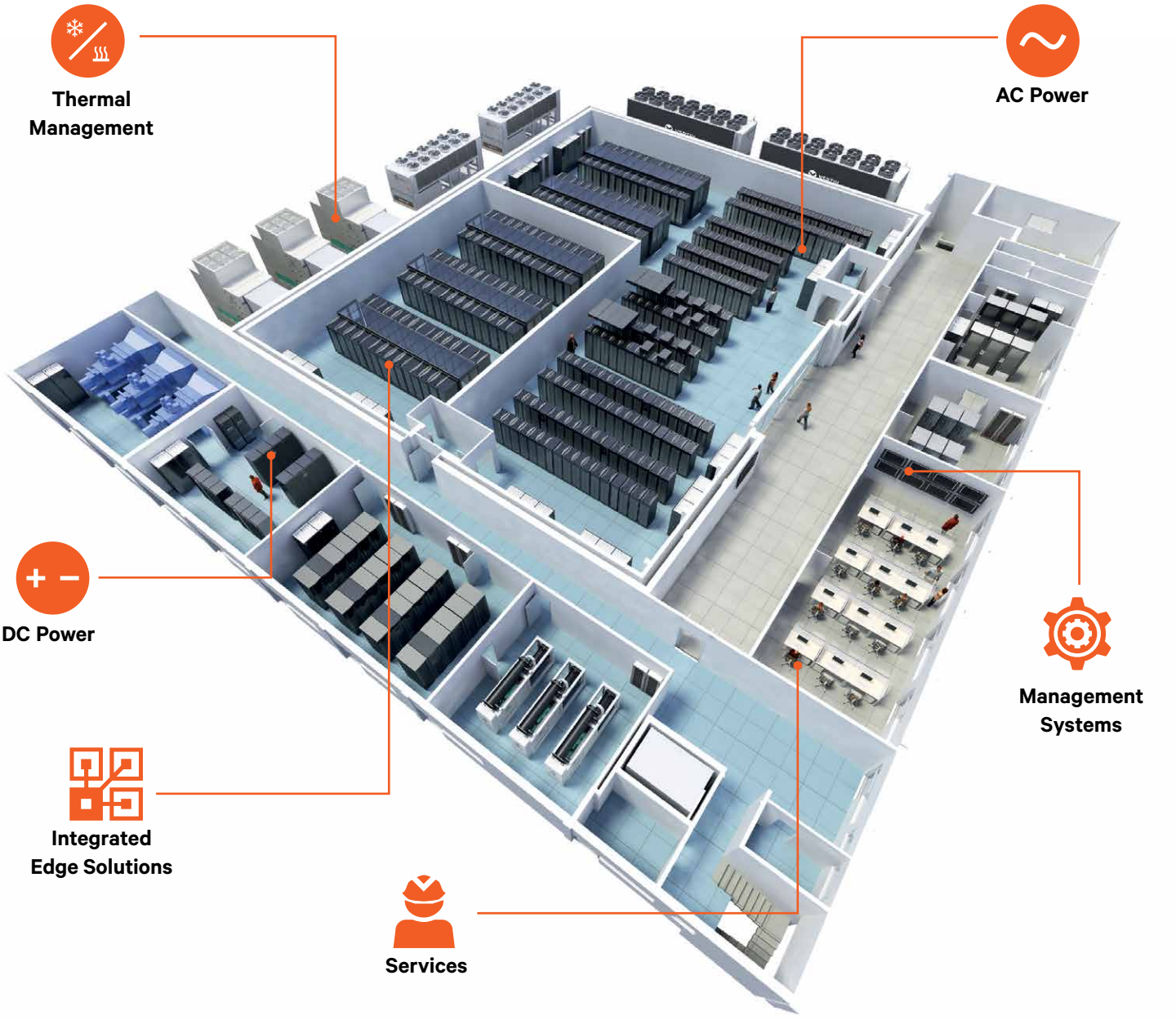
VERTIV.

Liebert®

AC & DC Power products to meet your specific Industrial needs

Vertiv solves the most important challenges facing today's data centers, communication networks and commercial & industrial facilities with a portfolio of power, cooling and IT infrastructure solutions, and services that extends from the cloud to the edge of the network.

Architects of Continuity™



What are our core differentiators?

VISIONARY EXPERTISE

IMMERSIVE COLLABORATION

RELENTLESS AGILITY

INTELLIGENT ECOSYSTEM

Contents

Feature-rich Industrial AC UPS system embedded with the latest technologies for optimal power protection and reliability

The Liebert® Hipulse D is an Industrial AC UPS system which is designed to meet a wide array of mission critical continuity needs in an industrial environment. It is embedded with the latest technologies available in the market today to provide your business maximum power protection even in the harshest conditions.

FEATURES

- Fully digital UPS solution for industrial applications
- Robust design ensure high reliability features
- User-friendly display
- Design and temperature features for industrial
- Zero Transfer time
- Galvanic isolation features
- State of Art Mechanical Assembly design for ease of Maintenance
- Parallel redundant configuration
- Fully customizable
- External communication capabilities
- Customized Designs to suit IP protection requirements

APPLICATION

- Manufacturing : Pharmaceutical, Textile, Retail
- Power Generation
- T&D
- Oil and Gas
- Transportation
- Cement plants
- Steel Plants
- Chemical & Fertilizer

A fully digital Industrial UPS system

- Easy System configuration through software for on-site modification and retrofitting needs
- State of the art SPWM Technology with digital control ensure low electrical noise for the loads/appliances
- Fast transient response
- Better voltage regulation
- Low total harmonic distortion(THD)
- Easy navigation
- Event log for analysis of fault occurence and easier maintenance
- Hipulse D-3X1- Input, Battery , Output, Bypass per Group 170, i.e. total 680 event logs; In Hipulse D-3X3
- 254 event logs
- Push button system control
- 2 lines of 20 characters display
- English & Chinese language display

Robust mechanical design for easy maintenance

- State of art front access for a more efficient maintenance
- If necessary, side and rear panels are removable Fan replacement from front or top
- Easy access to Thyristors, IGBTs, PCBs

Connectivity Options

- UPS MON-II (RS232 or ETHERNET based)
- SNMP (RJ45)
- MODBUS (RS 485)
- ETHERNET based remote monitoring (i-REMOTE)
- Profibus

International standards compliant

- IEC / EN 62040 – 1 : Safety
- IEC / EN 62040 – 2 : Electromagnetic compatibility
- IEC / EN 62040 – 3 : Performance & testing
- ISO 9001 : 2008 : Quality System

High reliability features

- 15 to 20 years product lifespan, supported by recommend preventive maintenance

Design & temperature

- Suitable for operation at higher ambient temperature
- Improved thermal design with ventilation ensures improve in MTBF of the components

Transfer time

- Safe transfer to bypass, ithout a break for the connected load
- 0 s when synchronized on reserve
- <10 ms transfer time in Async mode

Galvanic isolation features

- Any mains disturbance will not be transferred to the DC circuit or to the output
- Load remains safe all the time irrespective of switching/ transient in the Mains and sudden other output load changes in the O/P ACDB
- Double conversion topology provides clean and reliable power

Parallel redundant configuration

- Up to 3 units in parallel
- Immediate communication between the paralleled systems after
- connection
- No single point of failure
- Active load sharing

Customization Capability

- Customized UPS onfigurations offered at pre-sales stage
- Fully custom built options meet required output power, voltage levels as well as available input power and voltage quality levels
- Customer requirements like color, protection, PFC etc.
- Customized accessories like ACDB, SCVS, Cell Booster
- Option of input passive filter for PF & THDi improvement
- Battery charging requirements
- Extended temperature up to 500C
- Seismic qualification

MODEL	Standard Offerings	Optional
INPUT		
Nominal Voltage	415 V AC, 3 Phase, 3 wire (+10 %, -10 %)	220 V AC 3 Phase, 3 wire (+ 10 % , -15 %) (1)
Nominal Frequency	50 Hz (± 10 %)	60 Hz (± 10 %) (1)
Input Power factor	>=0.88 up to 7.5 kVA and >=0.92 for 10 kVA and above	≥ 0.94
Input Fault Level	10 KA/50 kA (for 300kVA & 500kVA)	50 kA (MCCB) Input Isolation Transformer
RECTIFIER		
Type	Full Wave, Advance PFC Rectifier	12 Pulse, above 20 kVA Rating
CHARGER		
Type	IGBT based Dual mode of charging Suitable to charge VRLA-SMF, Lead Acid, Ni-Cd battery	
Nominal Voltage Regulation	± 1 %	
Ripple (without Battery)	< 1 %	
Charging Method	Constant Voltage Constant Current (CVCC) Auto & Manual with 0 to 24 Hr programmable timer	
BATTERY		
Battery Voltage	240 VDC for 5 to 15 kVA (114 to 132 cells for Lead Acid & 181 to 210 cells for Ni-cd) 300 VDC for 20 kVA (144 to 162 cells for Lead Acid & 229 to 248 cells for Ni-cd) 360 VDC for 30-500 kVA (174 to 192 cells for Lead Acid & 277 to 305 cells for Ni-cd) Note : +2 Blocks of 12 V and -1 Block of 12 V possible	110 VDC (5-15 kVA UPS) (1) (54 to 67 cells for Lead Acid & 86 to 96 cells for Ni-cd) 220 VDC (20-80 kVA UPS) (1) (108 to 122 cells for Lead Acid & 172 to 191 cells forNi-cd)
Type	Ni-Cd / Tubular / VRLA	
Battery Charging Capacity(w/o Input Isolation Tra former)	5 to 10 kVA — Up to 15 A 15 to 20 kVA — Up to 20A 30 to 40 kVA — Up to 30 A 50 & 80 kVA — Up to 40 A 60 kVA — Up to 55 A 100 to 500kVA — Up to 150A	5 to 20 kVA Upto 40 A at 110 VDC 5 to 20 kVA Upto 20 A at 220 VDC 25 to 80 kVA Upto 75 A at 220 VDC 100 to 160 kVA Consult Engg. As per Customer request (2)
Protection	Battery Breaker , Reverse Battery Indication	Reverse Polarity, Battery Earth Fault
OUTPUT		
Nominal Voltage	220V / 230V / 240V AC 1P & 400 / 415V AC 3P	110 / 115 / 120 V AC (1PHASE) (2)
Load PF Support Capacity	0.8 to Unity (within its kVA / kW rating)	
Voltage Regulation	± 1 % for 230 VAC (1Phase) ± 1 % for 415 VAC Balance Load (3Phase) ± 2 % for 415VAC Unbalance Load (3Phase)	± 2 % for 110 VAC (1PHASE) (2)
Frequency	50 Hz (± 0.1 Hz) in Free Running Mode ± 5 % (± 1 to 5 % adjustable) in Synchronous mode	60 Hz (± 0.1 Hz) (2)
Waveform	True Sine Wave	
Total Harmonic Distortion	< 2 % Max. for 100 % Linear Load < 5 % Max. for 100 % Non-Linear Load (IEC 62040–3)	
Overload Capacity	110 % for 60 min, 125 % for 10 min. , 150 % for 1 min	
Duty	Continuous	
Inverter Philosophy	IGBT based PWM with INSTANTANEOUS sine wave control	
Dynamic Response	For 0 to 100 % step load change, the output shall remain within ± 5 % and recover to 98 % within 1 cycle (IEC 62040–3, Class 1)	
Crest Factor	3 : 1	

MODEL	Standard Offerings	Optional
STATIC SWITCH		
Frequency Synchronisation	± 2.5 Hz	
Slew Rate	0.2 Hz/Sec	
Transfer	In Sync mode – No break in transfer	
(Inverter to Bypass)	In ASync mode – < 10 ms	
Re-transfer (Bypass to	In Sync mode – No break in re-transfer	
Inverter)	In ASync mode – Not applicable	
Overload Capacity	1000 % for 100 ms (3)	
Manual Bypass Operation	Make Before Break	
System Configuration	Standalone	Parallel Redundant with separate batt bank
PHYSICAL		
Enclosure Protection	IP 41	IP 42
Colour	RAL 7035 Light Grey	RAL 7032 as per customer requirement
Paint Thickness & Type	90 micron (± 10 micron) Epoxy Powder Coated	
Cooling	Forced Air	
Cable Entry	Bottom	Top (4)
Wound Components	Class of Insulation – Class H (Transformer / Inductor)	
GENERAL SPECIFICATION		
Operating Temperature	0 to 40 0C	Up to 50 0C (2)
Relative Humidity	0 to 95 % (Non-condensing)	
Storage Temperature	0 to 55 0C	
Utility Socket	230 V / 5 A	
Illumination Lamp	11 W CFL	Space Heaters
Earth Busbar (Ref.IS 3043)	5-20 kVA: 3 x 25 mm CU 30-40 kVA: 3 x 25 mm CU (Earth bus bar running along the panel) 50-500 kVA: 6 x 50 mm cu (Earth bus bar running along the panel)	
PFCs	One relay contact for each (Rating 250 VAC , 1 A)	PFC with 250 V , 2 A / 6 A rating
Remote Panel		Transducer 4 to 20 mA With LCD (Ethernet Connectivity)
UPS Monitoring Software		UPSMON II
Connectivity	RS 232 / RS 485	SNMP, MODBUS Ethernet / RS 485

Notes:
1. Only upto 80kVA
2. Only upto 160kVA
3. Cannot be demonstrated
4. Additional termination panel added.

FP RANGE

Configured to order with industrial options Pre-defined blocks for shorter lead time

Liebert® FP60Z Uninterruptible Power Supply (UPS) is a true industrial UPS system offering a full-IGBT innovative design and embedding all the latest technologies Configured to order with industrial options in power protection.

BENEFITS

Best-in-class performance to optimize expenses:

- Reduced CAPEX - Upstream transformer, switchgear and cables are downsized thanks to high input power factor, low THDi rejection and low in rush current
- Controlled OPEX - Lower power consumption thanks to high efficiency
- Proven digital Vector Control technology to control the output waveform in real time, even on non linear loads

Industrial-grade maintainability:

- Innovative design without heavy power modules and allowing an easy front access to all components
- Removable ID Cards which safeguard the UPS parameters and facilitate control board replacement

Smart access to UPS data:

- Large color LCD touch-pad for user interface
- Configurable active mimic diagram
- Embedded event logger (up to 2000 events) and capability to export recorded events via USB memory stick

Industrial flexibility:

- Fit-for-purpose battery selection
- Galvanic isolation: either output or input and output transformers
- Wide range of electrical and mechanical options

FEATURES

Bidirectional rectifier to perform battery deep discharging tests into the mains

Ingress Protection IP42 as standard for harsh environmental conditions

Robust design to continuously operate at full load at 40°C

Continuous operation on input phase failure as optional feature

Range Overview

Liebert® FP60Z is available in standard range from 5 to 160 kVA in single-phase or three-phase output configurations and can be adapted to reach up to 250 kVA output power. It offers a wide choice of DC battery voltages (110 V, 220 V or 400 V) and of output voltages (from 1 X 110 V to 3 X 415 V).

The UPS uses patented digital Vector Control technology which increases the UPS performances, enables active conditioning of the load and allows Liebert® FP60Z features a wide input voltage tolerance, which makes the system compatible with the harshest industrial power grids.

To further improve load availability and process reliability, Liebert® FP60Z is able to operate in dual distributed parallel configuration, with one or two reserve supplies, with single or dual batteries, and can include an AC bus-tie.

Applications

- Petrochemical and Chemical
- Minings/Metals
- Power generation plants
- Oil & Gas
- Water and Wastewater
- Transportation (rail, metro, tramway)
- Continuous manufacturing processes

Example of Liebert® FP60Z - 800 mm width

Technical Specifications

OUTPUT POWER AT COS PHI 0.8 (kVA) VS BATTERY VOLTAGE (Vdc)											
	1-ph and 3-ph input			3-ph input only							
110 Vdc	5	10	20	-	-	-	-	-	-	-	-
220 Vdc	-	10	20	30	40	60	-	-	-	-	-
400 Vdc	-	-	-	-	40	60	80	100	120	160	250

INPUT	
Input Voltage	1-ph x 230 Vac (220, 240) 3-ph+N x 400 Vac (380, 415) +10 % (other voltages and tolerances on request)
Inrush Current	≤ 1 in (without input transformer) ≤ 8 in (with input transformer)
Power Factor	Up to 0.98
Frequency Range	50 Hz (60 Hz factory setting) ± 5 %
Embedded input features	AC input isolator switch Surge protection with MOV lightning arrestors

INTERMEDIATE DC CIRCUIT	
Nominal DC voltage	110 / 220 / 400 Vdc
Voltage stability in steady state	≤ 1% in float mode (input within tolerance)
Voltage ripple	≤ 1 % RMS (with and without battery connected)
Current limitation	I nominal
Charging characteristic	IU according to DIN 41773

OUTPUT	
AC voltage	1-ph: 230 Vac (208, 220 , 240) ; 110 Vac (115, 120, 127) 3-ph: 400 Vac (380, 415) ; 208 Vac (190, 200, 220)
Frequency stability	with internal oscillator ± 0.1% with reserve synchronism ± 1 % (1 to 4 % adjustable)
Voltage stability (0-100% load variation)	Static ± 1 % Dynamic VFI SS 111 as per IEC62040-3, class 1
Overload inverter (in % of nominal power)	150 %/ 1 min - 125 %/100ms - 150 %/5 s
Short-circuit clearance (in % of nominal current)	1-ph and 3-ph: 250 %/100 ms - 150 %/5s
Voltage distortion	with 100 % linear load < 2% with 100% non linear load < 5% as per IEC62040-3
Allowable power factor	0.5 lagging to 0.5 leading
Allowable crest factor	3/1
Embedded output features	Output switch Output isolation transformer class H

RESERVE LINE	
Embedded reserve line features	• Integrated manual bypass switch • Inbuilt input reserve line switch

BATTERY			
Type	Type Lead Acid or Nickel Cadmium, vented or recombination		
Recommended number of cells:	**110 Vdc**	**220 Vdc**	**400 Vdc**
• Lead Acid	54 to 72	108 to 144	192 to 228
• Nickel Cadmium	88 to 98	176 to 200	320 to 323
Battery current limitation	0.1 C (Lead Acid) / 0.2 C (Nickel Cadmium)		
Embedded battery features	• Inbuilt battery circuit breaker with aux. contact • Battery reverse polarity protection and indication • Battery Low Voltage Disconnection (LVD) • Battery test, automatic or manual mode • Battery room temperature sensor for battery charge compensation		

GENERAL DATA	
Efficiency	Up to 92% (according to rating and config.)
Operating temperature	From 0 °C to 50 °C
Storage temperature	From 20 °C to + 70 °C (battery excluded)
Relative humidity	< 95 % non condensing at 20 °C
Operating altitude	Up to 3000 m
Cooling	Fan-assisted
Ingress Protection	External IP42
Noise (at 1 m in front of the unit)	62 to 72 dB (according to rating)
Input/output isolation	2500 Vac / 1 minute
Frame color	RAL 7035
Feet	100 mm height with feet cover
Gland plate	Aluminum non-magnetic, 3 mm thickness
Dimensions	From 1 X 800 mm to 2 X 1200 mm width
Embedded system features	• Internal cabinet lighting • Auxiliary power socket • Lifting Eyes • Display language: English, French, Spanish, Russian, Turkish (factory setting)

OPTIONS	
Rectifier	• Input isolation transformer • Special 1-ph or 3-ph input voltage (up to 3 X 690 Vac) • Input voltage tolerance fro, -20% to + 15% • Input circuit breaker with aux. contact and breaking capacity up to 70kva • Automatic reverse phase sequence correction • Automatic input phase failure adaptation
Battery	• Battery protection box (circuit breaker) • Battery black start, automatic or manual mode • DC earth fault detection
Output	• Circuit breaker with aux. contact • Emergency Power Off
Reserve	• Circuit breaker with aux contact • Reserve isolation transformer (H class) • Reserve voltage stabilizer (servo-controlled) • Stabilizer output isolator
System	• Parallel configuration (distributed parallel) • Redundant monitored fans • G3 conformal coating on electronic cards against dust and humidity • Space heater with thermostat or hygrostat • Halogen free cabling
Mechanical	• Top cable entry • Special frame color (RAL paint standards) • Special feet height 200 mm or base frame • Antivibration pads
Communication	• Additional volt-free contacts (up to 20 relays) • Modbus RTU (RS232 or RS485) • Modbus to TCP_IP / Profibus / SNMP • PPVIS monitoring software

Compliance

STANDARDS	
IEC/EN 62040-1: 2008	Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS
IEC/EN 62040-2: 2006	Part 2: Electromagnetic compatibility (EMC) requirements
IEC/EN 62040-3: 2011	Part 3: Method of specifying the performance and test requirements
IEC/EN 60950-1: 2013 AMD2: 2014	Information technology equipment - Safety - Part 1: General requirements
Other	IEC 60529: 2013 / IEC61439 / IEC 60076: 2015/ IEC 60332-1-2: 2015/

CONFORMITY	
Low Voltage Directive (LVD)	2006/95/EC (before April 2016) 2014/35/EU (after April 2016)
EMC Directive	2004/108/EC (before April 2016) 2014/30/EU (after April 2016)
CE Mark	

Applications

Industrial Process Automation in areas like

- Petrochemicals & Refineries
- Oil & Gas
- Power Generation & Transmission
- Chemical And Pharmaceutical Industries
- Primary Metal And Steel Industries
- Pulp & Paper Industry
- Other Process Industries Like Textile, Mining, Cement
- Bio-Chemical Industries
- Fertilizer Industry

Transport Automation

- Airport Automation
- Railways Automation
- Road Transport Automation

Other Applications

- Access Control
- Security System
- Other Critical Application

UPS for the digital world, your power quality partner

From reliability to availability, from scalability to redundancy, from user-friendliness to maintainability, from parallelibility to connectivity, from investment protection to lower cost of ownership, whichever value you need, Hipulse AC address them efficiently and effectively. Hipulse AC is carefully designed to maximize the “availability” of your critical loads to ensure that business is protected to the extent possible against power failure and / or power quality problems.

This is the prime objective for which the Hipulse AC is built. Beside this, Hipulse AC is designed to address many other “customer values”. More than ever before, this New Millennium would require your critical applications to these applications to be UP all the time. Any downtime of these applications will directly impact your business goals of revenue growth and your customer satisfaction.

Hipulse AC out performs conventional UPS systems in Three Clear Ways

1. Proven Track Record
2. Uptime Availability
3. State-of-art Technology

Hipulse AC has been designed to suit the Indian conditions after doing a "Power Mapping" Survey across India. It is timeproven system working across India for Various Critical applications. We do not experiment at your cost. Hipulse UPS System is aesthetically designed to match the décor of Industrial Control, Data Processing, Medical Diagnostics Equipment, Laboratory rooms with Elegantly powder-coated cabinet.

Salient Features

- Rated at 0.8 output power factor
- On-Line double conversion with IGBT based PWM Inverter
- Wide input voltage tolerance (+/-15%)
- Wide input frequency tolerance (+/-6%)
- Automatic battery testing
- High overload capability of static bypass (14 times for 10 milliseconds and 10 times for 100 milliseconds)
- Ingress protection IP 31/ IP32/ IP 41 /IP 42
- Capability to handle:
  - High crest factor loads at 100% non-linear loads
- Built-in maintenance bypass (Single and 1+N Models)
- Front access for spares replacement and preventive Maintenance
- Provision to use any type of battery: Wet cells (Tubular Plante), Valve Regulated Lead Acid (VRLA) / Maintenance Free and Nickel Cadmium.
- Adjustable Frequency Synchronization with Static Bypass
- Provision of automatic battery circuit breaker instead of using conventional isolator in the DC path
- Advance Battery Management
- Selectable Timer for boost charging
- Overload capability of the UPS:
  - 110% full-load for 60 minutes
  - 125% full-load for 10 minutes
  - 135%-150% full-load for 60 Sec
- Field Protocols ModBus
- Compact footprint
- Fan Redundancy
- Parallelbility: Up to 6 module can be parallel for capacity enhancement / redundancy.

Meeting Protection Needs

- Temperature-compensated battery charging (Optional)
- Common Battery Sharing / Battery Circuit Breaker
- Short-circuit proof inverter
- Input Harmonic Filter (Optional)
- Protection against deep discharge of battery
- Auto online battery testing
- Battery Earth Fault Kit
- Back-feed Protection

Selectable Options

- Field settability of end-cell voltage of the battery
- Choice between Various Harmonic Filters
- 6 / 12 Pulse Rectifier
- Potential Free Contacts
- Bypass Options:
  - Servo Controlled Voltage Stabilizer (SCVS)
  - Static Voltage Regulator (SVR)
- Load Bus Synchronization
- Input Isolation Transformer
  - Compatible with Liebert® AF, the Active Harmonic Filter
  - Available for rectifier and / or bypass supply
- SPD (Surge Protection Device)
  - This offers protection from damaging transients and electrical line noises
- V-Connected Transformers.
- Fault Diagnostic Unit (PPVIS)
- AC Distribution Board
- Liebert® Static Transfer Switch
  - This allows critical load to be transferred between two independent, synchronised AC power sources without any risk of load disturbances
  - This allows automatic transfer of load between the two sources

Advanced Monitoring and Communications Capabilities Keep you in Control

Power Communication Options

When choosing the best system to protect your mission critical applications, an important consideration would be the software and communication options. As part of our commitment to provide the best solution for you, we offer a wide range of sophisticated software and communication options for Hipulse.

Communication Options

- **Fault Diagnostics Unit (PPVIS)** - to meet the needs of Continuous Supervision of UPS Operation, Data Logging on a work station.
- **MODBUS over RTU**
- **Programmable Potential Free Relays**
- **Liebert® Power Monitoring Capabilities:**

  - Fault Diagnostics Unit. (PPVIS)

HIPULSE CONTROLLER (M822E) DETAILS

- **Touch Screen LCD:** Colored Graphical Touchscreen display with Event log, Status, Measures, Warnings, Alarms & Settings. It stored up to 2000 events
- **Controls:** Touchscreen provides the rectifier & inverter ON/OFF buttons. In addition, Input, output & battery parameters are provided as well.
- Display: 9 x 16 cm2 LCD Display shows UPS single line diagram, operating parameters and all alarm conditions.Also gives the flexibility of User Configurable Mimic.
- USB Port: It enables Maintenance Personnel to export event logs via USB for further analysis.

*Condition Apply

Hipulse 1 ph (110 Vac) UPS System

Nominal Rating [kVA] (0.8)	25	40	50	60	70	80	90	105	130	150	160	200	250
kW at 0.8 P.F to unity P.F.	20	32	40	48	56	64	72	84	104	120	128	160	200
O/P Voltage	110 Vac (+/-5% Window settable)												
Rectifier Type	6p / 12p												
Physical Characteristics													
Depth [mm]	900	900	900	900	900	900	900	900	1025	1025	1025	1100	*
Width [mm]	900	900	1250	1250	1250	1250	1640	1640	1640	1640	1640	2830	*
Height [mm]	2100	2100	2100	2100	2100	2100	2100	2100	2300	2300	2300	2300	*
Weight [kg]	525	650	700	750	1150	1250	1650	1750	1850	2450	2550	3000	*
Construction													
Degree of Protection for Enclosure	IP 31 Standard (Optional : IP 32 / IP 41 / IP 42)												
Ventilation	Air Forced Cooling with Integral Fans												
Cable Entry	Bottom												
Cabinet Finish	RAL 7035 Light Grey (Other color shades available on demand)												
Input													
Voltage	380 / 400 / 415 / (+15% / -15%) 3 ph - 3 wire												
Frequency	50 or 60 Hz +/-5%												
THDi	Up To 10% with Input Filter (Optional)												
Power Factor	0.8-0.95 @ with Input Filter (Optional)												
Bypass													
Voltage	110 Vac												
Input Voltage Variation	+/-10%												
Frequency	50Hz												
DC Intermediate Circuit													
DC Ripple	< = 2% without battery / 1% with battery												
DC Nominal Voltage	384 V / 396 V / 408 V (For 380/400/415 Vac input)												
Battery Availability	Ni-Cd / Wet-Acid / VRLA 2V / SMF 12 V												
Output													
Voltage	110Vac- 1 ph												
Voltage Stability Steady State	+/- 1%												
100% Load Step	+/- 5%												
Recovery Time (to within 1% nominal)	<20ms												
Voltage Distortion	<=2%												
Voltage Distortion Non-Linear Load (3:1 Crest Factor)	<=5%												
Frequency	50 or 60 Hz												
Frequency Stability Synchronized with the Bypass Supply	+/- 1Hz												
Auto-Synchronised	+/- 0.1%												
Overload Capacity from Inverter at Nominal Voltage	110% for 60 mins., 125% for 10 mins., 135-150% for 1 min.												
Short circuit current from inverter	1.5 X In for 5 Sec (In accordance with EN50091-1-1)												
Environment													
Operating Temperature	0 to 40°C**												
Storage Temperature	-25°C to 70°C												
Relative Humidity	90% non-condensing type at 31°C												
Maximum Operating Altitude without Derating	1000 meters from MSL												
Acoustic Noise at 1 Meter from Panel Front	57 to 75 dBA (Depending on the kVA rating)												

** Dimensions will be available on Demand*
*** Standard Ratings also available for Ambient Temperature up to 50°C*
 # All specification are subject to change without notification in view of continuous improvement in product specification, design and engineering.
@ Nominal Operating Condition

Hipulse 1 ph (230 Vac) UPS System													
Nominal Rating [kVA] (0.8)	25	40	50	60	70	80	90	105	130	150	160	200	250
kW at 0.8 P.F to unity P.F.	20	32	40	48	56	64	72	84	104	120	128	160	200
O/P Voltage	230 Vac (+/-5% Window settable)												
Rectifier Type	6p / 12p												
Physical Characteristics													
Depth [mm]	900	900	900	900	900	900	900	900	1025	1025	1025	1100	*
Width [mm]	900	900	900	900	1250	1250	1250	1250	1640	1640	1640	2830	*
Height [mm]	2100	2100	2100	2100	2100	2100	2100	2100	2300	2300	2300	2300	*
Weight [kg]	525	650	700	750	1150	1250	1650	1750	1850	1800	2550	3000	*
Construction													
Degree of Protection for Enclosure	IP 31 Standard (Optional : IP 32 / IP 41 / IP 42)												
Ventilation	Air Forced Cooling with Integral Fans												
Cable Entry	Bottom												
Cabinet Finish	RAL 7035 Light Grey (Other color shades available on demand)												
Input													
Voltage	380 / 400 / 415 / (+15% / -15%) 3 ph - 3 wire												
Frequency	50 or 60 Hz +/-5%												
THDi	Up to 10% with Input Filter (Optional)												
Power Factor	0.8-0.95 @ with Input Filter (Optional)												
Bypass													
Voltage	230 Vac												
Input Voltage Variation	+/-10%												
Frequency	50Hz												
DC Intermediate Circuit													
DC Ripple	< = 2% without battery / 1% with battery												
DC Nominal Voltage	384 V / 396 V / 408 V (For 380/400/415 Vac input)												
Battery Availability	Ni-Cd / Wet-Acid / VRLA 2V / SMF 12 V												
Output													
Voltage	230 Vac- 1 ph												
Voltage Stability Steady State	+/- 2 %												
100% Load Step	+/- 5%												
Recovery Time (to within 1% nominal)	<20ms												
Voltage Distortion	<=2%												
Voltage Distortion Non-Linear Load (3:1 Crest Factor)	<=5%												
Frequency	50 or 60 Hz												
Frequency Stability Synchronized with the Bypass Supply	+/- 1Hz												
Auto-Synchronised	+/- 0.1%												
Overload Capacity from Inverter at Nominal Voltage	110% for 60 mins., 125% for 10 mins., 135-150% for 1 min.												
Short circuit current from inverter	1.5 X In for 5 Sec (In accordance with EN50091-1-1)												
Environment													
Operating Temperature	0 to 40°C**												
Storage Temperature	-25°C to 70°C												
Relative Humidity	90% non-condensing type at 31°C												
Maximum Operating Altitude without Derating	1000 meters from MSL												
Acoustic Noise at 1 Meter from Panel Front	57 to 75 dBA (Depending on the kVA rating)												

** Dimensions will be available on Demand*
*** Standard Ratings also available for Ambient Temperature up to 50 °C*
 # All specification are subject to change without notification in view of continuous improvement in product specification, design and engineering.
@ Nominal Operating Condition

Hipulse 3 ph (415 Vac) UPS System

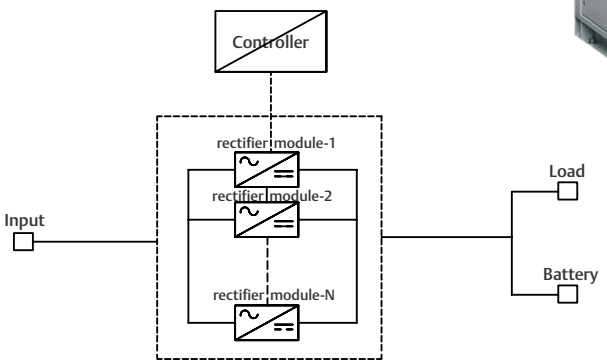
Nominal Rating [kVA] (0.8)	80	90	105	130	150	160	200	250	300	400	500	600	800
kW at 0.8 P.F to unity P.F.	64	72	84	104	120	128	160	200	240	320	400	480	640
O/P Voltage	380/400/415* (400V: Nominal) 3-phase +N, 4-wire												
Rectifier Type	6P			6P/12P								12P	
Physical Characteristics													
Depth (mm)	855										1000	1060	1000
Width (mm)	900			1250(6P) / 1890(12P)				1400(6P)/ 2040(12P)	1640(6P)/ 2280(12P)	2460	2640	3200	4410
Height (mm)	1900												
Construction													
Degree of Protection for Enclosure	IP 20 Standard (Optional: IP 31 / IP 42)												
Ventilation	Air Forced Cooling with Integral Fans												
Cable Entry	Bottom												
Cabinet Finish	RAL 7035 (Other color shades available on demand)												
Input													
Voltage	380/400/415* (400V: Nominal) 3-phase +N, 4-wire												
Frequency	50 or 60 Hz (±5%)												
THDi	Upto 10% with Input Filter (Optional)												
Power Factor	0.88-0.9 @ with input Filter (Optional)												
Bypass													
Voltage	380/400/415* (400V: Nominal) 3-phase +N, 4-wire												
Input Voltage Variation	± 10%												
Frequency	50 Hz												
DC Intermediate Circuit													
DC Ripple	≤2% without battery / 1% with battery												
DC Nominal Voltage	384V/396V/408V (For 380/400/415Vac input)												
Battery Availability	Ni-Cd/Wet Acid/VRLA 2V/SMF 12V												
Output													
Voltage	380/400/415* (400V: Nominal) 3-phase +N, 4-wire												
Voltage Stability Steady State	±1%												
100% Load Step	±5%												
Recovery Time (to within 1% nominal)	20ms												
Voltage Distortion Linear Load	≤2%												
Voltage Distortion Non-Linear Load (3:1 Crest Factor)	≤5%							≤3.5%					
Frequency	50 or 60 Hz												
Frequency Stability Synchronized with the Bypass Supply	±3 Hz												
Auto-Synchronized	±0.1%												
Overload Capacity from Inverter at Nominal Voltage	110% for 60 mins, 125% for 10 mins, 150% for 1 min												
Short circuit current from Inverter	1.5 X In for 5 Sec (in accordance with EN 50091 -1 -1)												
Environment													
Operating Temperature	0 to 40°C												
Storage Temperature	-25°C to 70°C												
Relative Humidity	90% non-condensing type at 31°C												
Maximum Operating Altitude without Derating	1000 m from MSL												
Acoustic Noise at 1 Meter from Panel Front	57 to 75 dBA (Depending on the kVA rating)												

@ Nominal Operating Conditions

UtilitySure is a reliable industrial modular rectifier battery charger with stateof-the- art technology.

UtilitySure is designed to meet the most demanding specifications of industrial requirements. UtilitySure product includes a wide choice of ratings and operator friendly features.

Available in 24, 48, 110 & 220 nominal voltages.



BLOCK DIAGRAM OF A MODULAR DC UPS (FCBC)

Benefits

- **Highest availability of power:**

- Hot-swappable modules to reduce the MTTR (Mean Time to Repair).
- MTBF (Mean time between failures) > 2,50,000 hrs.
- Various redundancy levels - N+1 (or) N+2 (or) N+N to improve load continuity.

- **Monitoring:**

- State-of-the-art Individual DC feeder earth leakage monitoring.
- Battery Monitoring System (BMS).
- Each Feeder status monitoring (On/off/trip).

- **High electrical performances:**

- Wide input voltage tolerance to comply with the worst utility conditions.
- Near Unity input power factor, low THDi rejection and low in rush current to save installation and operation costs.
- High eiciency to lower power consumption.

- **Industrial flexibility:**

- Suitable for all battery types (Lead Acid or Nickel-Cadmium or Plante).
- Scalability to meet the evolving load changes.

Key Features

- Large and colour LCD (touch-pad user interface - optional with EMU10 controller)
- USB port to import / export system configuration (optional with EMU10 controller)
- Low voltage ripple to optimize battery life
- In-built galvanic isolation (inside rectifier modules)
- Ingress protection up to IP 54
- Suits all weather conditions: works from - 20° C to 70° C

Applications

UtilitySure suits all DC UPS applications where modular design concept is key for maintenance with highest uptime. It is best suitable for all critical applications such as:

- Power generation
- Oil & gas
- Rail transportation infrastructures
- Power transmission and distribution substations
- Other industries

DETAILS OF RECTIFIER MODULES :

We have the following ratings of rectifier modules:

24V	48V	110V	220V
75A, 1Ph (ER2475/S) /	30A, 1Ph (ER4830/S)	10A, 1Ph (ER11010/S)	5A, 1Ph (ER22005/S)
75A, 1Ph (R24-2200)	50A, 1Ph (ER4850/S2)	20A, 3Ph (ER11020/T)	10A, 3Ph (ER22010/T)
	-	40A, 3Ph (ER11040/T5)	20A, 3Ph (ER22020/T)

The details of each rectifier module are as follows:

	1-Phase Modules				3-Phase Modules			
Parameter	ER22005/S	ER11010/S	ER4850/S2	ER2475/S	ER22020/T	ER22010/T	ER11040/T5	ER11020/T
			R24-2200					
AC Input Voltage (V)	85-286 (Single Phase)		85-290 (Single Phase)		260-530V (3 Phase, 3 Wire)	323-475V (3 Phase, 3 Wire)	260-530V (3 Phase, 3 Wire)	323-475V (3 Phase, 3 Wire)
AC input frequency	45 - 65				45 - 65			
AC input current (A)	<4	<4	<10	<10	<15	<10	<15	<10
Efficiency	≥91%	≥91%	≥92.4%	≥90%	≥89.5%	≥92%	≥91.5%	≥92%
Power Factor	≥0.99	≥0.99	≥0.99	≥ 0.99	≥0.99	≥0.92	≥0.99	≥0.92
THD	≤5%	≤5%	≤5%	≤5%	≤5%	≤30%	≤5%	≤30%
DC Output Voltage Range(V)	176 - 286	88- 143	42 - 68	21 - 39	176 - 320	176 - 320	88-160	88-160
Rated Current (A)	5	10	50	75	20	10	40	20
Output Power (W)	1430	1430	2900	2175	5720	2860	5720	2860
Ripple Factor	<=0.1% RMS	<=0.1% RMS	0.1% RM	S 0.5% RM	S 0.1% RM	S 0.1% RM	S 0.1% RM	S 0.1% RMS
Current Stabilizing Accuracy	≤±1.0 %	≤±1.0 %	≤±1.0 %	≤±1.0 %	≤±0.5 %	≤±0.5 %	≤±0.5%	≤±0.5%
Voltage Stabilizing Accuracy	≤±0.5 %	≤±0.5 %	≤±0.5 %	≤±0.7 %	≤±0.5 %	≤±0.5 %	≤±0.5 %	≤±0.5 %
CE & ROHS	CE CERTIFIED & ROHS COMPLIANT (R5)							
Noise (dB)	≤55	≤55	≤55	≤55	≤50	≤52	≤55	≤52
Dimension (mm)	145H	45H	143H	132H	241.5	176H	241.5H	176H
	72W	72W	85W	85W	88W	88W	88W	88W
	280D	280D	286D	286D	388 D	315 D	388 D	315D
Weight (kg)	<3	<3	<3.5	<3.5	<8	<6	< 8	<6
Operating Temperature	10 °C ~ 40 °C	10 °C ~ 40 °C	20 °C ~ 45 °C	10 °C ~ 45 °C	10 °C ~ 45 °C	10 °C ~ 45 °C	10 °C ~ 45 °C	10 °C ~ 45 °C

Standard Specifications:

Following are the best specifications we can offer with 24V/48V/110V/220V DC UPS Systems :

AC INPUT	24/148V		110/1220V	
Nominal Voltage	**1 Phase :** 200 VAC to 250V AC(Rated),Maximum: 290V AC ; Minimum: 85V AC (85V AC to 180V AC output power limiting)		**1 Phase :** 200 VAC to 250V AC, (Rated) Maximum: 286V AC ; Minimum: 85V AC (85V AC to 180V AC output power limiting)	
	3 Phase : By distributing the rectifier modules in each phase		**3 Phase :** 380VAC, 4W /3W (optional) Maximum: 530V AC ; Minimum: 260V AC (260V AC to 310V AC output power limiting)	
Frequency	45Hz to 65Hz		45Hz to 65Hz*	
THDi	≤ 5 % at rated load		≤ 5 % at rated load*	
Power Factor	≥ 0.99 at rated load		≥ 0.99 at rated load*	
Slow Start Time	upto 8 seconds		upto 8 seconds	
DC OUTPUT	**24V**	**48V**	**110V**	**220V**
Voltage	21 — 39V DC	42-68V	88-160V	176-320V
Current	20% - 110% rated current			
Efficiency	≥ 90 %	≥ 90.5 %	≥ 92 %	≥ 92.5 %
Ripple	≤ 0.5 %	≤ 0.1 %	≤ 0.1 %	≤ 0.1 %
Load regulation:	≤ 0.7 %	≤ 0.5 %	≤ 0.5 %	≤ 0.5 %
Voltage stabilizing accuracy:	≤ 0.7 %	≤ 0.5 %	≤ 0.5 %	≤ 0.5 %
Dynamic Response	200 micro sec			
Noise / Acoustics	≤ 55 dB			
Features	a. Auto change over (from float to boost & boost to float)			
	b. Battery test facility to check condition of the battery			
	c. Hot swappable feature of modules			
	d. Modules are equipped inbuilt fans (ambient temperature & output current regulated)			
ENVIRONMENTAL				
Storage Temperature	-20°C to +70°C			
Relative humidity	5% to 95%			
GENERAL				
PROTECTIONS	Switches / Breakers at AC input, DC output & battery path Output short circuit			
	AC input surge protection			
	Output over voltage shutdown			
	Output overload (current limit)			
ALARMS & METERING	Details are on next page (details of options with different controller types)			
Battery Compatible	VRLA / Tubular / Ni-Cd / Plante			
Dimensions	As per rating & requirement			
Paint Shade	RAL 7032 or RAL 7035 or as per requirement			
Cooling of System	Natural or forced cooling for system (Rectifier modules are equipped with in-built fans)			
Cable Entry	Bottom entry / Top entry			
Cabinet Sizes	Width: as per requirement I Height: upto 2000 mm I Depth: 600 / 800 mm			
Ingress Protection	Up to IP 54			
Optional Features	Integral DCDB, BMS/BHMS, IMS & each feeder insulation monitoring			

(1) *Depends on ratings

Controller Options:

Various types of controllers are offered with 24V/48V systems. The details of these controllers are shown in table below:

	Controllers (24V or 48V)		
Controller name	M530S	ACU+	EMU1OLC
Display size	LCD with 8/16 Characters	LCD with 4/16 characters	7" TFT HD LCD Touch Screen
Output voltage range	19V to 60V	19V to 60V	21 V - 39V / 42V-72V
Output current range	20% - 100% of rated current	20% - 100% of rated current	20% - 100% of rated current
Parameters monitored	Input Voltage	Input Voltage	Input Voltage
	Output Voltage	Output Voltage	Input Current
	Output Current	Output Current	Output Voltage
	Battery Voltage	Battery Voltage	Output Current
	Battery Current	Battery Current	Battery Voltage
	Load Voltage	Load Voltage	Battery Current
	Load Current	Load Current	Load Voltage
			Load Current
Alarms	AC mains failure Rectifier module failure Battery low DC/DC converter failure DC under Voltage Fan failure	AC mains failure Rectifier module failure Battery low DC/DC converter failure DC/DC converter failure Fan failure	AC mains failure Rectifier module failure Battery low DC/DC converter failure DC Over voltage Fan failure
	Thermal derating (of rectifier output due to high temperature)	Thermal derating (of rectifier output due to high temperature)	DC Insulation failure AC Breaker trip alarm (opt.), DC Breaker trip alarm (opt.) Battery Breaker trip alarm(optional) DC feeder grounding alarm(optional)
Communication	RS 485	RS 232 / RS 485 / Ethernet	RS 232 / RS 485 / Ethernet
Protocols	YDN23	HTTP, SNMP, EEM, SocTpe, Rsoc	CDT / MODBUS
Battery supports	VRLA/Li-ion	VRLA / Tubular / Ni-Cd / Plante	VRLA / Tubular / Ni-Cd / Plante
Max. No of rectifier modules monitored	30	60	32
Potential free contact	5	6	5
BHMS / BMS	N/A	Available (Optional)	Available (Optional)
Insulation monitoring (IMS)	N/A	N/A	Available (Optional)
Feeder status monitoring (on/off/trip)	N/A	N/A	Available (Optional)

Controller Options:

Various types of controllers are offered with 110V/220V systems. The details of these controllers are shown in table below:

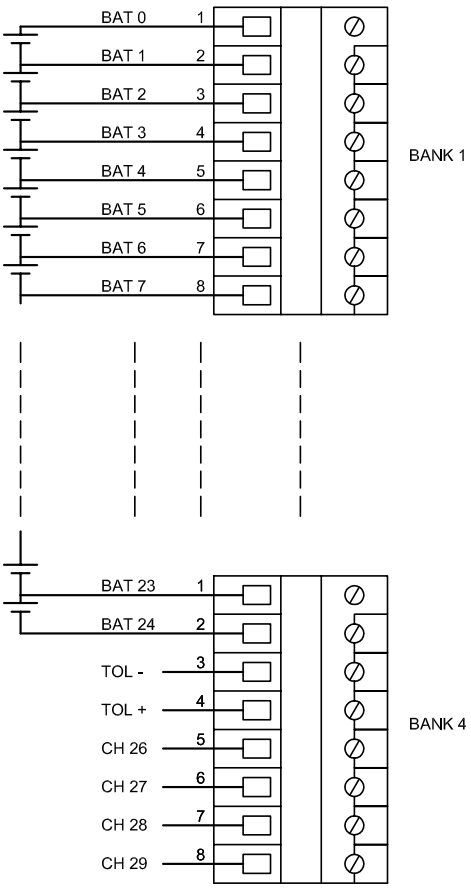
	Controllers (110V or 220V)	
Controller name	PSME 01	EMU10
Display size	1.6" x 3.1" LCD	7" TFT HD LCD Touch Screen
Output voltage range	80V -143V / 176V-320V	80V-160V / 176V-320V
Output current range	20% - 100% of rated current	20% - 100% of rated current
Parameters Monitored	Input Voltage	Input Voltage
	Output Voltage	Input Current
	Output Current	Output Voltage
	Battery Voltage	Output Current
	Battery Current	Battery Voltage
	Load Voltage	Battery Current
	Load Current	Load Voltage
		Load Current
Alarms	AC mains failure	AC mains failure
	Rectifier module failure	Rectifier module failure
	Battery low	Battery low
	DC/DC converter failure	DC/DC converter failure
	DC under voltage	DC under voltage, DC Over voltage
	DC Over voltage	Fan failure
	Fan failure	DC Insulation failure
	DC Insulation failure	AC Breaker trip alarm (optional)
	AC Breaker trip alarm (optional)	DC Breaker trip alarm (optional)
	DC Breaker trip alarm (optional)	Battery Breaker trip alarm(optional)
	Battery Breaker trip alarm(optional)	DC feeder grounding alarm (optional)
Communication	RS 232 / RS 485	RS 232 / RS 485 / Ethernet
Protocols	CDT / MODBUS	CDT / MODBUS / IEC 61850
Battery supports	VRLA / Tubular	VRLA / Tubular / Ni-Cd / Plante
Max. No of rectifier modules monitored	16	32
Potential free contact	1 (Summary Contact)	5
BHMS / BMS	N/A	Available (optional)
Insulation monitoring (IMS)	N/A	Available (optional)
Feeder status monitoring (on/off/trip)	N/A	Available (optional)

UtilitySure is a reliable industrial modular rectifier battery charger with state-of-the-art high frequency switching based switch-mode power supply. UtilitySure is specially designed to meet the most demanding industry specifications and includes a wide choice of ratings and operator friendly features.

SPECIAL FEATURES

1. BATTERY MONITORING SYSTEM (BHMS / BMS) :

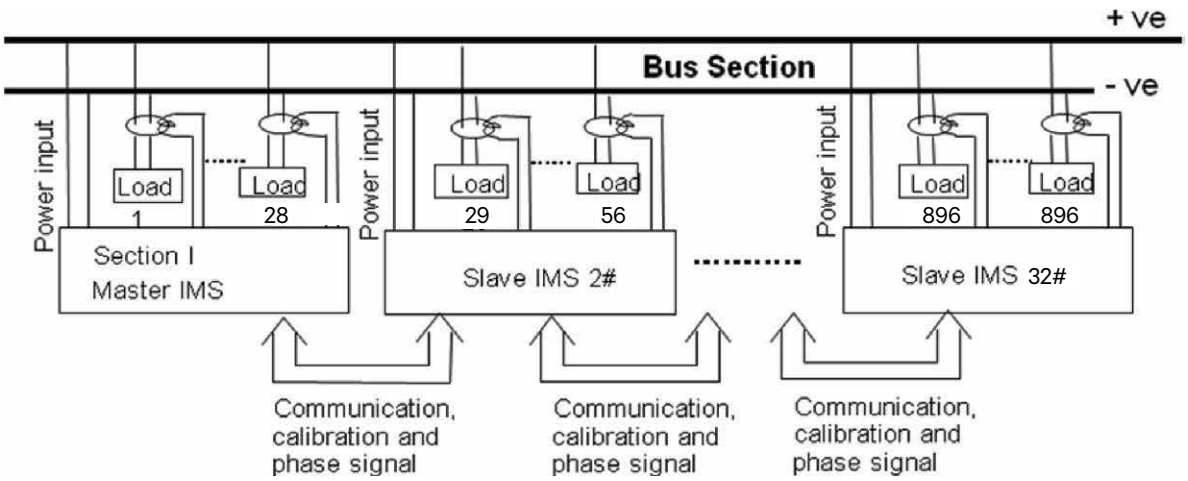
An integral part of the charger, with the same controller,both charger and BMS can be monitored. Battery sensing modules (EBU-01) each having 24 voltage channels(0.1V-16.5V), 1 current channel and 2 temperature channels are based on number of cells that need to be monitored. For example, suppose there are 55 cells of VRLA with a 110V DC system; then 3 nos. of EBU-01 modules are required for battery monitoring. The maximum number of cells that can be monitored are 240 cells with EMU10 controller. Suitable for 1.2 V /2V / 12 V battery monitoring.



2. INSULATION MONITORING SYSTEM (IMS) :

IMS is used to detect earth leakage in individual DC feeders. In any leakage develops between +ve/-ve DC line and earthing, then the fault is detected and immediately faulty feeder number and magnitude of leakage is displayed on the controller's display.

For this to be eective, a Hall eect CT has to be used in each feeder. These CT signals will be connected to the charger controller through EGU-01 sampling board. The connection drawing of IMS is as shown below: It can monitor upto 896 number of feeders insulation status.



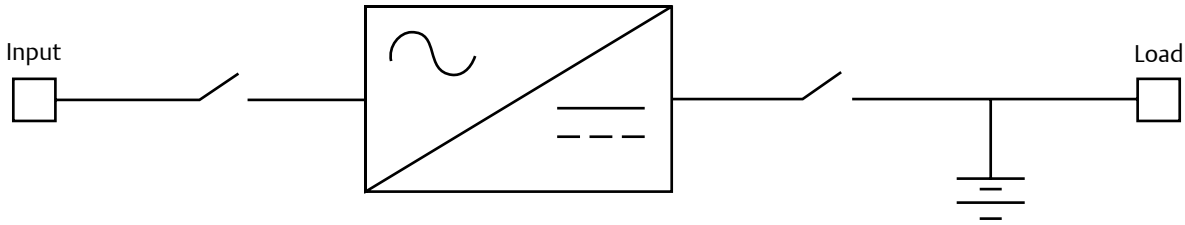
3. FEEDER STATUS (ON/OFF/ TRIP) MONITORING :

Tripping of DC feeders can be easily monitored by connecting each feeder (MCB/MCCB) trip contact to EGU-01 sampling module which will send signal to controller (EMU10). One EGU-01 can have 28 feeder inputs.

POSSIBLE CONFIGURATIONS:

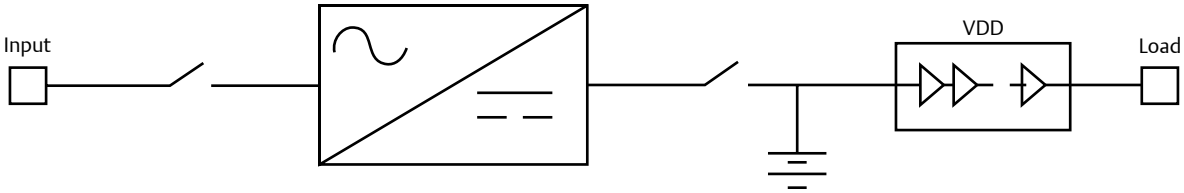
1. FCBC

In this configuration, charger is connected directly to battery and load. Normally, the charger will be in float mode trickle charging the battery and supplying the load. When AC mains fail the battery will supply the load. On restoration of power, the charger will switch to boost mode, charging the battery and supplying the load. In this mode, boost voltage will be appeared across the load terminal. There is also an option for integral DC distribution board.



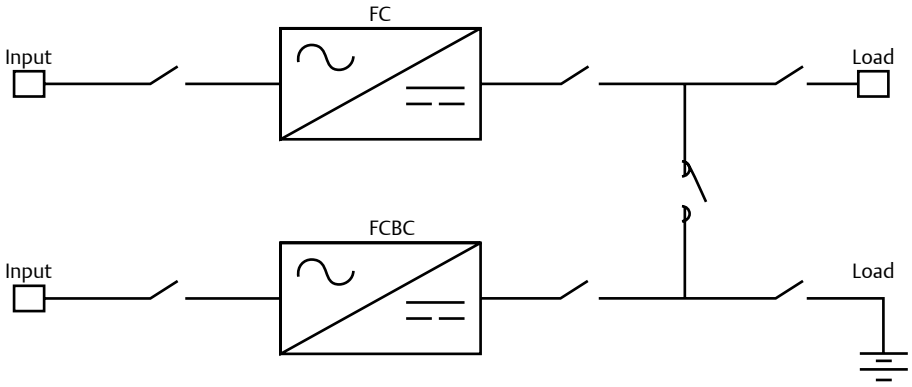
2. FCBC WITH VOLTAGE DROPPING DIODES

This configuration is very similar to the one described above. The extra feature is Dropper Diodes Chain which is required when there is only one FCBC and battery boost charging voltage is far high and if the voltage at load terminals needs to be limited within +/-10% of nominal system voltage. During float mode and AC mains fails condition the VDD Shall be bypassed through DC contractor



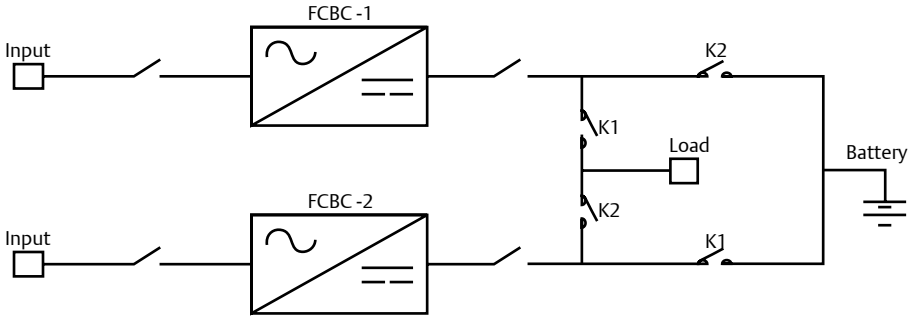
3. FC & FCBC

Here, one charger will always be in float mode(FC) and the other charger switches between float and boost modes based on battery condition (FCBC). When AC mains are ON, both chargers will be in float mode sharing the total load and trickle charging the battery. When AC mains fail, then contactor will be ON and load will be supplied by battery. Upon resumption of power, FCBC will switch to boost mode to boost charge the battery. Simultaneously, the contactor will be OFF. In this condition, both the charges will be working separately, FC supplying to load and FCBC boost charging the battery.



4. DUAL FCBC WITH 1X100% BATTERY, COMMON LOAD :

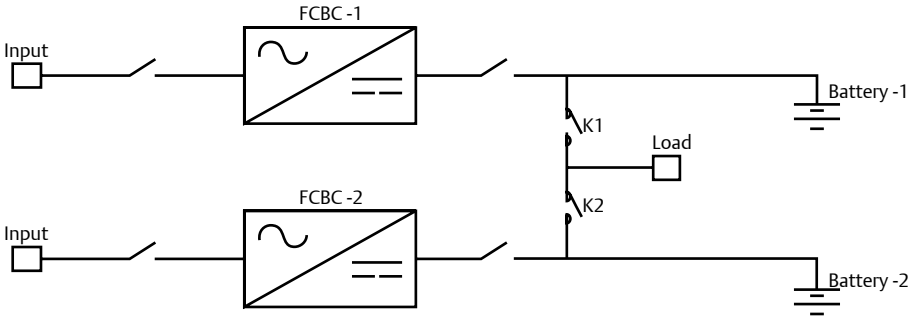
Both the chargers are Float cum Boost Chargers (FCBC). However, only one FCBC can go to boost mode at one time. Normally , both the charges will be in float mode sharing the total load and trickle charging the battery. When AC mains fail, both the contactors will be ON and load will be supplied by battery. Upon resumption of AC mains, one of the FCBCs will switch to boost mode and the respective contactor will be OFF(K1 for FCBC 1 and K2 for FCBC2), whilst the other FCBC will be in float mode supplying the load.



5. DUAL FCBC WITH 2X100% BATTERY, COMMON LOAD :

In this configuration, both the charges are float cum boost charges(FCBC) and the battery's configuration is 2x 100%. Each battery has 1 battery connected directly to it; however only 1 charger can go to boost mode at a time. If battery 1 needs boost charging, then FCBC-1 will go to boost mode to turbo charge the battery 1 and K1 will be OFF. At this time FCBC-2 will be float mode trickle charging the battery-2 and supplying the load.

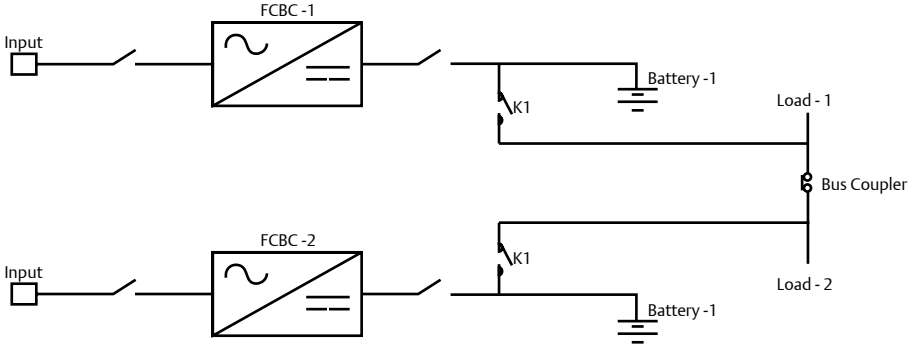
If battery-2 needs boost charging, then FCBC-2 will go boost mode to boost charge the battery-2 and K2 will be OFF. At this time, FCBC-1 will be in float mode trickle charging the battery-1 and supplying the load.



6. DUAL FCBC WITH 2X100% BATTERY, DUAL LOAD WITH BUS COPULER

Both the chargers have their respective batteries, but still only one charger can go to boost mode at a time. The bus coupler can be on auto/manual mode. (If required, we can give both chargers online boost charging as an option.) If battery-1 needs boost charging, then FCBC-1 will go boost mode to turbo charge the battery-1 and K1 will be OFF.

If it is a manual system, then bus coupler has to be turned ON before any of the charges go to boost mode. If it is on auto mode, then bus coupler will become ON whenever the charges go to boost mode.



Green Power Solution for Regenerative Load Applications

For the regulated power requirement, most of the CNC machines depend upon various power conditioners. However, these power conditioners are not sufficient to address the critical power requirement of CNC machine. The Four Quadrant Liebert RG UPS, offers regulated power, along with continuity and it also addresses the regenerative braking issues, thanks to its revolutionary design.

In the operation of CNC machine, whenever Regenerative braking occurs (faster deceleration of the motor speed or speed reversal) momentarily, the motor acts as a generator. This causes the current to flow in reverse direction, that is back to the utility lines, through the power conditioner. For the conventional UPS, this regenerative power will increase its DC bus voltage which causes the UPS tripping due to DC over voltage condition. In some cases it might damage the DC capacitors. Liebert RG UPS allows this regenerative power to flow back, smoothly to the utility, without causing any interruptions or damages to the UPS as well as other connected load.

Liebert RG UPS guarantees continuous, reliable and trouble free operation of CNC machine. Thereby decreasing the production losses, and increasing profitability!

FEATURES

- Double conversion online UPS
- Four Quardrant IGBT PWM rectifier
- Suitable for Regenerative Load
- Unity power factor
- Low input THDi
- State-of-the-Art Digital control (Optional)
- Inbuilt isolation transformer (Optional)
- Advance communication capabilities
- Compliance to International standards

Technical Specifications

Rating	**40, 60, 80, 120, 160, 200, 250 kVA**
INPUT	
Rectifier Design	Four Quardrant IGBT based PWM rectifier
Nominal Voltage	415 V AC (— 20% to +15%) 3 Ph & N
Nominal Frequency	50 Hz (±10%) (60 Hz optional)
Input Power Factor	≤ 0.99
Input Current Harmonics	≤ 3%(1)
BATTERY	
Battery Voltage	576 V DC
OUTPUT	
Inverter Design	**IGBT based PWM with Digital control**
Voltage	400 V AC (380 / 415, selectable) 3 Ph & N
Regulation	± 1% for balanced load, ± 2% for 100% unbalanced load
Phase Displacement	< 1° for balanced load, < 2° for 100% unbalanced load
Frequency	50 Hz (± 0.1 Hz) in free running mode, (± 2.5 Hz) in synchronous mode (60 Hz optional)
Waveform	True Sinewave
Total Harmonic Distortion	< 2% on linear load & < 5% on non-linear load (Ref. IEC 62040-3)
Crest Factor	3 : 1
Overload Capacity	125% for 10 minute; 150% for 60 sec. (Inverse time characteristics)
Dynamic Response	Complies to IEC 62040-3, Class 1
Duty	Continuous
ENVIRONMENTAL	
Operating Temperature	0 to 40 °C
Relative Humidity	Upto 90% (non condensing)
Altitude	< 1000 meter, above sea level (without derating)
PHYSICAL	
Enclosure Protection	IP - 20
Cooling	Forced air
Colour	RAL 7035
Cable Entry	Bottom
TESTING STANDARDS	IEC 62040-3

Rating (in kVA)	**40**	**60**	**80**	**120**	**160**	**200**	**250**
Acoustic Noise(2)	< 64 dBA	< 68 dBA		< 70 dBA		< 72 dBA	
Overall Efficiency(3)	upto 90%	upto 91%			upto 92%		
Width (in mm)(4)	600	1000	1000	1200	1400	1400	R-1000 &I-1400
Depth (in mm)	900	900	900	900	1000	1000	1000
Height (in mm)	1335	1750	1750	1850	2000	2000	2000
Approx. Weight (in kg)	500	875	875	950	1300	1300	R-800 & I-1050

(1) At nominal input voltage & at 50 to 100% load condition.
(2) Acoustic Noise measured @ 1.0 meter (Ref. ISO 3746)
(3) For Tolerance see IEC 60146 -1-1
(4) R - Rectifier, I - Inverter cubicle
Specification subject to change without prior notice

Introduction

Pulse Power is the Science & technology of accumulating energy over a relatively long period of time & releasing it very quickly. For Plasma Processing DC Pulse Power Supply is required. DC Pulse Power Supply is very much in vogue these days when conventional techniques fail to produce acceptable results. Pulse is represented by a shift in Voltage or Current & thus Power.

Pulsing is done to

- Avoid arcing – or at least to reduce arc defects.
- Achieve better film properties : Denser , tougher , brighter, more Transparent.
- Achieve higher yields
- Increase throughput

Specially designed power supply for ;

- PACVD / PECVD (Plasma Assisted / Enhanced Chemical Vapor Deposition)
- Electro-deposition
- Nano-oxide reduction by hydrogen glow discharge
- High precision plasma metal removal from surfaces using reactive gases
- Hydrogen Production
- Anodizing

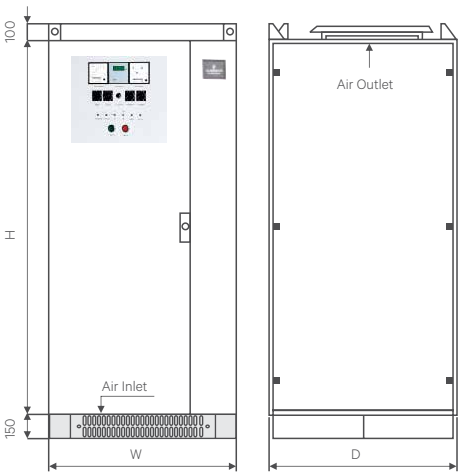
Features

- Option of voltage or current mode, as per the process requirement
- Smooth sputtering mode, +200 V to +1100 V pulse with variable duty and frequency
- Pulse frequency setting and variable voltage option
- Plasma current setting as per available working surface area

Rating	10 kVA	20 kVA	40 kVA	60 kVA
Input Voltage	415 V AC (+10% to - 10%), Three Phase & N			
Input Frequency	50 Hz (± 10%)			
Rectifier Type	Full Wave			
Output Power	10 kW, 20 kW, 40 kW, 60 kW			
Output Voltage	0 - 1200 V (Adjustable through 10 turn POT with dial)			
Output Frequency	1 kHz to 6 kHz Variable			
Duty Cycle	10 - 95%			
Waveform	Duty cycle controlled chopped DC output			
Configuration	Standalone			
Efficiency	> 90% (At full load & nominal input voltage)			
Acoustic Noise Level	< 64 dBA @ 1 meter			
Ambient Temp	0 to 400C			
Storage Temp	-10 to 700C			
Relative Humidity	Up to 95% (Non Condensing)			
Altitude	< 1000 meter. Above Sea Level (Without derating)			
Enclosure Protection Grade	IP - 41			
Cooling	Forced Air			
Color	RAL 7035 (Light Gray)			
Cable Entry	Bottom			
Dimension (W X D X H) in mm	800 X 800 X 1600			
Weight	275 kg	300 kg	350 kg	400 kg
Testing Standards	IEC 62040 - 3			

Display & Indications

Metering	DC Voltage	Output Current	Output Frequency
LED Indications	Control Supply OK	Rectifier Over Voltage	Mains ON
	Output OT		
Protections	Input Single Phasing/	High Speed	Output Overload
	Phase reversal	Over Current	Output Short Circuit
	Input Contactor	Over Temperature	Rectifier Over Voltage
	Arc Suppression		
	Alarms are provided for all important protections		
Controls			
Potentiometer	Output Voltage	Output Frequency	Duty Cycle
Switch	Auto / Manual for Output Voltage		



Front View Side View

Liebert® Ipro LXi AC UPS System

The Liebert® Ipro LXi Uninterruptible Power Supply System (UPS) is the result of Engineering in product simplification to offer Single Phase Input, Single Phase Output Design having IGBT based Inverter with improved reliability to Industrial requirements.

The Liebert® Ipro LXi range is designed to meet the most demanding schedules of Industrial projects. Each Liebert® Ipro LXi product includes selection of Industrialized & Pre-configured options to allow the product to be quickly configured and delivered.

Benefits

- **Improved reliability** with robust electrical performance
- **Smart Access to UPS Data:**
  - User Friendly LCD Display
  - Embeded Event logger (Total up to 800 Events)
- **Industrial Flexibility:**
  - Choice of Configurations & options (Refer Technical Data)
- **Compact foot print Area**
- **Easy On site maintenance**

Key features

In addition to above, the Liebert® Ipro LXi features:

- **Ingress protection IP41** as standard for harsh environmental conditions.
- **Robust design** to continuously operate a full load up to 50˚C ambient temperature.
- Galvanic isolation between Input & output.
- Compatible with SMF/Lead Acid/ Ni-cd battery.
- Digital control & monitoring
- Compact design with the capability to integrate Input isolation transformer up to 3 kVA in the cabinet (Optional)

Applications

The Ipro LXi is best designed for use in the following sectors :
(But not limited to)

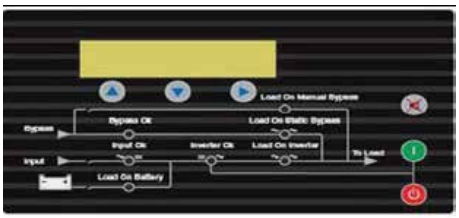
- Oil & gas
- Petrochemical & Chemical Industries
- Continuous process industries

Flexibility for a wide scope of Industrial Requirements

The Liebert® Ipro LXi is available today from 1 to 7.5 kVA in Single - Phase Input, Single - Phase Output configuration. It oers a choice of Output voltages (230V or 110 V AC).

Liebert® Ipro LXi features a wide input voltage tolerance , which makes the system compatible with the harshest industrial environment.

To further improve load availability & process availability, the Liebert® Ipro Lxi is able to operate in dual distributed parallel configuration , with one bypass (reserve) supply, with single or dual batteries and can include an AC Bus tie.



Ratings - Output Power at Cos phi 0.8 (kVA) Vs Battery Voltage (V dc)

192 V dc
1
2
3
5
7.5

Standards

Compliance	IEC62040 (-1,-2,-3) / 60146 /
	IEC 60950 / IEC 60529 /
	IEC 60439 / IEC60332 -1-2
	EMC Directive 2004 / 108 / CE
	Low Voltage directive (LVD)
	2006 / 95 / CE

Technical Data

Input	
Input Voltage	230V AC (+15 %, -10 %) Single phase
Power Factor	0.8(1)
Frequency Range	50 Hz (+/-6 %)
Charger	
Voltage Stability	+/- 1 % in float mode, input within tolerance
Voltage Ripple (w/o battery)	<=2 %
Charging Method	Constant voltage constant current
Output	
Available rating (See table above)	From 1 to 7.5 kVA (at PF 0.8 lagging)
AC Voltage :	
Single Phase	230 VAC (220, 240)
Frequency	50 Hz
Frequency Stability :	
with internal oscillator	50 Hz (+/-0.25 Hz)
with reserve synchronism	50 Hz (+/-2.5 Hz)
Voltage Stability (0-100 % load variation) :	
- Static	+/- 1 %
- Dynamic	Complies to IEC62040-3, Class 1
Overload Inverter (In % of nominal power)	150 % / 1 min - 125 % / 10 min
Voltage distortion :	
With 100 % linear load	< 3 %
With 100 % non linear load	< 7 %
Allowable Power factor	0.8 lag to unity (within its kVA / KW rating)
Allowable Crest factor	3:1
Battery	
Battery Voltage	192 V DC
Type	VRLA / SMF / Ni-cd
Recommended number of :	
- VRLA	96 cells
- SMF	16 blocks of 12V
- Ni-cd	153 cells
Battery charging current limitation	Selectable & adjustable in step 2,4,6A
General Data	
Operating Temperature	Up to 50 Deg. C
Storage Temperature	0 to 70 Deg C (Battery Excluded)
Relative Humidity	Up to 95% RH, non condensing
Operating altitude	< 1000 m (Without system de rating)
Cooling	Forced air
External Ingress Protection	IP41
Input / Output Isolation	2 KV AC for 1 min.
Frame Colour	RAL 7035
Dimensions	Varying according to rating & options (Consult us)

Options

Input	60 Hz (+/-10 %) Input Isolation Transformer
Battery	Charging Current - Selectable & Adjustable in step 5,10,14 A. Battery Reverse Polarity Protection, indication on LCD & alarm Common Battery Bank
Output	Configuration - Parallel Redundant - 2 nos . / Hot stand by / Load Bus sync Voltage - 110 V AC (+/-2 %) Frequency - 60 Hz (+/-0.25 Hz) (Factory setting)
Bypass (Reserve)	Isolation transformer Cubicle (Separate Cabinet) SCVS + Isolation transformer Cubicle (Separate Cabinet) SVR (Separate Cabinet)
System	AC Distribution (Separate cabinet) G3 conformal coating on PCBs
Mechanical	Frame Colour - RAL 7032 / RAL 7021 IP42
Communication	Potential free contacts - Rectifier Trip, Inverter trip , Load on battery, Battery low pre alarm, Load on static bypass (1 relay contact for each, Rating 1A / 230V or 2 A / 12 V DC) UPSMON II - Ethernet based SNMP - Ethernet based Combination - UPSMON II (232) + Modbus (485) or UPSMON II (Ethernet) + SNMP (RJ45) + Modbus (485) Profibus (Separate) I Remote - Ethernet based (Separate)

(1) At nominal Input Voltage & rated Load

(2) For Common battery bank Input isolation transformer is mandatory.

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