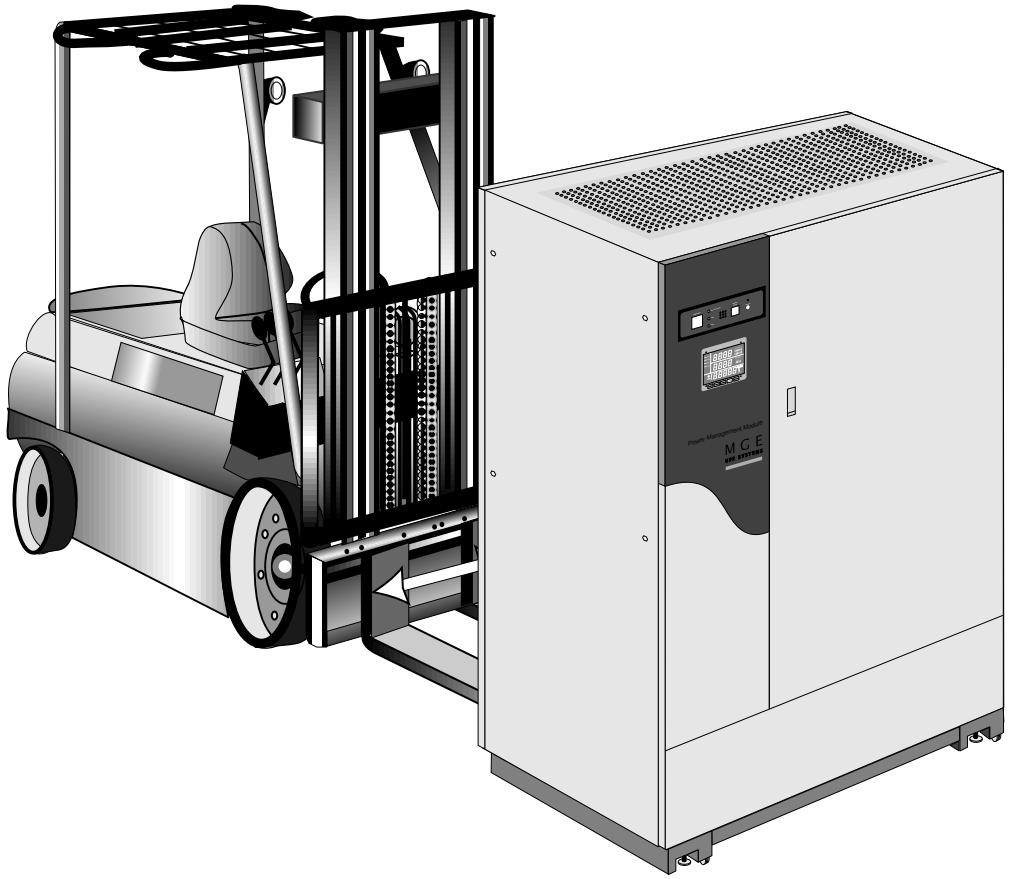
2.2 Handling

The PMM has heavy-duty casters to allow the equipment to be moved easily into position once it has been removed from the shipping truck.

The main cabinet can be moved only from the rear, using a fork lift truck (see Figure 2-2), and adjusting the forks to fit the dimensions of the forklift openings in the rear of the PMM enclosure. Once the PMM is in its final position, the leveling jacks on all four corners should be lowered to keep the PMM in place.

Models with sidecar(s) should **not** be moved with a forklift.

Fig. 2-1 **Handling**



Note: Only main cabinet can be moved using a forklift from the rear.

2.3 Storage

If the equipment is to be stored prior to installation, it should be stored in a cool, dry, well-ventilated location that is protected against rain, splashing water, chemical agents, etc. The equipment should be covered with a tarpaulin or plastic wrapper to protect it against dust, dirt, paint, or other foreign materials.

2.4 Prerequisite to Installation

Installation drawings are provided with each PMM. This section provides more information for a successful and efficient installation of the PMM. Installation of equipment must be handled by skilled technicians and electricians familiar with the requirements of high energy electrical equipment. The installation must comply with the requirements of the National Electrical Code (NEC, ANSI/NFPA 70, latest issue) and with local codes and requirements as applicable. We strongly recommend contracting MGE Customer Support Services for start-up. Do not allow unqualified personnel to handle or operate the equipment.

Environmental considerations
The PMM is intended for use in an environment where control of temperature and humidity is provided. Information on the maximum operating and recommended environmental parameters is given in Section 1-5.

The PMM generates heat and exhaust air through the top and rear of the enclosure. This added heat load may increase the ambient temperature of the room and this temperature should not exceed the specification on paragraph 1.5. The facility air conditioning system can maintain this room temperature within specs. Heat load and heat loss data is given in Table 1-1.

Mechanical considerations

Cable landing
PMM dimensions are given in Table 1-1. The PMM can be mounted on a raised or solid floor. Conduit landings are provided for bottom cable entry (top cable entry is an available option). A floor stand option is offered for solid floor installations if bottom cable entry is not possible.

J Box
When the junction box (J-Box) option is ordered, it is normally shipped in advance of the PMM, and may be installed prior to the arrival of the PMM. The J-Box can be floor or wall-mounted and must be placed within eight feet of the PMM, since the length of the optional supply cable is only ten feet.

Floor
For installations on a raised floor, a floor tile cut-out is required for passage of air and cables. The floor tile cut-out is shown in Figure 2-2. Floor loading must be considered when installing on a raised floor or on an upper story of a multiple-story building. Floor loading data is provided on the installation drawings supplied with your equipment. Consult a structural engineer while planning your PMM installation. Place the PMM so the leveling jacks are as close as possible to the corners of the tiles.

Noise

Consideration should be given to the specific location of the PMM cabinet to minimize the potential for sound transmission to surrounding structures and sound reflection. It is suggested that the following installation methods be included.

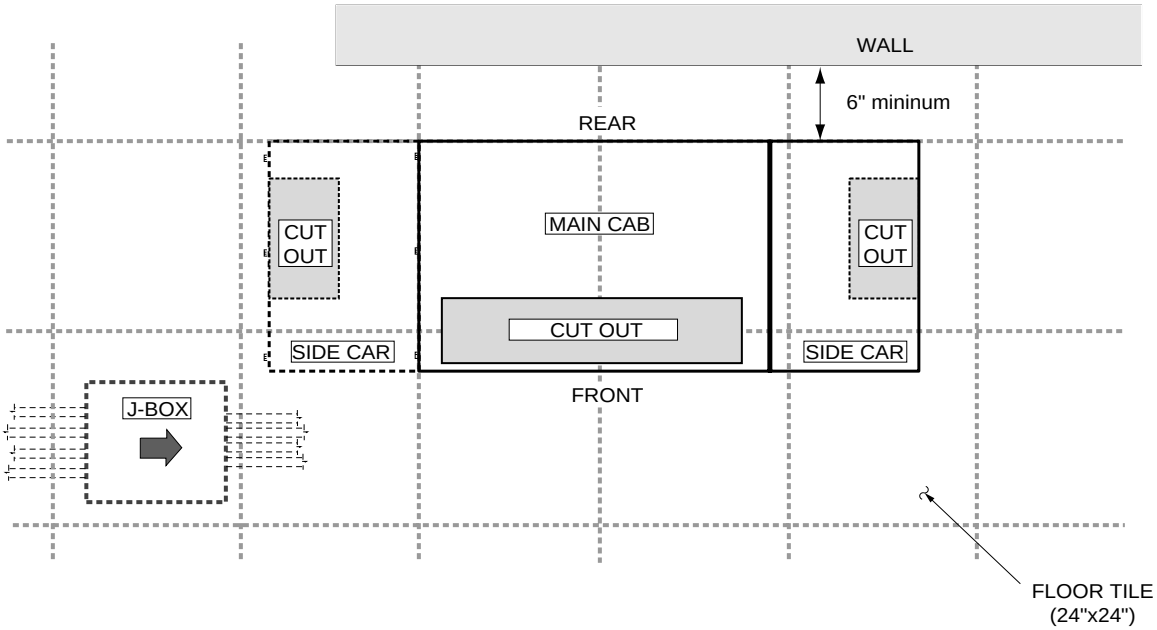
1. If possible, mount the PMM away from corners of walls or ceilings. For installations which must be near a corner, use sound absorbing materials on the walls and ceilings, if necssary, to eliminate reflection.

2. Provide a solid foundation for mounting the PMM.

3. Provide flexible conduit to make the connections to the PMM.

4. Locate the PMM as far as practically possible from areas where high sound levels are undesirable.

Fig. 2-2 **Placement, Showing Floor Tile Cut-Outs**



Access

The PMM requires a minimum of 36 inches front clearance for normal maintenance. PM126 & PM168 requires 36 inches right side clearance for normal maintenance. PM210 & PM 252 requires 36 inches left and right side clearance for normal maintenance. A minimum of six inches rear clearance access is required for transformer ventilation.

Cooling
The PMM is convection cooled. Cooling air is drawn through the bottom section of the enclosure and exhausted through the top. The PMM does not use forced air or air filters. Care should be taken to ensure that the air intake and exhaust areas are not obstructed for air flow.

Electrical considerations

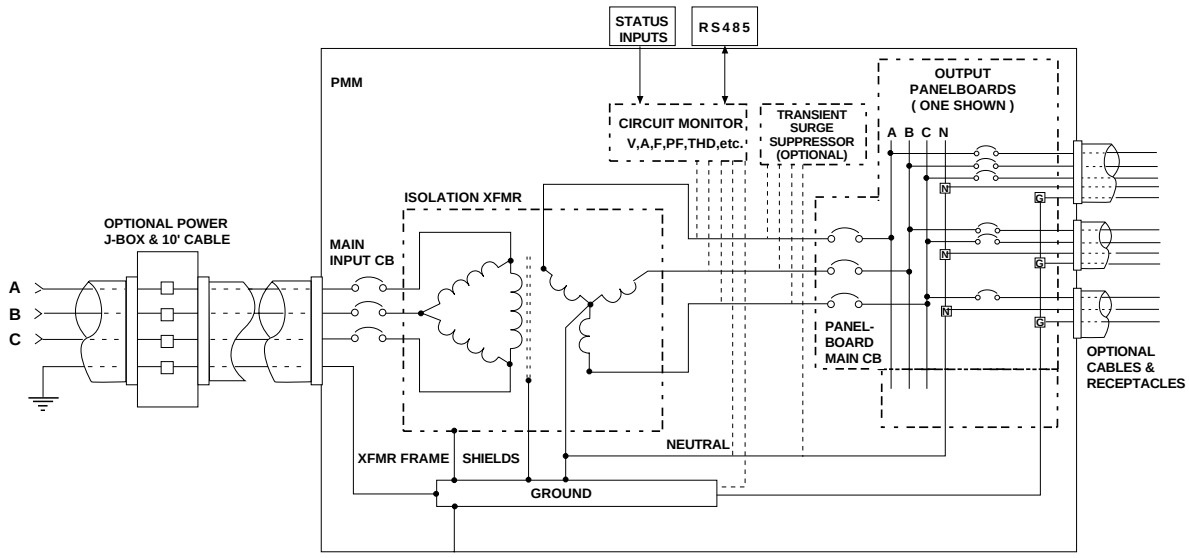
•Grounding
An insulated grounding conductor; identical to the phase supply conductors in size, insulation material, and thickness, must be installed as a part of the input branch circuit supplying the PMM.

Per the National Electrical Code, article 250, the grounding conductor is to have green insulation, with or without yellow stripes and be grounded to the utility service safety grounding point (or other acceptable building ground, such as the building frame in the case of a steel frame structure), at the service equipment entrance.

All attached plug receptacles in the vicinity of the PMM must be grounded in the same way. The conductors for those receptacle grounds are grounded to the safety ground (or other acceptable building ground, such as the building frame in the case of a steel frame structure), at the service equipment entrance.

Wiring for power and control cables is routed through the bottom of the enclosure (with an option for the top). This is shown in detail on the installation drawing for your configuration.

Fig. 2-3 **Grounding Within The PMM Electrical Path**



2.5 Installation Procedures

Installation procedures describe the general requirements for the PMM installation. Specific requirements are described in the installation drawings shipped with your configuration.

The steps to be followed are:

- Placement
- Output circuit breaker installation
- Connection of input power, output power, and control cables
- Start-up of the system

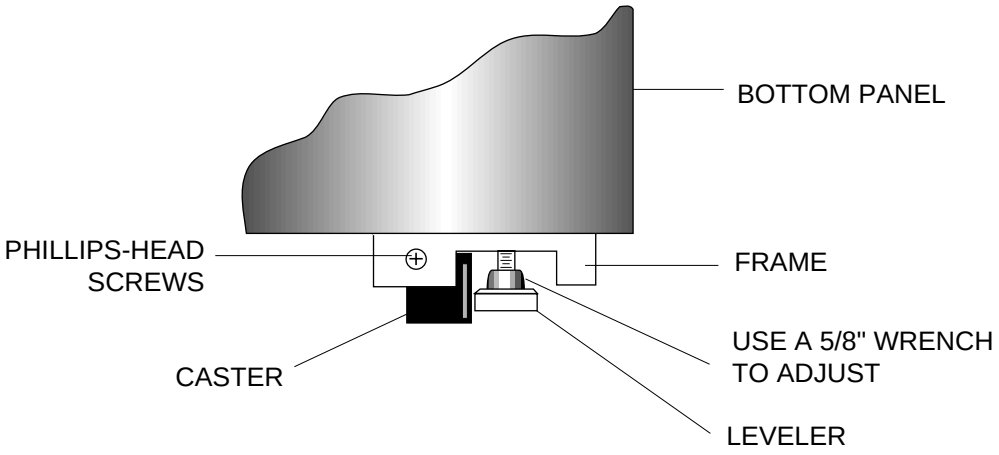
Installation of the PMM equipment must be handled by skilled technicians and electricians familiar with the special requirements of high-energy electrical equipment. The installation must comply with the requirements of the National Electrical Code (NEC, ANSI/NFPA 70, latest issue) and with local codes and requirements as applicable.

We strongly recommend contracting MGE for start-up of the PMM. Do not allow unqualified personnel to handle or operate the equipment.

2.5.1 Placement

Using the mechanical prerequisite information, determine the final location for the PMM and any applicable options, and move them into place. Lower the leveling jacks (see Figure 2-4) on all four corners of the enclosure, to ensure proper stability. The load must be on the leveling jacks instead of the casters.

Fig. 2-4 **Leveling Jacks**



2.5.2 Connections

Make all connections in accordance with the "Cable preparation for field wiring" guide (MGE Part Number 9-00038-00). Make certain that all connections are properly torqued.

AC input

The AC input connections are made through the bottom, to the main circuit breaker, CB1. For optional top cable access refer to the installation drawing. Some main circuit breakers include a cover plate protecting the compression connectors; refer to Figure 2-5 during the following procedure. To make the connections:

- Remove the cover plate from the bottom of the main circuit breaker CB1 and install input conduit.
- Make connections to the compression connectors. Phase sequence must be
  A, B, C.
- Install the cover plate at the bottom of the main input circuit breaker CB1.

AC output

Conduit landing are located below each panelboard with appropriate 1/2 and 3/4" keps nuts provided. The load connections are made to the circuit breaker configuration which has been designed, installed, and identified by you to meet the requirements of your installation. The connections to be made are either 2-, 3-, or 4-wires and ground and are made in compression type connectors. Make the connections as required for the one, two, or three phase power. Connectors are marked on the circuit breaker and the phase sequence for all 3-phase power is A, B, C.

Control connections

Control connections are made at the terminal blocks located near the bottom left inside panel (see Figure 2-7 and 2-8).

Fig. 2-5 **AC Input Connections (Circuit Breakers With Cover Plate)**

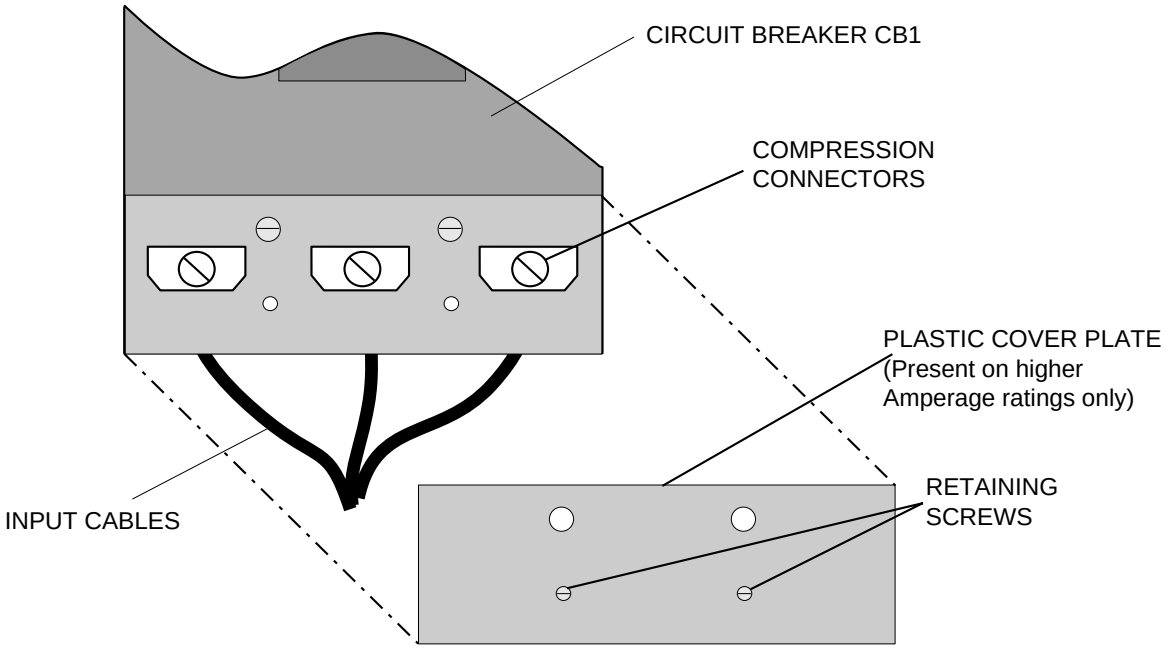


Table 2-1 **Output Power Conections to Branch Circuit Breakers**

TRIP AMPS	WIRE CONNECTOR
10	#14 - 8
15	#14 - 8
20	#14 - 8
25	#14 - 8
30	#14 - 8
35	#8 - 2
40	#8 - 2
45	#8 - 2
50	#8 - 2
60	#8 - 2
70	#8 - 2
80	#4 - 2/0
90	#4 - 2/0
100	#4 - 2/0
110	#4 - 2/0
125	#4 - 2/0
150	#4 - 300MCM

Fig. 2-6 **Optional Panel Board**

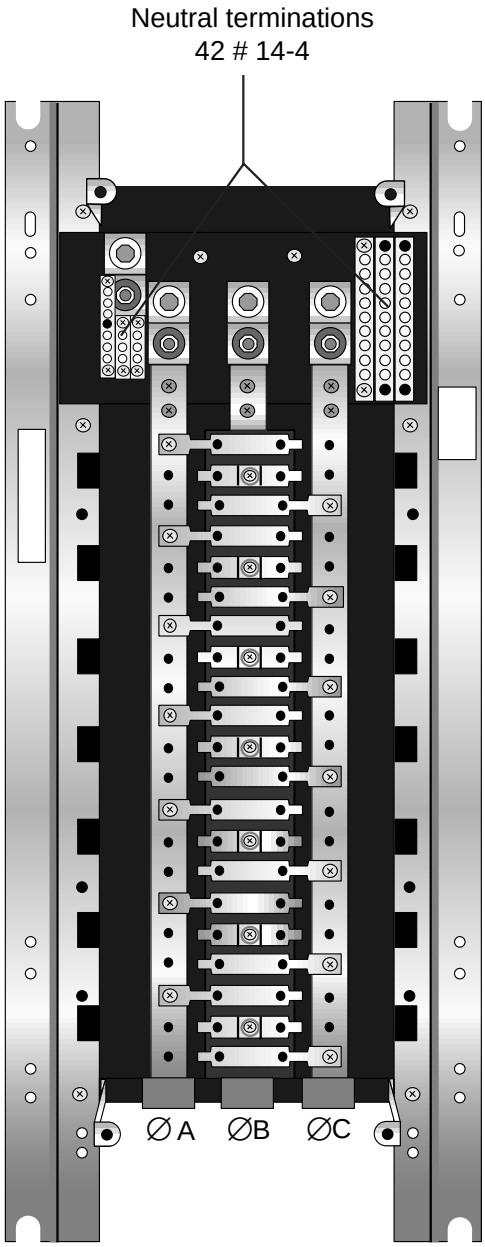


Fig. 2-7 **Control Connection Terminal Blocks**

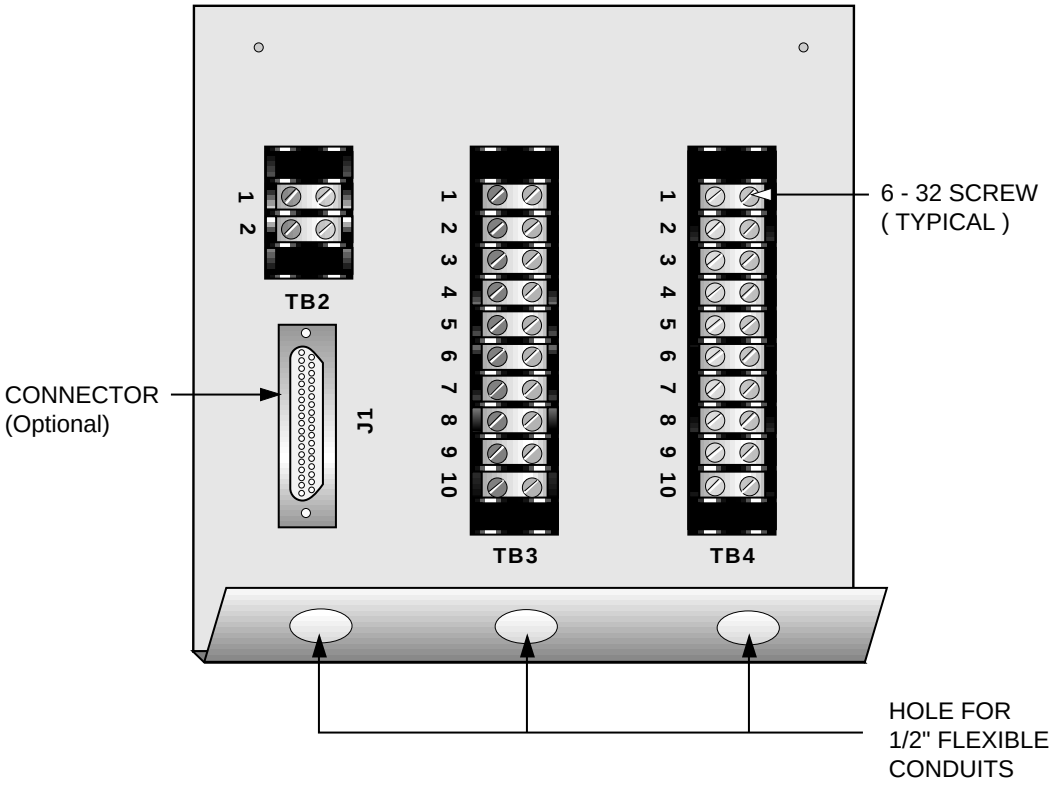
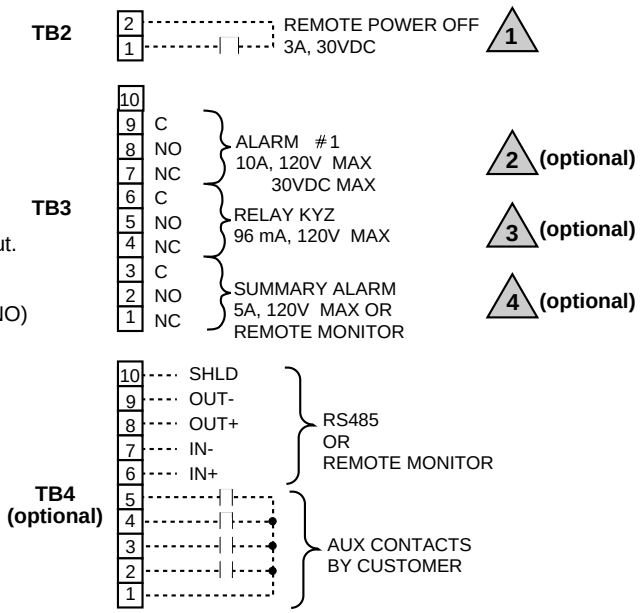


Fig. 2-8 **Connection and Signal Points on Terminal Blocks**

Notes:

1. Input from normally-open (NO) Form C contact closure trips main input circuit breaker.
2. Specified alarms provide normally-open (NO) or normally-closed (NC) Form C contacts for connection to remote alarms.
3. Specified alarms provide low-power pulse output.
4. Any alarm condition provides normally-open (NO) or normally-closed (NC) Form C contacts for connection to a remote device.



2.5.3 Finishing the Installation

Make sure that all covers and doors are installed and closed for proper operation. Also make sure that all air intake and outlet areas are not obstructed, allowing proper air flow for equipment cooling and ventilation.

2.6 Startup Procdedures

This section presents the procedures to be used for initial start-up of the PMM, and the sequence to be followed any time that the system is restarted after having been shut completely down with no power applied to the system.

2.6.1 Checks Before Startup

Before starting the PMM, read this PMM Owner's Manual thoroughly. Be certain that you fully understand the operation of the indicators, controls, and operational sequences.

Before starting the PMM, make sure of the following:

- Upstream power circuit breaker is open.
- Power cables have been properly connected to the input circuit breaker, or the power J-Box if installed.
- Voltage connected to the PMM matches the PMM nameplate and model number.
- Equipment has been properly grounded.
- All power and control connections are properly made and are tight.
- Intake and exhaust ventilation areas have no obstructions that might impair proper air flow.

2.6.2 Initial Startup

After verifying the information presented in Section 2.6.1:

- Close the upstream circuit breaker.
- Close the main circuit breaker CB1 and verify PowerLogic circuit monitor has the proper presentation as described in section III of this manual.
- Close the main panelboard circuit breaker.
- Close individual output circuit breakers as required.

2.6.3 Checks After Startup

Normal operation of the PMM should be verified immediately after the initial start-up has been performed. At the minimum, use the circuit monitor, if installed, to verify proper readings from all circuits.

Maintenance

3.0 Scope

This section describes maintenance of the PMM, including preventive maintenance, troubleshooting, and information about replacement parts.

3.1 Preventive maintenance

The following preventive maintenance routines should be considered the minimum requirements; your installation and site may require additional preventive maintenance to assure optimal performance from PMM and associated equipment. These routines should be performed twice a year.

The technician or electrician performing preventive maintenance on the PMM must read this manual thoroughly and be familiar with the indicators, controls, and operation of the equipment.

IMPORTANT

Isolate and de-energize the equipment for all maintenance operations.

a. Ensure that the equipment is clean and free of loose dust, dirt, and debris. The exterior of the enclosures can be cleaned with a mild solution of soap and water, lightly applied with a lint-free cloth.

b. Inspect the air intake and exhaust plates and clean as required. Verify that air flows freely through the equipment. Clean the air intake and exhaust plates, and the enclosure interior, with a vacuum cleaner.

IMPORTANT

Operation of the remote circuit breakers will cause power to be removed if it is present and will cause power to be applied if it is not. Make sure that all loads are prepared to have power removed (all critical circuits have been shut down), or circuits are safe for power application (no maintenance procedures are being conducted and downstream circuit breakers are open and tagged) before remote operation of the circuit breakers.

c. Remotely operate all circuit breakers to verify that circuit breakers function properly.

d. Verify that all system monitoring functions operate properly.

3.2 Troubleshooting

The following is a list of the most frequent problems, their most likely cause, and the possible solutions in the form of actions to be taken. In the event that the suggested solution does not solve the problem, call MGE UPS Systems. Customer Support Services for assistance.

A. PMM has no input power

Cause #1: No building power to the PMM

Action: Restore building power
Have a qualified technician check the wiring continuity between the DPS input (J-Box option) and e building input power panel. Refer to section II for connections.

Cause #2: The PMM is not properly connected to the optional J-Box.

Action: Have a qualified technician check the wiring continuity between the input (J-Box option) and the building input power panel. Refer to section II
for connections.

B. Specific output circuit(s) have no power

Cause #1: Associated output circuit breaker(s) are OFF.

Action: Reset the circuit breaker(s).

Cause #2: The wiring between the circuit breaker(s) and the equipment(s) is faulty.

Action: Have a qualified technician check for wiring continuity and correct phase sequence between the circuit breaker(s) and the equipment(s).

Cause #3: The equipment associated with the circuit breaker is operating above the rated load.

Action: Schedule a load check of the equipment with a qualified technician; adjust for load balance if possible.

Cause #4: Defective circuit breaker.

Action: Replace defective circuit breaker.

C. No output from the PMM, but the monitor is active.

Cause #1: Main input circuit breaker CB1 is off.

Action #1: Record which alarm indications are active.

Action #2: Reset alarm(s) and clear external signal.

Action #3: Check the alarm history display for reason the main input circuit breaker tripped:

a. Manual trip ... due to an emergency power off (EPO) button being pushed.

b. An “alarm shut-down” has occurred; determine the cause and take corrective action before resetting the main input circuit breaker CB1.

c. Automatic trip ... an external signal was received from the building wiring via the alarm interface instructing the PMM to shunt-trip.

d. Output overload ... schedule a load check of the PMM by a qualified technician.

e. Defective circuit breaker ... replace the circuit breaker.

f. Short circuit internal to the PMM ... Troubleshoot the PMM or call MGE UPS Systems Customer Support Services.

Cause #2: Output power fuse(s) blown

Action: Replace fuse(s)

D. Output from the PMM, but the monitor is not active.

Cause: Control power fuse(s) blown.

Action: Replace fuse(s)

.E. Over/under voltage.

Cause #1: Upstream UPS or power conditioner is defective.

Action: Correct problem at the power source.

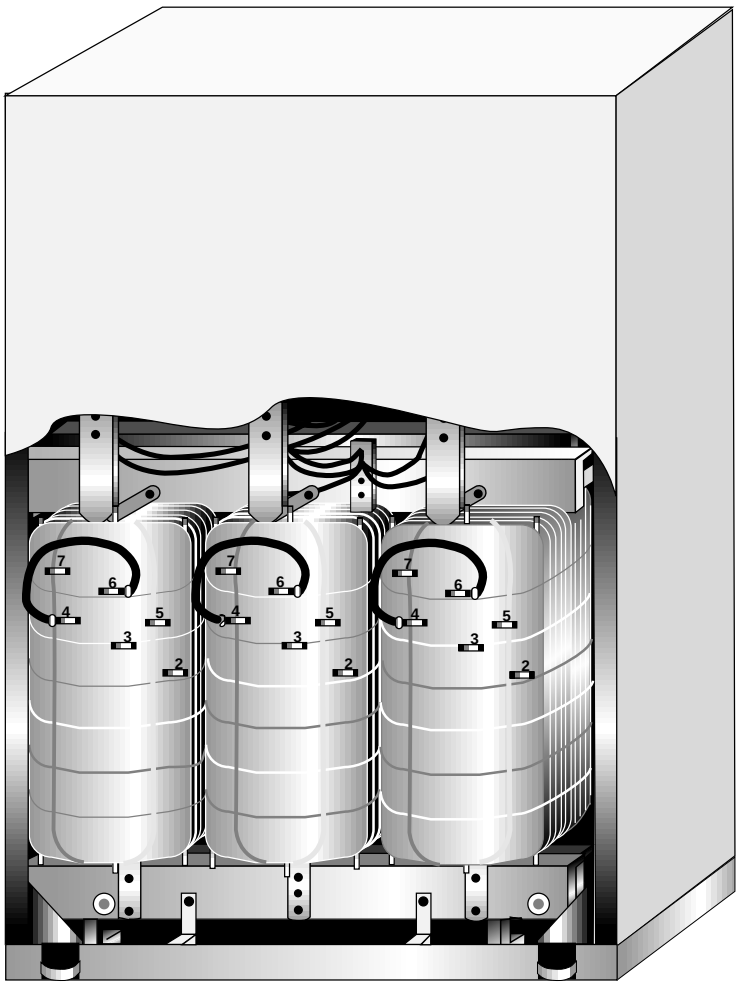
Cause #2: Voltage drop due to distance or excessive load on mains.

Action: Disconnect power and adjust transformer taps (see Figure 4-1); refer to the tap adjustment table on the transformer’s nameplate.

IMPORTANT

Before changing tranformer taps, verify that the over/under voltage condition is constant. Changing transformer taps will increase or decrease the ratio of input voltage to output voltage.

Fig. 3-1 **Transformer Taps, PMM Rear View Cutaway**



3.3 Replacement parts

Two levels of replacement parts are available for the PMM. These levels are designated B and C. The level that you should keep on hand for your installation will vary depending on the type of maintenance planned on site and the configuration of your PMM. Having replacement parts on hand will prevent on unacceptable delays due to time involved obtaining spare parts during critical periods, such as system start-up. Any items used during start-up will be replaced by MGE at no charge. Contact MGE UPS Systems Customer Support Services for specific recommendations. A description of each level is provided below:

level description

B. This level of replacement parts is recommended when the user can tolerate short duration system down-time to obtain replacement parts in the event of a major

system failure. This level of replacement parts consists of consumable items, specifically fuses, air filters, and the most critical printed-circuit card assemblies (PCAs).

C. This level of replacement parts is recommended when the user can tolerate only a minimum of down-time in the event of a major system failure. This level of replacement parts consists of consumable items, specifically fuses, and a complete set of critical printed-circuit card assemblies (PCAs).

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Appendix

Powerlogic Alarm Conditions and Alarm Codes

This section lists the circuit monitor's predefined alarm conditions. For each alarm condition, the following information is provided:

Alarm no.	A code number used to refer to individual alarms.
Alarm description	A brief description of the alarm condition.
Units	The units that apply to the pickup and dropout settings.

Alarm No.	Alarm description	Units
01	Over Current Phase A	Amps
02	Over Current Phase B	Amps
03	Over Current Phase C	Amps
04	Over Current Neutral	Amps
05	Over Current Ground	Amps
06	Under Current Phase A	Amps
07	Under Current Phase B	Amps
08	Under Current Phase C	Amps
09	Current Unbalance Phase A	Tenths %
10	Current Unbalance Phase B	Tenths %
11	Current Unbalance Phase C	Tenths %
12	Phase Loss, Current	Tenths %
13	Over Voltage Phase A	Volts
14	Over Voltage Phase B	Volts
15	Over Voltage Phase C	Volts
16	Over Voltage Phase A-B	Volts
17	Over Voltage Phase B-C	Volts
18	Over Voltage Phase C-A	Volts
19	Under Voltage Phase A	Volts
20	Under Voltage Phase B	Volts
21	Under Voltage Phase C	Volts
22	Under Voltage Phase A-B	Volts
23	Under Voltage Phase B-C	Volts
24	Under Voltage Phase C-A	Volts
25	Voltage Unbalance A	Tenths %
26	Voltage Unbalance B	Tenths %
27	Voltage Unbalance C	Tenths %
28	Voltage Unbalance A-B	Tenths %
29	Voltage Unbalance B-C	Tenths %
30	Voltage Unbalance C-A	Tenths %
31	Voltage Loss (Loss of A, B, or C, but not all)	Volts

Alarm No.	Alarm description	Units
32	Over kVA 3-Phase Total	kVA
33	Over kW Into The Load 3-Phase Total	kW
34	Over kW Out Of The Load 3-Phase Total	kW
35	Over kVAr Into The Load 3-Phase Total	kVAr
36	Over kVAr Out Of The Load 3-Phase Total	kVAr
37	Over Current Demand Phase A	Amps
38	Over Current Demand Phase B	Amps
39	Over Current Demand Phase C	Amps
40	Over Current Demand 3-Phase Total	Amps
41	Over Frequency	Hertz
42	Under Frequency	Hertz
43	Lagging True Power Factor	Thousandths
44	Leading True Power Factor	Thousandths
45	Lagging Displacement Power Factor	Thousandths
46	Leading Displacement Power Factor	Thousandths
47	Reserved	
48	Reserved	
49	Over Value THD Current Phase A	Tenths %
50	Over Value THD Current Phase B	Tenths %
51	Over Value THD Current Phase C	Tenths %
52	Over Value THD Voltage Phase A	Tenths %
53	Over Value THD Voltage Phase B	Tenths %
54	Over Value THD Voltage Phase C	Tenths %
55	Over Value THD Voltage Phase A-B	Tenths %
56	Over Value THD Voltage Phase B-C	Tenths %
57	Over Value THD Voltage Phase C-A	Tenths %
58	Over K-Factor Phase A	Tenths %
59	Over K-Factor Phase B	Tenths %
60	Over K-Factor Phase C	Tenths %
Alarm No.	Alarm description	Units

Alarm No.	Alarm description	Units
61	Over Predicted kVA Demand	kVA
62	Over Predicted kW Demand	kW
63	Over Predicted kVAr Demand	kVAr
64	Over kVA Demand Level 1	kVA
65	Over kVA Demand Level 2	kVA
66	Over kVA Demand Level 3	kVA
67	Over kW Demand Level 1	kW
68	Over kW Demand Level 2	kW
69	Over kW Demand Level 3	kW
70	Over kVAr Demand Level 1	kVAr
71	Over Lagging 3 Phase Avg. Power Factor	Thousandths
72	Under 3 Phase Total Real Power	kW
73	Over Reverse 3 Phase Power	kW
74	Phase Reversal	
75	Status Input 1 Transition from Off to On	
76	Status Input 2 Transition from Off to On	
77	Status Input 3 Transition from Off to On	
78	Status Input 4 Transition from Off to On	
79	Status Input 5 Transition from Off to On	
80	Status Input 6 Transition from Off to On	
81	Status Input 7 Transition from Off to On	
82	Status Input 8 Transition from Off to On	
83	Status Input 1 Transition from On to Off	
84	Status Input 2 Transition from On to Off	
85	Status Input 3 Transition from On to Off	
86	Status Input 4 Transition from On to Off	
87	Status Input 5 Transition from On to Off	
88	Status Input 6 Transition from On to Off	
89	Status Input 7 Transition from On to Off	
90	Status Input 8 Transition from On to Off	
91-98	Reserved	

Alarm No.	Alarm description	Units
99	End of Incremental Energy Interval	
100	Power-up/Reset	
101	End of Demand Interval	
102	End of Update Cycle	
103	Over Analog Input Channel 1	Integer value
104	Over Analog Input Channel 2	Integer value
105	Over Analog Input Channel 3	Integer value
106	Over Analog Input Channel 4	Integer value
107	Under Analog Input Channel 1	Integer value
108	Under Analog Input Channel 2	Integer value
109	Under Analog Input Channel 3	Integer value
110	Under Analog Input Channel 4	Integer value
111-120	Reserved	
201	Voltage Surge A-N/A-B	Volts
202	Voltage Surge B-N	Volts
203	Voltage Surge C-N/C-B	Volts
204	Current Surge Phase A	Amps
205	Current Surge Phase B	Amps
206	Current Surge Phase C	Amps
207	Current Surge Neutral	Amps
208	Voltage Sag A-N/A-B	Volts
209	Voltage Sag B-N	Volts
210	Voltage Sag C-N/C-B	Volts
211	Current Sag Phase A	Amps
212	Current Sag Phase B	Amps
213	Current Sag Phase C	Amps
214	Current Sag Neutral	Amps

Glossary

Symbols	
/	Used to represent “and/or.”
%	Percent; of each hundred.
° F.	Degrees fahrenheit.
° C	Degrees celsius.
@	At.
±	Plus or minus.
#	Number.
Ø	Phase.
ABC	Normal sequence of phases in three-phase power.
AC or ac	Alternating current.
Ambient air temperature	The temperature of the surrounding air.
AWG	American Wire Gauge, a standard unit for measuring wire cross-sectional area.
British Thermal Unit	A unit of heat equal to 252 calories (definition below).
BTU	British thermal unit. Defined as the amount of heat required to raise the temperature of one pound of water by 1° F.Calorie A unit of heat. One calorie is the amount of energy required to raise the temperature of one gram of water by one degree Celsius.
Carrier	The company or individual responsible for delivering goods from one area to another.
CB	Circuit breaker.
Conduit	A flexible or rigid tube surrounding electrical conductors.
Current rating	The maximum current that a piece of electrical equipment is designed to carry.
DC or dc	Direct current.

Earth ground	A ground circuit that has contact with the earth.
Electrician	Refers to an installation electrician qualified to install high-energy electrical components in accordance with national and local codes and regulations. Not necessarily qualified to maintain or repair electrical or electronic equipment; compare to Technician.
EPE	EPE Technologies, Inc. a subsidiary of Square D Company.
EPO	Emergency power off.
Fusible	Capable of being melted with heat.
GND	Electrical ground.
Hz	Hertz, a unit of measure for frequency; one cycle per second equal one Hertz.
Input branch circuit	The input circuit from the building's power panel circuit breaker to the equipment.
kVA	Kilovolt-Amperes; a measure of apparent power.
kVAr	Kilovolt-Amperes reactive.
kW	Kilovolt; a measure of real power.
LED	Light emitting diode.
MCM	Thousand circular mil; a unit of measure for wire sizes for multiple stranded over 4/0 AWG in diameter. M is from the Roman numeral system symbol for 1,000. Old unit of measure was kcmil.
MOV	Metal-oxide varistor.
NC	Normally closed.
NO	Normally open.
NEC	National electrical code, ANSI/NFPA 70.
NFPA	National Fire Protection Association.
NO	Normally-open.
OSHA	Occupational Safety and Health Act.
Packing list	The list of articles included with a given shipment.
PCA	Printed circuit assembly; refers to a printed wiring board (PWB) stuffed with electrical components.

P.F.	Power factor.
PWM	Power Management Module.
Remote Emergency Power Off	A switch used for emergency shutting down electrical equipment.
REPO	Remote emergency power off.
Shipping damage	Any damage done to an article while it is in transit.
Shipping pallet	A platform on which articles are fixed for shipping.
Technician	Refers to an electronic technician qualified to maintain and repair electronic equipment. Not necessarily qualified to install electrical wiring. Compare to Electrician.
TPS	Transient supression plate.
TVSS	Transient voltage suppression system.
UL	Underwriter’s Laboratories, Inc.
UPS	Uninterruptible power system.
Vac	Volts alternating current.
Vdc	Volts direct current.

Notes:

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