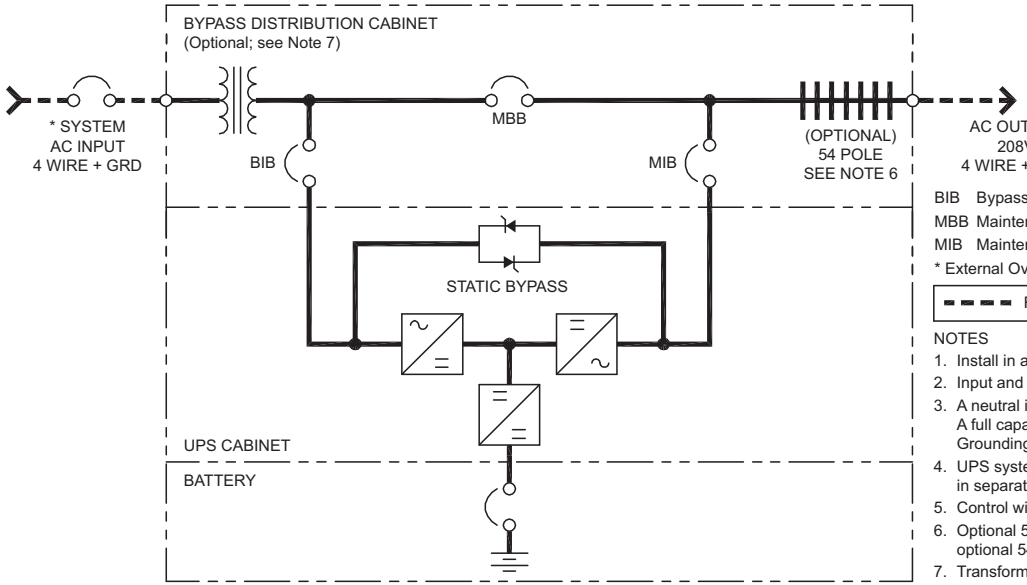
SITE PLANNING DATA-LIEBERT® APM™ 3-PHASE UPS: 15-90KVA/KW, 60HZ, 208-600VAC, SINGLE & DUAL INPUT



The UPS must be fed from a solidly grounded wye or delta AC source. Not for use with impedance-grounded systems, corner-grounded or high leg delta systems. For these applications, an isolation transformer must be installed between the AC

BIB Bypass Isolation Breaker
MBB Maintenance Bypass Breaker
MIB Maintenance Isolation Breaker
* External Overcurrent Protection by others

Field-supplied wiring

NOTES
1. Install in accordance with national and local electrical codes.
2. Input and bypass must share the same single source.
3. A neutral is required from the system AC input source. A full capacity neutral conductor is recommended. Grounding conductors are recommended.
4. UPS system input and output cables must be run in separate conduits.
5. Control wiring must be run in separate conduits.
6. Optional 54 pole, 225A for 45kVA frame only or optional 54 pole, 400A for 90kVA frame only.
7. Transformer available 480V or 600V input.

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Notes for Tables

1. Nominal (Nom) current is based on full rated output load at nominal input voltage.
2. Maximum (Max) current (125% of nominal) is short duration for battery recharge conditions.
3. UPS input and bypass cables must be run in separate conduit from output cables.
4. Nominal battery voltage is shown at 2.0 volts/cell per NEC 480-2.
5. Nominal rectifier AC input current (considered continuous) is based on full rated output load. Maximum current includes nominal input current and maximum battery recharge current (considered non-continuous). Continuous and non-continuous currents are defined in NEC 215.

   Nominal AC output current (considered continuous) is based on full rated output load. Output breakers are either supplied by the customer or by using the optional Liebert Bypass Distribution Cabinet.
6. Minimum-sized grounding conductors to be per NEC 250-122. Parity-sized ground conductors are recommended. Neutral conductors to be sized for full capacity per NEC 310-15 (b)(4). References are per NEC 2008.
7. Wiring requirements: AC Input: 3-phase, 4-wire, plus ground
   AC Output: 3-phase, 3- or 4-wire, plus ground
8. All wiring is to be in accordance with national and local electric codes.
9. Minimum access clearance is 36" (914mm) front; ventilation clearance is 24" (610mm) above and 12" (305mm) in the rear.
10. Top or bottom cable entry through removable access plates. Punch plate to suit conduit size, then replace.
11. Control wiring and power wiring must be run in separate conduit.
12. Dimensions shown include an internal battery (45kVA frame only).
13. Weights shown do not include an internal battery nor optional cabinets or features.
14. When a Liebert Bypass Distribution Cabinet is not used, the customer must supply the input circuit breaker with a 120VAC shunt trip. The shunt trip drive capability is 8A.

Additional Notes

- If site configuration includes a backup emergency generator, it is recommended that the engine generator set be properly sized and equipped for a UPS application. Generator options would typically include an isochronous governor (generator frequency regulation) and a UPS-compatible regulator (generator voltage regulation). Consult generator manufacturer for required generator options and sizing.
- If site configuration includes an automatic transfer switch, refer to Liebert Power Line titled "Criteria for Application of Automatic Transfer Switches (ATS) With Uninterruptible Power Supply (UPS) Systems," publication 91K-PLT-48-02. It is also recommended that the transfer switch be equipped with auxiliary contacts to provide a UPS "on generator" signal. Consult transfer switch manufacturer for required transfer switch options and sizing.
- If site configuration requires an external isolated maintenance bypass circuit, it should be noted that utility AC input might not be in phase with the UPS AC output. Consult a Vertiv sales representative or applications engineer.

Table 1 Site planning data - 15-90kVA, 60Hz, 208VAC, single input

UPS Rating		Voltage		AC Input			Battery		AC Output		Mechanical Data					System OCPD (45 and 90 kVA) (customer-supplied)
				Current, A		Rec. OPD	Nom. VDC	Max. Discharge	Current, A		Dimensions WxDxH, in. (mm)	Unit Weight, lb. (kg)		Heat Dis. BTU/hr (kWH)	Cooling Air CFM (m^3/hr)	
kVA	kW	Input	Output	Nom.	Max.				Nom.	OPD		45kVA Frame	90kVA Frame			
15	15	208	208	45	56	70	288	67	42	60	31.8x39.5x78.7 (800x1000x2000)	866 (394)	796 (362)	3,759 (1.1)	102 (173)	200A/ with 120VAC/ shunt trip
30	30	208	208	90	112	125	288	135	83	125		942 (428)	872 (396)	7,753 (2.21)	204 (346)	
45	45	208	208	134	167	200	288	202	125	200		1018 (463)	948 (431)	11,383 (3.34)	306 (519)	
60	60	208	208	179	223	250	288	269	167	225		NA	1024 (465)	15,130 (4.43)	408 (692)	400A/ with/ 120VAC/ shunt trip
75	75	208	208	224	279	350	288	335	208	300		NA	1100 (500)	18,853 (5.52)	510 (865)	
90	90	208	208	268	334	400	288	404	250	350		NA	1176 (535)	22,518 (6.6)	612 (1038)	
See Notes for Tables (above):				1	2, 3, 5, 8,12	6	4	1, 3, 8,12	1,3,8,12	6	13	14	14	—	—	15

Table 2 Site planning data - 15-90kVA, 60Hz, 480VAC, single input

UPS Rating		Voltage		AC Input			Battery		AC Output		Mechanical Data					System OCPD (45 and 90 kVA) (customer-supplied)
				Current, A					Current, A			Unit Weight, lb. (kg)				
kVA	kW	Input	Output	Nom.	Max	Rec. OPD	Nom VDC	Max. Discharge	Nom.	OPD	Dimensions WxDxH, in. (mm)	45kVA Frame	90kVA Frame	Heat Dis. BTU/hr (kWH)	Cooling Air CFM (m^3/hr)	
15	15	480	208	19	24	30	288	67	42	60	31.8x39.5x78.7 (800x1000x2000)	NA	1728 (785)	14,642 (4.3)	102 (173)	100A with 120VAC shunt trip
30	30	480	208	39	49	60	288	135	83	125		NA	1804 (820)	16,587 (4.9)	204 (346)	
45	45	480	208	58	73	90	288	202	125	200		NA	1880 (855)	20,217 (5.9)	306 (519)	
60	60	480	208	78	98	125	288	269	167	225		NA	1956 (889)	23,964 (7.0	408 (692)	200A with 120VAC shunt trip
75	75	480	208	97	121	150	288	335	208	300		NA	2032 (924)	27,687 (8.1)	510 (865)	
90	90	480	208	116	145	175	288	404	250	350		NA	2108 (958)	31,352 (9.2)	612 (1038)	
See Notes for Tables (p. 2):				1	2, 3, 5, 8,12	6	4	1, 3, 8,12	1, 3, 8, 12	6	13	14	14	—	—	15

Table 3 Site planning data - 15-90kVA, 60Hz, 600VAC, single input

UPS Rating		Voltage		AC Input			Battery		AC Output		Mechanical Data					System OCPD (45 and 90 kVA) (customer-supplied)
				Current, A					Current, A			Unit Weight, lb. (kg)				
kVA	kW	Input	Output	Nom.	Max	Rec. OPD	Nom VDC	Max. Discharge	Nom.	OPD	Dimensions WxDxH, in. (mm)	45kVA Frame	90kVA Frame	Heat Dis. BTU/hr (kWH)	Cooling Air CFM (m3/hr)	
15	15	600	208	16	20	25	288	67	42	60	31.8x39.5x78.7 (800x1000x2000)	NA	1743 (792)	12,350 (3.6)	102 (173)	100A with 120VAC shunt trip
30	30	600	208	31	39	50	288	135	83	125		NA	1819 (827)	16,344 (4.7)	204 (346)	
45	45	600	208	47	59	70	288	202	125	200		NA	1895 (861)	19,974 (5.8)	306 (519)	
60	60	600	208	62	78	100	288	269	167	225		NA	1971 (896)	23,721 (6.9)	408 (692)	150A with 120VAC shunt trip
75	75	600	208	78	98	125	288	335	208	300		NA	2047 (930)	27,444 (8.0)	510 (865)	
90	90	600	208	93	116	150	288	404	250	350		NA	2123 (965)	31,109 (9.1)	612 (1038)	
See Notes for Tables (p. 2):				1	2,3,5,8,12	6	4	1,3,8,12	1,3,8,12	6	13	14	14	—	—	15

Table 4 Site planning data - 15-90kVA, 60Hz, 208VAC, dual input

UPS Rating		Voltage		AC Rectifier Input			208VAC Bypass Input		Battery		AC Output		Mechanical Data					Input CB (customer-supplied)
				Current, A			Current		Nom VDC	Max. Discharge	Current, A		Dimensions WxDxH, in. (mm)	Unit Weight, lb. (kg)		Heat Dis. BTU/hr (kWH)	Cooling Air CFM (m^3/hr)	
kVA	kW	Input	Output	Nom.	Max	Rec. OPD	Nom	Rec. OPD			Nom.	OPD		45kVA Frame	90kVA Frame			
15	15	208	208	45	56	70	42	60	288	67	42	60	31.8x39.5x78.7 (800x1000x2000)	866 (394)	796 (362)	3,759 (1.1)	102 (173)	200A with 120VAC shunt trip
30	30	208	208	90	112	125	84	110	288	135	83	125		942 (428)	872 (396)	7,753 (2.21)	204 (346)	
45	45	208	208	134	167	200	126	175	288	202	125	200		1018 (463)	948 (431)	11,383 (3.34)	306 (519)	
60	60	208	208	179	223	250	168	225	288	269	167	225		NA	1024 (465)	15,130 (4.43)	408 (692)	400A with 120VAC shunt trip
75	75	208	208	224	279	350	210	300	288	335	208	300		NA	1100 (500)	18,853 (5.52)	510 (865)	
90	90	208	208	268	334	400	252	350	288	404	250	350		NA	1176 (535)	22,518 (6.6)	612 (1038)	
See Notes for Tables (p. 2):				1	2,3,5, 8,12	6	—	—	4	1,3,8,12	1,3, 8,12	6	13	14	14	—	—	15

Table 5 Site planning data - 15-90kVA, 60Hz, 480VAC, dual input

UPS Rating		Voltage		AC Input			208VAC Bypass Input		Battery		AC Output		Mechanical Data					
				Current, A			Current				Current, A			Unit Weight, lb. (kg)				
kVA	kW	Input	Output	Nom.	Max	Rec. OPD	Nom	Byp. OPD	Nom VDC	Max. Discharge	Nom.	OPD	Dimensions WxDxH, in. (mm)	45kVA Frame	90kVA Frame	Heat Dis. BTU/hr (kWH)	Cooling Air CFM (m3/hr)	Input CB (customer-supplied)
15	15	480	208	19	24	30	42	60	288	67	42	60	31.8x39.5x78.7 (800x1000x2000)	NA	1728 (785)	14,642 (4.3)	102 (173)	—
30	30	480	208	39	49	60	84	110	288	135	83	125		NA	1804 (820)	16,587 (4.9)	204 (346)	—
45	45	480	208	58	73	90	126	175	288	202	125	200		NA	1880 (855)	20,217 (5.9)	306 (519)	—
60	60	480	208	78	98	125	168	225	288	269	167	225		NA	1956 (889)	23,964 (7.0	408 (692)	—
75	75	480	208	97	121	150	210	300	288	335	208	300		NA	2032 (924)	27,687 (8.1)	510 (865)	—
90	90	480	208	116	145	175	252	350	288	404	250	350		NA	2108 (958)	31,352 (9.2)	612 (1038)	—
See Notes for Tables (p. 2):				1	2,3,5,8,12	6	—	—	4	1,3,8,12	1,3,8,12	6	13	14	14	—	—	15

Table 6 Site planning data - 15-90kVA, 60Hz, 600VAC, dual input

UPS Rating		Voltage		AC Input			208VAC Bypass Input		Battery		AC Output		Mechanical Data					
				Current, A			Current				Current, A			Unit Weight, lb. (kg)				
kVA	kW	Input	Output	Nom.	Max	Rec. OPD	Nom	Byp. OPD	Nom VDC	Max. Discharge	Nom.	OPD	Dimensions WxDxH, in. (mm)	45kVA Frame	90kVA Frame	Heat Dis. BTU/hr (kWH)	Cooling Air CFM (m3/hr)	Input CB (customer-supplied)
15	15	600	208	16	20	25	42	60	288	67	42	60	31.8x39.5x78.7 (800x1000x2000)	NA	1743 (792)	12,350 (3.6)	102 (173)	—
30	30	600	208	31	39	50	84	110	288	135	83	125		NA	1819 (827)	16,344 (4.7)	204 (346)	—
45	45	600	208	47	59	70	126	175	288	202	125	200		NA	1895 (861)	19,974 (5.8)	306 (519)	—
60	60	600	208	62	78	100	168	225	288	269	167	225		NA	1971 (896)	23,721 (6.9)	408 (692)	—
75	75	600	208	78	98	125	210	300	288	335	208	300		NA	2047 (930)	27,444 (8.0)	510 (865)	—
90	90	600	208	93	116	150	252	350	288	404	250	350		NA	2123 (965)	31,109 (9.1)	612 (1038)	—
See Notes for Tables (p. 2):				1	2,3,5,8,12	6	—	—	4	1,3,8,12	1,3,8,12	6	13	14	14	—	—	15

Table 7 UPS currents and terminals—Input (for dual-input unit only, 208V operation)

Unit Rating	Nominal Input Current	Max. Input Current	OCP Device Rating	Bolt Size	75°C Wire Current, total	Wire	Maximum Recommended Lug (T&B)	
							Compression Lug Two Hole 3/8" Bolt	Mechanical Lug Two Hole 3/8" Bolt
15	45	56	70	M10 (3/8")	130	(1) #1	54857BE	32209
30	90	112	125	M10 (3/8")	150	(1) 1/0	54860BE	32209
45	134	167	200	M10 (3/8")	200	(1) 3/0	54864BE	32211
60	179	223	250	M10 (3/8")	300	(2) 1/0	54860BE	32209
75	224	279	350	M10 (3/8")	350	(2) 2/0	54862BE	32209
90	268	334	400	M10 (3/8")	460	(2) 4/0	54866BE	32211

Table 8 UPS currents and terminals—Bypass input (for dual-input units, 208V operation)

Unit Rating	Nominal Input Current	OCP Device Rating	Bolt Size	75°C Wire Current, total	Wire	Maximum Recommended Lug (T&B)	
						Compression Lug Two Hole 3/8" Bolt	Mechanical Lug Two Hole 3/8" Bolt
15	42	60	M10 (3/8")	130	(1) #1	54857BE	32209
30	84	110	M10 (3/8")	150	(1) 1/0	54860BE	32209
45	126	175	M10 (3/8")	175	(1) 2/0	54862BE	32209
60	168	225	M10 (3/8")	230	(1) 4/0	54866BE	32211
75	210	300	M10 (3/8")	300	(2) 1/0	54860BE	32209
90	252	350	M10 (3/8")	350	(2) 2/0	54862BE	32209

Table 9 UPS currents and terminals—Output 208V

Unit Rating	Nominal Input Current	OCP Device Rating	Bolt Size	75°C Wire Current, total	Wire	Maximum Recommended Lug (T&B)	
						Compression Lug Two Hole 3/8" Bolt	Mechanical Lug Two Hole 3/8" Bolt
15	42	60	M10 (3/8")	130	(1) #1	54857BE	32209
30	83	125	M10 (3/8")	150	(1) 1/0	54860BE	32209
45	125	200	M10 (3/8")	175	(1) 2/0	54862BE	32209
60	167	225	M10 (3/8")	230	(1) 4/0	54866BE	32211
75	208	300	M10 (3/8")	300	(2) 1/0	54860BE	32209
90	250	350	M10 (3/8")	350	(2) 2/0	54862BE	32209

Table 10 UPS currents and terminals—Battery (288V string)

Unit Rating	Battery Current	OCP Device Rating	Bolt Size	75°C Wire Current, total	Wire	Maximum Recommended Lug (T&B)	
						Compression Lug Two Hole 3/8" Bolt	Mechanical Lug Two Hole 3/8" Bolt
15	67	80	M10 (3/8")	130	(1) #1	54857BE	32209
30	135	150	M10 (3/8")	175	(1) 2/0	54862BE	32209
45	202	225	M10 (3/8")	230	(1) 4/0	54866BE	32211
60	269	300	M10 (3/8")	300	(2) 1/0	54860BE	32209
75	336	350	M10 (3/8")	400	(2) 3/0	54864BE	32211
90	404	450	M10 (3/8")	460	(2) 4/0	54866BE	32211

Table 11 General specifications

INPUT	
Voltage	208/120, 220/127VAC, 50/60Hz, 3-phase, 4-wire plus ground
Voltage Range Without Derating	+15%, -20%
Frequency Range	40-70Hz
Current Distortion	3% maximum reflected THD at full load
Current Walk-In	5-35 seconds to full load (adjustable)
Power Factor	0.99 full load, 0.98 half load
ENVIRONMENTAL	
Operating Temperature	UPS: 32° to 104°F (0-40°C); Battery: 68° to 86°F (20-30°C)
Non-Operating Temperature	-4° to 158°F (-20° to 70°C)
Relative Humidity	0-95% non-condensing
Operating Altitude	Up to 3,300 ft. (1,000m) without derating
Acoustical Noise	Less than 57 dBA typical (45kVA), 60 dBA typical (90kVA) 3.3 ft. (1m) from the unit

Table 12 Internal battery

Model	Battery Code	Battery Time (Minutes)			Added Battery Weight lb. (kg)
		15kVA	30kVA	45kVA	
HX100-FR	FX	30	12	6	1056 (480)
HX150-FR	HX	53	21	12	1248 (567)

OUTPUT	
Voltage	208/120, 220/127VAC, 50/60Hz, 3-phase, 3- or 4-wire plus ground
Voltage Adjustment Range	±5%
Voltage Regulation	±1% for balanced load
	±5% for 100% unbalanced load
Dynamic Regulation	±5% deviation for 100% load step
	±1% for loss or return of AC input
Transient Response Time	Recover to ±5% of output voltage within 1/2 cycle
THD	For linear loads, 1% THD; Less than 4% THD for 100% nonlinear loads without kVA/kW derating
Phasing Balance	120° ±1° for balanced load
	120° ±1.5° for 100% unbalanced load
Frequency Regulation	±0.1% (single Liebert FlexPower™ assembly)
	±0.25% (six Liebert FlexPower assemblies)
Load Power Factor Range	0.7 lagging to 0.9 leading without derating
Overload	100% load, continuous;
	110% load, 60 minutes; 125% load, 10 minutes
	150% load, 60 seconds, with true sinusoidal waveform
STANDARDS	
Listed to UL 1778 UPS standards, and CSA certified. Meets current requirements for safe high performance UPS operation.	