

## 10.0 TECHNICAL SPECIFICATIONS

### 10.1 Conformity and Standards

The UPS has been designed to conform to the following European and international standards:

**Table 32 Compliance with European, international standards**

Description	Normative reference
General and safety requirements for UPS used in operator access areas	EN 50091-1-1 / IEC 62040-1-1 / AS 62040-1-1
Electromagnetic compatibility (EMC) requirements for UPS	EN 50091-2 / IEC 62040-2 / AS 62040-2 (Class A)
Method of specifying the performance and test requirements of UPS	EN 50091-3 / IEC 62040-3 / AS 62040-3 (VFI SS 111)

The above mentioned product standards incorporate relevant compliance clauses with generic IEC and EN standards for safety (IEC/EN/AS60950), electromagnetic emission and immunity (IEC/EN/AS61000 series) and construction (IEC/EN/AS60146 series and 60529). For more details, see below:

Description	Normative reference
Safety for Information technology equipment	EN60950 / IEC 60950 / AS 60950
Degrees of protection provided by enclosures (IP code).	EN 60529/ IEC60529 / AS 60529
Semiconductor convertors. Part 1: General requirements and line commutated convertors. Part 1-1: Specifications of basic requirements	IEC 60146-1-1 / AS 60146-1-1
Electromagnetic compatibility (EMC): immunity test	IEC / AS 61000-4-2, -3-4, -5, -6
Limits for harmonic current emission	IEC / AS 61000-3-2, -3-4, -3-6

The product standards in **Table 32** incorporate relevant compliance clauses with generic IEC and EN standards for safety (IEC/EN/AS60950), electromagnetic emission and immunity (IEC/EN/AS61000 series) and construction (IEC/EN/AS60146 series and 60529).

**Table 33 Environmental characteristics**

Rated Power, kVA	Unit of Measurement	30	40	60	80	100	120	140	160	200
Acoustic noise level at 1 meter	dBA	55	55	59	59	62	62	65	65	66
Altitude of Operation	m (ft)	≤1000 (3280) above sea level derate power by 1% per 100m between 1000 and 2000 (3280-6562)								
Relative Humidity	—	0 to 95% non condensing								
Operating Temperature	°C (°F)	0 to 40 (32 to 104) Note: Battery life is halved for every 10°C increase above 20°C								
UPS Storage-Transport Temperature	°C (°F)	-20 to 70 (-4 to 158)								
Recommended Battery Storage Temperature	°C (°F)	-20 to 30 (-4 to 86) (20 for optimum battery storage)								

**Table 34 Efficiency, AC/AC**

Input and output voltage 400VAC, battery charged, full rated linear load										
Rated Power, kVA	Unit of Measurement	30	40	60	80	100	120	140	160	200
Normal Mode (dual conversion)	%	89	90	91	91	90.6	91.1	92.5	92.7	92.8
ECO Mode	%	94	94.8	94.3	95	95	95.6	95.5	95.7	95.7
Inverter Efficiency (DC/AC) (battery at nominal voltage 480VDC and full-rated linear load)										
Battery Mode	%	93	93	94	94	94	94	94	94	94
Heat Losses & Air Exchange—Ventilation										
Normal Mode	kW	3.0	3.6	4.7	6.3	7.9	9.5	10.8	11.8	14.5
ECO Mode	kW	1.5	1.6	2.0	2.6	3.5	4.3	7.0	7.6	9.9
No Load	kW	1.3	1.4	1.9	2.4	3.0	3.7	4.9	4.9	5.6
Forced air cooling (front intake, top exhaust)	L/sec	333	333	458	458	500	500	671	671	721
	M <sup>3</sup> /hr	1200		1650		1800		2415		2595

**Table 35 Mechanical characteristics**

Rated Power, kVA	Unit of Measurement	30	40	60	80	100	120	140	160	200
Dimensions, H x W x D	mm (in)	1600 x 600 x 825 (63 x 23.6 x 32.5)				1800 x 700 x 825 (70.8 x 27.5 x 32.5)		1800 x 1000 x 825 (70.8 x 39.4 x 32.5)		
Mass, without batteries	kg (lb)	312 (688)	341 (752)	401 (884)	445 (981)	720 (1587)	720 (1587)	960 (2116)	960 (2116)	1060 (2337)
Finish	Colour	Pantone 877 (Silver grey) eqvl Becker Silver epoxy polyester powder 041-37-2								
Protection Degree	IEC 60529	IP20 (finger-proof with front doors open or closed)								

Values listed are the mass of the units with options added (ground fault sensor, bypass share inductors and redundant fans).

**Table 36 Rectifier AC input (mains)**

Rated power, kVA	Unit of Measurement	30	40	60	80	100	120	140	160	200
Rated AC Input Voltage <sup>1</sup>	VAC	380/400/415 V (three-phase and sharing neutral with the bypass input)								
Input voltage tolerance <sup>2</sup>	VAC	305V to 477V 304V to 208V (output de-rated from 99% to 70%)								
Frequency <sup>1</sup>	Hz	50/60Hz (tolerance 40Hz to 72Hz)								
Power Factor										
full load	kW/kVA	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
half load		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Input power										
rated <sup>3</sup>	kVA	27.2	35.9	53.3	71.0	88.8	107	122	139	174
maximum <sup>4</sup>		32.9	43.0	64.6	85.2	107	128	159	182	228
Input current										
rated <sup>3</sup>	A	39	52	77	103	128	154	177	201	252
maximum <sup>4</sup>		48	62	93	123	154	185	231	264	330
Harmonic Current Distort (with linear or non-linear balanced load and at input THVD≤2%)	THID % FL	3	3	3	3	3	3	3.5	3	3
Duration of progressive power walk-in	sec	10 seconds to reach full rated current (selectable 5 through 30 seconds in 5 second intervals)								

1. Rectifier operates at any of the rated supply voltages and frequencies without further adjustment.
2. At 305V input mains, the UPS maintains the specified output voltage at rated load without discharging a previously charged battery.
3. EN 50091-3: at rated load and input voltage 400V, battery charged
4. EN 50091-3: at rated load and input voltage 400V, battery charging at maximum rated power.

**Table 37 Intermediate DC circuit, battery**

Rated Power, kVA	Unit of Measurement	30	40	60	80	100	120	140	160	200
Battery bus voltage	VDC	Nominal: 480V (VRLA Float charge is 540V) Range: 400V ~ 600V								
Quantity of lead-acid cells										
Nominal	—	240 = [40 x 6-cell (12V) blocks]								
Maximum	—	252 = [42 x 6-cell (12V) blocks]								
Minimum	—	228 = [38 x 6-cell (12V) blocks]								
Float Voltage (VRLA)	V/cell	2.25 V/cell (selectable from 2.2 –2.3V/cell) Constant current and constant voltage (IU) charge mode								
Temperature compensation	mV/°C/cell	- 3.0 (selectable 0 to – 5.0 around 25°C [77°F] or 20°C [68°F] or inhibit)								
Ripple Voltage	% V float	≤1								
Ripple Current <sup>1</sup>	% C <sub>10</sub>	≤5								
Boost Voltage (VRLA)	V/cell	2.35 V/cell (selectable from 2.30-2.40V/cell) Constant current and constant voltage (IU) charge mode								
Boost Control	—	- float-boost current trigger 0.050 C <sub>10</sub> (selectable 0.030-0.070) - boost-float current trigger 0.010 C <sub>10</sub> (selectable 0.005-0.025) with 24 hr safety time-out (selectable 8-30 hr) - boost mode inhibit also selectable								
End Of Discharge (VRLA)	V/cell	1.63 V/cell (selectable from 1.60~1.75 V/cell Auto Inverse EOD voltage x discharge current mode (The end of discharge voltage increases at low discharge currents).								
Battery Charge	V/cell	2.4 V/cell (selectable from 2.3-2.4V/cell) Constant current and constant voltage (IU) charge mode Programmable auto trigger or inhibit of boost mode								
Battery Charging Power <sup>2</sup>	kW	5.1	6.7	10	13	17	20	23.8	27.2	34
Max Current (Adjustable) <sup>3</sup>	A	13	17	25	33	43	50	60	68	85

1. For a battery capacity of 24Ah or that corresponding to a rated back-up time of 10 minutes, whichever is greatest.

2. At low input voltage the UPS recharge capability increases with load decrease (up to the maximum capacity indicated).

3. Maximum currents listed are for end of discharge voltage of 1.67 V/cell for 240 cells.

**Table 38 Inverter output to critical load**

Rated Power (load pf 0.8 lag)	kVA	30	40	60	80	100	120	140	160	200
(load pf unity)	kW	24	32	48	64	80	96	112	128	160
(load pf 0.9 lead)	kVA	24	32	48	64	80	96	112	128	160
Rated AC Voltage <sup>1</sup>	V (ac)	380/400/415 V (three-phase, four-wire with neutral referenced to the bypass neutral)								
Frequency <sup>2</sup>	Hz	50 / 60								
Overload	% rated	110% for 60 min 125% for 10 min 150% for 1 min 225% for 200 msec								
Fault Current	% rated	320% current limitation for 200 msec								
Non linear load capability <sup>4</sup>	% rated	100%								
Neutral current capability	% rated	170%						152%		135%
Steady state voltage stability <sup>5</sup>	%	± 1 (balanced load), ± 2 (100% unbalanced load),								
Transient voltage response <sup>6</sup>	%	± 5								
Total Harmonic Voltage Distortion (THDV) <sup>4</sup>	%	< 1 (linear load) <3.5 (non linear load, 380V) <4.0 (non linear load, 400V) < 4.5 (non linear load, 415V)								
Synchronisation - Window - Slew Rate (Max change rate of synch frequency)	Hz	Rated frequency ± 2 Hz (selectable ± 0.5 to ± 3Hz)								
	Hz/sec	1 Hz/sec selectable 0.1 to 3Hz/s (single UPS), 0.2Hz/sec (paralleled. UPS)								
Inverter Voltage Tolerance	%V (AC)	± 5								

1. Factory set to 400V – 380 or 415V selectable by commissioning engineer.

2. Factory set to 50Hz; 60 Hz selectable by commissioning engineer. Frequency converter operation also selectable.

3. EN 50091-3 (1.4.50).

4. Crest factor > 3:1 limited by IEC 62040-3 definition of non linear load.

5. EN 50091-3 (4.3.4).

6. EN 50091-3 (4.3.7) also for 0-100-0% load transient. Transient recovery time: return to within 5% of steady state output voltage within half a cycle.

Table 39 Bypass input

Rated Power, kVA	Unit of Measurement	30	40	60	80	100	120	140	160	200	
Rated AC Voltage <sup>1</sup>	V (ac)	380/400/415 V three-phase four-wire, sharing neutral with the rectifier input and providing neutral reference to the output									
Rated current											
380V	A	45	61	91	121	151	182	212	242	303	
400V		43	58	87	116	145	174	202	230	288	
415V		42	56	83	111	139	167	194	222	278	
Overload capacity	%	135% long term 170% 10 min 1000% 100 ms						125% long term 150% 10 min 1000% 100 ms			
Upstream protection, bypass line (by others)		Thermomagnetic circuit-breaker, rated up to 125% of nominal output current. IEC 60947-2 curve C.									
Current rating of neutral cable	A	1.7 In						1.52In		1.35In	
Frequency <sup>2</sup>	Hz	50 / 60									
Transfer time (between Bypass and Inverter)	ms	Synchronous transfer: ≤ 1ms Asynchronous transfer (default): 15 ms (50 Hz), 13.3 ms (60 Hz) or 40, 60, 80, 100 ms selectable									
Bypass voltage tolerance	% V (ac)	Upper limit: +10, +15 or +20, default +15 Lower limit –10, -20, -30 or -40, default: -20 (delay time to accept steady bypass voltage: 10 sec)									
Bypass frequency tolerance	%	± 2.5, ±5, ±10 or ±20 default ±10									
Synchronisation - Window	Hz	Rated frequency ±2 Hz (selectable ± 0.5 to ± 3Hz)									

1. Factory set to 400V – 380 or 415V selectable by commissioning engineer.

2. Factory set to 50Hz; 60 Hz selectable by commissioning engineer. Bypass condition ignored when UPS set as frequency converter.