

## **Features**

- Maximum Mains power utilization, works from 3 phases or 2 phases or even 1 phase input and provides regulated single phase output
- Static Voltage Regulator (SVR) with or without isolation
- Wide input voltage working range 90Vac to 290VAc
- Integrated Auto Mains failure (AMF) functionality with manual/ auto switching between the Mains and DG set
- ASLI™ (Automatic Switching Line Input) to distribute AC loads among the available phases
- With and Without Neutral operation options
- Energy metering (AC and DC)
- EB Run time, DG run time and Battery run time log and history
- Option to control the Air-con switching
- Integrated surge protection devices
- Integrated AC Distribution Panel for various loads (can be customized)
- Integrated Aviation lamp controller, Fire/smoke Alarm
- In-built battery in PMS controller ensures uninterrupted working for minimum 6 hours even in the absence of any power source (Mains/DG/Site battery) at site
- Display of Mains and DG parameters

- GPRS modem for remote monitoring and control through TOC
- Event Log for last 1000 events with date & time stamp
- Front access to RS232 port for programming the controller parameters
- Advanced battery management
- Green Energy Compatible
- Communication with other devices through R\$485 MODBUS
- In-built DG battery charger
- Capacity up to 24kW DC Power
- Outdoor IP55 cabinet (Optional)

## **Optional features**

- Separate Class B SPD in IP55 Enclosure
- Video monitoring system using Camera
- Web based data monitoring through customer defined TOC/NOC
- Remote Locking system with Mechanical key override
- Inventory management using RF ID tags
- Fuel Monitoring System

#### **Benefits**

- Suitable for poor grid conditions
- Highly reliable and rugged
- Reduction in OPEX
- Reduction in CAPEX
- Highly efficient
- Modular and space saving

### **Applications**

- Wireless Cell Site Power Systems
- Medium exchanges & rural telecom networks



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## Enhanced Intelligent Integrated Power Management System (e-l<sup>2</sup>PMS<sup>™</sup>)

### Specifications of the building blocks

#### Central processing unit

Micro controller	High -speed micro controller each one for I²PMS™ AMF, SMPS & SVR
Time	Real time & date-programmable
Event logs	Last 500 events with time and date stamp
RS 232 port	for PC interface to configure the parameters
Data Transfer	Through suitable GPRS Modem (optional)
Remote Monitoring Feature	Optional Asset Management (RFID tags) Access control (Electro mechanical lock) Fuel Monitoring (Capacitive type Fuel sensor)

#### Static voltage regulator with Auto transformer \*

Туре	Micro controller based, true RMS, Static Voltage Regulator (SVR)
Power rating	1 x 8kVA**
Transformer Insulation	Temperature rise of the transformer as per Class-H Specs
Rated input voltage range	90 - 300V <sub>L-N</sub> ***
Rated output voltage	220 V ± 10% Line-Neutral (isolated output) ****
Input Frequency range	47-53 Hz
AC to AC conversion efficiency at full load	>96% for the specified input range
Response time	<10 ms (half cycle) to bring the output voltage within the regulation band of 220 V $\pm$ 10%
Critical dv/dt of Solid state devices	>400V/µs
Protections	
Voltage protections by PMS microcontroller (1st level protection)	Input supply to SVR cut-off (through Contactor) for Input Voltages > 290V
	Input supply to SVR cut-off (through Contactor) for Input Voltages <90V
Voltage protections by SVR	SVR output shuts off (immediate) for Input Voltage > 290V or <90V, restarts automatically with a hysteresis of 20V
microcontroller (2nd level protection)	SVR output shuts off in case its output Voltage> 250V (immediate) or <190V (with delay of 3 sec ), will restart after input power cycling (OFF-ON)

\* SVRs with in-built isolation transformer also available \*\* Can be offered with customized Power rating \*\*\* Can be offered with a customized input voltage range \*\*\*\* Can be offered with a customized output voltage range

#### DC Power system

System capacity (Max)	Type 1: -48V, 24 kW (max) with 8 nos. of 3,000W rectifiers
	Type 2: -48V, 18 kW (max) with 6 nos. of 3,000W rectifiers
Rectifier rating (Nominal)	-48V, 3,000W
Output power (per rectifier) vs. Input Voltage range (Line to Line) in case two or more phases are available	<ol> <li>Full power of 3,000W for the input voltage window of 176 to 480Vac (Line to Line) except for a small transition window of 290V to 305Vac where the power is linearly de-rated from 3000W to 2800W.</li> <li>Linearly de-rated power from 3000W to 2600W for the input voltage window of 175 to 155Vac (Line to Line)</li> </ol>
Output power ( per rectifier) vs. Input Voltage range (Line to Neutral) in case only one phase is available	<ol> <li>Full power of 3000W for the input voltage window of 176-290Vac (Line to Neutral)</li> <li>Linearly de-rated power from 3000W to 1320W for the input voltage window of 175-90Vac (Line to Neutral)</li> <li>The rectifier will shut down between 290Vac to 300Vac (Line to Neutral) on the higher side and 80 to 90Vac on the lower side.</li> <li>The guaranteed No damage continuous voltage range is 0-500Vac (Line to Neutral) for battery floated application.</li> </ol>
Output Voltage (Nominal)	-48Vdc
Operating Voltage Range – Float	-42Vdc to -56.5Vdc (default setting at 54.0V)
Operating Voltage Range – Boost	-48Vdc to -58Vdc (default setting at 55.2V)

### Auto Mains Failure system (Automatic Transfer Switch)

AMF rating	25kVA ****
Selection between EB Mains and DG set	Automatic/ Manual switching between EB Mains and DG set
DG saver logic	DG saver logic will not allow the DG to turn ON till the temperature inside the shelter becomes >35deg C (programmable) or the battery voltage becomes < 46V DC (programmable).
	Low lube oil (LLOP sensor not in scope of supply).
	Low Fuel level (Low fuel level sensor not in scope of supply).
	High Cylinder temperature (HCT sensor not in scope of supply).
	Low fuel level (Two sensors for two levels - one for alarm and one for tripping - <b>OPTIONAL</b> )
	Over load at 110% of DG capacity (Programmable)
DG trip Protection	Voltage protection
	HVD 255V (Programmable)
	LVD 190V (Programmable)
	DG Max Run time: DG run time feature ensures that the DG is not run continuously for more than 8 Hrs (programmable from 10 minutes to 480 minutes), however, if the site condition (as mentioned above) worsens, the DG set will turn ON again.
	DG on load after DG start and supply healthy (Typically 30 sec)
Delays (All the delays are	Blackout delay between Mains and DG contactor changeover (Typically 10 sec)
programmable)	DG cooling time (Typically 5 minutes)
	Three attempt for DG start with delay between attempts ((Typically 40-40-40 sec)
Battery charger & DG controller unit	Automatic DG battery charger with constant current charging facility. Charger is suitable for charging the SMF/Conventional battery up to 150AH.
	Generator controller with start, stop relays of 40 Amp rating & push button to start/stop the DG in manual mode
	Common VA meter for display of DG battery Voltage & Battery charging current
	Remote Auto / Manual mode selection for DG start/Stop at charger

 $\ast\ast\ast\ast\ast$  Can be offered with customized AMF rating

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## Fire alarm and detection system

Smoke detector	Photoelectric type smoke detector- 1 no.
	Sensitivity: 3%/ft.photo
	Vibration and shock proof.
	Plug-in-type inter changeable without requiring different mounting bases or alternations in the fire panel.
	Complies with EN54-Part 4/7
Features	fire and fault indication LED
	Pot free relay out-put in case of fire
	Switching off the complete unit in case of fire
Door Open Detection (Door Sensor not in scope)	I <sup>2</sup> PMS <sup>™</sup> controller accepts the input from Door sensor of shelter door & a pot free relay contact is available for remote extension

#### Measuring system

	DG voltage
	DG current
	DG Freq,
DG set medsorements	DG accumulated run hours in Auto Mode
	DG accumulated run hours in Manual Mode
	DG Energy
EB Mains measurements	Input Voltage (RY-YB-BR)
	Output voltages for SVR
	Mains Accumulated run hours
	Mains energy measurement
	Output Current
DC Output measurements	DC voltage of load/ battery bus
	Charge/ discharge current of each of 3 battery string
	4-channel DC Energy measurement

#### Alarms system

	<ul> <li>Mains Healthy</li> </ul>	<ul> <li>DG over load</li> </ul>
	<ul> <li>DG Healthy</li> </ul>	<ul> <li>Room temperature High</li> </ul>
	<ul> <li>EB contactor ON (Load on Mains)</li> </ul>	<ul> <li>DG Fail-to Start</li> </ul>
	<ul> <li>DG contactor ON (Load on DG)</li> </ul>	<ul> <li>DG Fail-to-Stop</li> </ul>
Alarms display on IPMS <sup>IM</sup> controller	<ul> <li>Mains UV/OV</li> </ul>	0
	<ul> <li>DG UV/OV</li> </ul>	<ul> <li>DG battery Low</li> </ul>
	<ul> <li>Mains Fail</li> </ul>	<ul> <li>Alternator-Fault</li> </ul>
	<ul> <li>SVR Fail</li> </ul>	• DG engine temperature High
	<ul> <li>System (PP) Battery Low</li> </ul>	<ul> <li>Smoke/Fire Alarm</li> </ul>
	<ul> <li>DG Fuel Low</li> </ul>	• DG LLOP
List of PF contacts in I²PMS™ controller	<ul> <li>✓ Mains Under-voltage / Over Voltage</li> </ul>	✓ DG- Battery Low
	<ul> <li>✓ DG Under-voltage / Over Voltage</li> </ul>	✓ Power-plant Battery Low
	<ul> <li>Mains Fail</li> </ul>	✓ Smoke / Fire
	✓ DG Overload	🗸 Room Temp. High
	✓ DG- Fail-to-start	<ul> <li>Engine Temp. High (HCT)</li> </ul>
	✓ DG- Fail-to-stop	<ul> <li>Door Open</li> </ul>
	✓ DG-LLOP	✓ Load on DG
	✓ DG- Low-fuel level	✓ DG ON

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	✓ DG running on No Load ✓ SVR Fail
Alarms display on DC Power system	3 status LEDs (AC, DC & BD) to indicate AC normal, DC normal & Battery discharge condition
Cormolier	Text display for various alarm conditions of SMPS
List of PF contacts in SMPS controller	3 nos. for severity (Critical, Major & Minor) &
	7 nos. user configurable

## AC & DC distribution unit (can be customized as per user requirement)

Input Protection		
Mains - 01 No.	TP MCB/ MCCB	
DG - 01 No.	DP MCB/ MCCB	
Load Distribution		
For DC Loads		
4 load MCBs for each of the 4 operators	SP MCB (C Curve), typical rating- 8 x 80A, 4 x 32A for Non critical loads and 4 x 32A for critical loads of 4 operators	
2 Spare MCBs for common loads	SP MCB (C Curve), typical rating- 2x16A	
For other AC loads		
Air Conditioner-02 Nos.	SP MCB (C Curve), typical rating- 32 A	
Power Point	SP MCB (C Curve), typical rating- 16 A	
Lighting	SP MCB (C Curve), typical rating- 6 A	
Spare	SP MCB (C Curve), typical rating- 6 A	
Aviation lamp	SP MCB (C Curve), typical rating- 6 A	
DG Battery charger	SP MCB (C Curve), typical rating- 6 A	
Aviation lamp Control		
Automatic Aviation lamp control (real time based), 220V output, protected by MCB		
Default setting ON between 18:00Hrs to 06:00Hrs		

#### **Surge Protection**

Class B Protection (optional)	Class B surge protection at the Grid input between three phases & earth
Class C Protection	Class C surge protection at the Plant input between three phases & earth
Class D Protection	Class D surge protection at rectifier level
DC Surge Protection (optional)	DC Surge protection across the DC bus

#### DG Battery Charger (AC-DC)

Input source	Powered from either SVR or DG
Rated Input Voltage	220V, 1Ph 50Hz AC
Output Voltage	13.5V DC
Charging Current	10A
Input Voltage Range of operation	190-255V AC 50Hz
Line Voltage Regulation	±3%
Load Regulation	$\pm 3\%$ of the half load preset voltage
Short circuit protection	Protected against short circuit at the output
Reverse polarity Protection	Protected against reverse polarity connection
Output Current limit	Output current limit at 10A

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## **Mechanical Specifications**

Nominal Cabinet Dimensions	Type1: 1900 x 600 x 500
(H x W x D) in mm	Type2: 1600 x 600 x 500
Weight (Approximate)	250 kgs (with 7.5kVA SVR and 4 rectifiers)
Material	CNC Fabricated Panel ,using CRCA sheet duly power coated with C.O. Blue & Door C.O. White
Mounting Type	Floor
Opening	Front Door (rear door For Outdoor)
IP protection	IP 20 (IP55 Optional)

### **Environmental Specifications**

Operating Ambient Temp	0°C to +50°C
Relative Humidity	95% RH

Applicable Standards	
EMI (CE)	EN55022:2006+A1:2007 (Class A)
EMI (RE)	EN55022:2006+A1:2007 (Class A)

Country of Sale						
South Asia	India, Sri Lanka					
SE Asia	-					
NA	-					
CALA	-					
European	-					
Africa	Nigeria,					

#### Ordering information

Please contact your Lineage Powers' Sales Representative for pricing, lead-time/availability of the listed model nos. and incase of any customized requirement.

l²PMS Variants	Inj Sec	out tion	AC-DC Conversion	Remote Monitoring						AC-AC Conversion			
	ATS	HPS	DCPS	RTA M	AMx	EMS	внм	FMS	ACS	САМ	AMS	GPRS	SVR
Type-1	$\checkmark$	$\checkmark$	$\checkmark$	1		1		$\checkmark$	1	√	√	√	
Type-2	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		$\checkmark$		$\checkmark$				√	$\checkmark$
Type-3	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	√						√	$\checkmark$
Type-4	$\checkmark$	$\checkmark$	$\checkmark$	1	$\checkmark$	1							$\checkmark$
Type-5	$\checkmark$	$\checkmark$		1		√							$\checkmark$
Type-6	$\checkmark$		$\checkmark$	$\checkmark$		√		$\checkmark$	√		√	√	$\checkmark$

#### **Abbreviations**

ATS	Auto Transfer Switch	FMS	Fuel Monitoring System
HPS	Healthy Phase Selection	ACS	Access Control System
DCPS	DC Power System	CAM	Camera Interface
RTAM	Real Time Alarm Monitoring	GPRS	GPRS MODEM for Remote Access
AMx	Alarm Multiplier	AMS	Asset Monitoring System
EMS	Energy Monitoring System	SVR	Static Voltage Regulator
внм	Battery Health Monitoring	FMS	Fuel Monitoring System



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