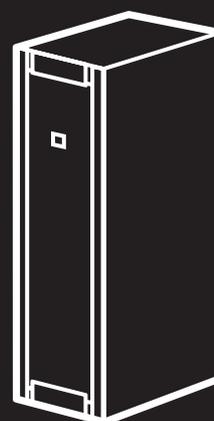


Smart-UPS[®] VT

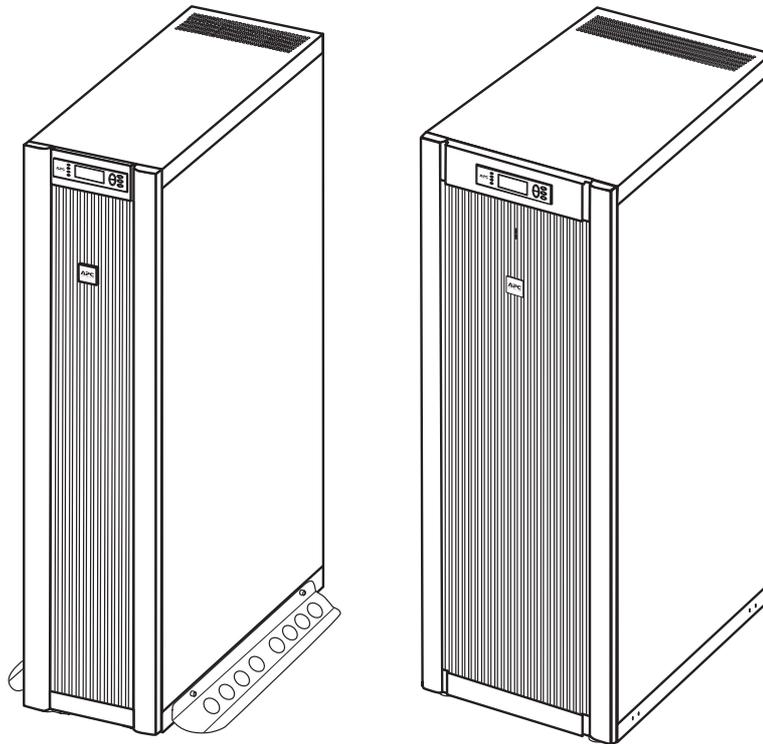
10-40kVA
400V

Site Preparation and Installation Manual



Smart-UPS® VT 10-40kVA 400V

Site Preparation and Installation Manual



IMPORTANT!

**THIS DOCUMENT CONTAINS IMPORTANT SAFETY INSTRUCTIONS -
PLEASE SAVE THESE INSTRUCTIONS!**

Contents

- Introduction 1**
- General Safety Instructions 2**
 - Warning/note symbols 2
 - Environmental symbols 2
 - General safety 3
- UPS Family Range and Components 5**
 - 14in/351mm Enclosures 5
 - 20in/523mm Enclosures 5
 - UPS sizes, weights and runtime configurations 6
 - Battery Module 6
 - Front Panels 7
 - Stabilizing Bracket 8
 - User interface 9
- Options 10**
 - Extended Run Battery Enclosure (XR Enclosure) and Battery Module 10
 - Part Numbers for XR Enclosures 11
 - Part Number for Battery Module 11
 - Maintenance Bypass Panels with Power Distribution Capability 12
 - Seismic anchoring / battery securing equipment 12
- Site Preparation (UPS and XR) 14**
 - Installation Space Requirements 14**
 - Clearance for 20in/523mm Enclosures 14
 - Clearance for 20 in/523 mm Enclosures in installations including an XR Enclosure 15
 - Clearance for stand-alone 14in/351mm Enclosures 16
 - Clearance for 14in/351 mm Enclosures in installations including XR Enclosures 17
 - Seismic Anchoring Preparation 18**
 - Drilling floor holes for seismic anchoring 18
 - Hole positions for seismic bolts 18

Operating Environment	20
Operating conditions	20
Heat dissipation	20
Audible noise	20
Recommended source connections	21
Recommended current protection	22
Minimum setting of breakers for 10kVA UPS	23
Minimum setting of breakers for 15kVA UPS	23
Minimum setting of breakers for 20kVA UPS	24
Minimum setting of breakers for 30kVA UPS	24
Minimum setting of breakers for 40kVA UPS	25
Recommended phase-conductor sizes [AWG] for a 104°F (40°C) temperature environment	26
EPO switch wiring	26
Basic Wiring Overview	27
Site Preparation Checklist	28

Electrical Installation **29**

Total-Power-Off Procedure	29
System-Electrical Information	31
Source connections	32
Wiring	33
Input/Output Wiring – Single Mains (default)	34
Wiring procedure - single mains	34
Input/Output Wiring – Dual Mains	36
Wiring procedure - dual mains	36
Communication Wiring to EPO and Optional Equipment	38
J106 and J108 pin connections	38
J106 UPS pin connections to J200 options	39
XR Enclosure, MBP, and Generator Control wiring	39
EPO wiring options (J108)	40
General Charge Setting	41
Charge setting procedure	41
Leveling Feet	42
Setting the leveling feet	42

Seismic Anchoring (option)	43
Floor attachment	43
Battery securing	44
Front Panel	45
Front Panel installation/removal	45
Wiring Verification Procedure	46
Installation Site Checklist	48
LIMITED FACTORY WARRANTY	49
APC product covered	49
Terms of warranty	49
Non-transferable Warranty extends to first purchaser for use	49
Assignment of warranties	49
Drawings, descriptions	50
Warranty claims procedure	50
Exclusions	50

Introduction

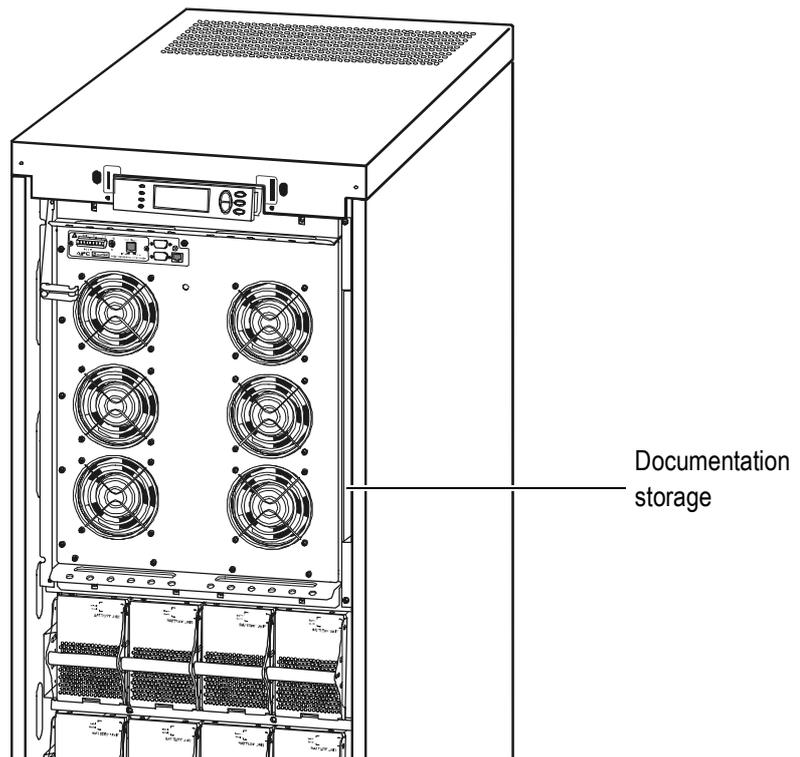
Welcome to the Site Preparation and Installation Manual for the Smart-UPS® VT. This manual contains information on how to prepare your site for the installation of the UPS and optional APC equipment (also available at www.apc.com) and instructions on how to carry out the electrical/mechanical installation.

Separate manuals are available on:

- Receiving and Unpacking - part # 990-1747
- Operation - part # 990-1985



The user manuals are provided in the documentation storage area at the top right corner on the UPS (behind the Front Panel).



For more information on APC products and services, visit us at www.apc.com

General Safety Instructions

This guide contains important instructions that should be followed when handling the UPS, Battery Enclosures, and Batteries.

Warning/note symbols



WARNING!
Risk of electric shock.



CAUTION!
Read this information to avoid equipment damage.



Note

Indicates important information.



Indicates that more information is available on this subject in a different section of this manual.



See also

Indicates that more information is available on the same subject in a different manual.

Environmental symbols

				
Temperature	Ventilation requirements	Humidity	Dust/Fumes	Altitude

General safety



WARNING!

All electrical power and control wiring must be installed by a qualified electrician and comply with local and national codes



WARNING!

When connected, the UPS contains energy from both AC and DC sources. If the UPS has dual mains supply, be aware of the two AC supply sources. Hazardous voltage from batteries may be present even when the unit is disconnected from the utility power source(s). Follow the *Total-Power-Off* procedure in this manual to completely de-energize the system. Disconnect charging source prior to connecting or disconnecting battery terminals.



WARNING!

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.



WARNING!

Batteries do not contain serviceable parts. Only APC authorized personnel may open batteries.



WARNING!

Do not dispose of battery or batteries in a fire. The battery may explode. Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.



WARNING!

Risk of Energy Hazard, 96 V, 7.2 Ampere-hour battery. Before replacing batteries, remove watches, rings, or other metal objects. High energy through conductive materials could cause severe burns.



WARNING!

When handling batteries, wear rubber gloves and boots. Do not lay tools or metal objects on top of batteries.



WARNING!

When replacing a battery module, replace with the same number of the: APC SYBT1 (always replace a whole Battery Module at a time).



WARNING!

Only trained personnel familiar with the construction and operation of the equipment and the electrical and mechanical hazards involved, may install and remove system components.



CAUTION!

Wait until you are ready to power up the system before installing Battery Modules in the UPS. Failure to do so can result in a deep discharge of the batteries and cause permanent damage (for 10-20kVA systems, the time from the battery installation time till the UPS is powered up should not exceed 75 hours or 3 days. For 20-40 kVA systems, the time should not exceed 96 hours, or 4 days).

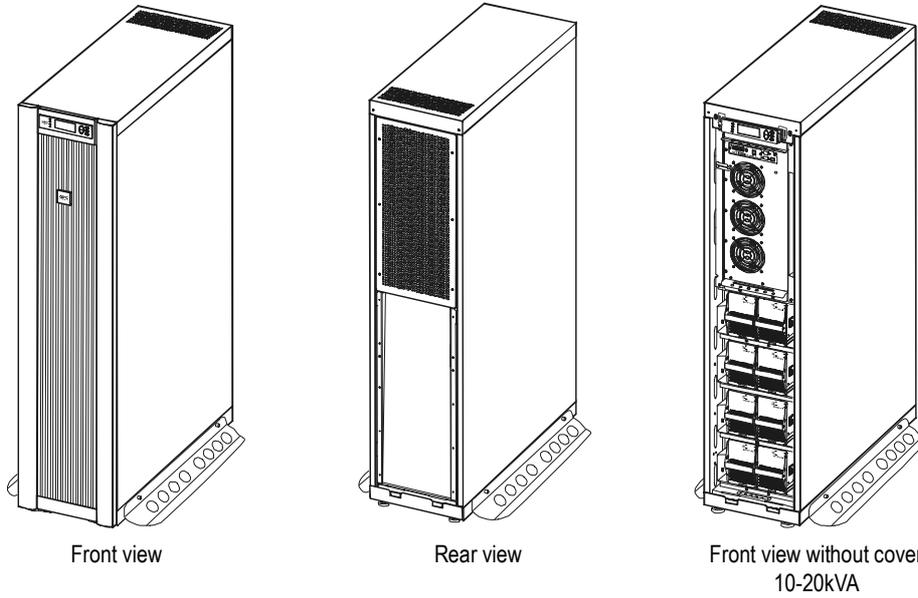


For configurations including customer-supplied external batteries, refer to manufacturer's battery installation and maintenance instructions.

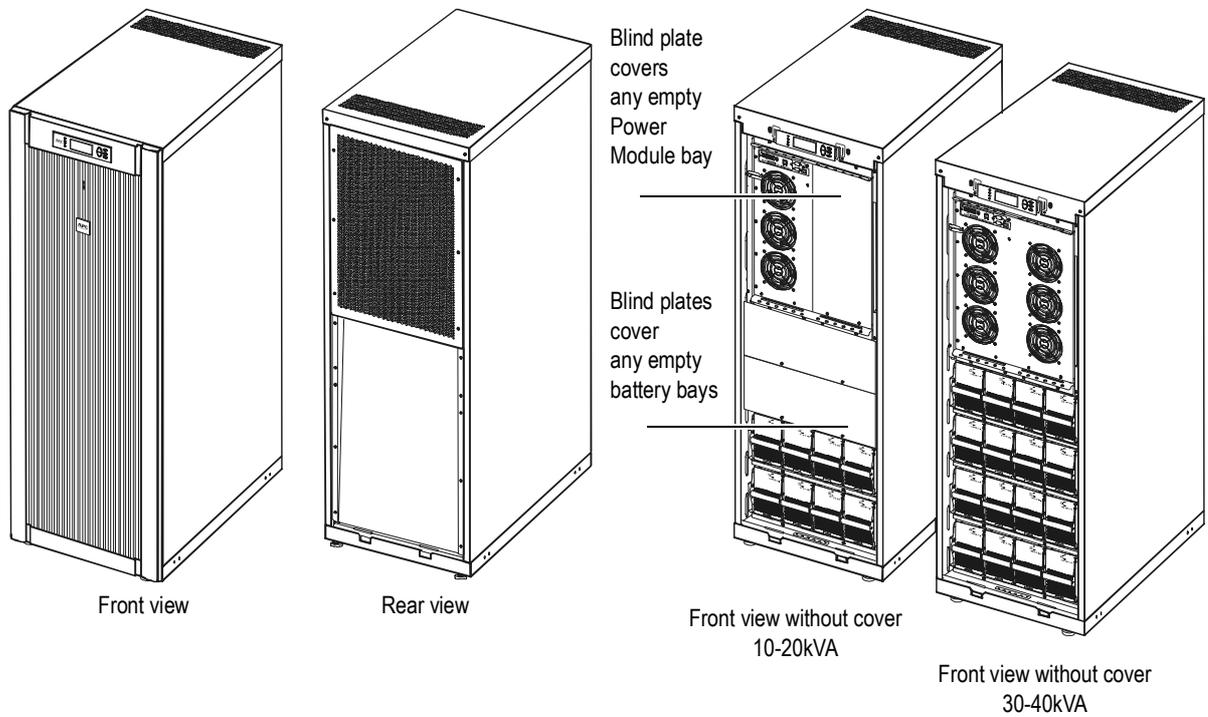
See also

UPS Family Range and Components

14in/351mm Enclosures



20in/523mm Enclosures

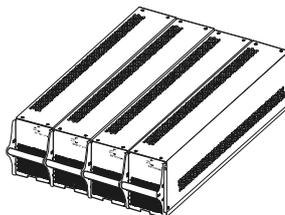


UPS sizes, weights and runtime configurations

Height (identical for all Enclosure sizes)						59in/1500mm		
Depth (identical for all Enclosure sizes)						33.7in/856mm		
Minimum runtime configuration						Maximum runtime configuration		
Enclosure width		Shipping weight		Installed weight			Installed weight	
	APC Part No.	lbs	kg	lbs	kg	APC Part No.	lbs	kg
10kVA 14in/351mm	SUVT10KH1B2S	739	336	671	305	SUVT10KH2B2S	950	432
10kVA 20in/523mm	SUVT10KH1B4S	811	369	743	338	SUVT10KH4B4S	1444	657
15kVA 14in/351mm	SUVT15KH2B2S	950	432	882	401	SUVT15KH2B4S	954	434
15kVA 20in/523mm	SUVT15KH2B4S	1022	465	954	434	SUVT15KH4B4S	1444	657
20kVA 14in/351mm	SUVT20KH2B2S	456	432	882	401	SUVT20KH2B2S	954	434
20kVA 20in/523mm	SUVT20KH2B4S	1022	465	954	434	SUVT20KH4B4S	1376	626
30kVA 20in/523mm	SUVT30KH3B4S	1233	561	1165	530	SUVT30KH4B4S	1376	626
40kVA 20in/523mm	SUVT40KH4B4S	1433	653	1365	622	SUVT40KH4B4S	1376	626

Battery Module

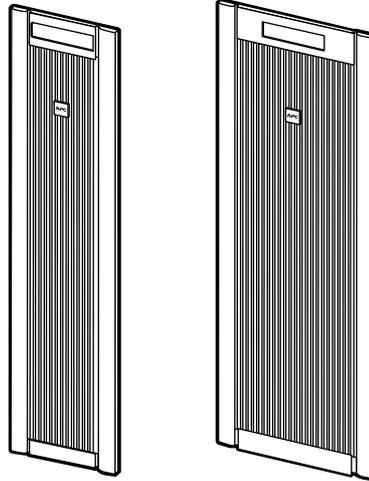
One Battery Module consists of 4 Battery Units (shipping in the UPS Enclosure).



4 x 50lb / 4 x 23kg

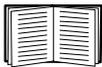
Front Panels

Install the Front Panel after the UPS has been electrically wired and started up.



Front Panel for 14in/
351mm Enclosure

Front Panel for 20in/
523mm Enclosure



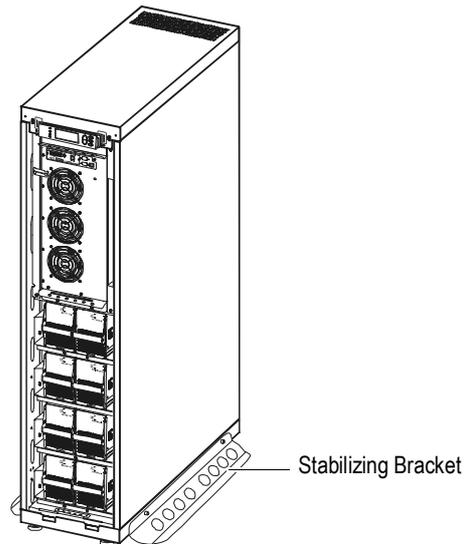
Front Panel installation procedure described in the *Front Panel* section.

Stabilizing Bracket

Always install the Stabilizing Brackets (shipped with the UPS) on the 14in/351mm Enclosure to enhance the stability of the Enclosure.



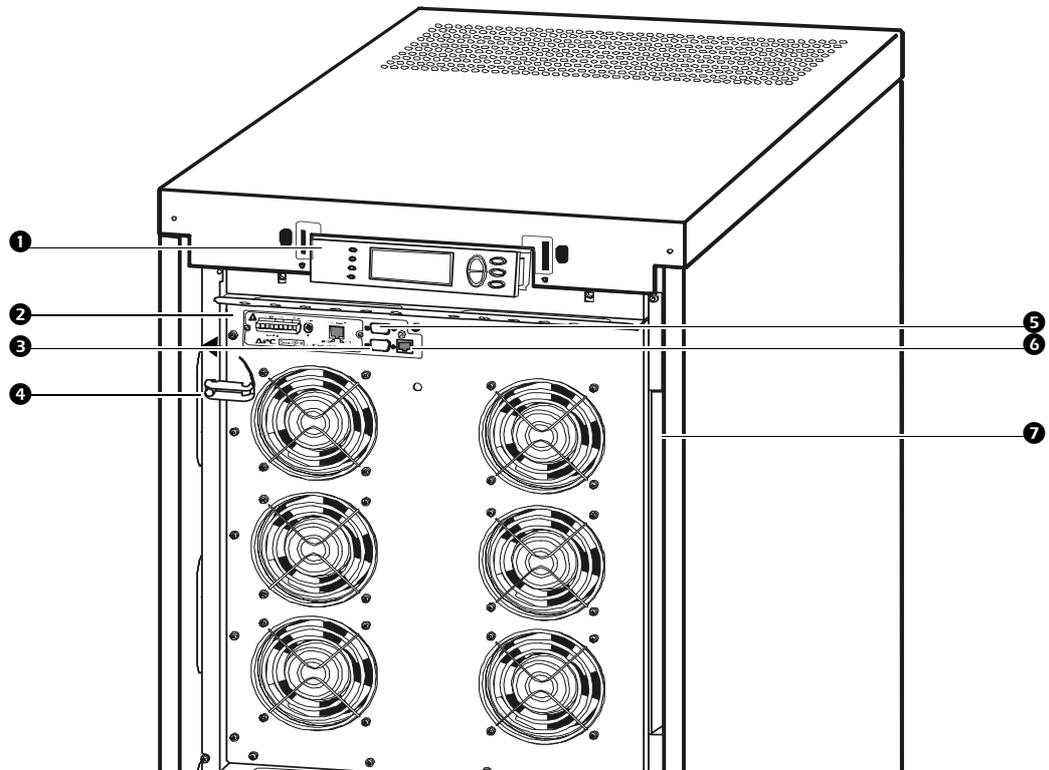
In non-seismic areas, it is not necessary to bolt the Stabilizing Bracket to the floor. Attach the Stabilizing Bracket to the UPS Enclosure only, re-using the screws used to secure the UPS to the pallet during shipment.



WARNING!

For stability reasons, do not remove Stabilizing Brackets from 14in/351mm Enclosures.

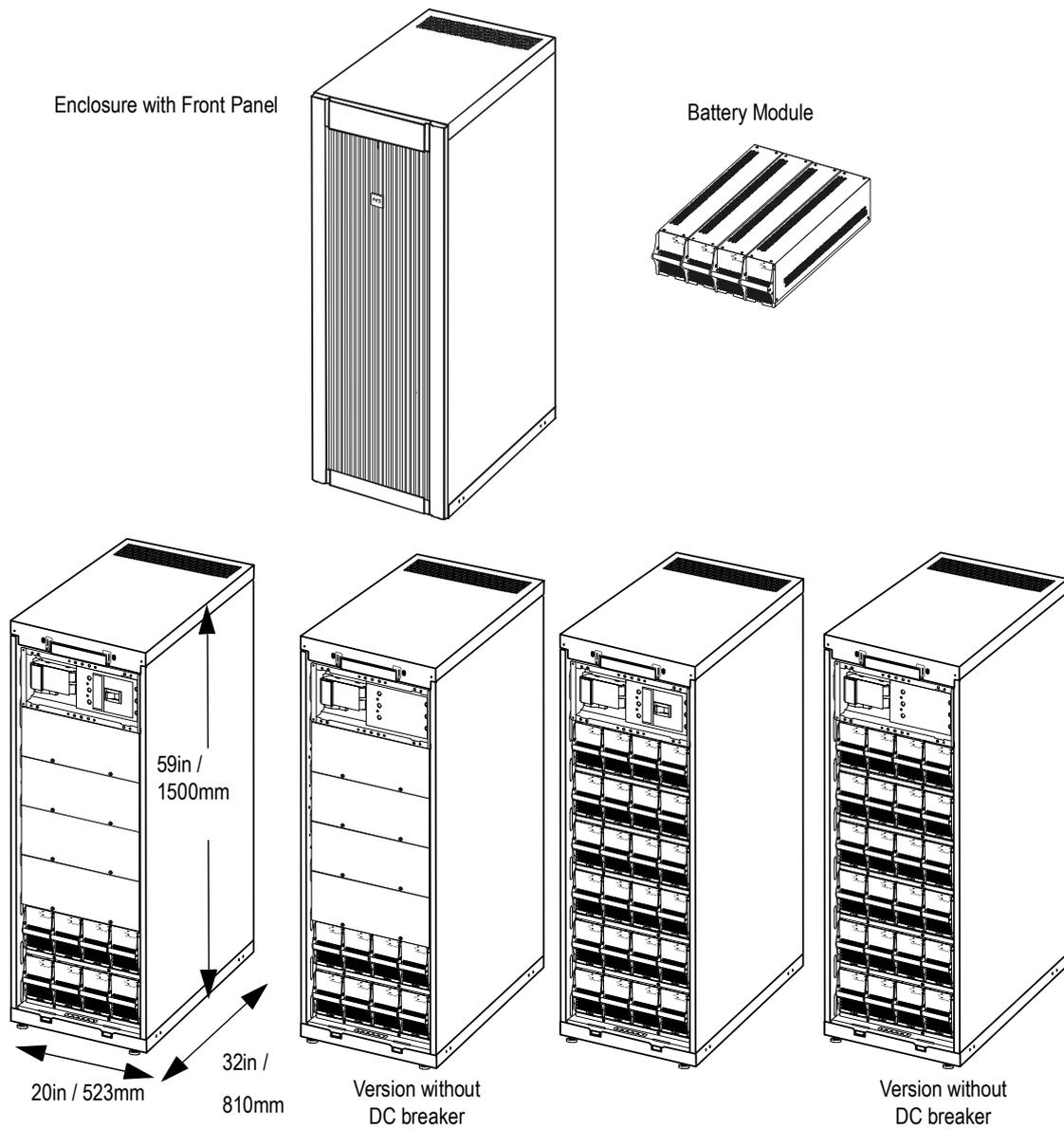
User interface



- ❶ Display: user-control interface used to configure the functionality, monitor the system, set alarm thresholds, and to provide audible and visual alarms.
- ❷ Network Management Card with Environmental Monitor (AP9619): used for remote system control and monitoring, e-mail notifications etc.
- ❸ Computer-interface port for the connection of computers with APC Powerchute® software.
- ❹ Mechanical bypass lever: used to bypass the upstream utility power around the UPS to support the load directly = internal mechanical bypass operation.
- ❺ Service port (for APC maintenance personnel only).
- ❻ Display port for the connection of display communication cable.
- ❼ Documentation storage.

Options

Extended Run Battery Enclosure (XR Enclosure) and Battery Module



XR Enclosure weights Minimum runtime:	
2 Battery Modules	887lbs/403kg
6 Battery Modules	1731lbs/787kg

Battery Module weight	
4 units = 1 Battery Module	4x50lb / 4x23kg

Part Numbers for XR Enclosures

XR Enclosure	
Enclosure with 2 Battery Modules (expandable to 6), and DC breaker:	SUVTBXR2B6S
Enclosure with 2 Battery Modules (expandable to 6), without DC breaker:	SUVTXR2B6S
Enclosure with 6 Battery Modules, and DC breaker:	SUVTBXR6B6S
Enclosure with 6 Battery Modules, without DC breaker	SUVTXR6B6S

Part Number for Battery Module

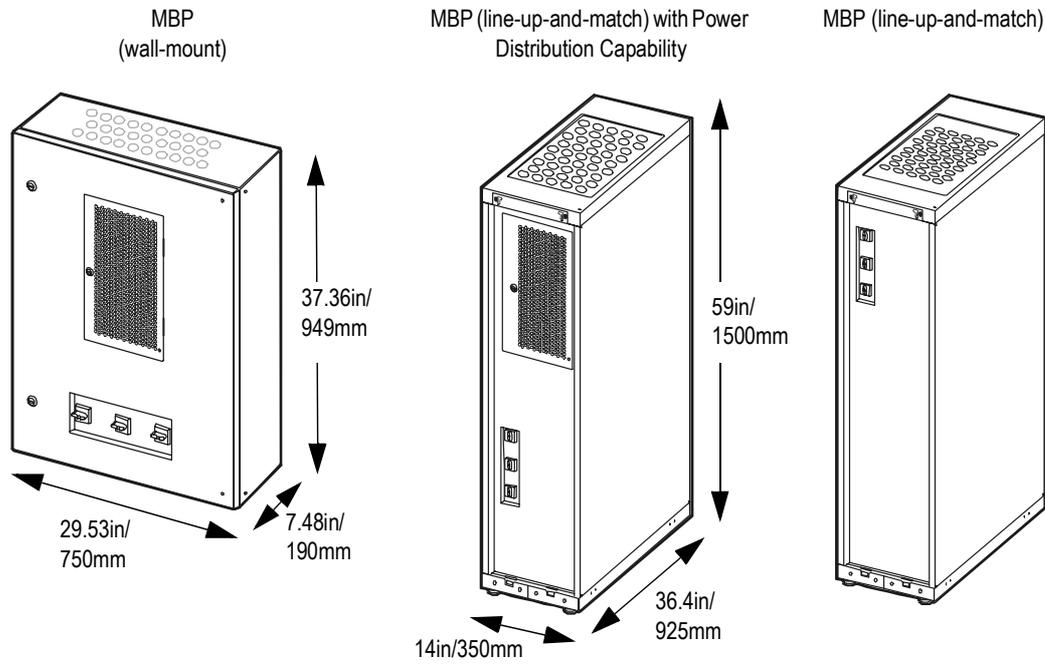
Battery Module	
Battery Module	SYBT4

Maintenance Bypass Panels with Power Distribution Capability



Note

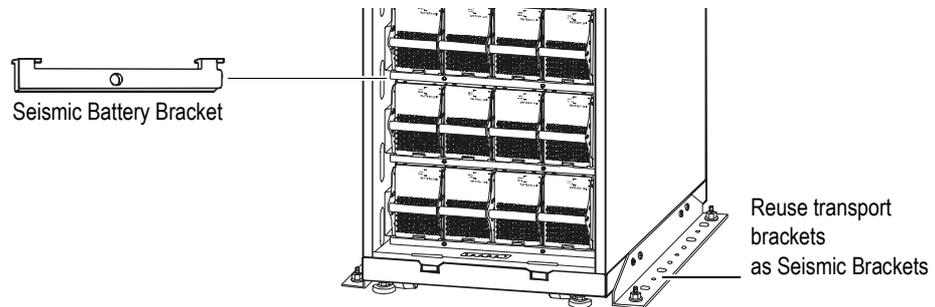
Further details on APC Maintenance Bypass Panel (MBP) with Power Distribution Capability are available on www.apc.com.



The Maintenance Bypass Panel provides overcurrent protection to the entire UPS system. It is also used to bypass the utility power around the UPS instead of through the system, e.g. when UPS maintenance is carried out.

Seismic anchoring / battery securing equipment

In seismic areas, each Battery Module must be secured with a Seismic Battery Bracket.



Note

Floor-anchoring bolts for the Seismic Bracket are not provided with the UPS. Purchase the floor bolts locally.



For more details on optional APC equipment for the APC Smart-UPS® VT, contact APC Technical Support in the U.S. at 800-555-2725. For other countries, see technical support numbers on rear cover.

Site Preparation (UPS and XR)

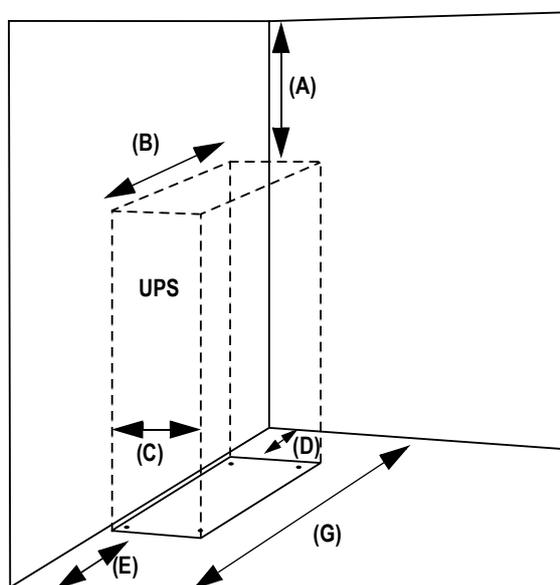
Installation Space Requirements



Note

Allow for enough working space behind the Enclosure for electrical work to be carried out (e.g. if you want to connect an XR Enclosure at a later stage).

Clearance for 20in/523mm Enclosures



Space requirements	in	mm
Minimum clearance above Enclosure (A)	20	523
Enclosure depth (B)	36.4	925
Enclosure width (C)	20	523
Minimum free rear space for ventilation* (D)	4	100
Minimum front clearance (E)	39.3	1000
Conduit Box, depth (F)	3.5	88
No side clearance required (add width of Enclosure Stabilizing Brackets for seismic protection if applicable)*	0	0
Stabilizing Bracket width	3.3	85
Total installation depth, inclusive of Front Panel, Conduit Box and minimum front and rear clearances (G)	111	2025

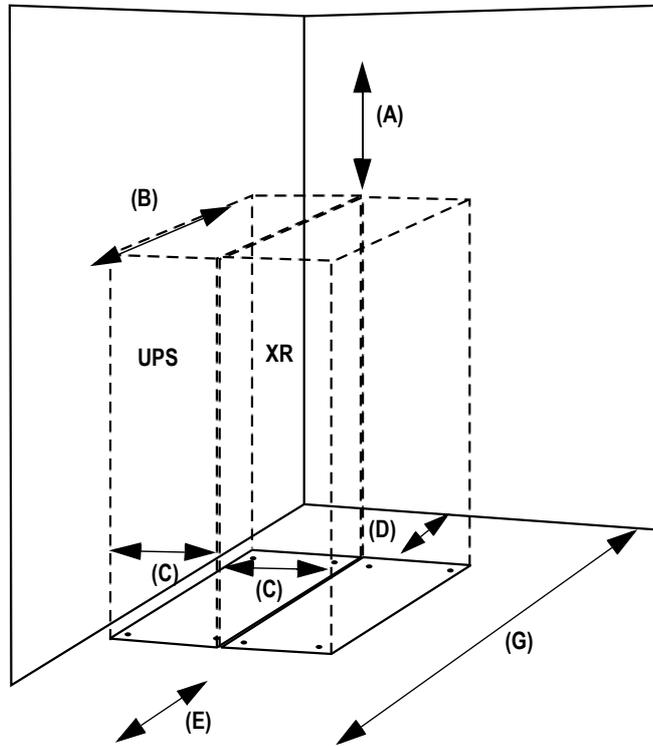
*) All physical installations must comply with local standards.

Clearance for 20 in/523 mm Enclosures in installations including an XR Enclosure



Note

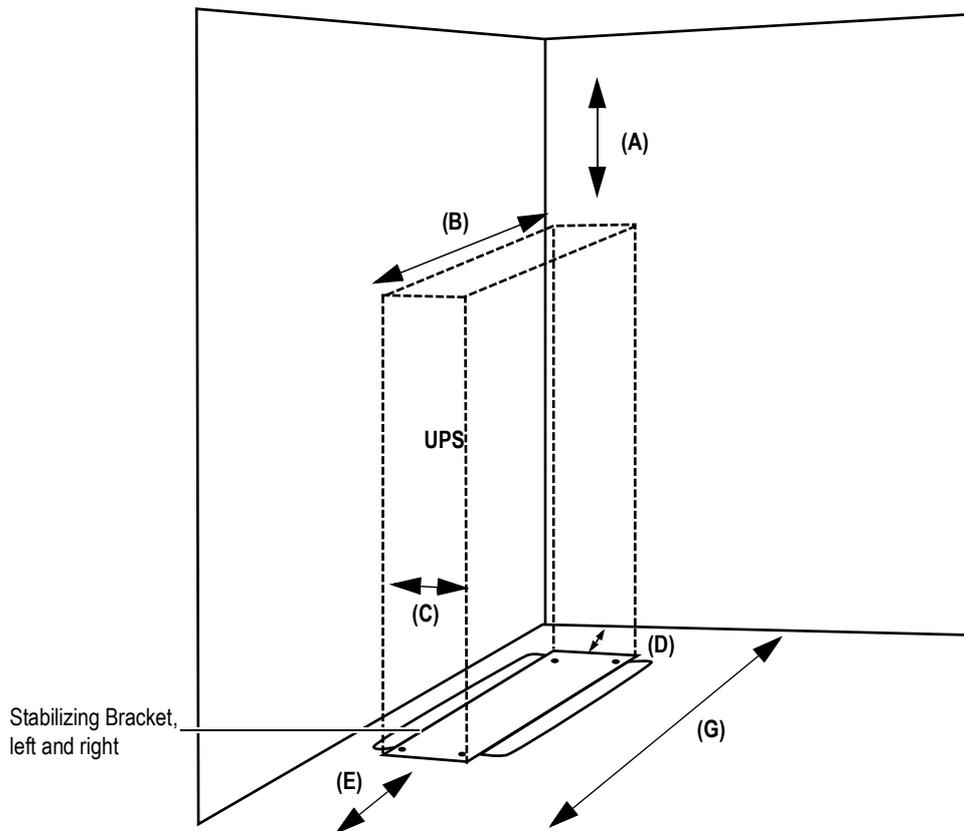
As seismic anchoring is carried out prior to wiring (and to busbar connection between UPS and XR Enclosures if applicable), allow for sufficient working space behind the unit for electrical work to be carried out (including busbar connections between Enclosures if applicable).



Space requirements	in	mm
Minimum clearance above Enclosures (A)	20	523
Enclosure depth (B)	36.4	925
Enclosure width (C)	20 (x 2)	523 mm (x 2)
Minimum free rear space for ventilation* (D)	4	100
Minimum front clearance (E)	39.3	1000
Conduit Box, depth (F)	3.5	88
No side clearance required (include width of Stabilizing Bracket for seismic protection if applicable)*	0	0
Stabilizing Bracket width	3.3	85
Total installation depth, inclusive of Front Panel, Conduit Box and minimum front and rear clearances (G)	79.7	2025

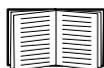
*) All physical installations must comply with local standards.

Clearance for stand-alone 14in/351 mm Enclosures



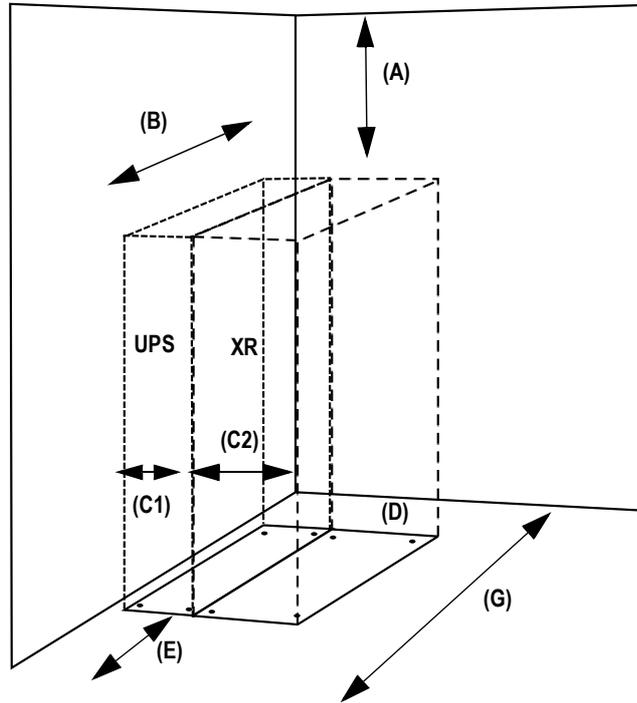
Space requirements	in	mm
Minimum clearance above UPS (A)	20	523
UPS depth (B)	36.4	925
UPS width	14	351
Minimum free rear space for ventilation* (D)	4	100
Minimum front clearance (E)	39.3	1000
Conduit Box, depth (F)	3.5	88
No side clearance required (add width of Stabilizing Bracket for seismic protection if applicable)*	0	0
Stabilizing Bracket width	3.3	85
Total installation depth, inclusive of Front Panel, Conduit Box and minimum front and rear clearances (G)	111	2025

*) All physical installations must comply with local standards.



For the stability of 14/351 mm stand-alone Enclosures, the Stabilizing Bracket must always be mounted on both sides of the UPS. Follow the Seismic Anchoring procedures for attachment.

Clearance for 14in/351 mm Enclosures in installations including XR Enclosures



Space requirements	in	mm
Minimum clearance above Enclosures (A)	20	523
Enclosure depth (B)	36.4	925
Enclosure width (C1)	14	351
Enclosure width (C2)	20	523
Minimum free rear space for ventilation* (D)	4	100
Minimum front clearance (E)	39.3	1000
Conduit Box, depth (F)	3.5	88
No side clearance required (add width of Stabilizing Bracket for seismic protection if applicable)*	0	0
Stabilizing Bracket width	3.3	85
Total installation depth, inclusive of Front Panel, Conduit Box and minimum front and rear clearances (G)	111	2025

*) All physical installations must comply with local standards.



For the stability of 14/351 mm stand-alone Enclosures, the transport brackets (re-use of brackets used to secure the UPS to the shipping pallet) must always be mounted on both sides of the UPS. Follow the Seismic Anchoring procedures.

Seismic Anchoring Preparation



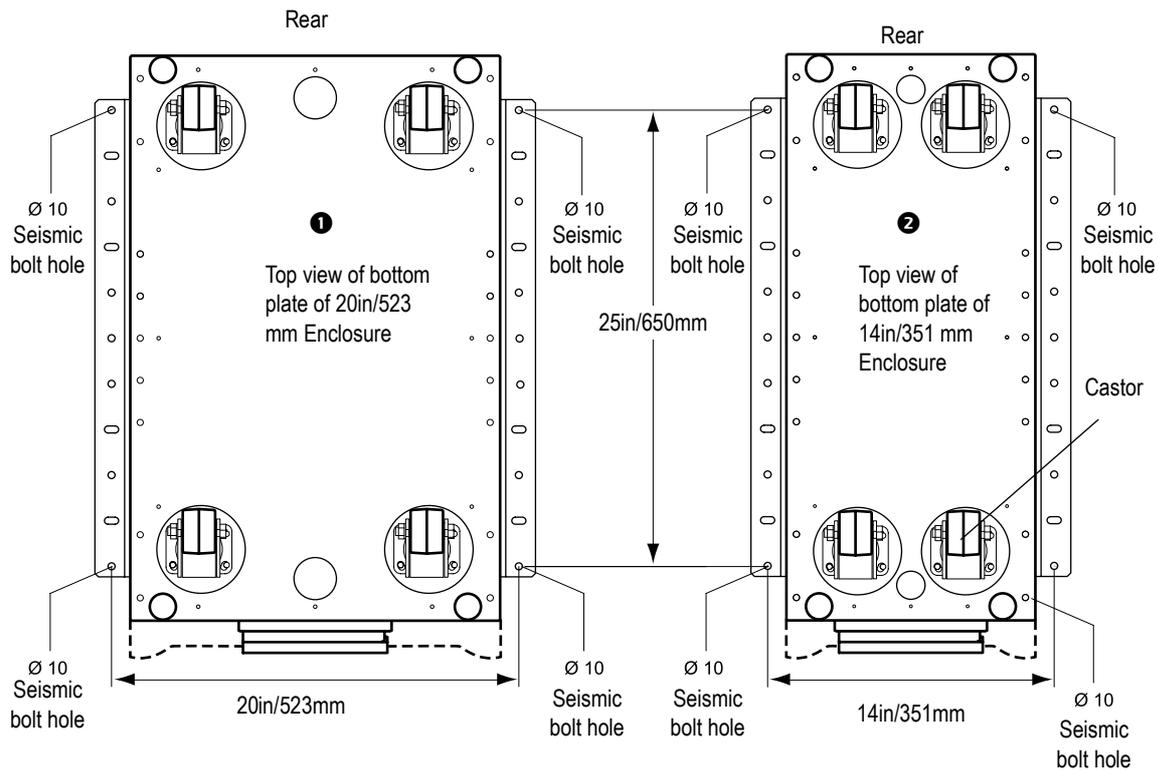
If seismic protection is required in your area, read this section. If not, proceed to *Operating Environment*. However, if you install a 14in/351mm Enclosure, it must always be equipped with the Enclosure Stabilizing Bracket for enhanced stability (not necessary to bolt the Enclosure Stabilizing Bracket to the floor in non-seismic areas).

Drilling floor holes for seismic anchoring



If your UPS installation requires seismic protection, the UPS installation must be anchored to the floor, re-using the brackets that also secured the Enclosure to the pallets when shipped. For easy determination of where to drill the holes, refer to the applicable drawings below indicating hole positions and size.

Hole positions for seismic bolts



❶ Refer to this drawing for seismic bolt positions for 20in/523mm.

❷ Refer to this drawing for 14in/351mm.



Note

Recommended minimum number of floor bolts per Enclosure: 4 (1 in each corner).
Recommended floor bolt size: 5/16(3/8)in/8mm.



Seismic Anchoring procedure described in the *Installation* section of this manual.

Operating Environment

Operating conditions



Install the UPS in an indoor, temperature-controlled area, free of conductive contaminants.

Temperature Range: 32° to 104°F / 0° to 40°C	Keep Ventilated Front-to-Rear Airflow (see space considerations)	Relative Humidity: <95% Non-condensing	No Conductive Dust or Corrosive Fumes	Altitude derating table: 3000ft/914m: 100% load 4500ft/1371m: 95% load 6000ft/1828m: 91% load 8000ft/2438m: 86% load 10000ft/3048m: 82% load

Heat dissipation

UPS size	kW at fully charged batteries
10kVA	0.5
15kVA	0.75
20kVA	1.0
30kVA	1.5
40kVA	2.0

Audible noise

	10-30kVA	20-40kVA
Audible noise at 100% load: (measured 1.09yard/1m from the UPS)	64dBA	67dBA

Recommended source connections



The UPS must be supplied from a 400Y/230V 4W + GND 50Hz source.



CAUTION!

Verify clockwise phase-rotation (L1, L2, L3) and make sure a neutral connection is present.



See also *Recommended Wiring for a 104°F (40°C) Temperature Environment*.

Recommended current protection



AC output over-current protection and AC output disconnect must be provided by the customer.

Dual/ single mains configu- ration	Connec- tion	10kVA	15kVA	20kVA	30kVA	40kVA	Notes
Dual	Mains input	20A breaker (30kA)	35A breaker (30kA)	50A breaker (30kA)	63A breaker (30kA)	80A breaker (30kA)	1+2
Dual	Bypass input	20A breaker (30kAIC)	35A breaker (30kA)	50A breaker (30kA)	63A breaker (30kA)	80A breaker (30kA)	1+2
Single	Mains/ Bypass input	20A breaker (30kA)	35A breaker (30kA)	50A breaker (30kA)	63A breaker (30kA)	80A breaker (30kA)	1+2
Any	Output	20A Class gL (gG) fuse	35A Class gL (gG) fuse	50A Class gL (gG) fuse	63A Class gL (gG) fuse	80A Class gL (gG) fuse	3

Note 1:

If the available fault current of the installation is below 30kA, a lower Icu-rated breaker can be used.

Note 2:

For breaker settings, refer to below table listing available overload currents.

Note 3:

Maximum rating of a single fuse configuration if the internal bypass must be protected during a load short circuit. Selectivity is not ensured by the configuration.

Minimum setting of breakers for 10kVA UPS

Overload/ Duration	Mains input	Bypass input	Output	Event/ Operation	Notes
<10ms	2kA	1.7kA	9kA	Internal fault	1
500ms	-	121.5A	121.5A	800% overload bypass operation	
30s	-	-	22.8A	150% overload normal/battery operation	
60s	-	-	19A	125% overload normal/battery operation	
∞	16.4A	16.7A	16.7A	Continuously	

Note 1: For the output value, the short-circuit-level is indicated.

Minimum setting of breakers for 15kVA UPS

Overload/ Duration	Mains input	Bypass input	Output	Event/ Operation	Notes
<10ms	2.1kA	1.8kA	9kA	Internal fault	1
500ms	-	182A	182A	800% overload bypass operation	
30s	-	-	34.2A	150% overload normal/battery operation	
60s	-	-	25.4A	125% overload normal/battery operation	
∞	24.6A	25.1A	25.1A	Continuously	

Note 1: For the output value, the short-circuit-level is indicated

Minimum setting of breakers for 20kVA UPS

Overload/ Duration	Mains input	Bypass input	Output	Event/ Operation	Notes
<10ms	2.5kA	2.3kA	9kA	Internal fault	1
500ms	-	244A	244A	800% overload bypass operation	
30s	-	-	45.6A	150% overload normal/battery operation	
60s	-	-	38A	125% overload normal/battery operation	
∞	32.5A	33.4A	33.4A	Continuously	

Note 1: For the output value, the short-circuit-level is indicated.

Minimum setting of breakers for 30kVA UPS

Overload/ Duration	Mains input	Bypass input	Output	Event/ Operation	Notes
<10 ms	3 kA	2.3kA	14 kA	Internal fault	1
500ms	-	365A	365A	800% overload bypass operation	
30s	-	-	68.4A	150% overload normal/battery operation	
60s	-	-	57A	125% overload normal/battery operation	
∞	49.2A	50.1A	50.1A	Continuously	

Note 1: For the output value, the short-circuit level is indicated.

Minimum setting of breakers for 40kVA UPS

Overload/ Duration	Mains input	Bypass input	Output	Event/ Operation	Notes
<10 ms	3 kA	2.3kA	14 kA	Internal fault	1
500ms	-	487A	487A	800% overload bypass operation	
30s	-	-	91.2A	150% overload normal/battery operation	
60s	-	-	76A	125% overload normal/battery operation	
∞	65.6A	66.9A	66.9A	Continuously	

Note 1: For the output value, the short-circuit level is indicated.

Recommended phase-conductor sizes [AWG] for a 86°F (30°C) temperature environment

UPS/[mm ²] sizes	Mains input [mm ²]	AC output [mm ²]	DC input [mm ²] 70 ⁰ C Wire
10kVA	2.5	2.5	6
15kVA	6	6	10
20kVA	10	10	16
30kVA	16	16	35
40kVA	25	25	50



Use Molex lug type or equivalent, and crimp to manufacturer’s specifications.



WARNING!

At 100% switch mode load, the neutral shall be rated for 200% phase current.

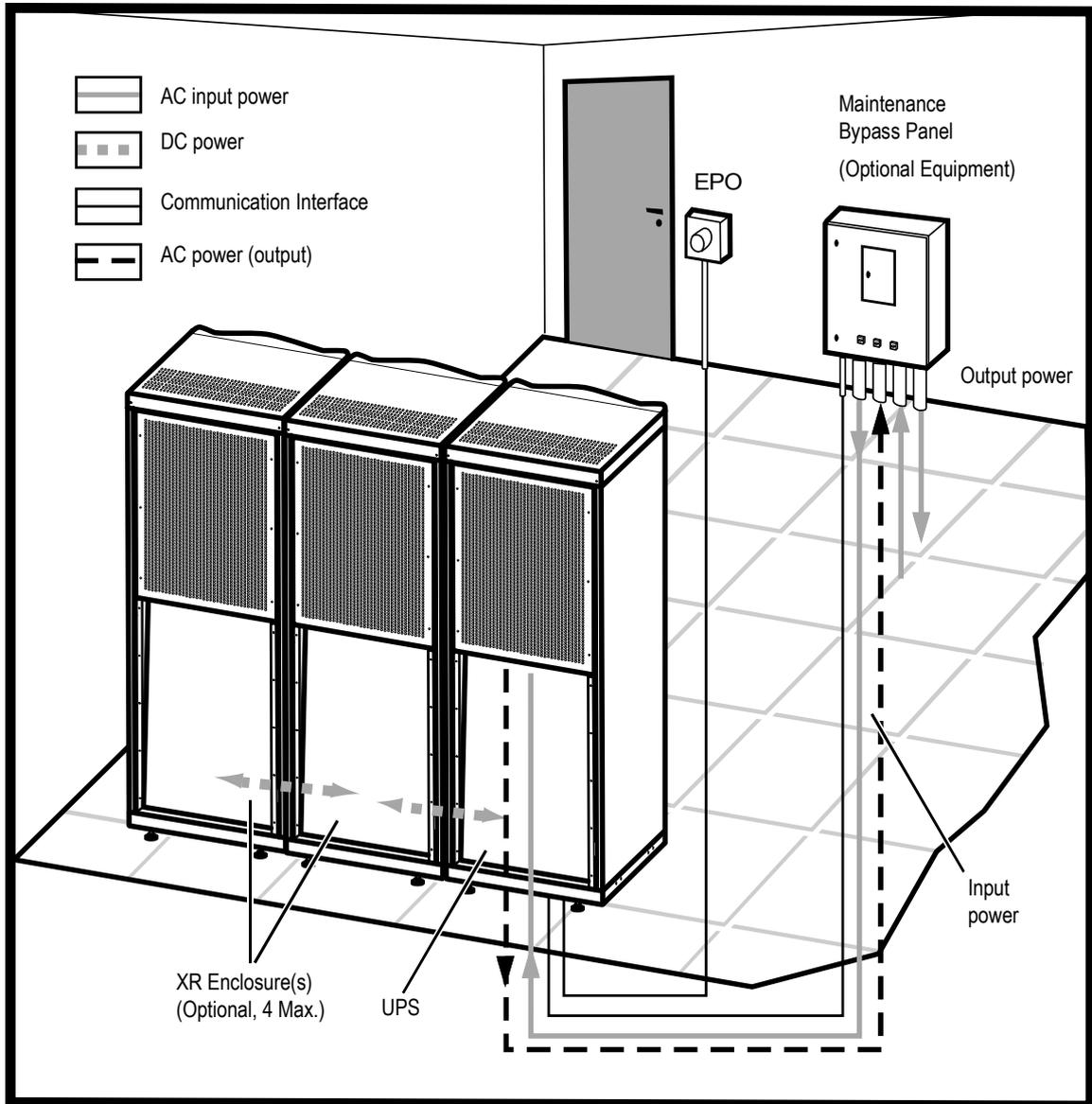
EPO switch wiring

The UPS must be connected to either a dry contact or a 24V_{DC} Emergency Power Off (EPO) switch.



See *EPO wiring options* in this manual.

Basic Wiring Overview



Site Preparation Checklist

System components. Have you –

- determined minimum battery run time requirement based on load (kW and kVA) and selected the proper number of XR Enclosures (APC SUVTBXR2B6S and APC SUVTBXR6B6S) and Battery Modules (SYBT4).
- considered Service Program or Extended Warranty plan?

Site Preparation. Have you –

- verified that input voltage and current are available?
- considered correct operating space, floor strength (see *Installation Space Requirements*), cooling, and environment (see *Operating Environment*).
- reviewed all electrical work to determine wiring requirements?

Arrival Preparation. Have you –

- verified that space and handling equipment are available to receive the UPS/XR Enclosure? (Including unloading the UPS/XR Enclosure from the delivery truck).
- scheduled an electrician to install the UPS/XR Enclosure?

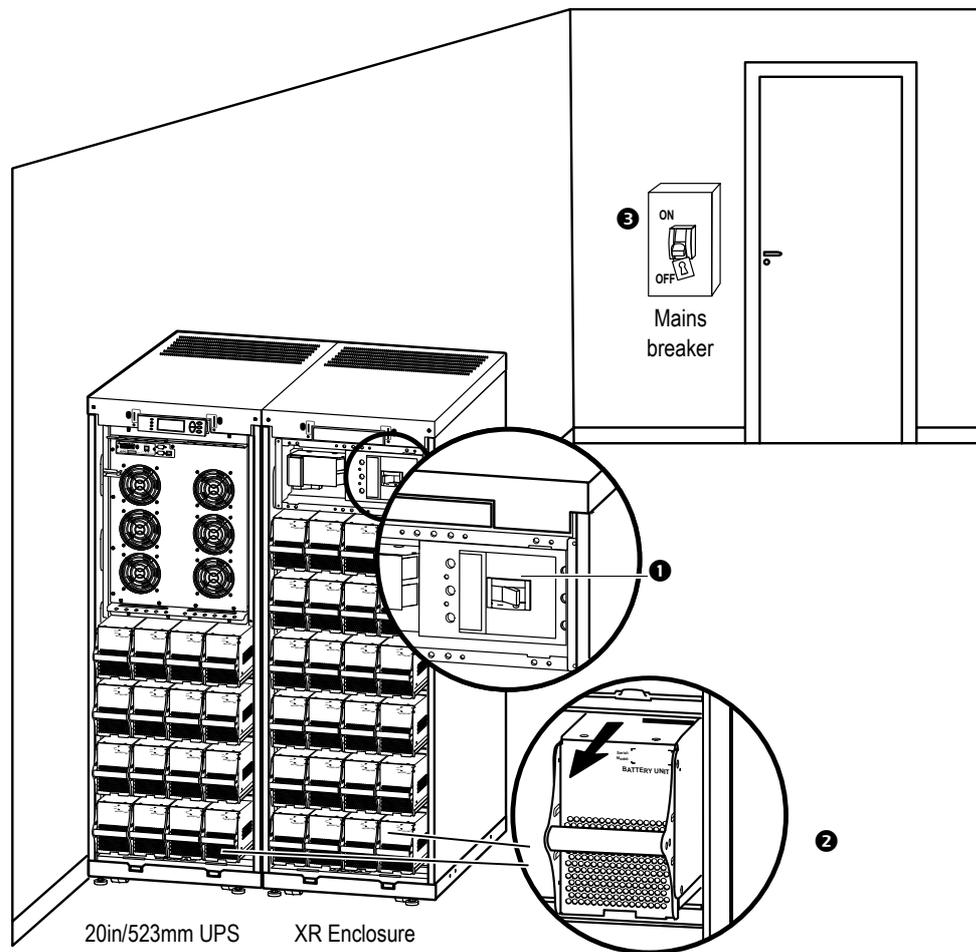
Electrical Installation

Total-Power-Off Procedure

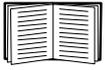


WARNING!

Hazardous electrically-charged parts inside the UPS and XR Enclosure are energized from the battery supply even when the AC power is disconnected. Before electrical installation begins, follow the Total-Power-Off procedure to completely de-energize the system.



- 1 Set the DC disconnect switch (if available) to the OFF position.
- 2 Remove all batteries from the system, or, alternatively, pull out all batteries to the red disconnect line shown on the battery. To ensure solid stability, do not pull batteries out beyond the red disconnect line unless completely removing them from the Enclosure.
- 3 Set the utility breaker to the OFF or LOCKED-OUT position. If the UPS has dual mains supply, set both supplies to the OFF or LOCKED-OUT position.



Refer to *Seismic Anchoring* in the Electrical Installation Manual for instructions on how to remove Seismic Battery Bracket (if applicable).



WARNING!

Correct lock-out procedures at utility breaker must be followed. If necessary, install a padlock.

System-Electrical Information

WARNING!



All electrical power and power control wiring must be installed by a qualified electrician, and must comply with local and national regulations for maximum power rating.

UPS ratings	10kVA 8 kW	15kVA 12 kW	20kVA 16 kW	30kVA 24 kW	40kVA 32kW
Input voltage (V)	3x400/ 230V	3x400/ 230V	3x400/ 230V	3x400/ 230V	3x400/ 230V
Input current (nominal) (A)	12.4	18.6	24.8	37.2	49.6
Maximum input current (continuous, at minimum mains voltage)	13.6	20.5	27.3	40.9	54.6
Input current protection for mains source or single mains supply (external to UPS, not supplied) (A)	20	35	50	63	80
Input current protection for bypass source in dual mains configuration (external to UPS, not supplied) (A)	20	35	50	63	80
Input frequency (Hz) range	40-70	40-70	40-70	40-70	40-70
Output voltage (on line). (V) Minimum and maximum values (+/- 1%)	3x400/ 230V	3x400/ 230V	3x400/ 230V	3x400/ 230V	3x400/ 230V
Output current (nominal) (A)	14.4	21.7	28.9	43.3	57.7
Maximum output current (in bypass only at 110% overload per phase)	15.9	23.8	31.8	47.6	63.5
Bypass input current (A) (in bypass only at 110% overload, per phase)	15.9	23.8	31.8	47.6	63.5
Neutral output current (with 100% switch mode load) (A)	25.0	37.5	50.0	75.0	100.0
Output current protection (external to UPS, not supplied) (A)	20	35	35	63	80
Output frequency range (Hz)	50/60	50/60	50/60	50/60	50/60
DC overcurrent device and disconnect switch for external safety: (A)	22	33	44	66	88
DC voltage rating of the battery supply	+/- 192	+/- 192	+/- 192	+/- 192	+/- 192
Maximum available battery supply fault current	10 kA				

Source connections



WARNING!

The UPS must be supplied from a 3x400/230V, L1,L2,L3,N,PE,50Hz source.



CAUTION!

Verify clockwise phase-rotation (L1, L2, L3) and make sure a neutral connection is present.



For recommended source connections, see *The Site Preparation* section.



CAUTION!

The installation must comply with all local and national codes.

Wiring



Note

Make sure the UPS is in its location of use before wiring begins.



CAUTION!

Verify clockwise phase-rotation (L1, L2, L3) and make sure a neutral connection is present.



Note

If seismic protection is required, attach the Seismic Protection Brackets to the UPS now. Follow step 1 under *Seismic Anchoring (Option)*.

Input/Output Wiring – Single Mains (default)

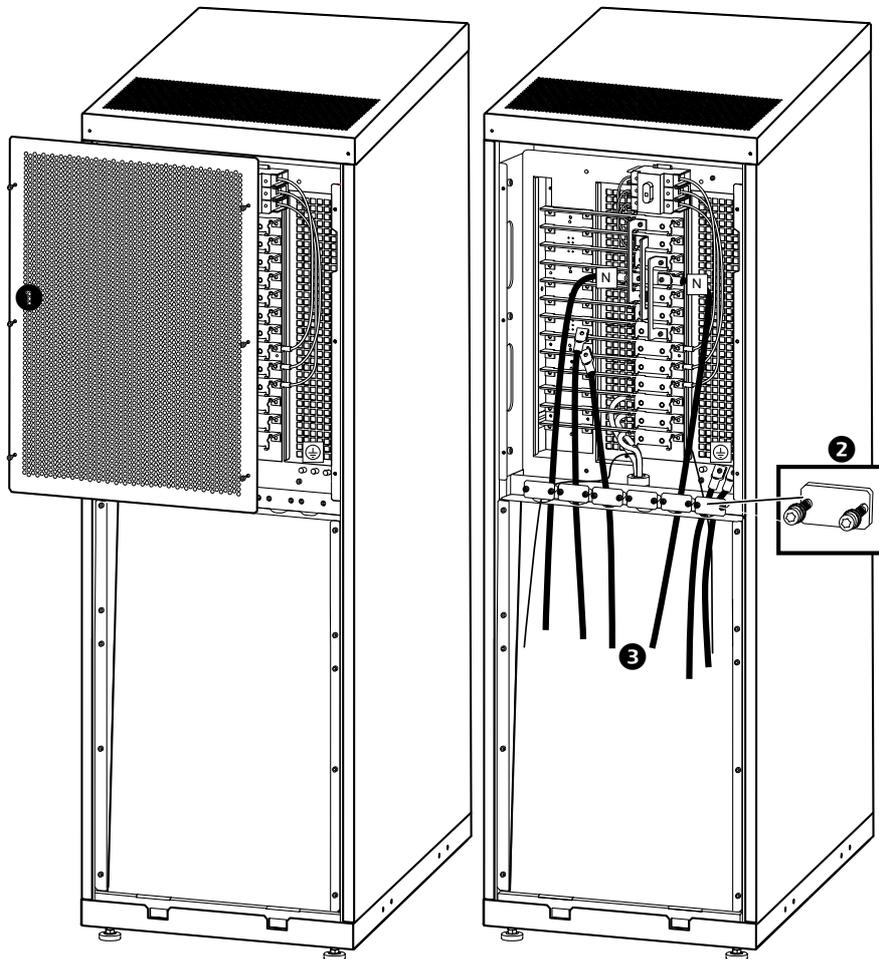
The UPS is designed for both single (default) and dual mains installations. Carry out the *Total Power Off Procedure*, and follow the below steps to install the UPS in a single-mains installation.



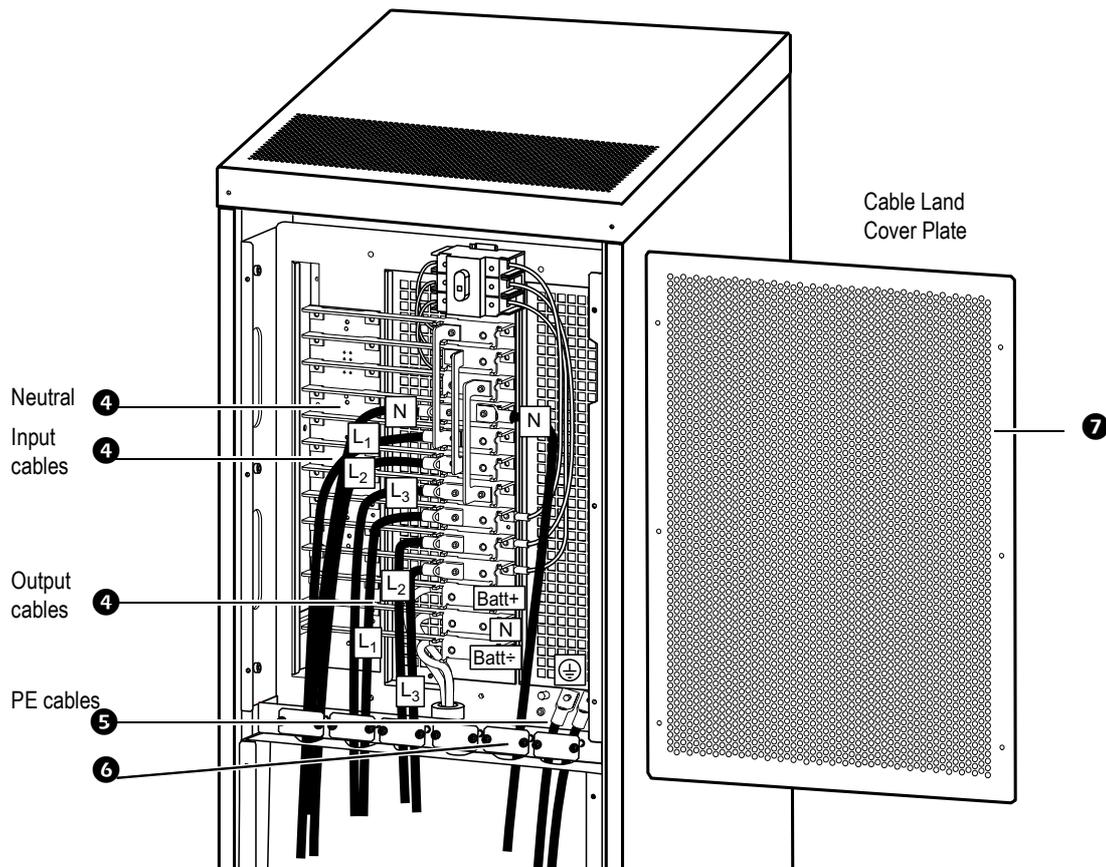
Note

The illustrations show a 20in/523 mm Enclosure, but installation procedures are identical for 14in/351mm Enclosures.

Wiring procedure - single mains



- 1 Loosen the (6) M4x13 screws from the cable-land cover plate on the rear, and remove.
- 2 Loosen the cable strain relief.
- 3 Route the cables from the slanted back plate and up through the punched bracket and into the cable land area.



- ④ Attach input cable lugs on L1, L2 and L3 input busbars (left side in the UPS), using the provided M6 hex screws. Attach output cable lugs on L1, L2 and L3 output busbars, using the provided M6 hex screws. Attach N x 2 where shown, using the provided hex screws.
- ⑤ Attach PE x 2 where shown, using the provided hex screws.
- ⑥ Fasten the cable strain relief.
- ⑦ Reinstall the Cable Land Cover Plate, following reverse deinstallation procedures.

Input/Output Wiring – Dual Mains

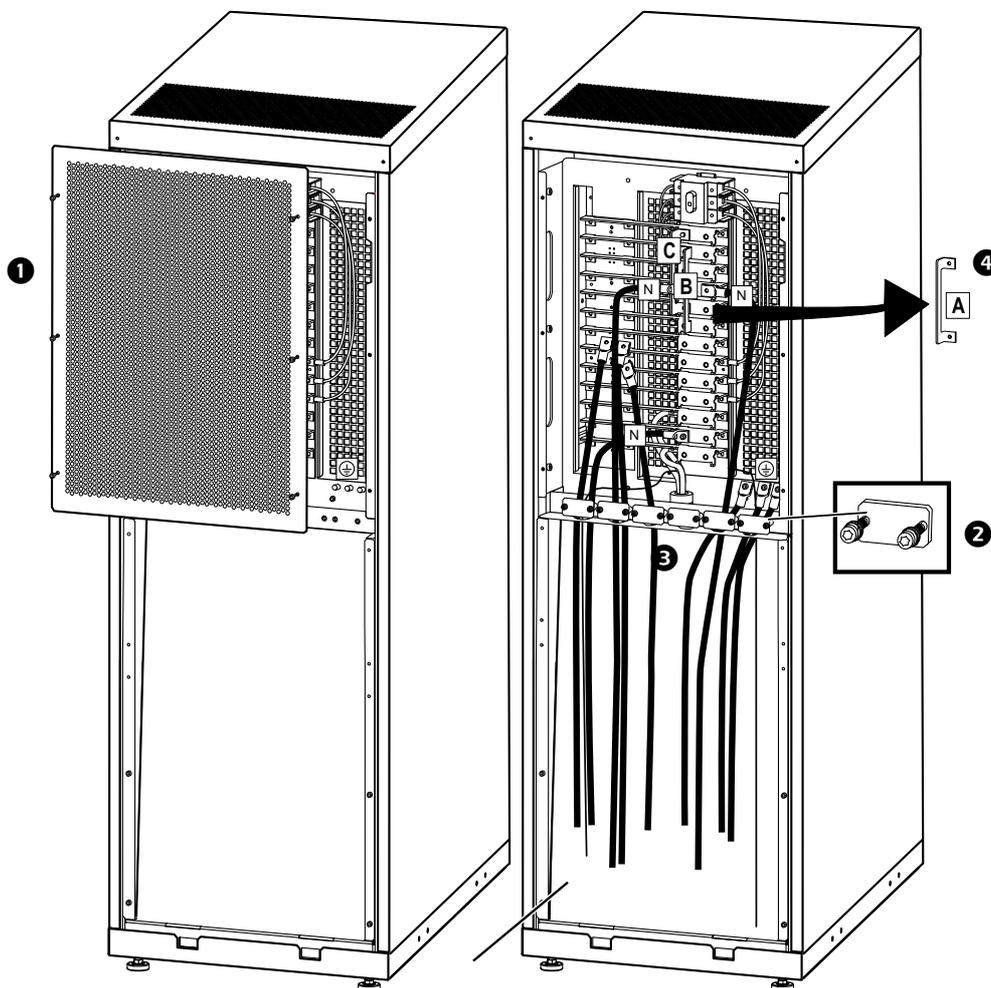
The UPS is designed for single mains installation as default. Carry out the *Total Power Off Procedure*, and follow the below instructions to install the UPS in a dual-mains installation.



Note

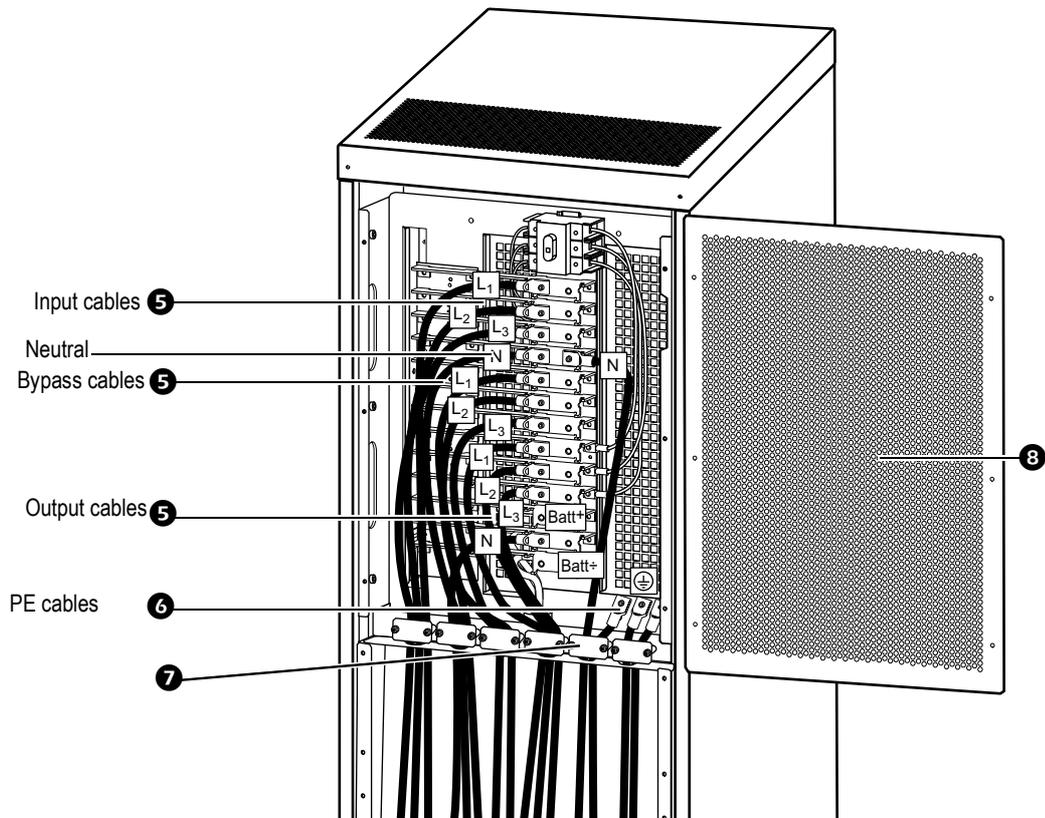
The illustrations show 20in/523 mm Enclosures, but the installation procedures are identical for 14in/351mm Enclosures.

Wiring procedure - dual mains



- 1 Loosen the (6) M4x13 screws from the cable-land cover plate and remove
- 2 Loosen the cable attachment bracket.
- 3 Route the cables from the slanted back plate and up through the punched bracket and into the cable land area.

- Remove the (2) M6x12 screws from Brackets A, B, and C and remove all 3 brackets.



- Attach the input cable lugs to input busbars L1, L2, L3, using the provided hex screws. Attach the bypass cable lugs to L1, L2, L3 bypass busbars, using the provided hex screws. Attach the output cable lugs to the L1, L2, L3 output busbars and attach, using the provided hex screws. Attach N x 3 where shown, using the provided hex screws.
- Attach PE x 3 where shown.
- Fasten the cable strain relief.
- Reinstall the Cable Land Cover Plate, following reverse deinstallation procedures (described in a previous step).

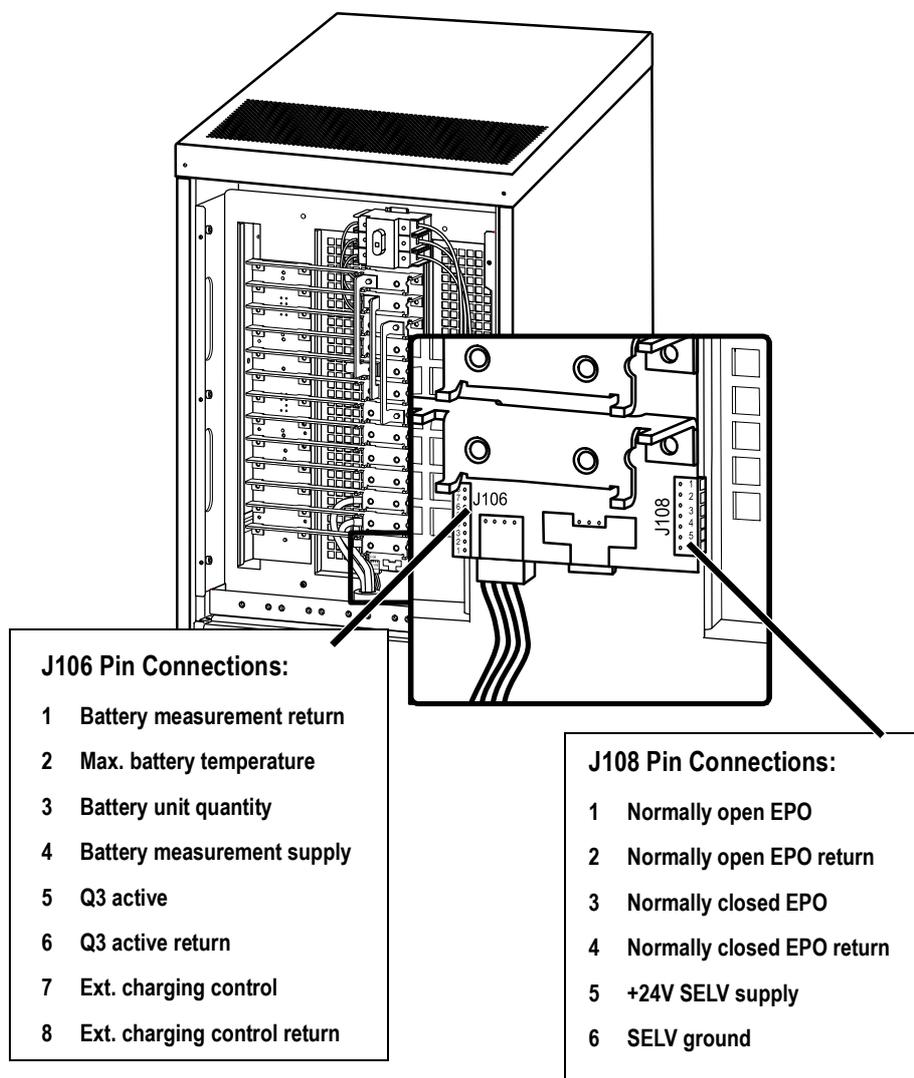
Communication Wiring to EPO and Optional Equipment



EPO switch and wiring must be suited for use in a SELV circuit.

Note

J106 and J108 pin connections



J106 UPS pin connections to J200 options

Pins 1 through 4 are for battery measurement.

Pins 5 & 6 are for external maintenance bypass Q3. When Q3 is closed, signals are fed back to the UPS controller.

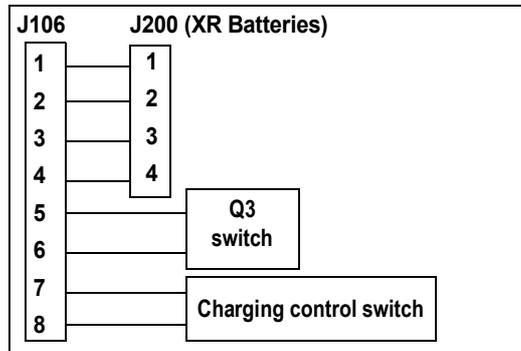
Pins 7 & 8 are for external charge control. When 7 & 8 are closed, the UPS charges batteries with a pre-defined percentage (0-100%) of the maximum charging power. To be used in generator applications, or if special codes requires charging control.



Note

When connecting the Q3 auxiliary signal, use gold-plated N/C auxiliary switch on Q3.

XR Enclosure, MBP, and Generator Control wiring



Pins 1 through 4 are for battery measurement.

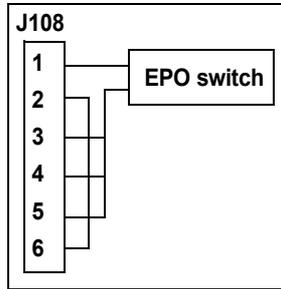
Pins 5 through 6 are for external maintenance bypass Q3.

Pins 7 and 8 are for external charge control.

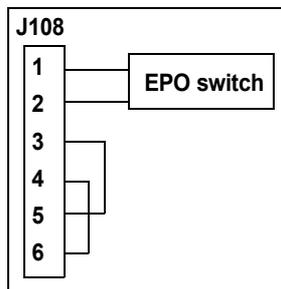
EPO wiring options (J108)

Connect the EPO cable, using one of the following 4 wiring configurations.

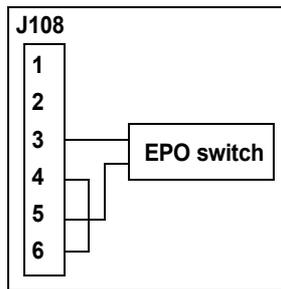
1: Dry Normally Open Contacts



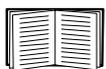
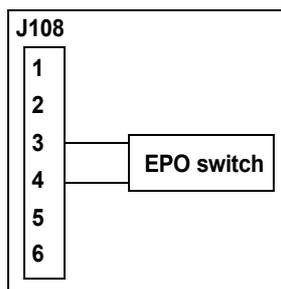
2: +24V Normally Open



3: Dry Normally Closed Contacts



4: +24V Normally Closed



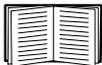
See *EPO wiring options* for setup.

General Charge Setting

The general charge setting is set to 100% as default.

From the display it is possible to adjust the charge levels to 75%, 50%, 25%, 10% and 0%.

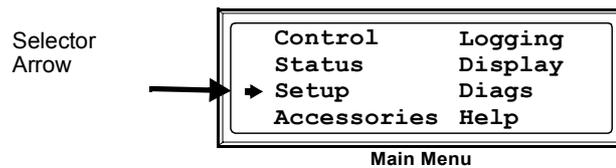
If the charge limit input is active (J106, pins 7,8) the UPS will reduce the maximum General Charge effect (100%) to the programmed value.



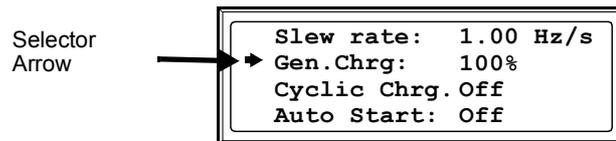
See *XR Enclosure, MBP, and Generator Control Wiring* for overview of J106.

Charge setting procedure

- 1 From the main menu of the display, select Set-up, and press RETURN



- 2 Select System, and press ENTER
- 3 Use the arrow keys to get to *Gen.Chrg: 100%*



- 4 Select *Gen.Chrg*, and press ENTER
- 5 An arrow will appear to the left of *Gen.Chrg*. Use the UP arrow on the display to go to the desired level of charge effect. Select ENTER.

Now when the charge limit input is active, the UPS will charge to the new setting.

Leveling Feet

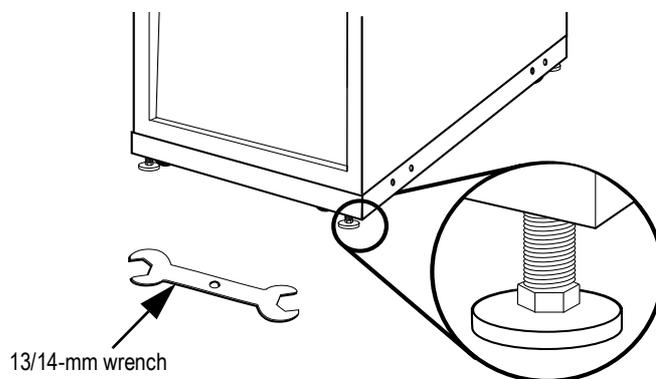


Note

Verify that the installation has been electrically wired before setting the leveling feet.

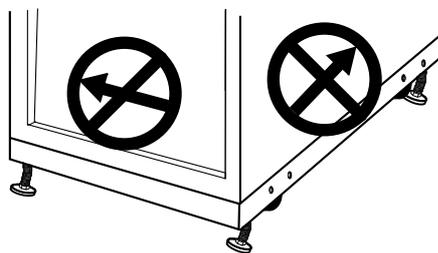
Setting the leveling feet

Set the leveling feet to ensure the UPS is horizontal when it is in its final operating position. Use a 13/14-mm wrench (shipped with UPS) to adjust all 4 leveling feet from front to back, and left to right, until the pads make solid contact with the floor. Use a level tube to check the Enclosure is horizontal.



CAUTION!

To avoid equipment damage, do not move the UPS after the leveling feet have been lowered.



Seismic Anchoring (option)



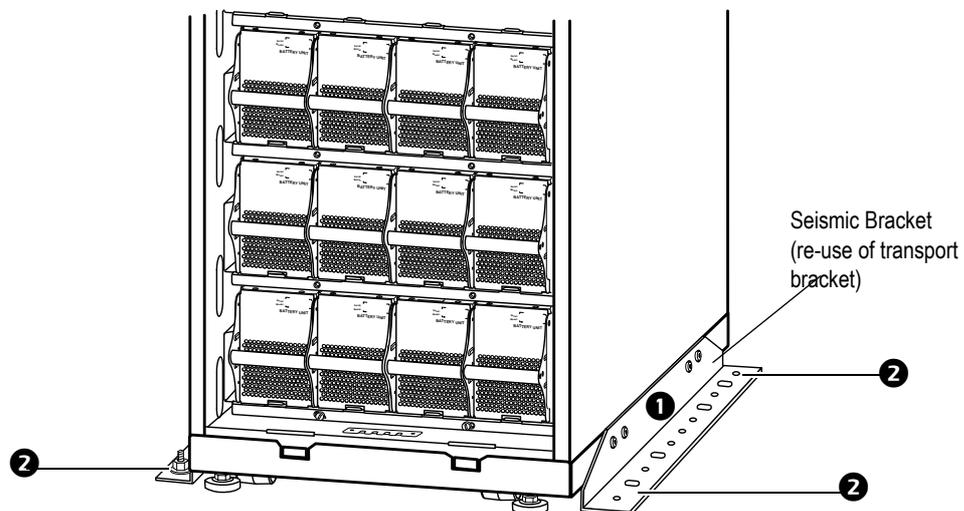
Seismic protection is an option. If you do not require seismic protection, proceed to the *Front Panel Installation* section.

Note

Floor attachment

For seismic protection the UPS installation can be bolted to the floor, and seismic battery brackets must be installed to secure the batteries in both UPS and XR Enclosures.

- 1 Use the 2 transport brackets that were used to secure the UPS to the pallet during transport.



- 2 Align the 4 holes in the bottom angle of the Seismic Bracket on either side of the UPS to the pre-drilled holes in the floor

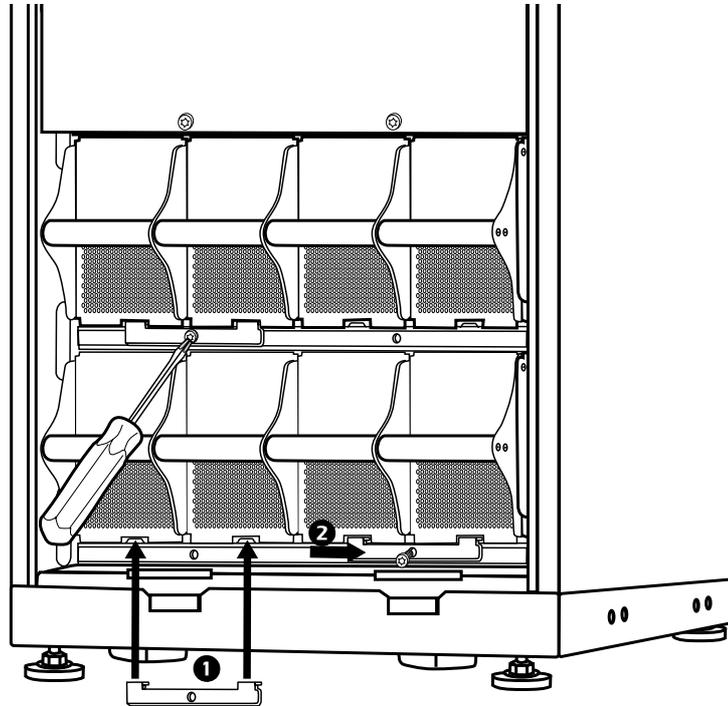


See also

See *Seismic Anchoring Preparation* in the Site Preparation and Installation Manual and install a minimum of 4 seismic anchors each (minimum size: M8) where shown, following the specifications provided by the manufacturer.

Battery securing

Attach two Seismic Battery Brackets per Battery Module in such a way that one bracket secures two Battery Units.



- ❶ Insert the two tabs of the Seismic Battery Bracket into the slots of the two Battery Units.
- ❷ Push the Seismic Battery Bracket to the right and push it downwards. Align the Seismic Battery Bracket hole with the hole in the battery shelf.
- ❸ Use one M6 screw to fasten the Seismic Battery Bracket to the shelf.
- ❹ Use same procedure to secure all batteries in the Enclosure.

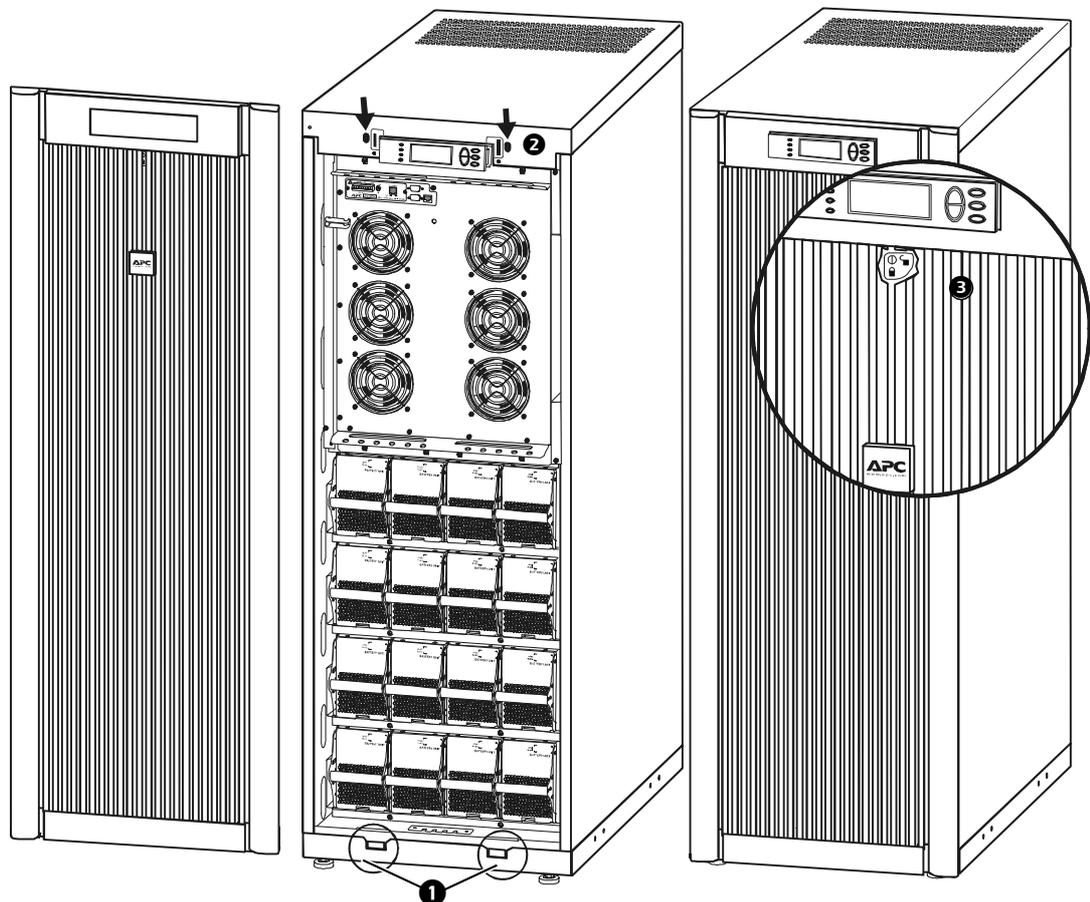


Note

Seismic anchoring procedures identical for both 14in/351mm and 20in/523 mm UPS Enclosures.

Front Panel

Front Panel installation/removal



- ❶ To install a Front Panel, insert the two guide taps positioned at the bottom of the Front Panel into the two slots at the bottom of the Enclosure.
- ❷ Push the Front Panel forwards until it engages the locking device at the top of the Enclosure.
- ❸ It is possible to lock the Front Panel: Use a screwdriver to set the lock mechanism to the locked position.

Use reverse procedures to remove the Front Panel.

Wiring Verification Procedure



Do not connect batteries in the UPS.

Note

Use following procedure to verify that the UPS has been wired properly:

- 1. If your installation includes an XR Enclosure, make sure that the DC breaker (if available) is in the OFF position and that both 125A fuses are removed from the XR Enclosure.
- 2. Check that the power wiring is torqued to 45 lbf in/5Nm.
- 3. If your installation includes an XR Enclosure, remount the 125A fuses in the XR Enclosure and check that the DC breaker (if available) on the XR Enclosure is in the ON position.
- 4. Apply utility power to the system input and measure the voltage at the input terminal block. Record voltages between:

Mains Input:

L1 and N: _____ L2 and N: _____ L3 and N: _____

Bypass Input (for dual mains installations):

L1 and N: _____ L2 and N: _____ L3 and N: _____



Measured voltage must be between 207 and 253. If not, STOP! Verify correct wiring (correct location of N) from the power source to the input wiring connections.

Note

- 5. Check that the display is powered up.
- 6. Select the Status Menu on the display, and check that all input voltages are present.
- 7. Verify L1, L2, L3 clockwise phase rotation using a phase-rotation meter.
- 8. Test the EPO switch. The system should shut down completely. If not, check the connections and the EPO switch to ensure that they are installed and functioning correctly. For installations with XR Battery Enclosures, the DC disconnect should trip to the OFF position at the EPO test (if applicable).
- 9. Successful completion of steps 1 through 5 indicates that the UPS wiring is correctly installed and functioning correctly. Turn off breakers and switches and shut down utility power to the system input. See *Total-Power-Off* Procedure.



Note

If a problem occurs, phone Customer Support at (1) (800) 800-4272 (US and Canada). Refer to rear cover for contact numbers in other countries.

- 10. Reinstall all wiring access panels and Front Panels to the UPS.



Note

If you have purchased any optional equipment, refer to product-specific manuals.

Installation Site Checklist

This checklist should be completed by the electrician after the wiring has been completed:

Installed at (company name, date, contact) _____

Name and telephone number of electrician: _____

UPS serial number: _____

Input Circuit Breaker size and type: _____

Output fuse size and type: _____

Location of protection devices (room): _____

Breaker ID: _____

EPO type: _____

Wire size and type: _____

PE connection method and location: _____

LIMITED FACTORY WARRANTY

The limited warranty provided by American Power Conversion Corporation (“APC”) in this Statement of Limited Factory Warranty applies only to Products you purchase for your commercial or industrial use in the ordinary course of your business.

APC product covered

Smart-UPS® VT

Terms of warranty

APC warrants that the Product shall be free from defects in materials and workmanship for a period of one (1) year from the date of start-up when APC authorized service personnel performed the start-up of the Product, or a maximum of 18 months from the date of Product shipment from APC, when APC authorized service personnel have not performed the start-up of the Product (“Warranty Period”). In the event that the Product fails to meet the foregoing warranty, APC shall repair or replace any defective parts, such repair or replacement to be without charge for on-site labor and travel if APC authorized personnel have conducted start-up of the Product. An APC Start-Up Service must be performed/completed by APC authorized service personnel or replacement of defective parts only will be covered. APC shall have no liability and no obligation to repair the installed Product if non-authorized personnel performed the start-up and such start-up caused the Product to be defective. Any parts furnished under this warranty may be new or factory-remanufactured. **Repair or replacement of a defective product or part thereof does not extend the original warranty period.**

Non-transferable Warranty extends to first purchaser for use

This Warranty is extended to the first person, firm, association or corporation (herein referred to by “You” or “Your”) for whom the APC Product specified herein has been purchased. This Warranty is not transferable or assignable without the prior written permission of APC.

Assignment of warranties

APC will assign to you any warranties which are made by manufacturers and suppliers of components of the APC Product and which are assignable. Any such warranties are assigned “AS IS” and APC makes **no representations** as to the effectiveness or extent of such warranties, assumes NO RESPONSIBILITY for any matters which may be warranted by such manufacturers or suppliers and extends no coverage under this Warranty to such components.

Drawings, descriptions

APC warrants for the Warranty Period and on the terms of the Warranty set forth herein that the APC Product will substantially conform to the descriptions contained in the APC Official Published Specifications or any of the drawings certified and agreed to by an authorized APC representative, if applicable thereto (“Specifications”). It is understood that the Specifications are **not warranties of performance** and **not warranties of fitness for a particular purpose**.

Warranty claims procedure

To obtain service under Warranty, contact APC Customer Support (see rear cover). You will need the model number of the Product, the serial number, and the date purchased. A technician will ask you to describe the problem. If it is determined that the Product will need to be returned to APC you must obtain a returned material authorization (RMA) number from APC Customer Support. Products that must be returned must have the RMA number marked on the outside of the package, and be returned with transportation charges prepaid. If it is determined by APC Customer Support that on-site repair of the Product is allowed, APC will arrange to have APC authorized service personnel dispatched to the Product location to repair or replace the Product at the discretion of APC.

Exclusions

APC shall not be liable under the Warranty if its testing and examination discloses that the alleged defect in the product does not exist or was caused by your or any third person’s misuse, negligence, improper installation or testing, unauthorized attempts to repair or modify, or any other cause beyond the range of the intended use, or by accident, fire, lightning or other hazard.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE, OF PRODUCTS SOLD, SERVICED OR FURNISHED UNDER THIS AGREEMENT OR IN CONNECTION HEREWITH. APC DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY, SATISFACTION AND FITNESS FOR A PARTICULAR PURPOSE. THE APC EXPRESS WARRANTIES WILL NOT BE ENLARGED, DIMINISHED, OR AFFECTED BY AND NO OBLIGATION OR LIABILITY WILL ARISE OUT OF APC RENDERING TECHNICAL OR OTHER ADVICE OR

SERVICE IN CONNECTION WITH THE PRODUCTS. THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REMEDIES. THE WARRANTIES SET FORTH ABOVE, CONSTITUTE SOLE LIABILITY OF APC AND YOUR EXCLUSIVE REMEDY FOR ANY BREACH OF SUCH WARRANTIES. THE WARRANTIES EXTEND ONLY TO YOU AND ARE NOT EXTENDED TO ANY THIRD PARTIES.

IN NO EVENT SHALL APC, ITS OFFICERS, DIRECTORS, AFFILIATES OR EMPLOYEES BE LIABLE FOR ANY FORM OF INDIRECT, SPECIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES ARISING OUT OF THE USE, SERVICE OR INSTALLATION OF THE PRODUCTS, WHETHER SUCH DAMAGES ARISE IN CONTRACT OR TORT, IRRESPECTIVE OF FAULT, NEGLIGENCE OR STRICT LIABILITY OR WHETHER APC HAS BEEN ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGE.



APC Worldwide Customer Support

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to access documents in the APC Knowledge Base and to submit customer support requests.
 - **www.apc.com** (Corporate Headquarters)
Connect to localized APC Web sites for specific countries, each of which provides customer support information.
 - **www.apc.com/support/**
Global support searching APC Knowledge Base and using e-support.
- Contact an APC Customer Support center by telephone or e-mail.
 - Regional centers:

Direct InfraStruXure Customer Support Line	(1)(877)537-0607 (toll free)
APC headquarters U.S., Canada	(1)(800)800-4272 (toll free)
Latin America	(1)(401)789-5735 (USA)
Europe, Middle East, Africa	(353)(91)702000 (Ireland)
Japan	(0) 3 5434-2021
Australia, New Zealand, South Pacific area	(61) (2) 9955 9366 (Australia)

- Local, country-specific centers: go to **www.apc.com/support/contact** for contact information.

Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

Entire contents copyright © 2004 American Power Conversion. All rights reserved. Reproduction in whole or in part without permission is prohibited. APC, the APC logo, and Smart-UPS VT are trademarks of American Power Conversion Corporation and may be registered in some jurisdictions. All other trademarks, product names, and corporate names are the property of their respective owners and are used for informational purposes only.

