



GE ZENITH™ SERIES MDU MONITORED DISTRIBUTION UNIT

50KVA – 750KVA
OWNER'S MANUAL
(01/2013)

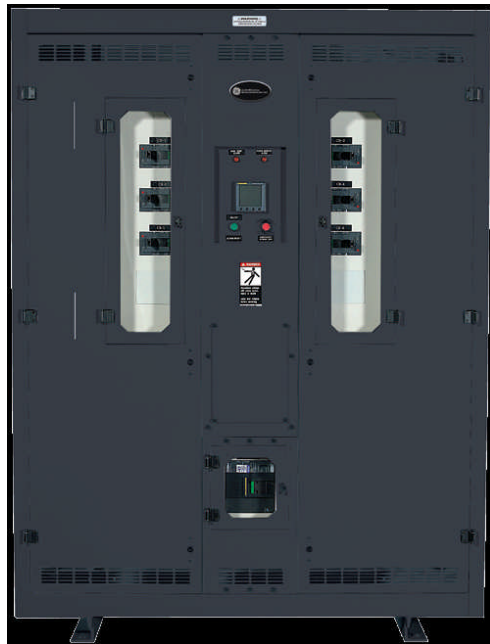


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1.0 Introduction

GE Zenith Controls, (GE) designs and manufactures the finest power distribution products available on the market today. GE's Monitored Distribution Units (MDUs) are completely self-contained, factory-tested units designed primarily for power conditioning, voltage transformation, isolation, over-current protection, distribution, static transfer switching and monitoring of AC power for computers and other equipment sensitive to power quality.

Your MDU is carefully assembled by craftsmen from parts manufactured to exact specifications from the highest quality materials. Only the optional input power junction box requires field installation.

GE MDU's are designed to be an integral part of your power quality solution, while allowing for easy expansion and relocation of your system capacity requirements.

This manual includes user operation and installation information for the **GE Zenith** - Series Monitored Distribution Unit with GE's GE Zenith Series monitoring package or M4 monitoring system

If you require additional information or need technical assistance please contact GE's field support division at any time.

GE ZENITH CONTROLS, INC.
601 SHILOH ROAD
PLANO, TX 75074
(800) 637-1738



2.0 Receiving Your MDU

2.1 Receiving and Unpacking Instructions

GE carefully packages every MDU to ensure damage-free delivery to your job site. GE recommends the following unpacking procedures be followed upon delivery.

1. Inspect packaging, exterior panels, and doors for any visible damage (i.e. scratches dents, cracks, or torn packaging). If any damage exists, please call the GE Service Team at (800) 637-1738.
2. Remove the outer layer of protective shrink wrap from the unit.
3. Carefully cut the safety bands, making sure that they do not scrape the exterior of the unit or scratch the paint. *Use eye, face, and hand protections to guard against injury when bands are cut.*
4. At this point, your unit is ready to be removed from the pallet using a fork-lift truck. Use extreme caution to ensure the unit is properly centered on the forks.
5. Once the unit is completely off the pallet and ramp, carefully remove the under layer of protective shrink wrap.
6. Ensure that the casters both rotate and can roll freely so as not to damage the flooring.
7. The unit is now ready to be rolled into its final position and prepared for installation. Please refer to the Installation Procedures listed on page 8 before proceeding.
8. If any further assistance is needed, please call the GE Service Team at (800) 637-1738.

Note: The MDUs should not be loosened from the shipping pallet until all handling by a forklift or pallet jack is completed. Complete internal inspection should be done only after equipment positioning and prior to electrical hookup.

Note: Any damages must be noted on the bill of lading with a detailed description of the damages incurred. A claim will need to be filed with the freight company at the time of delivery. Failure to properly document all damages may result in the unit's warranty being voided.



2.2. Inspection Procedures

The following inspection procedures should be performed immediately after your unit has arrived. Report any damages immediately to your GE Service Team by calling (800) 637-1738. All freight damage claims should be initiated with the freight carrier immediately.

1. **CABINET:** Inspect packaging, exterior panels, and doors for any visible damage (i.e. scratches, dents, cracks, or torn packaging). If any damage is noted, please the GE Service Team at (800) 637-1738.
2. **TRANSFORMER:** Inspect the transformer for any loose connections or displacement during shipment. Check to make sure all terminal lugs are tight and secure.
3. **INTERNAL FEEDERS:** Ensure all lug connections are tight and secure.
 - Check the main input feeder connections at the main breaker to be sure vibration has not loosened the terminal screws.
 - Using the same procedure, check the feeders from the load side of the main breaker to the primary side of the transformer.
 - Check all other lugs (i.e. neutral bus, ground bus, terminal blocks, etc.).
4. **OUTPUT DISTRIBUTION CABLE ASSEMBLIES:** cable coils must be inspected for cuts and/or damaged conduits. Each cable should be uncoiled and inspected individually.

Note: Do not remove the cable shipping pallet until the unit is near its final position

5. **INPUT POWER JUNCTION BOX (POWER J-Box):** carefully inspect the entire box for damage.



3.0 Installation Procedures

The following section of your owner's/operator's manual covers the general requirements for the installation of your Monitored Distribution Unit and its associated components.

Note: A GE authorized field engineer and/or a licensed electrician must install each unit. Startup by a GE certified technician is also required to validate the warranty.

3.1. Equipment placement

The preferred location of your MDU is in the center of the room. Although this location is not mandatory, it will allow accessibility for preventative maintenance (PM) checks and any other required services. Follow the National Electrical Code (NEC) and local electrical codes for panel board clearance requirements. The MDU is intended for indoor installation in an area with ambient temperatures of 32°F to 104°F (0°C to 40°C) with a relative humidity of 0% to 95% (non-condensing).

3.1.1. Clearances

Refer to the MDU shop drawings/submittals for recommended minimum service clearances. The NEC requires the indicated front and rear clearances for service access (*see Drawings section for typical clearances*). Clearance above the unit is required for cooling airflow (exhaust). Units with optional side cars with the distribution section also require service access clearance on the side. A MDU produces heat under normal operation. **Figure 1** shows typical MDU weights and heat generation.

Figure 1: MDU Approximate Weights and Heat Generation

MDU Rating (kVA)	Output Heat (kBTU)	Full Load Amperage			MDU Weight (Lbs)				
		208V Input	480V Input	600V Input	Without Sidecar	w/ (1) 9"-Sidecar	w/ (2) 9"-Sidecars	w/ (1) 21"-Sidecar	w/ (2) 21"-Sidecars
15	2.7	42	18	14	574	724	874	824	1074
30	4.8	83	36	29	945	1095	1245	1195	1445
50	7.1	139	60	48	1302	1452	1602	1552	1802
75	7.6	208	90	72	1470	1620	1770	1720	1970
100	8.4	278	120	96	1785	1935	2085	2035	2285
125	10.4	347	150	120	1855	2005	2155	2105	2355
150	12.2	416	180	144	1967	2117	2267	2217	2467
200	15.6	555	241	192	2149	2299	2449	2399	2649
225	17.6	625	271	217	2457	2607	2757	2707	2957
300	21.0	833	361	289	3297	3447	3597	3547	3797
400	34.6	N/A	481	384	2900	N/A	N/A	3150	3400
500	43.3	N/A	601	481	3900	N/A	N/A	4150	4400
625	54.1	N/A	752	602	4489	N/A	N/A	4739	4989
750	64.9	N/A	903	721	5390	N/A	N/A	5640	5890

Note: Weights listed are for MDU's with k-20 transformers and no sidecars. For k-1 weight, multiply 0.72. For k-13 weights, multiply by 1.12. Weights are for estimate purposes only. Actual shipping weight may vary.



3.1.2. Raised Floor

If the MDU is placed on a raised floor, it is recommended that the casters rest as close as possible to the corners of the floor tiles. This will allow the unit to span (1) one complete floor tile, permitting cutouts in the tile.

3.1.3. Cabling

The unit location may be specified on a floor plan which shows related equipment as well as identifying distribution cable runs. These cable runs should be recorded on panel board legend cards. Each legend card specifies the circuit location on the panel board and the computer or peripheral description.

3.1.4. Cabinet Leveling

Once the MDU has been positioned in its permanent location, turn down the (2) two front and the (2) two rear (optional) leveling pads on the base of the MDU until they make firm contact with the floor or landing surface. Level the unit and assure that the leveling pads are always in contact with the floor or landing surface. The primary purpose of the leveling pads is to prevent movement of the cabinet before and during attachment of the output cables. Casters, if provided with the MDU, will support the weight of the unit.

3.1.5. Raised floor loading

Additional floor bracing is recommended for all units. The weight of larger units should be considered in the room design. The raised floor system must be able to support both the MDU as well as any other associated equipment. GE recommends that the end user properly compute raised floor loading and supply proper floor bracing when needed.

Floor stands can also be provided by GE to support the MDU's weight on the raised floor.

Note: GE does not recommend the removal of Casters for MDU sizes up to 300kVA. Floor stands are designed to support your MDU with casters in place. Placing the MDU on the floor or stand without casters may damage the MDU cabinet which may void your warranty.

For typical floor weights of the MDU, please refer to **Figure 1** on the previous page, or your submittal package.

3.1.6. Raised floor cable entry

When applicable, provisions must be made for cable entry through the raised floor once the MDU has been properly located. The cable entry configuration should be free of any sharp edges and designed to allow permanent access for the distribution cables and input power cables. The tile directly in front of the unit should be easily removable for access to these cables.



3.2. System Grounding Recommendations

Note: Grounding for this equipment must not violate any local building or electrical codes.

System grounding has long been a topic affecting the computer equipment industry. The proper grounding of your GE Monitored Distribution Unit is critical to the operation of the unit. Improper grounding of a system may create unsafe conditions as well as electrical noise that may cause data processing problems. GE has conducted a great deal of research on system grounding, and makes the following recommendations.

3.2.1. Power System Grounding

The primary concern is to provide a safe system that both complies with the electrical code (NEC article 250 in the USA, Canadian Electrical Code Section, 10, IEEE wiring regulations and chapter 54 in the UK) and ensures proper and safe equipment operation. The MDU should have a parity sized, green grounding conductor connected from the power J box to the nearest grounding electrode. The MDU contains a factory wired, green grounding conductor (within the power cable) from the power J box to a single ground point inside the MDU cabinet. From this single ground point, each piece of equipment should be separately grounded via a green grounding conductor within the flexible output computer grade cable.

3.2.2. Grounding Conductors

An isolation grounding conductor identical in size, insulation material, and thickness to the grounded and ungrounded branch circuit supply conductors should be installed as part of the branch circuit that supplies the system. This grounding conductor should be marked green (or green with yellow stripe) when using a (4) four wire system. A typical power wiring diagram is illustrated in **Figure 2**.

This grounding conductor should be grounded at the nearest available grounding electrode in accordance with all electrical codes. The output cabling receptacles of the MDU should be the same grounding type. The grounding conductors serving these receptacles should be terminated at the MDU ground bus.

Figure 2 provides the ground wire ratings.

Grounding for systems with Remote Panel boards:

Careful consideration should be given to the grounding of systems with remote Panel boards. See FIPS PUB 94 or contact GE's factory for recommendations.



Figure 2: Typical MDU Online Diagram (15kVA – 300kVA)

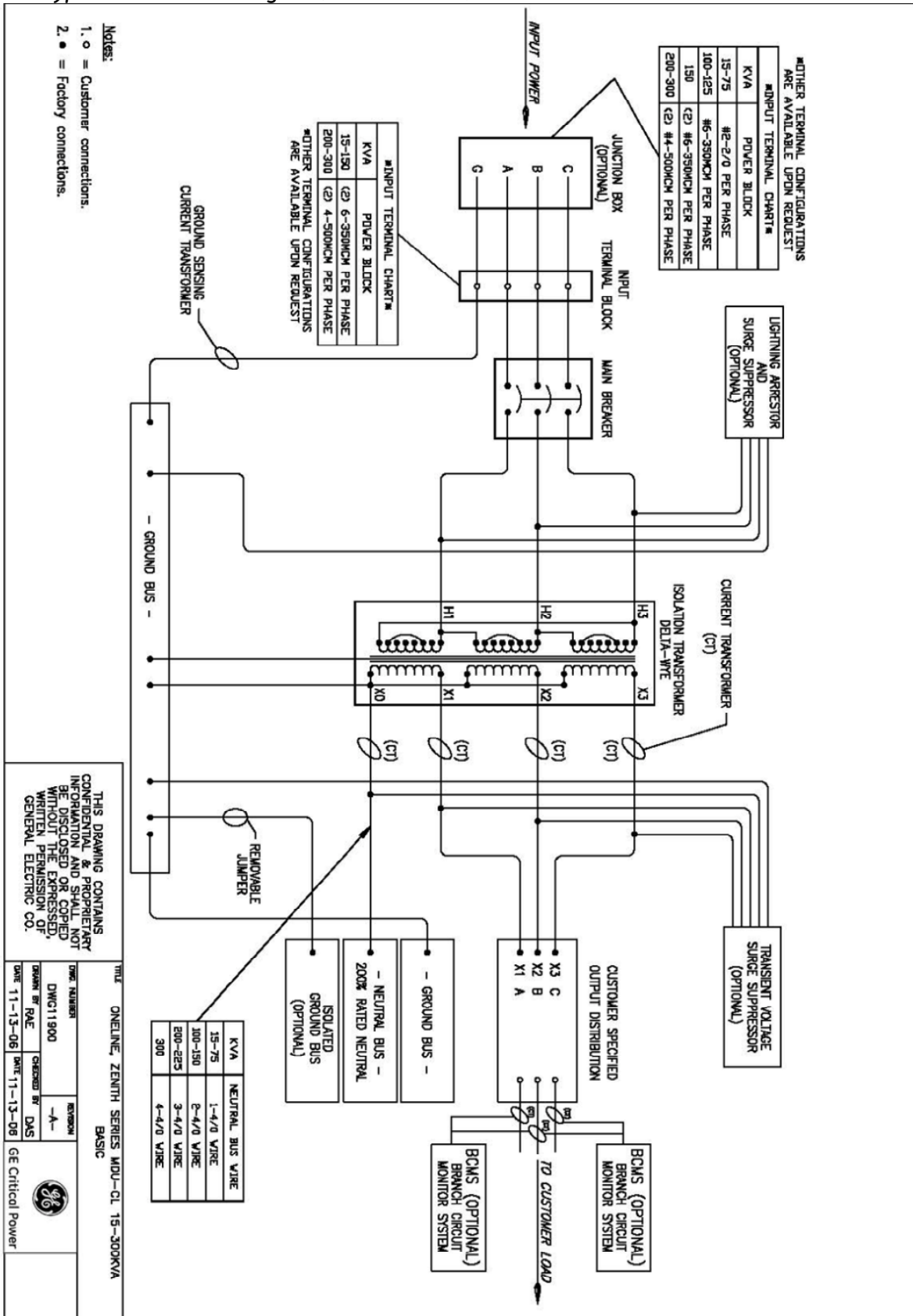
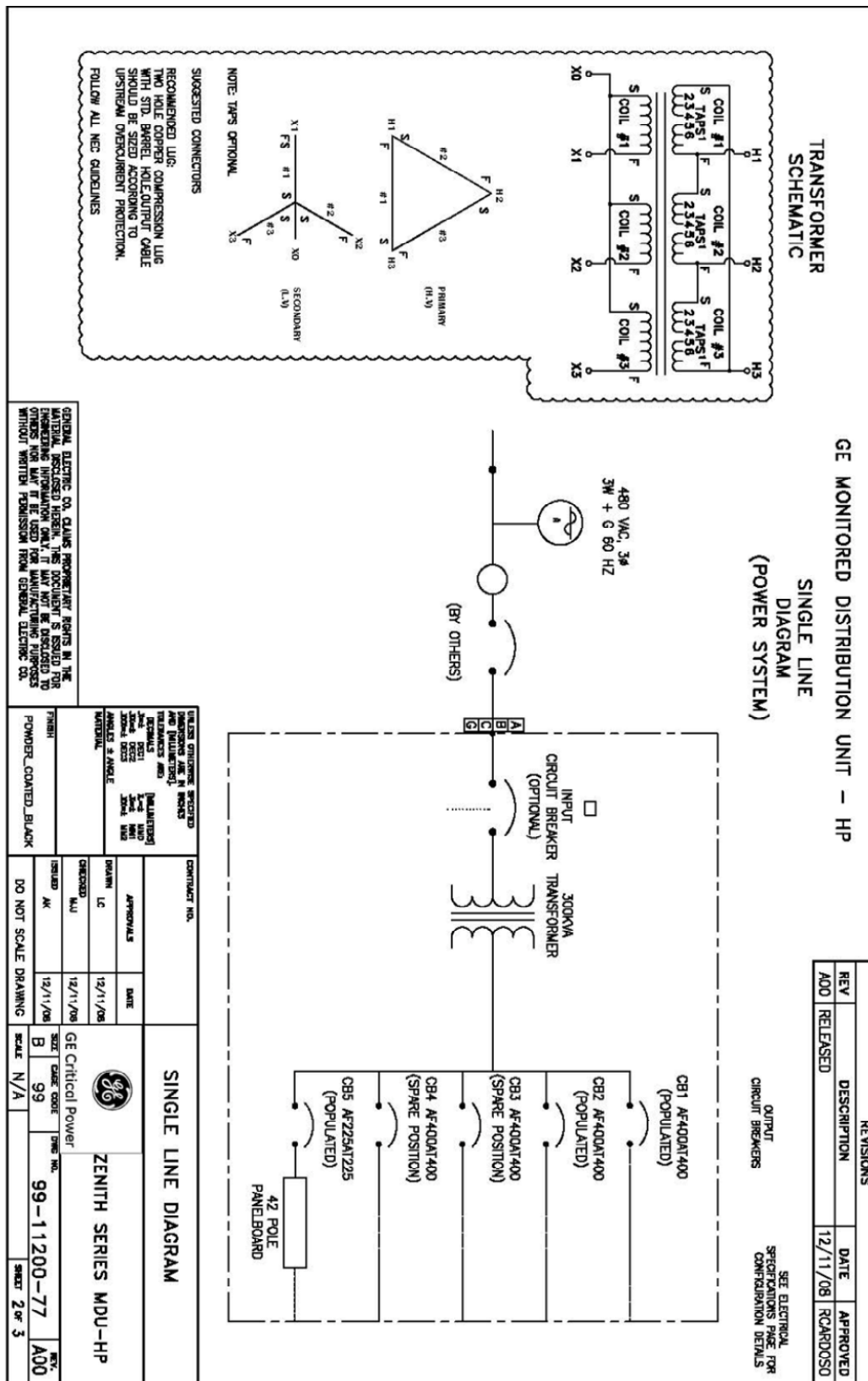


Figure 2: Typical MDU Online Diagram (400kVA - 750kVA)



3.3. Internal Wire Sizing

Protective Circuit Breaker or Actual Amperage ^{3,4}	Internal Conductors				
	Phase Wire, Single ^{1,3,4,6}	Phase Wire, Two Parallel ^{1,3,4,6}	Neutral Wire, Single ^{1,3,4,6}	Neutral Wire, Two Parallel ^{1,3,4,6}	Ground Wire, Single ^{1,3,4,6}
25	#10	#14	#10	#12	#10
30	#10	#12	#8	#10	#10
40	#8	#10	#8	#10	#10
50	#8	#10	#6	#10	#10
60	#8	#8	#4	#8	#10
70	#8	#8	#3	#8	#8
80	#6	#8	#3	#8	#8
90	#6	#8	#2	#6	#8
100	#4	#8	#1	#6	#8
110	#4	#8	#1	#4	#6
125	#4	#8	1/0	#4	#6
150	#2	#6	2/0	#3	#6
175	#1	#6	3/0	#2	#6
200	1/0	#4	3/0	#1	#6
225	1/0	#4	4/0	1/0	#4
250	2/0	#3	250MCM	1/0	#4
300	3/0	#2	350MCM	2/0	#4
350	4/0	#1	400MCM	3/0	#3
400	250MCM	1/0	500MCM	4/0	#3
500	350MCM	2/0	750MCM	300MCM	#2
600	500MCM	3/0	1000MCM	400MCM	#1
700	700MCM	4/0	1500MCM	500MCM	1/0
800	800MCM	250MCM	N/A	700MCM	1/0
1000	1000MCM	350MCM	N/A	1000MCM	2/0

Notes:

1. Conductor ratings are based on NEC Table 310.17.
2. Deleted.
3. All wires must be UL listed.
4. Conductors must be separated for air circulation – not bundled
5. Parallel conductor lengths must be equal within 2% (e.g. two parallel conductors 10 feet long must match in length within 2.4”).
6. For components like circuit breakers, the 75°C column in NEC Table 310.17 must be used.
7. For components like bus bars that allow 90°C connections, the 90°C column in NEC Table 310.17 can be used.



3.4. High Frequency (RF) Grounding (computer rooms)

In addition to the power grounding system, a reference grounding system for high frequency noise is desirable (with the two systems being bonded together for the same reference potential). A grid made up of (2) two foot squares will provide an effective signal reference grounding system. The raised floor can be utilized if it has firmly connected metal stringers providing good electrical connections. If this type of floor is not available, a grid can be fabricated by laying a mesh (2 foot square) of braided copper strap directly on the concrete sub floor (electrically connected at each intersection point). The frames of all the data processing equipment, including the MDU, should be connected (by the shortest possible distance) to the reference grid with braided copper. Finally, the reference grid should be bonded to the MDU for a single point potential ground reference.

For optimum performance all distances for power and high frequency grounding should be kept to an absolute minimum. To summarize, a radial grounding of this type (utilizing a single ground point) will ensure that your facility is electrically safe, complies with all code requirements, and will be essentially free of ground caused computer noise and problems.

3.5. Input Power Junction Box and Cable Assembly (Optional)

Warning: Verify that incoming high voltage circuits are not energized before making any connections in the input junction box.

If the MDU is equipped with an input junction box, then the input junction box (power J box) and power cable assembly must be installed in accordance with all applicable electrical codes. The power J box should be installed only by a qualified electrical contractor.

The location of the power J box in relation to the MDU is a critical relationship. The power J box must be located within (6) six feet of the MDU. It must be positioned so as to allow accessibility after the MDU has been installed. Extreme care should be taken so as not to restrict the positioning of any power cabling. If the MDU is positioned with its rear panel up against a wall, the power J box must be installed at least 36 inches (3 feet) from the wall and in a position that will allow future accessibility. Do not obstruct the floor tiles located directly above the power J box.

It is recommended that the power J box location allows the input power cables to enter the unit through the floor tile cutouts.

If a junction box is not furnished, the input power feeder should be connected to the main input landings internal to the MDU.



3.6. Torque Specifications

3.6.1. Structural Fasteners

Structural fasteners are typically used for fastening the MDU to a supplied floor stand or concrete slab. If structural fasteners are required per assembly instructions, refer to the table below for typical torque values. Tighten steel hardware parts (except electrical connections) to the values given in the following table.

Bolt Diameter	Tightening Torque (in-lb)
#8 (5/32")	15
#10 (3/16")	20
1/4"	120
5/16"	228
3/8"	396
7/16"	648
1/2"	936

3.6.2. MCCB's, MCSW's, Contactors, and Other Electrical Components

Always tighten electrical component (CBs, contactors, etc.) connections to the manufacturer's torque specifications furnished with the component. There are some guidelines for electrical components if no manufacturer data is available. Tighten connections using Belleville type (spring) washers until washers are flat.

3.7. Torque Value Quick Reference

Use the following as a reference only. Always check the breaker or component labeling and/or instructions for proper torque values. **DO NOT OVER TORQUE!**

Always use the manufacturer's hardware on CBs, contactors, etc. Once connections are torqued and sealed, make sure that removable lug covers are reinstalled,

3.7.1. Standard Circuit Breakers (Mains & Sub-feeds)

Manufacturer	Breaker Frame / Bolt	Required Torque (ft-lb)
Square D	F Frame	6.7
	K Frame	20.9
	L Frame	31.3
	M Frame	25.0
Cutler Hammer	F Frame	10.0
	J Frame	22.9
	K Frame	22.9 (Wire Smaller than 250 MCM)
	K Frame	31.3 (Wire 250 MCM or larger)
ABB ISOMAX Rear Lug Mounting Bolt requires	S3	22.9
	S4	22.9
	S5	22.9
	Rear Lug Mounting Bolt	9.2



3.7.2. Transformer Lugs

Wire Size (Awg or MCM)	Required Torque (ft-lb)
2/0	4.2
250	22.9
350	31.3
500	31.3

3.7.3. Fasteners

Wire Size installed, AWG or MCM	SLOTTED HEAD SCREWDRIVER TORQUE VALUE (in-lb)		SCREW CONNECTOR TORQUE VALUE (in-lb)
	Slot width up to 3/64" Slot length up to 1/4"	Slot width over 3/64" Slot length over 1/4"	
#14	15 in-lb	25 in-lb	35
#12	15 in-lb	25 in-lb	35
#10	15 in-lb	25 in-lb	35
#8	20 in-lb	25 in-lb	40
#6	25 in-lb	35 in-lb	45
#4	N/A	35 in-lb	45
#3	N/A	40 in-lb	N/A
#2	N/A	40 in-lb	50
#1	N/A	40 in-lb	50
1/0	N/A	40 in-lb	50
2/0	N/A	40 in-lb	50
3/0	N/A	40 in-lb	N/A
4/0	N/A	40 in-lb	N/A

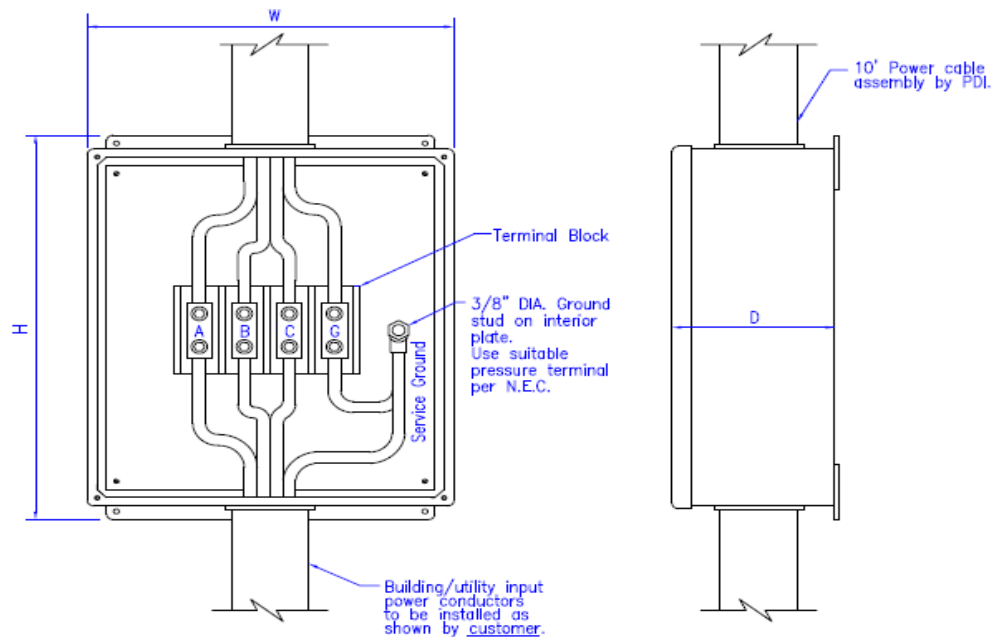
Hex Socket Size	SOCKET HEAD SCREW CONNECTOR TORQUE VALUE (in-lb)	HEX SOCKET ALLEN SCREW TORQUE VALUE (in-lb)
1/8"	45	35
5/32"	100	80
3/16"	120	100
7/32"	150	120
1/4"	200	150
5/16"	275	225
3/8"	375	300
1/2"	500	400
9/16"	600	500

3.7.4. Terminal Blocks and Distribution Breakers

Torque ratings vary depending on item in use. Please refer to label on the item. 3.0 ft-lb of torque is typically required for Distribution Breakers. There is a wide variation of torque requirements for terminal blocks with various sizes.



3.7.5. Junction Box and Power Cable Sizing Chart



Main Input Circuit Breaker Size (Amps)	Input Power Cable Wire Size Per Phase & Ground (# - Size)	Input Power Cable Conduit Size (# - Size)	Input Junction Box Size (H x W x D)	Input Junction Box Terminal Block Size (# Poles - Wire Range)
25	1 - 8 AWG	1 - 1"	12" x 10" x 5"	4 Pole - # 12 - 2/0
30	1 - 6 AWG	1 - 1"	12" x 10" x 5"	4 Pole - # 12 - 2/0
40	1 - 6 AWG	1 - 1"	12" x 10" x 5"	4 Pole - # 12 - 2/0
50	1 - 6 AWG	1 - 1"	12" x 10" x 5"	4 Pole - # 12 - 2/0
60	1 - 6 AWG	1 - 1"	12" x 10" x 5"	4 Pole - # 12 - 2/0
70	1 - 4 AWG	1 - 1 1/4"	12" x 10" x 5"	4 Pole - # 12 - 2/0
80	1 - 4 AWG	1 - 1 1/4"	12" x 10" x 5"	4 Pole - # 12 - 2/0
90	1 - 3 AWG	1 - 1 1/4"	12" x 10" x 5"	4 Pole - # 12 - 2/0
100	1 - 3 AWG	1 - 1 1/4"	12" x 10" x 5"	4 Pole - # 12 - 2/0
110	1 - 2 AWG	1 - 1 1/4"	12" x 10" x 5"	4 Pole - # 12 - 2/0
125	1 - 1 AWG	1 - 1 1/2"	12" x 10" x 5"	4 Pole - # 12 - 2/0
150	1 - 1/0 AWG	1 - 1 1/2"	12" x 10" x 5"	4 Pole - # 12 - 2/0
175	1 - 2/0 AWG	1 - 2"	16" x 14" x 6"	4 Pole - # 6 - 350 MCM
200	1 - 3/0 AWG	1 - 2"	16" x 14" x 6"	4 Pole - # 6 - 350 MCM
225	1 - 4/0 AWG	1 - 2"	16" x 14" x 6"	4 Pole - # 6 - 350 MCM
250	1 - 250 MCM AWG	1 - 2 1/2"	24" x 18" x 6"	4 Pole - # 6 - 350 MCM
300	2 - 3/0 AWG	1 - 3"	24" x 18" x 6"	4 Pole - # 6 - 350 MCM
350	2 - 4/0 AWG	2 - 2"	24" x 18" x 6"	4 Pole - # 4 - 500 MCM
400	2 - 4/0 AWG	2 - 2"	24" x 18" x 6"	4 Pole - #4 - 500 MCM
500	2 - 250 MCM AWG	2 - 2 1/2"	24" x 18" x 6"	4 Pole - #4 - 500 MCM
600	2 - 350 MCM AWG	2 - 3"	24" x 18" x 6"	4 Pole - #4 - 500 MCM
700	2 - 500 MCM AWG	2 - 3"	24" x 18" x 6"	4 Pole - #4 - 500 MCM
800	3 - 300 MCM AWG	3 - 2 1/2"	Special	Special



3.7.6. System Power-Up Procedure

Note: Before applying utility power to the unit, the electrician performing the installation and/or a factory authorized representative should be present to verify that the following steps have been performed properly.

1. Confirm that the MDU's main input circuit breaker is in the "off" position.
2. Ensure that all of the MDU's output circuit breakers or sub-feed breakers are in the "off" position.
3. The installing contractor should now verify that the input voltage to the unit matches the input voltage rating of the unit as identified on the system's legend label found on the interior of the front door. The input voltage rating also appears on the transformer label located on the top of the high isolation transformer positioned at the rear of the unit.
4. Ensure that the power J box has been installed correctly (i.e. proper phase rotation and safe grounding practices as indicated above).

Warning: Ensure that the above conditions are met before applying incoming power to the MDU.

5. Apply Power to the unit
6. Measure for the proper MDU input voltage. This should match the units rating (+ 5% to -10% from nominal rating).
7. Check the phase rotation (clockwise) and voltage at the power J box.
8. Check to ensure the emergency power off (EPO) light is on.
9. Energize the MDU main breaker by setting the toggle to the "on" position.

Note: If the main breaker trips to the "off" position when energized, contact GE 's service division at (800)637-1738 as this is an indication of a fault in the unit.

10. Perform an EPO check by depressing the EPO button and assuring that the main breaker shunt trips.
11. Manually reset the main breaker to the "on" position. This may require that you manually trip the lever all the way to the "off" position.
12. Check the output voltages. If the output voltages are not within acceptable limits, it may require the taps on the transformer be changed. Each transformer is labeled with the tap connections. All tap changes must be done with the input power turned off.
13. The MDU is now ready to sequentially energize the branch circuit breakers.
14. Units equipped with monitoring can be activated by depressing the monitor on/off button located to the left of the LCD display. See System Monitoring on page 23 of this manual for monitor operation.

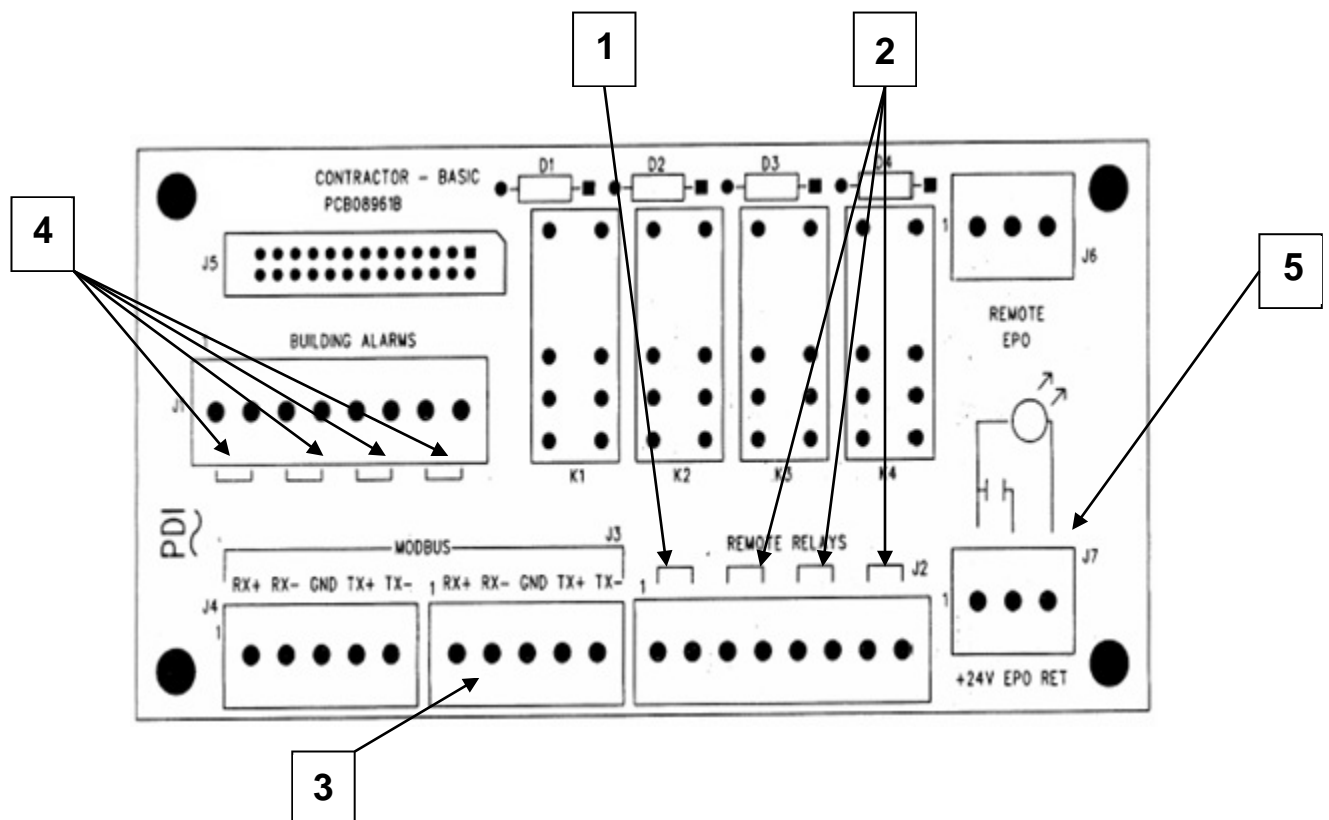
Note: Equipment attached to the MDU may require special start up procedures. Please consult the individual manufacturers for these requirements.



3.8. Customer Connections: Low Voltage Interface Board

Customer connections for remote monitoring or controls are found on the MDU's Low Voltage Interface Board (contractor board). This board is mounted internally within the MDU and is located behind the safety cover between the output distribution panels in the lower front of the unit. All interface wiring should be run within the cabinet for termination on the contractor board. All interface wiring (building alarms, AC alarms, halon alarms, remote power off systems, etc.) and contacts are to be provided by others.

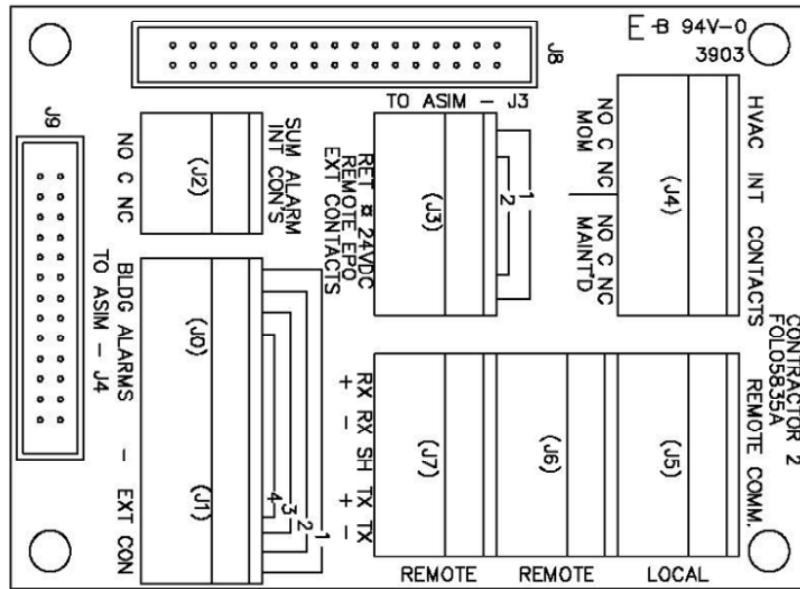
3.8.1. GE Zenith Series Monitoring Package



1. **Summary Alarm:** Dry Contact point to advise when unit is in alarm.
2. **Dry Contact Remote Relays:** Programmable dry contacts for external output of specific internal alarms
3. **ModBus Connection:** 4-wire configuration connection is located on the Customer connection terminal block
4. **Building Alarm:** Input terminal block to provide unit with input on four (4) external building alarms
5. **Remote EPO:** Connection point for input of remote EPO signal to system. This is a dry contact connection point. Connection of voltage to this point can cause damage to the unit. Connect external dry contacts to terminals marked +24v and EPO for EPO circuit. The return position is if there is also a light for the remote EPO button.



3.8.2. M4 Monitoring Package



Notes:

- ① Interconnection wiring should be sized #14-#22 AWG.
- ② All connections by others.
- ③ Connection leads to be stripped 1/4".
- ④ See sheet 2 for terminal block connections.
- ⑤ All remote communications from GE Units are connected to J5, J6 or J7.

J2-Summary Alarm Contact Points (Standard with M4 Monitoring System):

These contact points are for connection of the Summary Alarm. The Summary Alarm is two (2) form "C" contacts, one N.O. and one N.C., that change states whenever the M4 Monitor detects any alarm condition. Used for external monitoring or a remote alarm indicator. See page two for connection information.

J4-Building Alarm Points - HVAC Contacts (Standard with M1 or M4 Monitoring Systems):

These terminal points are for Maintained and Momentary Contact connections. The Maintained Contacts are provided with one DPDT relay, which changes dry contact states to indicate whether power is on or off, see page two for connection information. The Momentary Contacts are provided with one DPDT relay with dry contacts, which activate whenever the Emergency Power Off circuit is activated, see page two for connection information.

J0 & J1-Building Alarm Points (Standard with M4 Monitoring System):

This terminal is for connection to up to four building alarms (only three Building Alarms provided for the Line Conditioner). The M4 is used to monitor these additional environmental points. These dry contacts are shipped as N.O., but can be programmed as N.C. if requested. These Building Alarms are often used for A/C or UPS status monitoring. See page two for connection information.

J5, J6 & J7-Remote Communication Points (Standard with M4 Monitoring System):

These three terminals are used for connection to an External Communication Monitoring System. J5 terminal is used for GE connection to the board. J6 & J7 terminals are used for connection of the customer's external monitoring system. Contact the factory for further details.

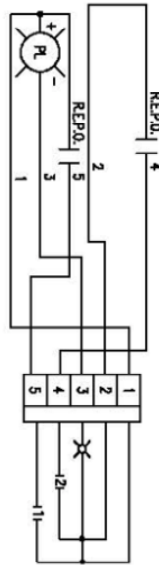
CONTRACTOR BOARD DETAIL

<p style="font-size: small;">THIS DRAWING CONTAINS CONFIDENTIAL & PROPRIETARY INFORMATION AND SHALL NOT BE DISCLOSED OR COPIED WITHOUT THE EXPRESS WRITTEN PERMISSION OF GENERAL ELECTRIC CO.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="font-size: x-small;">ENCL. NUMBER</td> <td style="text-align: center;">1 of 8</td> </tr> <tr> <td style="font-size: x-small;">DESIGNER</td> <td style="text-align: center;">CERROSA</td> </tr> <tr> <td style="font-size: x-small;">DRAWN BY</td> <td style="text-align: center;">K. Harlow</td> </tr> <tr> <td style="font-size: x-small;">DATE</td> <td style="text-align: center;">03-15-04</td> </tr> <tr> <td style="font-size: x-small;">REVISION</td> <td style="text-align: center;">-B-</td> </tr> </table> <div style="text-align: center;"> <p style="font-size: x-small;">GE Critical Power</p> </div>	ENCL. NUMBER	1 of 8	DESIGNER	CERROSA	DRAWN BY	K. Harlow	DATE	03-15-04	REVISION	-B-
ENCL. NUMBER	1 of 8										
DESIGNER	CERROSA										
DRAWN BY	K. Harlow										
DATE	03-15-04										
REVISION	-B-										



TERMINAL J3

REMOTE EMERGENCY POWER OFF
(CONTACTS BY CUSTOMER)



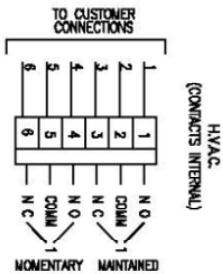
- Notes:**
- Terminals are provided for connection to 2 N.O. OMC connections with 24VDC and lamp RE.P.O.1.
 - For DC voltage connection for full lamp RE.P.O.1, terminals 1 and 2 are positive and terminals 4, 5, and 6 are negative.

- Total power rating is not to exceed 25W.
- Wiring is provided by customer.

TERMINAL J4

Notes:

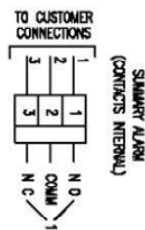
- Two separate contact points are provided.
- Contact rating is as follows:
10A @ 120VAC
10A @ 240VAC
10A @ 30VDC
- Contacts are energized by E.P.O. or RE.P.O. operation.
- Contacts are released when E.P.O. or RE.P.O. is released.
- If N.C. contacts are used, do not remove lock once system is energized.
- Wiring is provided by customer.



TERMINAL J2

Notes:

- One set of contact points are provided.
- Contact rating is as follows:
2A @ 120VAC
2A @ 240VAC
2A @ 24VDC
- Contacts are energized in any alarm state.
- Contacts are released only when the alarm is reset.
- If N.C. contacts are used, do not remove lock once system is energized.
- Wiring is provided by customer.

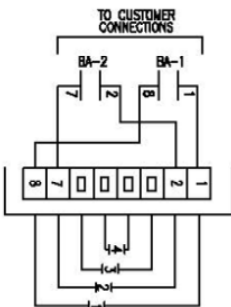


TERMINALS J0 & J1

BUILDING ALARMS
(CONTACTS BY CUSTOMER)

Notes:

- Two separate contact points are provided.
- Contacts are supplied as N.C. by default, programmed N.C. by O.E.
- Connectors should be made to a DV contact.
- If N.C. contacts are used, do not remove lock once system is energized.
- Wiring is provided by customer.



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DRAWING NUMBER		DRAWING REVISION		 GE Critical Power
03-15-04	-B-	03-15-04	-B-	



3.8.3. Optional Low Voltage Junction Box

An optional Low Voltage Junction Box may be provided with your MDU, and is an extension of the Low Voltage Interface Board for Customer connections external to the MDU. This provides a convenient access to the MDU's interface terminals without exposing the internal components of the MDU. The box is wall-mountable, and houses a contractor board that is connected to the MDU via 10-ft long interface cables.

3.8.4. Output Distribution Cable(s) Installation

Warning: The MDU should be de-energized before attempting to install any output cables or assemblies. Power distribution cables and assemblies should be installed by a qualified electrical contractor and/or a factory authorized GE representative. For assistance call GE at (800) 637-1738.

The MDU should be in its permanent position with all input power cables properly connected before going any further. If the unit is resting on raised floor tiles, verify the proper cutouts have been made before continuing. Be careful not to remove an excessive amount of floor tiles that could cause the flooring to become unstable.

Note: Special care must be taken when assigning circuit breaker positions for proper load balancing.

Optional output distribution cables may have been shipped already attached to the unit. If this is the case, they should be removed from the pallet and uncoiled. After they are uncoiled, they should be inspected before installation. Remove necessary floor tiles and lay out the cables to their respective equipment. After the cables have been properly laid out, replace all removed floor tiles.

Note: Output cables on k-rated units must have a neutral wire that is twice the size of the phase wires.

With the output cables unattached and the unit in its permanent position, the following procedures should be followed:

1. Open and remove the access door to the distribution panel board or sub-feed breaker.
2. Remove dead front cover panel exposing branch circuits or sub-feed breaker(s).
3. Remove cable entry cover panel.
4. Install the appropriate circuit breakers, if not factory-installed
5. Locate an appropriate sized pre-punched conduit knock out.
6. Remove locknut from distribution cable end.
7. Feed cable conductor up through knock out and re-install locknut.
8. Tighten locknut securely.
9. Remove the necessary floor tiles and route the cable to its respective equipment.

Note: Care should be taken when placing the output cables in the units to properly align and lace these due to the limited area for placing cables. This will be especially true for 400kVA-750kVA rated MDU's when the maximum number of sub-feeds are utilized. Please call the GE factory for any assistance needed to insure the placement of these cables.

10. Replace floor tiles.
11. Strip insulation approximately 1/2 inch from the end of the cable.
12. Connect phase wires to the output circuit breaker terminals according to the chart below:



Country	Color coding (Phase A,B,C)
United States (US)	Black, Red Blue
Canada	Red, Black, Blue
United Kingdom (UK)	Red, Blue, Yellow

13. Connect the ground wire (green or green with yellow tracer) to the distribution panel ground bus.
14. If the cable requires a neutral wire (white), connect this wire to the distribution panel neutral bus.
15. Checks to make sure all connections are securely tightened.
16. Remove the blank fillers from the distribution cover panels for the required circuit breakers.
17. Reinstall and properly align all panels previously removed.
18. Mark (with pencil) installed breakers on the distribution cover panel identification card.
19. Check for proper phase rotation and voltage before attaching the other end of cable to its associated equipment.



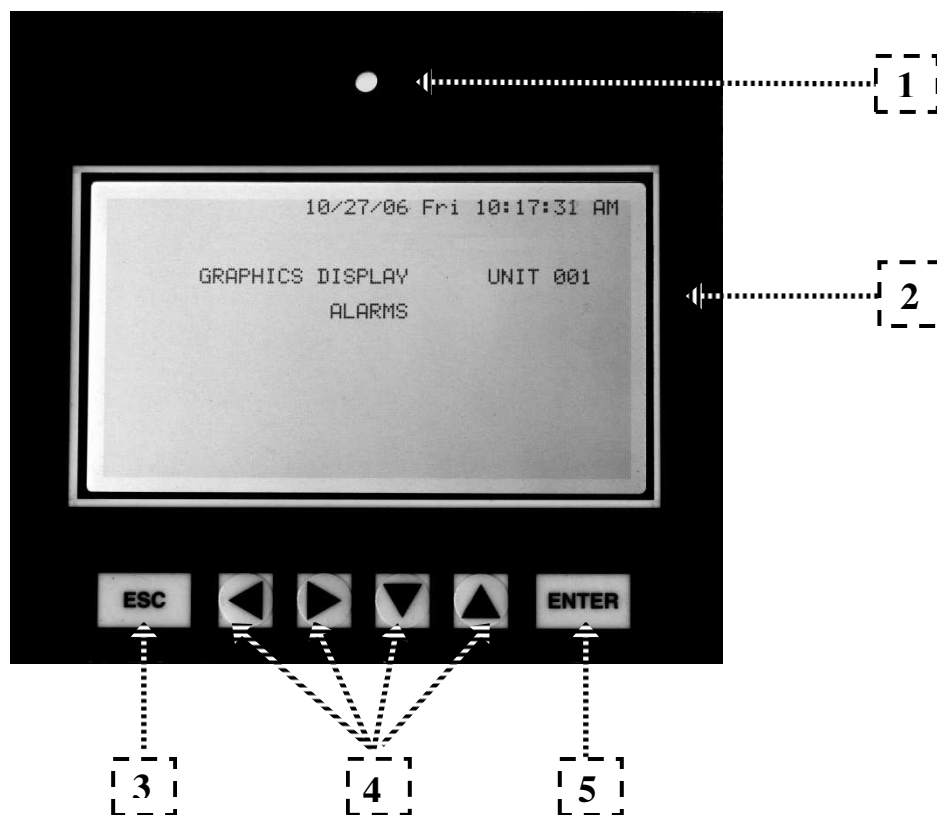
4.0 System Monitoring

If all the previous instructions have been properly completed, it is time to activate the monitor display panel. The monitor display panel has its own power on/off switch located in the lower left hand corner of the display panel. Depress the on/off button and the LCD display window will illuminate indicating that power is being supplied to the monitor. The MDU will either be equipped with a **GE Zenith Series** or an **M4** monitoring package. Refer to the Bill of Materials to verify your specific model

4.1. GE Zenith Series MDU Monitor

GE's GE Zenith Series MDU Monitor features a graphic LCD panel accessible from the front of the MDU. The monitor is part of a microprocessor based Operator Interface Module that monitors analog power points within the MDU unit.

4.1.1. LCD Monitor Layout



1. LED Status Indicator
2. Graphics Display
3. Esc/Setup
4. Navigation Controls
5. Enter/Toggle Screen



4.1.2. GE Zenith Series Monitor Features

Feature	Std / Optional
Mod Bus; RS485/RS422 Communication ports	Std.
SNMP Communication	Optional
LCD Graphic Display	40x16 char
Standard Contractor Board: <ul style="list-style-type: none"> ➤ 2A Building Alarm contacts - Qty (4) ➤ 5A Relay Contacts (summary alarm) - Qty (4) 	Std
Standard Contractor Board: <ul style="list-style-type: none"> ➤ 2A Building Alarm contacts - Qty (8) ➤ 5A Relay Contacts (summary alarm) - Qty (8) 	Optional
Remote EPO Contacts	Std.
Customized Application Specific Display	Optional
Audible Alarm annunciation	Std.
Guarded "Emergency Power off" (EPO) Pushbutton (may be disabled at customer request)	Std.
Monitor On/Off Switch	Std.
Monitor mounted on a draw-out mechanism (ease of service)	Std.
BCMS for panel board branch circuits and/or sub-feed breakers	Std.
Output KVA	Std.
Output KW	Std.
Output KWH	Std.
Power Factor	Std.
Synchronous Clock	Std.
Date and time of day	Std.
Accepts Standard CT inputs	Std.
600 Volt Direct Connection on Voltage Inputs (for 600V MDU)	Optional
Accuracy: $\pm 2\%$ current and voltage readings	Std.
Min/Max Readings of metered data for BCMS Screens	Std.
Password Protected	Std.
Set-point controlled alarm logging	Std.
Operating Range -25°C - +70°C	Std.



Feature	Std / Optional
1- V_{in} : 1- V_{out} , 1- I_{out}	Std.
1- V_{in} : 2- V_{out} , 2- I_{out}	Optional
2- V_{in} : 1- V_{out} , 1- I_{out}	Optional
Input Voltage THD	Std.
Input Ground Current	Std.
Neutral Current	Std.
Phase Loss	Std.
Ground Fault Alarm	Std.
Time & Date Stamp for alarms	Std.
Alarm Conditions	
Input Frequency (Hz) (Frequency Deviation)	Std.
Input Phase Rotation (Phase Rotation Error)	Std.
Low Transformer Temperature alarm 180° C	Std.
High Transformer Temperature alarm 200° C	Std.
High Temperature Shutdown (may be disabled at customer request)	Std.
True RMS Metering	Std.
Input Voltage - Line to Line (High/Low alarm)	Std.
Output Voltage - Line to Line (High/Low alarm)	Std.
Output Voltage - Line to Neutral (High/Low alarm)	Std.
THD - Input Voltage	Std.
Output Current - A,B & C phases (phase loss and high current alarm)	Std.
Current - Output neutral (High Current Alarm)	Std.
Ground Current (Ground Fault Alarm)	Std.
Over-Voltage / Under-Voltage Shutdown	Optional
Ground Fault Shutdown	Optional
Phase Rotation / Phase Loss Shutdown	Optional



4.1.3. Control Functions

The control and monitoring functions are maintained as separate circuits to prevent a monitor malfunction from affecting equipment operation. Only excessively high temperature in the transformer will automatically shut down the MDU system. If your MDU is equipped with any other internal automatic shutdown system, it will be a separate device located in the monitor tray area.

Note: GE strongly advises against any other automatic shutdown devices except remote EPO functions.

Computer room air handling/conditioning equipment may be connected to the control interface board (contractor board) for automatic shutdown of this equipment during emergencies.

The emergency power off push-button and/or remote emergency power off switches will cause the unit to shut down.

1. Emergency Power Off

A guarded and illuminated EPO push-button is interfaced to the shunt trip mechanism of the main circuit breaker. Activation of this momentary contact push-button causes the main circuit breaker to trip, thus removing all connected loads from the electrical service.

2. LED Indicator

A simple red light/green light display is provided for non-technical personnel. Any monitored parameter outside of the threshold limits will illuminate a red light above the display for identification of the fault condition. When all parameters are nominal, a green light will illuminate.

3. Horn

The display has a horn that will sound if an alarm is present. The horn can be enabled and disabled in the setup options.

4. LCD Display Panel

The LCD panel displays all analog inputs, digital inputs, calculated points, and alarm indications. The LCD provides alpha-numeric display capabilities to insure correct interpretation of the unit's monitoring functions.

5. Front Panel Buttons

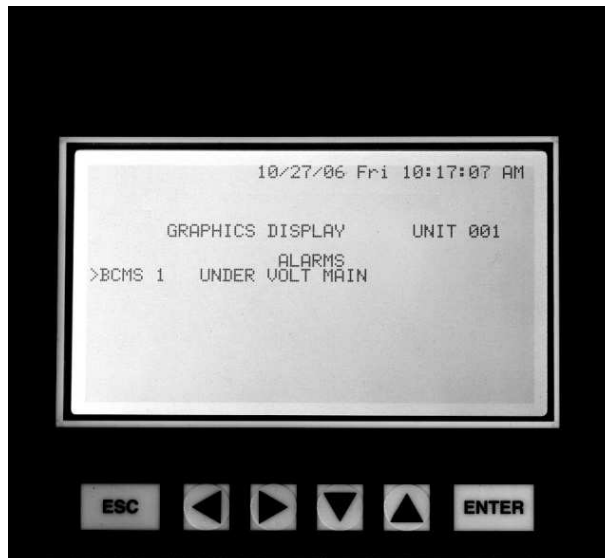
The front panel has (6) six buttons that allow navigation through the different screens on the display. Pressing any button will turn the backlight on. After the backlight is on, you can use them to navigate through the screens.



4.1.4. Monitor Screens

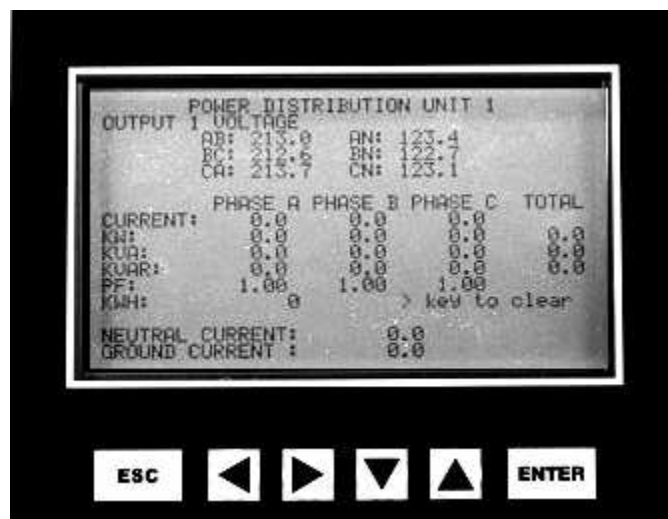
1. Banner/Alarm Screen

The display will revert to the banner screen after some time. This screen shows the banner and any alarms on the unit. The up and down arrow buttons will scroll through the alarms on the screen designated by the ">" on the left side of the screen. Any alarms with "> to clear" on the right side can be cleared by pressing the right arrow button when the alarm is selected. There can be several pages of alarms, and scrolling down will take you to the next page.



2. MDU Device Screen

Several different devices can be connected to the display. Pressing "Enter" on the banner screen will take you to the first device. This is the main MDU device page showing analog parameters. Pressing the "Enter" button will switch you to other devices (if available) and then back to the Banner Screen. Other devices can include Branch Circuit Monitoring, Temperature Monitoring, etc. The up and down arrow buttons are used to navigate through the different pages.



3. Setup Screen

The Setup Screen can be reached from the Banner Screen or any Device Screen by pressing the “Esc” button. Once in the Setup Screen, you will have to enter the password to continue. The default password is “GE”. The password can be changed in the Setup Screen. Once the password is entered correctly, the lock symbol located in the top right corner of the display will appear opened. After the lock appears opened, you can change parameters. It will automatically lock back after a set period of time with no button presses. The up and down arrow buttons are used to select the items to be changes. The selected item is designated by the “>” on the left side of the screen. The left and right arrow keys are used to change the information. For the options where text is changed (banner, password, etc.), the “>” will be replaced by a “_” and an underscore will appear under the letter or number to be changed. The up and down arrow buttons will change the letter or number. When you are finished, you must scroll back to the beginning. The “_” will return to a “>” and you can scroll to the next setup option.



Typical Setup Options

1	Banner	User-customizable banner that shows on the main banner/alarm screen. This can be changed while in setup mode.
2	Devices	Specifies the number of devices connected to the monitor via ModBus Protocol. Each device connected to the display must have a different modbus address.
3	Upstream Modbus	This is used to change the modbus settings of the port that the customer uses to connect to read modbus information. The address, baud rate, and parity can all be changed.
4	Downstream Modbus	This is used to change the modbus settings of the port that connects to the devices in the unit to read modbus information. The baud rate and parity can all be changed. GE does not recommend changing the ModBus settings as communication problems may occur.
5	Password	Allows the user to set or change the password (up to six-characters).
6	Time and Date	This is used to set the time and date. To change AM and PM you have to roll the hour past 12. When you have the information entered correctly move to the “SET” and hit enter.
7	Horn	Used to enable or disable the horn.
8	Devices	The next screen is used for device setup. A device such as BCMS can be set up to disable certain alarms that are not desired. You can also change the panel board size for trending info.



9	SNMP/WEB	<p>For SNMP or Web enabled MDU's, the last screen is used to change all the SNMP information.</p> <ul style="list-style-type: none">a. IP – The IP address of the unitb. SNM – Subnet Maskc. DGW – The Default Gatewayd. DNS – The Domain Name Servere. TDS – The Trap Destination Serverf. Trap Enable – Specifies whether or not you want traps sent out. <p>More information is available in the SNMP section of this manual.</p>
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Note: There can be several pages of options as a result of special project requirements



4.1.5. Contractor Connections

1. Printed Circuit Boards (PCB)

A low voltage control junction box shall not be included on this equipment. All Remote Emergency Power Off, building alarms, output relays, communication ports and other control wiring shall be terminated onto a Contractor Interface Board which is an integral component within the MDU system itself.

Standard Interface Board

- a. Remote Emergency Power Off interconnect positions
- b. Four (4) Relay Contacts (NO contacts) rated 5 amps (summary alarm)
- c. Four (4) Building alarm contacts rated 5 amps
- d. Remote monitoring connection ports (ModBus RTU Protocol, RS-422/485)

Advanced Interface Board (optional)

- a. Remote emergency power off interconnect positions
- b. Eight (8) Relay Contacts (NO contacts) rated 5 amps (summary alarm)
- c. Eight (8) Building alarm contacts rated 2 amps
- d. Remote monitoring connection ports (ModBus RTU Protocol, RS-422/485)
- e. Local monitoring of GE approved devices (ModBus RTU Protocol, RS-422/485)

Note: The Tx+ and Tx- are transmission points, and should be connected to the receiver of the monitoring system. The Rx- and Rx+ are receiving points.

4.1.6. Communications

1. ModBus RTU

a. Hardware

The GE Zenith™ Series MDU monitor has a 4 or 2 wire plus ground, RS-422/RS-485 compatible interface. The communications parameters for the interface are 9600 baud, 8 bit, even parity, and 1 stop bit as standard with options for odd and no parity and 2400, 4800 and 19200 baud. For (4) four wire all commands are sent to the monitor on (1) one pair and all replies from the monitor are on the other pair. The pair on which an M4 sends will be in a high impedance state until an M4 responds to a command. For (2) two wire all commands are sent to a GE ZENITH™ SERIES and all replies from a GE ZENITH™ SERIES are sent on the same pair. The pair will be in a high impedance state until an M4 responds to a command. For (2) two wire communications the transmit + and receive + must be jumped together as well as the transmit - and receive -. You must also verify that the packet is complete before another transmit is initiated. The interface is isolated.

b. Packets

The monitor never initiates communications, rather it responds to command packets sent to it. Each command packet sent to the monitor has an address byte that includes the address of the destination of that monitor. It does not respond to packets addressed to "0".



c. Registers

Most of the analog values are 2 byte integers representing a parameter such as input voltage, current, etc. KWH takes 2 of the 2-byte integers. Some parameters require scaling, and are noted in the points list.

d. Prerequisites

Each connected monitor must have a unique address between 1 and 255. The Setup screen is used to set up the address of the monitor. It also uses additional sequential address for each device. The number of devices is also in the setup screen.

Note: improper configuration of a GE Zenith Series Monitor may block other monitors or devices on the chain.

e. Biasing and Termination

Since there is only one master, the master can and should drive its transmit pair continuously. But slaves do not drive the master's receive pair until they send the master a response. As soon as they are finished, they stop driving the master's receive pair. This is necessary since other slaves may need to send responses on the master's receive pair. Therefore, most of the time the master's receive pair is just floating. The master's adapter SHOULD drive its transmit pair continuously and, of course, never drive the receive line, except in an effort to be 2 wire compatible. Most adapters do not drive the transmit pair until the start of the first character sent, and only continue to drive the transmit pair a few milliseconds after the last character (meaning the master's transmit pair is usually just floating most of the time).

f. Wiring

RS485/RS422 cable length can be up to 4000ft if the proper cable is used. To achieve this you need to have a shielded cable with 2 twisted pairs and shield/ground. The two transmit lines need to be in one twisted pair and the two receive lines need to be in the other twisted pair. The cable resistance should be 27 ohms/1000ft @ 1 kHz or less and the mutual capacitance should be 14pf/ft @ 1 kHz or less. RS422 is typically (4) four wire, and RS485 is typically (2) two wire and is slower than RS422.

g. Supported Commands and Replies

Note that these are typical for the product. See the point list for specifics.

a. Report slave ID

Sent Hex: 01 11 C0 2C

Reply Hex: 01 11 0D EA FE 52 50 50 20 44 69 73 70 6C 61 79 A3 A6

b. Read holding registers

Sent Hex: 01 03 00 00 00 01 84 0A

Reply Hex: 01 03 02 00 00 B8 44

c. Write single register

Sent Hex: 01 06 00 00 00 00 89 CA

Reply Hex: 01 06 00 00 00 00 89 CA

The flag and data numbers shown here are in "human" numbers. The first analog channel is numbered 1 but, in software, it is accessed by an index value of 0. It is common for a system to be one register off due to this situation, so it is important to verify that the registers are correct early in the configuration procedure. As similar readings are in adjacent registers, being one register off is not necessarily apparent.



2. SNMP

a. Hardware

The GE Zenith Series Monitor has an expansion board that can be used to provide SNMP. The expansion board plugs into the main display board. The SNMP parameters are configured in the setup menu on the third page. See the setup menu for more information about configuring the SNMP. SNMP version 1 is supported.

b. Prerequisites

Each connected monitor must have a unique address. The Setup screen is used to set up the address of the monitor.

Note: improper configuration of a GE Zenith Series Monitor may conflict with other monitors or devices on the network.

c. Wiring

The connection to the SNMP expansion board is made with a standard Ethernet cable.

d. Supported Commands

Note that these are typical for the product. See the mib file associated with your MDU configuration for specifics.

- a. snmpget
- b. snmp
- c. write single register



5.0 Branch Circuit Monitoring System (BCMS)

Your MDU may be equipped with GE's Branch Circuit Monitoring System (BCMS) in either the *Basic* version or the *Plus* version as an added feature to the MDU system.

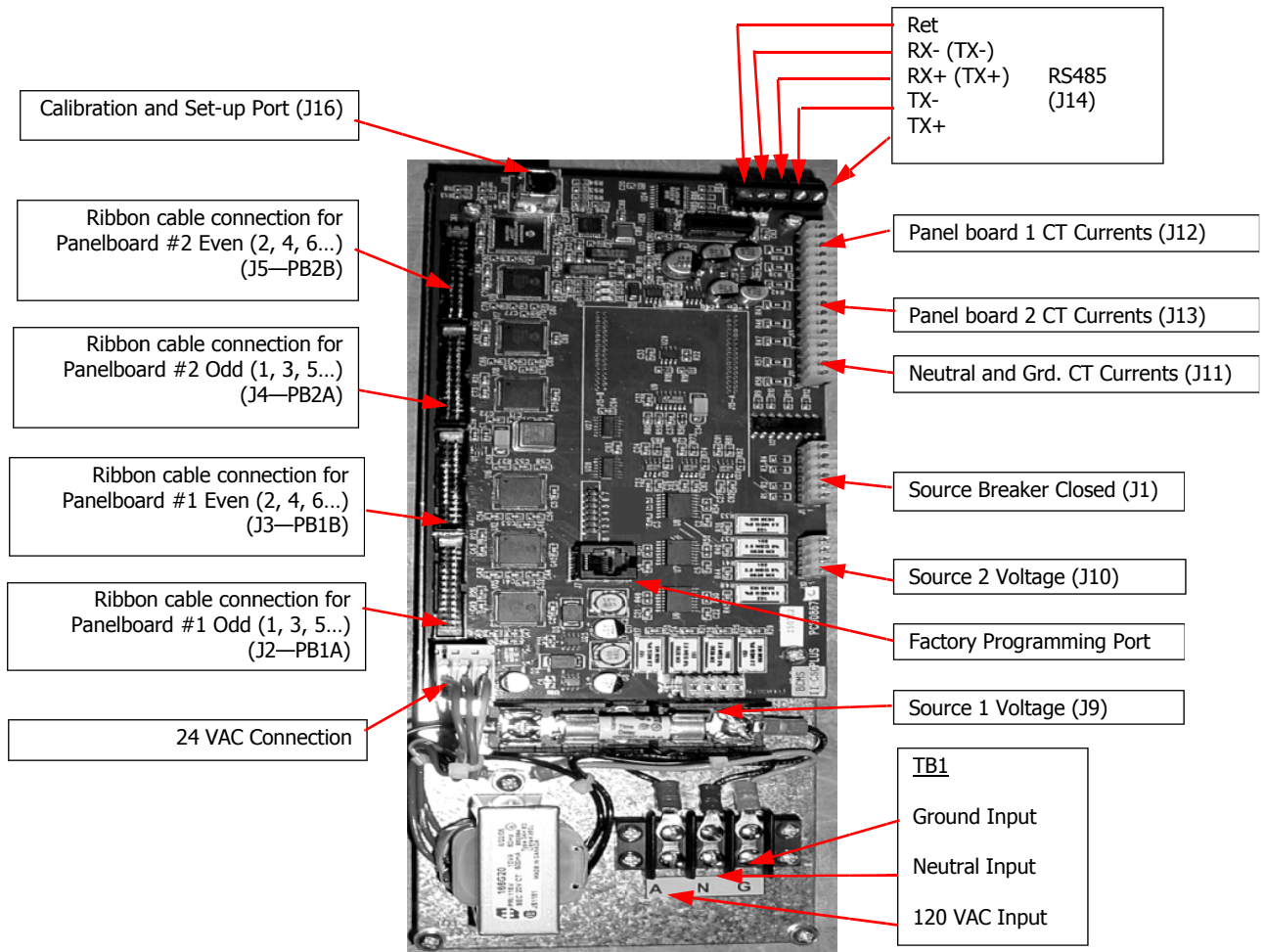
An installed BCMS *Basic* option renders the capability to measure and monitor panel board and/or sub-feed currents. The total currents are a summation of the branch circuit breakers on each panel board. The BCMS *Plus* option, in addition to current monitoring, measures and monitors source voltages and determines power calculations.

Parameters are displayed locally on the GE Zenith Series MDU Monitor.

5.1. BCMS Components

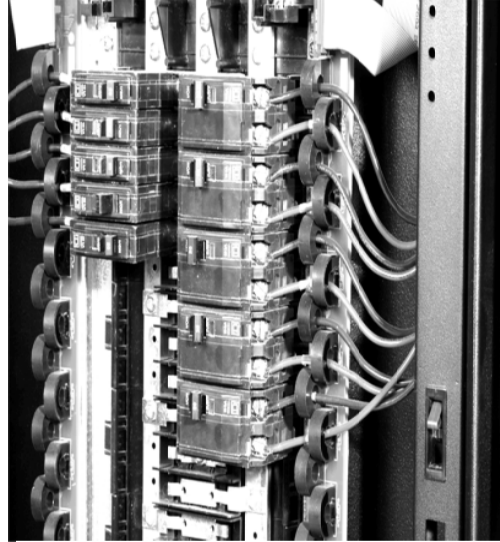
5.1.1. Acquisition Module

The Acquisition module consists of a fuse, small control transformer and a printed circuit board (Figure 1 in Appendix A) mounted on a plate. There can be up to 4 CT modules connected to this board, for a total of 84 CT's. There are terminals for six voltages and four digital points. There are also eight terminals for Power CT's to enable the BCMS to monitor total current. It sends this information out via ModBus RTU to the local display or customer supplied monitoring system.



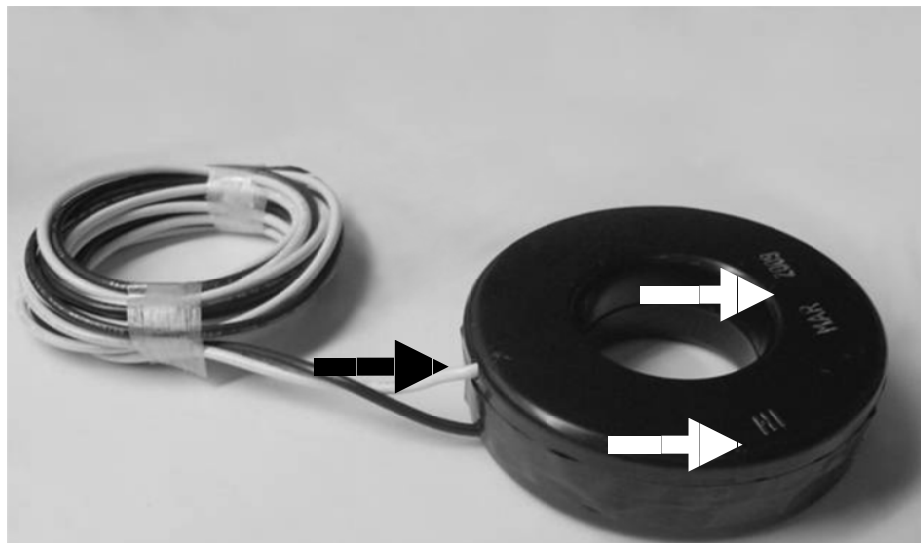
5.1.2. Current Transformers (Panel board CT's)

The current transformers are normally placed on both sides of a panel board. The wire to each branch breaker is then run through the appropriate current transformer before being connected to the breaker. These are mounted to a printed circuit board with the solid core solution for new installation applications and individually mounted split core CT's that each have two wires for existing panel board applications are available.



5.1.3. Current Transformers (CT's)

When attaching solid-core CTs for sub-feed monitoring purposes make sure the label and white wire should face the load. Always remember "label faces load". The label can be identified from the imprinted "H" and Manufacture date.



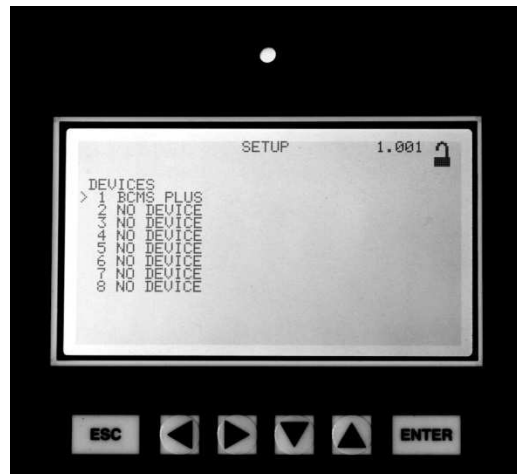
5.2. BCMS Local Monitoring via GE Zenith Series MDU Monitor

5.2.1. BCMS Device Setup

Prior to this setup, ensure that all devices have been connected to the monitor via ModBus. Each BCMS device being added the monitor needs to be assigned a unique ModBus address. The MDU device is typically assigned address "1", while subsequent devices are assigned "2...", "3", etc.

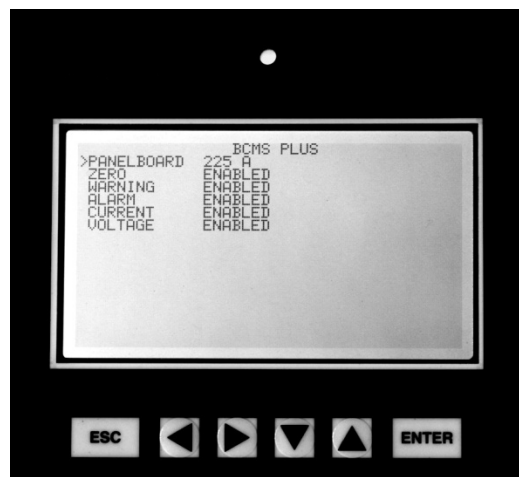
Device List:

To add a BCMS device, navigate to the main monitor setup screen as described on page 28. While on the main monitor setup, position the cursor ">" on "DEVICES" (using the up or down keys) and press "ENTER". This will take the user to the Device List illustrated on this page. Based on detected connections, the GE Zenith Series Monitor automatically generates this list.



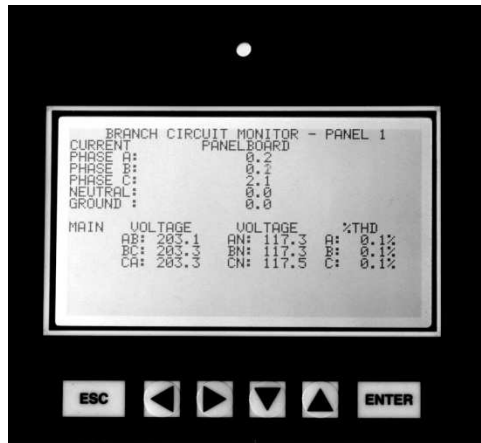
Device Settings:

Position the cursor on the desired device in the list and Press "ENTER" to modify settings for that particular device on the next screen (*illustrated in bottom-right section of this page*). Once settings are configured, return to the Banner Screen described on page 27 by pressing "ESC".



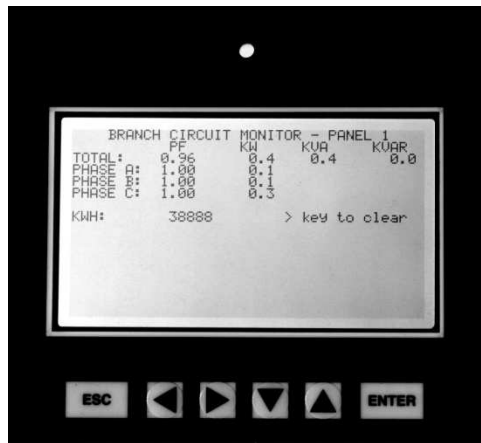
Panel board Main Parameters:

Shows total currents and voltages for the panel board.



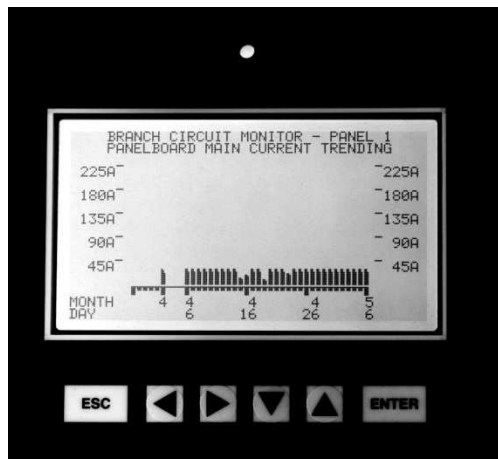
Panel board Power Calculations:

Displays true RMS kW, kVA, kVAR, and also shows kWh.



Panel board Current Trending:

Displays current trends for the panel board over a period of time



1. ModBus Data Interface

The normal data protocol is ModBus RTU and uses a 4-wire plus shield, multi-point EIA/TIA-422-B (RS-422) interface. The default communications parameters for the interface are 9600 baud, 8 bit, even parity, and 1 stop bit. Parity can be changed. Optionally, the BCMS data interface can be strapped for 2 wire plus shield RS-485, and 2 wire plus ground RS-232. Note that RS-232 is only possible if there is only one BCMS (there is no multi-point or daisy chain) and the distance to the computer is less than 20 ft. The communications parameters remain the same. Address 1 is the default base address. It is changed from the service port.



6.0 System Troubleshooting

6.1. System Safety Precautions

DANGER: There is high voltage equipment inside the MDU cabinet. Always use extreme caution and follow all recommended safety precautions.

DO NOT operate the MDU without all exterior panels properly in place.

DO NOT allow unauthorized personnel to perform any services on your MDU. Please contact GE's field support division at (800) 637-1738 for your authorized service agent and for assistance.

DO NOT touch any printed circuit board without consulting GE's field support division. Improper handling of circuitry could cause damage to your MDU and void the warranty.

If following the troubleshooting procedures below does not repair your MDU, contact GE's Service Team at (800) 637-1738 for scheduling service.

6.1.1. Troubleshooting guidelines (GE Zenith Series Monitoring Package)

SYMPTOM	PROBABLE CAUSE	REMEDY
No power to unit	Unit not connected to power J box. Main Breaker not enabled	Connect unit to Power J box. Turn on or reset main circuit breaker
Individual output circuit has no power.	Output circuit breaker and or cable is not connected to MDU.	Connect output circuit to MDU and energize circuit.
No output from unit but indicators are on	Main breaker is turned off or has tripped	Check LCD Display for active alarms, then reset main breaker.
No upstream communication	Not able to remotely communicate to the monitor	Press the ESC key and verify remote upstream address, baud rate, & parity are set correctly.
No audible indication	No audible when an alarm occurs	Press the ESC key and verify the horn is enabled.
No able to scroll thru screens	Cannot see panel information	Press the enter button firmly to view MDU information
Not able to see MDU output readings	No output voltages or currents are displayed	Once on the input screen, use the Up or down arrows to access output screens.
Unable to see BCMS (optional) panels on front panel	No BCMS currents are displayed on monitor screens.	Verify a BCMS is connected to the downstream port and press the esc key to setup the number of additional Panel boards added.



7.0 GE Zenith Series Monitor Alarm Description

ALARM NAME	ALARM MESSAGE	ALARM DESCRIPTION
Input Phase Rotation	"PHASE ROTATION"	If the phase rotation is incorrect on the unit's input, the unit will alarm.
High Temperature Transformer	"THERM OVERTEMP"	If the 180° C thermal switches located in the windings of the transformer reach their rating or better, the unit will alarm. First part of a two stage high transformer temperature alarm system.
High Temperature Transformer Shutdown	"THERM HIGHTEMP"	If the 200° C thermal switches located in the windings of the transformer reach their rating or better, the unit's main circuit breaker will shunt trip, shutdown the unit. Second part of a two stage high transformer temperature alarm system.
Input Voltage Phase A-B High	"INPUT VOLT AB HIGH"	If the input voltage on phase A-phase B goes above the preset level line to line, the unit will alarm.
Input Voltage Phase B-C High	"INPUT VOLT BC HIGH"	If the input voltage on phase B-phase C goes above the preset level line to line, the unit will alarm.
Input Voltage Phase C-A High	"INPUT VOLT CA HIGH"	If the input voltage on phase C-phase A goes above the preset level line to line, the unit will alarm.
Input Voltage Phase A-B Low	"INPUT VOLT AB LOW"	If the input voltage on phase A-phase B goes below the preset level line to line, the unit will alarm.
Input Voltage Phase B-C Low	"INPUT VOLT BC LOW"	If the input voltage on phase B-phase C goes below the preset level line to line, the unit will alarm.
Input Voltage Phase C-A Low	"INPUT VOLT CA LOW"	If the input voltage on phase C-phase A goes below the preset level line to line, the unit will alarm.
Output Voltage Line A-B High	"OUTPUT VOLT AB HIGH"	If the output voltage on line A-line B goes above the preset level line to line, the unit will alarm.
Output Voltage Line B-C High	" OUTPUT VOLT BC HIGH"	If the output voltage on line B-line C goes above the preset level line to line, the unit will alarm.
Output Voltage Line C-A High	" OUTPUT VOLT CA HIGH"	If the output voltage on line C-line A goes above the preset level line to line, the unit will alarm.
Output Voltage Line A-B Low	" OUTPUT VOLT AB LOW"	If the output voltage on line A-line B goes below the preset level line to line, the unit will alarm.
Output Voltage Line B-C Low	"OUTPUT VOLT BC LOW"	If the output voltage on line B-line C goes below the preset level line to line, the unit will alarm.
Output Voltage Line C-A Low	"OUTPUT VOLT CA LOW"	If the output voltage on line C-line A goes below the preset level line to line, the unit will alarm.
Output Voltage Line A - Neutral High	"OUTPUT VOLT AN HIGH"	If the output voltage on line A-Neutral goes above the preset level line to Neutral, the unit will alarm.
Output Voltage Line B - Neutral High	"OUTPUT VOLT BN HIGH"	If the output voltage on line B-Neutral goes above the preset level line to Neutral, the unit will alarm.
Output Voltage Line C - Neutral High	"OUTPUT VOLT CN HIGH"	If the output voltage on line C-Neutral goes above the preset level line to Neutral, the unit will alarm.



Output Voltage Line A - Neutral Low	"OUTPUT VOLT AN LOW"	If the output voltage on line A-Neutral goes below the preset level line to Neutral, the unit will alarm.
Output Voltage Line B - Neutral Low	"OUTPUT VOLT BN LOW"	If the output voltage on line B-Neutral goes below the preset level line to Neutral, the unit will alarm.
Output Voltage Line C - Neutral Low	"OUTPUT VOLT CN LOW"	If the output voltage on line C-Neutral goes below the preset level line to Neutral, the unit will alarm.
Output Current Line A High	"OUTPUT CURR A HIGH"	If the output current on line A goes above the preset level, the unit will alarm.
Output Current Line B High	"OUTPUT CURR B HIGH"	If the output current on line B goes above the preset level, the unit will alarm.
Output Current Line C High	"OUTPUT CURR C HIGH"	If the output current on line 3 goes above the preset level, the unit will alarm.
Ground Current High	"OUTPUT CURR GND HIGH"	If the ground current goes above the preset level of 10 Amps, the unit will alarm.
Neutral Current High	"OUTPUT CURR NEU HIGH"	If the neutral current goes above the preset level, the unit will alarm.
Total System kVA High	"KVA TOTAL HIGH"	If the total system kVA goes above the preset level, the unit will alarm.
Output Phase A kVA High	"KVA A HIGH"	If the output kVA on Phase "A" goes above the preset level, the unit will alarm.
Output Phase B kVA High	"KVA B HIGH"	If the output kVA on Phase "B" goes above the preset level, the unit will alarm.
Output Phase C kVA High	"KVA C HIGH"	If the output kVA on Phase "C" goes above the preset level, the unit will alarm.
Total System kW High	"KW TOTAL HIGH"	If the total system kW goes above the preset level, the unit will alarm.
Output Phase A kW High	"KW A HIGH"	If the output kW on Phase "A" goes above the preset level, the unit will alarm.
Output Phase B kW High	"KW B HIGH"	If the output kW on Phase "B" goes above the preset level, the unit will alarm.
Output Phase C kW High	"KW C HIGH"	If the output kW on Phase "C" goes above the preset level, the unit will alarm.
Emergency Power Off	"EPO"	This alarm can be activated in by pushing the unit's EPO button. When EPO button is pushed, the alarm is activated and he unit's main input circuit breaker will then be shunt tripped off line.
Remote Emergency Power Off	"REMOTE EPO"	This alarm can be activated in by closing the contacts on the contractor board. When Remote EPO button is activated, the alarm is activated and he unit's main input circuit breaker will then be shunt tripped off line.



8.0 Special Instructions

8.1. Output Panel boards

MDUs that are supplied with output panel boards should have all the output loads balanced at the panel boards. The objective is to place equivalent current wave forms and magnitude on each output. With most (3) three phase loads containing a full wave bridge rectifier, distributing the 3 pole breakers (by ampacity) evenly across matched Panel boards provides optimum balancing. Duty cycle, if available, should also be considered. Single phase loads with high third harmonics should also be evenly balanced across the Panel boards. Below are the steps to follow for proper balancing of circuits.

- A. Divide all output into (3) three categories by breaker pole position (1 pole, 2 pole, 3 pole).
- B. Subdivide the 3 categories by breaker size (ampacity).
- C. Assign the largest 3 pole breaker to panel board #1.
- D. If there is an even number of the larger 3 pole breakers, assign them evenly between the panel boards. If you are unable to assign them evenly, then assign smaller 3 pole breakers to the panel having fewer breakers.
- E. Perform steps c) and d) in regards to the next size down, 3 pole breakers. Continue with this procedure until all 3 pole breakers are installed.
- F. Repeat this process with all 2 pole and 1 pole breakers respectively. Units that are equipped with four (4) or six (6) Panel boards should first divide the circuits into groups of two (for 4 Panel boards) and groups of three (for 6 Panel boards). Once the circuits are evenly divided, proceed with the above steps.

Note: Do not assign only single pole or two pole breakers to an individual panel board.

8.1.1. Panel board manufacturers

When choosing the proper distribution breakers for use on a specific panel board within your MDU, be sure to use only distribution breakers that are compatible with associated panel board. Below is a list of compatible distribution breakers for specific Panel boards. If you need any assistance in choosing the proper breakers please contact GE's field support division at (800) 637-1738.

1. **General Electric Panel boards:** Use only General Electric (type AQL3422AT) type THQB, THHQB, TXQB, or THQL breakers.

If another brand panel board not mentioned above is placed in your MDU, then be sure and only use a distribution breaker that is compatible with that manufacturer. You may need to contact the panel board manufacturer to ensure compatibility.



8.2. Output Dedicated Circuit Breakers (Sub-Feeds)

Certain MDUs will be designed for a specific application such as a large mainframe. These units may be equipped with individual molded case output circuit breakers that should be sized for these specific applications. For these applications, please consult your submittal package for proper power connections. Consult GE's field support division at (800) 637-1738 before installing any additional output breakers to these units.

8.3. Low Voltage Interface Board (Contractor Board)

All low voltage connections for HVAC shutdown, Remote Emergency Power Off (REPO), etc. are made on the Low Voltage Interface Board generally located behind the MDU's front upper interior cover on the front of the logic /monitor plate. Included on the Low Voltage Interface Board are:

1. Connections for one DPDT relay that activates whenever the EPO circuit is activated.
2. Two sets of connections for a REPO system.
3. Connections for (1) one DPDT relay that will change state when power is either on or off.
4. Four sets of customer contacts for building and/or environmental alarms.

Refer to the specifications/drawings section of this manual for detailed drawings of the customer interface board.



9.0 Warranty, Maintenance and Terms

9.1. GE Service Department

The GE Service Department is proud to provide support for its broad range of power quality products. GE Zenith, Static Switch, Computer Shield, Site Monitoring, and Line Conditioning series products all are manufactured, sold, and serviced under the GE umbrella. Our commitment to servicing these products begins with our START UP service, and continues with our factory Warranty and is continuously maintained through our Preventative Maintenance Contracts.

9.1.1. GE's Standard Warranty

GE's Standard Warranty is good for all products for 18 months following shipment or 12 months after START UP, whichever comes first. After the warranty period is over, customer is on Time & Material basis unless a Preventative Maintenance contract is in effect.

9.1.2. Start Up

GE START UP is mandatory for all MDU's purchased, and is a sure way of getting your power quality equipment up and running as you need it. By following our standard START UP procedures, you can be assured that your power quality equipment will perform to your requirements. Some of the features and benefits are:

- GE START UP services provide a factory-trained customer support engineer to oversee visual inspection of the installation and system calibration.
- GE START UP service also provides factory-trained customer support engineers to assist with operational training.

9.1.3. Maintenance Contracts

GE Maintenance contracts help to ensure that the reliability of your critical power systems is intact. By following our stringent maintenance procedures, GE's factory trained customer support engineers provide extra insurance for the availability of critical systems, and maximize the company's profitability.

9.1.4. Time and Materials

In most cases the customer will be covered by START UP service or Maintenance Contracts, however, there may be times when the customer needs GE service and lacks the benefits that these two packages provide. Therefore, GE provides Time and Material coverage for those in need of our customer support engineers.



9.2. GE Maintenance Contracts

9.2.1. Features & Benefits

A GE maintenance contract helps ensure that the reliability of your critical power systems remain intact.

1. A promise of prompt courteous service.

With factory-trained technicians in nearly every major city in North America, GE is able to respond within four hours of a support call and provide on-site assistance in emergency down time situations.

GE provides 24 hours a day, 7 days a week direct line to Service (800-637-1738).

There are no added costs for weekends, nights or holidays.

2. Two comprehensive Preventative Maintenance visits annually.

Factory trained service engineers will visit your site twice annually using the state of the art diagnostics systems.

- ◇ **Infrared Scanner** provides information that can determine impending failures on connections and busing before they become a catastrophic problem.
- ◇ **Harmonic Analyzer** provides real time information on the effects harmonic currents are having on your power distribution system (performed on an annual PM visit).

Other services include:

- ◇ Thorough visual inspection of all parts (bulbs, displays, missing hardware, cleanliness, and corrections as required).
- ◇ Verification of monitor calibration and correction.
- ◇ Check load balance, kVA usage and building alarms.
- ◇ Complete hard copy report summarizing all tests and analysis.

3. GE provides Flexibility and Commitment.

- ◇ GE can customize your service to meet your needs (number of PM visits per year, scope of coverage (e.g. parts not included), length of contract, etc.).
- ◇ GE provides nationwide factory trained and authorized service engineers ready to meet your demands.
- ◇ Guaranteed parts availability. GE ensures that all parts needed to service your equipment or the latest technology will be available to you.



10.3 Warranty Validation Request

Thank you for your recent purchase of GE equipment. The warranty for your equipment becomes effective from the date of commissioning by a GE Authorized Technician. Please complete the information below and return to GE by fax at **(804) 737-1549**. We will activate the warranty and return the warranty agreement for your records.

Customer Information

Customer:	
Location:	
Contact:	
Contact Phone:	
Contact E-mail:	

Equipment Information

Serial #	(If different from above)		
	Location	Contact	Contact Phone

GE use only

Commissioning Date:	
Warranty Commencement:	
Warranty Completion Date:	



9.4. Warranty Agreement

Serial #: _____ Model #: _____

Equipment Location Address: _____

() _____

Contact Name: _____

Seller warrants to Buyer that, unless otherwise stated by the Seller, any products or services furnished hereunder will be free from defects in material, workmanship and title, under normal use and services and quality specified in Seller's quotation. This warranty shall apply to failure to meet said warranties (excluding any defects in title) which appear within twelve (12) months from date of startup or eighteen (18) months from the date of shipment, whichever occurs first.

The conditions of any tests shall be mutually agreed upon and Seller shall be notified of, and may be represented at, all tests that may be made. The warranties and remedies set forth herein are conditioned upon (a) proper transportation, handling, storage, installation, commissioning, operation, use and maintenance, and conformance with any applicable recommendations of Seller and any applicable laws, regulations or codes (b) Buyer promptly notifying Seller of any defects and, if required, promptly making the product available for correction. This warranty shall not apply (a) if Customer or any other unauthorized person has made any modifications, alterations, or repairs to the Product not authorized by Seller, including Customer's use of parts in conjunction with the Product not admitted or delivered by Seller, (b) to a Product with removed or altered serial numbers, (c) to a Product damaged by acts of God, sources external to the Product, misuse, accident, abuse, neglect, negligence, or use beyond rated capacity, and (d) if GE authorized field service technician does not commission the Product.

If any product or service fails to meet the foregoing warranties (except title), Seller shall thereupon correct any such failure either, at Seller's option, (i) by repairing any defective or damaged part or parts of the products, and/or re-performing any defective service, or (ii) making available any necessary repaired or replacement parts or necessary service which will be performed during normal working hours on a straight time basis. Repaired or replaced products will be returned FCA (INCOTERMS 2000) the Seller's plant or other mutually agreed upon point of shipment. If re-performance is not practicable, Seller will furnish without charge services in an amount essentially equal to those that, in the sole judgment of Seller, would have been required for re-performance. Where a failure cannot be corrected by Seller's reasonable efforts, the parties will negotiate an equitable adjustment in price.

This Paragraph sets forth the exclusive remedies for claim (except title) based on defect, failure or nonconformity of the products or services supplied, whether claim is in contract or tort (including negligence) or otherwise and however instituted. Upon the expiration of this warranty, all such liability shall terminate. Except as set forth in "Patents" the foregoing warranties are exclusive and in lieu of all other warranties or conditions whether written, oral, implied or statutory. No implied or statutory warranties or conditions of merchantability or fitness for particular purpose shall apply. Seller does not warrant any products or services of others, which Buyer has designated.

This agreement shall be effective from _____ to _____.



10.0 Appendices

10.1. Appendix A – MDU Input Breaker Sizing Chart

Main Breaker Amperage Rating Chart

INPUT VOLTAGE				
	TRANSFORMER LESS	GE ZENITH		
kVA	208/120 Vac	208 Vac	480 Vac	600 Vac
15	60 Amp	60 Amp	30 Amp	20 Amp
30	110 Amp	110 Amp	50 Amp	40 Amp
50	175 Amp	200 Amp	80 Amp	70 Amp
75	300 Amp	300 Amp	125 Amp	100 Amp
100	350 Amp	400 Amp	175 Amp	125 Amp
125	500 Amp	500 Amp	200 Amp	175 Amp
150	600 Amp	600 Amp	250 Amp	200 Amp
200	700 Amp	800 Amp	350 Amp	250 Amp
225	800 Amp	800 Amp	400 Amp	300 Amp
300	N/A	N/A	500 Amp	450 Amp
400	N/A	N/A	700	CF
500	N/A	N/A	800 Amp	CF
625	N/A	N/A	1000	CF
750	N/A	N/A	1200	CF



10.2. Appendix B - Class A Computing Device: Information To User

The following warning or similar statement shall be provided in a conspicuous location in the operation manual so that the user of a class a computing device is aware of its interference potential. Additional information about corrective measures may also be provided to the user at the manufactures option.

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



11.0 Spare Parts

The following is the recommended spare parts requirements for GE's standard Monitored Distribution Units. GE recommends that (1) one complete spare parts kit be kept for every (5) units at one site.

Some MDU's are manufactured to meet a special application and/or a special configuration. These units may require that a customized spare parts kit be ordered. If you require a special spare part kit, please contact GE's Local Representative for assistance.

The parts contained in a spare parts kit are OEM parts and have been tested to assure reliability and functionality. GE recommends that only OEM parts be replaced in its MDU's. Failure to do so could result in the unit's warranty being voided.

All parts should be replaced by a GE factory authorized engineer only. Some parts may require special calibration and/or installation procedures.

It is recommended that spare parts kits be stored in a properly controlled storage area that is easily accessible with 24 hour access in case of emergency requirements.

The following are details for available Kit Options for your MDU.

For pricing and availability of spare parts kits please contact GE's Local Representative.



- 11.1. Spare Parts Kits - GE Zenith MDU with M4 Monitoring Package**
- 11.2. Spare Parts Kits - GE Zenith MDU with GE Zenith Series Monitoring Package**

11.2.1. GE Zenith Series MDU - "Option A" Kit

Qty	Description	Part #
5	Assorted Fuses	
1	Control Power Transformer	XMR06314
5	South-co Panel Retainer	FAS-12-11014-12
5	South-co Panel Clip	FAS-12-11017-11
5	South-co Panel Fastener	FAS-121120511
5	South-co Panel Washer	FAS-85-46-10141
1	GE Zenith Series Data Acquisition Card	PCB09647

11.2.2. GE Zenith Series MDU - "Option B" Kit

Qty	Description	Part #
1	GE Zenith MDU GE Zenith Series Spare Parts Kit (Option A)	
1	Audible Alarm Horn	HRN00001
5	Emergency Power Off Indicating Light	SWT00027
1	Emergency Power Off Switch	SWT00005
1	Emergency Power Off Switch Guard	SWT00006
1	GE Zenith Series MDU Monitor	PCB09507
1	GE Zenith Series Contractor Board	PCB08961
1	Complete Set of Ribbon Cables (6)	

11.2.3. GE Zenith Series MDU w/ BCMS - "Option C" Kit

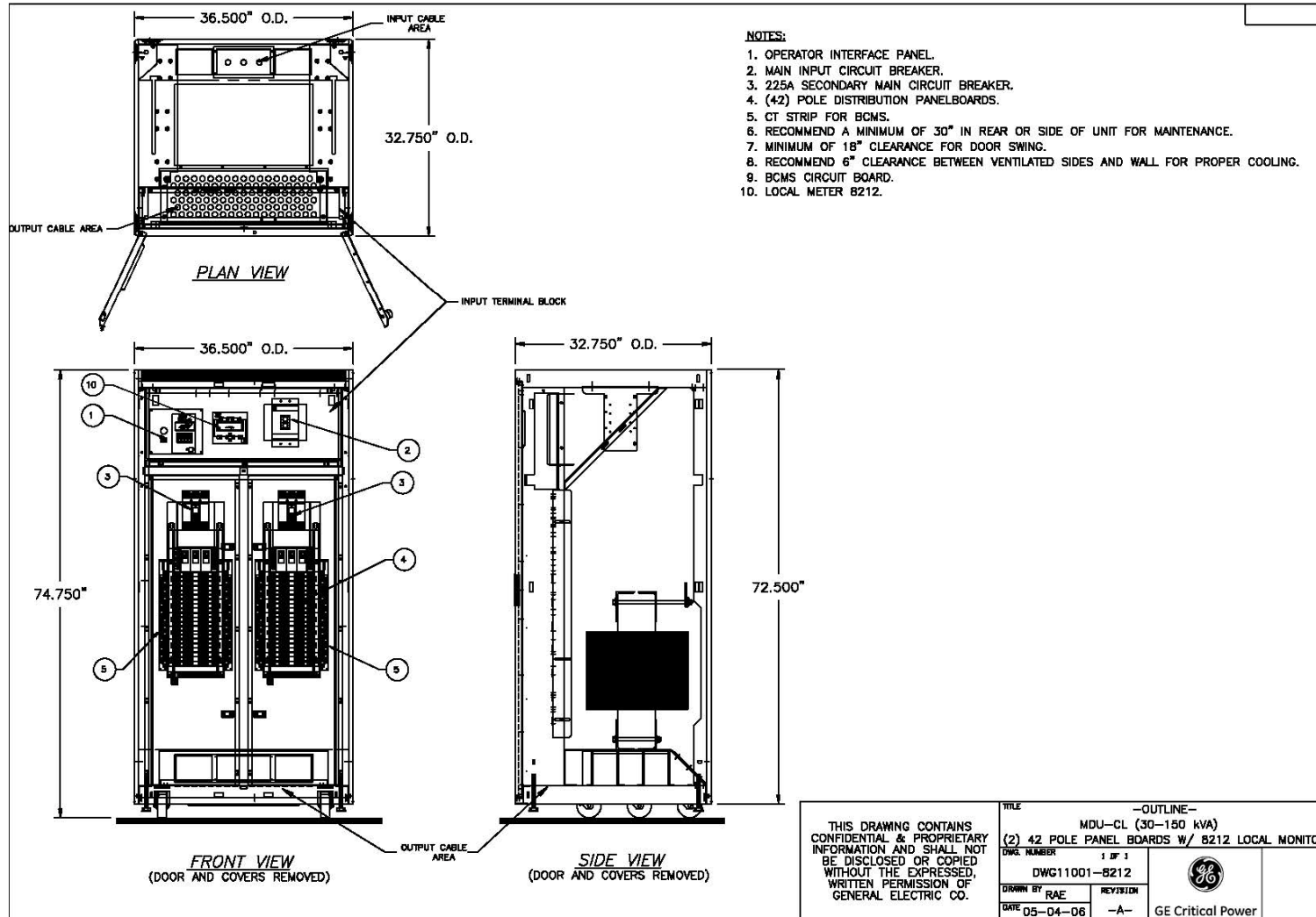
Qty	Description	Part #
1	GE Zenith MDU (with MDU GE Zenith Series Monitor) Spare Parts Kit (Option B)	
1	BCMS Board	PCB08674
1	Data Module Transformer	XMR04668
1	Split Core Hot Fix Board with 6 CT's	PCB08504 / XMR08001



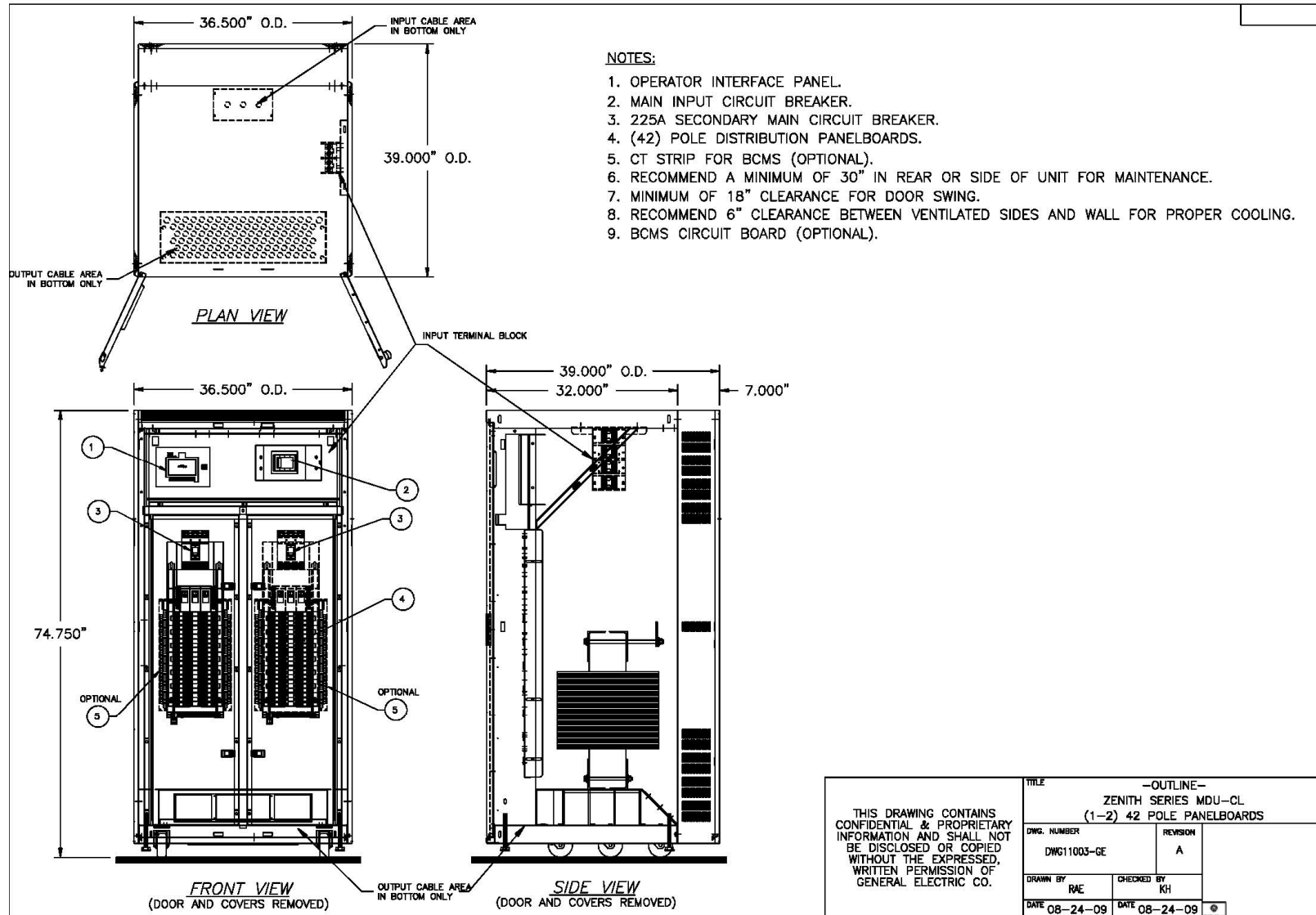
12.0 Drawings



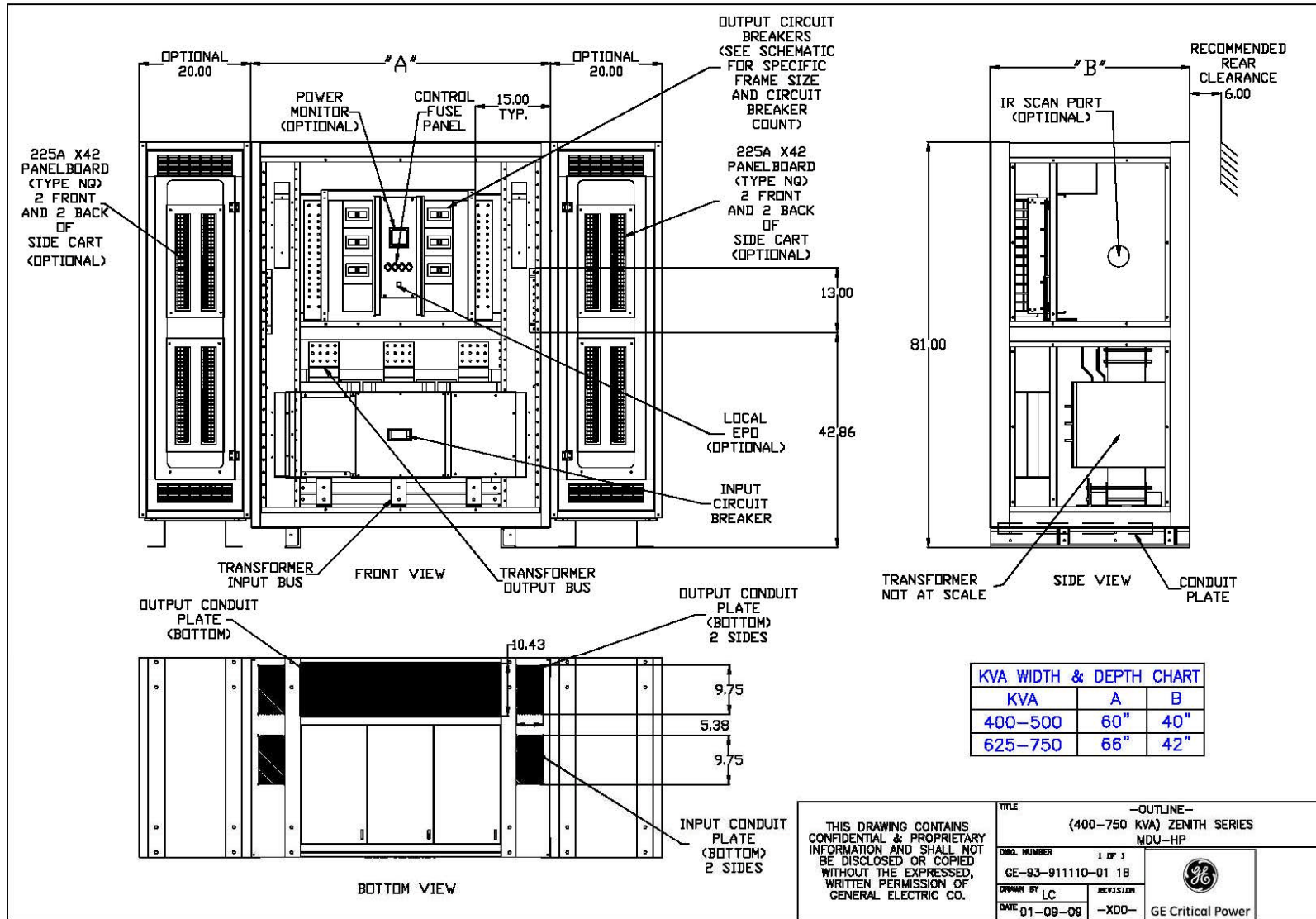
12.1. Typical Outline, 30kVA-150kVA MDU



12.2. Typical Outline, 200kVA-300kVA MDU



12.3. Typical Outline, 400kVA - 750kVA MDU



12.4. Typical 30kVA–300kVA MDU Floor stand (11"–76" Heights)

PDU MOUNTING HOLES

"B"

"A"

CENTER SUPPORT (48"–60"–72") ONLY

B	65.250"	MS09759 (72") CENTER SUPPORT
A	68.000"–76.000"	
B	53.250"	MS09758 (60") CENTER SUPPORT
A	56.000"–64.000"	
B	41.250"	MS09518 (48") CENTER SUPPORT
A	44.000"–52.000"	
B	35.250"	MS09758 (42")
A	38.000"–46.000"	
B	29.250"	MS09304 (36")
A	32.000"–40.000"	
B	23.250"	MS09681 (30")
A	26.000"–34.000"	
B	14.250"	MS09213 (18"/24")
A	17.000"–25.000"	
B	8.250"	MS09221 (12")
A	11.000"–14.250"	

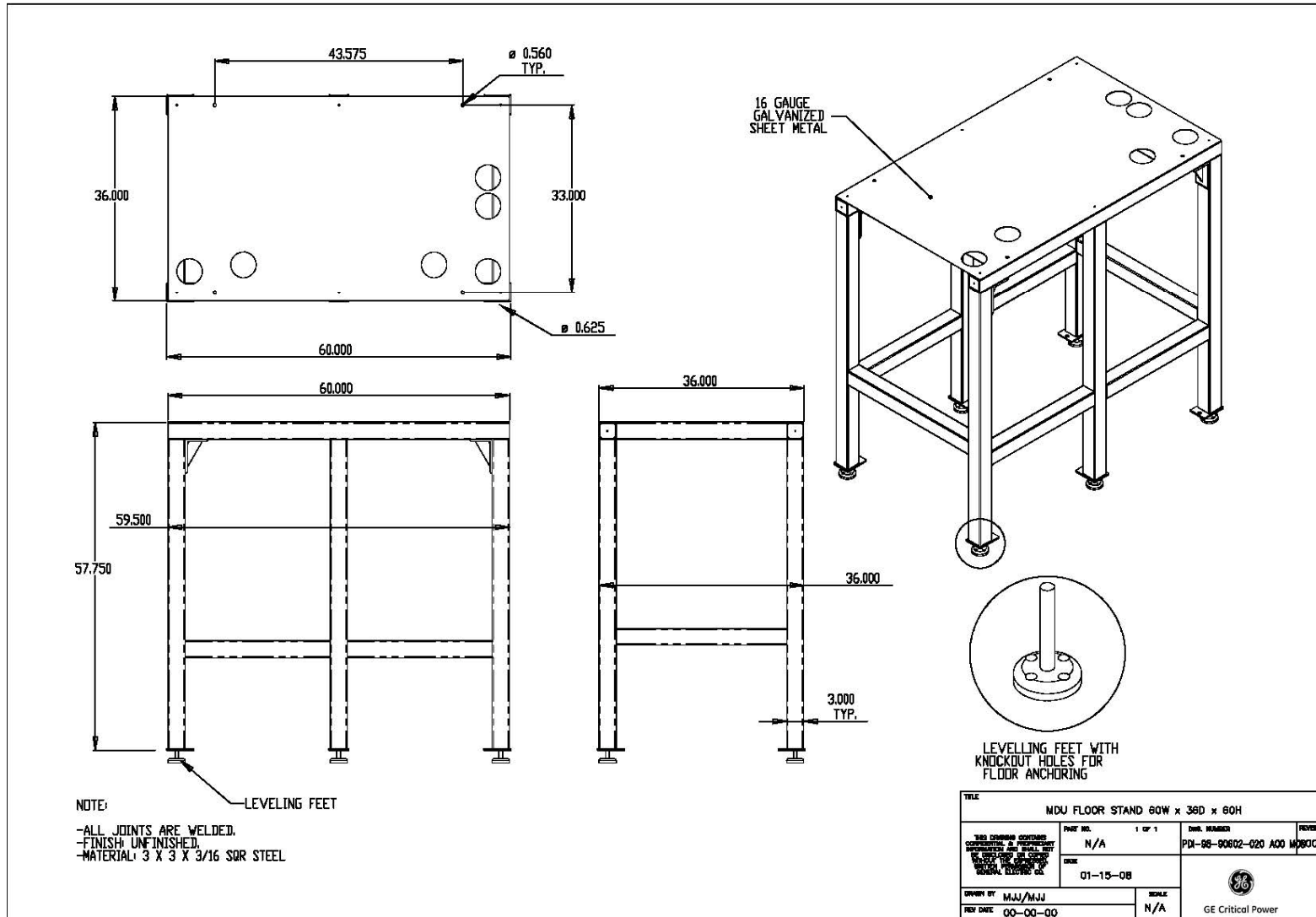
NOTES:

1. STANDS ARE MADE OF 1/4" FORMED ANGLE.
2. SUPPLIED WITH (8) HEXNUTS & (4) WASHERS.
3. TO ACQUIRE MINIMUM HEIGHT, LEGS MUST BE REMOVED.
4. OTHER STANDS SIZES UPON REQUEST.

THIS DRAWING CONTAINS CONFIDENTIAL & PROPRIETARY INFORMATION AND SHALL NOT BE DISCLOSED OR COPIED WITHOUT THE EXPRESSED WRITTEN PERMISSION OF GENERAL ELECTRIC CO.	TITLE ZENITH SERIES MDU FLOOR STAND CHARTED SPECIFICATIONS	
	DWG. NUMBER DWG11099	1 OF 3
	DRAWN BY RAE	REVISION -B-
	DATE 05-25-07	GE Critical Power



12.5. Typical 400kVA-750kVA MDU Floor stand (60" Height Shown)



13.0 Notes

