

Installation

Smart-UPS[®]VT in Parallel

10-40 kVA

380/400/415 V 208/220 V 200/208 V



Contents

Safety .		. 1
IMPC - SAV	ORTANT SAFETY INSTRUCTIONS VE THESE INSTRUCTIONS	
Prep	oare for Floor-Anchoring (optional)	
	System arrangements 2 Hole positions for a stand-alone UPS enclosure with L-shaped anchoring brackets 3 Hole positions for up to four UPS units in parallel with U-shaped anchoring brackets 4	
Prepare	e for Parallel Communication Cables	. 5
	Three different ways of routing cables5Schematic overview of the PBus cables layout5Remove the front panel6Remove the top cover6Remove the batteries7Install the interconnection plates (optional)7	
Run the	e Cables	10
UPS	s apart without Conduits and Interconnection	
UPS	s bayed together without Conduits	
UPS	s apart or bayed together with Conduits	
Final M	echanical Assembly	15
Leve and	el the Enclosures (L-shaped Floor Anchoring Brackets) Install Batteries	

Power Connections (Overview)	17
380/400/415 V input	17
Breaker sizes 380/400/415 V	18
200/208/220 V input	19
Breaker sizes 200/208/220 V	20
Contact Information	

Safety

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS



Warning: ALL safety instructions in the Safety Sheet (990-2822) must be read, understood and followed prior to installation. Failure to do so could result in equipment damage, serious injury, or death.



Warning: Parallel operation is not available when the system is set up for 3-wire operation, which only applies to Japanese systems.

Caution: 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.



Note: The cables must be routed by the electrician but not attached. The field service engineer from APC by Schneider Electric will install the parallel communication box and attach all cables to the UPSs.



Note: Up to four UPS units can run in parallel.

See also:

For information on UPS specifications on the Smart-UPS VT series, see part nos. (available from the document storage in the UPS):

- 990-1986 Installation 380/400/415 V
- 990-1598 Installation 208/220 V
- 990-2360 Installation 200/208 V

Prepare for Floor-Anchoring (optional)



Note: If floor anchoring and battery securing is required, read this section. If not, see "*Prepare for Parallel Communication Cables*" on page 5.

Note: Allow for enough working space behind the enclosure for electrical work to be carried out (e.g. if you want to install a conduit box or if you want to connect an XR Battery Enclosure at a later stage). Minimum rear clearance is 100 mm (3.93 in) and must comply with applicable national and local codes. 600 mm (23.6 in) is recommended.



Note: The L-shaped floor anchoring brackets that secured the enclosure to the pallet during shipment may be used for a stand-alone UPS enclosure to enhance stability. See this chapter for hole positions and see also "Level the Enclosures (L-shaped Floor Anchoring Brackets) and Install Batteries" on page 15. The L-shaped floor anchoring brackets are not necessary when baying enclosures together. Instead, the three U-shaped floor anchoring brackets from the baying kit are used.



Note: Hole positions are only intended as a guide.

System arrangements

APC recommends the following arrangements of UPS units and XR Battery Enclosures (XR) in parallel.

Examples with two parallel systems using baying kits.



Note: UPS units and their respective XR Battery Enclosure must be bayed together. XR Battery Enclosures must never be shared in a parallel UPS system.

Hole positions for a stand-alone UPS enclosure with L-shaped anchoring brackets



Note: Recommended minimum number of screws per enclosure for the L-shaped brackets is four; one in each corner. Recommended floor bolt size: M8.

Model width: 352 mm (13.85 in) and 523 mm (20.59 in).



Note: Rear service clearance must comply with applicable national and local codes. 600 mm (23.6 in) is recommended.

Hole positions for up to four UPS units in parallel with U-shaped anchoring brackets.



Note: Recommended minimum number of floor screws for the below two configurations is 10.

Model width: 352 mm (13.85 in).



Model width: 523 mm (20.59 in).



Prepare for Parallel Communication Cables

Three different ways of routing cables

Note: The enclosures in a parallel system can be kept apart, or they can be assembled with interconnection plates (SUVTOPT011 APC Smart-UPS VT Parallel Operation Baying Kit). If the enclosures are kept apart the communication cables can be run in conduits (if applicable).

The routing of cables between the UPSs can be done in three different ways:

- 1. UPSs apart (without conduits and without interconnection plates)
- 2. UPSs bayed together (without conduits and with interconnection plates)
- 3. UPSs apart or bayed together (with conduits and optional interconnection plates).

Schematic overview of the PBus cables layout



Note: The cables must be run by the electrician but not attached. The Field Service Engineer from APC by Schneider Electric will attach all cables to the UPS(s) and install the parallel communication box.



Note: The PBus cables run from UPS 1 to UPS 2 to UPS 3 to UPS 4 if your configuration consists of 4 UPSs.



Note: The PBus cables are labelled PBus 1 and PBus 2.



Note: PBus 1 cables must be kept together and PBus 2 cables must be kept together. If you by mistake run a cable between a PBUS1 terminal and a PBUS2 terminal you will be notified by the display.



Note: If the configuration consists of only two UPS units, the terminators must be installed in UPS 1 & 2. With three UPS units the terminators must be installed in UPS 1 & 3.

This schematic overview shows the cable layout:



Remove the front panel



1.Turn the screw to the right to the unlocked position.

2.Lift the front panel upwards to free it from the enclosure frame.

Remove the top cover



1.Loosen the six screws of the top cover (four at the front and two at the back).

2.Lift up from the back and push forward to free the cover.

3.Leave the cover unattached on top of the UPS.

Note: Remove the battery compartment cover (only applicable to Japanese systems).

Remove the batteries

Note: See Operation manual 990-2282.

Install the interconnection plates (optional)



Note: If the UPS units are kept apart, the interconnection plates are irrelevant. Please instead move to "Level the Enclosures (L-shaped Floor Anchoring Brackets) and Install Batteries" on page 15 or use the U-shaped anchoring brackets (described below) for floor anchoring. If the UPS units are kept together, please proceed with the below installation procedure of the interconnection plates.



1.Remove the side panels from the enclosure(s) to get access to the holes in the bottom frame.



Note: If the UPS system is going to be anchored to the floor, drilling holes for anchoring is recommended to take place at this stage. See "Prepare for Floor-Anchoring (optional)" on page 2.

Note: Make sure that the enclosures are level to be able to anchor the enclosures to each other.



Note: The U-shaped anchoring brackets are 1-2 mm higher than the opening below the enclosure to inactivate the casters. Therefore, the enclosure must be tilted when placing the U-shaped anchoring brackets under the enclosure.

- 3. In each side of the same enclosure insert a maximum of nine and a minimum of two M8 screws (not provided) through holes in the bottom of the enclosure and through holes in the U-shaped floor anchoring brackets, and into the pre-drilled floor holes.

- 4. Fasten the screws.
- 5. Move the adjacent enclosure on its casters close to the enclosure with the U-shaped floor anchoring brackets.





Note: If the adjacent enclosure is on its levelling feet, use a forklift or pallet jack to move it into position.



6.Insert the interconnection plates between the two enclosures. One is positioned toward the front and the other toward the rear. Note how the "wings" on the interconnection plates rest in slots at the top of the inner panel.

7.Align the two enclosures and level the three marked rows of bolt holes in UPS 1 with the holes in UPS 2.

8.Push the two enclosures firmly together.



9.Bolt the two enclosures together, using the six M6x25 mm screws and nuts supplied in the kit; join one hole at the front and one hole at the rear of the enclosures on three levels.

10. Position the last and third U-shaped floor anchoring bracket under the adjacent enclosure (see previous graphics) and insert a minimum of two floor anchoring M8 screws (not provided) through holes in the bottom of the enclosure and through holes in the U-shaped floor anchoring bracket, and into the predrilled floor holes, and then fasten the screws.

Run the Cables

UPSs apart without Conduits and Interconnection

Note: If the UPS system is going to be anchored to the floor, drilling holes for anchoring is recommended to take place at this stage. See *"Prepare for Floor-Anchoring (optional)" on page 2.*



- 1. Remove the front panel if not already done under "Prepare for Parallel Communication Cables" on page 5.
- 2. Loosen the two screws from the cable-inlet plates at the bottom plate of UPS 1 and UPS 2, and remove the plates.

- 3. From UPS 1: Run the two PBus cables to the slots on the left side of the enclosure and down inside the panel.
- 4. From the lowest slot fish out the cables from the side panel and run them down through the cable inlet and through the round hole at the bottom.
- 5. Run the PBus cables to UPS 2 and to the slots on the left side of the enclosure, and up inside the panel.
- 6. Fish out the PBus cables and leave them unattached to the parallel box.
- 7. Run the ABus cable from the Maintenance Bypass Panel to the slots on the left side of the enclosure and up inside the panel the same way as for the PBus cables.
- 8. Reattach the cable-inlet covers.
- 9. Fasten the cables with cable ties.

Note: Proceed the routing of cables into UPS 3 and UPS 4, if applicable.

UPSs bayed together without Conduits



Note: If the UPS system is going to be anchored to the floor, drilling holes for anchoring is recommended to take place at this stage. See "*Prepare for Floor-Anchoring (optional)*" on page 2.

Note: See "*Install the interconnection plates (optional)*" on page 7 for instructions on how to assemble the enclosures with interconnection plates.



- 1. Remove the front panel and the top cover if not already done under *"Prepare for Parallel Communication Cables" on page 5.*
- 2. Loosen the two screws from the cable-inlet plates at the bottom plate of UPS 1 and UPS 2, and remove the plates.

- 3. From UPS 1: Run the two PBus cables to the slots on the left side of the enclosure and down inside the panel.
- 4. From the lowest slot fish out the cables from the side panel, run the cables across and through the cable inlets of the two side panels.
- 5. From the bottom of UPS 2, run the PBus cables to the slots on the left side of the enclosure and up inside the panel.
- 6. Fish out the PBus cables and leave them unattached to the parallel box.
- 7. Run the ABus cable from the Maintenance Bypass Panel to the slots on the left side of the enclosure and up inside the panel the same way as for the PBus cables.
- 8. Reattach the cable-inlet cover plates.
- 9. Fasten the cables with cable ties.

Note: Proceed the routing of cables into UPS 3 and UPS 4, if applicable.

UPSs apart or bayed together with Conduits

Note: If the UPS system is going to be anchored to the floor, drilling holes for anchoring is recommended to take place at this stage. See *"Prepare for Floor-Anchoring (optional)" on page 2.*



Note: When enclosures are assembled with interconnection plates and bolted together, the PBus cables can be run inside the enclosures and then only the ABus cable has to be run in a conduit (if applicable).



Note: See "*Install the interconnection plates (optional)*" on page 7 for instructions on how to assemble the enclosures with interconnection plates.



1.Remove the front panel and the top cover if not already done under "Prepare for Parallel Communication Cables" on page 5.

2.Remove the conduit plate at the back of the UPS cover and drill holes with center in the small pre-drilled holes. 2 cm (3/4 in) is recommendable for conduits.



- 3. Run the ABus and the PBus cables through the conduit holes into the inside of the top cover on UPS 1. Leave the cables on top of the UPS.
- 4. Attach conduits with 2 cm (3/4 in) fittings (not supplied).
- 5. Run conduits with PBus cables to UPS 2. Pull the cables through the top cover conduit plate and leave the cables on top of the UPS as shown.
- 6. Attach conduits to UPS 2 with 2 cm (3/4 in) fittings (not supplied).
- 7. Run the ABus cables (in conduits if applicable) to the Maintenance Bypass Panel (*see Maintenance Bypass Panel (MBP) CAN I/O Board* Installation sheet 990-2873).

Note: Proceed the routing of cables into UPS 3 and UPS 4, if applicable.

Final Mechanical Assembly

Level the Enclosures (L-shaped Floor Anchoring Brackets) and Install Batteries



Note: The leveling feet and the L-shaped floor anchoring brackets (reuse of transportation brackets) are used in some configurations instead of the optional U-shaped floor anchoring brackets described earlier in this manual.

Level the enclosures with the leveling feet

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

Set the leveling feet to ensure that the UPS is completely horizontal when it is in its final operating position. Use the wrench shipped with the UPS to adjust all four leveling feet from the front to the back, and from the left to the right, until the pads make solid contact with the floor. Use a bubble level to check that the enclosure is horizontal.





Caution: To avoid equipment damage, do not push or pull the UPS after the leveling feet have been lowered.



Install battery-securing and floor-anchoring brackets



- 1. Install the batteries by pushing them all the way into the enclosure.
- 2. If required, install the battery securing brackets to hold the batteries firmly in place. Note! Do not install the bracket the same way they were positioned when the enclosure arrived. Rotate the brackets 180° and reinstall.



Note: Battery securing brackets are delivered with the UPS or XR Battery Enclosure and installed in front of the batteries. Extra battery securing brackets for additional batteries can be purchased. Refer to kit SUVTOPT003: APC Smart-UPS VT Battery Lock Kit for one Battery Module (two batteries).

3. Install the L-shaped floor-anchoring bracket (reuse of transportation brackets) by adding four M6 screws and nuts (provided) to the enclosure (only if the optional U-shaped floor anchoring brackets described in this manual have not been chosen).

Note: If the floor has not been prepared for anchoring, see "Prepare for Floor-Anchoring (optional)" on page 2.

- 4. Drill floor holes.
- 5. Add a minimum of two M8 screws (not provided) to the anchoring bracket and tighten the screws to the floor.

Reinstall the top cover and the front panel



Note: See "Remove the top cover" on page 6 and "Remove the front panel" on page 6 and perform these procedures in reverse order.

Power Connections (Overview)

380/400/415 V input



Breaker sizes 380/400/415 V

Q3 in capacity systems.

	Rating in kVA (380/400/415 V)					
Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA	
2	35 A	50 A	63 A	100 A	125 A	
3	50 A	80 A	100 A	160 A	200 A	
4	63 A	100 A	125 A	200 A	250 A	

Q4 in capacity systems.

Rating in kVA (380/400/415 V)

Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA
2	35 A	50 A	63 A	100 A	125 A
3	50 A	80 A	100 A	160 A	200 A
4	63 A	100 A	125 A	200 A	250 A

Q3 in redundant systems (n+1).

Rating in kVA (380/400/415 V)

Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA
2	16 A	25 A	35 A	50 A	63 A
3	35 A	50 A	63 A	100 A	125 A
4	50 A	80 A	100 A	160 A	200 A

Q4 in redundant systems (n+1).

Rating in kVA (380/400/415 V)

Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA
2	16 A	25 A	35 A	50 A	63 A
3	35 A	50 A	63 A	100 A	125 A
4	50 A	80 A	100 A	160 A	200 A

Q1 and Q5 in capacity and redundant systems.

	Rating in kVA (380/400/415 V)				
	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA
Bypass overcurrent protection Q1	16 A	25 A	35 A	50 A	63 A
Bypass overcurrent protection Q5	16 A	25 A	35 A	50 A	63 A

Q2 in capacity and redundant systems.

	Rating in kVA (380/400/415 V)				
	10 kVA	15 kVA	20 kVA	30 kVA	40 kVA
Load side breaker Q2 (output)	16 A	25 A	35 A	50 A	63 A

Note: Note: If fuses are used, they must have a gL/gG-characteristic.

200/208/220 V input



Note: Note: Fuses must be Class J, i.e. Bussmann LPJ or equivalent.

Breaker sizes 200/208/220 V

Q3 in capacity systems.

	Rating in KVA (200/208/220 V)				
 Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA	
2	70 A	125 A	150 A	225 A	
3	125 A	175 A	225 A	350 A	
4	150 A	225 A	300 A	450 A	

Q4 in capacity systems.

Rating in kVA (200/208/220 V)

Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA
2	70 A	125 A	150 A	225 A
3	125 A	175 A	225 A	350 A
4	150 A	225 A	300 A	450 A

Q3 in redundant systems (n+1).

Rating in kVA (200/208/220 V)

Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA
2	35 A	60 A	70 A	125 A
3	70 A	125 A	150 A	225 A
4	125 A	175 A	225 A	350 A

Q4 in redundant systems (n+1).

Rating in kVA (200/208/220 V)

Units in parallel	10 kVA	15 kVA	20 kVA	30 kVA
2	35 A	60 A	70 A	125 A
3	70 A	125 A	150 A	225 A
4	125 A	175 A	225 A	350 A

Q1 and Q5 in capacity and redundant systems.

	Rating in kVA (200/208/220 V)				
	10 kVA	15 kVA	20 kVA	30 kVA	
Bypass overcurrent protection Q1	35 A	60 A	70 A	125 A	
Bypass overcurrent protection Q5	35 A	60 A	70 A	125 A	

Q2 in capacity and redundant systems.

	Rating in kVA (200/208/220 V)				
	10 kVA	15 kVA	20 kVA	30 kVA	
Load side breaker Q2 (output)	35 A	60 A	70 A	125 A	

Contact Information

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