ANEXO

PROYECTO TÉCNICO ADMINISTRATIVO PARA HIBRIDACIÓN PLANTA SOLAR FOTOVOLTAICA EXISTENTE “FV ALCONCHEL 2020.2” 11MW CON SISTEMA DE ALMACENAMIENTO ELECTROQUÍMICO EN BATERÍAS “ALM HIB ALCONCHEL 2020.2” 10 MW / 2h

“HIB ALCONCHEL 2020.2” 21MW

MARZO 2025

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ALEJANDRO BARÓN
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Motivo: Soy el autor de este documento
Ubicación: Sevilla
Fecha: 2025.04.08 10:58:30 +02'00'

TABLA DE CONTENIDO

1. PLANO DE IMPLANTACIÓN

Este plano contiene las coordenadas UTM (Datum ETRS89) HUSO 29 de las líneas subterráneas de Media Tensión entre las áreas de almacenamiento y hasta su llegada a la subestación elevadora existente. También incluye las coordenadas de entrada en la subestación existente.

La PSFV "FV ALCONCHEL 2020.2" conecta con la Subestación elevadora BARCARROTA 2020 30/66kV, localizada en la propia PSFV, y desde ahí hasta la Subestación SE BARCARROTA 66kV, propiedad de E-distribución Redes Digitales SLU (EDR), punto de Conexión a la Red (PCR).

La instalación proyectada corresponde a un sistema BESS conectado en el embarrado existente de 30kV de la SET BARCARROTA 2020, donde compartirán embarrado con las líneas procedentes de la PSFV. PSFV y BESS tendrán un medidor independiente, y un medidor en común en el lado de 66kV. Esta operación permitirá el desacople entre el recurso solar y la generación del conjunto hibridado.

LEYENDA

- INSTALACIÓN "FV ALCONCHEL 2020.2" EXISTENTE
- VALLADO "FV ALCONCHEL 2020.2" EXISTENTE
- CONTENEDOR BATERÍAS
- PCS + MVSKID
- LÍMITE PARCELA
- ZANJA MT
- ZANJA MT BAJO VIAL
- ZANJA BT
- ZANJA MT EXISTENTE "FV ALCONCHEL 2020.2"

"HIB ALCONCHEL 2020.2"

"ALM HIB ALCONCHEL 2020.2"

"FV ALCONCHEL 2020.2"

Coordenadas ETRS89 HUSO 29

	Línea MT	
	X	Y
1	685742,64	4265947,04
2	685753,09	4265947,04
3	685756,25	4265953,16
4	685760,51	4265955,33
5	685756,31	4265955,33
6	685756,27	4265971,89
7	685730,95	4265971,89
8	685730,73	4266014,49
9	685725,86	4266017,91
10	685720,93	4266016,82
11	685674,33	4265981,23
12	685659,93	4265964,11
13	685621,91	4265932,13
14	685602,54	4265922,61
15	685584,27	4265897,47
16	685573,07	4265846,82
17	685559,64	4265832,59
18	685556,60	4265818,59
19	685457,54	4265718,12
20	685439,69	4265705,47
21	685427,95	4265698,15
22	685428,69	4265691,93
23	685425,82	4265691,26

FECHA:	NOMBRE:	REVISIÓN:	COMENTARIO:
31/03/2025	MSR	00	

	FECHA:	NOMBRE:	FIRMA:
DIBUJADO:	31/03/2025	MSR	
APROBADO:	31/03/2025	ABS	

INOVE INGENIERÍA

ESCALA: S/E	TÍTULO: Implantación	PROYECTO: ALM HIB ALCONCHEL 2020.2
		CÓDIGO: 071-AL.2-EL-DRW-100
		REVISIÓN: 00

2. EQUIPOS PRINCIPALES (ANEXO I – HOJAS DE DATOS DE EQUIPOS PRINCIPALES)

En Sevilla, marzo de 2025

D. Alejandro Barón Santana

Ingeniero Industrial. Colegiado. Nº 6337.

C.O.I.I. Andalucía Occidental

ANEXO I

HOJAS DE DATOS DE EQUIPOS PRINCIPALES

MARZO 2025

Narada南都电源

Technical Specification

Narada Center 20 1500-314-5016L-0.5C Container

ZHEJIANG NARADA POWER SOURCE CO., LTD | www.naradapower.com

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Contents

1. Abbreviations

Table 1-1 Abbreviations

No.	Abbreviations	Full Name
1	AC	Alternating Current
2	BAT	Battery
3	BESS	Battery Energy Storage System
4	BOS	Balance of System
5	BMS	Battery Management System
6	BMU	Battery Management Unit
7	BCU	Battery Cluster Management Unit
8	BAMS	Battery Administration Management System
9	BAU	Battery Administration Management Unit
10	BOP	Balance of Plant
11	BOL	Beginning of Life
12	DC	Direct Current
13	EMS	Energy Management System
14	EOL	End of Life
15	FSS	Fire Suppression System
16	HMI	Human Machine Interface
17	HV	High Voltage
18	HVAC	Heating & Ventilation and Air Conditioning
19	LFP	Lithium iron phosphate
20	MV	Middle Voltage
21	PCS	Power Conversion System
22	POC	Point of Connection
23	SOC	State of Charge
24	SOH	State of Health
25	UPS	Uninterruptable Power Supply

2. System Design

This system adopts the outdoor container BESS system, which contains Narada LFP battery: NESP series, intelligent battery management system and the group technology. Narada can supply safe, reliable, stable power supply solutions, to provide comprehensive highly quality energy.

2.1 Scope of Supply

Narada will offer solutions for the requirements as below:

1) Storage batteries;
2) Battery installation rack;
3) BMS;
4) HVAC;
5) Fire suppression system;
6) Container solution.

Table 2-1 List of Supply Scope (20ft Container equipped with 12 battery racks)

Equipment	Specification and Models	Unit	Qty.	Remark
Battery Cell	FE314A	pcs	4992	
Battery Strings	1331.2V 314Ah system	set	12	With racks and BMS
Container	20ft ISO container	set	1	Battery container
FSS	NOVEC1230	set	1	For reference
Liquid Unit	60kW cooling capacity	unit	1	
AUX Combiner Panel	DC combiner panel & Auxiliary power supply	unit	1	

2.2 BESS Specification

Table 2-2 Center 20 1500-314-5016L-0.5C BESS Specification

Items	Unit	Parameters
Cell Configuration	-	12P416S
Rack Qty.	pcs	12
Rated Voltage	V	1331.2
Work Voltage Range	V	1164.8 ~ 1497.6
Rated Energy	MWh	5.016
Allowed C-rate	-	0.5C
Cooling Type	-	Liquid
Dimension (W × D × H)	mm	6058 × 2438 × 2896 (20ft)
Weight	kg	~45000
Temp. Difference	℃	≤5
DC RTE	%	≥94%
Lifespan	years	20
IP Grade	-	IP54
FSS Type	-	NOVEC 1230 (For reference)
COM Port/Protocol	-	Modbus TCP/IP
Recommended Storage Temp. Range	℃	15 ~ 30
Operation Ambient Temp. Range	℃	-30 ~ 55
Certificates	-	UL 9540, UN 3536

2.3 BESS Topologic

The BESS topological drawing shows the design of BESS and how the AC, DC, and control sections are interconnected. In DC section, one battery bank is made up with certain number of racks in accordance with the system configuration and normally one battery bank connects to one PCS. Several combinations of PCS and battery system establish the whole BESS.

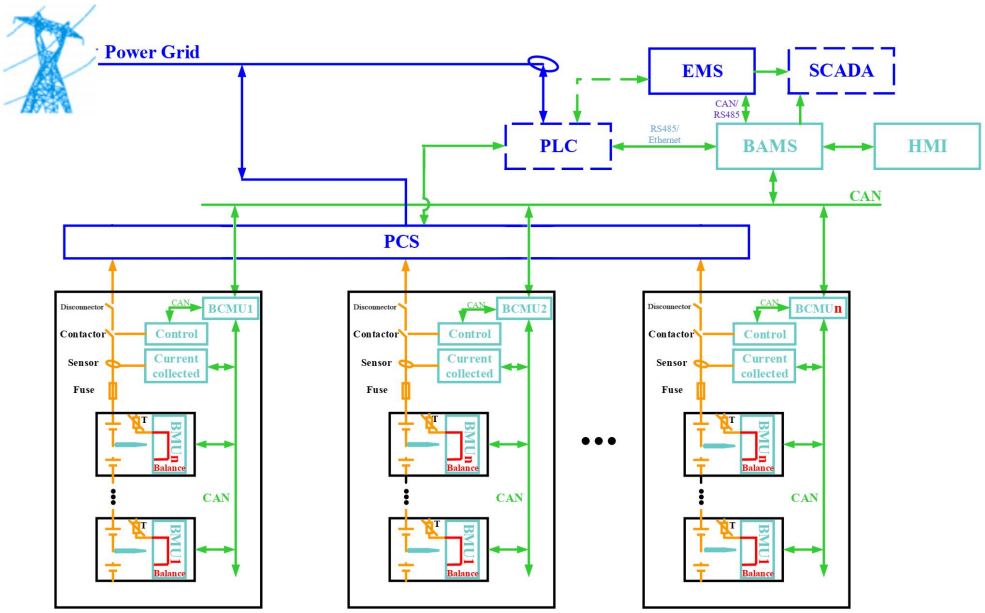


Figure 2-1 BESS Topological Drawing (For reference)

3. Battery System

3.1 Battery Cell

Battery cell, the basic unit of lithium iron phosphate battery, consists of positive, negative electrodes and electrolyte, with rated voltage of 3.2V and rated capacity of 314Ah. Narada adopts advanced LFP chemistry batteries, enjoying low cost, high efficiency and reliability as well as industry-leading safety technology. The battery cell is sealed in aluminum enclosure as shows in the following picture.

Table 3-1 Specification of Battery Cell

Item	Unit	Specification	Rendering
Type No.	-	FE314A	 (For reference)
Battery Chemistry	-	LFP	
Nominal Capacity	Ah	314Ah	
Nominal Energy	Wh	1004.8	
Nominal Voltage	V	3.2	
Operating Voltage	V	2.50 ~ 3.65	
Dimension (W×D×H)	mm	174 × 72 × 207	
Weight	kg	~5.7	
Recommended C-Rate	-	0.5C	
Certificate	-	UL9540A, IEC62619, UN38.3	

3.2 Battery Module

A battery module consists of a number of cells in a manner of 1P52S, with rated voltage of 166.4V and rated capacity of 314Ah. The battery module and BMS adopt unified standard modular design to ensure the universality of the system. Flexible configuration, multiple battery modules can be in serial for expanding voltage and capacity.

Table 3-2 Specification of Battery Module

Item	Unit	Specification	Rendering
Type No.	-	166.4NESP314	 (For reference)
Module Configuration	-	1P52S	
Module Capacity	Ah	314	
Energy	kWh	52.2	
Nominal Voltage	V	166.4	
Operating Voltage	V	145.6 ~ 187.2	
Dimension (W×D×H)	mm	780 × 1140 × 245	
Weight	kg	~355	
Recommended C-Rate	-	0.5C	
Certificate	-	UL9540A, IEC62619, UN38.3	

3.3 Battery Rack

A number of modules and control box are connected in series through electrical connectors, delivers high voltage up to 1331.2V in rated voltage and 314Ah in rated capacity. Each battery rack contains 8 modules and 1 control box, which integrates BCU, disconnector, contactors, pre-charge resistor, fuses, current sensors and switching power supply.

Table 3-3 Specification of Battery Rack

Item	Unit	Specification	Rendering
Type No.	-	166314418	 (For reference)
Rack Configuration	-	1P416S	
Module Quantity	pcs	8	
Capacity	Ah	314	
Energy	kWh	418.0	
Nominal Voltage	V	1331.2	
Operating Voltage	V	1164.8 ~ 1497.6	
Dimension (W×D×H)	mm	905 × 1100 × 2517	
Weight	kg	~3000	
Recommended C-Rate	-	0.5C	
Certificate	-	UL9540A, IEC62619, UN38.3	

3.4 Battery Container

The populated 20ft NWI liquid-cooling energy storage container is an integrated high energy density system, which consists of battery rack system (314Ah LFP cell), BMS (battery management system), FSS (fire suppression system), thermal management system and auxiliary distribution system.

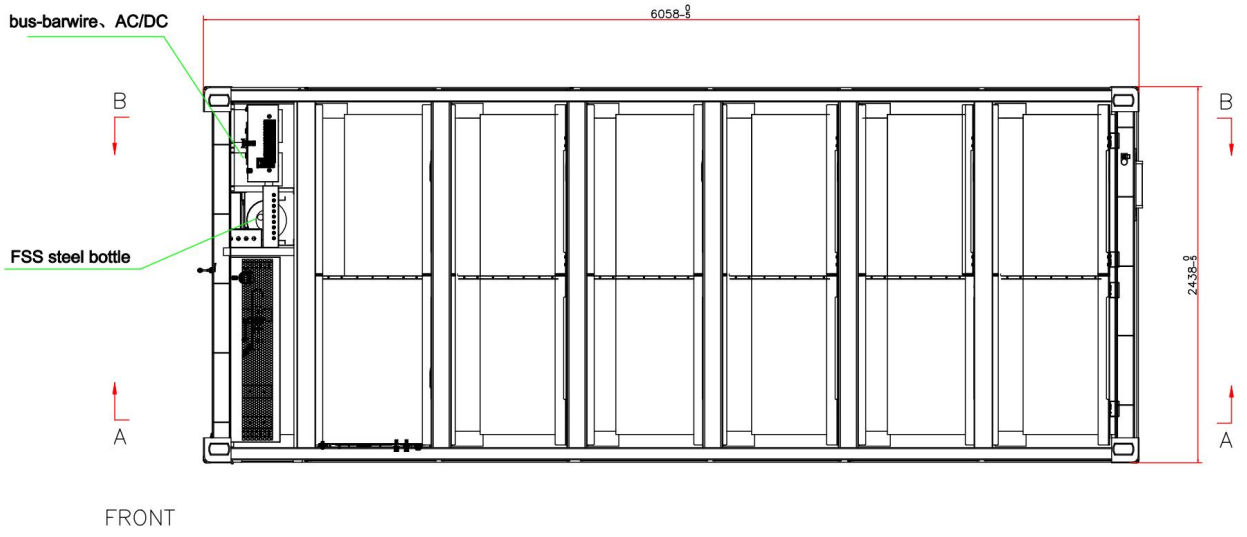


Figure 3-1 Battery Container Layout (For reference)

3.5 Battery Management System

3.5.1 Overview

BMS collects, processes and stores the important information during the operation of the battery module in real time, and exchanges the information with the external equipment to give real-time alarm and protection during the operation of the battery module. BMS generally adopts multi-level distributed architecture design. For three-level architecture, BMS system is composed of module level BMU, rack level BCMU and bank level BAMS. The overall control and communication diagram is shown as below:

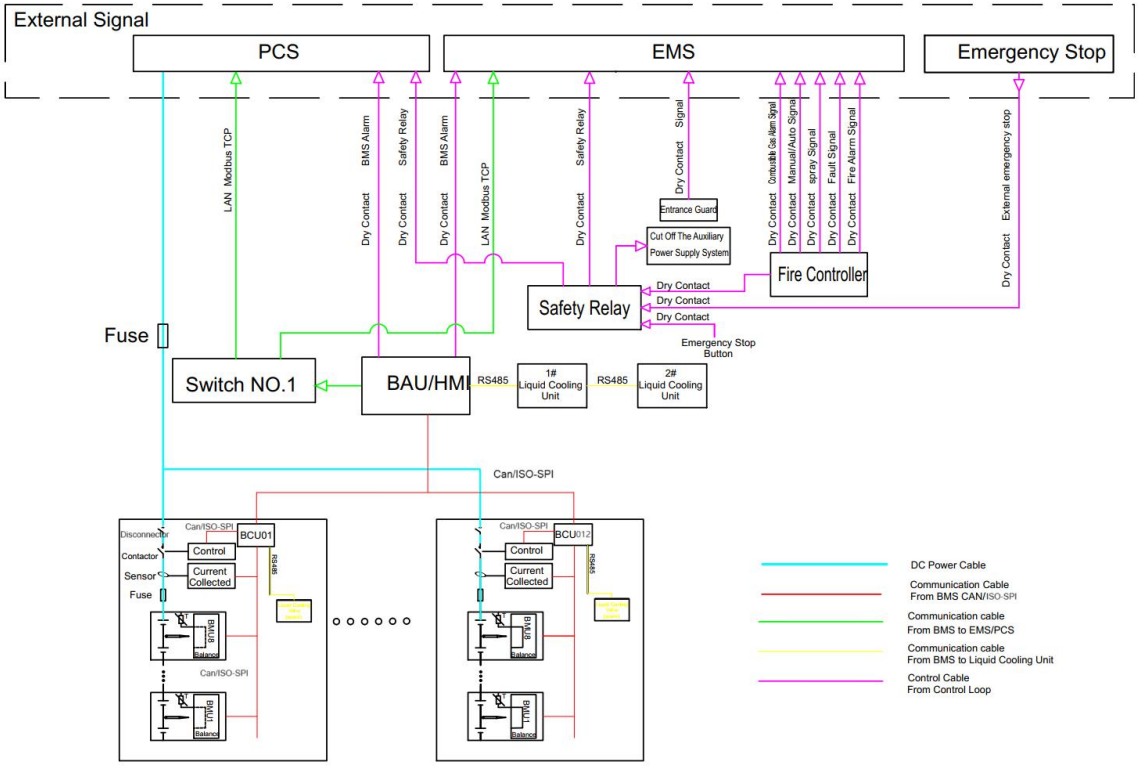


Figure 3-2 BMS Communication Diagram (For reference)

3.5.2 Multi-level BMS Function

Table 3-4 Multi-level BMS Function (For reference)

BMS Level	Main Function	Description
BMU	Basic hardware configuration	Cell voltage sampling
		Temperature sampling
	Battery cell management	Active equalization
	Information management	Communication with BCMU

BMS Level	Main Function	Description
BCMU	Battery status sampling	Total rack voltage sampling
		Charging and discharging current sampling
		Insulation resistance sampling
	Thermal management	Temperature alarm signals
	Estimation of battery status	Estimation of SOC
		Estimation of SOH
	Failure diagnosis	Battery failure diagnosis alarm
		BMS system self-check and fault diagnosis alarm
	Information management	Software upgrade
		Communication with BMU and BAMS
BAMS	Information management	Remote management interface
		Communicate with PCS, EMS and other equipment
	Data storage	Data storage, transmission and processing

4. Auxiliary Equipment

Maximum Auxiliary consumption for Narada single 0.5C 314Ah container						
Item	Components	Description	Power /W	No	Total /W	Notes
1	Liquid Cooling Unit	Liquid Cooling Unit 60KW	1200	1	1200	Standby mode
			35600	1	35600	Cooling mode
2	HVAC	Cooling & Heating	1000	1	1000	/
3	Container auxiliary power	Lighting	50	1	50	
		Container socket	2000	1	2000	
4	Dehumidifier	Dehumidification	60	8	480	
5	Switch	Switch	3	1	3	UPS
6	BMS	BMS	200	12	2400	
7	Water Sensor	/	0.5	1	0.5	
8	Temperature/Humidity Sensor	/	0.4	2	0.8	
9	FSS Control Panel/Sensors	Built-in battery	120	1	120	
In total		Max consumption power (kW)			41.65	
		Operating consumption power (kW)			39.60	
		Standby consumption power (kW)			4.72	

4.1 AUX Combiner Panel

AUX combiner panel works as an important device for auxiliary power supply and DC combiner.

Auxiliary power supply:

a) Power source of Liquid cooling unit, FSS, Lighting, BMS, etc.;

b) With UPS minimum 15 minutes time as backup power supply;

c) Flexible power resource input support: 380/400/480Vac/50/60Hz 3P4L (**The type of auxiliary resource shall be confirmed by the Client before the contract**);

d) Protection function with main circuit breaker and dual E-stop circuit systems.

DC combiner panel:

The main function of the DC combiner panel is to combine multiple battery racks to one DC bus, then connect to the DC input of PCS with necessary protections. Fuses, SPDs, and SPD fuses act as key parts of battery protection devices.

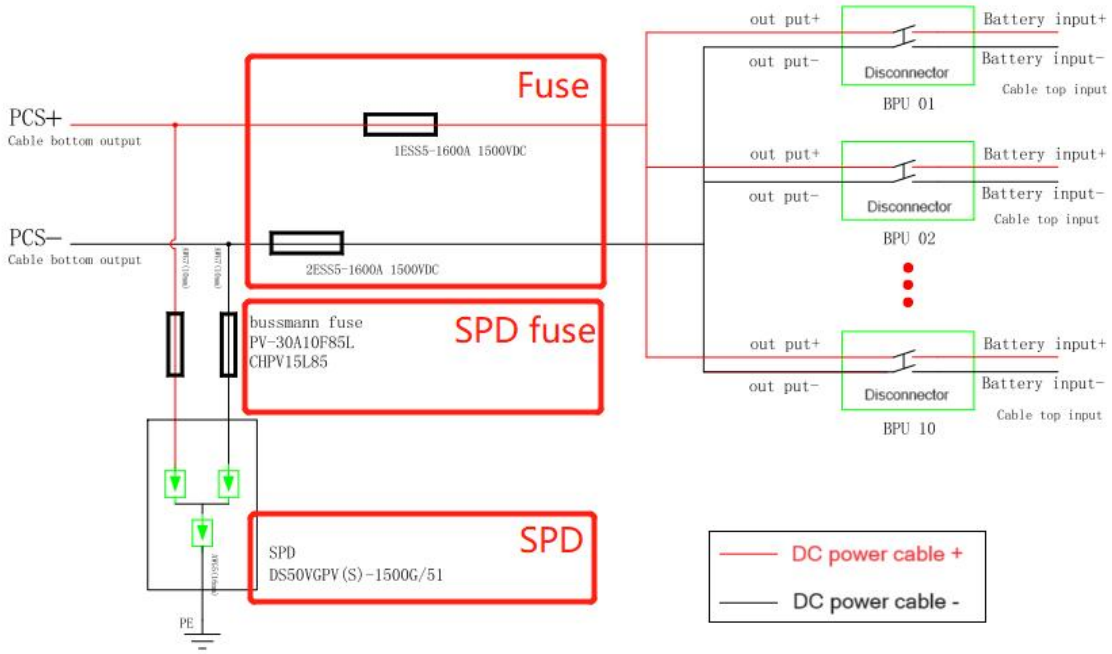


Figure 4-1 DC Combiner Panel Connection Diagram (For reference)

4.3 Thermal Management System

The system uses a liquid cooling system for heat dissipation. Liquid cooling is a technology that uses a

liquid as a coolant to remove heat from the heated parts. It has good temperature homogeneity. The liquid cooling system mainly consists of pipes, pumps, heat exchangers and compressors. The main coolant of the system is ethylene glycol and water.

4.3.1 Equipment Cooling Design

Inside the enclosure, there are multi-stages cooling pipes to manage the battery system. First level is the master pipe on the top of enclosure, connected with cooling unit. Second level is the secondary pipe, to separate the master pipes to each rack stage to cool down rack temperature. Third level is targeted for each module cooling (branch pipeline). Each stage will support with inlet and outlet pipes correspondingly. The coolant from master pipe to branch pipe is sent from cooling unit to modules by the pump. After absorbing the heat generated by the battery it is returned to the cooling unit. The layout of the liquid cooling pipe is shown below.

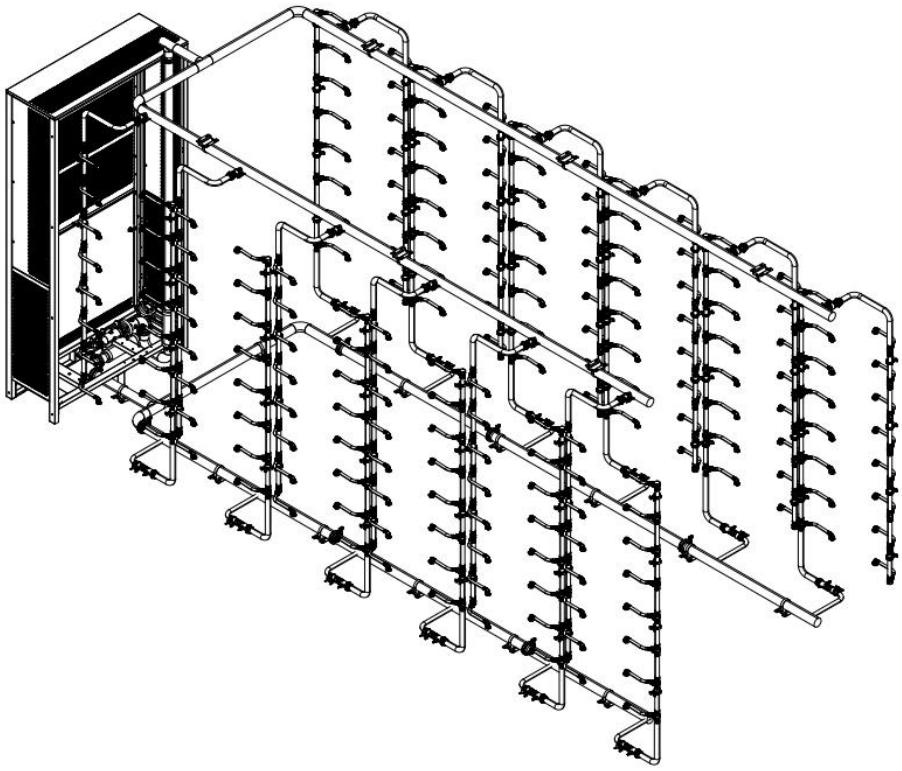


Figure 4-2 Liquid Cooling Pipe Layout (For reference)

4.4 Fire Suppression and Alarm System Design

4.4.1 Description

The fire suppression system of battery container is composed of automatic fire alarm system, automatic gas fire extinguishing system, flammable gas detection, exhaust fan system, and sprinkler system. Automatic fire alarm and gas fire extinguishing system consists of fire alarm controller/gas extinguishing controller, temperature sensors, smoke sensors, manual/automatic switch, emergency start and stop device, sound and light alarm, alarm bell, gas release indicator, gas fire extinguishing system, pressure relief valve, etc. Flammable gas detection and exhaust system is composed of flammable gas detector and exhaust fan. The sprinkler system consists of pipes, sprinklers and joints.

Note that, this fire system design is just for reference, and should be redesigned or modified at system design stage.

4.4.2 Main Equipment List of FSS

Table 4-1: Main Equipment List of FSS (For reference)

No	Components	Qty.	Location	Note
1	FSS Control Panel	1	Inside	Receive detector signal, feedback system status, and linkage start gas fire extinguishing system, sound, light and exhaust equipment.
2	Smoke Sensor	2	Inside	Detect the smoke concentration in the battery container and send the alarm to the alarm controller when there is an alarm value
3	Temperature Sensor	2	Inside	Detect the ambient temperature in the battery container and sends an alarm to the alarm controller when there is an alarm value
4	Alarm Bell	1	Inside	Provide sound alarm when smoke or temperature or flammable gas alarms separately
5	Sound and Light Alarm	1	Outside	Provide sound and flash alarm when multiple alarms of smoke and temperature are given

No	Components	Qty.	Location	Note
6	FSS Emergency Start & Stop Button	1	Outside	Perform an emergency start or stop operation
7	FSS Manual/Auto Switch	1	Outside	Switch the system manually or automatically when entering the container for maintenance
8	Gas Release Indicator	1	Outside	Indicates that a gas extinguishing agent is being sprayed
9	Flammable Gas Detector	2	Inside	Detect the concentration of flammable gas in the container, send alarm signal, linkage exhaust system
10	Exhaust Fan (With shutter)	1	Inside	Ventilate containers to avoid deflagration caused by flammable gas accumulation
11	Shutter	1	Inside	The inside shutter is for free air inlet and the back shutter is for flammable gas outlet
12	Gas Extinguishing System	1	Inside	Accept the start signal of the controller and spray fire extinguishing agent to protect the container with full flood extinguishing
13	Sprinkler Systems	1	Inside	Pipes are arranged inside containers and joints are reserved outside containers for connecting fire hydrants or fire trucks to douse fires and cool them down. Manual operations are required

Note: Above quantities match to 20ft single container.

4.4.3 Fire Suppression System Work Flow

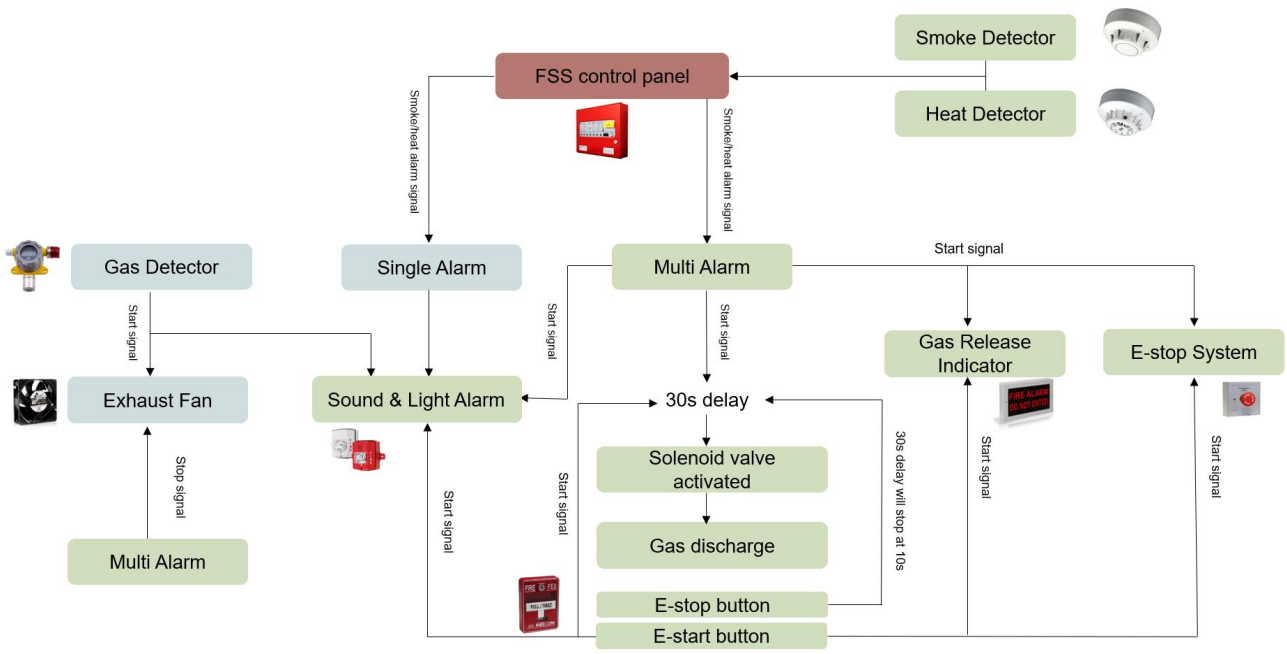


Figure 4-3 Fire Suppression System Work Flow (For reference)

4.4.4 Control logic

4.4.4.1 Flammable Gas Detection System Work Flow

Exhaust fan will start operation if flammable gas detector detects that flammable gas concentration is higher than 10%LEL, at meanwhile “Sound & Light Alarm” will start too.

4.4.4.2 Automatic Fire Alarm System Work Flow

a) Exhaust fan will start operation if only one temperature detector or smoke sensor triggered (primary fire signal), at meanwhile “Sound & Light Alarm” will start too.

b) If two smoke sensors alarm or two temperature sensors alarm or smoke sensor (≥1) + temperature sensor (≥1) alarm (secondary fire signal), it belongs to Multi Alarm, Emergency Stop System will be tripped, exhaust fan will stop operation, “Sound & Light Alarm” and “Gas Release Indicator” will start at the same time, and 30s delay will be triggered too.

c) Once “FSS Emergency Start & Stop Button” is pushed as FSS Emergency Start, action is same as step b.

d) Once “FSS Emergency Start & Stop Button” is pushed as FSS Emergency Stop, FSS action will stop when timer runs to “10s”. If time is less than 10s, the timer will be reset to 10s and stop.
Note: The stop button cannot be released, otherwise the time will continue to countdown.

e) FSS will be discharged after 30s delay.

4.4.4.3 Manual Fire Alarm System

Figure 4-4 FSS Control Panel Auto/Manual Switch (For reference)

When open the door, turn to “Manual Only” in the plate. When the system is at “Manual Only” state, FSS will only alarm without gas release. If need to start gas extinguishing system, push Emergency Start Button outside container door. Before close the container door, turn to “Auto & Manual”.

5. Revision History

Version No.	Action	Author	Auditor	Date
V1.0	First Release	Charleen Chen	Jaden Cai, Jolin Zhou	2023-12-01

ZHEJIANG NARADA POWER SOURCE CO., LTD.

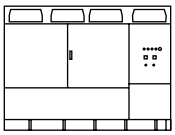
No.822 Wen'er West Road, Hangzhou, Zhejiang, China.

Multi PCSK

DS 2.1

Modularity.
Easy maintenance.
Up to 4 independent DC inputs.
Advanced grid support.
Compatible with all battery technologies.

Freemaq Multi PCSK



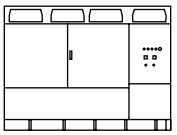
COMMON FEATURES MULTI PCSK		FRAME 2	FRAME 3	FRAME 4	
AC	Max. AC Output Current (A) @40°C	1837	2756	3674	
	Operating Grid Frequency (Hz)	50/60Hz			
	Current Harmonic Distortion (THDi)	< 3% per IEEE519			
	Power Factor (CosPhi) [1]	0.5 leading ... 0.5 lagging			
	Reactive Power Compensation	Four quadrant operation			
DC	DC Voltage Ripple	< 3%			
	Max. DC Continuous Current per Input (A)	1148	1148	2295	1148
	Max. DC Short Circuit Current per Input (kA)	250 kA with a time constant of 3ms			
	Battery Technology	All type of batteries (BMS required)			
	Number of Separate DC Inputs	2	3	2	4
CABINET	Dimensions [WxDxH] (ft)	9.8 x 6.5 x 7.2			
	Dimensions [WxDxH] (m)	3.0 x 2.0 x 2.2			
	Weight (lbs)	11465	11795	12125	
	Weight (kg)	5200	5350	5500	
	Type of Ventilation	Forced air cooling			
ENVIRONMENT	Degree of Protection	NEMA 3R / IP55			
	Operating Temperature Range [2]	From -25°C to +60°C, >40°C power derating			
	Operating Relative Humidity Range	From 4% to 100% non-condensing			
	Storage Temperature Range	From -40°C to +60°C			
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)			
CONTROL INTERFACE	Communication Protocol	Modbus TCP			
	Power Plant Controller	Optional. Third party SCADA systems supported			
	Keyed ON/OFF Switch	Standard			
PROTECTIONS	Ground Fault Protection	Insulation monitoring device			
	Humidity Control	Active heating			
	General AC Protection & Disconn.	Circuit breaker			
	General DC Protection & Disconn. [3]	High-speed fuses, Motorized DC disconnect switches			
	Overvoltage Protection	Type II for AC and Type I+II for DC			
CERTIFICATIONS & STANDARDS	Safety	UL 1741 / CSA 22.2 No.107.1-16 / IEC 62109-1 / IEC 62109-2 / IEC 62477-1			
	Installation	NEC 2023			
	Utility Interconnect [4]	IEEE 1547:2018 / UL 1741 SA & SB/ IEC 62116:2014			

NOTES

[1] Consult P-Q charts available: $Q(kVAr)=\sqrt{(S(kVA)^2-P(kW)^2}$.
[2] Optional available for temperatures down to -35°C.
[3] Battery short circuit disconnection has to be done on the battery side.
[4] Consult Power Electronics for other applicable standards/grid codes.

POWER ELECTRONICS

Freemaq Multi PCSK



690 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP2195K2**	**FP3290K3**	**FP4390K2**	**FP4390K4**
AC	AC Output Power (kVA/kW) @40°C [1]	2195	3290	4390	
	AC Output Power (kVA/kW) @50°C [1]	2035	3055	4075	
	Operating Grid Voltage (VAC)		690V ±10%		
DC	DC Voltage Range [2]		976V - 1500V		
	Maximum DC Voltage		1500V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.84%	98.87%	98.93%	
	Euroeta (η) (preliminary)	98.45%	98.48%	98.65%	
660 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP2101K2**	**FP3151K3**	**FP4200K2**	**FP4200K4**
AC	AC Output Power (kVA/kW) @40°C [1]	2100	3150	4200	
	AC Output Power (kVA/kW) @50°C [1]	1950	2925	3900	
	Operating Grid Voltage (VAC)		660V ±10%		
DC	DC Voltage Range [2]		934V - 1500V		
	Maximum DC Voltage		1500V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.81%	98.84%	98.90%	
	Euroeta (η) (preliminary)	98.45%	98.48%	98.65%	
645 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP2055K2**	**FP3080K3**	**FP4105K2**	**FP4105K4**
AC	AC Output Power (kVA/kW) @40°C [1]	2055	3080	4105	
	AC Output Power (kVA/kW) @50°C [1]	1905	2855	3810	
	Operating Grid Voltage (VAC)		645V ±10%		
DC	DC Voltage Range [2]		913V - 1500V		
	Maximum DC Voltage		1500V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.78%	98.87%	98.87%	
	Euroeta (η) (preliminary)	98.40%	98.60%	98.60%	
630 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP2005K2**	**FP3005K3**	**FP4010K2**	**FP4010K4**
AC	AC Output Power (kVA/kW) @40°C [1]	2005	3005	4010	
	AC Output Power (kVA/kW) @50°C [1]	1860	2790	3720	
	Operating Grid Voltage (VAC)		630V ±10%		
DC	DC Voltage Range [2]		891V - 1500V		
	Maximum DC Voltage		1500V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.79%	98.85%	
	Euroeta (η) (preliminary)	98.39%	98.42%	98.59%	
615 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP1955K2**	**FP2935K3**	**FP3915K2**	**FP3915K4**
AC	AC Output Power (kVA/kW) @40°C [1]	1955	2935	3915	
	AC Output Power (kVA/kW) @50°C [1]	1815	2725	3635	
	Operating Grid Voltage (VAC)		615V ±10%		
DC	DC Voltage Range [2]		870V - 1500V		
	Maximum DC Voltage		1500V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.79%	98.84%	
	Euroeta (η) (preliminary)	98.38%	98.41%	98.57%	

NOTES

[1] Values at 1.00·Vac nom and CosPhi=1. The maximum AC output power must be limited to meet the P-Q capability requirement at the inverter level of some grid codes. Consult Power Electronics for derating curves and overload capability in grid forming mode.
[2] Consult Power Electronics for derating curves. In the event of overvoltage in the grid, the minimum DC voltage will vary proportionally with the AC voltage.

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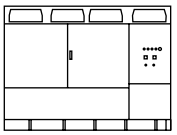
Freemaq Multi PCSK



600 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP1910K2**	**FP2865K3**	**FP3820K2**	**FP3820K4**
AC	AC Output Power (kVA/kW) @40°C [1]	1910	2865	3820	
	AC Output Power (kVA/kW) @50°C [1]	1775	2660	3545	
	Operating Grid Voltage (VAC)		600V ±10%		
DC	DC Voltage Range [2]		849V - 1500V		
	Maximum DC Voltage		1500V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.94%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	
530 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP1685K2**	**FP2530K3**	**FP3370K2**	**FP3370K4**
AC	AC Output Power (kVA/kW) @40°C [1]	1685	2530	3370	
	AC Output Power (kVA/kW) @50°C [1]	1565	2350	3130	
	Operating Grid Voltage (VAC)		530V ±10%		
DC	DC Voltage Range [2]		750V - 1300V		
	Maximum DC Voltage		1300V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.94%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	
500 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP1590K2**	**FP2385K3**	**FP3180K2**	**FP3180K4**
AC	AC Output Power (kVA/kW) @40°C [1]	1590	2385	3180	
	AC Output Power (kVA/kW) @50°C [1]	1475	2215	2955	
	Operating Grid Voltage (VAC)		500V ±10%		
DC	DC Voltage Range [2]		708V - 1250V		
	Maximum DC Voltage		1250V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.94%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	
480 V		**FRAME 2**	**FRAME 3**	**FRAME 4**	
REFERENCES		**FP1525K2**	**FP2290K3**	**FP3055K2**	**FP3055K4**
AC	AC Output Power (kVA/kW) @40°C [1]	1525	2290	3055	
	AC Output Power (kVA/kW) @50°C [1]	1415	2125	2840	
	Operating Grid Voltage (VAC)		480V ±10%		
DC	DC Voltage Range [2]		679V - 1200V		
	Maximum DC Voltage		1200V		
	Number of Separate DC Inputs	2	3	2	4
EFFICIENCY	Efficiency (Max) (η) (preliminary)	98.76%	98.78%	98.84%	
	Euroeta (η) (preliminary)	98.37%	98.39%	98.56%	

NOTES

[1] Values at 1.00·Vac nom and CosPhi=1. The maximum AC output power must be limited to meet the P-Q capability requirement at the inverter level of some grid codes. Consult Power Electronics for derating curves and overload capability in grid forming mode.
[2] Consult Power Electronics for derating curves. In the event of overvoltage in the grid, the minimum DC voltage will vary proportionally with the AC voltage.

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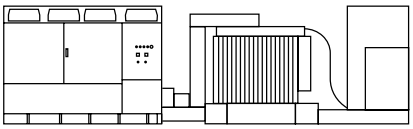
MV Skid Compact

DS 1.1

Turn-key solution
Easy and fast connection
Compact and versatile
Simplifies commissioning

MV Skid Compact



RATINGS	Power range @ 40 °C	1525 kVA - 4390 kVA
	Power range @ 50 °C	1415 kVA - 4075 kVA
MEDIUM VOLTAGE EQUIPMENT	MV voltage range	6.6 kV / 11 kV / 13.2 kV / 13.8 kV / 15 kV / 20 kV / 22 kV / 23 kV / 25 kV / 30 kV / 33 kV / 34.5 kV
	LV voltage range	480 V / 500 V / 530 V / 600 V / 615 V / 630 V/ 645 V / 660 V / 690 V
	Transformer cooling	ONAN
	Transformer vector group	Dy11
	Transformer protection	Protection relay for pressure, temperature (two levels) and gassing
		Monitoring of dielectric level decrease
		PT100 optional.
	Transformer index of protection	IP54
	Transformer losses	IEC standard or IEC Tier-2
	Oil retention tank	Galvanized steel. Integrated with hydrocarbon filter. Optional
	Switchgear configuration	Double feeder (2L)
	Switchgear protection	Circuit breaker (V)
	Switchgear short circuit rating [1]	16 kA 1 s (optionally 20 kA or 25 kA)
	Switchgear IAC [1]	A FLR 16 kA 1 s
CONNECTIONS	LV-MV connections	Close coupled solution (plug & play)
	LV protection	Motorized circuit breaker included in the inverter
	HV AC wiring	MV bridge between transformer and protection switchgear prewired
ENVIRONMENT	Ambient temperature range [2]	-25 °C... +50 °C (T > 50 °C power derating)
	Maximum altitude (above sea level) [1]	Up to 1000 m
	Relative humidity	4% to 95% non condensing
AUXILIARY SERVICES	User cabinet	Integrated in the inverter (by default). Optionally, LV cabinet in the skid.
	UPS system [1]	1 kVA/1 kW (12 minutes). Optional
OTHER EQUIPMENT	Safety mechanism	Interlocking system
	Fire suppression system	Transformer oil tank retention accessory. Optional.
STANDARDS	Compliance	IEC 62271-212, IEC 62271-200, IEC 60076, IEC 61439-1

NOTES

[1] Consult with Power Electronics for other options.
[2] For lower temperatures, consult with Power Electronics.

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