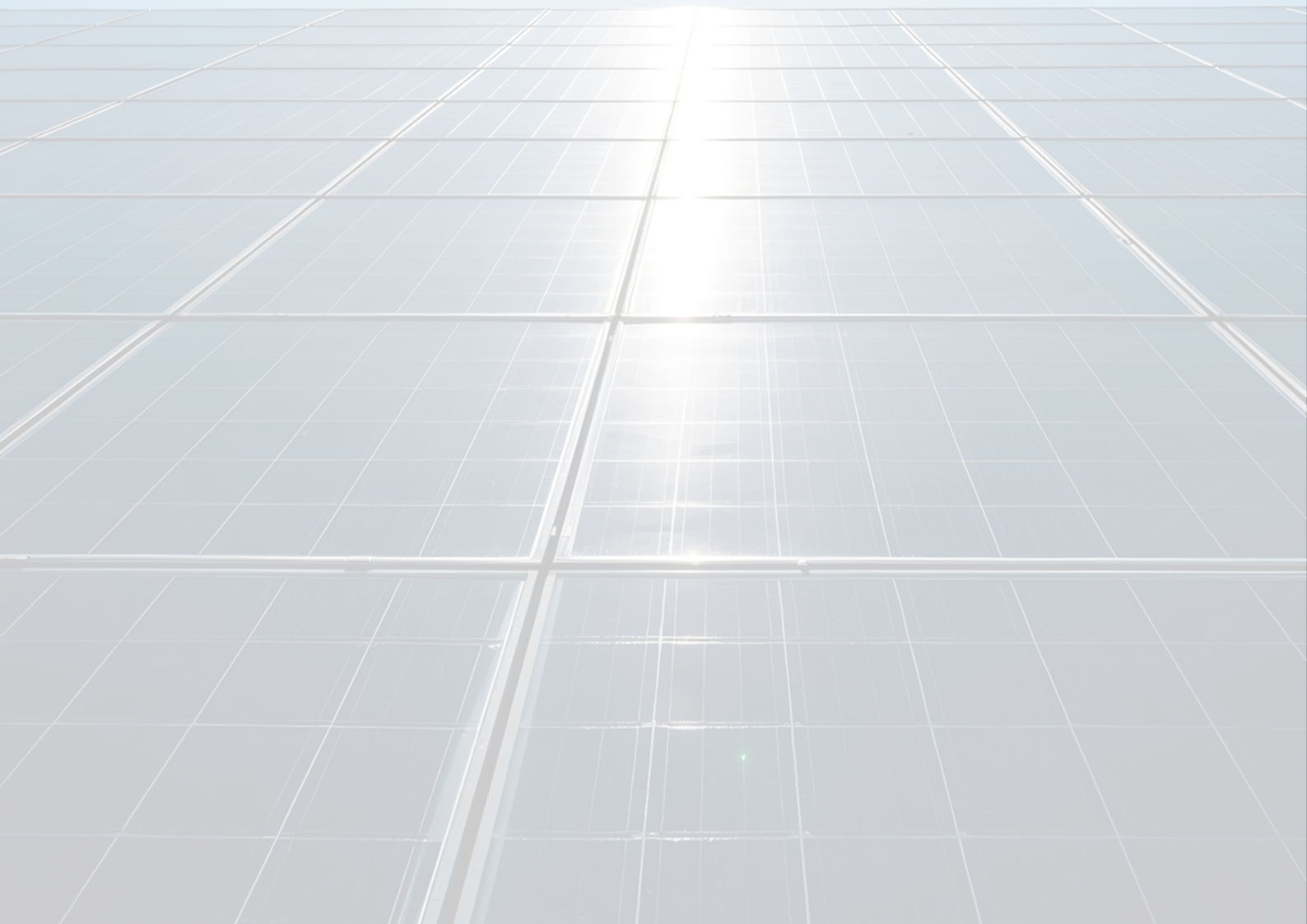


SKID SOLUTION

ENS-15M-1150-X-X-X-X-S_2V0_GEN1
15MWh 1150V



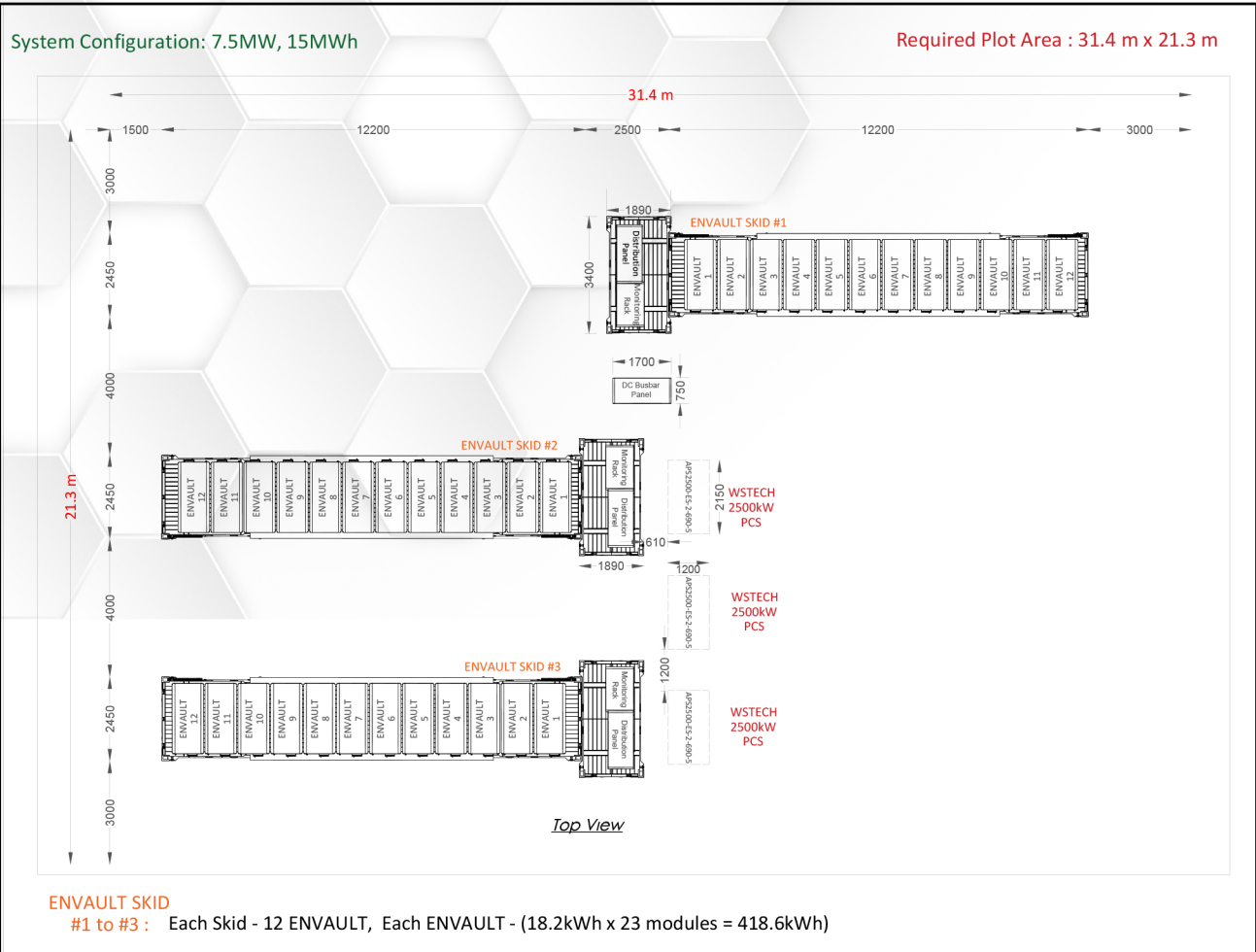
SKID ENERGY STORAGE:

INTRODUCTION:

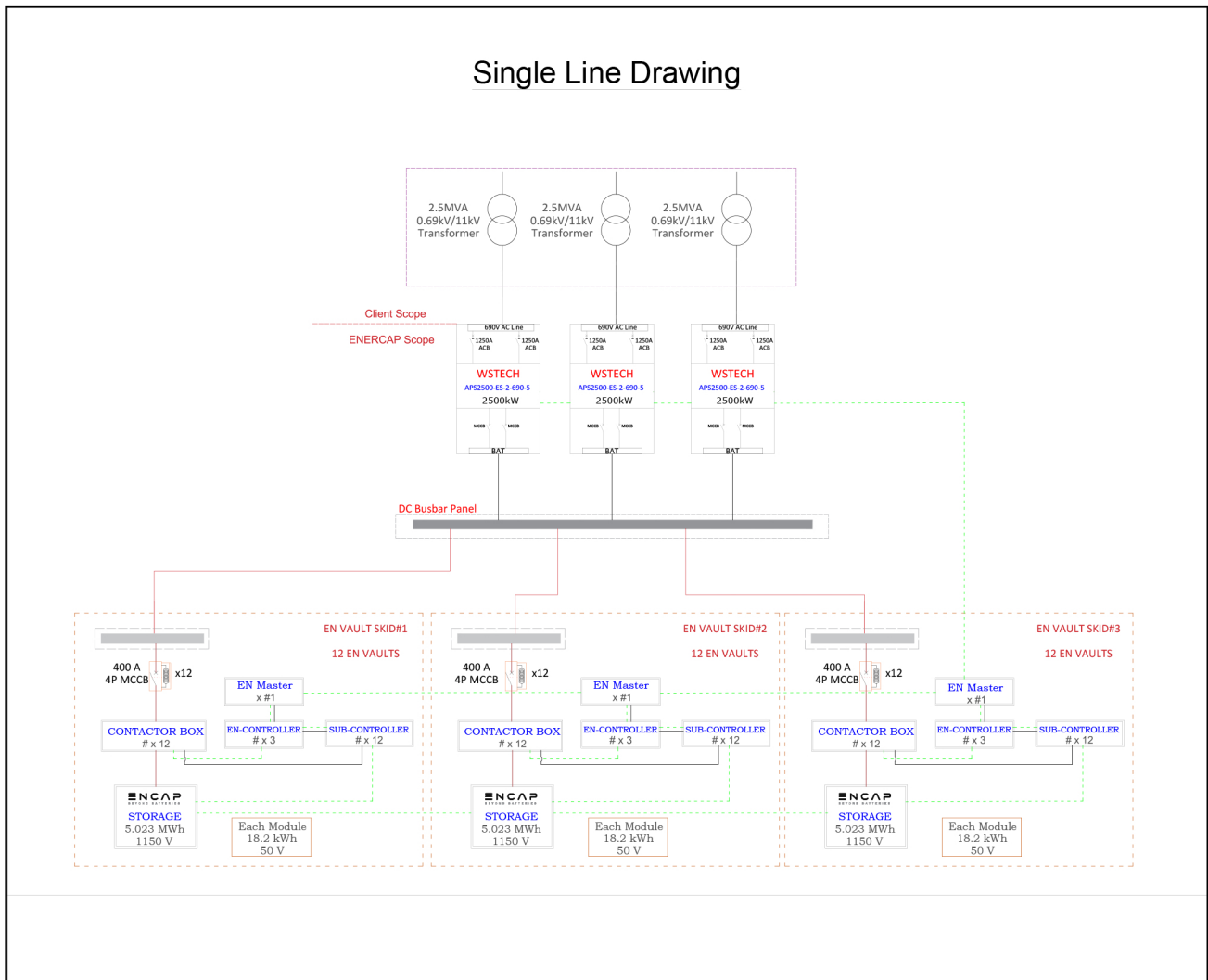


The Skid system consists of an energy storage battery system installed in Envault, a monitoring system, and a battery management unit. This “turnkey” system is designed to meet the demanding requirements for residential, C&I and utility side applications alike, committed to making the power interconnected reliably.

PROJECT SITE LAYOUT

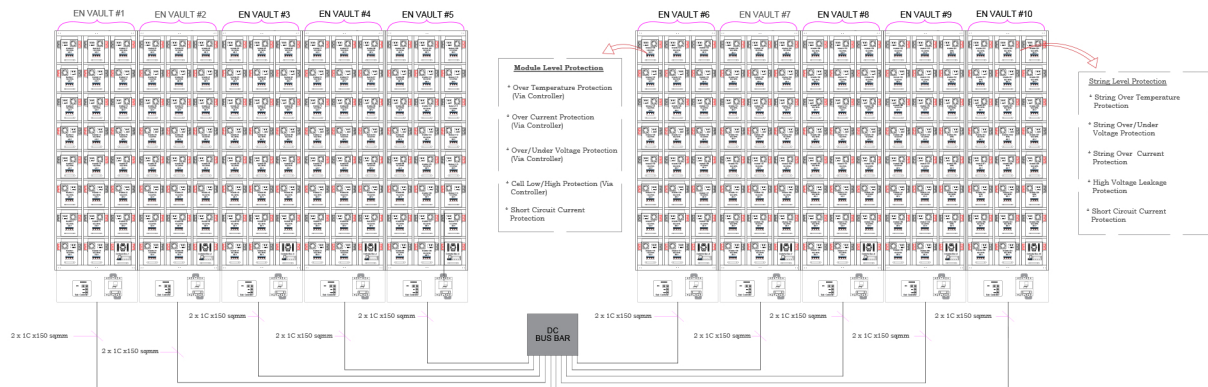


SINGLE LINE DIAGRAM

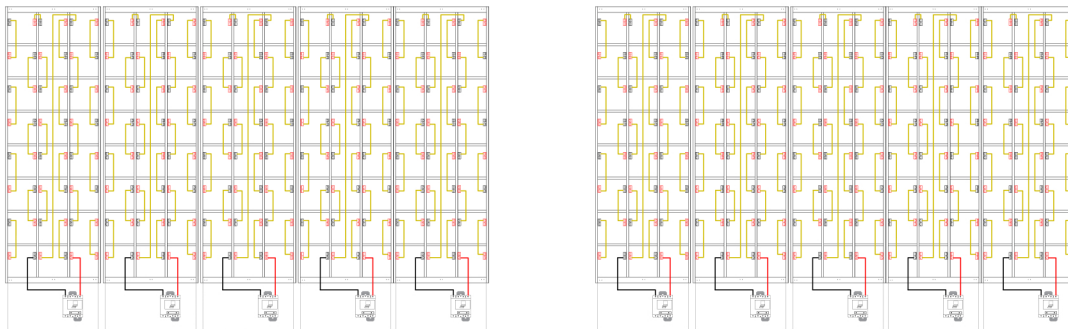


MODULE STRING ASSEMBLY

Module Strings Assembly



Module Rack Series Connection Diagram



PROJECT OVERVIEW

S / N	ITEMS		DESCRIPTION	QTY
1	ENVault Skid			3 Units
2	WSTECH		2500kW	3 Units
3	Monitoring Rack	No.of Racks		3 Units
		Industrial WIFI Router		3 Units
		Industrial PC	Industrial PC Re- sistive Square Screen 19 Inch I3-4040 CPU+8GB RAM+256GB	3 Units
		Auxiliary Inverter	3kW, 48V	3 Units
		Auxiliary Module	ENCAP 8kWh, 48V	3 Units
		Encontroller		9 Units
		EN-Master		3 Units
4	ENVAULT	No. of ENVaults		36 Units
		Storage Capacity	18.2kWh, 50V	828 Units
		Sub Controller		36 Units
		Contactor Box		36 Units
		MCCB	4P/400A	36 Units
5	Distribution Panel			4 units

WSTECH APS2500



FEATURES

- Fast response times below 100ms and communication speed up to 10ms
- Water-cooled IGBT and inductance combined with air to air heat-exchanger
- Hermetically closed cabinet (no dust, sand or rain inside)
- Ambient conditions -40°C up to 60°C, up to 5000m altitude
- Supply of up to 100% leading/lagging reactive power
- Efficiency up to 99.0%

PERFORMANCE SPECIFICATIONS	
MODEL	APS2500-ES-2-690-5
DC SIDE	
Independent DC Source	1
Nominal DC Voltage ($U_{DC,Nom}$)	1100V
Max. DC Voltage ($U_{DC,Max}$)	1500V
Min. DC Voltage ($U_{DC,Min}$)	1008V/1109 V
Max. DC Current ($I_{DC,Max}$)	2 x 1220 A
Max. Short Circuit Level ($I_{DC,SC}$)	6.4 kA/ 30 kA / 140 kA (max. 0.5 mS)
Nominal DC Power ($P_{DC,Nom}$)	2541kW
Max. Capacity against earthing	2000 μ F
GENERAL	
Control Strategy	CC-CV
Efficiency (Coupled APUs)	(98.5 99.0 98.9 98.8 98.7)%
Efficiency (Seperated APUs)	(98.5 99.0 98.9 98.7 98.6)%
EU Efficiency	98.8%
Feed-in stating at ($P_{DC,TH}$)	200 W
Standby Losses	90 W
Max. Auxiliary Power	<3500 W
GRID SIDE	
Max. AC apparent power (S_{max})	2500 kVA
Nominal AC power ($P_{AC,nom}$)	2500 kW

Number of Apparent Power Units (APU)	2
Number of independent grids	1
Nominal grid voltage (UAC, nom)	690V
Grid voltage range	+/- 10% of UAC, nom
Nominal grid frequency (fnom)	50 Hz
ROCOF	<= 4Hz/s
Network configuration	IT system
Max. AC current per APU (IAC, max (APU))	1050 A
Max. AC current – APS (IAC, max (APS))	2 x 1050 A
Max. short circuit level (IAC, SC (APS))	42 kA
Short circuit withstand capability (ICW)	42 kA, 100ms
Short circuit contribution (I'K)	2 x 1060 A
Short circuit contribution (I''K)	2 x 1060 A
Short circuit contribution (IP)	2 x 1560 A
Max. load capability	100%
Time span overload	0.0 s
Asymmetrical load between the phases	417 kVA
Power factor (cos ϕ)	0 ind ... 1 ... 0 cap
AC current distortion (THD)	< 3%

ENS-15M-1150-X-X-X-X-S_2V0_GEN1

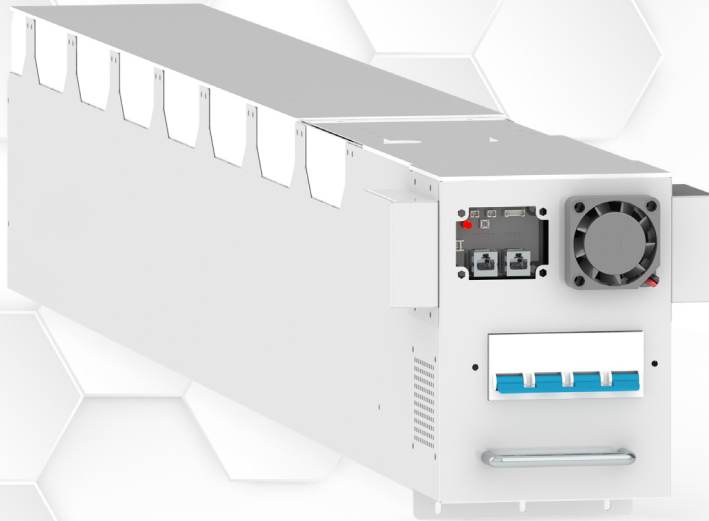
ENVAULT



ENVault INSIDE VIEW



1. MODULE 18.2kWh 50V



FEATURES

1. EFFICIENT

- Highly Efficient: > 95% RTE (Round Trip Efficiency)
- 100% DOD (Depth of Discharge)
- 500,000 Cell Life Cycles

2. SAFE & RELIABLE

- Wide Operating Temperature Range
- Deployable in Various Environments including High Altitudes
- No Thermal Runaway Risk

PERFORMANCE SPECIFICATIONS	
DC Energy	18.2kWh
Voltage Range	48Vdc to 58Vdc
DC Voltage (Nominal)	50Vdc
Internal Resistance	< 4 mili Ohms
CELL SPECIFICATIONS	
Technology	Encapsulated Cell
CHARGE CHARACTERISTICS	
Maximum Continuous Charge Current	365A (~1C)
Charging Method	CC/CP/VP
DISCHARGE SPECIFICATIONS	
Maximum Continuous Discharge Current	365A (~1C)
Discharging Method	CC/CP/VP
EN-CONNECT SOFTWARE	
Module Monitoring	Total Voltage, Individual Cell Voltages, Current, Temperatures, SOC and Energy Consumed
MODULE ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature Range	-30°C~ +70°C
Operating Humidity	Non-Condensing
MECHANICAL SPECIFICATIONS	
Module Casing Material	GI Powdered
Terminal Type	Anderson Connectors
SMART FEATURES	
Communication	CANBUS and UART

SERVICE LIFE	
Cells Projected Cycle Life ²	500,000 cycles
Cells Projected Calendar Life ³	25 years
Module Projected Shelf Life ⁴	10 years
Warehousing	Can be stored at any SOC without affecting cycle life

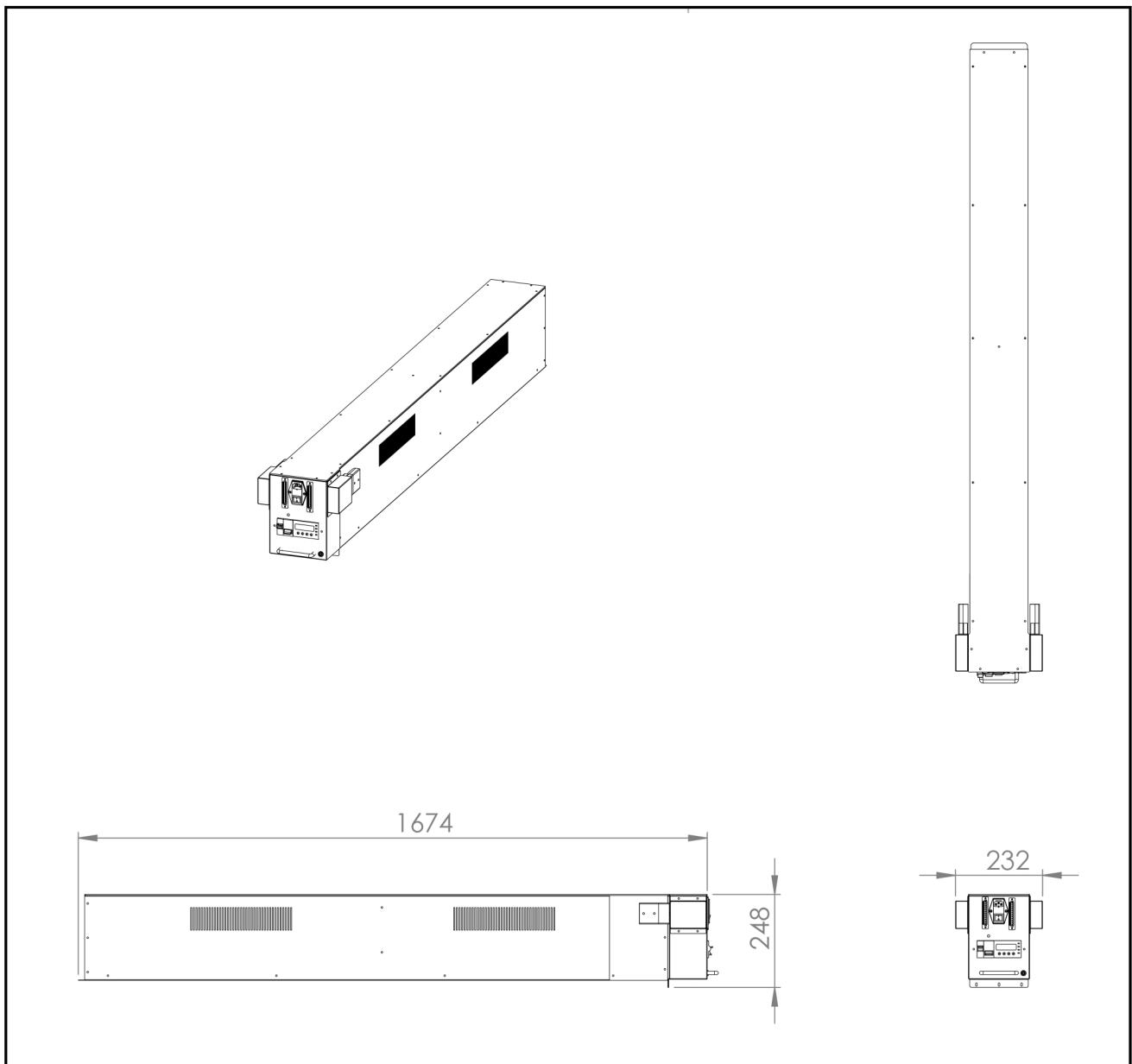
2. CONTACTOR BOX



FEATURES

1. Short Circuit Protection
2. High Current (Charging/ Discharging) Protection
3. DC Bypass for Overload Current >20A
4. Manual Bypass Breaker For Maintenance Purpose

CONTACTOR BOX 2D DIAGRAM



SPECIFICATIONS

Voltage	230Vac
Charge Control	365A
Discharge Control	365A
DC Bypass for Overload Current	>20A
Pre-charge Current	10A via 200W limiting Resistor
Protection	Short Circuit Protection, High Current (Charging/Discharging) Protection
Manual Bypass Breaker	125A 1Pole
Communication	RJ45 Port (CANBUS Communication)
Dry Contact Control	DB 25 Pin
LED Indicator	Pre-charge, Charge, Discharge, Bypass, Fan
Compatibility	Work only through EN Rack Controller

MECHANICAL SPECIFICATIONS

Dimensions (W x H x D) mm	453 x 156 x 507
Weight (kg)	18
Material	GI/AL/Plastic

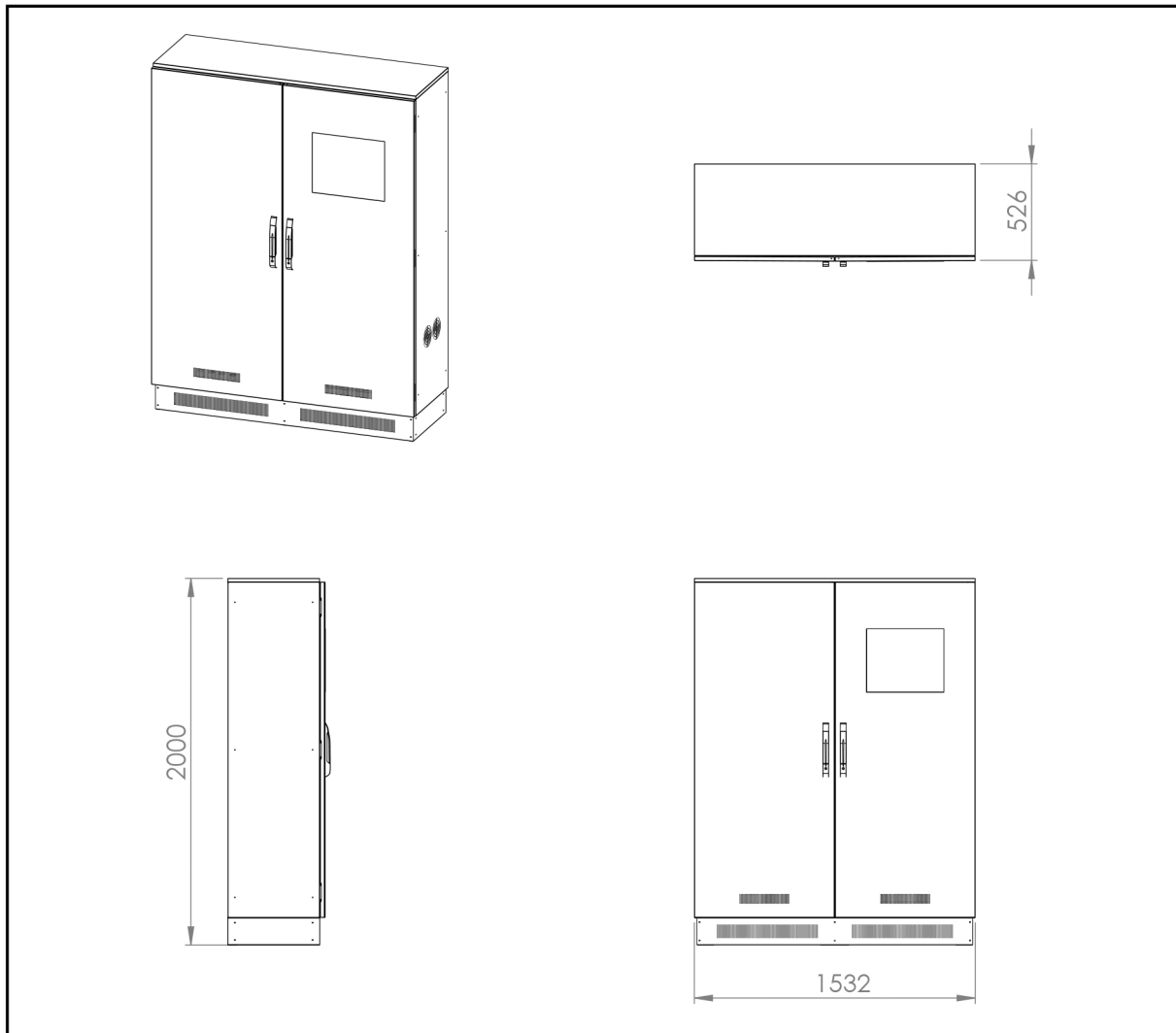
3. SUBCONTROLLER



MONITORING RACK & DISTRIBUTION PANEL



2D DIAGRAM



MONITORING RACK

FEATURES

Monitoring rack includes the following items;

1. 19 inches industrial PC for monitoring the container
2. Industrial WIFI Router
3. EN- Controller
4. EN-Master
5. Auxiliary Enserver 3kW
6. Auxiliary Module 8kWh 50V

1. Fan-less Industrial PC



PERFORMANCE SPECIFICATIONS

Size	19"
Resolution	1280 * 800
Color	Chroma: 16.7M
Brightness (Standard Value)	Brightness: 300cd/m2
Response Time	6.5ms
Touch Screen Type	Resistive Touch Screen
Resolution	500DPI

2. Industrial WIFI Router



FEATURES

Stable and Reliable

1. Industrial design, metal enclosure, protection class IP30
2. Wide input voltage DC9-36V, with reverse polarity protection
3. ESD, Surge, EFT/Burst protection
4. Hardware and software watchdog, multi-layer link detection mechanism make it self-recovery from unexpected failure and guarantee reliable communication between remote devices and data center
5. Provides comprehensive security protections for sensitive business data, including secure VPN transmission, firewall against network attacks

Flexible Networking

1. Supports 2G/3G/4G network all over the world, supports APN/VPDN private network access
2. Supports automatic detection of cellular network, 4G/3G/2G mode automatic switching
3. Supports fail over between 4G and WAN, ensures automatic switch to alternative back-up connection, effectively ensuring uninterrupted data transmission
4. Supports 2.4GHz WiFi, scaling more devices access, support wired and wireless connecting Internet
5. Compatible with 5.8GHz WiFi (optional)

PERFORMANCE SPECIFICATIONS

Cellular Interface	Antenna	2xSMA-K
	SIM card	1 x (3V & 1.8V) Standard 2FF SIM, drawer-type sim card slots
Ethernet		1 x WAN port, 10/100 Mbps, compliance with IEEE 802.3, supports auto MDI/MDIX, 1.5KV network isolation transformer protection
		4 x LAN ports, 10/100Mbps, compliance with IEEE 802.3, IEEE 802.3u standards, supports auto MDI/MDIX, 1.5KV network isolation transformer protection
Indicators	LED	PWR: red, always on after powered on Work: green, blinking when the router is ready and working properly WLAN: green, always solid on when WiFi is enabled and working properly USR: user defined. Net indicator: Red always on after connected to 2G network Green always on after connected to 3G network Orange always on after connected to 4G network Signal strength: 3 solid bars, strongest signal
Terminal block	Pinout	V+, V-: 2cores terminal power supply socket, built-in power supply phase-reversal protection GND: ground terminal Tx/B: RS-232/RS485 pin (set up by software) Rx/A: RS-232/RS485 pin (set up by software) DI: 2 x Digital input, passive switch DO: 2 x Digital open collector output, max output-36V, 300mA COM: common terminal, use in conjunction with DOs

WiFi Interface	Standards & Frequency	IEEE802.11b/g/n, 2.4GHz, AP mode
	Data speed	IEEE802.11b/g, maximum 54 Mbps. IEEE802.11n, maximum 150Mbps
	Antenna	2xRP-SMA-K
	Transmission distance	80 meters by line of sight. Actual transmission distance depends on environment of the site.
Power Supply	Adapter	DC12V/1A
	Connector	DC Power Jack Barrel Type Female 5.5*2.1mm Round socket or industrial terminal block,reverse polarity protection
	Input voltage	DC9~36V
	Working power	Average 522mA/12V, Maximum 811mA/12V
Serial Interface	RS485/ RS232(alternative)	Industrial terminal block. Note: RS232 default.
	Baud rate(bps)	1200,2400,4800,9600,19200,38400,57600,115200,230400
	Data bits	8
	Stop bits	1,2
	Parity	NONE, ODD, EVEN
Physical Characteristics	Housing	Metal shell, IP30
	Dimensions	125.0*103.0*45.0mm
	Installation method	Ear mounting ,DIN-Rail mounting
	EMC	Static IEC61000-4-2, level 3

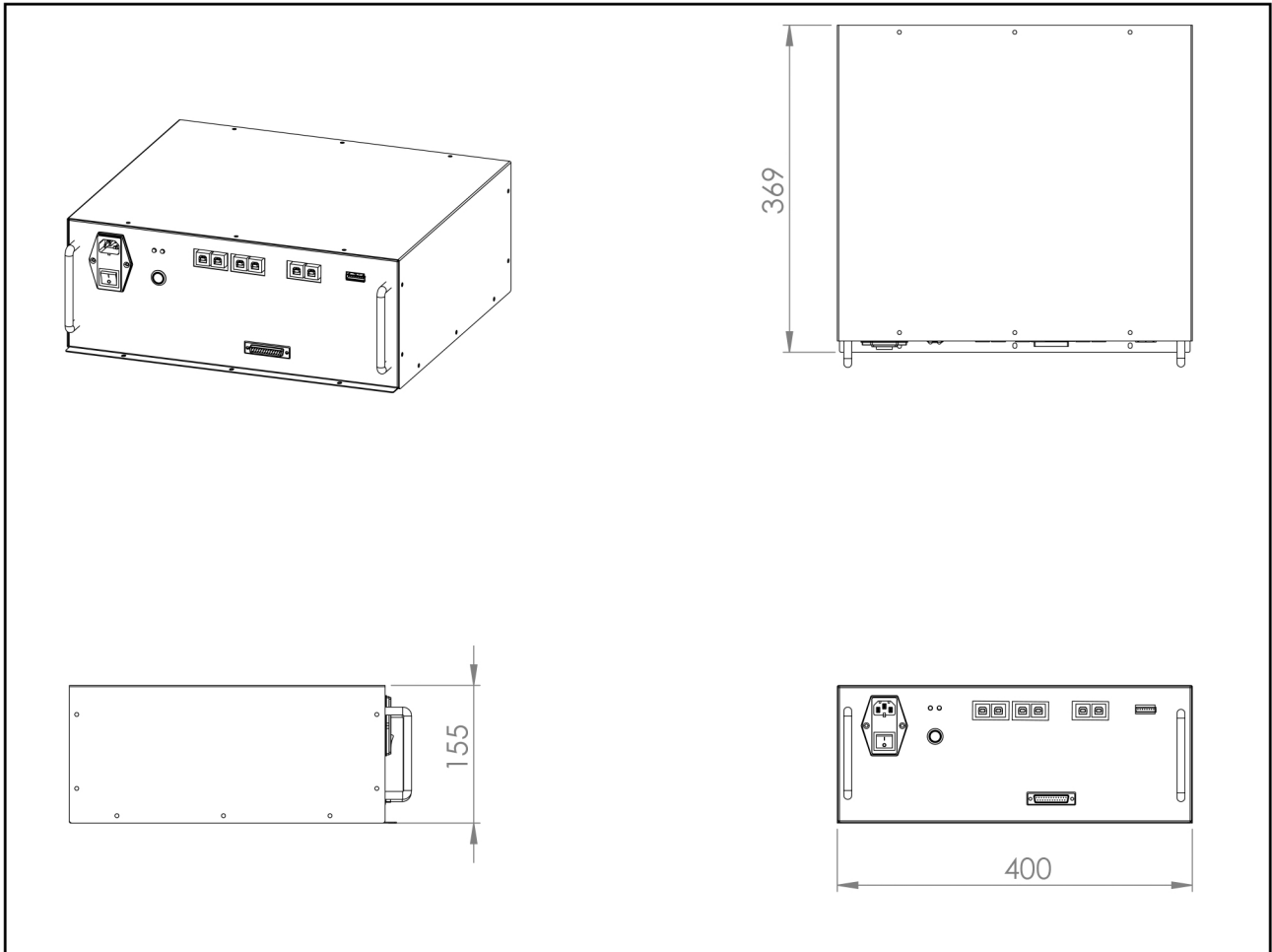
3. ENCONTROLLER



FEATURES

- Input Power 220VAC
- Collects data from multiple strings and send it to Enserver Master

ENCONTROLLER 2D DIAGRAM



SPECIFICATIONS	
Input Power	230Vac
Controller	String Charge & Discharge Control, Independent String Communication Control
Protection	Modules Over Voltage, High Current and High Temperature Protection
Communication	RJ45 Port (CANBUS Communication)
Dry Contact Control	DB 25Pin
Internal Power Indication	230Vac Power Indicator, 12Vdc Power Indicator
MECHANICAL SPECIFICATIONS	
Dimensions (W x H x D) mm	400 x 155 x 369
Weight (kg)	8
Material	GI/AL/Plastic

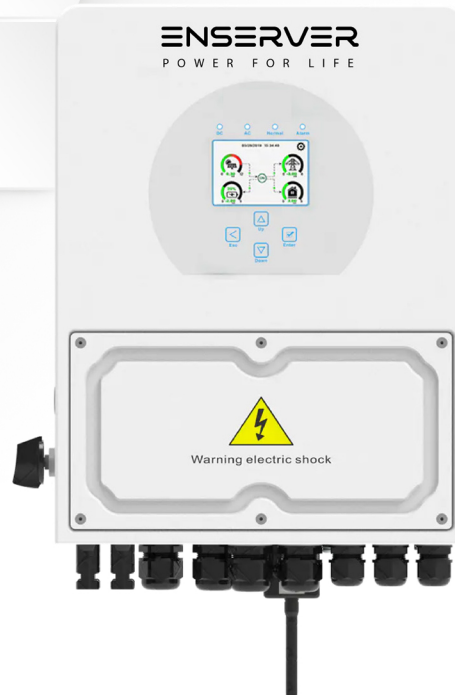
4. ENMASTER



FEATURES

- The EN Server Master acts as a communication link between the EN controllers and WSTECH. It gathers data from the EN controllers and sends it to the EN servers.
- It also manages the charging and discharging of the DC storage module based on its state of charge (SOC). By continuously monitoring the SOC, it ensures the charging and discharging processes are optimized for safe and efficient system operation.

5. ENSERVER FOR AUXILIARY POWER



BATTERY INPUT DATA

Battery Voltage Range(V)	40VDC to 60VDC
Max. Charging Current(A)	70 A
Max. Discharging Current(A)	70 A
Charging Strategy	Self-adaption to BMS
Number of battery input	1

PV STRING INPUT DATA

Max DC Input Power(W)	3900 W
Max DC Input Voltage(V)	500 VDC
Start-up Voltage(V)	125 V
MPPT Voltage Range(V)	150V to 425V
Rated DC Input Voltage(V)	370 V

Max Input Short-Circuit Current(A)	17 A
Maximum Operating PV Input Current(A)	13 A
No.of MPPT Trackers/No.of String Per MPPT Tracker	2/1
AC INPUT/OUTPUT DATA	
Rated AC Input/Output Active Power(W)	3000 W
Max AC Input/Output Apparent Power (VA)	3300 VA
Peak Power (off-grid)(W)	2 times of rated power,10s
Rated AC Input/Output Current(A)	13.6/13 A
Max AC Input/Output Current(A)	15/14.3 A
Max Continuous AC Pass through (grid to load)(A)	35 A
Rated Input/Output Voltage/ Range(V)	220V/230
Grid Connection Form	L+N+PE
Rated Input/Output Grid Frequency/ Range	50Hz/45Hz-55Hz 60Hz/55Hz-65Hz
Power Factor Adjustment Range	0.8 leading to 0.8lagging
Total Current Harmonic Distortion THDi	<3% (of nominal power)
DC Injection Current	<0.5%I _n
EFFICIENCY	
Max Efficiency	97.6%
MPPT Efficiency	>99%

EQUIPMENT PROTECTION

Integrated	DC Polarity Reverse Connection Protection, AC Output Over Current Protection AC Output Over Voltage Protection, AC Output Short Circuit Protection, Thermal Protection DC Terminal Insulation Impedance Monitoring, DC Component Monitoring, Ground Fault Current Monitoring Power Network Monitoring, Island Protection Monitoring, Earth Fault Detection, DC Input Switch Over voltage Load Drop Protection, Residual Current (RCD) Detection, Surge protection level
Surge Protection Level	TYPE II(DC),TYPE II(AC)

INTERFACE

Communication Interface	WIFI, RS485, CAN
-------------------------	------------------

GENERAL DATA

Operating Temperature Range	-40 to +60°C, >45°C Derating
Permissible Ambient Humidity	0~100%
Permissible Altitude	2000m
Noise	<30 dB(A)
Ingress Protection(IP) Rating	IP 65
Inverter Topology	Non-Isolated
Over Voltage Category	OVC II(DC),OVC III(AC)
Cabinet size (W*H*D) [mm]	330 x 433 x 238
Weight (Kg)	14 Kg

Type Of Cooling	Natural cooling
Grid Regulation	IEC 61727, IEC 62116, CEI 0-21, EN 50549, NRS 097, RD 140, UNE 217002, OVE-Richtlinie R25, G99, VDE-AR-N 4105
Safety EMC/Standard	IEC/EN 61000-6-1/2/3/4, IEC/EN 62109-1, IEC/EN 62109-2

6. ENSIRIUS MODULE FOR AUXILIARY

8kWh 48V



FEATURES

1. EFFICIENT

- Highly Efficient: > 95% RTE (Round Trip Efficiency)
- 100% DOD (Depth of Discharge)
- 500,000 Cell Life Cycles

2. SAFE & RELIABLE

- Wide Operating Temperature Range
- Deployable in Various Environments including High Altitudes
- No Thermal Runaway Risk

PERFORMANCE SPECIFICATIONS	
DC Energy	8000Wh
Ampacity	250Ah
Voltage Range	44Vdc to 55Vdc
DC Voltage (Nominal)	48Vdc
Internal Resistance	< 4 mili Ohms
CELL SPECIFICATIONS	
Technology	Hybrid Cell
Nominal Cell Voltage	6.75 ~8.4Vdc, Equalizer 3.8Vdc
CHARGE CHARACTERISTICS	
Maximum Continuous Charge Current	160A (~1C)
Charging Method	CC/CP/VP
DISCHARGE SPECIFICATIONS	
Maximum Continuous Discharge Current	160A (~1C)
Discharging Method	CC/CP/VP
EN-CONNECT SOFTWARE	
Module Monitoring	Total Voltage, Individual Cell Voltages, Current, Temperatures, SOC and Energy Consumed
MODULE ENVIRONMENTAL SPECIFICATIONS	
Operating Temperature Range	-30°C to 70°C
Operating Humidity	Non-Condensing
MECHANICAL SPECIFICATIONS	
Dimensions (W x H x D) mm	453 x 321 x 395
Weight (kg)	63 kg
Module Casing Material	GI Powdered
Terminal Type	F08 Terminals

SMART FEATURES	
OLED Display	Monitor Module
Communication	WIFI
Alarm	Buzzer alarm in the event of Over/under-Voltage, Over-Current, Over Temperature
Dry Contacts Output	Four programmable Dry Contacts
SAFETY PERFORMANCE	
Short Circuit Protection	Instant Electronic Switching, Terminal Cut-off
Over/under Voltage	Electronic Switching, Terminal Cut-off
Over Current	Electronic Switching, Terminal Cut-off
Over Temperature	Electronic Switching, Terminal Cut-off
SERVICE LIFE	
Cells Projected Cycle Life	500,000 cycles
Cells Projected Calendar Life	25 years
Module Projected Shelf Life	10 years
Warehousing	Can be stored at any SOC without affecting cycle life