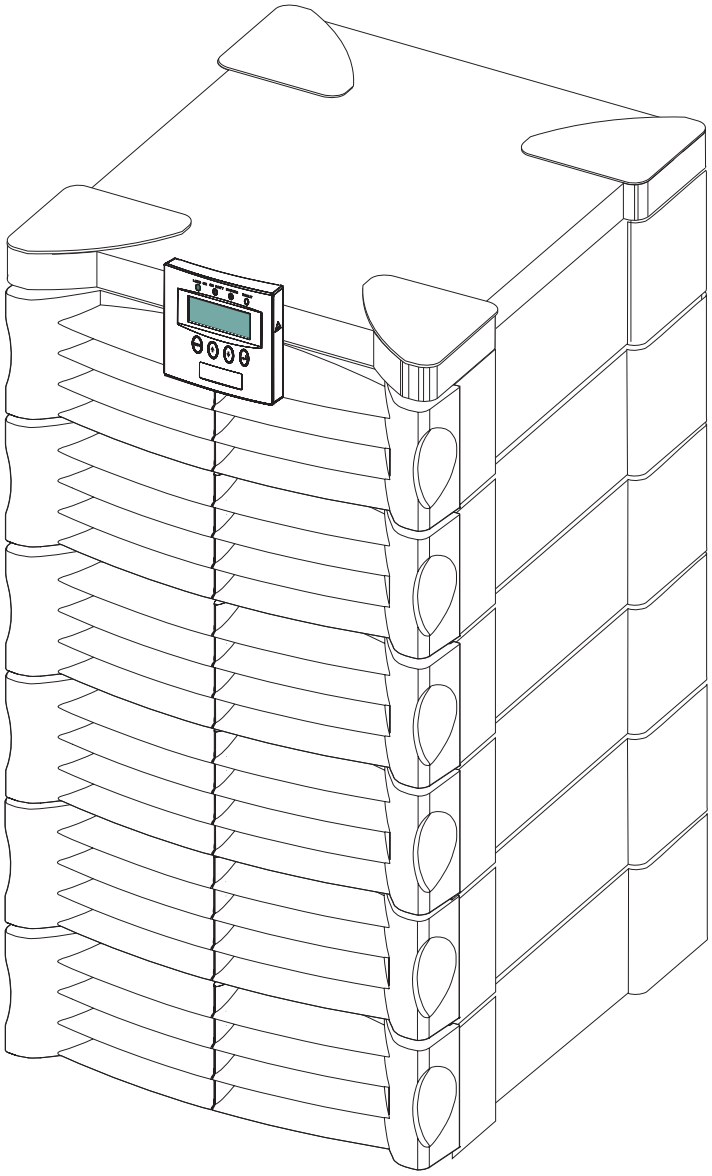
Symmetra™ Power Array™

Symmetra™ User Manual

380V/400V/415V - 3:1

Frame Model: SYMSTRF3I



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Hospital grade wiring devices and leakage current may be ordered as options on many APC UPS systems. APC does not claim that units with this modification are certified or listed as Hospital Grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.

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Safety Information

Safety Symbols

Warning! **Indicates a hazard which, if not avoided, could result in injury or death.**

Caution! **Indicates a hazard which, if not avoided, could result in damage to the product or other property.**

Notice! **Read and pay attention to this important information.**

Indicates the primary safety ground.

Safety Information

- The Symmetra™ contains an internal energy source. Hazardous voltage can be present even when disconnected from the utility power source.
- READ AND SAVE THIS USER'S MANUAL - This *User's Manual* provides safety, installation and operating instructions for optimal performance and service life from the Symmetra™ Power Array. A complete list of technical support numbers are printed on the back cover. Record serial numbers on the back cover before calling technical support.
- Before installing electrical connections - ***Read, Study, and Understand the Electrical Installation Section of this User Manual.*** All wiring connections *must be made correctly by a qualified electrician.*
- Where required, the electrician must attach the UPS warning tag to the input power distribution panel.
- Installation of the power and battery modules, and operation of the Symmetra™ to be performed by personnel trained in electrical and mechanical hazards.
- Installation and replacement of the Main and Redundant Intelligence Modules (MIM & RIM) can be performed by any untrained person.
- The protective earth conductor for the Symmetra™ carries the leakage current from the load devices (computer equipment). Therefore, the size of the conductor must be at least as large as the wire required by IEC 950. IEC 950 states the following nominal cross-sectional areas:
  - 6 mm^2 for rated current between 33 & 40 A
  - 10 mm^2 for rated current between 41 & 63 A
  - 16 mm^2 for rated current between 64 & 80 A
  - 25 mm^2 for rated current between 81 & 100 A
- The 120V, 7.2 Ah battery module constitutes a risk of electrical shock and an energy hazard. Before replacing battery modules, remove conductive jewelry such as chains, wrist watches and rings. High short circuit current through conductive materials could cause severe burns.

- Do not dispose of batteries or battery modules in a fire. The batteries may explode. Return all battery modules to APC or to an appropriate recycling center.
- Do not open or mutilate battery modules or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
- Battery modules are heavy (60 lb). Two people are required to handle battery modules.
- This product is intended for installation in a temperature controlled, clean, dry, indoor area that is free of conductive contaminants. (0° to 40° C.)
- This product must be connected to an Emergency Power Off (EPO) switch.
- **Total Power Off Procedure**

  Remove all power from the Symmetra™ before opening any of the wiring panels:

  1. Set system enable switch to the "stand by" position.
  2. Set input circuit breaker to the "stand by" position.
  3. Remove all battery modules from the Power Array.
  4. If an extended run battery cabinet is connected to the Symmetra™, disconnect the cabinet by removing the power cable from the bottom rear connector of the Symmetra™.
  5. Disconnect the utility power source circuit breaker. Label it with a safety warning tag.

Radio Frequency Interference

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

Shielded cables must be used with this unit to ensure compliance with the Class A FCC limits.

Operation Symbols

	"On Position"	Indicates that a switch or current protection device is in the "on" position. The system enable switch, maintenance bypass switch and the input circuit breaker can be placed in the "on" position.
	"Off Position"	Indicates that a switch is in the "off" position. The maintenance bypass switch is the only switch that can be placed in the "off" position.
	"Stand By Position"	Indicates that a switch or current protection device is in the "stand by" position. The system enable switch, and the input and output circuit breakers can be placed in the "stand by" position.

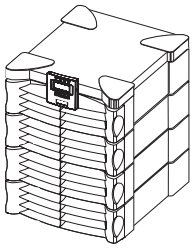
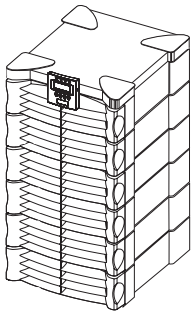
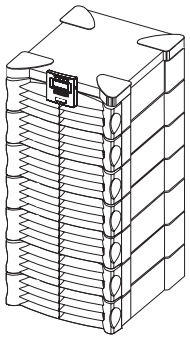
Introduction

Welcome!

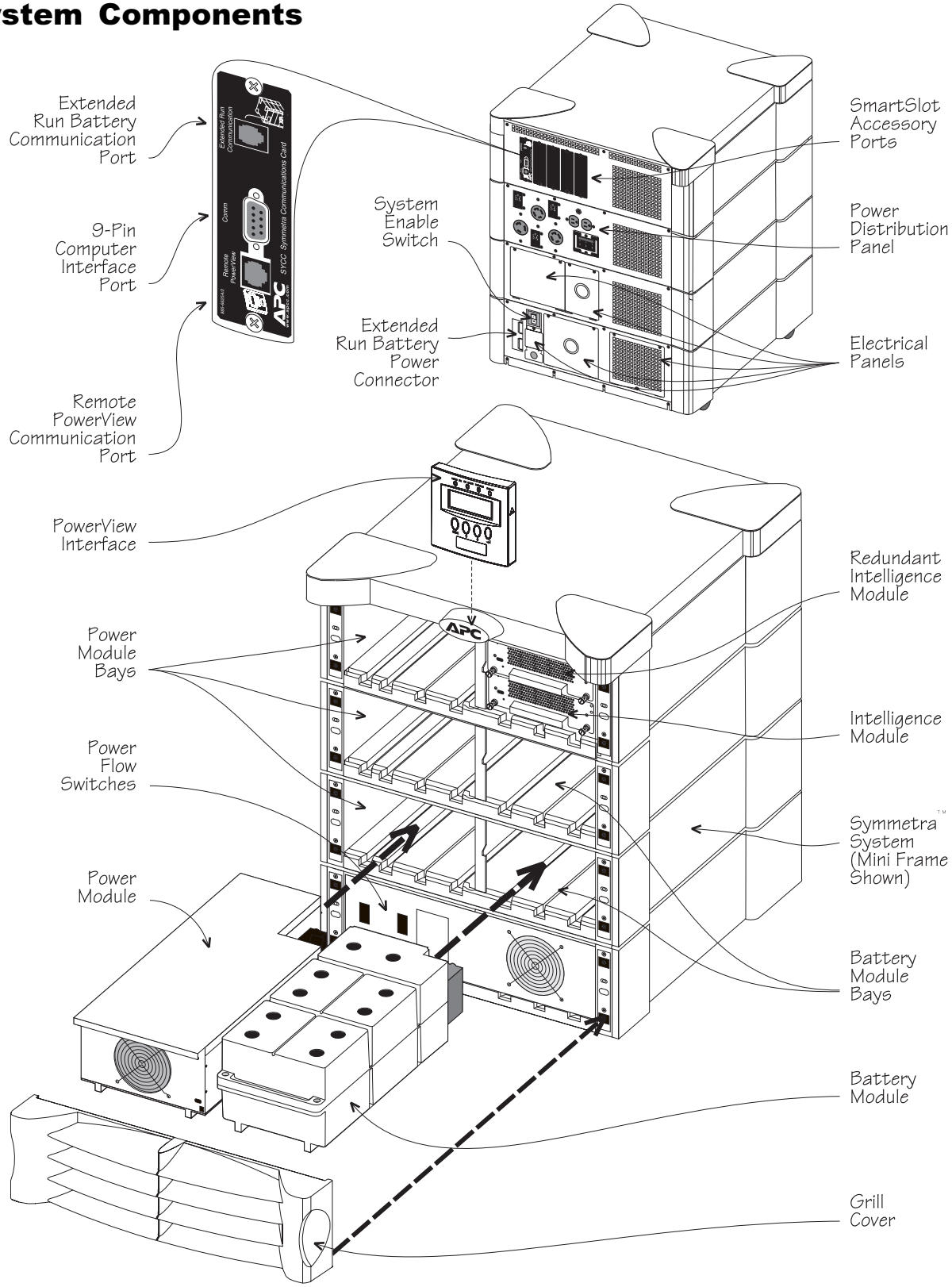
Congratulations for your purchase of a Symmetra™ Power Array! The Symmetra™ is a UPS system with redundant and modular power, battery and intelligence components. It is the finest protection available to safeguard a datacenter and important data against the unpredictability of power fluctuation and failure.

Models

Symmetra™ systems can be ordered in a variety of configurations. All of these are built around one of the frames listed below. Refer to the packaging list or the frame name plate to determine the frame model.

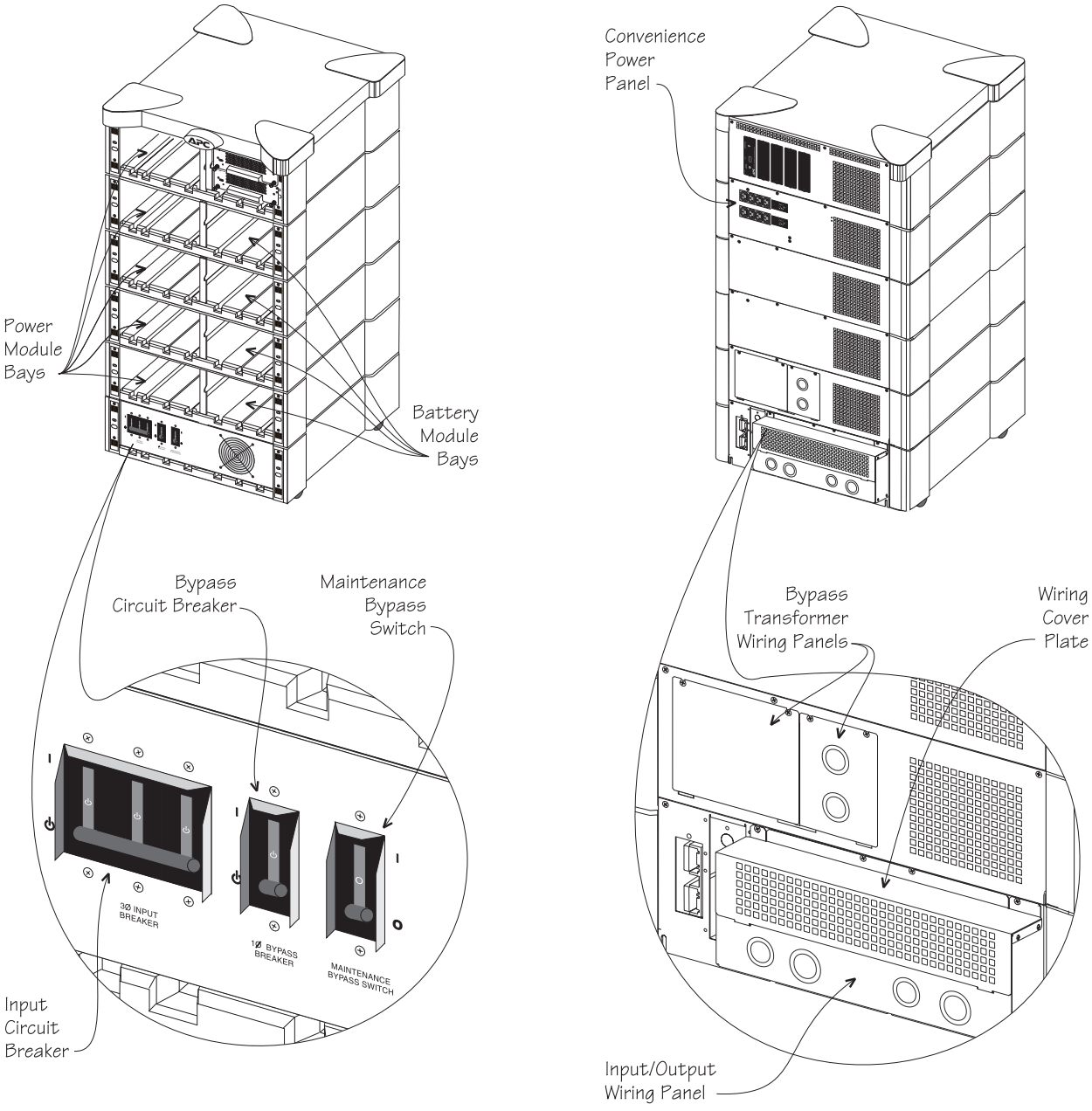
Frame Model	Description	Illustration
SYMINIF	8 kVA Maximum / Single Phase / 60Hz Input: 208V or 240V Output: 120V/208V/240V	
SYMINIF-PD	Same as above but includes power distribution receptacles.	
SYMINIFI	8 kVA Maximum / Single Phase / 50Hz or 60Hz Input: 220V or 230 or 240V Output: Same as input	
SYMSTRFI	16 kVA Maximum / Single Phase / 50Hz or 60Hz Input: 220V or 230V or 240V Output: Same as input	
SYMSTRF3I	16 kVA Maximum / 50Hz or 60Hz Input: Three Phase 380V or 400V or 415V Output: Single Phase 220V or 230V or 240V	
SYMSTRF	16 kVA Maximum / Single Phase / 60Hz Input: 208V or 240V Output: 120V/208V/240V	
SYMSTRF-PD	Same as above but includes power distribution receptacles.	

System Components



Symmetra™ Component	Description
Power Module	A 4kVA alternating current power processing unit. Slides into the Symmetra™ frame.
Battery Module	A 120V DC battery string housed inside a plastic enclosure. Slides into a Symmetra™ frame, and some Extended Run battery frames.
Main Intelligence Module(MIM)	The intelligence of the Symmetra™ system. Performs all monitoring, control and communication functions.
Redundant Intelligence Module (RIM)	A redundant version of the MIM. Allows the MIM to be hot-swappable without interrupting the UPS power flow.
Symmetra™ System Frame	The Symmetra™ frame serves as the base for the modular components of the system.
Power Flow Switches Input Circuit Breaker(s) Maintenance Bypass Switch	The input circuit breaker(s) regulate power to the Symmetra™. When in the "on" position, the Maintenance Bypass Switch bypasses the Symmetra™ and connects load equipment directly to the utility power source. See specific model diagrams for details.
Grill Cover	Snaps to the front of the Symmetra™ frame.
Communication Ports	■ A port for connecting a remote PowerView interface. ■ A 9-pin computer interface port for APC Powerchute*Plus* software. ■ A communication port for some Extended Run battery frame models.
SmartSlot Accessory Ports	Four ports are provided for optional *SmartSlot*™ accessories.
Power Distribution Panel (Where applicable.)	Power distribution panel for plugging load equipment into the back of the Symmetra™ frame.
System Enable Switch	When in the "on" position, the Symmetra™ powers up internally, *but does not power the load*. (The "Turn Load On" command is issued by using the PowerView.) When in the "off" position, the system powers down internally.
Extended Run Battery Power Connector	An Extended Run battery frame power connection.
Electrical Panels EPO Wiring Access Panel Input Wiring Access Panel Output Wiring Access Panels	Emergency Power Off wiring and Input/Output terminal connections behind these panels. See specific model diagrams for details.

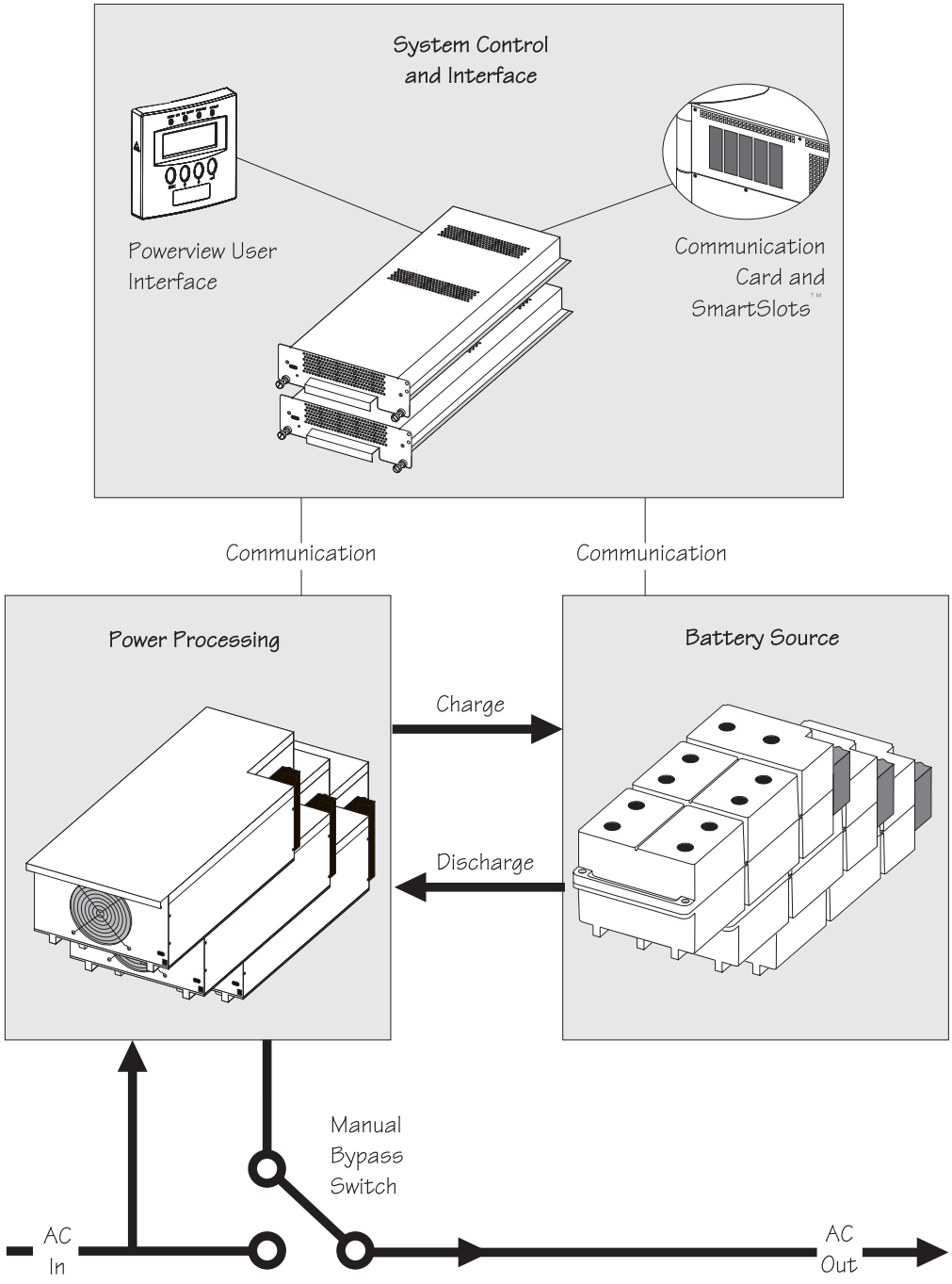
Model Specific Details (SYMSTRF3I)



Symmetra™ Components Specific To Model: SYMSTRF3I	Description
Input Circuit Breaker	Connects Symmetra to the utility power source. Protects the system against extreme overloads when in the on line mode.
Input/Output Wiring Panels	The wiring panel and cover plate are shipped in the accessories box with the user manual. The electrician installs these when wiring the Symmetra.
Bypass Transformer Wiring Panels	An optional bypass transformer is wired to a terminal connection block located behind these panels.
Convenience Power Panel	Eight IEC 320 C13 type power outlets (220V-240V). Arranged in two sets of four plugs, protected to 10Amp maximum outputs.
Bypass Circuit Breaker	Only used when no bypass transformer option is installed. Protects the system against extreme overloads when in bypass mode. If a bypass transformer is included with the system, a cover plate must be installed over this switch.
Maintenance Bypasss Switch	Manual control of the bypass function. When the maintenance bypass switch is in the "on" position, power is delivered directly from utility power source to the load equipment.
Note: *This table applies to model SYMSTRF3I only.*	

Basic Operation

The internal architecture of the Symmetra™ system is comprised of a control and interface system (intelligence modules and several user interface options) that monitors and controls a power processing system (power modules) and a battery source (battery modules). The relationship between these functional components is illustrated below.



Glossary of Symmetra™ Terms

Extended Run Battery Frame - An accessory that increases the battery capacity of a system. Multiple Extended Run frames can be connected to a single Symmetra™ to significantly increase run time.

Hot-Swappable - Modules are "hot-swappable" when they can be replaced safely while the load equipment is still powered and the Symmetra™ is fully functional.

N+1 - Refers to the level of power module redundancy. "N" represents the number of power modules required to power the load, and "+1, +2, etc." represents the number of extra power modules that are installed. For example, a 7.3 kVA load requires two power modules for adequate protection. If the Symmetra™ is configured with only two modules, it has an "N+0" level of redundancy, or no redundancy. If the system is configured with three power modules, it has an "N+1" redundancy. Depending on the the load requirements, Symmetra™ can be configured with 2, 3 or even 4 extra power modules, giving it an N+2, N+3, or N+4 level of redundancy.

Redundancy - Refers specifically to power modules. If at least one "extra" power module is installed, the system can sustain a fault condition and still provide protection to the load equipment. To be fully redundant, the system should be configured with at least one redundant power module, and a minimum of two battery modules. (When two or more battery modules are present, one of them can fail and the system will still have a battery power source. The total number of battery modules determines the length of on-battery run time.)

Scalability - The modular architecture allows the user to increase power capacity as load requirements increase. Scalability is limited by the size of the frame, and the number of available power module bays.

***SmartSlot™* Accessories** - *SmartSlot*™ bays at the rear of the frame accommodate up to four accessory cards. Before installing any *SmartSlot*™ accessory, ensure it is a compatible "Symmetra™ OK" model.

- Share-UPS™ - Provides automatic shutdown of up to two additional servers.
- PowerNet™ SNMP - Provides network UPS management.
- Measure-UPS™ II - Provides environmental information such as ambient temperature and humidity.
- Call-UPS™ - Works with an external modem to provide out-of-band UPS management.

System Capacity - The maximum output power that a Symmetra™ system can deliver. System capacity is limited by the lesser of the frame size, or the capacity of the installed power modules.

- A Mini Frame (8kVA) with one power module installed (4kVA) has a system capacity of 4kVA.
- A Master Frame (16kVA) with five power modules (20kVA) has a system capacity of 16kVA.

Site Requirements

Operating Space Requirements

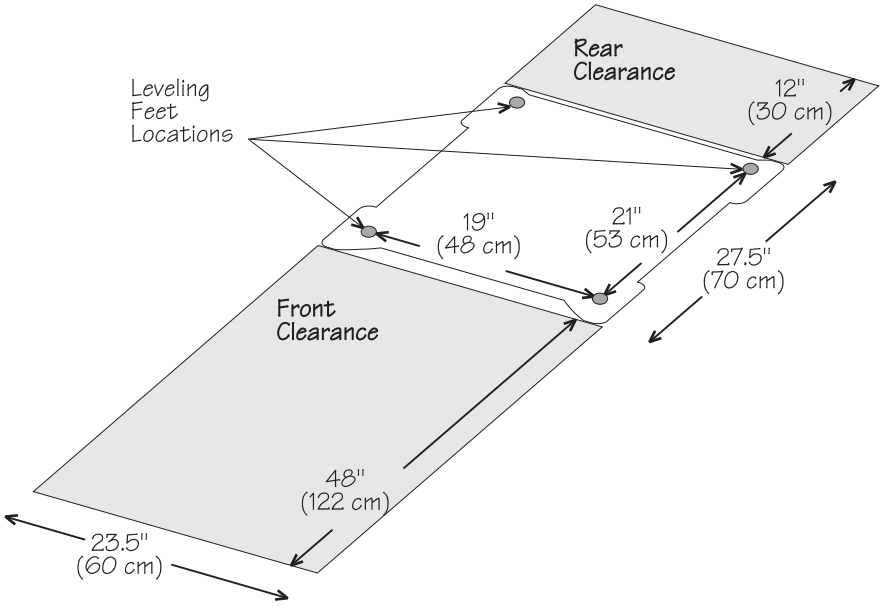
The Symmetra™ is 23.5” (60cm) wide, and 27.5” (70cm) deep. No space is required on the sides of the Symmetra™ frame.

Rear Clearance

- A minimum of 12" (30 cm) of clearance is required behind the frame for adequate airflow.
- The system enable switch must remain accessible.
- The back of the Symmetra™ must be accessible for the electrician to install wiring.

Front Clearance

- A minimum of 48" (122 cm) of clearance is required in front of the frame.
- The PowerView interface must remain accessible.
- The front of the Symmetra™ must be accessible to install and replace power and battery modules.



Notice!

- The voltage transformer in the SYMINIF and SYMSTRF models emits an electro magnetic field (EMF) that can interfere with the normal function of a computer monitor. Do not install these models in close proximity to a computer monitor. The EMF is not of sufficient magnitude to cause interference with other equipment.

Structural Requirements

Symmetra™ components are heavy. Use this table to determine the total weight of the system.

Symmetra™ Component		Weight lb (kg)	Product Dimensions W x D x H inches (cm)
Note: Weights shown are for frames fully loaded with modules.			
North American Models	SYMINIF	490 lb (229 kg)	23.5" x 27.5" x 34" (60 x 70 x 86)
	SYMINIF-PD	495 lb (225 kg)	
	SYMSTRF	910 lb (414 kg)	23.5" x 27.5" x 55" (60 x 70 x 140)
	SYMSTRF-PD	925 lb (420 kg)	
International 1:1 Models	SYMINIFI	360 lb (164 kg)	23.5" x 27.5" x 34" (60 x 70 x 86)
	SYMSTRFI	650 lb (295 kg)	23.5" x 27.5" x 48" (60 x 70 x 122)
3:1 Model	SYMSTRF3I	655 lb (298 kg)	
Extended Run Battery Frame Options	SYXR4-BM	320 lb (145 kg)	23.5" x 27.5" x 20" (60 x 70 x 51)
	SYXR12-BM	930 lb (423 kg)	23.5" x 27.5" x 48" (60 x 70 x 122)
	SYXRBC1	860 lb (391 kg)	24" x 33" x 43" (61 x 84 x 109)
	SYXRBC2	1560 lb (709 kg)	40" x 33" x 43" (102 x 84 x 109)
	SYXRBC3	2,300 lb (1,045 kg)	40" x 33" x 60" (102 x 84 x 152)
Other Options	SY-BPXFMR	200 lb (91 kg)	18" x 25" x 25" (46 x 64 x 64)

⚠ Caution!

- The weight of the Symmetra™ frames rest on four 1.5" (3.8 cm) diameter leveling feet. Ensure the floor and subfloor is structurally sound to support the weight of the Symmetra™ frame(s) when concentrated on the leveling feet. Also, make sure the structure can support the *total* weight of all Symmetra™ frames, extended run battery frames, and all other options.

Environmental Requirements

Install Symmetra™ in a temperature controlled, clean, dry, and protected indoor area that is free of conductive contaminants. The environment must have adequate airflow, and be free of corrosive fumes.

Environmental Condition	Acceptable Range
Temperature	32°F - 104°F (0°C - 40°C)
Relative Humidity	0 - 95% non-condensing
Elevation	0 to 10,000 feet above mean sea level (0 to 3,048 m)

Heat Output

Heat output of the Symmetra™ is significantly increased when batteries are charging. Battery recharge periods are relatively infrequent.

Symmetra™ Component		BTU Output (Batteries Charged)	BTU Output (Batteries Charging)
North American Models	SYMINIF	3,413	8,670
	SYMINIF-PD		
	SYMSTRF	6,826	15,640
	SYMSTRF-PD		
International 1:1 Models	SYMINIFI	2,321	7,578
	SYMSTRFI	4,642	13,456
3:1 Model	SYMSTRF3I		

Short-Term Battery Module Storage Requirements

Battery modules must be temporarily stored until the electrical wiring is connected and the Symmetra™ is ready to be powered.

- Batteries should be stored at 0°F to 77°F (-18°C to 25°C) to preserve battery life.
- Storage environment can be within 0 to 100% relative humidity , *non-condensing.*

  Note: *Condensation will cause corrosion of electronic and chassis parts.*

Caution!

- Installing battery modules in a Symmetra™ that is not powered will discharge the batteries and could damage them permanently. Do not install battery modules into the Symmetra™ frame until after the electrical wiring connections have been made, and the system is ready to be powered.

Electrical Requirements - Input/Output

Symmetra™ Component		Wiring	Voltage (VAC)	Current Full Load	Overcurrent Protection (External)	Minimum Wire Size
North American Models	SYMINIF	Input	208V	40A	50Amp 1-Pole	#8 AWG (10mm²)
			240V	35A		
		Output	120V/240V	40A	50Amp 2-Pole	
			120V/208V/240V		50Amp 3-Pole	
	SYMINIF-PD	Input	208V	40A	50Amp 1-Pole	#8 AWG (10mm²)
			240V	35A		
		Output	120V/240V	40A	50Amp 2-Pole	
			120V/208V/240V		Overcurrent protection is built into the power distribution panel for all output.	
	SYMSTRF	Input	208V	80A	100Amp 1-Pole	#3 AWG (25mm²)
			240V	70A		
		Output	120V/240V	80A	100Amp 2-Pole	
			120V/208V/240V		100Amp 3-Pole	
	SYMSTRF-PD	Input	208V	80A	100Amp 1-Pole	#3 AWG (25mm²)
			240V	70A		
		Output	120V/240V	80A	100Amp 2-Pole	
			120V/208V/240V		Overcurrent protection is built into the power distribution panel for all output.	
International 1:1 Models	SYMINIFI	Input	220V, 230V or 240V	40A	50Amp 1-Pole	#8 AWG (10mm²)
		Output				
	SYMSTRFI	Input	220V, 230V or 240V	80A	100Amp 1-Pole	#3 AWG (25mm²)
		Output				
International 3:1 Model	SYMSTRF3I	Input with Bypass Transformer	380V, 400V or 415V	26A/Phase when online, 50A on L1 and L2 in bypass	60Amp 3-Pole	#8 AWG (10mm²)
		Input without Bypass Transformer		26A/Phase when online, 80A on L1 in bypass	100Amp 3-Pole	#3 AWG (25mm²)
		Output	220V, 230V or 240V	80A	100Amp 1-Pole	#3 AWG (25mm²)
	Bypass Balancing Transformer	Input	Controlled by system frame.			#8 AWG (10mm²)*
		Output				#3 AWG (25mm²)*

** Install the bypass balancing transformer no further than 50' (15 m) from the Symmetra™. If a greater distance is required, factor in voltage drop when selecting wire gauge.*

Electrical Requirements - EPO Switch

The Symmetra™ Power Array can be connected to either a dry contact or 24Vdc Emergency Power Off switch. The terminal connections for the EPO switch are physically isolated from the primary circuitry of the Power Array system.

EPO Specifications

The EPO circuit is considered a Class 2 and SELV circuit.

SELV is an acronym for "Safety Extra Low Voltage." SELV is a common term in Europe and IEC standards. A SELV circuit is isolated from primary circuitry through an isolating transformer and designed so that under normal conditions, the voltage is limited to 42.4 Vpeak or 60 Vdc.

A Class 2 Circuit is a common term in North America and in UL and CSA standards. It is defined in the Canadian Electrical Code (C22.1, Section 16) and in the National Electrical Code (NFPA 70, Article 725).

SELV and Class 2 circuits must be isolated from all primary circuitry. Do not connect any circuit to the EPO terminal block unless it can be confirmed that the circuit is SELV or Class 2. If there is a question, use a contact closure switch. Use one of the following cable types to connect the Symmetra™ to the REPO switch:

CL2 - Class 2 cable for general purpose use.

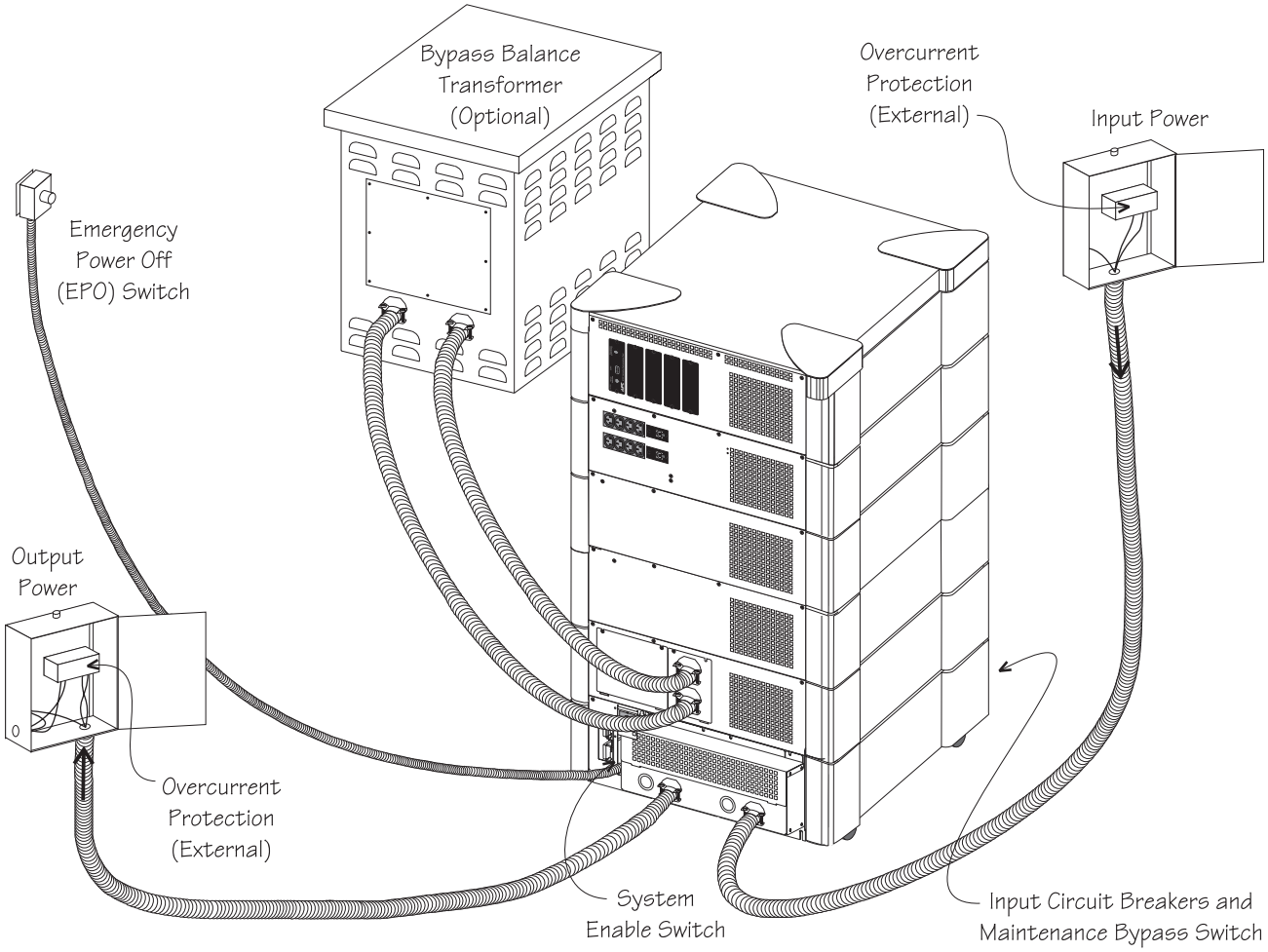
CL2P - Plenum cable for use in ducts, plenums, and other space used for environmental air.

CL2R - Riser cable for use in a vertical run in a shaft or from floor to floor.

CL2X - Limited Use cable for use in dwellings and for use in raceway.

For installation in Canada, the cable should be CSA Certified, type ELC (Extra-Low-Voltage Control Cable).

Electrical Wiring Overview



Receiving and Unpacking

Receiving the Symmetra™

The Symmetra™ Power Array frame and modular components are shipped on a number of pallets, dependant on the configuration ordered. Verify that labeled boxes match the purchase order. Consider the system component shipping weights and dimensions before moving them. If power modules are missing, check the frame. The power modules may have been pre-installed at the factory.

Inspect Packaging

Inspect packaging for signs of mishandling. If damage is detected:

1. Note the damage on the Bill of Lading.
2. File a damage claim with the shipping agent within 24 hours.
3. Notify APC of the damage claim, and condition of the equipment.

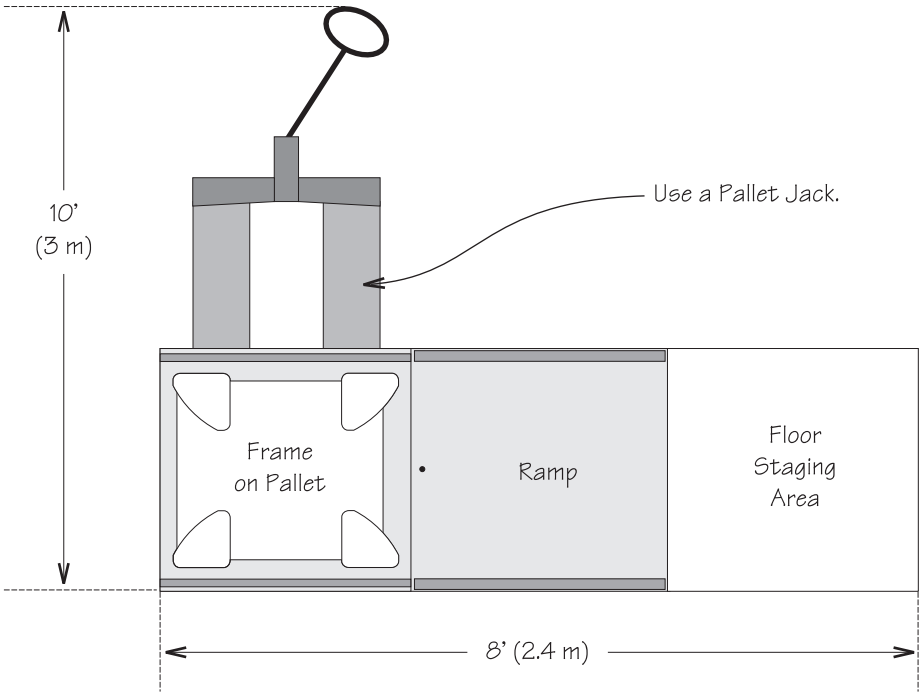
Symmetra™ Component		Shipping Weight lb (kg)	Shipping Dimensions W x D x H inches (cm)
Note: Shipping weights shown are for frames with no modules.			
North American Models	SYMINIF	335 lb (152 kg)	33" x 30" x 42" (84 x 76 x 107)
	SYMSTRF	580 lb (264 kg)	33" x 30" x 63" (84 x 76 x 160)
International 1:1 Models	SYMINIFI	205 lb (93 kg)	33" x 30" x 42" (84 x 76 x 107)
	SYMSTRFI	315 lb (143 kg)	33" x 30" x 56" (84 x 76 x 142)
3:1 Model	SYMSTRF3I	320 lb (145 kg)	
Battery Module	SYBATT	70 lb (32 kg)	13" x 31" x 17" (33 x 79 x 43)
Power Module	SYPM	40 lb (18 kg)	

Notice!

- If power modules were pre-installed, add their weight to the Symmetra™ frame weight.

Moving The Symmetra™ Frame and Modules

The frame (bolted to the pallet), should be positioned with a pallet jack or a fork lift. Leave enough space to unpack the frame, install the ramp, and for two people to roll it onto the floor. The Symmetra™ frame can be moved over a flat, smooth floor surface by rolling it on the frame casters. The individually boxed power and battery modules should be stacked close to the installation site.

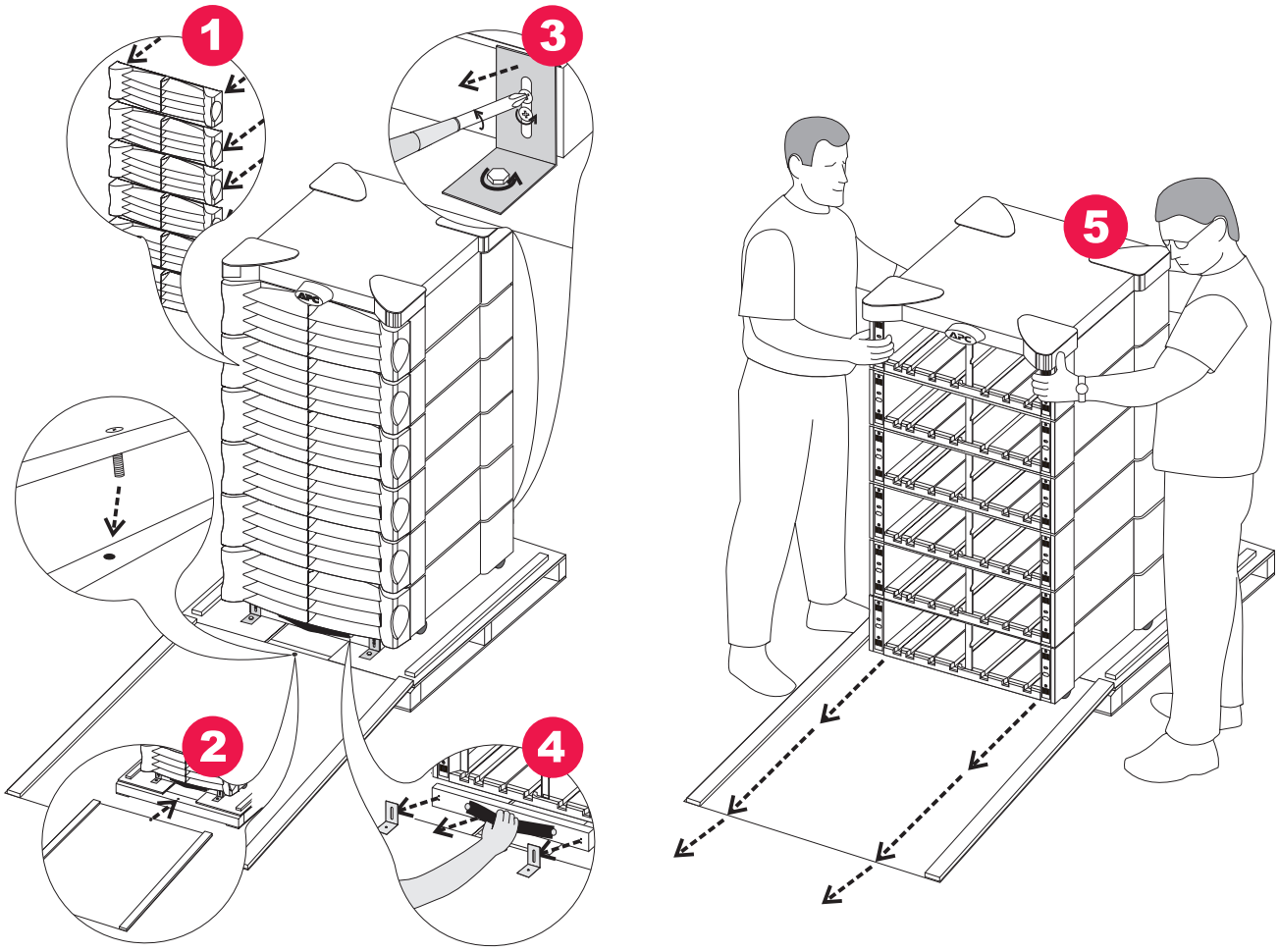


⚠ Caution!

- Do not install battery modules into the Symmetra™ frame until after electrical wiring connections have been made, and the system is ready to be powered.
- If battery modules are to be stored for an extended time, store them in a dry, cool environment.
- Battery modules are heavy (70 lb). Two people are required to carry, move and install them.

Unpacking the Symmetra™ Frame

1. Remove packaging materials and the grill covers. Use care to prevent scratching the surface of the frame.
2. Locate the pallet ramp that is shipped beneath the top corrogated shipping cover.
3. Follow the steps below to remove the frame from the pallet. After unpacking, carefully roll the Symmetra™ to the installation site. It is now ready to be wired.



⚠ Caution!

- Two people are required to remove the frame from the pallet.
- All four leveling feet at the base of the Symmetra™ frame must be fully retracted before rolling the frame from the pallet.
- If rolling the frame on the casters over objects such as door thresholds or floor irregularities, be careful to prevent the frame from tipping.

Electrical Installation

Model: SYMSTRF3I

The following procedures must be performed by a qualified electrician!

Wiring the three phase SYMSTRF3I Symmetra™ includes:

1. Connecting 380V, 400V, or 415V three phase input wiring from a dedicated circuit
2. Connecting 220V, 230V, or 240V single phase output wiring to load equipment via a distribution panel
3. Connecting an Emergency Power Off (EPO) switch
4. Connecting an optional Bypass Balancing Transformer

Notice!

- All power and control wiring must be installed by a ***qualified electrician***.
- Input, Output, Emergency Power Off , and Bypass Transformer wiring must comply with all applicable local and country codes.
- It is recommended that input electricity for the Symmetra™ be provided from a dedicated utility power source. (There are no other circuits on the line.)
- It is recommended that flexible metal conduit be used for all wiring connections. Place the Symmetra™ in the final operating position when determining the length of flexible conduit.
- Read this section ***completely*** before installing any wiring to the Symmetra™ frame.

⚠ Warning!

- Verify that all incoming line voltage (utility power) and low voltage (control) circuits are de-energized, and locked out, before installing cables or making connections, whether in the junction box or to the Symmetra™ Power Array.
- Verify that all battery modules are removed from the frame, and all Extended Run battery frames are disconnected from the Power Array before making any wiring connections to the Symmetra™ .
- Always follow the **Total Power Off** Procedure before making wiring connections to or from a functioning Symmetra™ Power Array. (See the Safety Information section.)

Electrical Requirements

Symmetra™ Component		Wiring	Voltage (VAC)	Current Full Load	Overcurrent Protection (External)	Minimum Wire Size
International 3:1 Model	SYMSTRF3I	Input with Bypass Transformer	380V, 400V, or 415V	26A/Phase when online, 50A on L1 and L2 in bypass	60Amp 3-Pole	#8 AWG (10mm²)
		Input without Bypass Transformer		26A/Phase when online, 80A on L1 in bypass	100Amp 3-Pole	#3 AWG (25mm²)
		Output	220V, 230V, or 240V	80A	100Amp 1-Pole	#3 AWG (25mm²)
	Bypass Balancing Transformer	Input	Controlled by system frame.			#8 AWG (10mm²)*
		Output				#3 AWG (25mm²)*
** Install the bypass balancing transformer no further than 50' (15 m) from the Symmetra™. If a greater distance is required, factor in voltage drop when selecting wire gauge.*						

EPO Switch Wiring (Required)

The Symmetra™ Power Array is to be connected to either a dry contact or 24Vdc Emergency Power Off (EPO) switch. The terminal connections for the EPO switch are physically isolated from the primary circuitry of the Power Array system.

EPO Specifications

The EPO circuit is considered a Class 2 and SELV circuit.

SELV is an acronym for "Safety Extra Low Voltage." SELV is a common term in Europe and IEC standards. A SELV circuit is isolated from primary circuitry through an isolating transformer and designed so that under normal conditions, the voltage is limited to 42.4 Vpeak or 60 Vdc.

A Class 2 Circuit is a common term in North America and in UL and CSA standards. It is defined in the Canadian Electrical Code (C22.1, Section 16) and in the National Electrical Code (NFPA 70, Article 725).

SELV and Class 2 circuits must be isolated from all primary circuitry. Do not connect any circuit to the EPO terminal block unless it can be confirmed that the circuit is SELV or Class 2. If there is a question, use a contact closure switch. Use one of the following cable types to connect the Symmetra™ to the EPO switch:

CL2 - Class 2 cable for general purpose use.

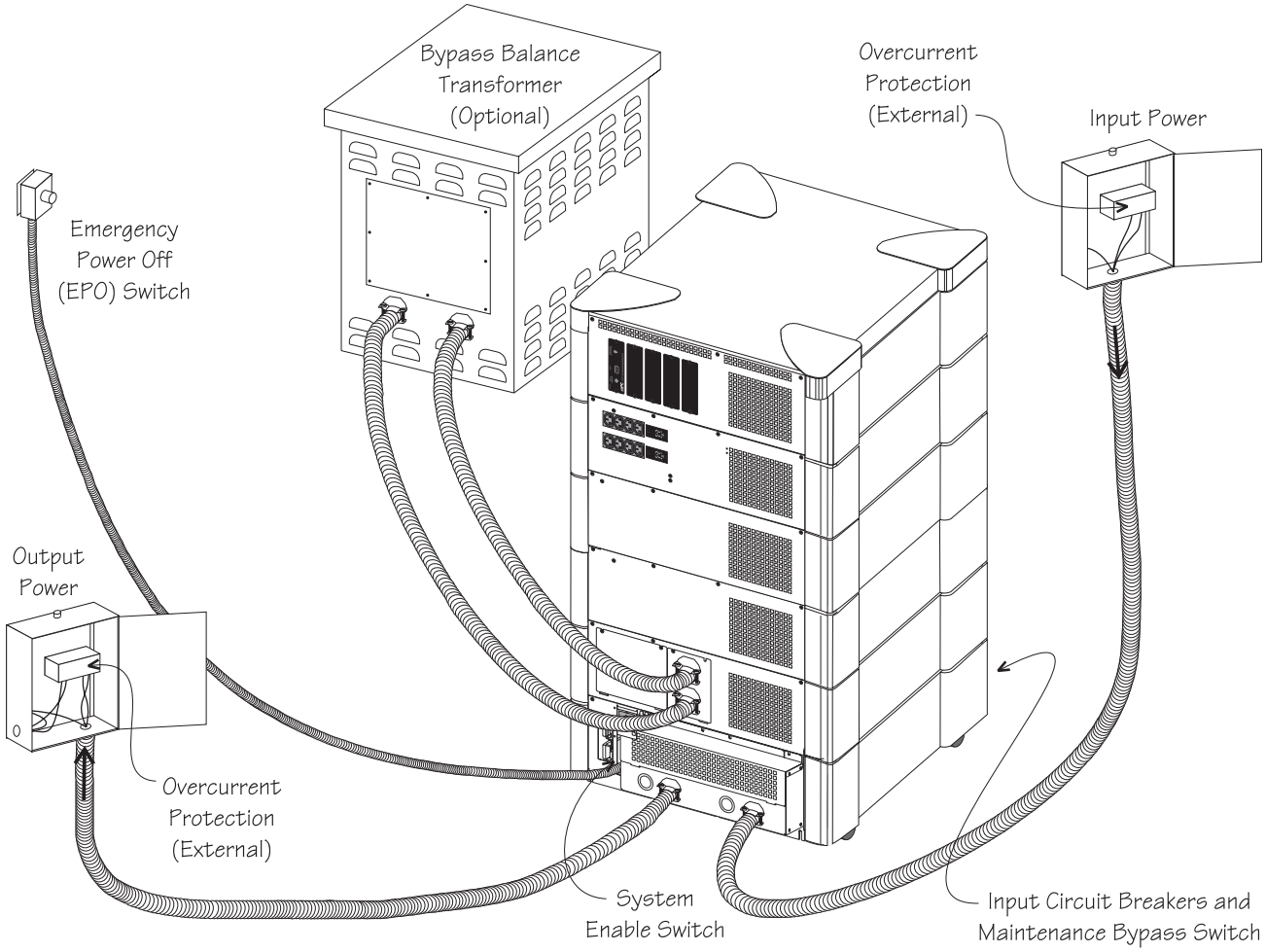
CL2P - Plenum cable for use in ducts, plenums, and other space used for environmental air.

CL2R - Riser cable for use in a vertical run in a shaft or from floor to floor.

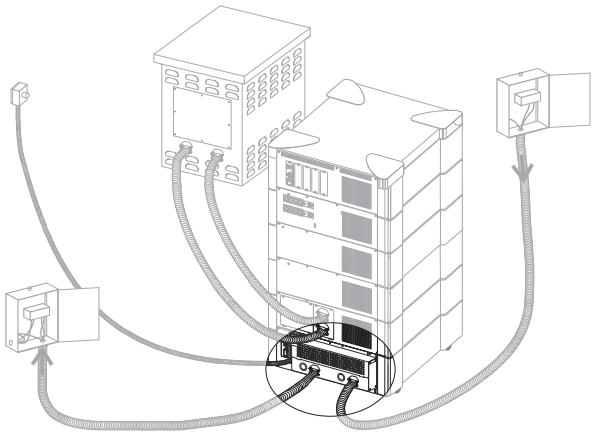
CL2X - Limited Use cable for use in dwellings and for use in raceway.

For installation in Canada, the cable should be CSA Certified, type ELC (Extra-Low-Voltage Control Cable).

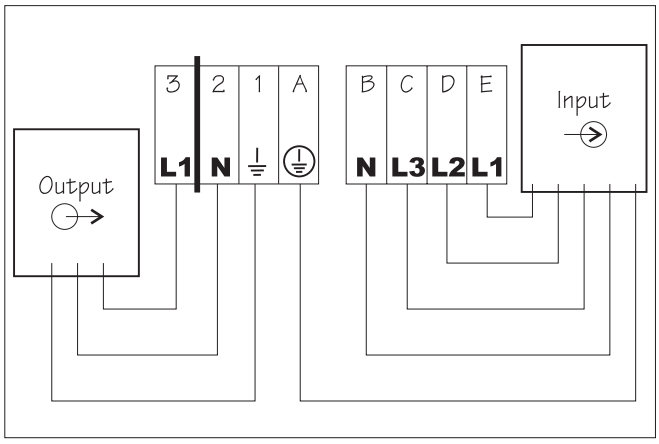
Electrical Wiring Overview

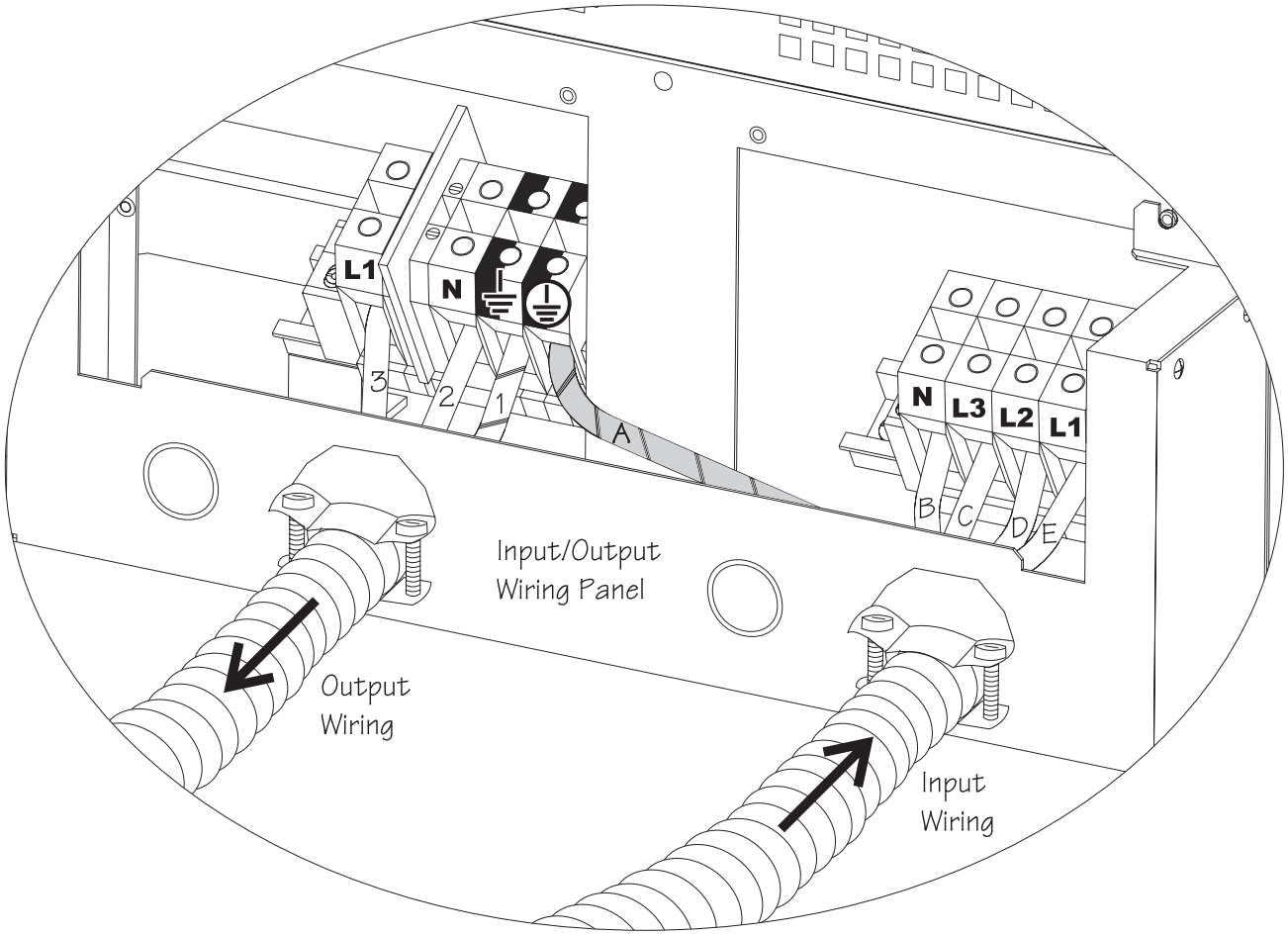


Input/Output Wiring



I/O Wiring Schematic





Input/Output Wiring Procedure

1. Mount the Input/Output Wiring Panel to the lower rear frame panel.
   Note: *The I/O wiring panel and the cover plate are shipped in the frame accessory package located in the upper right module bay of the frame. Remove the four mounting screws from the rear of the Symmetra™ frame, and use them to install the panel. Place the cover plate aside.*
2. Attach flexible metal conduit to the wiring panel.
   Note: *If the pre-installed knock-outs do not fit your strain relief hardware, use existing knock-out as a pilot to create a new hole.*
3. Pull the wire through the conduit. Leave enough wire extending from the conduit strain relief to reach terminal blocks.
4. Strip approximately 1/2" (13 mm) of insulation from the end of each wire.
5. Connect the ground wires to the green/yellow grounding terminal block connections.
   Note: *Both input and output grounds attach to the same terminal block. Make sure to wire them correctly.*
6. Connect the neutral wires to terminal block connections marked "N" in blue.

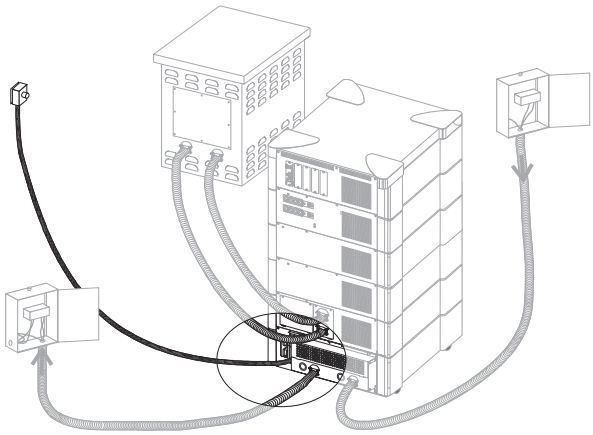
⚠ Caution!

- Tighten screws to ensure good electrical connection.

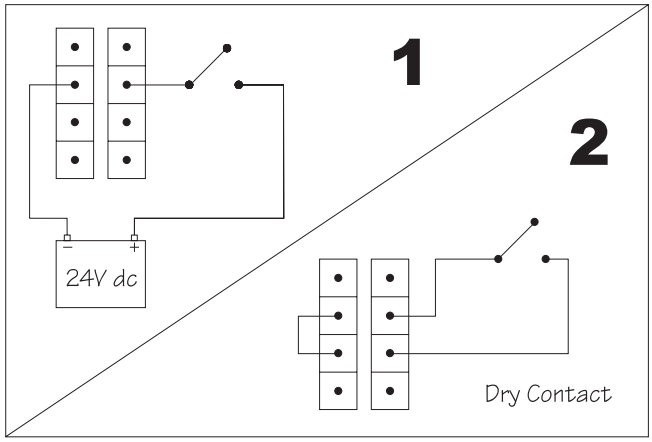
7. Connect remaining power wires to terminal block connections.
8. Inspect wiring for proper connections.
   Note: *Do not mount the wiring cover plate until the wiring verification procedure is complete.*

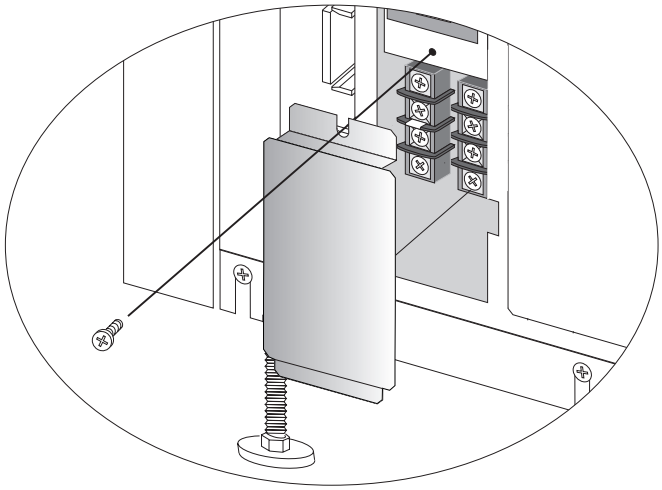
	Wiring	Symbol	Description	Minimum Wire Size
1	Output Ground *Install Second!*	⏚	Safety Ground (Green/Yellow)	#3 AWG (25mm²)
2	Output Neutral *Install Fourth!*	**N**	Output Return (Blue)	
3	Output Phase	**L1**	Output Power	
A	Input Ground *Install First!*	⏚	Primary Safety Ground (Green/Yellow)	#8 AWG (10mm²) if a bypass transformer is installed.
B	Input Neutral *Install Third!*	**N**	Input Return (Blue)	
C	Input Phase	**L3**	Input Power	#3 AWG (25mm²) if a bypass transformer is not installed.
D	Input Phase	**L2**	Input Power	
E	Input Phase	**L1**	Input Power	

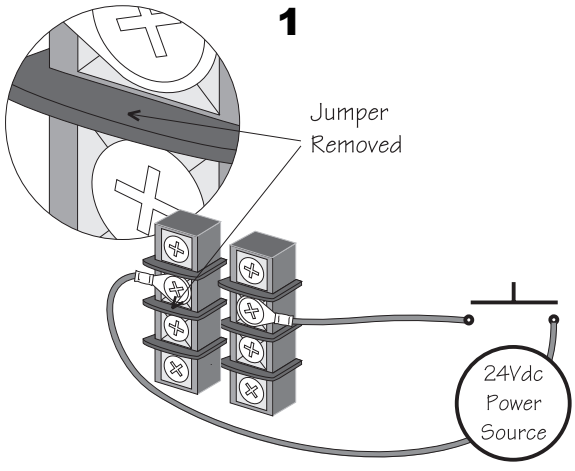
Emergency Power Off Switch Wiring (Required)

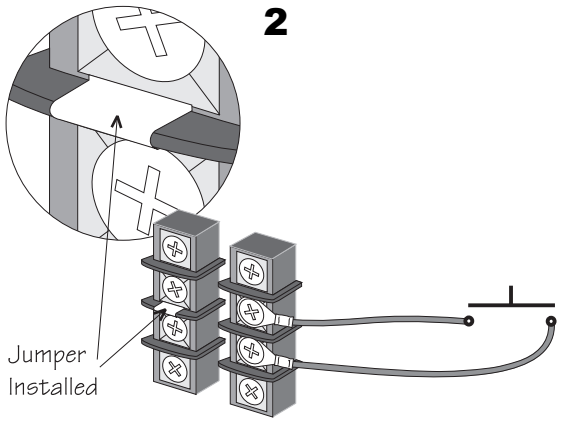


EPO Wiring Schematic





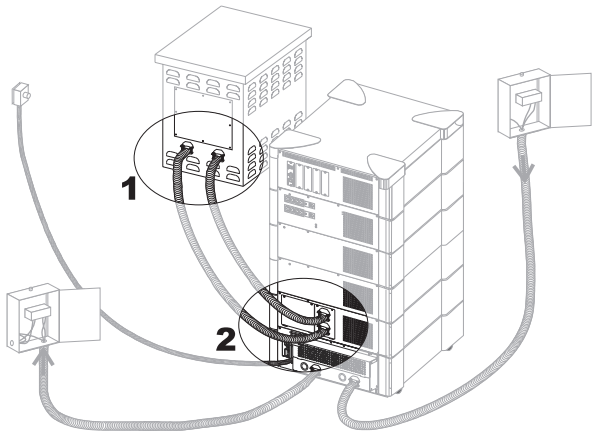




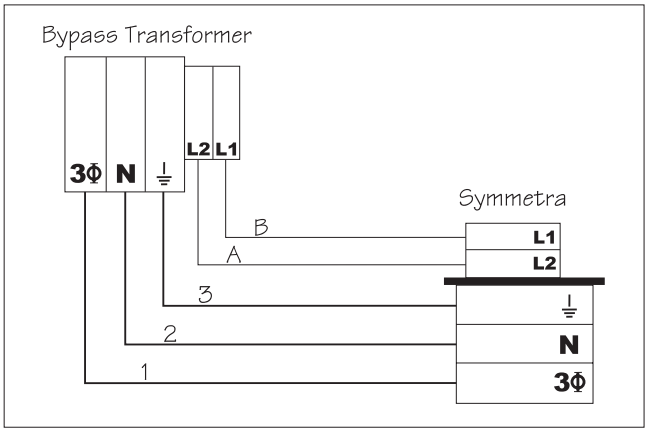
Emergency Power Off Switch Wiring Procedure

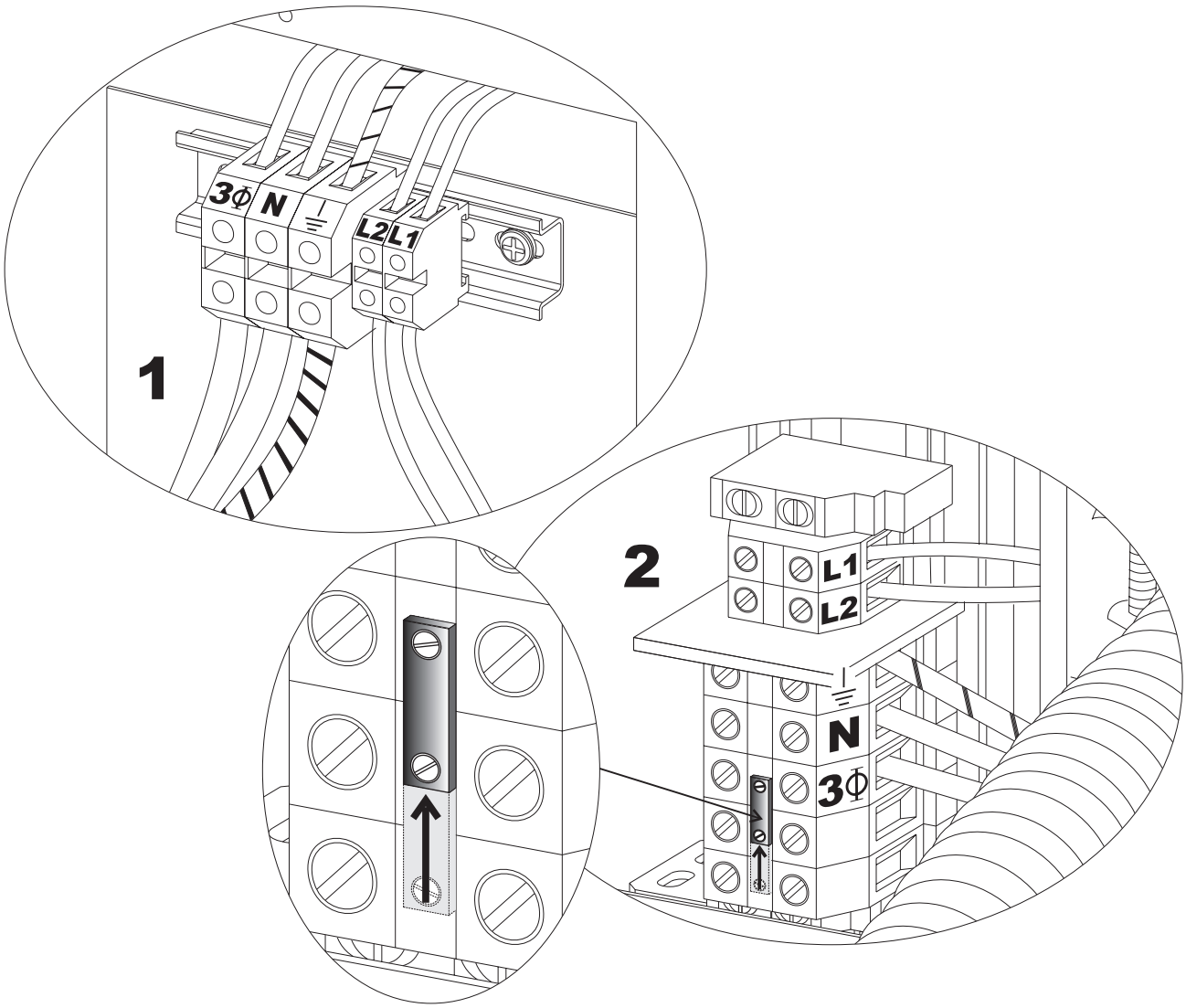
1. Remove EPO wiring access panel.
2. Determine the type of EPO switch to be used: A contact closure or 24V dc. If a 24V dc EPO switch will be used, remove the factory installed jumper.
4. Attach flexible conduit, or appropriate wire/strain relief to panel.
5. Pull the wire through the conduit. Leave enough wire extending from the conduit strain relief to reach terminal blocks.
6. Strip approximately 1/2" (13 mm) of insulation from both wires. Secure a wire terminal to each wire.
   Note: *It is recommended that ring terminals (crimped) be used to ensure good electrical connection.*
7. Connect wires as shown according to switch type.
8. Inspect wiring to ensure proper connections. Carefully fold wiring into the entry compartment and remount the access panel.

Bypass Balancing Transformer Wiring (Optional)



Balancing Transformer Wiring Schematic





Bypass Balance Transformer Wiring Procedure (Optional)

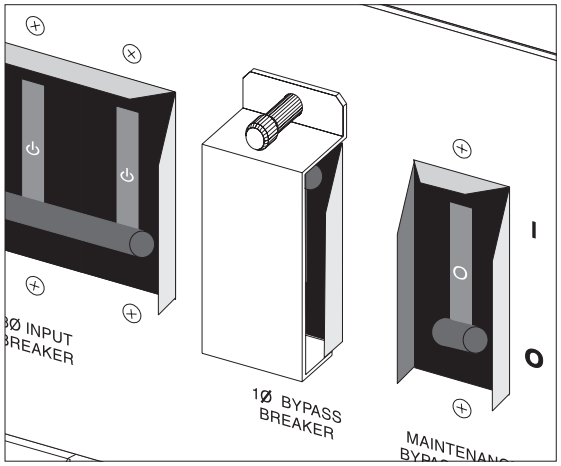
1. Remove the transformer wiring panels on the Symmetra™ frame, and on the back of the transformer.
2. Move the jumper bar on the frame terminal block up one position. See illustration.
3. Pull the wire through the conduit. Leave enough wire extending from the conduit strain relief to reach terminal blocks.
   Note: *The input wires must not be in the same conduit as the output wires. See wiring schematic.*
4. Attach flexible metal conduit to the Symmetra™ wiring panel and to the transformer frame . Remount the wiring panel onto the Symmetra™ frame.
5. Strip approximately 1/2" (13 mm) of insulation from the end of each wire.
6. Connect the ground wire to the green/yellow grounding terminal block connection.
7. Connect the neutral wires to terminal block connections marked "N" in blue.
8. Connect remaining power wires to terminal block connections.
9. Inspect wiring to ensure proper connections.

Caution!

- Fasten connection screws to ensure good electrical connection.

10. Remount the wiring panels onto the Symmetra™ frame and the transformer.
11. Switch the bypass circuit breaker to the on (I) position and install the cover plate over it. See illustration.

Note: *Installing the bypass transformer option removes the bypass circuit breaker from the power path.*



	Wiring	Symbol	Description	Minimum Wire Gauge
1	Output Phase	3Φ	Output Power	#3 AWG (25mm²)
2	Output Neutral	N	Output Return (Blue)	
3	Safety Ground	⏚	Safety Ground (Green/Yellow)	
A	Input Phase	L2	Input Power	#8 AWG (10mm²)
B	Input Phase	L1	Input Power	

Wiring Verification Procedure

The following procedure will ensure that the Symmetra™ has been wired properly. The electrician who performed this electrical installation should complete this checklist and deliver it to the system operator.

Caution!

- Ensure all switches (system enable, maintenance bypass , input circuit breaker, and bypass circuit breaker) are in the "off" or "stand by" position. Ensure all load equipment is turned off or is unplugged from the Power Array.
  Note: *If a bypass transformer was installed, disregard the bypass circuit breaker.*

❑ **1.** Apply power to the system input, and measure voltage at the input terminal block. Record measured voltages below:

L1-Neutral: _____

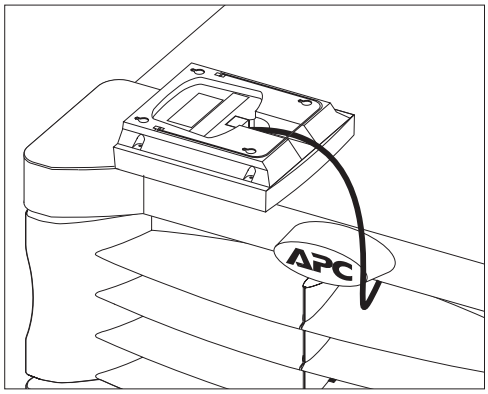
L2-Neutral: _____

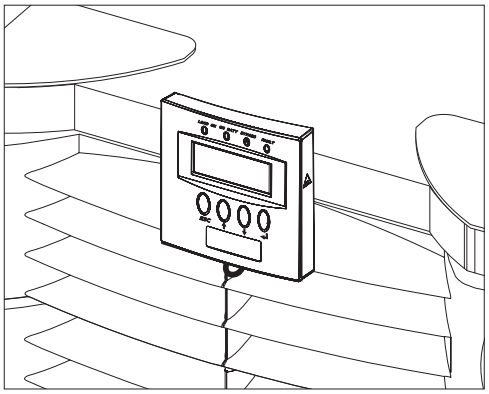
L3-Neutral: _____

Caution!

- Measured voltage must be between 184V and 265V. If it is not, STOP! Verify correct wiring from the power source to the input wiring connections. Repeat step 1.

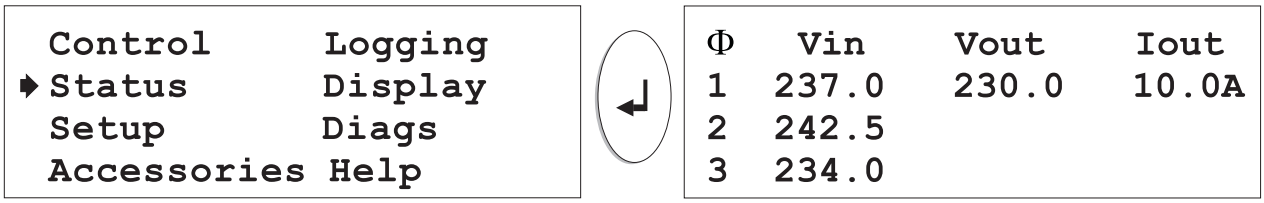
❑ **2.** Connect the PowerView display as shown below:





❑ **3.** Switch the input circuit breaker and bypass breaker on, then switch the system enable switch on.
Note: *The system will make some clicking sounds as it powers up, and may display fault messages on the PowerView display. Disregard these messages at this time.*

❑ **4.** Press the "Escape" key on the display until the top level menu screen appears. Select "Status." Pressing the enter key opens the voltage status screen as illustrated below.
Note: The fault light on the display may remain on. Disregard this visual indicator at this time.



❑ **5.** Record input voltages below, and compare with measured voltages from step 1. If the two measurements are significantly different, contact APC Symmetra™ technical support.

Vin1: _____

Vin2: _____

Vin3: _____

❑ **6.** Switch the maintenance bypass switch on.
Note: Disregard any LED indicator or fault messages on the PowerView.
Record output voltage below, and compare with Vin1 from step 5. If the two measurements are significantly different, contact APC Symmetra™ technical support.

Reported Output Voltage: Out:_____**V**_____**Hz**

❑ **7.** Test the EPO switch. The system enable switch should physically move to the "stand by" position, and the system should shut down completely. If this does not occur, check the connections and the EPO switch to ensure they are installed and functioning properly.

❑ **8.** Successful completion of steps 1 through 7 indicate that the system wiring is properly installed. Turn off breakers and switches and shut down input power to the system. Reinstall all wiring access panels on the frame.

Electrical Installation Completed by:_____

_____

_____

APC Worldwide Technical Support Telephone Numbers:

APC Headquarters, US
Tel:800-800-4272

APC Argentina
Tel:0800-9-2722

APC Australia
Tel:+612-9955-9366
Fax: +612-9955-2844
Freephone:1 800 652 725

APC Austria
Tel: 0800 296480

APC Belgium
Tel:0800 15063

APC Brazil
Tel: 0800-127221

APC China
Tel:+86-10-8529-9888
Fax: +86-10-8529-9158

APC Czech Republic
Tel:0800 102063

APC Denmark
Tel:800 18 153

APC Finland
Tel:9800 13 374

APC France
Tel:0800 906 483

APC Germany
Tel:0800 1801227

APC Greece
Tel:00800 353 12206

APC Holland
Tel:0800 0224655

APC Hungary
Tel: 06800 12221

APC India, Nepal, Sri Lanka, Bangladesh, and Maldives
Tel: +91-44-433-1124
Fax: +91-44-434-1464

APC Indonesia
Tel: +62-21-650-0813
Fax: +62-21-60-7427

APC Ireland
Tel: 1-800-702000 x2045

APC Israel
Tel: 177 353 2206

APC Italy
Tel: 800 874731

APC Japan
Tel: +813-5434-2021
Fax: +813-5434-2022

APC Korea
Tel: +82-2-501-6492
Fax: +82-2-501-6369

APC Luxembourg
Tel: 0800 2091

APC Malaysia
Tel: +603-756-8786
Fax: +603-756-8780

APC Norway
Tel: 800 11 632

APC Philippines
Tel: +63-2-813-2662
Fax: +63-2-892-2448

APC Poland
Tel:00800 353 1202

APC Portugal
Tel:0800 853 182

APC Russia
Tel:+7 095 916 7166

APC Singapore, Thailand, Vietnam
Tel:+65-398-1000
Fax:+65-398-1010

APC South Africa
Tel: 0800 994206

APC Spain
Tel:900 95 35 33

APC Sweden
Tel: 020 795 419

APC Switzerland
Tel: 0800 556177

APC Taiwan
Tel: +886-2-2755-1945
Fax: +866-2-2755-1946

APC Turkey
Tel: 0800 353 90275

APC United Kingdom
Tel: 0800 132990

Latin America, toll free to APC Corporate, USA:

Antigua
Tel: 800-326-0640

Bahamas
Tel: 800-788-9688

Barbados
Tel: 800-534-0631

Bermuda
Tel: 800-623-0717

Brazil
Tel: 0800-127221

Chile
Tel: 123-0-020-0254
Tel: 00-020-3255

Colombia
Tel: 980153947

Mexico
Tel: 95-800-804-4283
Tel: 001-800-788-2208

Peru
Tel: 001-800-804-4383

Uruguay
Tel: 000-413-598-2139
Tel: 1 800-788-9688

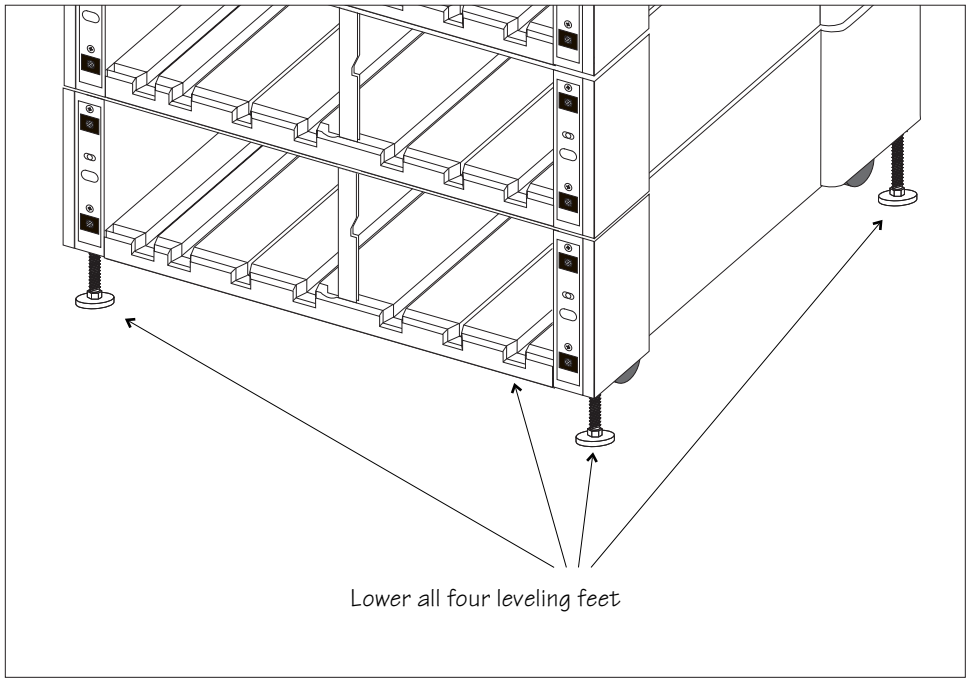
Venezuela
Tel: 8001-2856
Tel: 800-1-3506

Startup Procedure

After the electrical wiring connections are verified, power and battery modules can be installed and the Symmetra™ can begin to deliver conditioned power to the output power panel(s).

Securing The Frame - Setting The Leveling Feet

1. Locate the frame in its final operating position.
   Note: *Leave a minimum of 12" (30 cm) of clearance at the rear of the frame for adequate airflow. Make sure the system enable switch remains accessible.*
2. Hand turn all four leveling feet until the pads make contact with the floor.
3. Use a wrench to extend each leveling foot by turning the hex nut two complete turns.
4. Adjust the leveling feet until the frame is level front to back and side to side.



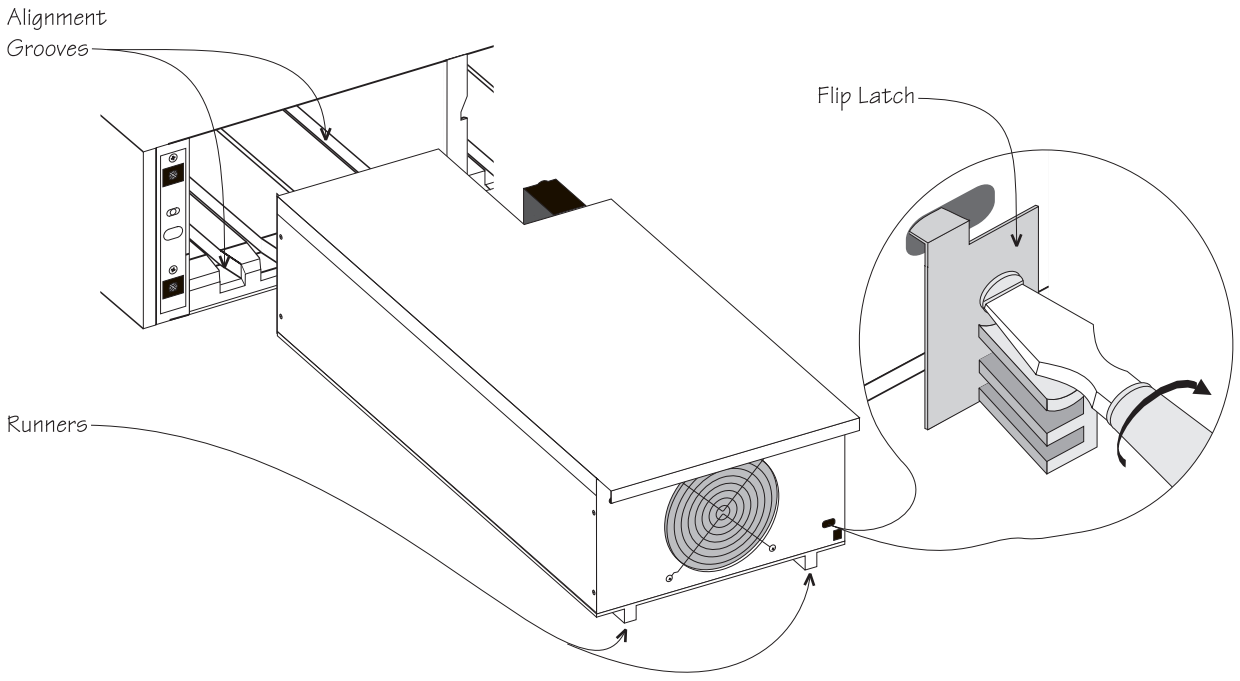
Lower all four leveling feet

Notice!

- After the leveling feet are lowered, attempting to move the frame may bend them.

Power Module Installation

1. Align the runners of a power module with the alignment grooves in the bottom module bay. Firmly slide the power module into the frame until the "drop-lock" engages.
2. Swing the flip latch up and fasten the screw to the power module. Do not overtighten.
3. Follow this procedure to install all power modules.

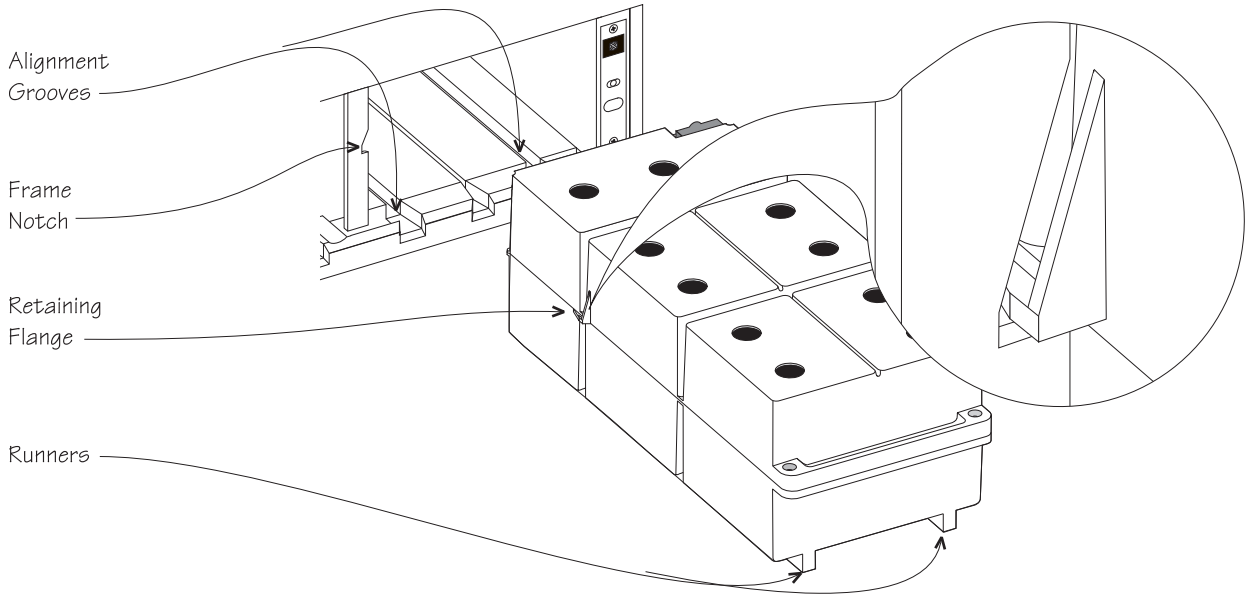


Notice!

- Power modules are installed on the left, battery modules are installed on the right.
- Always install power modules into the lowest available bay.
- If the power modules were installed at the factory, remove each of the shipping retainers that secured the modules during shipping. Secure the flip latches.

Battery Module Installation

1. With one person on each side of a battery module, align the runners of a battery module with the alignment grooves in the bottom module bay. Carefully slide the battery module into the frame until the retaining flange passes through the frame notch.
2. One person can now firmly push the battery module into the frame until the "drop-lock" engages.
3. Follow this procedure to install all battery modules.



⚠ Warning!

- The 120V, 7.2 Ah battery module constitutes a risk of electrical shock and an energy hazard. High short circuit current through conductive materials could cause severe burns. Before handling battery modules, remove conductive jewelry such as chains, wrist watches and rings.
- Battery modules weigh approx. 60 lb (27 kg). Two people are required to handle battery modules.
- Always install battery modules in the lowest available bay. When removing modules, start from the highest level and work down.

System Startup Procedure

Notice!

- **Refer to Appendix A for information about the PowerView Interface.**
- At least one power module, one battery module, and the main intelligence module must be installed before the system will start.
- Load equipment can be left connected during this start-up procedure, but it should be switched off until startup is complete.
- The PowerView can be configured to display French, Italian, German or Spanish. (Appendix A, page 3.)

1. Apply input power to the system from the utility power source.
2. Switch the input circuit breaker(s) and the system enable switch on.
3. Wait approximately 15 seconds to allow the system intelligence module to boot up and complete a startup sequence.
4. Open the top-level menu screen on the PowerView display. (See Appendix A, page 4.)
   Note: *The PowerView may display some "configuration change" messages because the system was configured at the factory with a different number of power or battery modules than are now installed. Disregard these messages, and press the escape key to close them.*
5. Verify that all power, battery and intelligence modules are detected by the system and are functioning properly by reviewing all status screens on the PowerView. (From the **Status** menu, open status screens for battery, power, main intelligence, and redundant intelligence modules. See Appendix A, page 5.)
   Note: *If a problem is reported, ensure the system component in question is properly installed. If the problem persists, refer to the troubleshooting information in Appendix B.*
6. Turn load on. (From the **Control** menu, click **Turn Load On**. See Appendix A, page 5.)
7. Replace all front grill covers. Make sure all wiring panels are firmly secured to the frame.
8. The Symmetra™ system is now ready to support the load equipment and be configured to meet specific power needs.

Configuration and Advanced Operation

Notice!

- The following information should be considered when configuring the Symmetra Power Array to provide optimal power protection for your specific requirements. For detailed settings and programming sequences, refer to *The PowerView Interface - Appendix A*.

Configuration

Display Settings

- The PowerView display date/time should be set to ensure an accurate set of records in the event log. The beeper volume and screen contrast can be adjusted to meet your particular site needs.
- A password can be used to prevent unauthorized access to configuration settings. Once a password is invoked, changes can be made only after entering the password.
- The Startup Screen can be customized to display information that is most important to you.

System Settings (Setup)

- Shutdown and return parameters can be set to best fit your specific power environment. Consider the time required to gracefully shut down your equipment in the event that a power outage drains the Symmetra™ to battery exhaustion. Also consider how and when power to the load equipment should be restored after the utility power returns.
- Output frequency can be controlled. Full Range Tracking (default) offers the widest available range. If your equipment requires tighter limits, consider the output frequency tolerance setting and bypass control.
- Alarm thresholds can be set to protect your selected system limits. The Symmetra will constantly self monitor load output and alert you with an audible alarm and an error message displayed on the PowerView screen if a violation occurs.
- Other settings include system self test scheduling, UPS Identification setting, output voltage, and output voltage reporting.

Logging Control

- A log of the last 64 system events is recorded and stored in the PowerView. The log function can be configured to record only those events important to you. The event log is especially valuable for diagnosing configuration problems.

Advanced Operation

Control Functions

Symmetra requires you to use the "power load on/off" function to deliver power to the load equipment. Other control functions allow you to conduct a system self test, test/control external communications by simulating a power failure, and command the system to go into and out of bypass mode. These functions are primarily used during configuration changes or system maintainance.

Diagnostic Information

Symmetra constantly monitors itself for internal problems. If an error is detected, the display fault indicator will light, and an error message will appear on the PowerView screen. Use this diagnostic information to determine the source of the fault.

Status Review

The status of each modular component in the system - battery, power, and intelligence modules - can be individually reviewed using the PowerView. System settings can also be reviewed.

Load/Capacity changes

Over time, it is possible there will be an increased power demand placed on the Symmetra. As the power demand increases, system capacity is decreased. Symmetra monitors this relationship and will initiate an audible alarm if the user-defined parameters are violated. This can be rectified by the following methods:

a.) Increase system capacity by adding Power and Battery Modules.

b.) Change alarm settings to eliminate the violation.

c.) Reduce the load by disconnecting equipment.

Note: *System capacity is limited by the lesser of the frame size, or the total capacity of the installed power modules.*

Runtime Calibration

To ensure the Symmetra is accurately reporting the battery runtime. A *Runtime Calibration* test should be conducted at least once a year. The runtime calibration exercises the battery system to 50% discharge, and helps maintain optimal battery function.

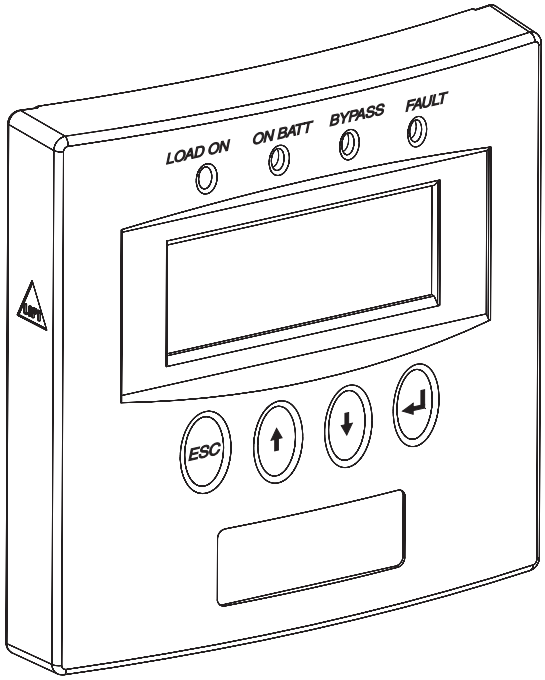
Accessories

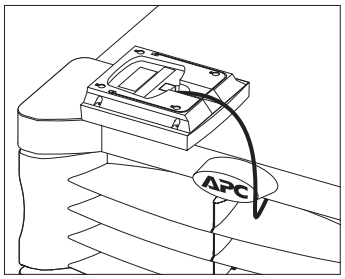
The PowerView will communicate with *SmartSlot* accessories only when an auxilary power cable connects the PowerView to the computer interface port at the rear of the Symmetra. Contact APC Technical Support for information about this function.

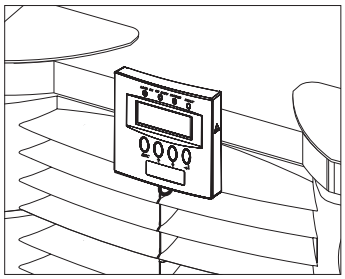
Appendix A

The PowerView Interface

It is easy to use the PowerView to command, monitor and configure the Symmetra™ Power Array system. The interface is so intuitive that even first-time users get up to speed quickly.



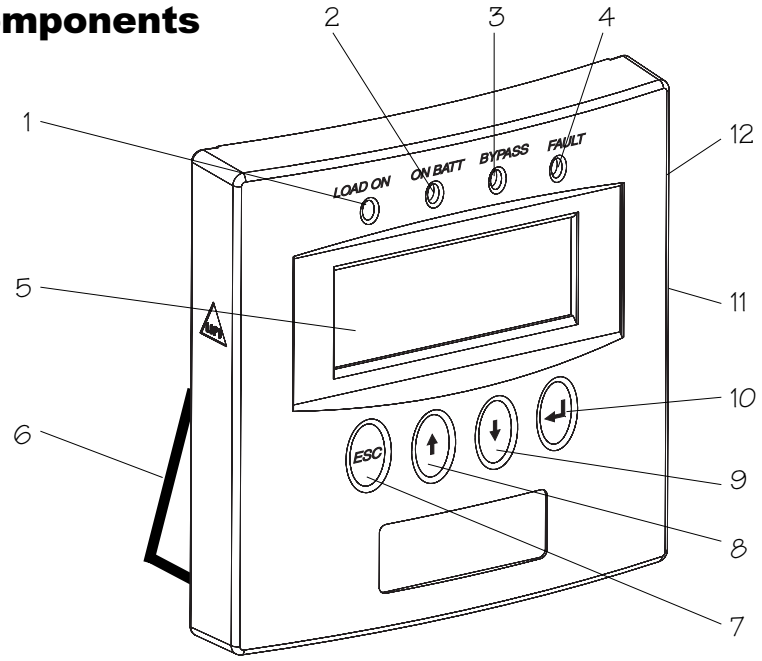




Notice!

- The PowerView default language is English. It can be configured to display French, Italian, German or Spanish. See page 3.
- The PowerView can be connected or disconnected without interrupting the UPS function of the Symmetra™.

PowerView Components



PowerView Component		Description
1	LOAD ON LED (green)	The load equipment is receiving power.
2	ON BATTERY LED (yellow)	An input power failure has occurred. Power is being supplied from the battery modules.
3	BYPASS LED (yellow)	Power to the load is being supplied directly from the utility power source. The Symmetra™ is effectively bypassed from the circuit.
4	FAULT LED (red)	The Symmetra™ has detected an internal fault condition. An alarm message appears on the alphanumeric display. (See Appendix B.)
5	LCD Display	A 4x20 character alphanumeric liquid crystal display.
6	Tabletop Stand	Pull out the wire bail to set the PowerView on a flat surface.
7	Escape Key	Exits the current screen. Returns to the previous screen.
8	Scroll Up Key	Moves the selection arrow up, or scrolls up through a list.
9	Scroll Down Key	Moves the selection arrow down, or scrolls down through a list.
10	Enter Key	Opens the selected menu command, or opens a selection list.
11	Audio Alarm	The PowerView emits a "beep" alarm.
12	Language EPROM Chip	English, French, Italian, German or Spanish. (Default is English.)

Language Configuration

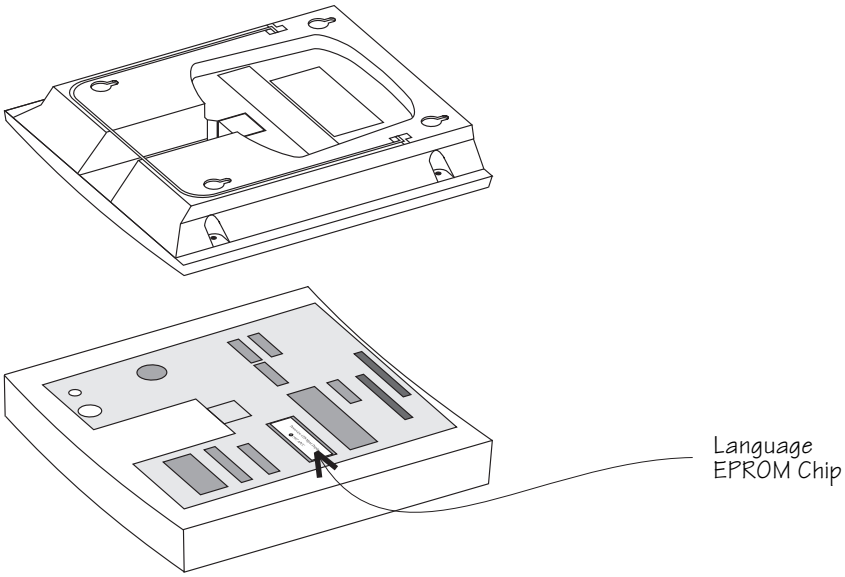
To change the PowerView display language, an internal EPROM chip must be replaced.

Caution!

- The internal circuitry of the PowerView and the language EPROM chip are sensitive to static electricity. Use all necessary precautions to eliminate static electricity from yourself and all tools before replacing the chip. Do not remove the chip from the protective case until ready to install it in the PowerView.
- The PowerView cable must be disconnected from the PowerView before proceeding.

Language Chip Replacement Procedure

1. Remove four screws to separate the rear cover from the PowerView.
2. Locate the language EPROM chip. It is adjacent to a larger 40-pin chip. *There is a semicircular notch at one end of the language chip. The replacement chip must be oriented so that the semicircular notch is in the same position.*
3. Insert a small flathead screwdriver between the language chip and the socket. Gently twist the blade to lift the chip. Proceed with caution and patience to avoid bent pins.
4. Position the replacement language chip on the socket with the semicircular notch in the same orientation as the original. Carefully ensure that all pins are properly aligned with the socket. Apply even pressure with fingers to the top of the EPROM until it is fully seated in the socket. Replace the rear cover.



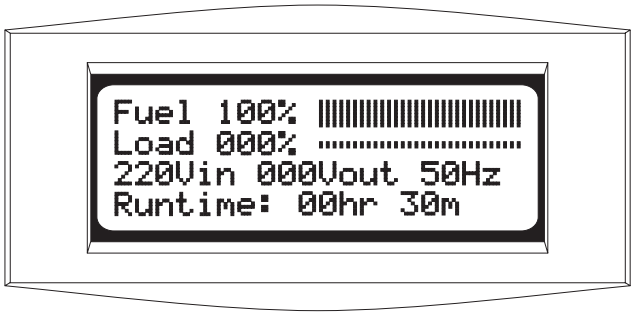
The Startup Screen

The factory default startup screen is opened by pressing the escape key. It displays the following information:

- **Fuel Percentage** - the percentage of battery capacity (fuel) that is presently available.
- **Load Percentage** - the percentage of system capacity that is being used to supply conditioned power to the load equipment.
- **Voltage and Frequency** - the input/output voltage, and the ouput frequency.
- **Run Time** - the run time that can be expected, based on the amount of power required by the load equipment, and the power capacity of all battery modules connected to the Symmetra™ Power Array.

Note: *The PowerView interface will "time out" after ten minutes of inactivity, and the LCD display will go blank. The screen display will reappear when any key is touched.*

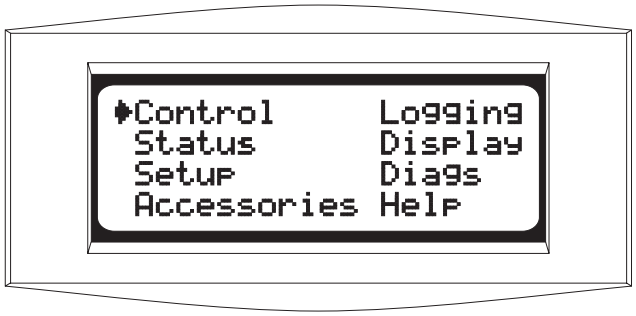
Note: *The startup screen for the international single phase models is depicted. Your startup screen may vary.*



Top-Level Menu Screen

Press the escape key to open the "Top-Level Menu" screen. This screen is the "launching pad" to monitor, command and configure the system. Refer to the following tables for all PowerView commands and controls.

Note: *The selection arrow in the illustration below is used to select a command. Pressing the up or down key moves the selection arrow to the desired command, and then pressing the enter key opens it.*



Control	Function
Turn Load On/Off	The system control for delivery of output power to connected equipment.
Do Self Test	Initiates a system self test. Runs through all self-diagnostics. If a problem is detected, an error message will be displayed.
Simulate Power Failure	Simulates a power failure/return. Used to test if the server recognizes this event.
Graceful Reboot	Requires the Symmetra to be connected to PowerChute software. Initiates a signal for the server to shutdown. After the user-defined "Low-Battery Duration," the output power is switched off for the duration of the user-defined "Return Delay." Then the output power is switched on again. See Setup>Shutdown to set these time delays.
Graceful Turn Off/On	Requires the Symmetra to be connected to PowerChute software. Initiates a signal for the server to shutdown. After the user-defined "Low-Battery Duration," the output power is switched off. See Setup>Shutdown to set these time delays.
Start Runtime Calibration	Calculates an accurate battery runtime measurement. Delivers load output power from battery source. Discharges battery to 50% of their capacity.
UPS Into/Out Of Bypass	The system control of the bypass function. Power is delivered directly from utility source to load equipment.

Status	Function
Voltage/Current Status Screen	Displays input voltage, output voltage, and output current information.
Percentage Load - No Redundancy	Compares the current load to the total capacity of all power modules.
Percentage Load - With Redundancy	Compares the current load to the total capacity of all power modules except the power modules that are set aside by the "Fault Tolerance" alarm threshold. For example, if there are four power modules installed, and the fault tolerance alarm threshold is set to "1," this percentage of load uses only 3 power modules for the calculation. See Setup>Alarm Thresholds to set the redundancy level.
Input and Output Frequencies	Displays the measured input and output frequencies
Battery Status Screen	Displays battery module source voltage, capacity, runtime, and status information.
Power Module Status Screen	Displays power module source capacity, fault tolerance, and status information.
Alarm Thresholds Status Screen	Displays the user-defined alarm settings. See Setup>Alarms to set these alarm thresholds.
Miscellaneous Status Screen	
Self Tst	Displays summary result of self test.
Lst xfr	Displays a summary of the reason for the last system transfer.
Status	Displays the current operating mode (i.e., on line, on batt, bypass, etc.).
IM/RIM	Displays the status of Intelligence and Redundant Intelligence modules.

PowerView Commands (continued)

Setup	Function	Options
Shutdown	Sets the shutdown parameters in the event of a utility power failure.	
Low Batt Dur	An audible alarm will sound this number of minutes before the Symmetra shuts down due to battery exhaustion.	2, 5, 7, or 10 minutes
Shutdown Dly	Used if the computer that issues the shutdown command requires additional run time to gracefully shut itself down.	20, 180, 300 or 600 seconds
Return Dly	When utility power is restored after a utility power failure, a delay interval to allow utility power to stabilize before the system goes back online.	0, 60, 180 or 300 seconds
Return Bat Cap	When returning from an extended utility power failure, a minimum battery capacity before repowering the load.	0, 15, 50, or 90%
Defaults	Set all settings to factory defaults	
Output Freq	The Symmetra output will phase lock to the input within this range.	50 or 60Hz +/- .1Hz, 50 or 60Hz +/- 3Hz, Full Range Tracking
Alarms	Sets the alarm thresholds.	
Redundancy	An audible alarm will sound if the redundancy falls below this level.	0, 1 or 2
Load	An audible alarm will sound when the load exceeds this limit.	1kVA to 8kVA, Never (Mini Frame) 1kVA to 6kVA, Never (Master Frame)
Runtime	An audible alarm will sound if the available runtime falls beneath this minimum.	5, 10, 15, 30, or 45 minutes, 1, 2, 3, 4, 5, 6, 7, or 8 hours, or never
Bypass	In the unlikely event that both the Symmetra™ fails, and the input voltage or line frequency is outside of normal range, choose one of these options:	Go to Bypass or Drop Load
Copy	Not used with Symmetra.	
Other	Remaining user-defined settings.	
Self Test	The Symmetra can automatically test itself at this user-specified periodic interval.	At Power On, 7 days, 14 days, or Disabled
UPS ID	Assigns a seven-character text string to a system.	
Output	Sets output voltage regardless of input voltage. (International systems only.)	220V, 230V or 240V
Vout Reporting	Reports the most significant output voltage. (North American versions only.)	208V, 240V, or Auto

PowerView Commands (continued)

Accessories
Only used when the PowerView is connected to the computer interface port at the back of the Symmetra™ frame. Monitors the Measure UPS *SmartSlot* Accessory.

Logging	Function
View Log	Tracks the most recent 64 events. Point to an entry and press the enter key for more information on that event.
View Statistics	Records the total number of transfers to battery, low battery, faults, and on battery runtime events.
Configure Logging	Sets the type of events that are recorded in the log.
Power Events: On/Off	
UPS Controls: On/Off	
UPS Faults: On/Off	
User Activity: On/Off	
List Event Groups	Allows for specific event listing.
Power Events	
UPS Control Events	
User Activities	
UPS Fault Events	
MeasureUPS Events	
Clear Log	Clears the view log. Does not clear the active event lists.

PowerView Commands (continued)

Display	Function	Options
Date/Time	Set the correct time and date.	dd:mm:yy (day:month:year) and hh:mm (hour:minute)
Password	Protects against unauthorized configuration changes.	
Password	Sets a password.	A-Z, 0-9, '_' = end
Timeout	An inactivity timer.	1, 2, 5, 10, or 30 minutes, 1, 2, or 4 Hours, or Forever.
Invalidate	Puts password into effect. Prevents unauthorized changes to the Symmetra configuration.	
Information	Displays PowerView model number, serial number, date of manufacture and revision information.	
Beeper	Sets audible alarm (beeper) criteria.	
At UPS	Not used with the Symmetra.	
At Display	Sets parameters for the audible alarm in the PowerView.	Power Failure, Power Failure +30 seconds, Low Battery, Never.
Volume	Sets audible alarm volume	Off, Low, Medium, Hi
Click	Set click sound when pressing display buttons.	On, Off
Contrast	Set LCD screen contrast	0, 1, 2, 3, 4, 5, 6, 7
Configure	Custom configures the startup screen displayed information	It is recommended to use factory default

PowerView Commands (continued)

Diag(nostics)	Function
Fault and Diagnostics	Display current system fault and diagnostic information of that fault.
Intelligence Module	Displays detailed intelligence module status and information.
Redundant Intel Module	Displays detailed redundant intelligence module status and information.
Pwr Modules	Displays detailed power module status and information.
Batts	Displays detailed battery module status and information.

Help
Online help screens are built into the PowerView display. Press the "Scroll Up" and "Scroll Down" keys simultaneously to access context sensitive help.

■ *The PowerV ew cable must be d sconnected from the PowerV ew before proceed ng.*

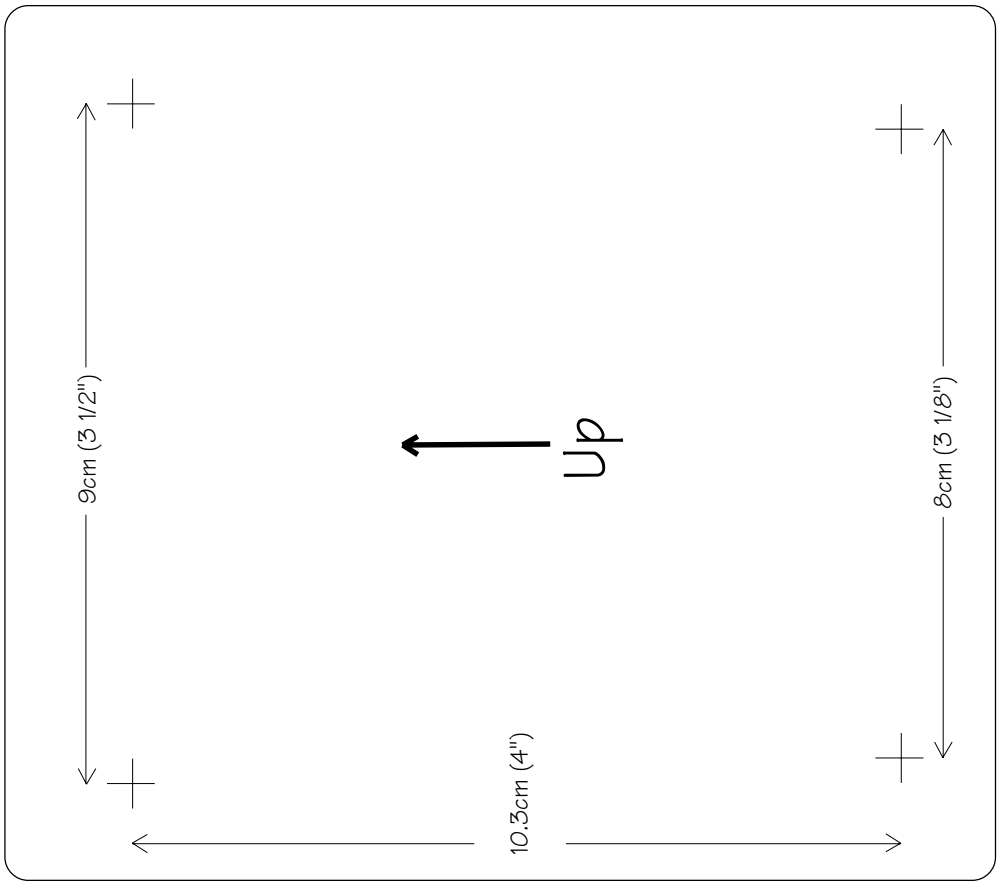
Symmetra™ APC www.apcc.com Power Array™

Wall Mounting the PowerView

Use the template below to install the PowerView on a wall:

1. Note the four mounting slots molded into the back of the PowerView.
2. Secure four large screws on a clean dry wall surface.
3. Leave each screw extending 5/16" (8mm) out from the surface of the wall.
4. Connect the 20' PowerView remote cable (provided) to the PowerView and to the PowerView communication port at the rear of the Symmetra™ frame.
5. Position the PowerView onto the screws.

Cut Here



Appendix B
Troubleshooting

The PowerView reports various messages on the display, including alarm status and changes in system configuration. This section lists all PowerView display messages, what each means, and an appropriate corrective action.

Note: *More than one of these messages may occur at one time. If this happens, be sure to review all of the messages for a better understanding of the system condition.*

	PowerView Message	Meaning	Corrective Action
Start-Up	#Pwr modules changed since last ON.	At least one power module has been added, or removed from the Symmetra™ since the last time the Pwr ON command was issued.	No corrective action necessary. Proceed with the startup.
	#Batteries changed since last ON.	At least one battery module has been added, or removed from the Symmetra™ since the last time the Pwr ON command was issued.	No corrective action necessary. Proceed with the startup.
	No Redundant Intelligence Module.	There is no RIM installed.	Proceed with the startup, or abort the startup, and install a RIM. **Note:** Without a functioning RIM, there is no redundancy in the event of a MIM failure.
	Batt capacity less than Return Batt Cap	The battery capacity of the Symmetra™ is less than the user specified minimum battery capacity required to turn on the load.	**Option #1**: Abort the startup, and allow batteries to recharge. **Option #2**: Continue startup, with less than minimum battery capacity.
	Input Freq outside configured range	The input frequency to the Symmetra™ is outside the configured range. The output frequency will not synchronize with the input frequency. Normal bypass is not available.	**Option #1**: Improve the frequency of the incoming voltage. **Option #2**: Widen the range of the acceptable incoming frequency with the PowerView. (Startup-Setup-Output Freq-Select.) **Option #3**: Proceed with startup. Normal bypass is not available.
	AC adequate for UPS but not for bypass	The Symmetra™ will function online with the input voltage, but in the event that bypass is required, the input voltage is not adequate to power the load equipment.	**Option #1**: Improve the incoming voltage. **Option #2**: Proceed with startup. Normal bypass is not available.
	Low/No AC input, startup on battery	Input voltage is not adequate to start the Symmetra™. If startup proceeds, Symmetra™ will function from battery.	**Option #1**: Abort startup until acceptable input voltage is present. **Option #2**: Proceed with startup. Battery will be discharged.

	PowerView Message	Meaning	Corrective Action
General Status	# of batteries increased.	At least one battery module has been added to the system.	No corrective action necessary.
	# of batteries decreased.	At least one battery module has been removed from the system.	No corrective action necessary.
	# of Pwr Modules increased.	At least one power module has been added to the system.	No corrective action necessary.
	# of Pwr Modules decreased.	At least one power module has been removed from the system.	No corrective action necessary.
	Intelligence Module inserted.	A MIM has been installed into the Symmetra™.	No corrective action necessary.
	Intelligence Module removed	A MIM has been removed from the Symmetra™.	No corrective action necessary.
	Redundant Intelligence Module inserted.	A RIM has been installed into the Symmetra™.	No corrective action necessary.
	Redundant Intelligence Module removed.	A RIM has been removed from the Symmetra™.	No corrective action necessary.
	# of External Battery Cabinets increased.	At least one external battery cabinet has been connected to the frame.	No corrective action necessary.
	# of External Battery Cabinets decreased.	At least one external battery cabinet has been disconnected from the Symmetra™.	No corrective action necessary.
	Redundancy Restored	A loss of power module redundancy occurred, and has been restored. Either additional modules have been installed, or the load has been reduced.	No corrective action necessary.
	Load is No Longer above Alarm Threshold	The load had exceeded the load alarm threshold. The situation has been corrected either because the load decreased, or the threshold was increased.	No corrective action necessary.
	Min Runtime restored.	The system runtime had dropped below the configured minimum, and has been restored. Either additional battery modules were installed, the existing battery modules recharged, the load was reduced, or the threshold was raised.	No corrective action necessary.

	PowerView Message	Meaning	Corrective Action
Module Failure	Bad Battery Module	A battery module has failed, and requires replacement.	Refer to Appendix C for module replacement procedure.
	Bad Power Module	A power module has failed, and requires replacement.	Refer to Appendix C for module replacement procedure.
	Intelligence Module is installed and failed	The main intelligence module has failed, and requires replacement.	Refer to Appendix C for module replacement procedure.
	Redundant Intelligence Module is installed and failed	The redundant intelligence module has failed, and requires replacement.	Refer to Appendix C for module replacement procedure.
Threshold Alarm	Load is above kVA alarm threshold	The load has exceeded the user specified load alarm threshold.	**Option #1:** Reduce the load. **Option #2:** Use the PowerView to raise the alarm threshold.
	Redundancy has been lost.	Symmetra™ no longer detects redundant power modules. Either power module(s) have failed, or the load has increased.	**Option #1:** If possible, install additional power modules. **Option #2:** Decrease the load. **Option #3:** Disable the redundancy alarm by setting redundancy to zero. (Startup-Setup-Alarms-Redundancy-select zero.)
	Redundancy is below alarm threshold.	Actual power module redundancy has fallen below the user specified redundancy alarm threshold. Either power module(s) have failed, or the load has increased.	**Option #1:** If possible, install additional power modules. **Option #2:** Decrease the load. **Option #3:** Use the PowerView to decrease the redundancy alarm threshold. (Startup-Setup-Alarms-Redundancy-select.)
	Runtime is below alarm threshold.	The predicted runtime is lower than the user specified minimum runtime alarm threshold. Either the battery capacity has decreased, or the load has increased.	**Option #1:** Allow the battery modules to recharge. **Option #2:** If possible, increase the number of battery modules. **Option #3:** Decrease the load. **Option #4:** Use the PowerView to decrease the minimum runtime alarm threshold. (Startup-Setup-Alarms-Runtime-select.)
Bypass	Bypass is not in range (either freq or voltage)	The frequency and/or voltage is out of acceptable range for bypass. This message occurs when Symmetra™ is on line, and indicates that the bypass mode may not be available if required.	**Option #1:** Decrease the sensitivity to input frequency. (Startup-Setup-OutputFreq-select.) **Option #2:** Corrrect input voltage to provide acceptable voltage and/or frequency.
	Bypass contactor stuck in bypass position.	Symmetra™ is stuck in the bypass position, and cannot go online.	Call your contract service provider, or APC Technical Support. (See inside front cover.)

	PowerView Message	Meaning	Corrective Action
Bypass	Bypass contactor stuck in on-line position.	Symmetra™ is stuck in the on-line position, and cannot go to bypass.	Call your contract service provider, or APC Technical Support. (See inside front cover.)
	UPS in bypass due to internal fault.	Symmetra™ has transferred to bypass mode because a fault has occurred.	Call your contract service provider, or APC Technical Support. (See inside front cover.)
	UPS in bypass due to overload	The load has exceeded the system power capacity. The Symmetra™ has switched to bypass mode.	**Option #1**: Decrease the load. **Option #2**: If possible, add power modules to the system.
	System is in Maintenance Bypass	The Symmetra™ is in bypass because the maintenance bypass switch is in the "on" position.	No corrective action necessary.
General Fault	On Battery	The Symmetra™ is in the on battery mode of operation. The battery modules are being discharged.	No corrective action necessary. ***Note:*** *Runtime is limited in duration. Prepare to shutdown the Symmetra™ and the load equipment, or restore incoming voltage.*
	Need Bat Replacement	One or more battery modules are in need of replacement.	Refer to Appendix C for module replacement procedures.
	UPS Fault	A fault has occurred in a power module. This will always occur with a bad power module failure message.	Call your contract service provider, or APC Technical Support. (See inside front cover.)
	Shutdown or unable to transfer to Batt due to overload	Symmetra™ has shutdown because an overload has occurred and bypass is not available.	**Option #1**: Reduce the load to eliminate overload. **Option #2**: If possible, add power modules to eliminate overload. **Option #3**: Replace failed power modules to eliminate overload. ***Note:*** *If bypass is not available because of a power failure, wait for power to be restored. If there is a utility problem, have it corrected.*
	Load Shutdown from Bypass. Input Freq/Volts outside limits.	Symmetra™ has shut the load down while it was on bypass, because the input power went out of acceptable range.	Correct the input voltage problem.
	Fault, Battery Charger Failure	The battery charger in one or more power module(s) failed.	Refer to Appendix C for module replacement procedures.
	Fault, Bypass Relay Malfunction	The bypass relay has malfunctioned.	Call your contract service provider, or APC Technical Support. (See inside front cover.)

	PowerView Message	Meaning	Corrective Action
General Fault	Fault, Internal Temp exceeded normal limits	The temperature of one or more battery modules is too hot.	Replace the overheated modules. Refer to Appendix C for module replacement procedures.
	Input circuit breaker tripped open	The input circuit breaker on the Symmetra™ has tripped. Input voltage is disconnected to the Symmetra™.	**Option #1:** If this occurs in conjunction with an overload condition, decrease the load and reset the breaker. **Option #1:** If no overload condition exists, reset breaker. If it trips again, call your contract service provider, or APC Technical Support. (See inside front cover.)
	System level fan failed	A cooling fan in the Symmetra™ frame has failed.	Call your contract service provider, or APC Technical Support. (See inside front cover.)
	The Redundant Intelligence Module is in control	The main intelligence module has failed, and the RIM is functioning as the primary intelligence module.	Replace the intelligence module. Refer to Appendix C for module replacement procedures.
	IIC inter-module communications failed.	The communications between the MIM and at least one other module has failed.	Call your contract service provider, or APC Technical Support. (See inside front cover.)

Appendix C
Module Replacement

The battery and power modules and the main intelligence and redundant intelligence modules are user replaceable. If a power or main intelligence module fails and a "redundant" module is present, the failed module can be replaced without interrupting power to the load equipment.

Note: *A redundant intelligence module can be replaced without interrupting power to the load, provided a functioning MIM is installed. A battery module can be replaced without interrupting power to the load, provided the Power Array is not in the on-battery operating mode.*

Module Failure Alarm Indicators

In the event of a module failure, the PowerView will display one of the following module failure messages, and the red *Fault* LED status indicator will glow. The PowerView audible alarm, a pager notification, and/or software notification may also be initiated.

```
Bad Battery Module
Main Frame Module:R5
Level 5 from top
Press any key...
```

```
Bad Power Module
Module:L1
Top Level
Press any key...
```

```
Intelligence Module
is installed and
failed
Press any key...
```

```
Rednt. Intell. Module
is installed
and failed
Press any key...
```

The power and battery module failure messages identify the bay where the module is installed. Bay locations (L1, L2, etc. or R2, R3, etc.) are printed on the center spine of the frame, between the module bays.

Technical Support & Obtaining Replacement Module

To obtain a replacement module or for technical assistance, contact APC technical support. A technician can help diagnose a problem over the telephone and can facilitate obtaining replacement modules.* When contacting APC, be prepared with the following information:

- *In the event of a module failure, the PowerView may display additional "fault list" screens. Press any key to scroll through these fault lists, record the information, and relay it to the the technical support technician.*
- *If possible, call APC technical support from a telephone that is within reach of the Symmetra™ PowerView. This will aid in using the PowerView to gather and report additional information to the technician.*
- *Be prepared to provide a detailed description of the problem. A technician will help you solve the problem over the telephone if possible or will give you a Return Material Authorizaton Number (RMA#). If a module is returned to APC, this RMA# must be clearly printed on the outside of the package.*
- *If the Symmetra™ is within the warranty period, repairs will be performed free of charge. If it is not within the warranty period, there will be a charge for repair.*
- *If the Symmetra™ is covered by an APC PowerPlan Service Product, have that information available to give to the technical support technician.*

Returning Modules to APC

To return a failed module to APC, pack the module in the original shipping container, and return it by insured, prepaid carrier. The APC technician will provide the address. If you no longer have the original shipping materials, ask the technician about obtaining a new set. It is very important that you pack the module properly to avoid damage in transit. Never use stryrofoam beads or other loose packaging materials when shipping a module. The module may settle in transit and become damaged. Enclose a letter in the package with your name, RMA#, address, a copy of the sales receipt, description of the trouble, a phone number, and a check (if necessary.)

Note: *Damages sustained in transit are not covered under warranty.*

*If a service contract was purchased from another service provider, contact the service provider for replacement modules and technical assistance.

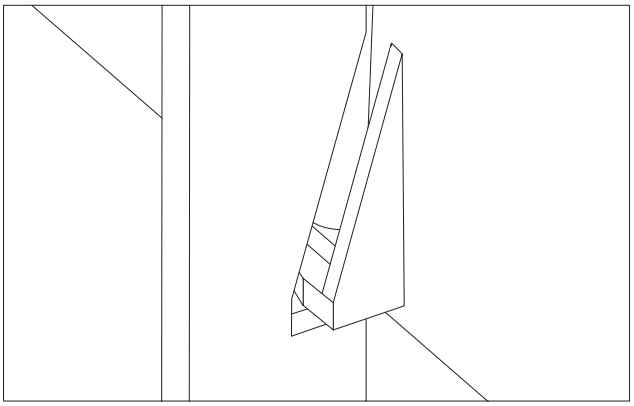
Battery Module Replacement

1. Remove the appropriate grill cover. The battery module bays are labeled on the center spine behind the grill covers.

2. Battery modules are designed with a "drop lock" that holds them securely in the frame. Slightly lift the front handle of the battery module, and pull it forward to the safety stop.

3. With one person on either side of the battery module, lift and remove the battery module from the frame.

Note: *The safety stop retaining flange passes through the notch in the frame as the battery module is removed.*



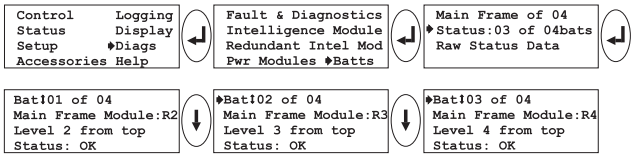
4. To dispose of the battery module, return it to the appropriate service provider or directly to APC for recycling.

Note: *The battery module contains sealed, non-spillable lead acid batteries. These must be recycled or disposed of properly.*

5. Install the replacement battery module.

Replacement Battery Module Verification

From the startup screen, press any key to open the top level menu screen. Follow the sequence below to ensure that the new battery module is recognized by the Power Array system and is functioning properly. (Status: OK).



⚠ Warning!

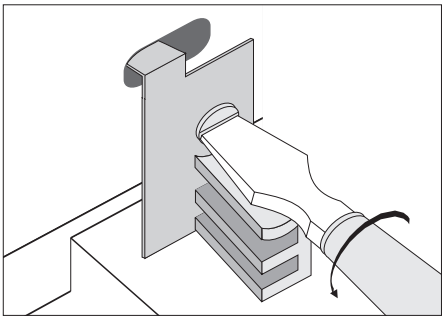
- The 120V, 7.2 Ah battery module constitutes a risk of electrical shock and an energy hazard. High short circuit current through conductive materials could cause severe burns. Before handling battery modules, remove conductive jewelry such as chains, wrist watches and rings.
- Battery modules weigh approx. 60 lb (27 kg). Two people are required to handle battery modules.

Power Module Replacement

1. Remove the appropriate grill cover. The power module bays are labeled on the center spine of the frame, behind the grill covers.

Note: *If replacing a non-redundant power module, or if the failed power module is the only power module, the Symmetra™ must be placed in manual bypass mode, or the load equipment must be switched "off." To place the Symmetra™ in manual bypass, switch the maintenance bypass switch to the "on" position. When the Symmetra™ is in bypass mode, the load equipment is unprotected from power failure.*

2. Use a flathead screwdriver to release the flip latch from the power module.



3. Note the two drop lock seating tabs at the front of the power module. These drop locks hold the module firmly in the Power Array frame. When removing a failed power module, lift the front of the module slightly to release the drop lock seating tabs, and then pull the module from the bay.

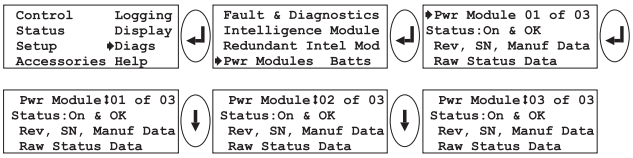
4. Remove the power module from the frame.

5. Return the power module to the appropriate service provider, or return it directly to APC for recycling.

6. Install the replacement module and tighten the flip latch. If Symmetra™ was placed in manual bypass in step 1 above, return to normal operation by switching the maintenance bypass switch back to the "off" position.

Replacement Module Verification

From the startup screen, press any key to open the top level menu screen. Follow the sequence below to ensure that the new module is functioning properly. Information about each power module is accessed by pressing the Up or Down navigation key. Make sure all power modules display a status of "On & OK."



Main Intelligence Module Replacement

1. Remove the grill cover from the top level of the Power Array.

The intelligence module resides under the redundant intelligence module in the upper right corner of the frame.

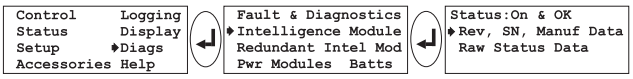
Note: *If a functioning RIM is installed, it will provide limited control of the Symmetra™ until the replacement MIM is installed. If a functioning RIM is not installed, either the Symmetra™ must be placed in manual bypass mode or the load equipment must be switched off. To place the Symmetra™ in manual bypass, switch the maintenance bypass switch to the "on" position.*

Important: *When the Symmetra™ is in bypass mode, the load equipment is unprotected from power failure.*

2. Use a flathead screwdriver to release the flip latch.
3. Unscrew and release the retaining screws.
4. Slide the MIM out of the frame.
5. Slide the replacement MIM into the frame. If Symmetra™ was placed in manual bypass in step 1 above, return to normal operation by switching the maintenance bypass switch back to the "off" position.

Replacement MIM Verification

From the startup screen, press any key to open the top level menu screen. Follow the sequence in below to ensure that the replacement MIM is functioning properly. (Status: On & OK).



Redundant Intelligence Module Replacement

1. Remove the grill cover from the top level of the Power Array.

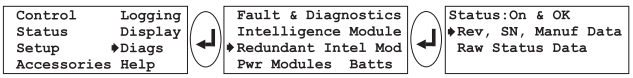
The redundant intelligence module resides above the intelligence module in the upper right corner of the frame.

Note. *A RIM can only be replaced if a functioning MIM is installed or the load equipment is switched off.*

2. Use a flathead screwdriver to release the flip latch.
3. Unscrew and release the retaining screws.
4. Slide the RIM out of the frame.
5. Slide the replacement RIM into the frame.

Replacement RIM Verification

From the startup screen, press any key to open the top level menu screen. Follow the sequence in below to ensure that the replacement RIM is functioning properly. (Status: On & OK).



Appendix D
Specifications

Operation	
System	Power Array having Hot-Swappable Modules which are Redundant, Scalable, Self-diagnosing and Fault-tolerant.
Topology	On-Line, Triple Conversion with Power Factor Correction.
Power Capacity	4-16 kVA (2.8 - 11.2 kW)
Battery Type	Sealed Maintenance Free, Valve Regulated Lead Acid, (VRLA), 3-5 years life
Battery Charger	Automatic Float, Equalize High Frequency PWM charger.
Inverter	IGBT, High Frequency PWM, Microprocessor controlled.
Battery Recharge Time	< 3 Hours with standard supplied packs in the frame.
Extended Battery Option	Yes
Temperature	1°C - 40°C (32°F - 104°F)
Relative Humidity	0 - 95% non-condensing
Elevation	0 to 10,000 feet above mean sea level (0 to 3,048 m)

Input Specifications	
Nominal Input Voltage	380 / 400 / 415 VAC, 50/60 Hz, 3 phase, 5 wire
Input Voltage Range	290 to 480 V AC (i.e. 400V +20%, -28% with Batteries charging)
Input Frequency Range	45-65 Hz.
Input Power Factor	0.95 @ Full Load
Input Inrush Current	< Full Load current at Nominal Voltage
Input Generator Sizing	1.5 x Frame Capacity - Feeder friendly, No Significant Oversizing, allow for Battery Charging and System Efficiency

Output Specifications	
Nominal Output Voltage	220 / 230 / 240 VAC, 50/60 Hz, 1 phase, 3 wire
Output Power kVA (kW)	4-16 kVA (2.8 to 11.2 kW)
Load Power Factor	0 - 1
Output Frequency	50/60 Hz +/- 0. 1% Free Running 50/60 Hz +/- 3 Hz Sync to Bypass; User Settable
Output Voltage Regulation Steady State	<+/- 3% for No-load to Full-load, Min AC input to Max AC, Min DC to Max DC, Linear or Non-linear load or any combination
Output Voltage Regulation Transient/Dynamic	<+/- 5% for 100% load application or removal Linear or Non-linear load
Recovery Time	< 10 milliSec i.e. Half Cycle to Steady state
Total Harmonic Distortion	< 2% for Linear Loads < 5% for 100% non-linear loads
Load Crest Factor Supported	5:1
Overload Capacity	150% for 30 Secs, 125% for 10 mins
Efficiency	> 90% @ Full Load - Linear or Non-linear loads

Physical Specifications	
Audible Noise - Fully Loaded	62dBA
Dimensions	Width: 60cm Depth: 70cm Height: 122 cm
Weight - Fully Loaded	298Kgs
Heat Dissipation - Max with Batteries Charging	13,456 BTU's

Compliance Specifications	
VDE-GS Verifications	EN 60950, EN 50091, IEC 950, VDE 0805

Notes

Serial Numbers: (Please record upon receipt of the Symmetra™ System.)

Frame Serial Number: _____

PowerView Serial Number: _____

Power Module Serial Numbers: _____ (L1)

_____ (L2)

_____ (L3)

_____ (L4)

_____ (L5)

Main Intelligence Module Serial Number: _____

Redundant Intelligence Module Serial Number: _____

Battery Module Serial Numbers: _____ (R2)

_____ (R3)

_____ (R4)

_____ (R5)

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APC Finland
Tel:9800 13 374

APC France
Tel:0800 906 483

APC Germany
Tel:0800 180 1227

APC Greece
Tel:00800 353 12206

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Fax:+65-398-1010

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Bermuda
Tel: 800-623-0717

Brazil
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Chile
Tel: 123-0-020-0254
Tel: 00-020-3255

Colombia
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Mexico
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Tel: 001-800-788-2208

Peru
Tel: 001-800-804-4383

Uruguay
Tel: 000-413-598-2139
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Venezuela
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