Price $50.00

CRUCIAL POWER PRODUCTS

User's Manual

Life Line Regulator
Medical Power PC

Operating Documentation

Doc #. 6002-xxx
Revision A

Installation and Operating Documentation

When the Lights Go out – We Turn On

Crucial Power Products

Congratulations on selecting one of the fine products from Crucial Power Products, the Leader in Power Protection Technology. Our wide product offering includes Uninterruptible Power Systems (UPS), Power Conditioners, Automatic Voltage Regulators and Specialty Transformers (e.g. computer–grade, medical–grade). Since our beginnings in 1975, Crucial Power Products has shipped thousands of these fine products around the world, to discerning customers, for use on sensitive equipment and critical applications. Our customers, both new and long–time, continue to enjoy security and peace of mind as they realize what it means to "When the lights go out, we turn on".

One of our goals is to make these manuals both comprehensive and easy to use. This **new–format** Technical Manual is the result of ideas and inputs from customers who have taken an active interest in our continued success. We invite constructive feedback on our products and documentation via fax, mail or telephone.

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NOTICE: THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION

SAFETY

Safety precautions are important when operating or servicing electrical equipment. The following symbols are used extensively throughout this manual. Always heed these precautions since they are essential to the safe operation and servicing of this product.

THIS DANGER SYMBOL IDENTIFIES A CONDITION OR ACTION WHICH WILL RESULT IN SEVERE INJURY OR DEATH TO AN INDIVIDUAL OR SEVERE DAMAGE TO EQUIPMENT OR OTHER PROPERTY.

This Caution symbol identifies a condition or action which may result in minor injury to an individual or minor damage to the equipment or other property.

This unit was designed for specific applications. It should **not** be modified and/or used for any application other than for that which it was designed. Optional equipment not described in the sales literature of this manual should not be installed without first checking with the Service department. If you have any questions about this unit's application call the Service department at the number shown on the previous page.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during installation and maintenance of the unit and batteries.

IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

1. Do not use outdoors.
2. Do not mount near gas or electric heaters.
3. Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in eyes, flush acid with fresh water and contact a physician immediately.
4. Equipment should be mounted in locations or at heights where it will not readily be subjected tampering by unauthorized personnel.
5. The use of accessory equipment not recommended by the manufacture may cause an unsafe condition.
6. Do not use this equipment for other than intended use.

SAVE THESE INSTRUCTIONS

REVISION HISTORY

REV	DATE	PRIMARY REASON FOR CHANGE
A	July 25, 2003	Preliminary Release.

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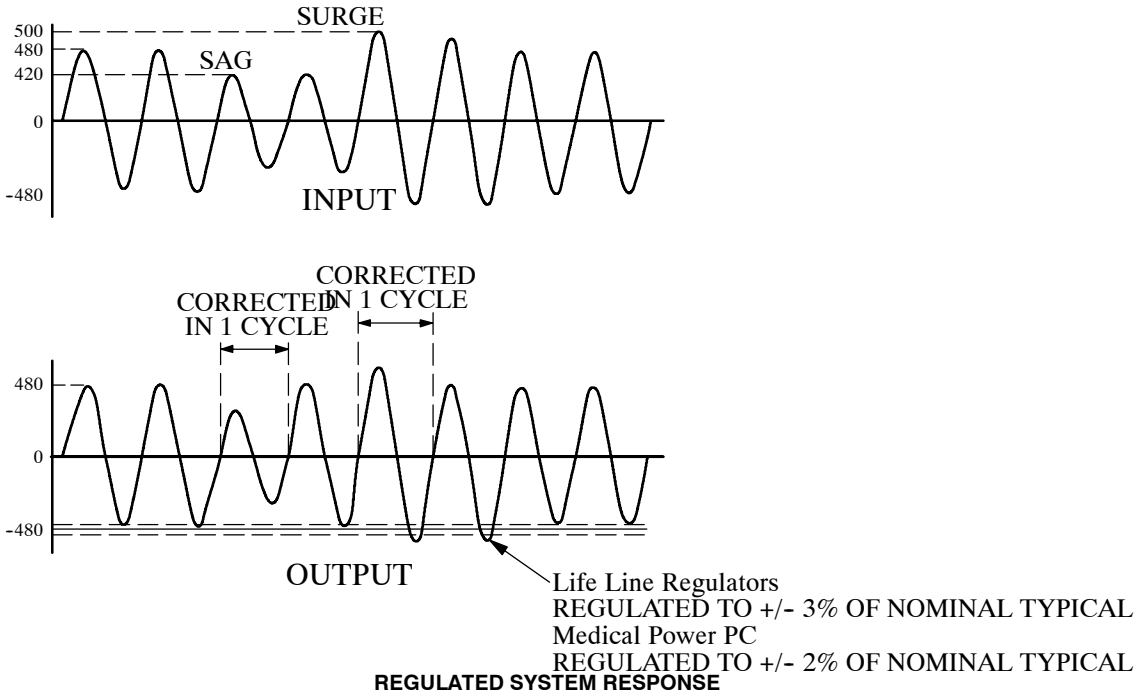
SECTION 1 – OPERATION

1–1 INTRODUCTION

This manual provides installation, operation and maintenance information for the Life Line regulators and Medical Grade PC units. A detailed description of each product is provided in the following subsections.

All components used are of the highest quality and specifically selected to achieve the highest level of performance. These units are UL listed and conform to National Electric Code (NEC) and Occupational Safety and Health Act (OSHA) standards.

The Life Line regulators and Medical Grade PC have tapped electronic voltage regulators. Six taps are on each primary winding of the transformer. Each tap is controlled by a silicon–controlled rectifier (SCR) switch and can become active at any time. Input line–to–line voltage and line current are monitored for each phase. Peak voltage is compared with a desired reference. Depending on this comparison, the regulation logic activates the proper SCR switch when the phase current becomes zero. This changes the primary–to–secondary turns ratio which corrects output voltage to the desired nominal. The correction process starts in less than one cycle. See Illustration 1–1.



REGULATED SYSTEM RESPONSE
ILLUSTRATION 1–1

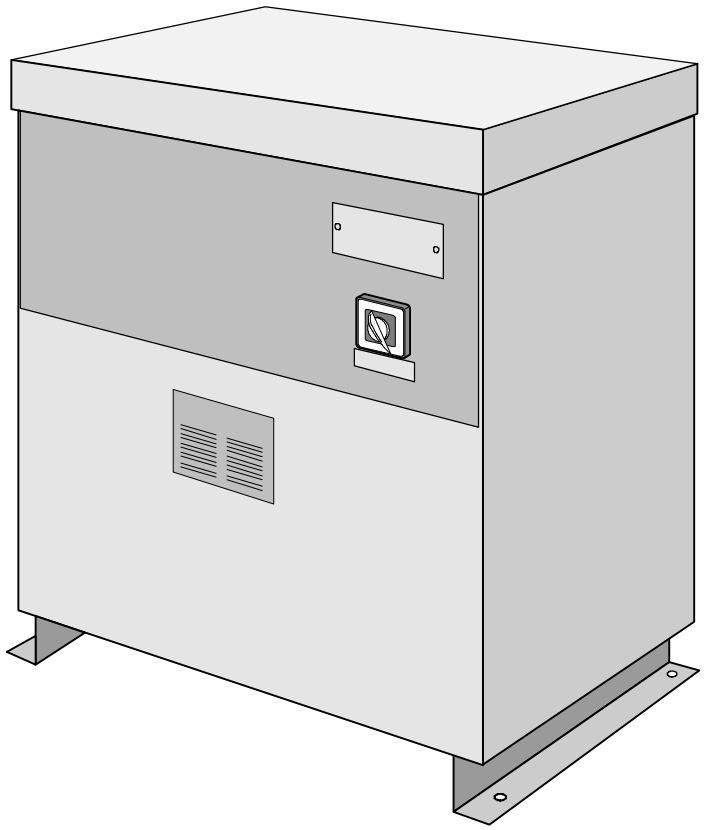
1–1–1 Life Line Regulators

The Life Line Regulators are designed to provide the reliable, high–quality power necessary to meet the needs of today's sensitive electronics.

These three–phase, 60 Hertz, self–contained, modular units provide isolation and regulation of AC power. The zero–current tap switching voltage regulation circuitry automatically adjusts for an input voltage range between +10% surge and –26% sag about the nominal rated voltage with an output voltage range of ± 3% typical to ± 4% maximum. Each phase is regulated independently.

The Life Line Regulators are available in input voltages of 208 or 480 VAC and output voltages of 208Y/120 and 480Y/277 VAC. These units are available in sizes ranging from 15 kVA to 300 kVA. The specific rating information for your unit is provided on the label plate located on the front panel. Refer to Appendix A.

The Life Line Regulators unit is shown in Illustration 1–2.



**LIFE LINE REGULATORS AND MEDICAL POWER PC (100 – 300 KVA)
WITH 208 VAC INPUT OR (125–300 KVA WITH 480 VAC INPUT**
ILLUSTRATION 1–2

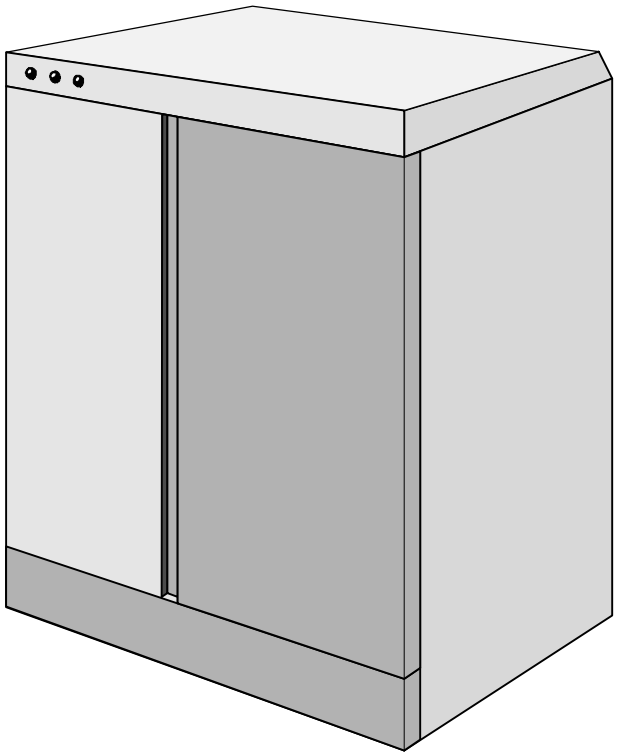
1–1–2 Medical Power PC

The Medical Power PC power conditioner is designed to provide the reliable, high–quality power necessary to suit the needs of today's sensitive medical devices.

This three–phase, 60 Hertz, self–contained, modular unit provides isolation and regulation of AC power. The zero–current tap switching voltage regulation circuitry automatically adjusts for an input voltage range between +8% surge and –10% sag about the nominal rated voltage with an output voltage range of ± 1.5% typical to ± 2% maximum. Each phase is regulated independently.

The Medical Power PC is available in input voltages of 208 or 480 VAC and output voltages of 208Y/120 and 480Y/277 VAC. This unit is available in sizes ranging from 15 kVA to 300 kVA. The specific rating information for your unit is provided on the label plate located on the front panel. Refer to Appendix A.

The 15 to 100 kVA Medical Power PC with 480 VAC or the 15–75 kVA with 208 VAC is shown in Illustration 1–3. The 125 to 300 kVA Medical Power PC with 480 VAC input or the 100–300 kVA with 208 VAC input is shown in Illustration 1–2.



MEDICAL POWER PC (15 – 100 KVA) FOR 480 VAC INPUT
(15 – 75 KVA) FOR 208 VAC INPUT
ILLUSTRATION 1–3

1 – 2 BENEFITS

The Life Line Regulators and Medical Power PC protect electronic equipment from an overvoltage condition during line power surges and an undervoltage condition during sags. In addition, the unit protects equipment load by attenuating transients present on utility power lines. overvoltage, overcurrent, and transient conditions stress electronic components and decrease system reliability.

In medical applications, voltage fluctuations affect the image quality of imaging systems. Artifacts are introduced under sag conditions. Regulating power maintains image quality, resulting in more consistent images.

1 – 3 TRANSFORMER

The transformer contained in the unit is designed for convection cooling by means of free circulation of air through the bottom, front and back of the unit. Maximum ambient temperatures should not exceed 104˚F (40˚C). The transformer contains built – in thermal sensors which monitor internal temperatures. In models with a Input Main Circuit breaker (IMCB), the thermal sensors send a shunt trip signal to the IMCB in the event of an over temperature condition.

1 – 4 PRODUCT FEATURES

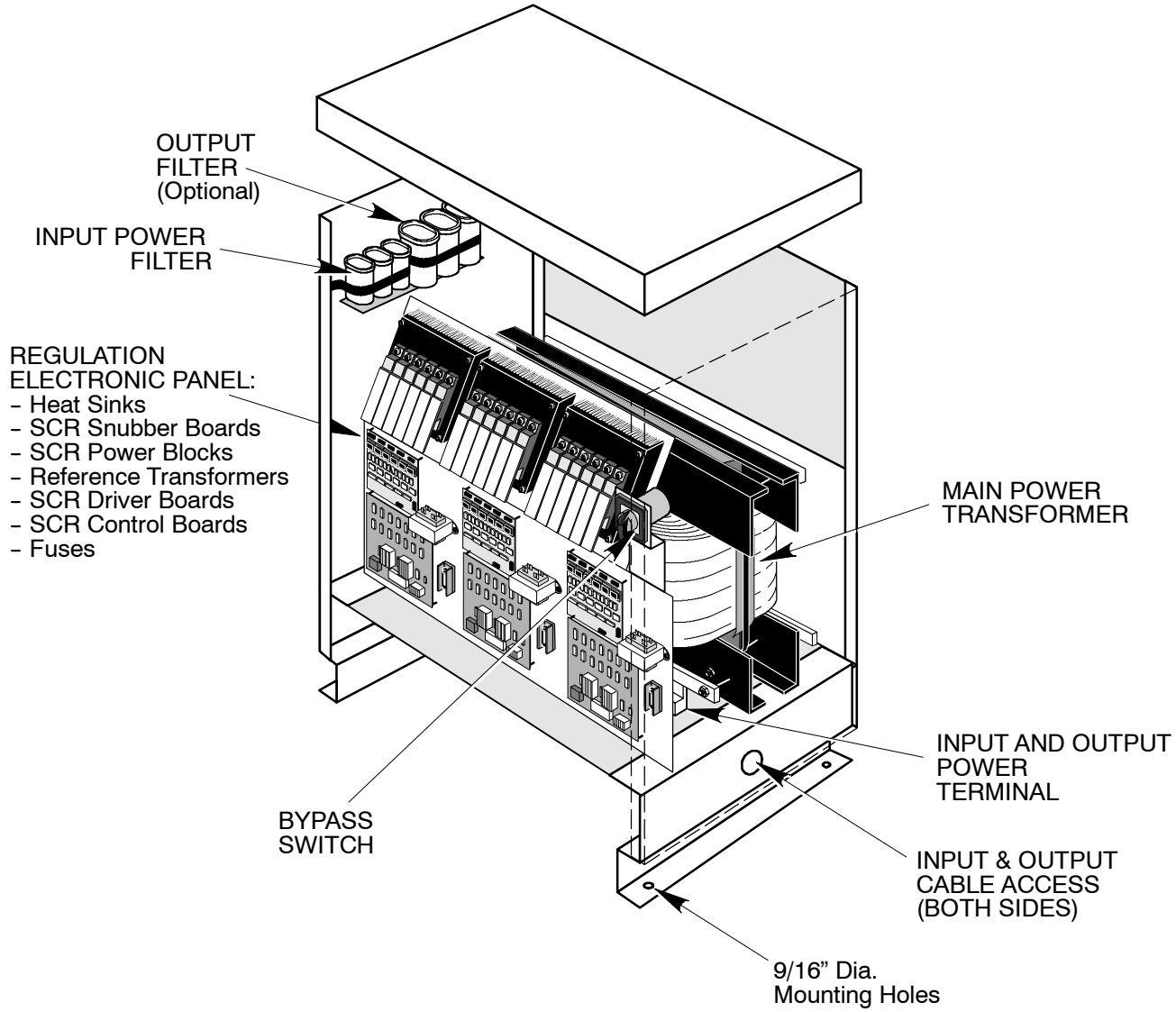
Sections 1 – 4 and 1 – 5 describe the features of the Life Line Regulators and Medical Power PC. Some features described in Section 1 – 4 are standard on all models while other features are offered as options. Refer to Table 1 – 1 to determine if the features described in this section are applicable to your unit. Refer to Section 4, Options, for information on optional features.

TABLE 1 – 1
PRODUCT FEATURES

OPTION	MODEL		
	Life Line Regulators	**Medical Power (15 – 75 kVA)**	**Medical Power (100 – 300 kVA)**
Bypass Switch	S	S	S
Main Input Circuit Breaker	N	O	N
Power On Indicators	N	S	N
Input Filter	S	S	S
Output Filter	O	S	S
Input/Output Power Terminals	S	S	S

TABLE KEY: S = Standard equipment, O = Available as an option, N = Not available for this model.

1 – 4 PRODUCT FEATURES (continued)

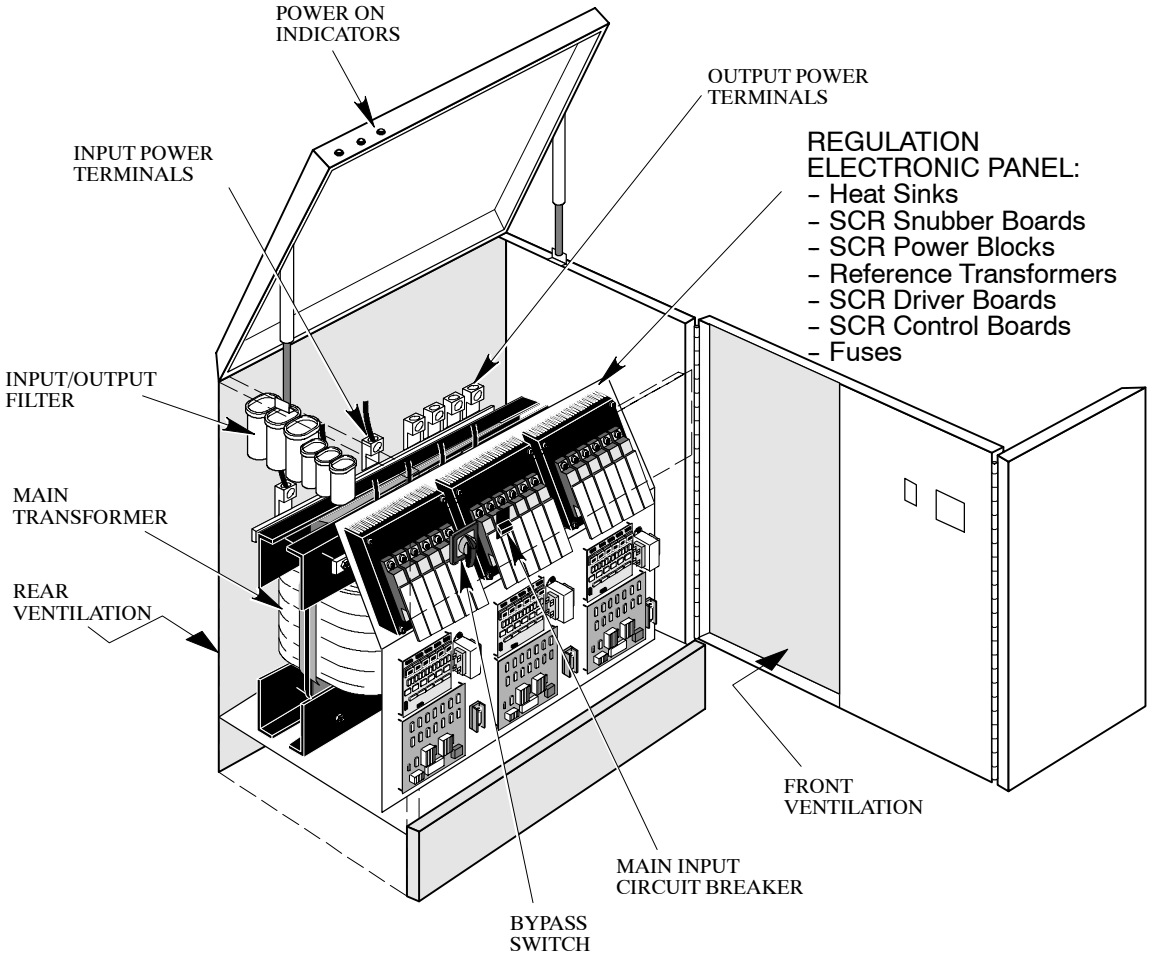


LIFE LINE REGULATORS; 15 TO 150 KVA, 480 VAC INPUT

MEDICAL POWER PC; 125 – 150 KVA, 480 VAC INPUT

ILLUSTRATION 1 – 4

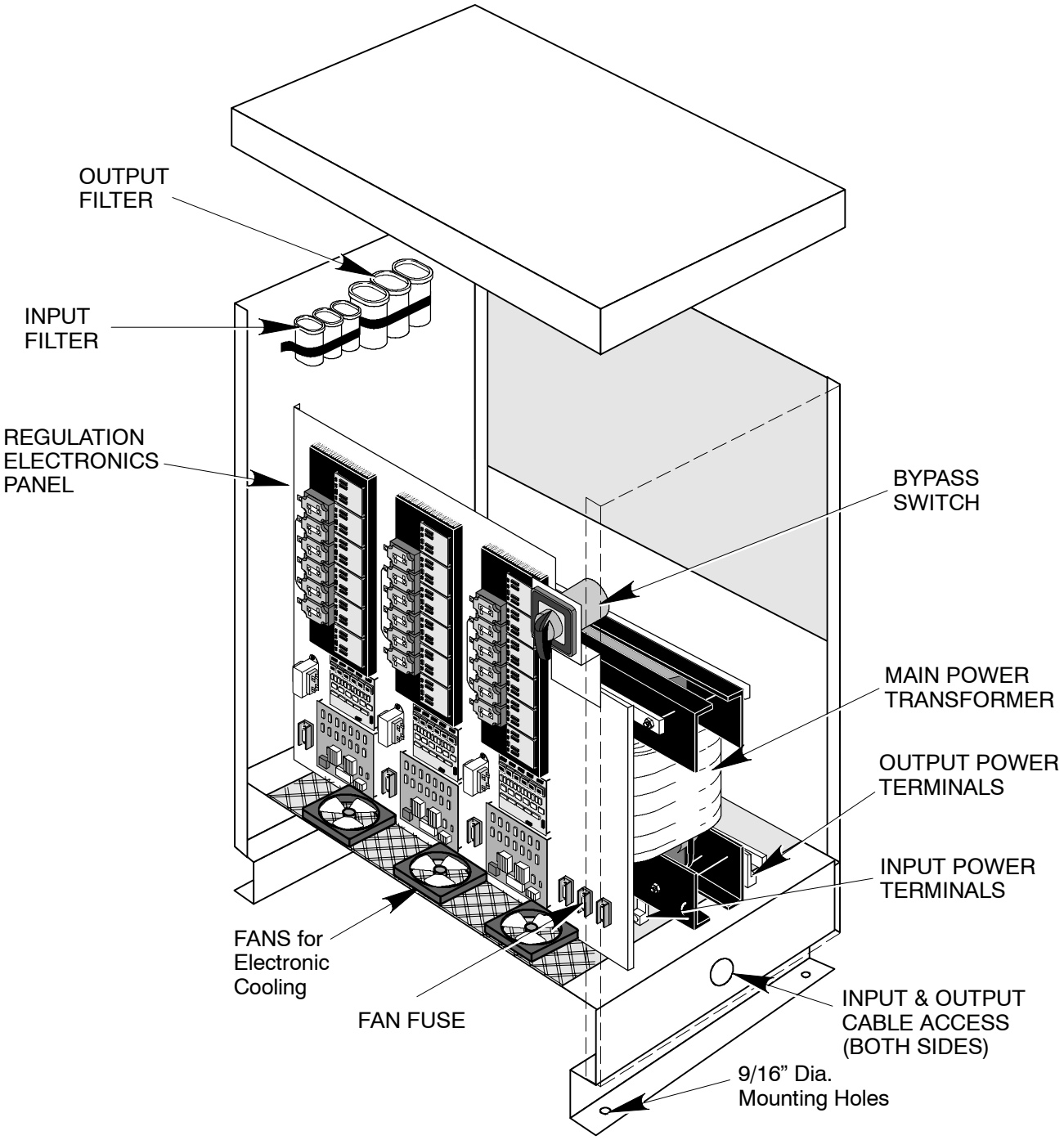
1 – 4 PRODUCT FEATURES (continued)



MEDICAL POWER PC (15 – 75 KVA) FEATURES

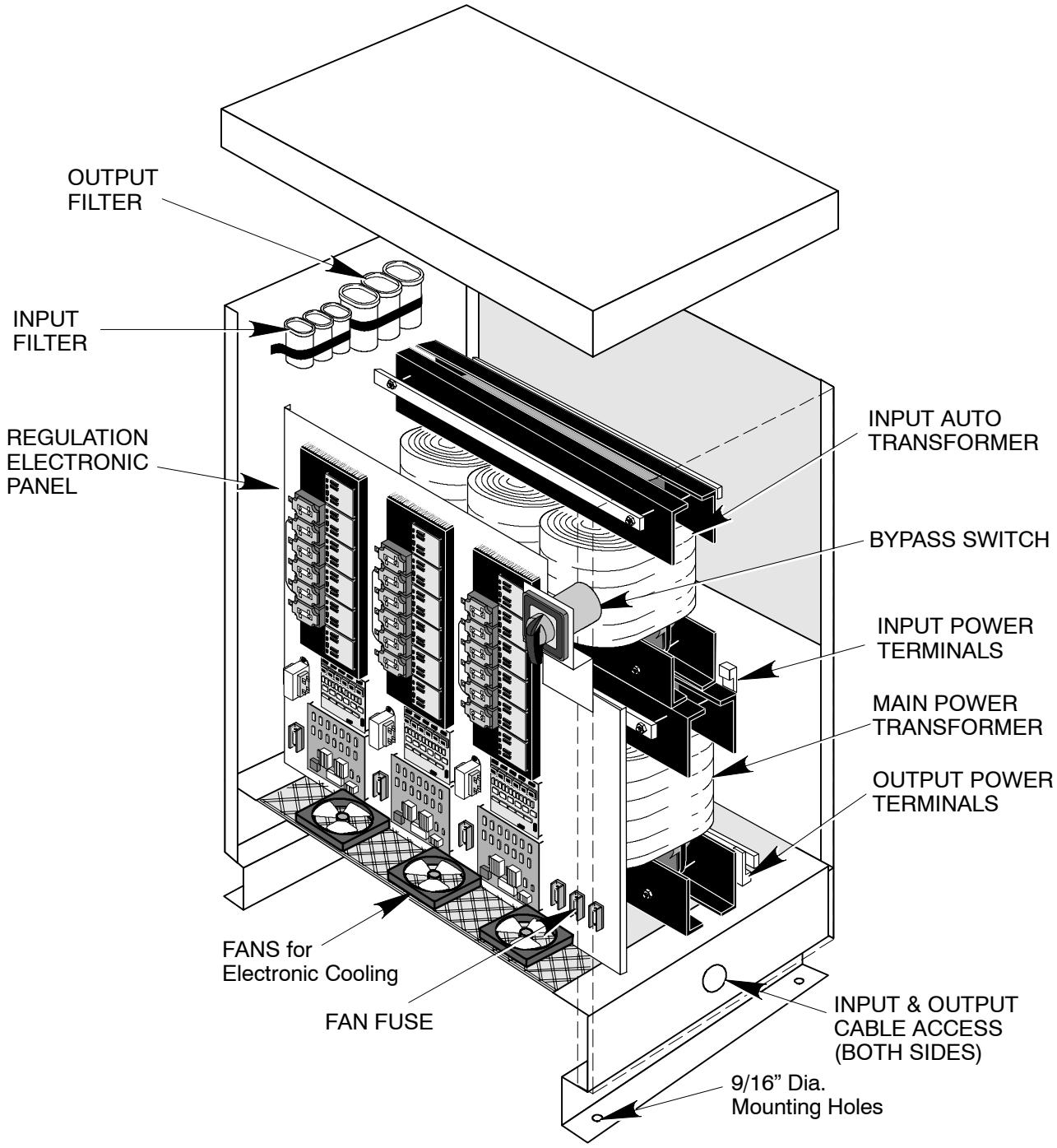
ILLUSTRATION 1 – 5

1 – 4 PRODUCT FEATURES (continued)



LIFE LINE REGULATOR; 175 KVA TO 300 KVA, 480 VAC INPUT
MEDICAL POWER PC; 125 KVA TO 300 KVA WITH 480 VAC INPUT
ILLUSTRATION 1 – 6

1 – 4 PRODUCT FEATURES (continued)



LIFE LINE REGULATOR AND MEDICAL POWER PC; 175 KVA TO 300 KVA, 208 VAC INPUT

ILLUSTRATION 1 – 7

1–4–1 Bypass Switch

The bypass switch is located on the front panel. See Illustrations 1–4 thru 1–7. This switch bypasses voltage regulation but maintains the functioning of the voltage change/isolation transformer between input and output. In AUTO position line to–neutral voltages are regulated. In MAN (manual) position, regulation logic is bypassed and input power is applied to load via transformer without regulation. Select the MAN position if there is a problem with regulation logic circuitry. Refer to Section 1–7–2, Nonregulating Condition for the procedure to operate the unit in bypass mode.

CAUTION

The Bypass Switch must never be changed with the unit powered up.

1–4–2 Main Input Circuit Breaker (IMCB)

The MAIN INPUT CIRCUIT BREAKER (IMCB) located on the front panel of the unit, is used to switch power to the unit ON and OFF. See Illustration 1–5.

The IMCB is shunt tripped by activation of a solenoid within the breaker when remote switches or thermal switches in the main transformer sense an over temperature condition. If the IMCB is shunt tripped, refer to Section NO TAG, Miscellaneous Problems for the reset procedure.

An optional undervoltage shunt–trip is available.

Be sure to observe ALL warnings and cautions when setting the IMCB to ON or OFF.

1–4–3 Power On Indicators

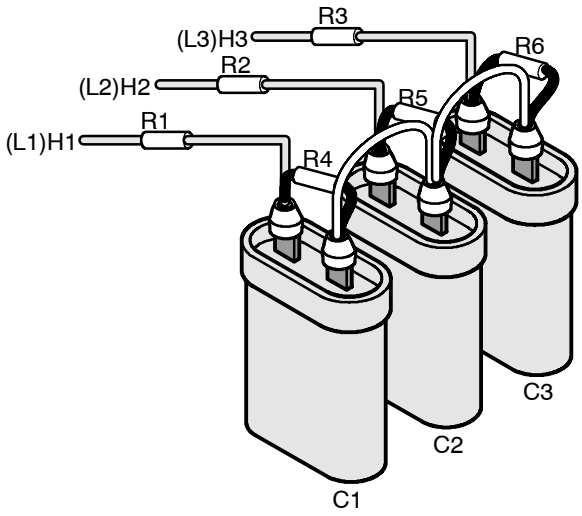
Power On Indicators are located on the front of the unit. See Illustration 1–5. There is one neon indicating light for each of the three phases. If a phase is lost, the corresponding indicator will extinguish indicating which phase is not powered.

1–4–4 Input and Output Power Terminals

Input and Output power connections are made at the terminals located beneath the transformer except the illustration 1–5 where the terminals are located above and to the rear of the main transformer. See Illustration 1–4. Terminals are labeled H1, H2, H3, or L1, L2, L3 for the input cable connections and X0, X1, X2, X3 for the output cable connections.

1–4–5 Input Filter

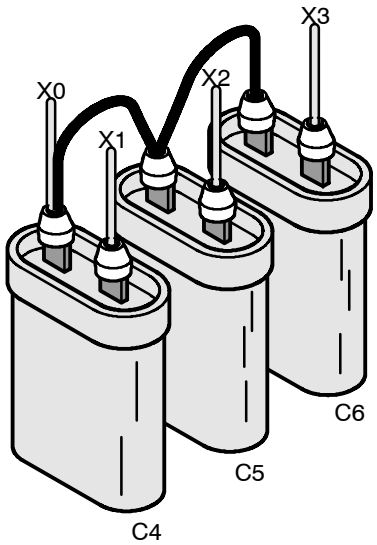
The Input filter is installed on the primary side of the transformer. The input filter consists of a resistor/capacitor network which acts as a large snubber circuit to eliminate high frequency impulses from entering the power system. See Illustration 1–8.



INPUT FILTER WIRING
ILLUSTRATION 1–8

1–4–6 Output Filter

The Output filter is installed on the transformer secondary. It consists of a capacitor network which prevents noise from being fed back to the unit from noise generating loads. See Illustration 1–9.
Output filters are standard on the Medical Power PC and optional on other models.



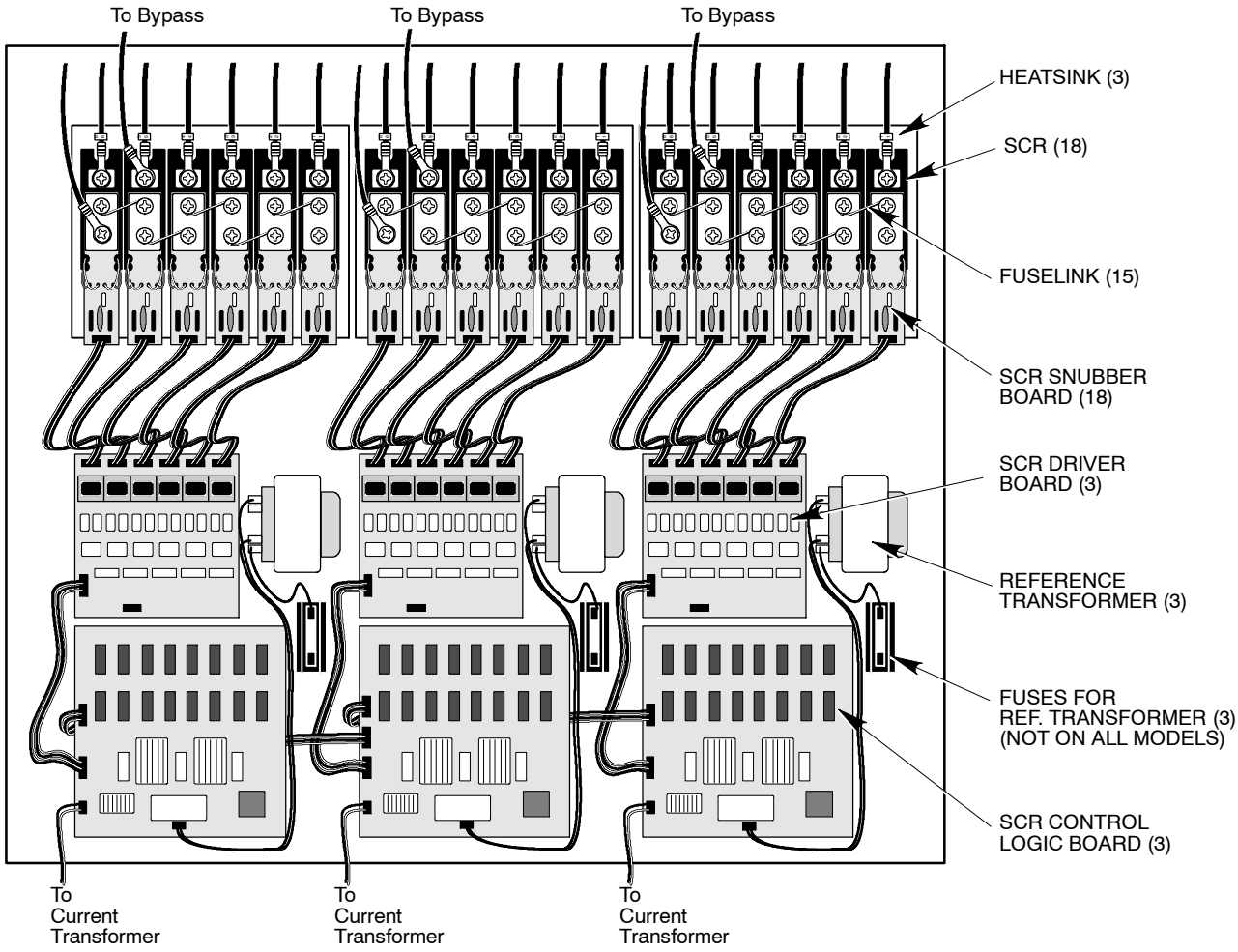
OUTPUT FILTER WIRING
ILLUSTRATION 1–9

1 – 5 REGULATION COMPONENTS

Regulation is accomplished by solid – state electronics which control the tap switching function at the zero – current – crossing. Refer to Section NO TAG, THEORY OF OPERATION for more detail.

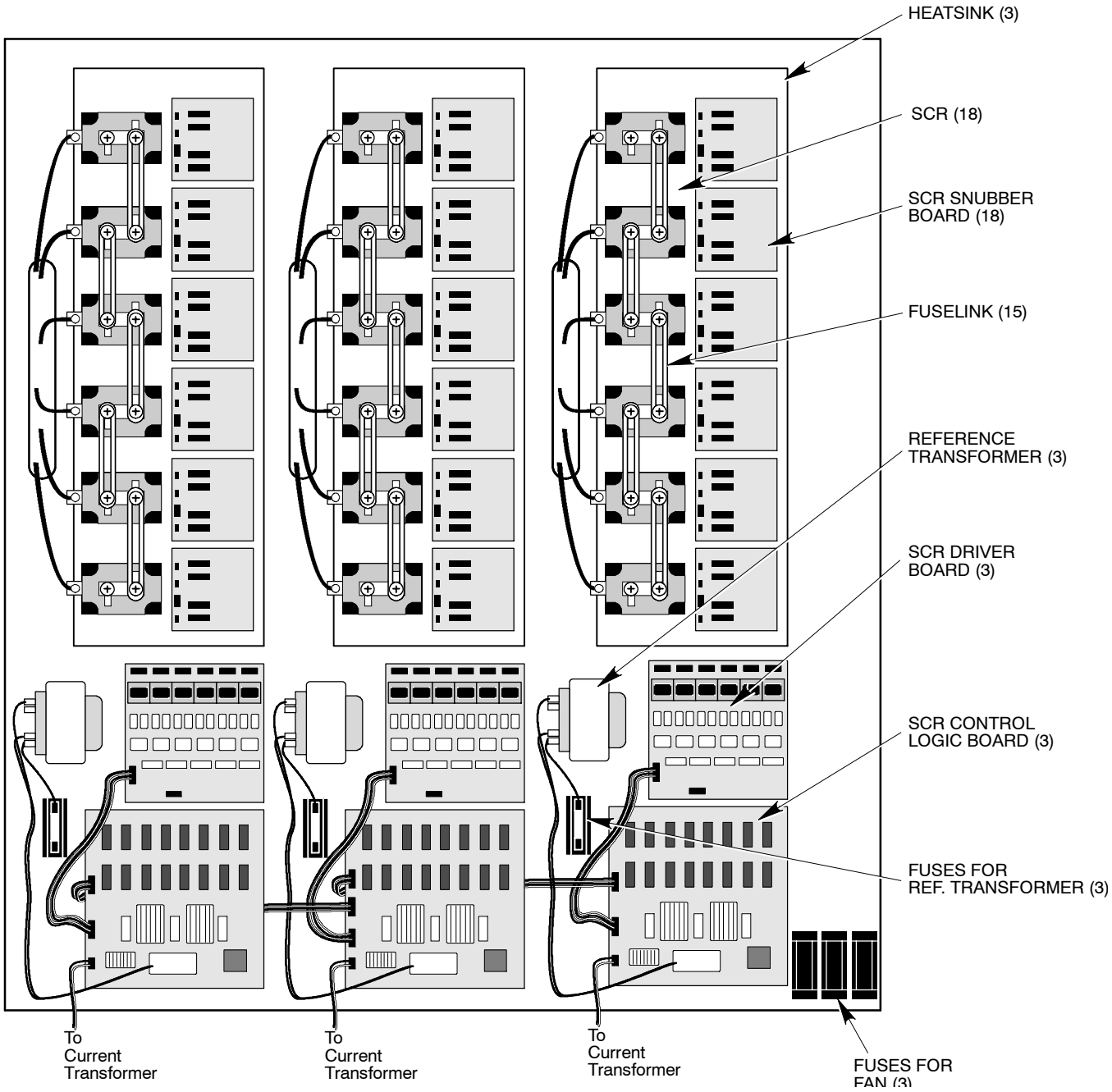
The regulation components are mounted on the regulation panel and can be seen by removing the front panel. See Illustration 1 – 10 and 1 – 11. The regulation components include 3 SCR Control logic boards, 3 SCR Driver boards, 18 SCR/SCR Snubber board assemblies, 3 current transformers, 3 reference transformers, and 3 heatsinks. See Illustration 1 – 12 for a block diagram of the regulation panel components.

Each SCR Control logic board has seven LEDs. The first six LEDs indicate the active tap selection during operation. LED 7 indicates power is applied to the board and is always lit during operation.



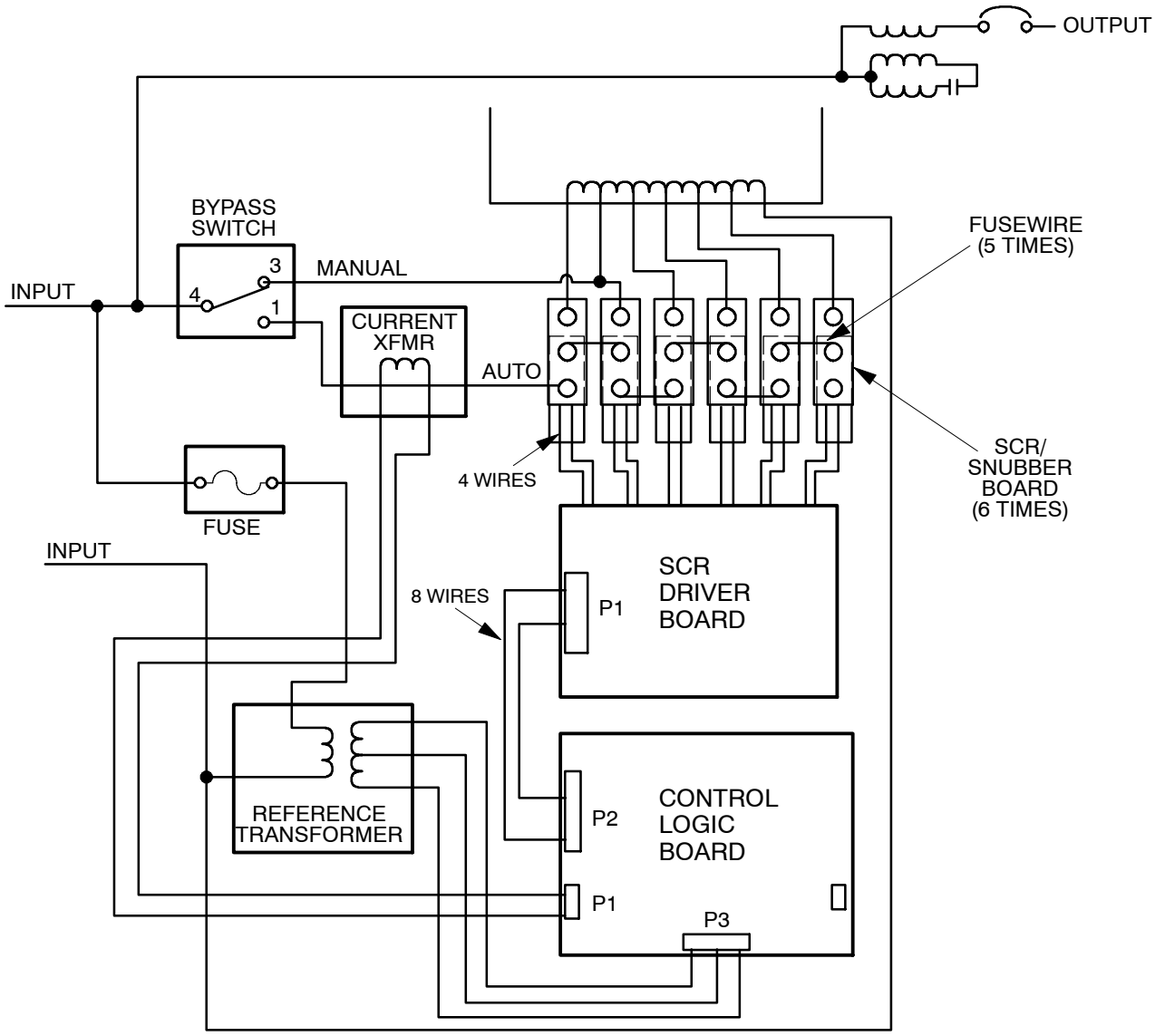
REGULATION PANEL ASSEMBLY LAYOUT
ILLUSTRATION 1 – 10

1 – 5 REGULATION COMPONENTS (continued)



REGULATION PANEL ASSEMBLY LAYOUT
ILLUSTRATION 1 – 11

1 – 5 REGULATION COMPONENTS (continued)



REGULATION BLOCK DIAGRAM
ILLUSTRATION 1 – 12

Note 1.
On Life Line Regulators Tap 5 of the transformer is selected. On the Medical Power PC, Tap 4 is selected.

1–6 STARTING THE UNIT

This procedure is to be used only for starting the unit during the normal course of operation. Follow this operating procedure any time the unit has been turned off in a non–emergency situation.

CAUTION

If this is the initial startup or if the unit has been moved, perform the Startup procedure in Section 3–1–7 before applying power to the unit.

CAUTION

If the unit is connected to a Power Island modular distribution center, verify that all panelboard output circuit breakers are OFF before turning on branch feeder circuit breaker.

1. Verify that Bypass Switch is set to AUTO.
2. Verify that connected load is OFF.
3. Energize facility branch circuit breaker.
4. Open front door (Medical Power PC only).
5. Set IMCB to ON (Medical Power PC only).
6. Close front door.
7. Turn ON connected load.

1–7 OPERATION

This unit is designed for unattended continuous operation. Units that have an IMCB can be switched ON and OFF on a regular basis using the IMCB as a switch.

1–7–1 Normal Condition

When the unit is powered up and regulating, the power on indicating lights will be illuminated on the Medical Power PC only.

The normal operating condition of the unit is as follows:

1. Facility branch circuit breaker set to ON.
2. Bypass switch in AUTO position.
3. Input Main Circuit Breaker ON (if applicable).
4. Connected load set to ON.
    - If Power Island connected, output panelboard circuit breakers ON (as required).

1–7–2 Nonregulating Condition

In case the regulating circuits fail to regulate, the unit can continue to operate in bypass mode (without regulation) until regulation can be restored. Follow the procedure listed below to operate the unit in bypass mode.

Note

The following procedure is only for temporary operation. Voltage surge and sag protection is not available for any load while the bypass switch is in manual mode (bypass switch is set to MAN).

1. Turn connected load OFF.
2. Set facility branch circuit breaker to OFF.
3. Set IMCB to OFF (if applicable).
4. Turn bypass switch from AUTO to MAN.
5. Set facility branch circuit breaker to ON.
6. Set IMCB to ON (if applicable).
7. Turn connected load ON.
8. Refer to manufacturer's service personnel.

SECTION 2 – PREINSTALLATION

2–1 LOCATION CONSIDERATIONS

OPERATING ENVIRONMENT. Provide an operating environment which meets the following conditions:

- AMBIENT TEMPERATURE 32˚ to 104˚ F
  0˚ to 40˚ C

- RELATIVE HUMIDITY
  Line Line Regulators and Medical Power PC: 10% to 90% (noncondensing)

POSITIONING. Position the unit so that the regulating electronics are not obstructed by objects that could make servicing the unit difficult. Allow minimum service access clearances as defined in Illustrations 2–3 and 2–4.

This unit is air cooled by convection. Do not block air flow from the front, rear, or bottom of the unit.

TABLE 2–1

Line Line Regulators SITE PLANNING SPECIFICATIONS

NOMINAL INPUT VOLTAGE	208	480
INPUT VOLTAGE RANGE	154 – 229	355 – 528
MAXIMUM INPUT VOLTAGE	229	528
FREQUENCY (Hz)	60	
AMBIENT TEMPERATURE ˚F (˚C)	80 (26.7)	

kVA SIZE	INPUT VOLTAGE	NOMINAL RATED CURRENT	COOLING BTU/hr	WEIGHT lbs (kg)	SIZE H x W x D in. (cm)
				WITHOUT PACKAGING	
15	208	42	2040	400 (181)	32 X 26.5 X 17 (107 X 67 X 43)
	480	18			
30	208	83	4080	500 (227)	
	480	36			
50	208	139	6800	700 (318)	40.5 X 31.5 X 22 (103 X 80 X 56)
	480	60			
75	208	208	10200	850 (386)	
	480	90			
100	208	277.6	13600	1250 (567)	66 X 50.5 X 32 (168 X 128 X 81)
	480	120		1000 (454)	40.5 X 31.5 X 22 (103 X 80 X 56)
125	208	347	17000	1400 (635)	66 X 50.5 X 32 (168 X 128 X 81)
	480	150		1100 (499)	51.5 X 40.5 X 26.5 (131 X 103 X 67)
150	208	416	20400	1500 (680)	66 X 50.5 X 32 (168 X 128 X 81)
	480	180.4		1200 (544)	51.5 X 40.5 X 26.5 (131 X 103 X 67)
175	208	485.8	23800	1700 (771)	66 X 50.5 X 32 (168 X 128 X 107)
	480	210.5		1400 (635)	
200	208	555	27200	2000 (907)	
	480	240.6		1500 (680)	
225	208	625	30600	2250 (1021)	
	480	270.6		1600 (726)	
250	208	694	34000	2450 (1111)	
	480	300.8		1800 (817)	
300	208	833	40800	2900 (1315)	
	480	361		1950 (885)	

TABLE 2–2
MEDICAL POWER PC SITE PLANNING SPECIFICATIONS

NOMINAL INPUT VOLTAGE	208	480
INPUT VOLTAGE RANGE	187.2 – 225	432 – 518
MAXIMUM INPUT VOLTAGE	225	518
FREQUENCY (Hz)	60	
AMBIENT TEMPERATURE °F (°C)	80 (26.7)	

kVA SIZE	INPUT VOLTAGE	NOMINAL RATED CURRENT	COOLING BTU/hr	WEIGHT lbs (kg)	SIZE H x W x D in. (cm)
				WITHOUT PACKAGING	
15	208	42	2040	400 (181)	42 X 32 X 22 (107 X 81 X 56)
	480	18			
30	208	83	4080	500 (227)	
	480	36			
50	208	139	6800	700 (318)	
	480	60			
75	208	208	10200	900 (408)	42 X 32 X 27 (107 X 81 X 69)
	480	90			
100	208	277.6	13600	1300 (590)	66 X 50.5 X 32 (168 X 127 X 81)
	480	120		1150 (522)	42 X 32 X 22 (107 X 81 X 56)
125	208	347	17000	1400 (635)	66 X 50.5 X 32 (168 X 128 X 81)
	480	150		1200 (544)	51.5 X 40.5 X 26.5 (131 X 103 X 67)
150	208	416	20400	1550 (703)	66 X 50.5 X 32 (168 X 128 X 81)
	480	180.4		1250 (567)	51.5 X 40.5 X 26.5 (131 X 103 X 67)
175	208	485.8	23800	1800 (817)	66 X 50.5 X 32 (168 X 128 X 81)
	480	210.5		1450 (658)	
200	208	555	27200	2100 (953)	
	480	240.6		1550 (703)	
225	208	625	30600	2350 (1066)	
	480	270.6		1650 (748)	
250	208	694	34000	2550 (1157)	
	480	301		1900 (862)	
300	208	833	40800	3000 (1361)	
	480	361		2000 (907)	

2–2 FLOOR LOADING

Sizes and weights of units are listed in the following tables. Provide a floor with strength sufficient for loads specified.

TABLE 2–3
Line Line Regulators FLOOR LOADING

kVA SIZE	INPUT VOLTAGE	FLOOR LOADING lbs/sq ft (kg/sq m)	kVA SIZE	INPUT VOLTAGE	FLOOR LOADING lbs/sq ft (kg/sq m)
15	208	128 (628)	150	208	129 (489
	480			480	161 (788)
30	208	160 (788)	175	208	152 (563)
	480			480	126 (464)
50	208	146 (710)	200	208	179 (662)
	480			480	134 (497)
75	208	176 (862)	225	208	202 (746)
	480			480	143 (530)
100	208	108 (414)	250	208	220 (811)
	480	208 (1013)		480	161 (597)
125	208	121 (464)	300	208	260 (960)
	480	148 (723)		480	175 (646)

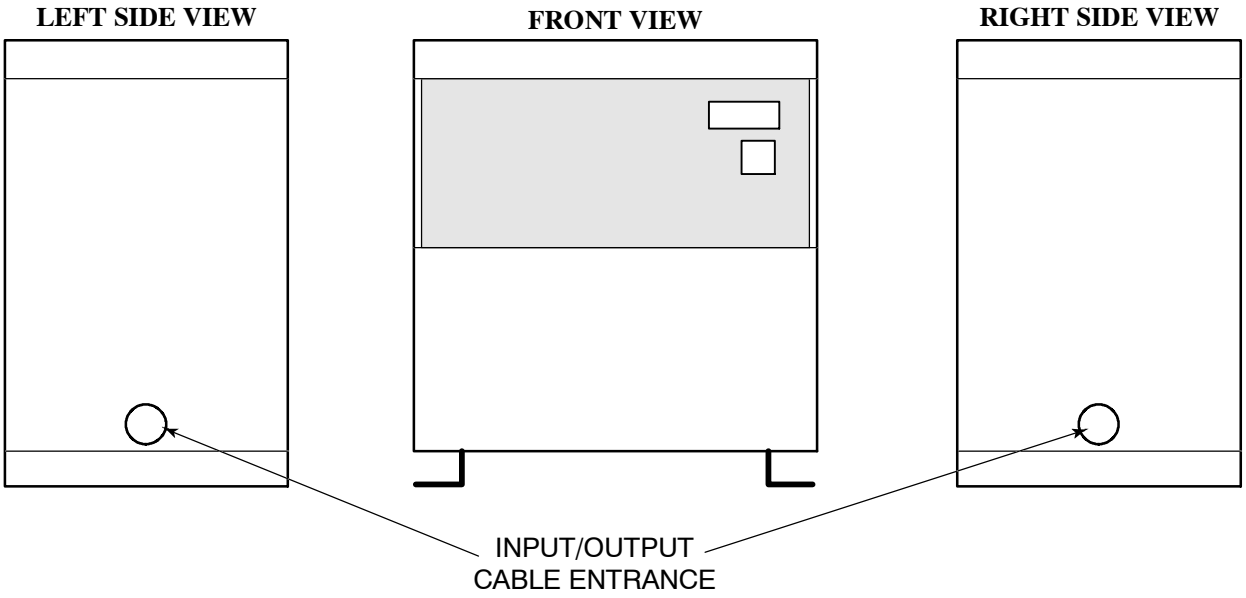
TABLE 2–4
Medical Power PC FLOOR LOADING

kVA SIZE	INPUT VOLTAGE	FLOOR LOADING lbs/sq ft (kg/sq m)	kVA SIZE	INPUT VOLTAGE	FLOOR LOADING lbs/sq ft (kg/sq m)
15	208	82 (399)	150	208	134 (513)
	480			480	168 (822)
30	208	102 (500)	175	208	155 (597)
	480			480	125 (480)
50	208	143 (701)	200	208	181 (696)
	480			480	134 (513)
75	208	184 (899)	225	208	206 (778)
	480			480	142 (546)
100	208	112 (431)	250	208	220 (845)
	480	192 (934)		480	164 (629)
125	208	121 (464)	300	208	259 (994)
	480	161 (788)		480	172 (662)

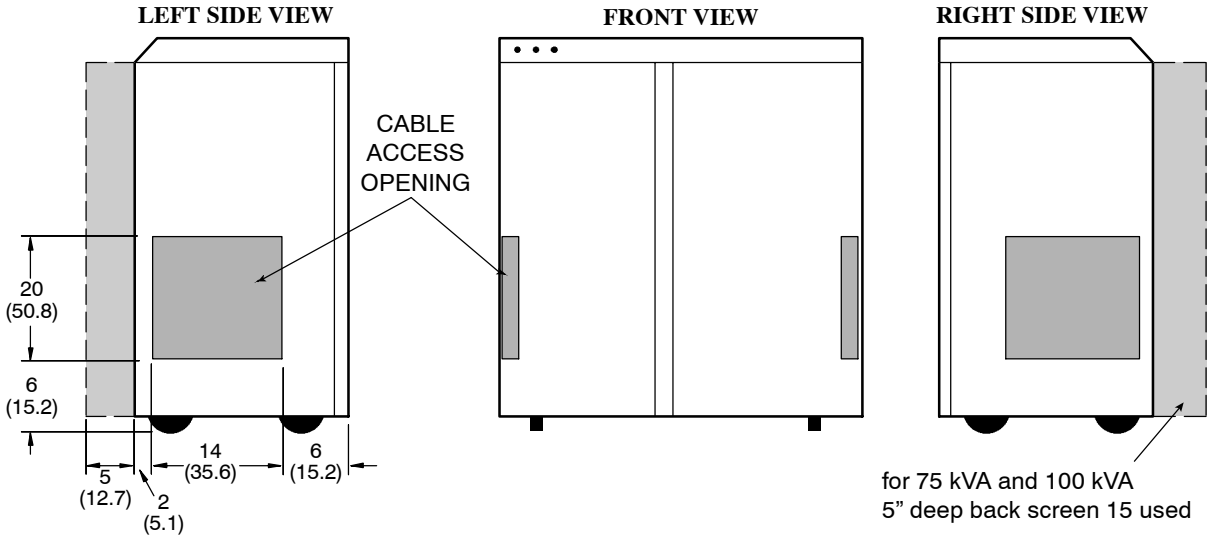
2–3 CABLE ACCESS AND FLOOR LAYOUT

2–3–1 Cable Access

Cable access to the Line Line Regulators and Medical Power PC, sizes 100 to 300 kVA, is through a 4” diameter hole in the right and left sides of the unit throught which the input and output cables can be passed. Cable access to the Medical Power PC, sizes 15 to 75 kVA is through an opening in the left and right side of the unit. See Illustrations 2–1 and 2–2.



LINE LINE REGULATORS AND MEDICAL POWER PC (100 – 300 KVA) CABLE ACCESS
ILLUSTRATION 2–1

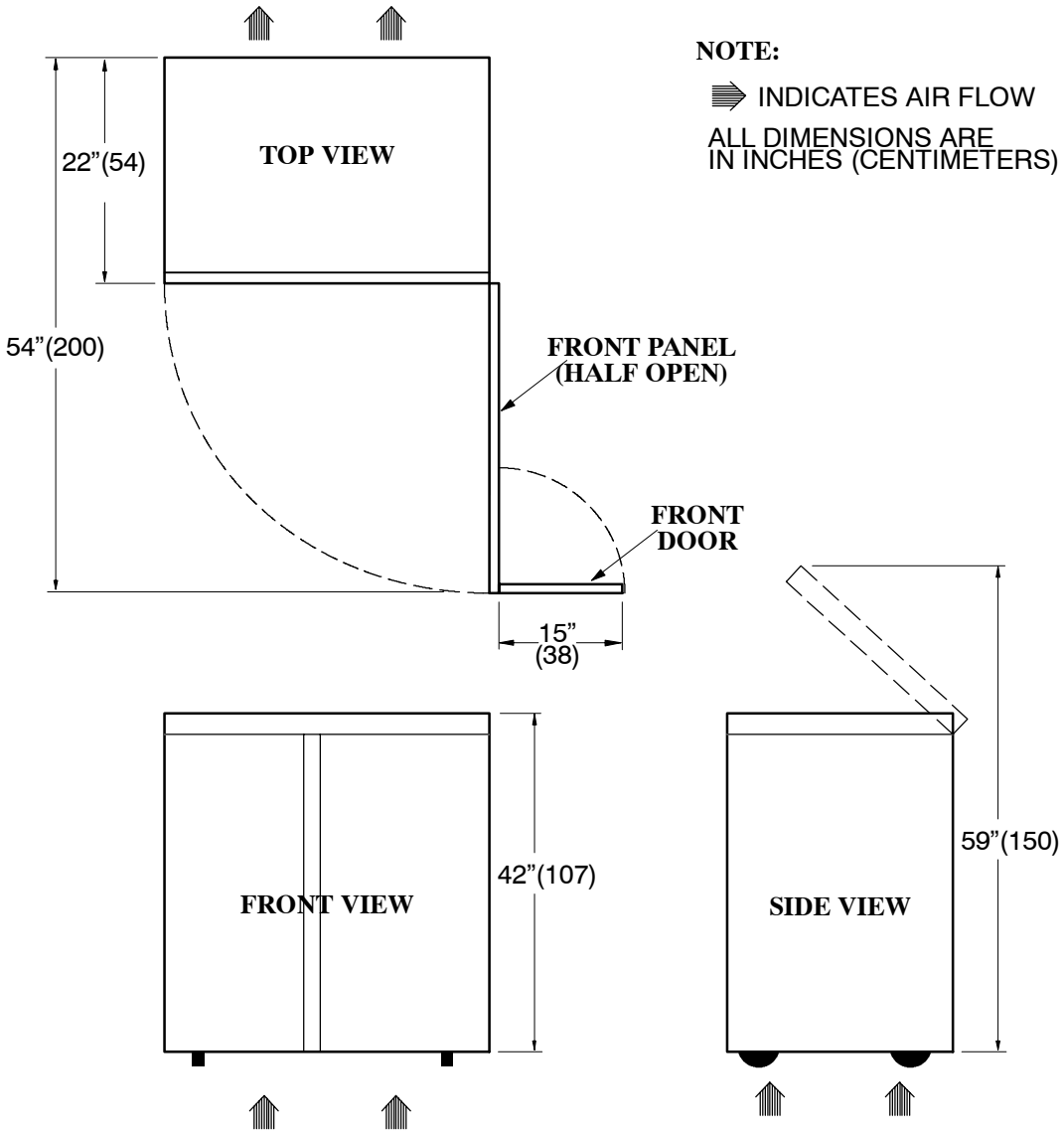


MEDICAL POWER PC (15 – 75 KVA) WITH 208 VAC INPUT, (15–100 KVA) WITH 480 VAC INPUT ACCESS
ILLUSTRATION 2–2

2–4 MOUNTING

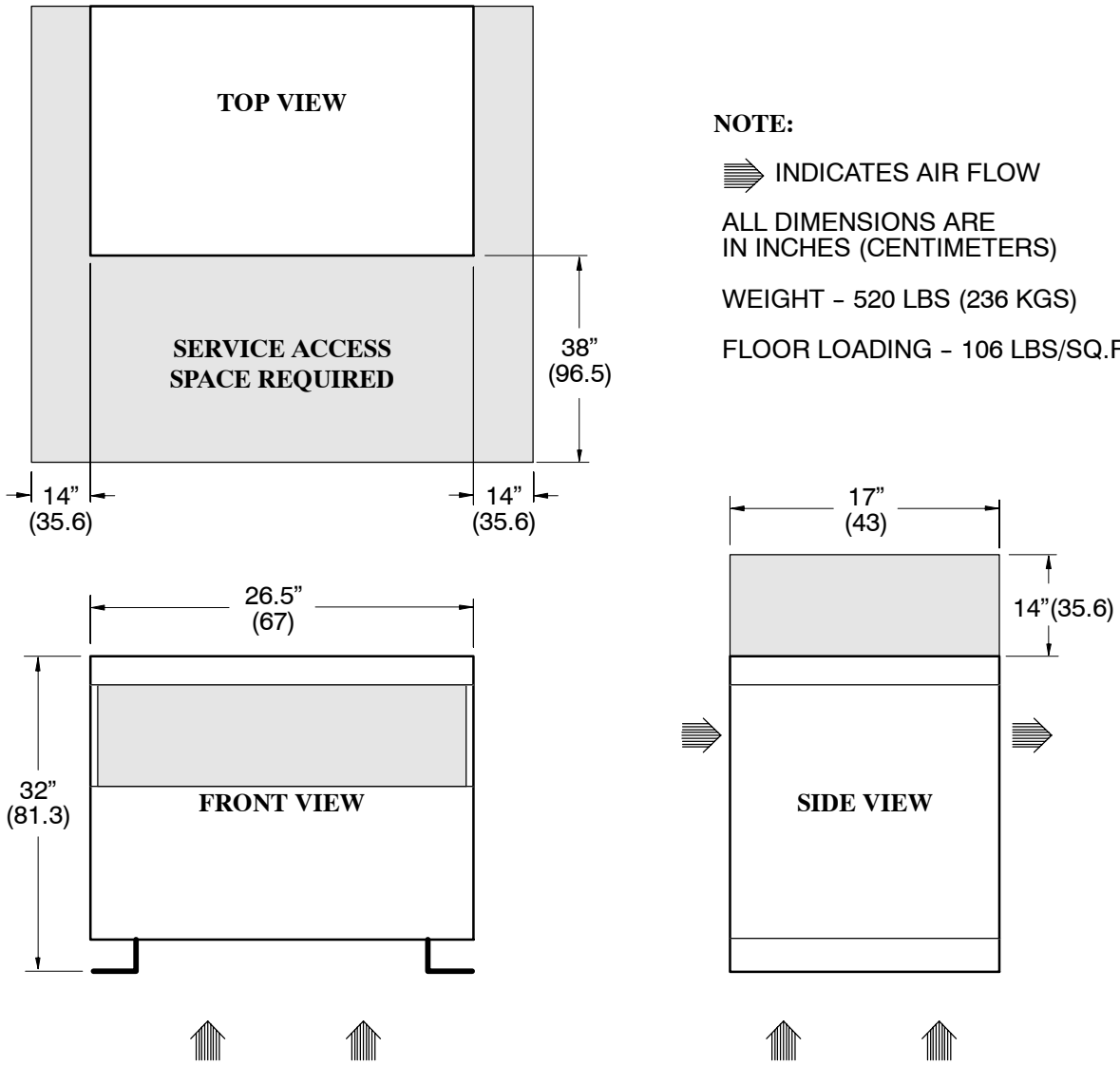
The Medical Power PC, sizes 15 to 75 kVA are equipped with leveling jacks to provide firm footing when the unit is set in its permanent location. With the leveling jacks in place, the unit cannot roll on the wheels. If local code requires the unit to be more firmly secured, mount the unit to the floor using angle brackets. A seismic option is available to mechanically attach the unit to the floor.

The Line Line Regulators and Medical Power PC, sizes 100 to 300 kVA, are equipped with angle–iron feet that have four 9/16–inch diameter holes pre drilled for mounting. Units can be bolted to the floor using these mounting holes.



MEDICAL POWER PC (15 – 75 KVA) CLEARANCES
ILLUSTRATION 2–3

2–4 MOUNTING (continued)



LINE LINE REGULATORS AND MEDICAL POWER PC (100 – 300 KVA) CLEARANCES
ILLUSTRATION 2–4

SECTION 3 – INSTALLATION

3–1 INSTALLATION

Install unit using the procedures in this section. Final installation must be in accordance with NEMA standards and conform to local electrical codes as appropriate.

3–1–1 Unpacking

Unit is shipped on a pallet, secured with metal bands and can be handeled using a fork lift or pallet jack.

DANGER!!

CUT METAL BANDS CAREFULLY. THEY ARE UNDER TENSION AND MAY CAUSE INJURY.

1. Position the container away from walls or other obstructions.
2. Cut metal shipping bands.
3. Remove cardboard cover. Avoid puncturing the cardboard cover with sharp objects which may damage the surface of the unit.
4. Remove the unit from the pallet.
   - Life Line Regulators and Medical Power PC (100– 300 kVA) can be removed using fork lift.
   - Medical Power PC (15 – 75 kVA) come with integral casters and are packed with a wooden ramp. Secure ramp from slipping and roll unit off pallet. Secure ramp to pallet before rolling unit down ramp.
5. Remove protective plastic film.
6. Inspect unit for damage per Section 3–1–2, Inspection.
7. Move unit to installation site.
8. Before final positioning of unit, verify that all cable routing conduit and raceway is positioned properly.

CAUTION

unit weighs from 400 lbs (181 kg) to 3,500 lbs (1,588 kg) including the packaging. Use care when rolling unit with integral casters. Plywood or steel plates may be used to distribute weight and protect floor surface from overload damage.

3–1–2 Inspection

Perform the following Inspection procedure of the unit to check for obvious damage or safety hazards that may have occurred during shipping or handling of the unit. All units must be inspected when received and again prior to use. Any damage must be reported immediately to ON–LINE POWER, INC. or an authorized representative. Freight damage claims should be initiated with the carrier.

CAUTION

Do not connect unit to building power until the following procedure has been completed.

1. Inspect all external surfaces (panels, covers, etc.) for abrasions, indentations, or other obvious damage.
2. File a claim with shipping agency for any damage caused by shipping.
3. Forward a copy of damage claim to ON–LINE POWER, INC. at the following address:

   ON–LINE POWER, INC.
   5701 Smithway Street
   City of Commerce, CA 90040

3–1–3 Input Cable Installation -- Life Line Regulators & Medical Power PC 100 -- 300 kVA

The customer–furnished input power cable provides power from the building power source to the unit. Both the circuit which feeds this cable and this cable should be dedicated to providing power only to this unit. This cable must include three, power conductors and an insulated ground conductor. Size the cable to suit the unit kVA rating, the input voltage and the overall length of the cable. The input power cable size and installation must be in accordance with the National Electrical Code (NEC) and applicable local requirements.

A parity sized ground, with respect to the primary input conductors is recommended. The grounding conductor is to be grounded to earth at the service equipment or other acceptable true building ground.

The unit has one 4–inch diameter hole in each side of the frame to accomodate the input and output power cables. There are no holes in the side panels. The holes in the panels can be sized, located and punched or drilled when the cable is installed. The input power cable can be connected through the left or right side of the unit.

If cables are crossed or wires are likely to touch, insulating sleeves or their equivalent must be used to prevent wires from touching.

Tools Required

- Phase Rotation Meter

CAUTION

Input power connection and required branch circuit breaker should be installed by a licensed electrical contractor in accordance with local codes.

3–1–3 Input Cable Installation – Life Line Regulators & Medical Power PC 100 – 300 kVA (continued)

CAUTION

Primary and secondary power circuit conductors must not touch each other. If conductors touch, use insulating sleeves.

DANGER!!

VERIFY THAT INCOMING HIGH–VOLTAGE CIRCUITS ARE DE–ENERGIZED BEFORE CONTINUING WITH THIS PROCEDURE.

PROCEDURE:

1. Turn facility circuit breaker to OFF, lock and tagout in accordance with OSHA Lockout/Tagout requirements.
2. Remove top cover by unbolting two bolts on each side of cover.
3. Remove front panel by unbolting six bolts at corners and at left and right sides of panel.
4. Punch or drill a hole in side panel.
   - Locate hole so that it aligns with existing hole in frame. See Illustration 2–4. Size hole to suit cable/conduit.
5. Insert cable/conduit through hole in panel and into hole in frame. Secure with appropriate fitting.
6. Prepare cable ends by removing 3/4–inch of insulation from each input power cable conductor.
7. Identify each phase conductor according to phase A, B, C. Identify ground conductor.
8. Route and connect phase conductors to input terminals on input labelled H1, H2, and H3 or L1, L2, and L3. See Illustration 1–4, 1–5, 1–6, and 1–7.
9. Locate ground lug on side of cabinet.
10. Route and connect ground conductor to ground lug.
11. Proceed to Section 3–1–4, for instructions to install output power cable.

3–1–4 Output Cable Installation -- Life Line Regulators and Medical Power PC 125 -- 300 kVA

The customer–furnished output power cable provides power from the unit to a connected load or to a Power Island when distribution to more than one connected load is required.

The unit has one 4–inch diameter hole in each side of the frame – as described in the preceeding section. The output power cable can be connected through the left or right side of the unit.

PROCEDURE:

1. Turn facility circuit breaker to OFF, lock and tagout in accordance with OSHA Lockout/Tagout requirements.
2. Remove top cover by unbolting two bolts on each side of cover.
3. Remove front panel by unbolting six bolts at corners and at left and right sides of panel.
4. Punch or drill a hole in side panel.
    - Locate hole so that it aligns with existing hole in frame. See Illustration 2–4. Size hole to suit cable/conduit.
5. Insert cable/conduit through hole in panel and into hole in frame. Secure with appropriate fitting.
6. Prepare cable ends by removing 3/4–inch of insulation from each output power cable conductor.
7. Identify each phase conductor according to phase A, B, C, Neutral, and Ground conductor.
8. Route and connect phase conductors to output terminals of the transformer X0, X1, X2, and X3. See Illustration 1–4, 1–5, 1–6, and 1–7.
9. Locate ground lug.
10. Route and connect ground conductor to ground lug.
11. Proceed to Section 3–1–7, Startup.

3–1–5 Input Cable Installation – Medical Power PC 15 – 100 kVA

The customer–furnished input power cable provides power from the building power source to the unit. Both the circuit which feeds this cable and this cable should be dedicated to providing power only to this unit. This cable must include three power conductors and an insulated ground conductor. Size the cable to suit the unit kVA rating, the input voltage and the overall length of the cable. The input power cable size and installation must be in accordance with the National Electrical Code (NEC) and applicable local requirements.

A parity sized ground, with respect to the primary input conductors is recommended. The grounding conductor is to be grounded to earth at the service equipment or other acceptable true building ground.

The input power cable should be installed through the left side panel. No holes are provided in the panel. A hole can be sized, located and drilled or punched when the cable is installed.

If cables are crossed or wires are likely to touch, insulating sleeves or their equivalent must be used to prevent wires from touching.

PROCEDURE:

1. Turn OFF facility circuit breaker, lock and tagout according to OSHA requirements.
2. Open front door.
3. Verify that the Main Input Circuit Breaker is set to OFF (as applicable).
4. Open the hinged front panel by unbolting the three screws on the left side of panel and removing the screw to the top and swinging panel to the right.
5. Remove rear panel by unbolting 6 screws located on the corners and right and left sides of the panel.

DANGER!!

VERIFY THAT INCOMING HIGH–VOLTAGE CIRCUITS ARE DE–ENERGIZED BEFORE CONTINUING WITH THIS PROCEDURE.

6. Punch or drill holes in left side panel to accomodate input cable.
7. Route and connect the 3 power wires to input power terminals labelled L1, L2, and L3. See Illustration 1–5.
8. Route and connect the ground wire to the ground lug on the cabinet.
9. Proceed to Section 3–1–6 to install output cable.

3–1–6 Output Cable Installation -- Medical Power PC 15 -- 100 kVA

The customer–furnished output power cable provides power from the unit to a connected load or to a Power Island when distribution to more than one connected load is required.

This cable should be installed through the right side panel. No holes are provided in the panel. A hole can be sized, located and drilled or punched when the cable is installed.

Procedure

1. Turn OFF facility circuit breaker, lock and tagout according to OSHA requirements.
2. Open front door.
3. Verify that the Main Input Circuit Breaker is set to OFF (as applicable).
4. Open the top panel by removing the screw from the front panel and lift the top panel to it's up position.
5. Remove rear panel by unbolting 6 screws located on the corners and right and left sides of the panel.

DANGER!!

VERIFY THAT INCOMING HIGH–VOLTAGE CIRCUITS ARE DE–ENERGIZED BEFORE CONTINUING WITH THIS PROCEDURE.

6. Punch or drill holes in right side panel to accomodate output cable.
7. Route and connect the 4 power wires to output terminals. (X0, X1, X2, and X3) See Illustration 1–5.
8. Route and connect the ground wire to the ground lug on the cabinet.
9. Proceed to Section 3–1–7, Startup to complete the installation.

3–1–7 Startup -- Life Line Regulators and Medical Power PC (100 -- 300 kVA)

After connecting the input and output cables and before placing the unit in service, verify the output voltage using the following procedure.

Tools Required

- Phase Rotation Meter
- Voltage meter

FATAL ELECTRIC SHOCK HAZARD!! TO PREVENT FATAL ELECTRIC SHOCK DISCONNECT POWER FROM UNIT AND LOCK OFF BEFORE YOU PERFORM THE FOLLOWING PROCEDURE.

PROCEDURE:

1. Verify that facility circuit breaker is OFF, locked and tagged according to OSHA requirements.
2. Check power connections.
3. Verify that there are no obstructions that restrict air flow.
4. Unlock facility circuit breaker and set to ON.
5. Check that input power is phased in clockwise rotation (A, B, C). Use phase rotation meter.
6. Measure the input voltages phase to phase and be sure the readings agree with the values listed on the label plate.
7. Measure the line–to–neutral output voltages as follows:
   a. Verify that output line to neutral voltages agree with the values listed on the label plate located on the front panel and in Appendix A.
      - If output voltage readings are out of specification, refer to Section 3–1–9, Calibrate Control Logic Board, otherwise, continue to next step.
8. Turn OFF power to connected load.
9. Turn OFF facility circuit breaker, lock and tagout according to OSHA requirements.

3–1–7 Startup – Life Line Regulators and Medical Power PC (100 – 300 kVA) (continued)

10. Replace front panel.

11. Unlock and turn ON power to facility circuit breaker.

The unit is ready for service.

3–1–8 Startup – Medical Power PC 15 – 100 kVA

After connecting the input and output cables and before placing the unit in service, verify the output voltage using the following procedure.

Tools Required

- Phase Rotation Meter
- Voltage meter

PROCEDURE:

1. Verify that connected load is OFF.

2. Turn OFF facility circuit breaker, lock and tagout according to OSHA requirements.

FATAL ELECTRIC SHOCK HAZARD!! TO PREVENT FATAL ELECTRIC SHOCK DISCONNECT POWER FROM UNIT AND LOCK OFF BEFORE YOU PERFORM THE FOLLOWING PROCEDURE.

3. Open front door.

FATAL SHOCK HAZARD!! LETHAL VOLTAGES EXIST WITHIN THE UNIT DURING THE FOLLOWING CHECK. FOLLOW THE STEPS BELOW EXACTLY. FAILURE TO DO SO COULD RESULT IN SEVERE INJURY OR DEATH.

3–1–8 Startup – Medical Power PC 15 – 100 kVA (continued)

4. Verify that IMCB is OFF.
5. Check power connections.
6. Verify that there are no obstructions that restrict air flow.
7. Unlock facility circuit breaker and set to ON.
8. Turn on IMCB on Medical Power PC.
9. Check that input power is phased in clockwise rotation (A, B, C). Use phase rotation meter.
10. Measure the input voltages phase to phase and be sure the readings agree with the values listed on the label plate.
11. Measure the line–to–neutral output voltages as follows:

    b. Verify that output line to neutral voltages agree with the values listed on the label plate located on the inside of the front door and in Appendix A.

    - If output voltage readings are out of specification, refer to Section 3–1–9, Calibrate Control Logic Board, otherwise, continue to next step.

12. Turn OFF IMCB.
13. Turn OFF facility circuit breaker, lock and tagout according to OSHA requirements.
14. Close front panel.
15. Unlock and turn ON facility circuit breaker.
16. Turn IMCB ON (as applicable).
17. Close front door.

The unit is ready for service.

3–1–9 Calibrate Control Logic Board

The SCR driver board has seven green LEDs. LED 7 indicates power is applied to the board and is illuminated any time power to the unit is on. LEDs 1 through 6 represent tap settings and only one of these six LEDs should be on at any time. See Illustration 3–2. It is normal for the LED's 1 through 6 to delay 6 seconds after the power LED has turned on.

If no LED is lit or if two or more LEDs are lit, immediately turn facility circuit breaker OFF or turn IMCB to OFF (if installed). The regulator can be placed on manual operation for emergency service. See Section 1–7–2.

If only one LED (1 through 6) is lit, perform the following calibration:

PROCEDURE:

1. Turn connected load OFF.
2. Turn facility circuit breaker OFF, lock and tagout in accordance with OSHA Lockout/Tagout requirements.
3. Open Life Line Regulators, Medical Power PC (100 – 300 kVA) as follows:
   a. Remove front panel by unbolting six screws at corners and left and right sides of each panel.
4. Open Medical Power PC (15 – 75 kVA) as follows:
   a. Open front door.
   b. Set IMCB to OFF (as applicable).
   c. Open hinged front panel by unbolting three screws at left side of panel. Swing panel to right.
5. Unlock facility circuit breaker and turn ON.
6. Set IMCB to ON (as applicable).
7. Turn connected load ON.

3–1–9 Calibrate Control Logic Board (continued)

DANGER!!

FATAL SHOCK HAZARD!! LETHAL VOLTAGES EXIST WITHIN THE UNIT DURING THE FOLLOWING CHECK. FOLLOW THE STEPS BELOW EXACTLY. FAILURE TO DO SO COULD RESULT IN SEVERE INJURY OR DEATH.

8. Make the following adjustments on the Control logic board for phase A: See Illustration 3–1.

   a. Measure AC voltage across R1 or R2. Voltage should be between 10 and 100mv.

   b. Measure DC voltage across C42.

   c. Adjust R62 until voltage reads 8.5 VDC with a load of 1 kw for 50 kVA or less and 2 kw load for 75 kVA or larger.

   Note
   Potentiometer R62 is a 30–turn pot. It may require several turns before output level changes.

   d. Adjust R39 counter clockwise until LED 6 is lit. See Illustration 3–1 and Illustration 3–2.

   e. Measure DC voltage across C42.

   f. Adjust R62 until voltage reads 8.5 V.

   g. Measure neutral–to–phase A output voltage between transformer terminals X1 and X0.
   Refer to Appendix B for transformer terminal configuration.

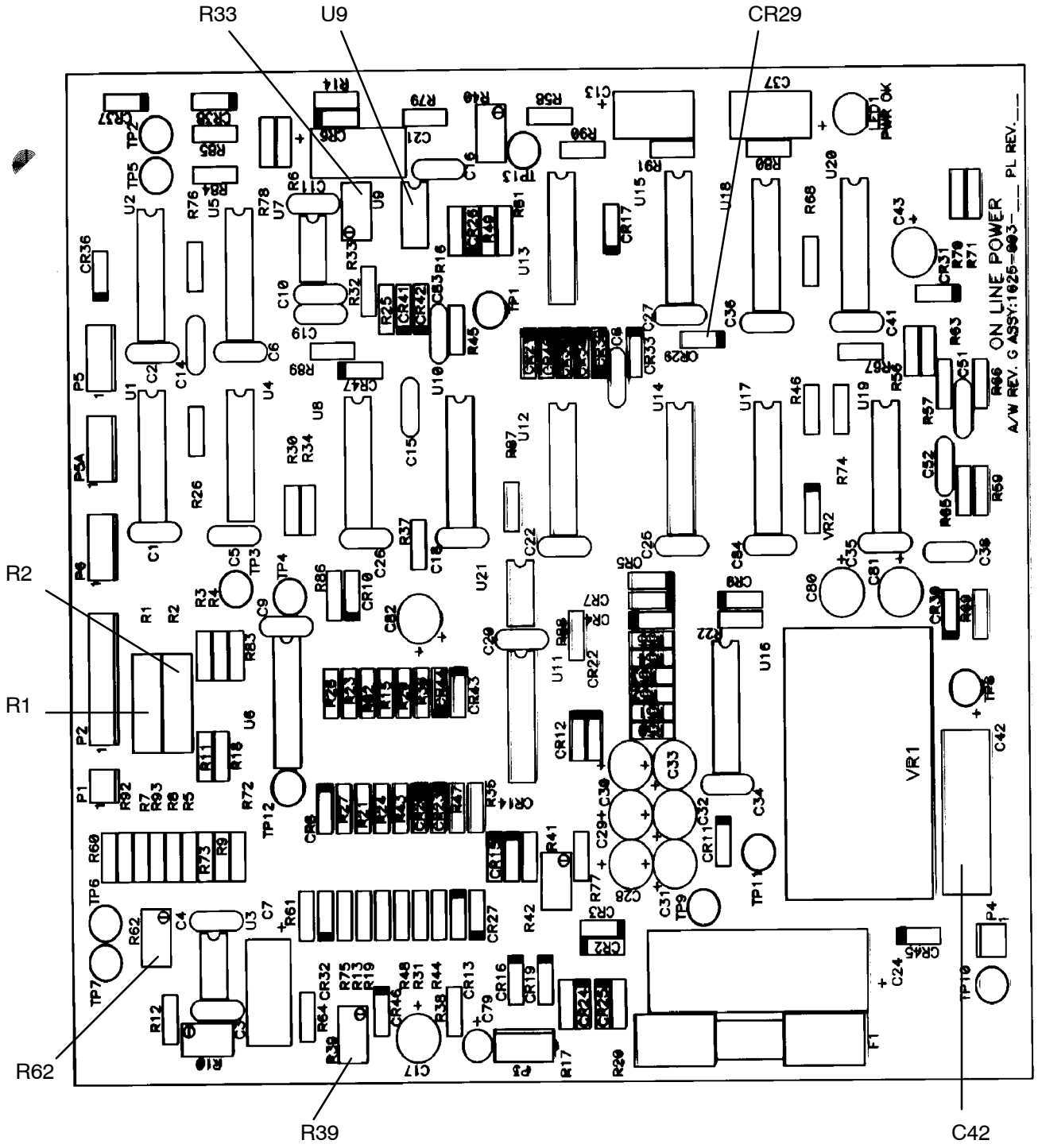
   h. Adjust R39 until output voltage reads 120V or 277V, phase to neutral, depending on rated output voltage.

   - Output voltage should be ± 3% of nominal for Life Line Regulators
     Output voltage should be ± 2% of nominal for Medical Power PC

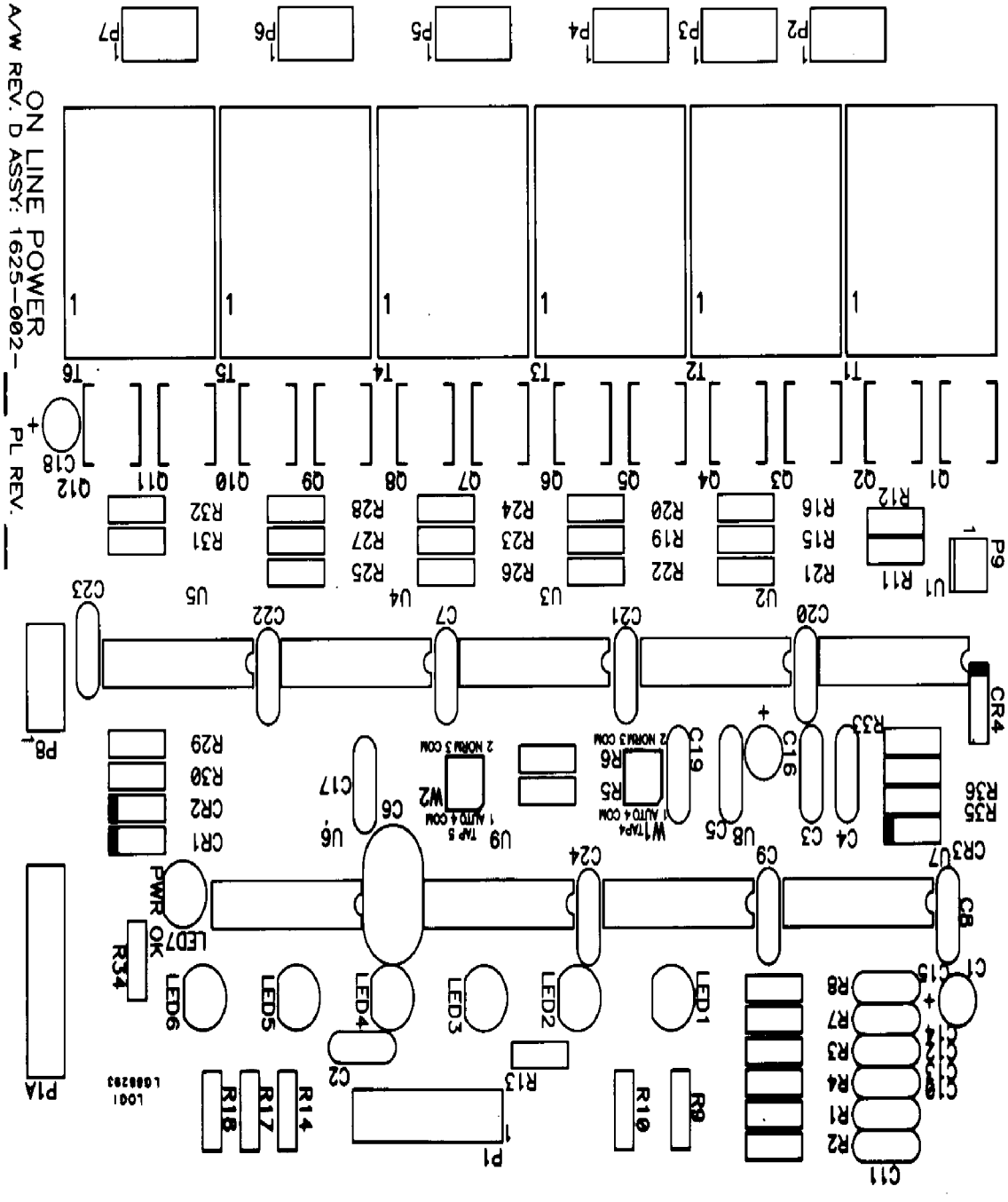
   Note
   Output voltage does not change linearly as potentiometer R39 is rotated. Output voltage does a step change. Pot R39 is a 30–turn pot. It may require several turns before output level changes.

   i. Repeat the procedure on the phase–B and phase–C Control logic boards. Take voltage measurements between transformer terminals X2 and X0 and between X3 and X0 respectively for phase B and C.

REV A



CONTROL LOGIC BOARD
ILLUSTRATION 3–1

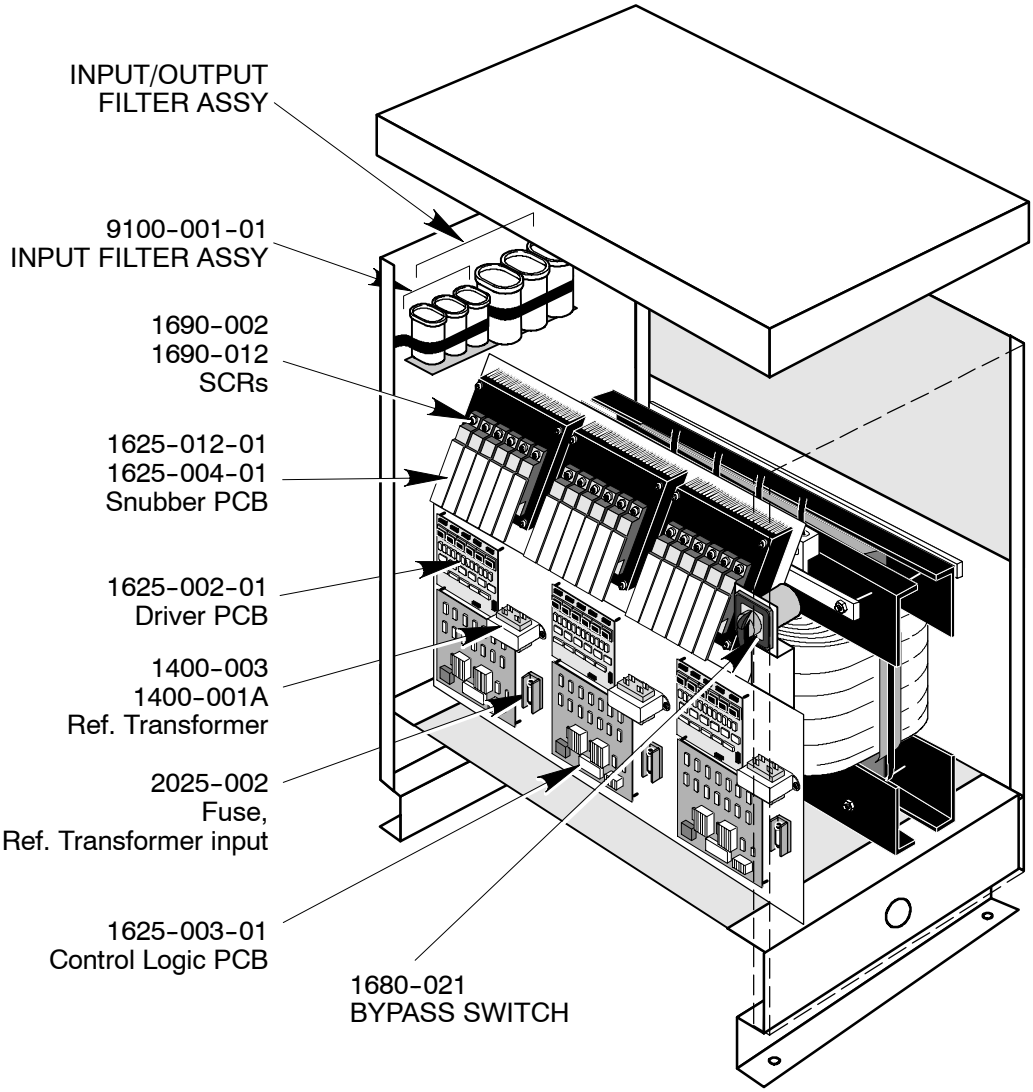


SCR DRIVER BOARD
ILLUSTRATION 3–2

3–2 CONFIGURATION

The unit is shipped factory configured. No configuration is necessary. Do not change tap connections.

3–3 RENEWAL PARTS, Life Line Regulator



3–3–1 Vendor Parts List, Life Line Regulator

Vendor No.	Vendor	Description (Remarks)
1680–021	Crucial Power	SWITCH, BYPASS, 1 USED
1680–042	Crucial Power	SWITCH, BYPASS, 1 USED
1425–001	Crucial Power	TRANSFORMER, CURRENT 50:5, 3 USED (Note 1)
1425–004	Crucial Power	TRANSFORMER, CURRENT 1000:1, 3 USED (Note 1)
1425–003	Crucial Power	TRANSFORMER, CURRENT 100:5, 3 USED (Note 1)
1425–007	Crucial Power	TRANSFORMER, CURRENT 200:5, 3 USED (Note 1)
1425–002	Crucial Power	TRANSFORMER, CURRENT 400:5, 3 USED (Note 1)
1690–002	Crucial Power	SCR, 15–50 KVA MODEL, 18 USED
1690–012	Crucial Power	SCR, 75–175 KVA MODEL, 18 USED
1690–011	Crucial Power	SCR, 200–300 KVA MODEL, 18 USED
1625–004–01	Crucial Power	PCB, SNUBBER, SCR, 15–50 KVA MODEL, 18 USED
1625–012–01	Crucial Power	PCB, SNUBBER, SCR, 75–175 KVA MODEL, 18 USED
121543003–02	Crucial Power	PCB, SNUBBER, SCR, 200–300 KVA MODEL, 18 USED
1625–002–01	Crucial Power	PCB, SCR DRIVER, 3 USED
1400–001A	Crucial Power	TRANSFORMER, REFERENCE, 208 V PRI, 3 USED
1400–003	Crucial Power	TRANSFORMER, REFERENCE, 480 V PRI, 3 USED
9100–001–01	Crucial Power	INPUT FILTER ASSY, 1 USED (not shown)
1625–003–01	Crucial Power	PCB, CONTROL LOGIC, 3 USED

NOTES:

1. For current transformer part numbers, refer to Tables 3–1.

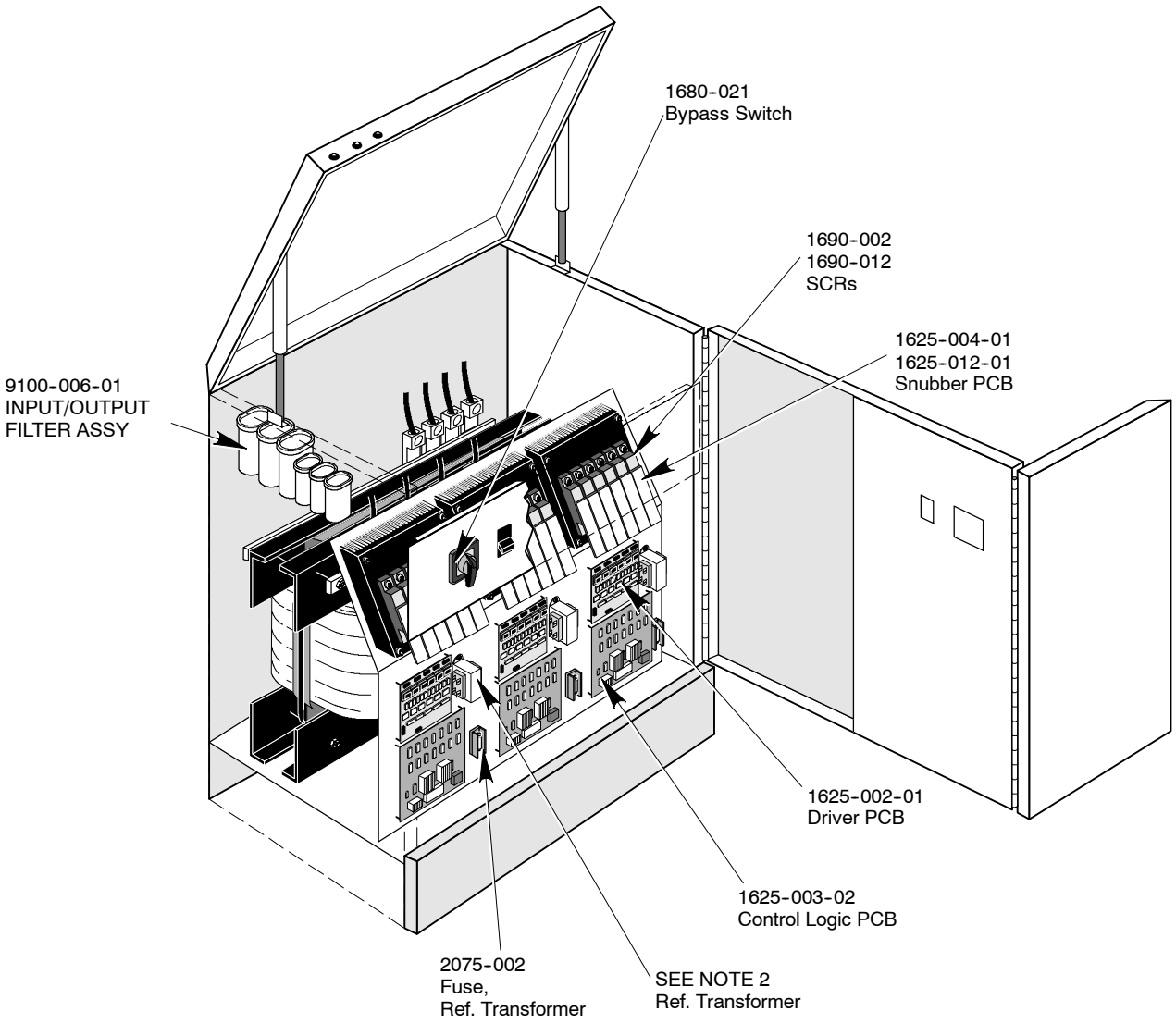
2. Reference transformer part numbers:
   For 208 V input use 1400–001A
   For 480 V input use 1400–003

3–3–1 Vendor Parts List, Life Line Regulator (continueed)

TABLE 3–1
LIFE LINE REGULATOR CURRENT TRANSFORMERS

SIZE (KVA)	MODEL NUMBER	INPUT VOLTAGE	CURRENT TRANSFORMER
15	PR015B0500T3 PR015B0900T3	208	1425–001
	PR015H0500T3 PR015H0900T3	480	1425–017
30	PR030B0500T3 PR030B0900T3	208	1425–007
	PR030H0500T3 PR030H0900T3	480	1425–003
50	PR050B0500T3 PR050B0900T3	208	1425–007
	PR050H0500T3 PR050H0900T3	480	1425–003
75	PR075B0500T3 PR075B0900T3	208	1425–005
	PR075H0500T3 PR075H0900T3	480	1425–007
100	PR100H0500T3 PR100H0900T3	480	1425–007
125	PR125H0500T3 PR125H0900T3	208 & 480	1425–007
150	PR150H0500T3 PR150H0900T3	208 & 480	1425–005
175	PR175H0500T3 PR175H0900T3	208 & 480	1425–005
200	PR200H0500T3 PR200H0900T3	208 & 480	1425–002
225	PR225H0500T3 PR225H0900T3	208 & 480	1425–002
250	PR250H0500T3 PR250H0900T3	208 & 480	1425–004
300	PR300H0500T3 PR300H0900T3	208 & 480	1425–004

3–4 RENEWAL PARTS, Medical Power PC (15 – 75 kVA)



3–4–1 Vendor Parts List, Medical Power PC (15 – 75 kVA)

Vendor No.	Vendor	Description (Remarks)
1680–021	Crucial Power	SWITCH, BYPASS, 1 USED
1425–001	Crucial Power	TRANSFORMER, CURRENT 50:5, 3 USED (Note 1)
1425–017	Crucial Power	TRANSFORMER, CURRENT 25:5, 3 USED (Note 1)
1425–003	Crucial Power	TRANSFORMER, CURRENT 100:5, 3 USED (Note 1)
1425–005	Crucial Power	TRANSFORMER, CURRENT 300:5, 3 USED (Note 1)
1425–007	Crucial Power	TRANSFORMER, CURRENT 200:5, 3 USED (Note 1)
1690–002	Crucial Power	SCR, 15–50 KVA MODEL, 18 USED
1690–012	Crucial Power	SCR, 75 KVA MODEL, 18 USED
1625–004–01	Crucial Power	PCB, SNUBBER, SCR, 15–50 KVA MODEL, 18 USED
1625–012–01	Crucial Power	PCB, SNUBBER, SCR, 75 KVA MODEL, 18 USED
1625–002–01	Crucial Power	PCB, SCR DRIVER, 3 USED
1400–001A	Crucial Power	TRANSFORMER, REFERENCE, 208 V PRI, 4 USED (Note 2)
1400–003	Crucial Power	TRANSFORMER, REFERENCE, 480 V PRI, 6 USED (Note 2)
9100–001–01	Crucial Power	INPUT FILTER ASSY, 1 USED (not shown)
9100–006–01	Crucial Power	INPUT/OUTPUT FILTER ASSY, 1 USED (not shown)

NOTES:

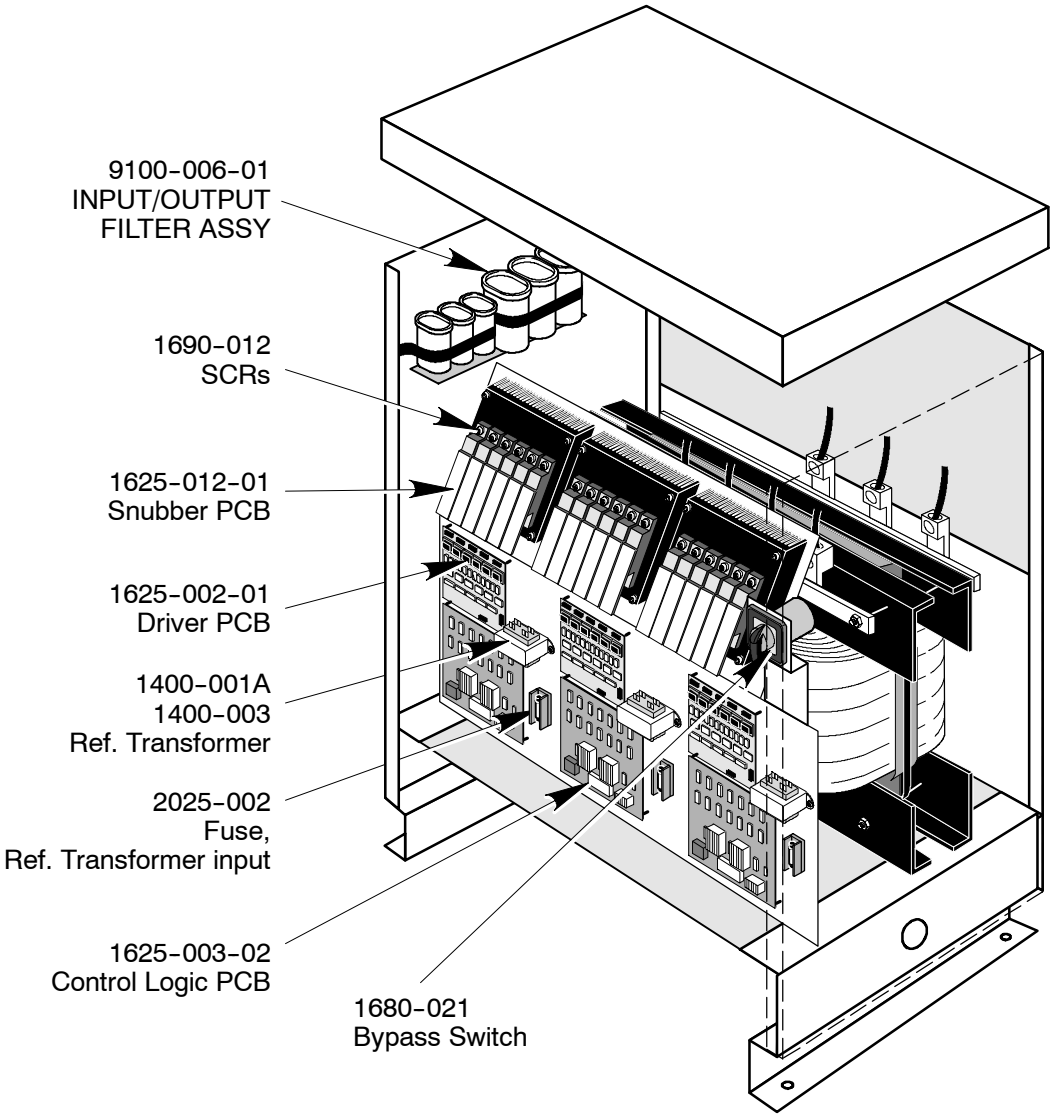
1. For current transformer PART numbers, refer to Table 3–2.

2. Reference transformer vendor numbers:
   For 208 V input use 1400–001A
   For 480 V input use 1400–003

TABLE 3–2
MEDICAL POWER PC (15 – 75 kVA) CURRENT TRANSFORMERS

SIZE (KVA)	MODEL NUMBER	INPUT VOLTAGE	H1, H2, H3
15	PS015B0500T3 PS015B0900T3	208	1425–001
	PS015H0500T3 PS015H0900T3	480	1425–017
30	PS030B0500T3 PS030B0900T3	208	1425–007
	PS030H0500T3 PS030H0900T3	480	1425–003
50	PS050B0500T3 PS050B0900T3	208	1425–007
	PS050H0500T3 PS050H0900T3	480	1425–003
75	PS075B0500T3 PS075B0900T3	208	1425–005
	PS075H0500T3 PS075H0900T3	480	1425–007

3–5 RENEWAL PARTS, Medical Power PC (100 – 300 kVA)



3–5–1 Vendor Parts List, Medical Power PC (100 – 300 kVA)

Vendor No.	Vendor	Description (Remarks)
1680–017	Crucial Power	SWITCH, BYPASS, 1 USED
1425–007	Crucial Power	TRANSFORMER, CURRENT 200:5, 3 USED (Note 1)
1425–005	Crucial Power	TRANSFORMER, CURRENT 300:5, 3 USED (Note 1)
1425–002	Crucial Power	TRANSFORMER, CURRENT 400:5, 3 USED (Note 1)
1690–012	Crucial Power	SCR, 100–175 KVA MODEL, 18 USED
1690–011	Crucial Power	SCR, 200–300 KVA MODEL, 18 USED
1625–012–01	Crucial Power	PCB, SNUBBER, SCR, 100–300 KVA MODEL, 18 USED
1625–002–01	Crucial Power	PCB, SCR DRIVER, 3 USED
121543003–02	Crucial Power	PCB, SNUBBER SCR 200–300 KVA MODEL, 18 USED
1400–001	Crucial Power	TRANSFORMER, REFERENCE, 208 V PRI, 4 USED (Note 2)
1400–003	Crucial Power	TRANSFORMER, REFERENCE, 480 V PRI, 6 USED (Note 2)
9100–006–01	Crucial Power	INPUT/OUTPUT FILTER ASSY, 1 USED (not shown)

NOTES:

1. For current transformer vendor numbers, refer to Table 3–3.

2. Reference transformer vendor numbers:
   For 208 V input use 1400–001A
   For 480 V input use 1400–003

TABLE 3–3
MEDICAL POWER PC (100 – 300 KVA) CURRENT TRANSFORMERS

SIZE (KVA)	MODEL NUMBER	INPUT VOLTAGE	CURRENT TRANSFORMER
100	PS100H0500T3 PS100H0900T3	480	1425–007
125	PS125H0500T3 PS125H0900T3	480	1425–007
150	PS150H0500T3 PS150H0900T3	480	1425–005
175	PS175H0500T3 PS175H0900T3	480	1425–005
200	PS200H0500T3 PS200H0900T3	480	1425–002
225	PS225H0500T3 PS225H0900T3	480	1425–002
250	PS250H0500T3 PS250H0900T3	480	1425–004
300	PS300H0500T3 PS300H0900T3	480	1425–004

SECTION 4 – OPTIONS

4–1 INTRODUCTION

Crucial Power offers a number of options which can enhance the performance of the Life Line Regulator and Medical Power PC and expand the units' power distribution capacity to suit facility requirements.

This section discusses the functions and capabilities of the following options:

- Remote Emergency Power Off (REPO) Station
- Thermal (REPO) Station
- Surge Protection
- Main Input Circuit Breaker
- Output Filtering

Some of the options listed above are provided as standard equipment on some models of Crucial Medical Power PCs and Life Line Regulators while other options are only available on some models. Refer to Table 4–1 to clarify options availability.

TABLE 4–1
OPTIONS MATRIX

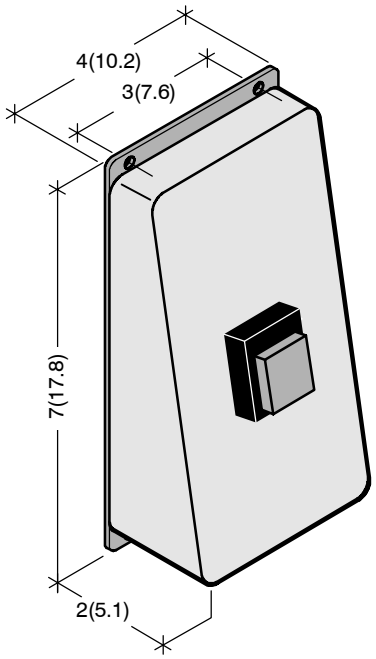
OPTION	MODEL		
	Life Line Regulator	Medical Power PC (15 – 75 kVA)	Medical Power PC (100 – 300 kVA)
REPO	N	N	N
Thermal REPO	N	N	N
Surge Protection	O	S	S
Main Input Circuit Breaker	N	O	N
Output Filtering	O	S	S

TABLE KEY: S = Standard equipment, O = Available as an option, N = Not available for this model.

4–2 REMOTE EMERGENCY POWER OFF STATION, Medical Power PC up to 75 kVA

The Remote Emergency Power Off Station (REPO) is a wall–mounted unit that enables operating personnel to remotely shut down the Medical Power PC or Life Line Regulator in an emergency. The REPO station consists of a painted sheet metal enclosure with a guarded, momentary, normally open, red tactile switch. See Illustration 4–1 for REPO–box size and mounting hole location.

The REPO station is designed to be vertically mounted and can be located anywhere an emergency shut–off is required. The REPO station is provided with a 50–foot, two–conductor cable (15 m). Other length cables are available in five–foot increments.



REPO BOX
ILLUSTRATION 4–1

4–2–1 Installation for REPO

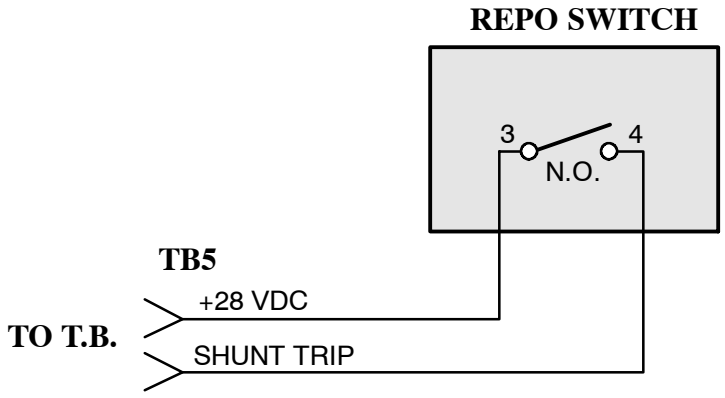
The REPO cable will be 50 to 100 feet (15 – 30 m) long depending on length ordered. The cable is supplied with a two–pin connector on one end and bare wires on the other end. The bare wires connect to a terminal block in the Medical Power PC.

Procedure

1. Select the location for the REPO box.
2. Mount REPO box on wall or other structure using fasteners that are appropriate for the surface on which the REPO box is to be mounted.
3. Remove REPO box cover.

4–2–1 Installation for REPO (continued)

4. Connect 2 wires in REPO cable to terminals on REPO switch as shown in Illustration 4–2.
5. Turn OFF main facility circuit breaker, lock and tagout in accordance with OSHA requirements.
6. Open front door of Medical Power PC.
7. Set IMCB to OFF.
8. Remove floor tiles as required to route REPO cable from REPO box to Medical Power PC.
9. Route REPO cable up through opening in floor (as applicable) and into conduit entry opening.
10. Locate the two–terminal REPO terminal block in the Medical Power PC.
11. Connect the 2 wires in REPO cable to REPO terminal block. See Illustration 4–2.
12. Replace floor tiles as required.
13. Set IMCB to ON.
14. Close front door of Medical Power PC.
15. Set main facility circuit breaker to ON.



REPO WIRING
ILLUSTRATION 4–2

4–3 THERMAL REMOTE EMERGENCY POWER OFF STATION

The Thermal REPO is a wall mounted unit that functions as a dual temperature warning and shutdown monitor. The first and second stage over temperature settings are field selectable. The Thermal REPO provides a contact closure for the first stage alarm, and a unit shutdown interface for the second stage over–temperature response. In addition, the Thermal REPO displays the ambient temperature on a 3–digit display.

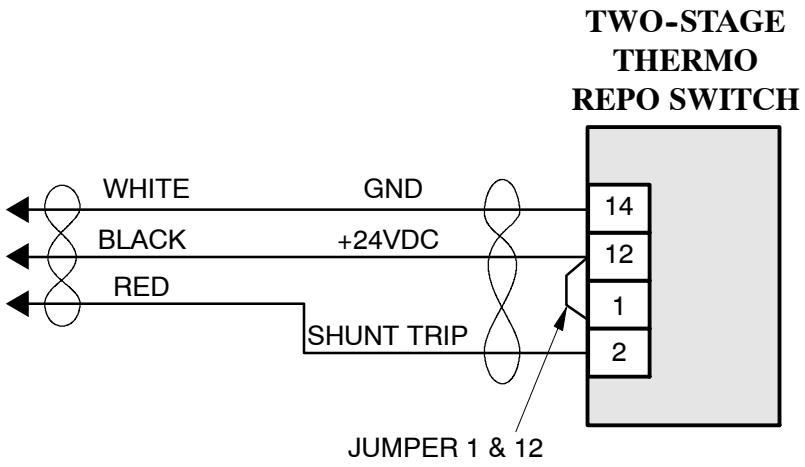
The Thermal REPO station is designed to be vertically mounted at eye level or slightly lower. It can be located anywhere an emergency shut–off is required. The Thermal REPO is provided with a 50–foot (15 m), three–conductor cable. Longer cables are available in five–foot increments up to 100 feet (30 m).

Thermal REPO Specifications:

- Temperature range
- Dimensions
- Weight

4–3–1 Installation for Thermal REPO

The Thermal REPO cable will be 50 to 100 feet (15 – 30 m) long depending on length ordered. The cable is supplied with bare wires on the both ends. The bare wire ends connect to the terminals inside the Thermal REPO enclosure.



THERMAL REPO WIRING
ILLUSTRATION 4–3

4–3–1 Installation for Thermal REPO (continued)

Note

The Thermal REPO is shipped with separate operating instructions.

Procedure

1. Select the location for the Thermal REPO box.
2. Remove Thermal REPO box cover.
3. Mount Thermal REPO box on wall or other structure using mounting holes located in the back of Thermal REPO enclosure. Use fasteners that are appropriate for the surface on which the Thermal REPO box is to be mounted.
4. Connect three wires in Thermal REPO cable to terminals on Thermal REPO switch as shown in Illustration 4–3.
5. Turn OFF main facility circuit breaker, lock and tagout in accordance with OSHA requirements.
6. Open front door of Medical Power PC.
7. Set IMCB to OFF.
8. Route Thermal REPO cable from Thermal REPO box to Medical Power PC. Remove floor tiles as required.
9. Open front panel of Medical Power PC.
10. Route Thermal REPO cable up through opening in floor (as applicable) and into conduit entry opening.
11. Locate terminal block on the Medical Power PC.
12. Connect the three wires to the terminal block.
13. Replace floor tiles as required.
14. Close front panel of Medical Power PC.
15. Set IMCB to ON.
16. Close front door of Medical Power PC.
17. Set main facility circuit breaker to ON.

4–4 SURGE PROTECTION

The Secondary Surge Suppression circuit consists of a special output filter comprising fuse–protected metal oxide varistors and indicator lights. This option is designed to reduce the effect of load induced electrical noise on other electronics such as connected loads. In addition, the secondary surge suppression circuit prevents electronic and electromechanical devices from interfering with each other.

The characteristics of the filter assembly are as follows:

- Parallel (shunt) operation
- Response time of less than five nanoseconds
- Repetitive transient to 5,000 volts per second
- Clamping voltage (208Y/120):

  Ratio 1.2, 144 Vac line to neutral, 364 Vac line to line

  Ratio 1.75, 210 Vac line to neutral, 364 Vac line to line
- Peak pulse power rating:

  27 kW line to neutral

  13.4 kW line to line
- Fused for circuit protection with visual blown fuse indicators (one per phase)

The secondary surge suppression circuit is factory installed at the time of production. No assembly or adjustments are required.

4–5 MAIN INPUT CIRCUIT BREAKER, Phase Stabilizer (15 – 75 kVA)

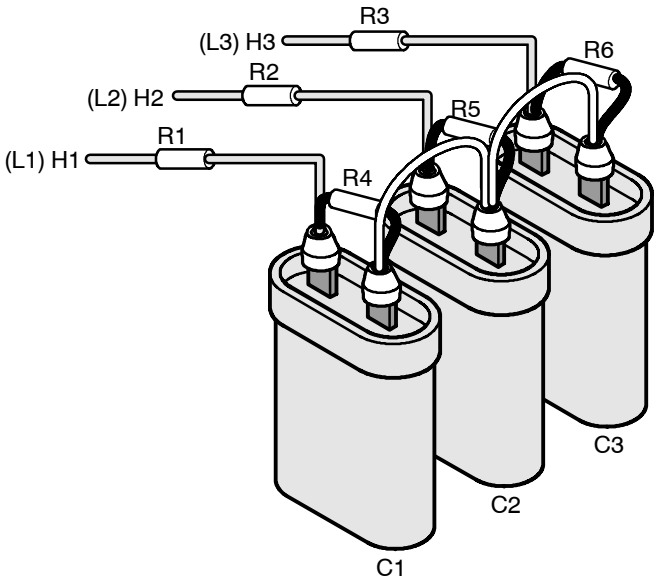
The optional MAIN INPUT CIRCUIT BREAKER (IMCB) is used to switch power to the Phase Stabilizer unit ON and OFF. The IMCB is located on the front panel of the unit, behind the hinged front door.

Be sure to observe ALL warnings and cautions when setting the IMCB to ON or OFF.

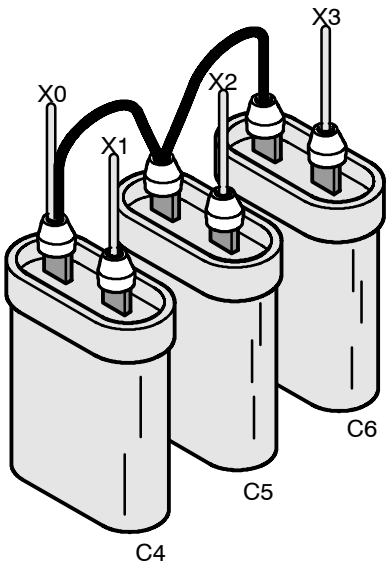
This option is factory installed at the time of production. No assembly or adjustments are required.

4–6 INPUT/OUTPUT FILTERING

The Input/Output filter comprises an input filter installed on the primary and an output filter installed on the secondary of the transformer. The input filter consists of a resistor/capacitor network which acts as a large snubber circuit to eliminate high frequency impulses from entering the power system. The output filter consists of a capacitor network which, when coupled with the primary filter, virtually eliminates most electronic noise from reaching the applied load or being fed back to the unit from noise generating loads. See Illustration 4–4 and 4–5.



INPUT FILTER WIRING
ILLUSTRATION 4–4



OUTPUT FILTER WIRING
ILLUSTRATION 4–5

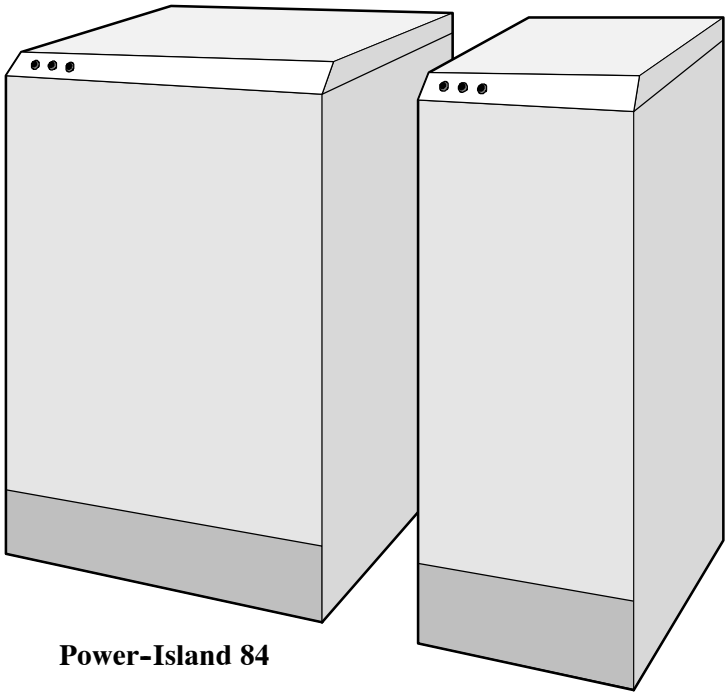
4–7 POWER ISLAND

4–7–1 Features

The Power Island is a modular power distribution center which can be used with either the Medical Power PC or Life Line Regulator. The Power Island can extend the distribution capability of the Medical Power PC or Life Line Regulator by up to 42 and 84 pole positions.

The 225–amp or 450–amp Power Island is available in two models. The Power Island–42 can accommodate one 42–pole panelboard and the Power Island 84 can accommodate two 42–pole panelboards. The standard panelboard is a 225–amp Square–D Snap–On. For other panelboard configurations, refer to your Crucial Power Sales Representative. The style and function of both Power Island models coordinates with and complements the design of the Phase Stabilizer in the 15 to 75 kVA sizes. See Illustration 4–6.

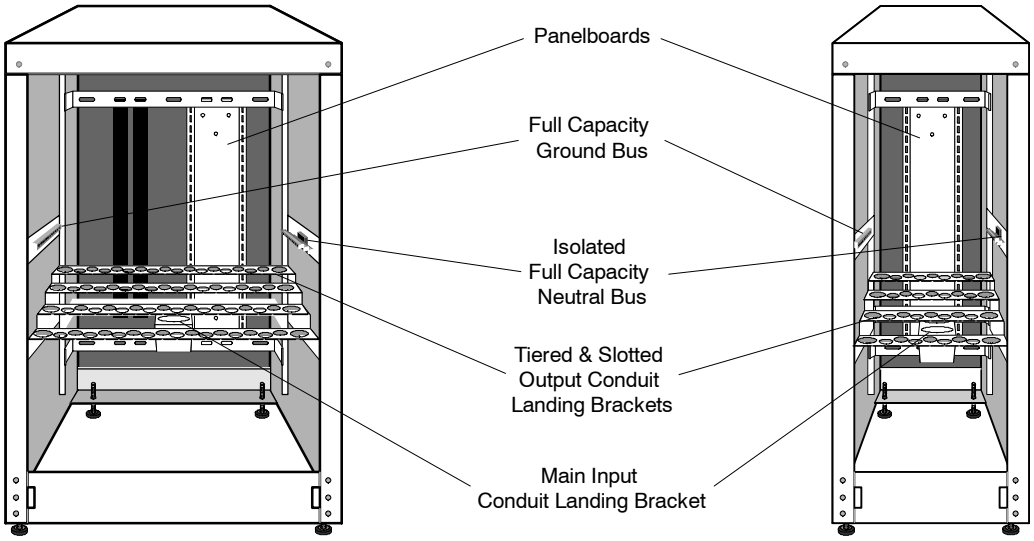
The Power Island provides three neon phase indicators, located on the front of the unit. Each phase is independently monitored. If a phase is lost the corresponding indicator will extinguish, showing which phase is having the problem.



POWER ISLAND
ILLUSTRATION 4–6

4–7–2 Power Island Specifications

MODEL	DIMENSIONS in. (cm)			WEIGHT lbs. (kg)	FLOOR LOADING lbs/ft (kg/m)
	W	H	D		
Power Island/42	14 (36)	42 (107)	24 (61)	175 (74)	75 (360)
Power Island/84	28 (71)	42 (107)	24 (61)	225 (102)	48 (236)



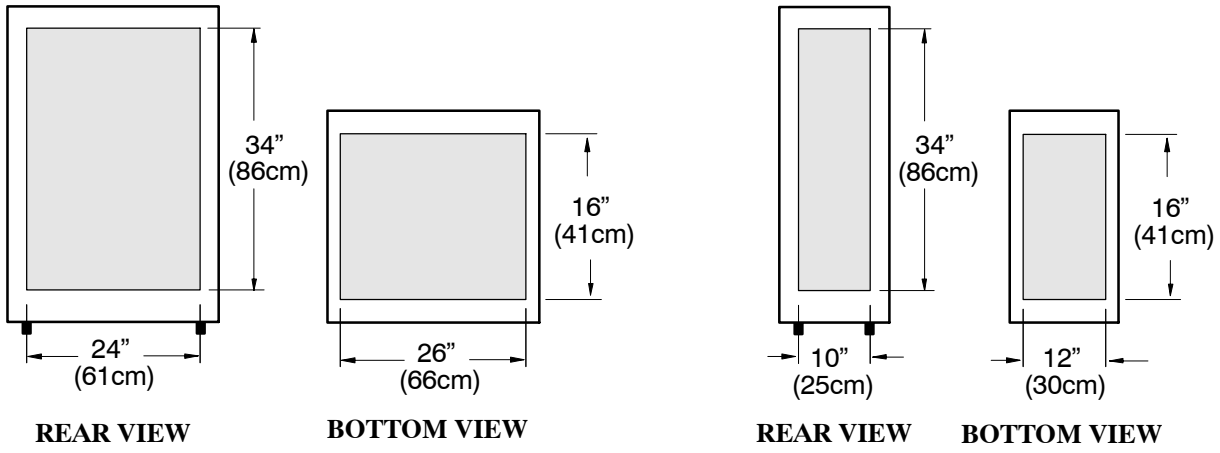
Power-Island 84
REAR VIEW

Power-Island 42
REAR VIEW

POWER ISLAND FEATURES
ILLUSTRATION 4–7

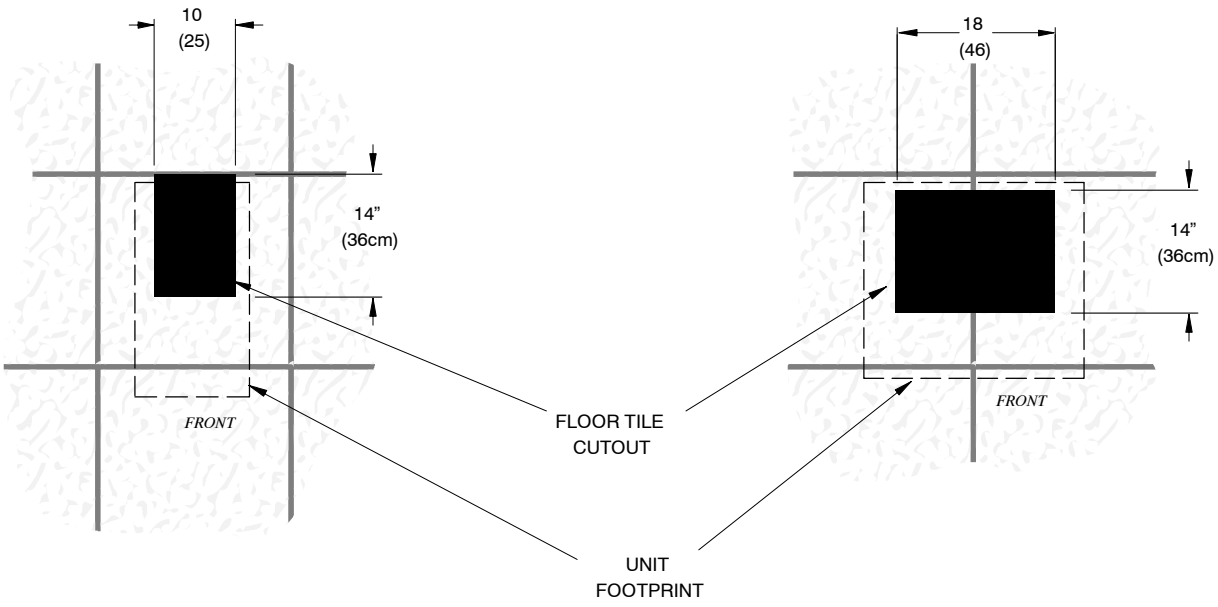
4–7–3 Preinstallation

Determine the location of the Power Island and routing of input and output cables prior to installation. Because the Power Island is a stand–alone unit it can be placed as close to the load as possible. The following Illustrations are provided to aid in determining cable access, floor layout and service clearances.
See Illustrations 4–8, 4–9 and 4–10.

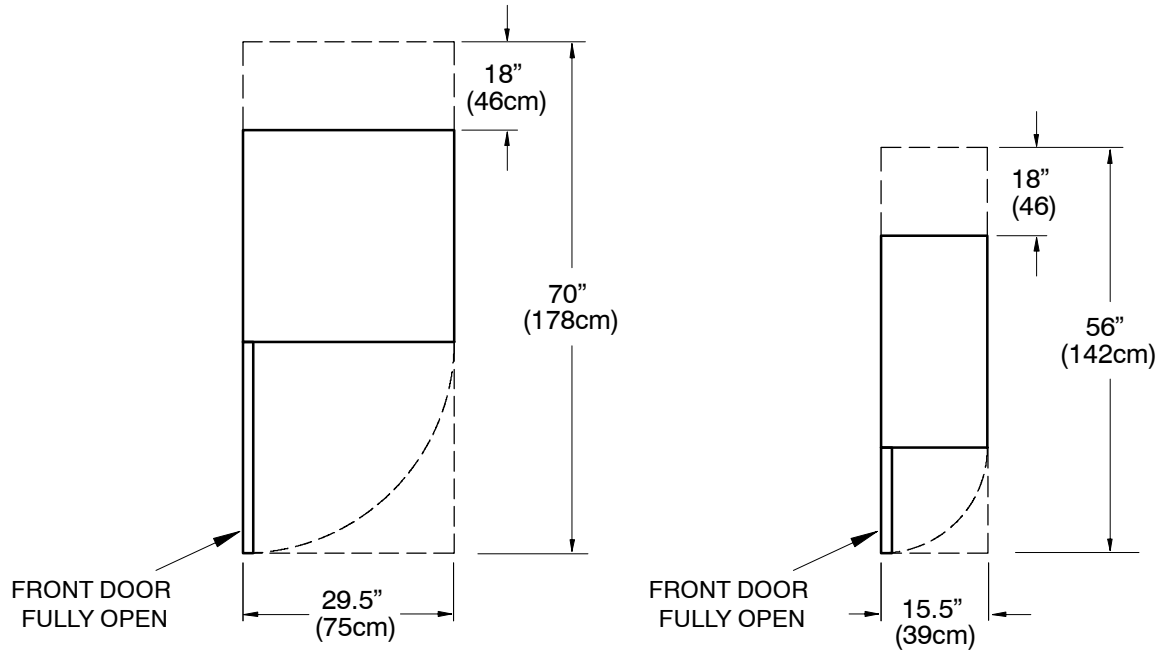


POWER ISLAND CABLE ACCESS
ILLUSTRATION 4–8

4–7–3 Preinstallation (continued)



POWER ISLAND FLOOR TILE CUTOUT
ILLUSTRATION 4–9



Power-Island 84 **Power-Island 42**

POWER ISLAND DIMENSIONS AND CLEARANCES
ILLUSTRATION 4–10

4–7–4 Input Interconnect Cable Installation

An optional 225–amp or 450–amp Output Interconnect Cable is available to connect the Power Island to the Medical Power PC or Life Line Regulator. This cable is specified in 5–foot increments to a maximum of 50 feet (15 m).

The following instructions cover installation of the Input Interconnect Cable to the Medical Power PC or Life Line Regulator. If a Power Island 84 is being installed, two input interconnect cables are required.

Procedure

1. Turn OFF main facility circuit breaker to Medical Power PC or Life Line Regulators lock and tagout in accordance with OSHA requirements.
2. Open front door of Power Island.

POTENTIAL ELECTRICAL HAZARDS TO HUMAN LIFE EXIST WITHIN THIS EQUIPMENT WHEN ENERGIZED. DISCONNECT INPUT POWER TO UNIT BEFORE OPENING ENCLOSURE OR TOUCHING INTERNAL PARTS.

3. Verify that IMCB is set to OFF.
4. Verify that all output circuit breakers are set to OFF.
5. Remove front panel of Power Island.
6. Remove floor tiles as required and route Input Interconnect Cable between Power Island and Medical Power PC or Life Line Regulator.
7. Route Input Interconnect Cable up through floor opening (as applicable) and into Main Input Conduit Landing Bracket.
8. Connect the grounding conductor to the ground bus in the Power Island.
9. Connect the power conductors to the Input Main Circuit Breaker located at the top of the panelboard in the Power Island.

4–7–4 Output Interconnect Cable Installation (continued)

10. Access the interior of Medical Power PC or Life Line Regulator as follows:

    - Phase Stabilizer (15 – 75 kVA)

    a. Raise hinged lid.

    b. The Power Island Interconnect cable can be routed through the bottom or through the right side of the Phase Stabilizer.

    - Life Line Regulators, Phase Stabilizer (100 – 300 kVA)

    a. Remove top cover by unbolting two bolts on each side of cover.

    b. Remove front panel by unbolting six bolts.

11. Route Output Interconnect Cable up through floor opening (as applicable) and into conduit entry opening.

12. Connect the grounding conductor to the ground bus in the Medical Power PC or Life Line Regulator.

13. Connect the power conductors to the Output Power Terminal Block in the Medical Power PC or Voltage Regulator.

4–7–5 Output Cable Installation

The following instructions cover installation of the Output Cables between the connected loads and the Power Island:

Note

The equipment to be connected to the Power Island may require special grounding procedures. Refer to technical documentation which accompanies that equipment.

Procedure

1. Turn OFF facility circuit breaker to Medical Power PC or Life Line Regulator, lock and tagout according to OSHA requirements.

2. Open front door of Power Island.

3. Verify that IMCB is set to OFF.

4. Verify that all output circuit breakers are set to OFF.

4–7–5 Output Cable Installation (continued)

DANGER!!

POTENTIAL ELECTRICAL HAZARDS TO HUMAN LIFE EXIST WITHIN THIS EQUIPMENT WHEN ENERGIZED. DISCONNECT INPUT POWER TO UNIT BEFORE OPENING ENCLOSURE OR TOUCHING INTERNAL PARTS.

5. Open front door of Power Island.
6. Open hinged front panel by unbolting the three screws on the left side of panel and swinging panel to the right.
7. Remove rear panel by unbolting 6 screws located on the corners and right and left sides of the panel.
8. Remove floor tiles as required.
9. Route output cable between equipment to be powered and Power Island.
10. Pass output cable through floor opening and up into cable landing bracket.
11. Secure conduit fitting to landing bracket. Install noninsulated bushings on all conduits and flexes.
12. Route and connect the 1 to 3 power wires to output circuit breaker.
13. Route and connect the ground wire to the ground bus. See Illustration 4–7 for location of ground bus.
14. Route and connect the neutral wire to the neutral bus. See Illustration 4–7 for location of neutral bus.
15. Replace rear panel.
16. Replace hinged front panel.

APPENDIX A – SPECIFICATIONS

TABLE A–1
SPECIFICATIONS

LIFE LINE REGULATOR		
NOMINAL INPUT VOLTAGE	208 VAC	480 VAC
INPUT VOLTAGE RANGE	154 – 229	355 – 528
MAXIMUM INPUT VOLTAGE	229	528
NOMINAL RATED CURRENT (A)	See Table 2–1	
FREQUENCY (Hz)	60	
OUTPUT VOLTAGE REGULATION	± 3% Typical, ± 4% Maximum	
LINE–TO–LINE VARIATION	LESS THAN 2%	
RESPONSE TIME	1 Cycle Typical	
FILTERS: INPUT OUTPUT	 YES Optional	
COOLING REQUIREMENT (BTU/hr)	See Table 2–1	
WEIGHT lbs (kg) (estimated)	See Table 2–1	
OUTPUT VOLTAGE	208Y120 VAC or 480Y277 VAC	
CAPACITY (KVA)	15, 30, 50, 75, 100, 125, 150, 175, 200, 225, 250, 300 kVA	
NUMBER OF PHASES	3	
SURGE RATING	200% of Full Load for 10 Seconds 1000% of Full Load for 1 Cycle	
HARMONICS ADDED	1% Maximum	
POWER FACTOR	Greater Than 96%	
AMBIENT TEMPERATURE ˚F (˚C)	80 (26.7)	
SIZE H X W X D in. (cm)	See Table 2–1	

TABLE A–2
SPECIFICATIONS

MEDICAL POWER PC		
NOMINAL INPUT VOLTAGE	208 VAC	480 VAC
INPUT VOLTAGE RANGE	187 – 225	432–518
MAXIMUM INPUT VOLTAGE	225	518
NOMINAL RATED CURRENT (A)	See Table 2–2	
FREQUENCY (Hz)	60	
OUTPUT VOLTAGE REGULATION	± 1.5%Typical, ± 2% Maximum	
LINE–TO–LINE VARIATION	LESS THAN 2%	
RESPONSE TIME	1 Cycle Typical	
FILTERS: INPUT OUTPUT SECONDARY SURGE SUPPRESSION	 YES YES YES	
COOLING REQUIREMENT (BTU/hr)	See Table 2–2	
WEIGHT lbs (kg) (estimated)	See Table 2–2	
OUTPUT VOLTAGE	208Y120 VAC or 480Y277 VAC	
CAPACITY (KVA)	15, 30, 50, 75, 100, 125, 150, 175, 200, 225, 250, 300 kVA	
NUMBER OF PHASES	3	
SURGE RATING	200% For 10 Seconds	
HARMONICS ADDED	1% Maximum	
POWER EFFICIENCY	Greater Than 96%	
AMBIENT TEMPERATURE ˚F (˚C)	80 (26.7)	
SIZE H X W X D in. (cm)	See Table 2–2	

GLOSSARY

AC	Air Conditioning
Current transformer	The transformer used to feed a current signal to the logic board.
Front door	The hinged front door on the Medical Power PC (15 – 75 Kva). It covers the bypass switch and the IMCB if installed.
Front panel	The hinged panel behind the front door on theMedical Power PC (15 – 75 kVA) into which the bypass switch and the IMCB (if installed) are mounted.
IMCB	InputMain Circuit Breaker — The circuit breaker on the front panel used to switch power to the CP 18 ON and OFF. Optional on Medical Power PC (15 – 75 kVA).
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
OSHA	Occupational Safety and Health Administration
PCB	Printed Circuit Board — A surface for the mounting and interconnection of electronic components.
REPO	Remote Emergency Power Off — A switch, separate from but wired to the regulation unit, when pressed, shunt trips the Main Input Circuit Breaker.
Thermal REPO	Thermal Remote Emergency Power Off — A thermal activated switch, separate from but wired to the regulation unit, which reacts to a predetermined temperature range by shunt tripping the Main Input Circuit Breaker.
Reset (a circuit breaker)	Snap the breaker first to OFF position, then to ON.
SCR	Silicon–Controlled Rectifier
Shunt Trip	A device for tripping a circuit breaker indirectly, using a signal to activate a solenoid, instead of directly, because of an overcurrent condition.
Trip	A circuit breaker in an open position as a result of an overcurrent condition to the load, or as the result of a remote trip command (shunt trip). In a tripped condition, power to the load is off. The tripped circuit breaker position differs from the off position in that the breaker must first be turned to the off position before restoring power to the load.
TB	Terminal Block