

# Regione Puglia

COMUNE DI SAN PANCRAZIO SALENTINO (BR) - SALICE SALENTINO (LE)  
AVETRANA (TA) - ERCHIE (BR)

**PROGETTO PER LA REALIZZAZIONE DI IMPIANTO PER LA  
PRODUZIONE DI ENERGIA ELETTRICA DA FONTI RINNOVABILI,  
NONCHE' OPERE CONNESSE ED INFRASTRUTTURE, DI POTENZA  
NOMINALE PARI A 36 MW ALIMENTATO DA FONTE EOLICA,  
CON ANNESSO SISTEMA DI ACCUMULO INTEGRATO DI POTENZA  
PARI A 24 MW, PER UNA POTENZA IN IMMISSIONE PARI A 60MW  
DENOMINATO IMPIANTO "NEXT2"**

## PROGETTO PARCO EOLICO "NEXT2"

Codice Regionale AU: CY53TR6

Tav.:	Titolo:
6_36a	IMPIANTO DI ACCUMULO SCHEDA DI PROGETTO

Scala:	Formato Stampa:	Codice Identificatore Elaborato
-	A4	CY53TR6_NPDI2_ERC_6_36a_ElaboratoGrafico

Progettazione:	Committente:
<b>QMSOLAR s.r.l.</b> Via Guglielmo Marconi scala C n.166 - Cap 72023 MESAGNE (BR) P.IVA 02683290742 - qmsolar.srls@pec.it Amm.re unico Ing. Francesco Masilla  Gruppo di progettazione: MSC Innovative Solutions s.r.l.s - Via Milizia 55 - 73100 LECCE (LE) P.IVA 05030190754 - msc.innovativesolutions@gmail.com Ing. Santo Masilla - Responsabile Progetto	<b>NPD Italia II s.r.l.</b> Galleria Passarella, 2, Cap - 20122 MILANO P.IVA 11987560965 - email: npditaliaii@legalmail.it
Indagini Specialistiche :	

Data Progetto	Motivo	Redatto:	Controllato:	Approvato:
15/09/2023	Prima versione	F.M.	S.M.	NPD Italia II srl



**CATL**

20-foot Container ---Liquid Cooling Battery System



# C contents

- 1 Product Specification
- 2 System Overview
- 3 Installation

**Note:**  
**Data updating is possible due to  
continue improvement process**



Part

01

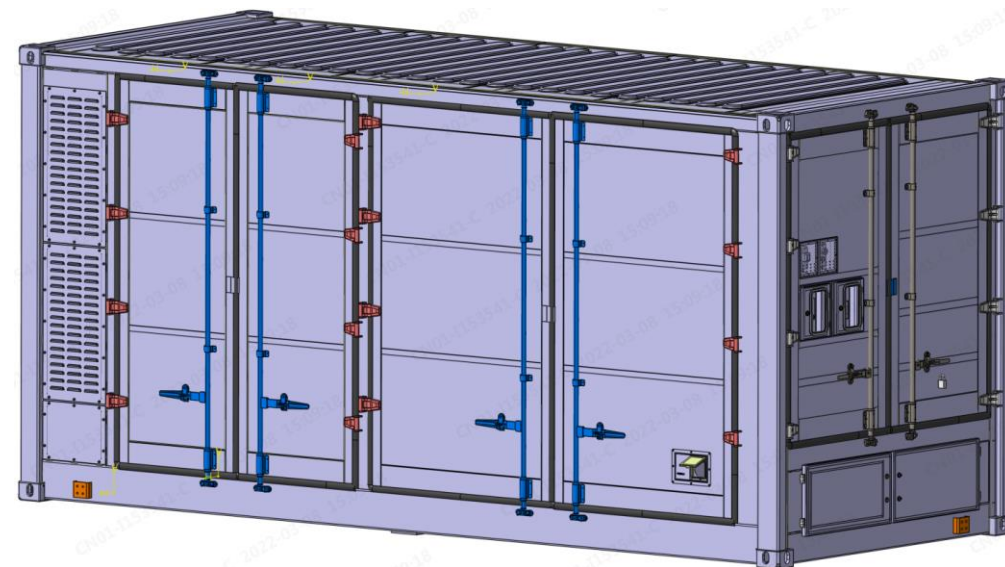
**Product introduction**  
**LFP 280Ah**



# Product introduction



NO.	Type	Description
1	Rated Energy	3.72MWh
2	Cell Cap(Ah)	LFP-280Ah
3	Rated Voltage	1331V/1500V
4	Container size	2462 (W)*6058(D)*2896(H)mm
5	Weight(T)	35T
6	Max Charging/Discharging Power	0.5P/0.5P
7	Cooling method	Liquid cooling
8	Color	RAL7035
9	IP	IP55



IEC 62619



UL 1973



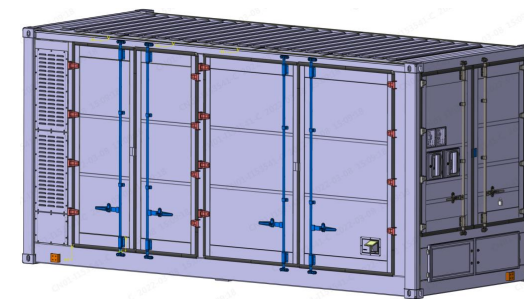
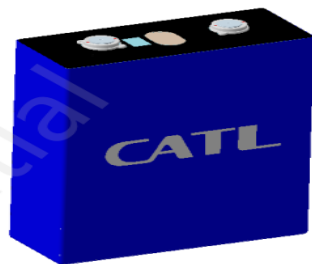
UL 9540A



IEC 62477-1



## Specification:



Item	Cell-280Ah	Module	Container
Configuration	/	2P52S	10P416S
Dimension (W*D*H)(mm)	173.9*207.2*71.7	810*2060*240	2462 *6058*2896
Weight (kg)	5.36±0.30Kg	~660kg	~35000kg
Rated Voltage (V)	3.2	166.4	1331.2
Voltage Range(V)	2.5 ~ 3.65	145.6 ~ 187.2	1164.8 ~ 1497.2
Rated Energy(kWh)	0.896	93.18	3727



## Specification:

Product Type		LFP battery bank	
NO.	Item	Specification	
1	Configuration	10P416S	
2	Rated Energy	3727kWh	
3	Rated Voltage	1331.2VDC	
4	Voltage Range	1164.8~1497.6VDC	
5	Charging Current (0.5P)	Rated	1400A
6	Charging Power (0.5P)	Rated	1863.68kW
7	Discharging Current (0.5P)	Rated	1400A
		Maximum	1600A
8	Discharging Power (0.5P)	Rated	1863.68kW



## Specification:

Product Type		LFP battery bank	
NO.		Item	Specification
9	Operating Ambient Temperature	Charge	-25 °C...+55 °C
		Discharge	-25 °C...+55 °C
10	Auxiliary power supply	Voltage range	3AC 380...480V
11	Environment condition	Storage Temperature	-35 °C...+60 °C
		Application altitude	≤4000m ( >2000m need be derated)
12	General Parameters	Communication protocol	CAN, RS485, TCP/IP
		Communication connection	Fast plug
		Power connection	Cable lug: 16 x M12
		Aux Power connection	Terminal
		Coolant	50% Ethylene glycol aqueous solution
13	Fulfill standard	cell	Cell: UN38.3, UL1973, IEC62619, UL9540A Container/rack: UL1973, UL9540A





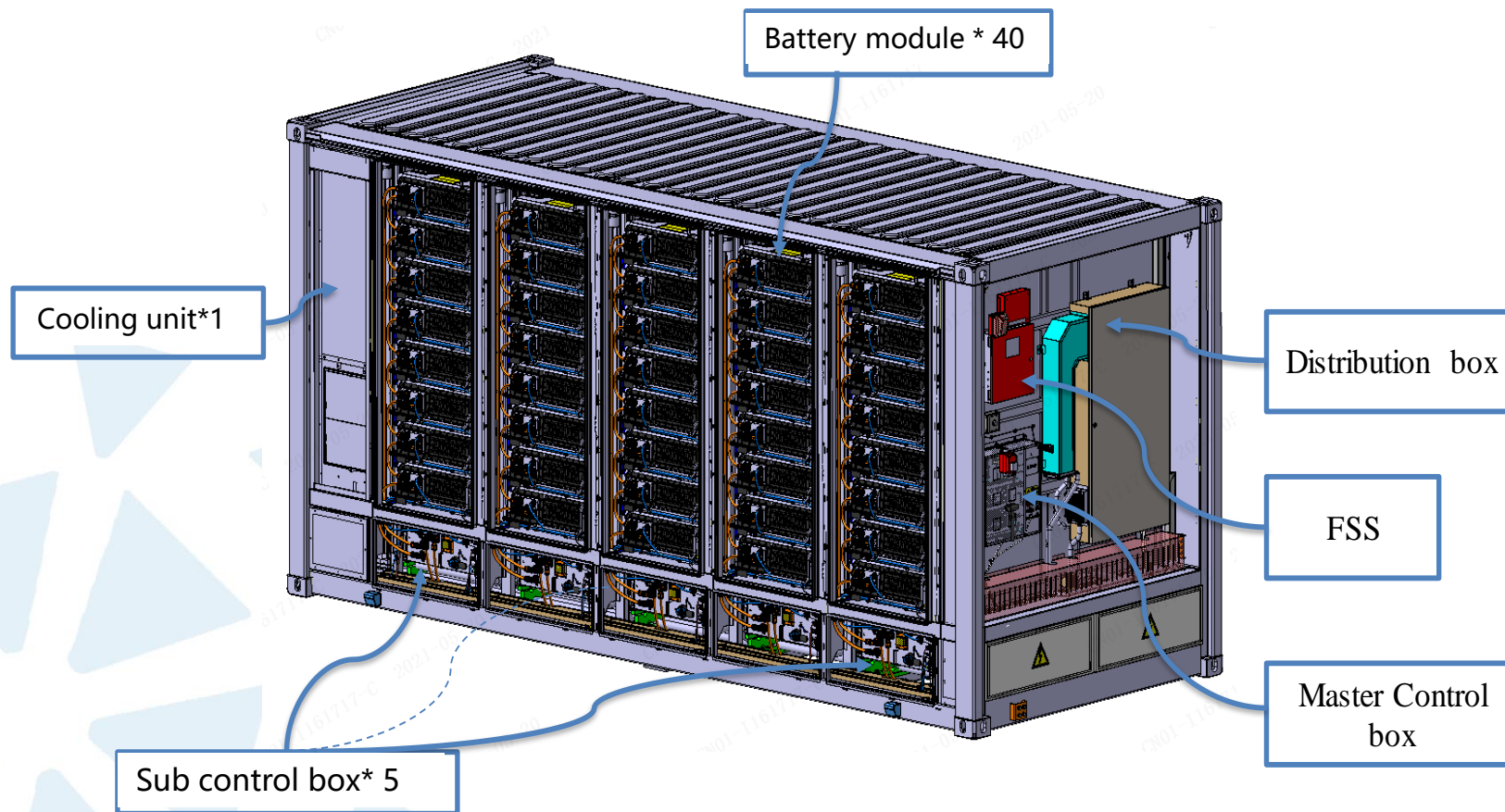
Part

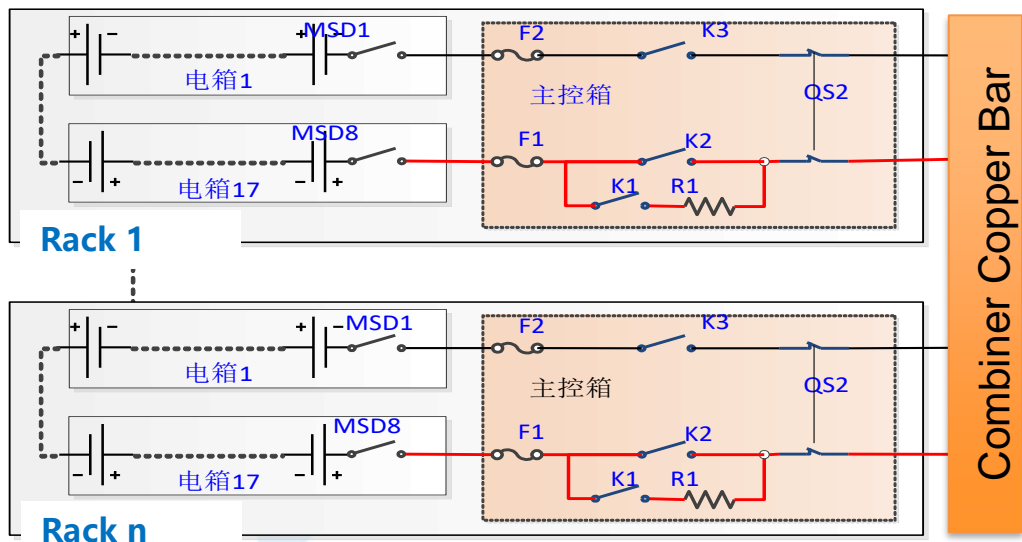
02

**System Overview**

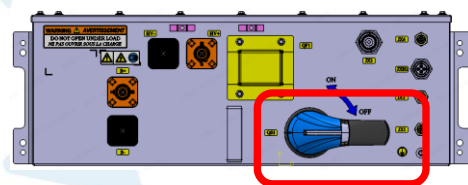


# System Overview---Basic Configuration

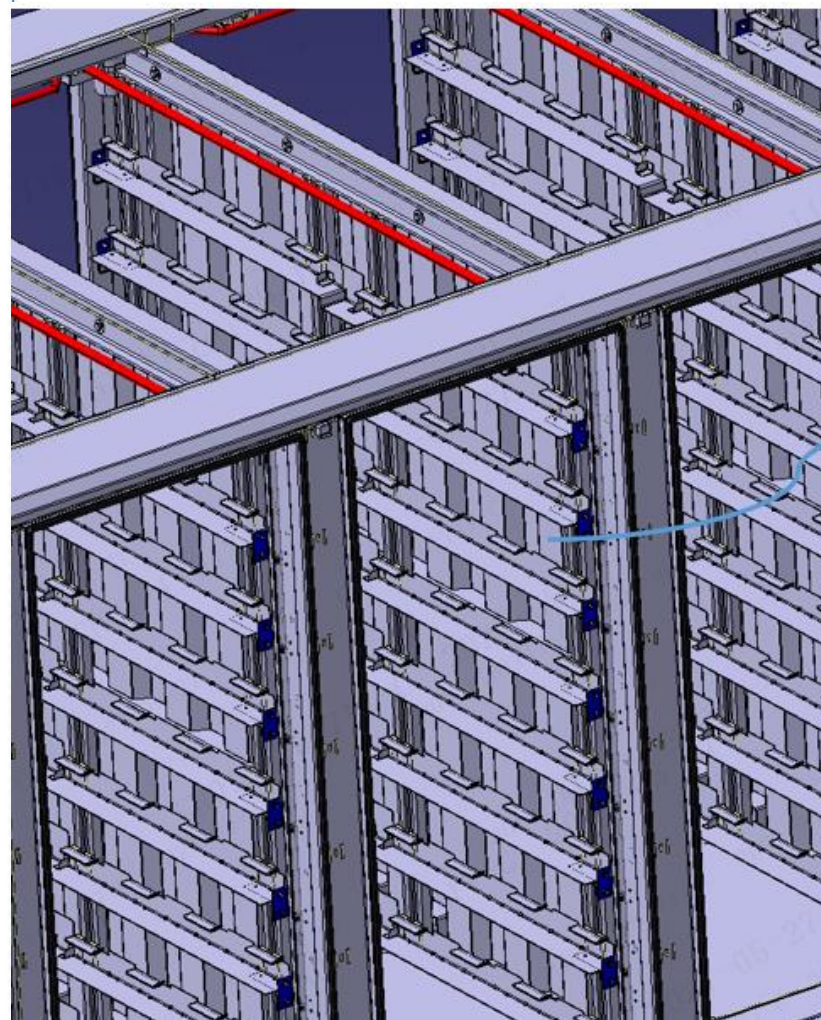




MSD

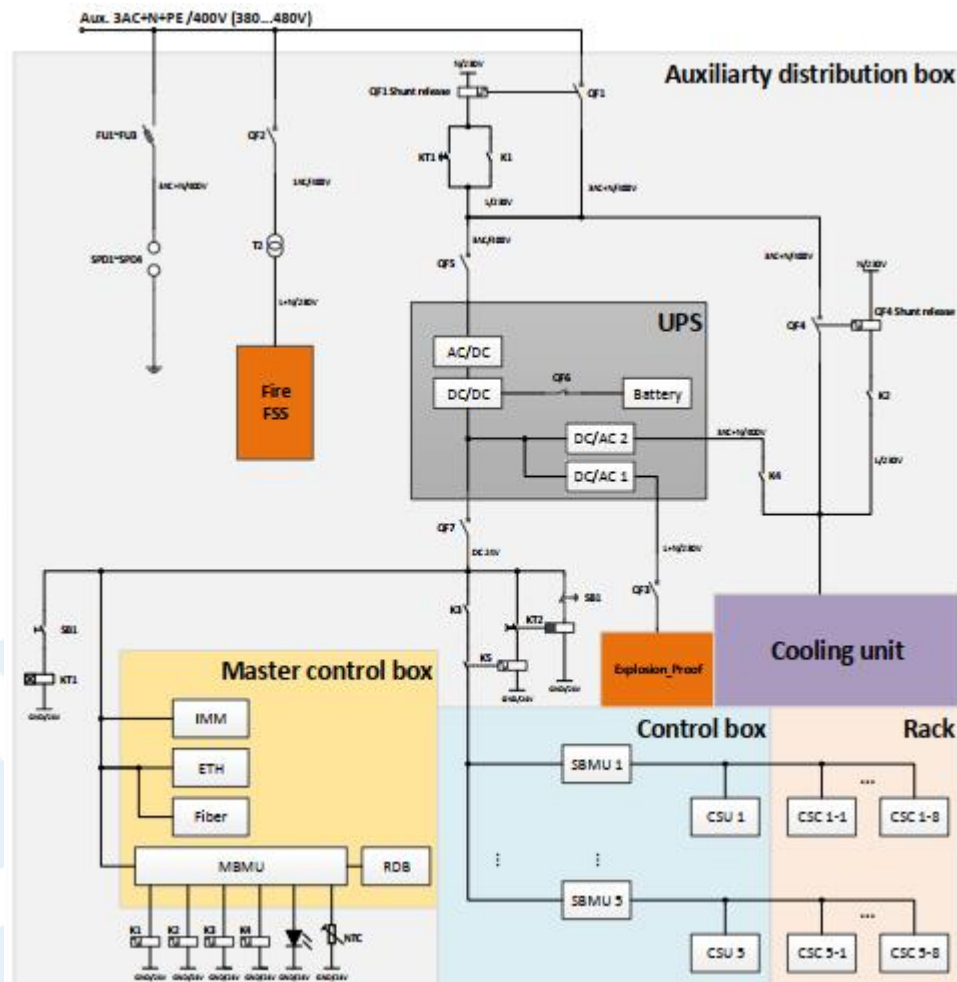


QS1: Isolating Switch



- ✓ Module, Rack has disconnect device & Fuse to ensure safety

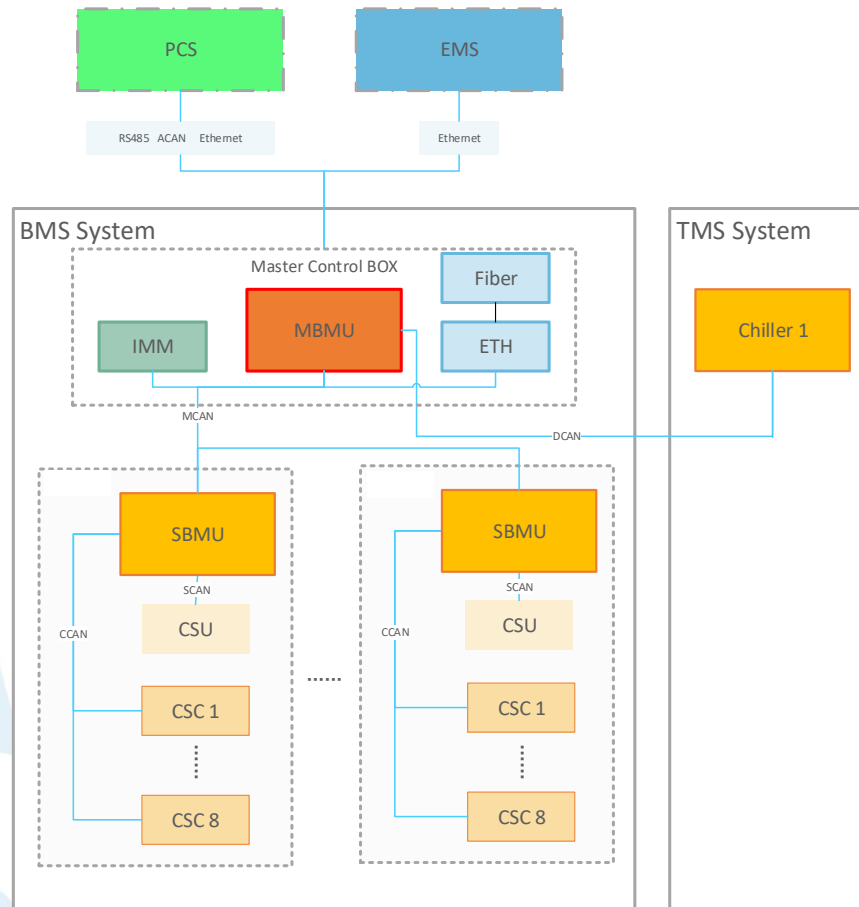
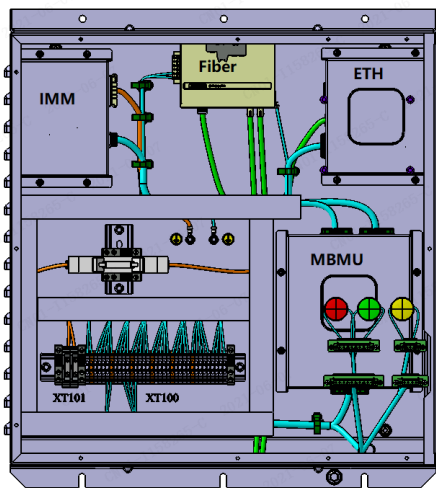
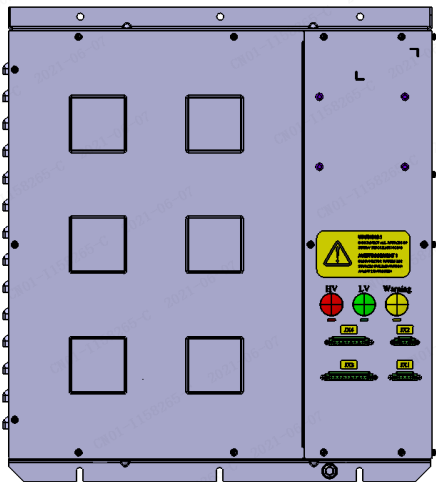
- ✓ Rack design / Fast Plug, efficient and safe



## Feature:

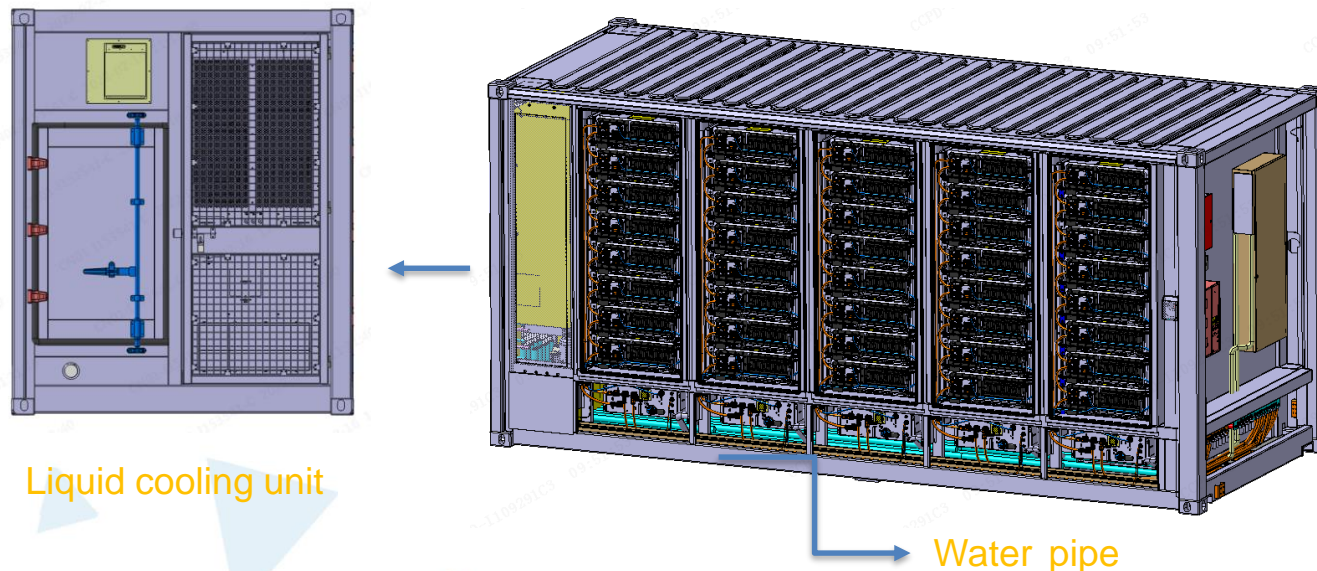
- ✓ Auxiliary power supply input : 380...480V 3AC, 50/60Hz
- ✓ Include DC24V power supply output & DC24V UPS for BMS system
- ✓ Include E-stop circuit
- ✓ Include circuit protection and power supply on-off control circuit
- ✓ Include Type II SPD for AC Power supply

# Electrical Room/Master Control Box



## Feature:

- ✓ Three level communication Architecture
- ✓ Integrated MBMU, IMM, ETH, Fiber Conversion Module in control box together.
- ✓ Support two container parallel connection
- ✓ Low power consumption of BMS system



Liquid cooling unit

Water pipe

### Feature:

- ✓ Max. ambient temperature: 55 °C
- ✓ Power supply: 3AC 380~480V
- ✓ 15~40kW Cooling power for 0.5P System
- ✓ Cooling performance is auto-adjustable according to ambient temperature & precharge/charge status

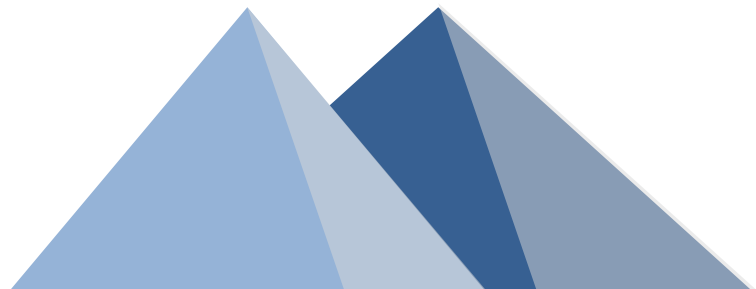
Type	0.5 P System
Quantity of Chiller	1
Cooling Capacity	15~40kW

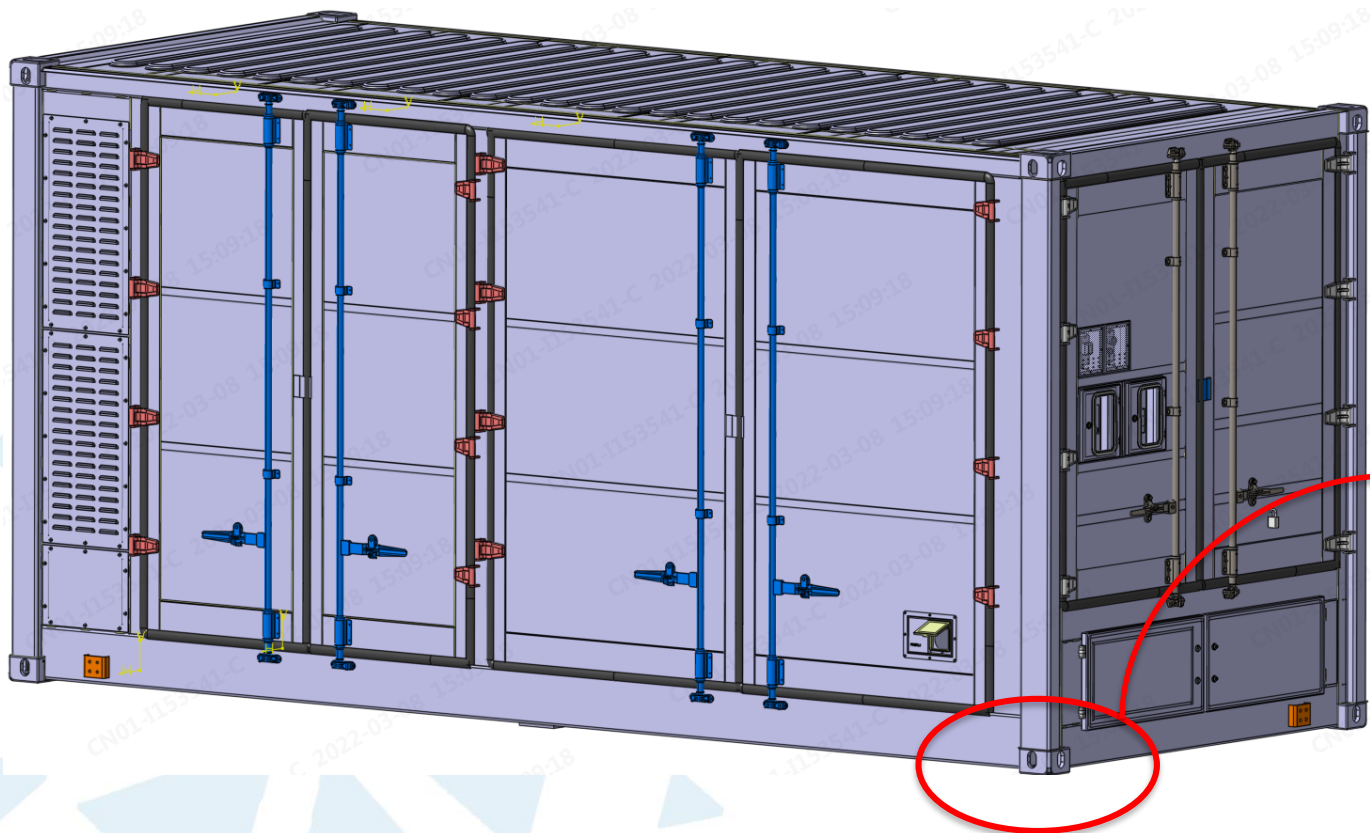


Part

03

**Installation**

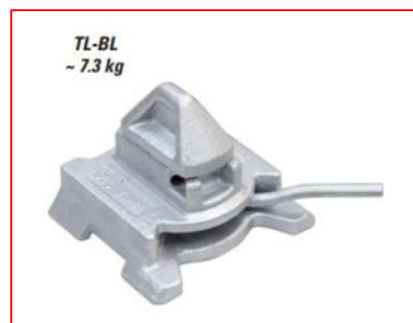




**Concrete Foundation:**  
Anchor **Bolt** Installation



**Welding installation:** The container bottom frame is **welded** to the embedded steel plate



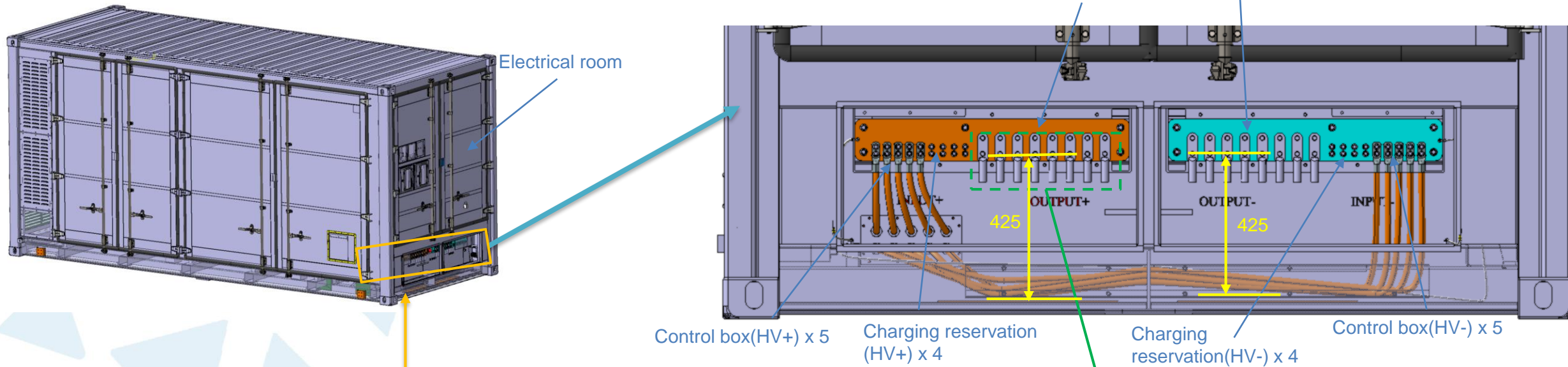
**Twist lock installation:**  
The four bottom corners of the container can be fixed with the foundation through the container twist lock



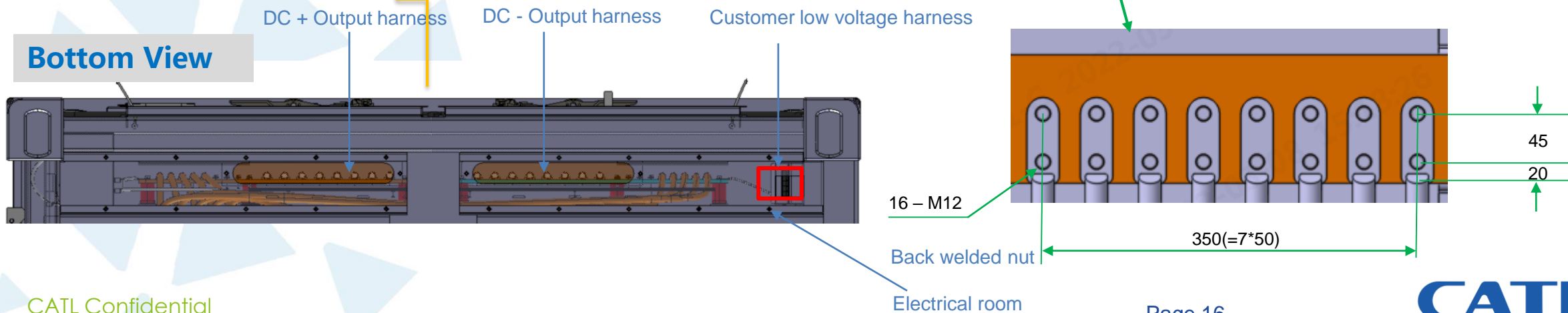
# Installation: External power cable connection



Front View



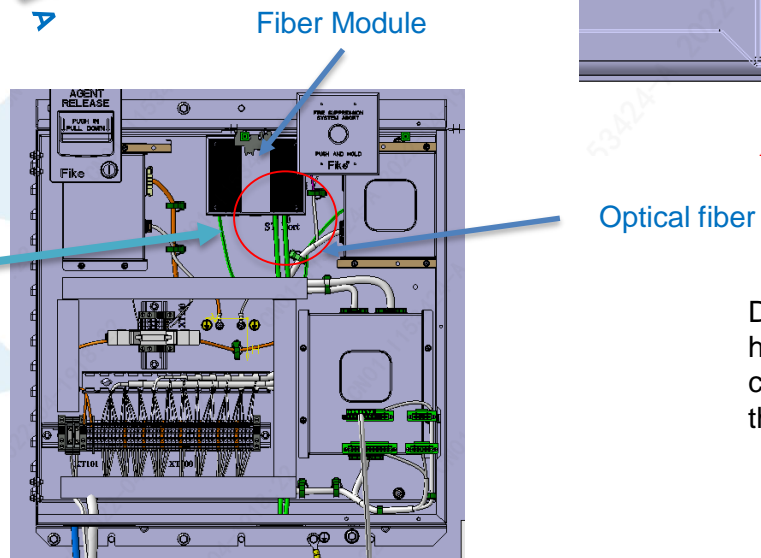
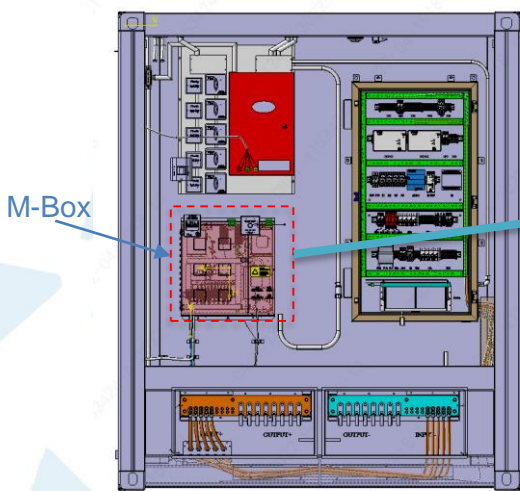
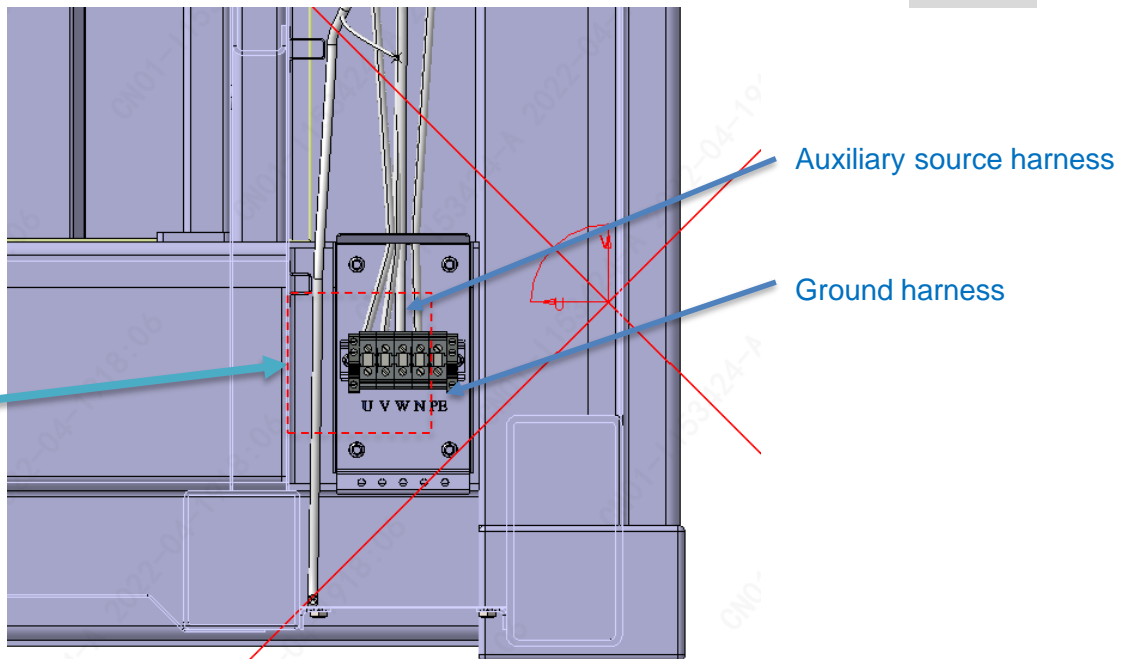
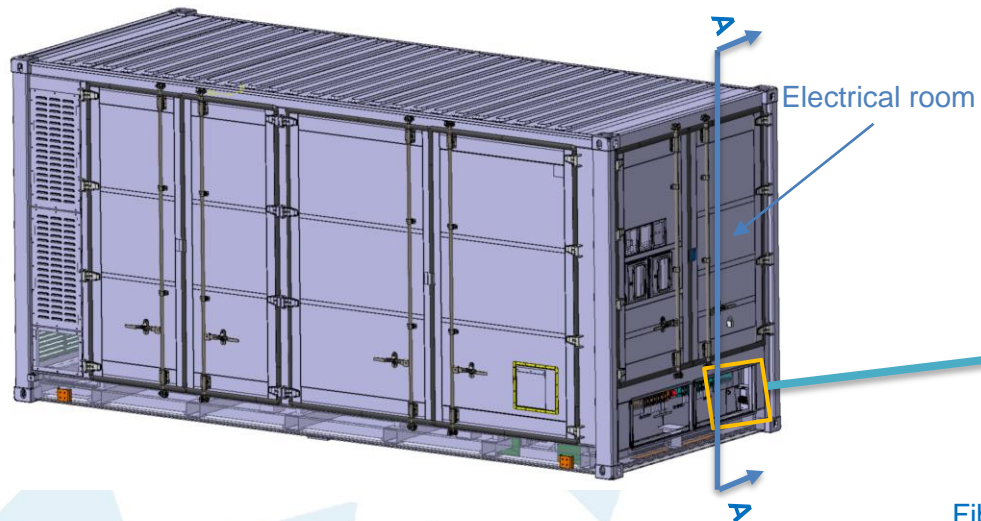
Bottom View



# Installation: External power cable connection

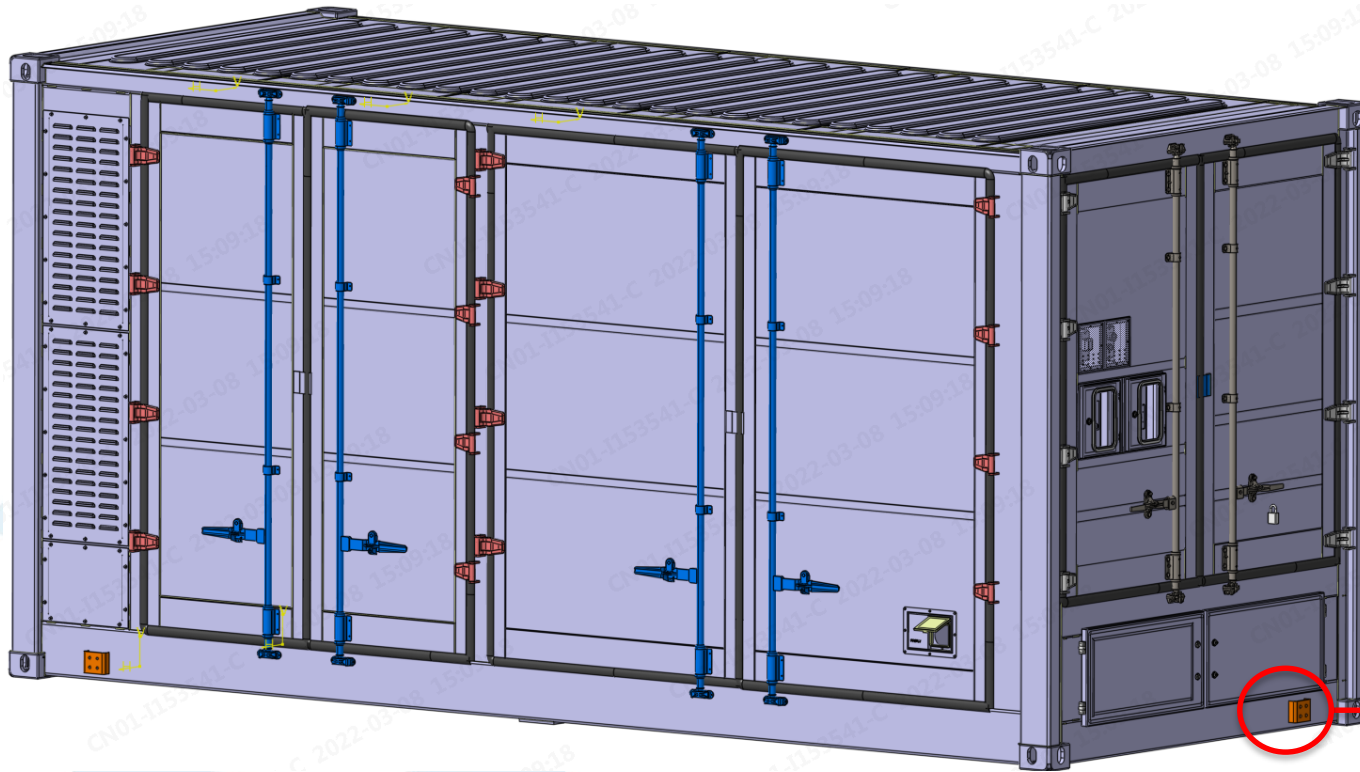


A-A



Due to the current uncertainty about the turning radius of the fiber optic harness, we need to continue to check whether the fiber optic harness can go from the fiber optic module interface to the terminal block where the auxiliary source harness is located

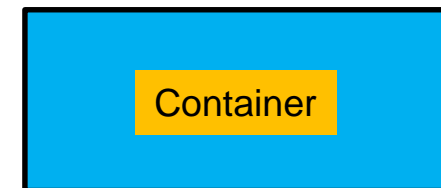
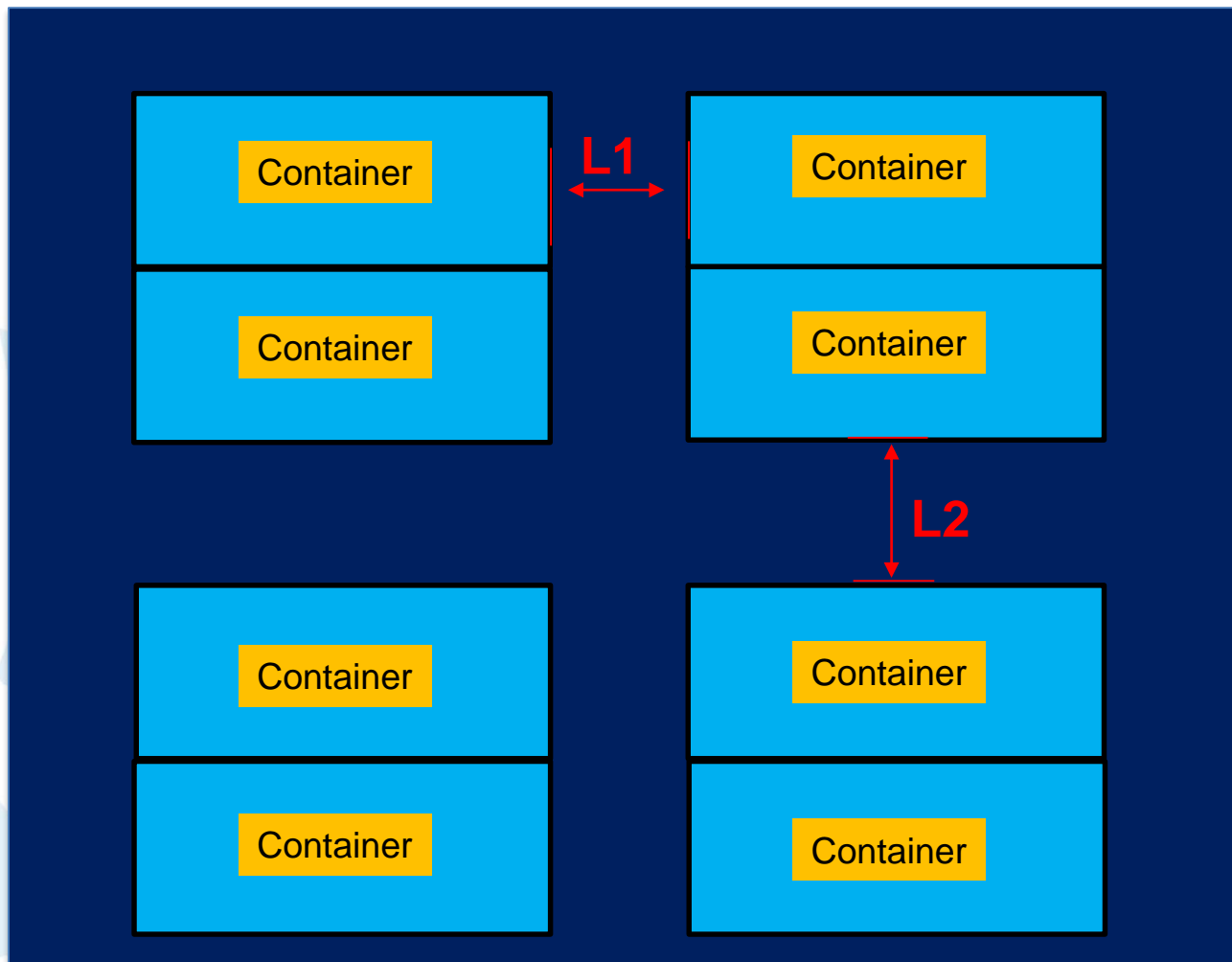
# Installation: Grounding point



Earth point: Copper bar

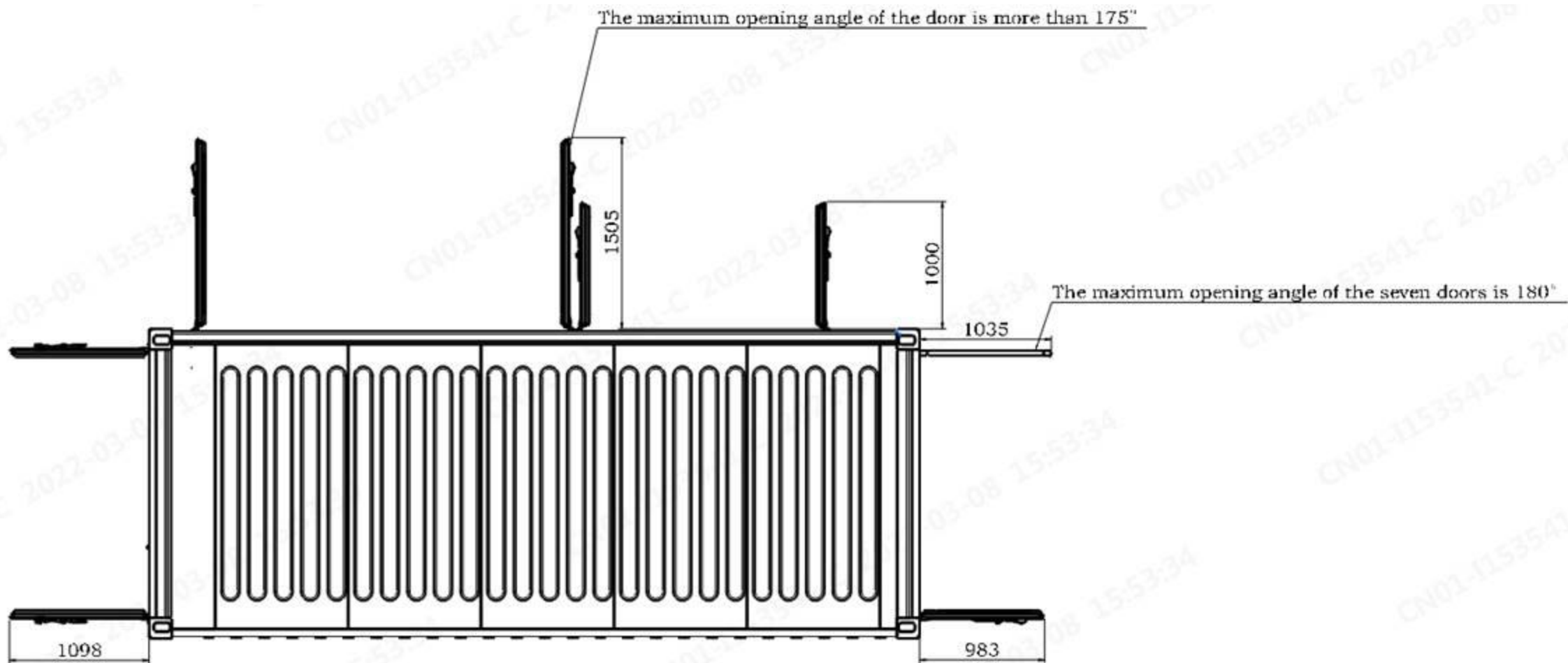


To avoid the hot air interaction for two containers, And to maintain the container, the minimum distance must be followed :



**L1:3.0M**

**L2:3.5M**



# CATL

Web: <http://www.catlbattery.com>  
E-mail: [sales@catlbattery.com](mailto:sales@catlbattery.com)



INVERTER

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 690V

	FRAME 1	FRAME 2	
<b>NUMBER OF MODULES</b>	<b>4</b>	<b>6</b>	
<b>REFERENCES</b>	<b>FP2445K</b>	<b>FP3670K</b>	
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2445	3670
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2530	3800
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3179
	Operating Grid Voltage (VAC)	690V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading..0.5 lagging	
	Reactive power compensation	Four quadrant operation	
<b>DC</b>	DC Voltage Range (full power)	976V-1310V / 976V-1500V (optional)	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 18 positive and 18 negative connections	
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.87%	98.93%
	Euroeta (η) <sup>[3]</sup>	98.48%	98.65%
	Max. Power Consumption (kVA)	8	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level <sup>[4]</sup>	< 79 dBA	
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported	
	Keyed ON/OFF switch	Standard	
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device	
	Humidity control	Active Heating	
	General AC Protection & Disconn.	Circuit Breaker	
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>	
	Overvoltage Protection	AC and DC protection (type 2)	
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.



## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 660V

	FRAME 1	FRAME 2	
<b>NUMBER OF MODULES</b>	<b>4</b>	<b>6</b>	
<b>REFERENCES</b>	<b>FP2340K</b>	<b>FP3510K</b>	
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2340	3510
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2420	3630
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3175
	Operating Grid Voltage (VAC)	660V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading..0.5 lagging	
	Reactive power compensation	Four quadrant operation	
<b>DC</b>	DC Voltage Range (full power)	934V-1310V / 934V-1500V (optional)	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 18 positive and 18 negative connections	
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.84%	98.90%
	Euroeta (η) <sup>[3]</sup>	98.48%	98.65%
	Max. Power Consumption (kVA)	8	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level <sup>[4]</sup>	< 79 dBA	
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported	
	Keyed ON/OFF switch	Standard	
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device	
	Humidity control	Active Heating	
	General AC Protection & Disconn.	Circuit Breaker	
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>	
	Overvoltage Protection	AC and DC protection (type 2)	
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 645V

	FRAME 1	FRAME 2	
<b>NUMBER OF MODULES</b>	<b>4</b>	<b>6</b>	
<b>REFERENCES</b>	<b>FP2285K</b>	<b>FP3430K</b>	
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2285	3430
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2365	3550
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3178
	Operating Grid Voltage (VAC)	645V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading..0.5 lagging	
	Reactive power compensation	Four quadrant operation	
<b>DC</b>	DC Voltage Range (full power)	913V-1310V / 913V-1500V (optional)	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 18 positive and 18 negative connections	
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.81%	98.87%
	Euroeta (η) <sup>[3]</sup>	98.43%	98.60%
	Max. Power Consumption (kVA)	8	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level <sup>[4]</sup>	< 79 dBA	
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported	
	Keyed ON/OFF switch	Standard	
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device	
	Humidity control	Active Heating	
	General AC Protection & Disconn.	Circuit Breaker	
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>	
	Overvoltage Protection	AC and DC protection (type 2)	
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00·Vac nom and cos Φ= 1.Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 630V

		FRAME 1	FRAME 2
<b>NUMBER OF MODULES</b>		<b>4</b>	<b>6</b>
<b>REFERENCES</b>		<b>FP2235K</b>	<b>FP3350K</b>
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2235	3350
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2310	3465
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3175
	Operating Grid Voltage (VAC)	630V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading...0.5 lagging	
	Reactive power compensation	Four quadrant operation	
<b>DC</b>	DC Voltage Range (full power)	891V-1310V / 891V-1500V (optional)	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 18 positive and 18 negative connections	
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.79%	98.85%
	Euroeta (η) <sup>[3]</sup>	98.42%	98.59%
	Max. Power Consumption (kVA)	8	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level <sup>[4]</sup>	< 79 dBA	
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported	
	Keyed ON/OFF switch	Standard	
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device	
	Humidity control	Active Heating	
	General AC Protection & Disconn.	Circuit Breaker	
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>	
	Overvoltage Protection	AC and DC protection (type 2)	
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 615V

	FRAME 1	FRAME 2	
<b>NUMBER OF MODULES</b>	<b>4</b>	<b>6</b>	
<b>REFERENCES</b>	<b>FP2180K</b>	<b>FP3270K</b>	
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2180	3270
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2255	3380
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3173
	Operating Grid Voltage (VAC)	615V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading..0.5 lagging	
	Reactive power compensation	Four quadrant operation	
<b>DC</b>	DC Voltage Range (full power)	870V-1310V / 870V-1500V (optional)	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 18 positive and 18 negative connections	
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.79%	98.84%
	Euroeta (η) <sup>[3]</sup>	98.41%	98.57%
	Max. Power Consumption (kVA)	8	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level <sup>[4]</sup>	< 79 dBA	
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported	
	Keyed ON/OFF switch	Standard	
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device	
	Humidity control	Active Heating	
	General AC Protection & Disconn.	Circuit Breaker	
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>	
	Overvoltage Protection	AC and DC protection (type 2)	
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00•Vac nom and cos Φ= 1.Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 600V

		FRAME 1	FRAME 2
<b>NUMBER OF MODULES</b>		<b>4</b>	<b>6</b>
<b>REFERENCES</b>		<b>FP2125K</b>	<b>FP3190K</b>
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2125	3190
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2200	3300
	Max. AC Output Current (A) @50°C	2047	3070
	Max. AC Output Current (A) @40°C	2117	3175
	Operating Grid Voltage (VAC)	600V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading...0.5 lagging	
	Reactive power compensation	Four quadrant operation	
<b>DC</b>	DC Voltage Range (full power)	849V-1310V / 849V-1500V (optional)	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 18 positive and 18 negative connections	
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.78%	98.84%
	Euroeta (η) <sup>[3]</sup>	98.39%	98.56%
	Max. Power Consumption (kVA)	8	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level <sup>[4]</sup>	< 79 dBA	
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported	
	Keyed ON/OFF switch	Standard	
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device	
	Humidity control	Active Heating	
	General AC Protection & Disconn.	Circuit Breaker	
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>	
	Overvoltage Protection	AC and DC protection (type 2)	
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00·Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 530V

	FRAME 1	FRAME 2
<b>NUMBER OF MODULES</b>	<b>4</b>	<b>6</b>
<b>REFERENCES</b>	<b>FP1875K</b>	<b>FP2820K</b>
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2820
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2915
	Max. AC Output Current (A) @50°C	3070
	Max. AC Output Current (A) @40°C	3175
	Operating Grid Voltage (VAC)	530V ±10%
	Operating Grid Frequency (Hz)	50/60 Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading..0.5 lagging
	Reactive power compensation	Four quadrant operation
<b>DC</b>	DC Voltage Range (full power)	750V-1310V / 750V-1500V (optional)
	Maximum DC voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC continuous current (A)	2646
	Max. DC short circuit current (A)	180kA / 5ms
	Battery Technology	All type of batteries (BMS required)
	Battery Connections	Up to 18 positive and 18 negative connections
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.84% (preliminary)
	Euroeta (η) <sup>[3]</sup>	98.56% (preliminary)
	Max. Power Consumption (kVA)	8
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2
	Weight (lbs)	12125
	Weight (kg)	5500
	Type of ventilation	Forced air cooling
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)
	Relative Humidity	4% to 100% non condensing
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)
	Noise level <sup>[4]</sup>	< 79 dBA
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported
	Keyed ON/OFF switch	Standard
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device
	Humidity control	Active Heating
	General AC Protection & Disconn.	Circuit Breaker
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>
	Overvoltage Protection	AC and DC protection (type 2)
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005

[1] Values at 1.00•Vac nom and cos Φ= 1.Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 500V

	FRAME 1	FRAME 2	
<b>NUMBER OF MODULES</b>	<b>4</b>	<b>6</b>	
<b>REFERENCES</b>	<b>FP1770K</b>	<b>FP2660K</b>	
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	1770	2660
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	1830	2750
	Max. AC Output Current (A) @50°C	2045	3070
	Max. AC Output Current (A) @40°C	2113	3175
	Operating Grid Voltage (VAC)	500V ±10%	
	Operating Grid Frequency (Hz)	50/60 Hz	
	Current Harmonic Distortion (THDi)	< 3% per IEEE519	
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading...0.5 lagging	
	Reactive power compensation	Four quadrant operation	
<b>DC</b>	DC Voltage Range (full power)	708V-1310V / 708V-1500V (optional)	
	Maximum DC voltage	1500V	
	DC Voltage Ripple	< 3%	
	Max. DC continuous current (A)	2646	3969
	Max. DC short circuit current (A)	180kA / 5ms	
	Battery Technology	All type of batteries (BMS required)	
	Battery Connections	Up to 18 positive and 18 negative connections	
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.78% (preliminary)	98.84% (preliminary)
	Euroeta (η) <sup>[3]</sup>	98.39% (preliminary)	98.56% (preliminary)
	Max. Power Consumption (kVA)	8	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7	
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2	
	Weight (lbs)	12125	12677
	Weight (kg)	5500	5750
	Type of ventilation	Forced air cooling	
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55	
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)	
	Relative Humidity	4% to 100% non condensing	
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)	
	Noise level <sup>[4]</sup>	< 79 dBA	
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP	
	Power Plant Controller	Optional. Third party SCADA systems supported	
	Keyed ON/OFF switch	Standard	
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device	
	Humidity control	Active Heating	
	General AC Protection & Disconn.	Circuit Breaker	
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>	
	Overvoltage Protection	AC and DC protection (type 2)	
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2	
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005	

[1] Values at 1.00·Vac nom and cos Φ= 1. Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.

## TECHNICAL CHARACTERISTICS

## FREEMAQ PCSK 480V

	FRAME 1	FRAME 2
<b>NUMBER OF MODULES</b>	<b>4</b>	<b>6</b>
<b>REFERENCES</b>	<b>FP1700K</b>	<b>FP2550K</b>
<b>AC</b>	AC Output Power (kVA/kW) @50°C <sup>[1]</sup>	2550
	AC Output Power (kVA/kW) @40°C <sup>[1]</sup>	2640
	Max. AC Output Current (A) @50°C	3070
	Max. AC Output Current (A) @40°C	3175
	Operating Grid Voltage (VAC)	480V ±10%
	Operating Grid Frequency (Hz)	50/60 Hz
	Current Harmonic Distortion (THDi)	< 3% per IEEE519
	Power Factor (cosine phi) <sup>[2]</sup>	0.5 leading..0.5 lagging
	Reactive power compensation	Four quadrant operation
<b>DC</b>	DC Voltage Range (full power)	679V-1310V / 679V-1500V (optional)
	Maximum DC voltage	1500V
	DC Voltage Ripple	< 3%
	Max. DC continuous current (A)	3969
	Max. DC short circuit current (A)	180kA / 5ms
	Battery Technology	All type of batteries (BMS required)
	Battery Connections	Up to 18 positive and 18 negative connections
<b>EFFICIENCY &amp; AUX. SUPPLY</b>	Efficiency (Max) (η) <sup>[3]</sup>	98.84% (preliminary)
	Euroeta (η) <sup>[3]</sup>	98.56% (preliminary)
	Max. Power Consumption (kVA)	10
<b>CABINET</b>	Dimensions [WxDxH] (ft)	12 x 7 x 7
	Dimensions [WxDxH] (m)	3.7 x 2.2 x 2.2
	Weight (lbs)	12125
	Weight (kg)	5500
	Type of ventilation	Forced air cooling
<b>ENVIROMENT</b>	Degree of protection	NEMA 3R / IP55
	Permissible Ambient Temperature	-35°C to +60°C, >50°C / Active Power derating (>50°C)
	Relative Humidity	4% to 100% non condensing
	Max. Altitude (above sea level)	2000m / >2000m power derating (Max. 4000m)
	Noise level <sup>[4]</sup>	< 79 dBA
<b>CONTROL INTERFACE</b>	Communication protocol	Modbus TCP
	Power Plant Controller	Optional. Third party SCADA systems supported
	Keyed ON/OFF switch	Standard
<b>PROTECTIONS</b>	Ground Fault Protection	Insulation monitoring device
	Humidity control	Active Heating
	General AC Protection & Disconn.	Circuit Breaker
	General DC Protection & Disconn.	DC switch <sup>[5]</sup>
	Overvoltage Protection	AC and DC protection (type 2)
<b>CERTIFICATIONS</b>	Safety	UL1741, CSA 22.2 No.107.1-16, IEC62109-1, IEC62109-2
	Utility interconnect <sup>[6]</sup>	UL 1741 SA - Feb. 2018, IEEE 1547.1-2005

[1] Values at 1.00•Vac nom and cos Φ= 1.Consult Power Electronics for derating curves.

[2] Consult P-Q charts available:  $Q(kVar)=\sqrt{(S(kVA))^2-P(kW)^2}$ .

[3] Consult Power Electronics for the extended DC voltage range option efficiency data.

[4] Readings taken 1 meter from the back of the unit.

[5] Battery short circuit disconnection has to be done on the battery side.

[6] Consult Power Electronics for other applicable standards / grid codes.



TRASFORMATORE

**Project Manager:** CONCEPCION JARQUE  
**Phone number:** 56797  
**E-Mail:** concepcion.jarque@es.abb.com

**Sales order:** 101526147/10  
**Item:** 1LES009287-000

**Customer PO:** 4500257150

Rated Power (kVA)	3510	Customer especification		Vector group.	Dy1
Forced power (kVA)		Tapping	B SPCTAPS	Freq. (Hz)	60
HV(V)	34500/	LV (V)	660	Altitude (m)	1000
HV conect. a (V)					
Cooling system:	AN/AF	Wo at 100% un (W)	8000	<b>3rd LV Winding</b>	
Standard:	IEEE C57.12.01	Wc (120 °C) (W)	27500	Power (kVA):	
Installation:	Indoor	Wt tolerance (W)		LV (V):	
C/E/F Class:	C2/E2/F1	Wt tolerance (W)		Terminal Position LV3:	
		Short circuit voltage%	8.50	Ucc (HV/LV3) (%):	
		Power/Pressure noise level (db(a))	/71	Ucc (LV/LV3) (%):	
		Ucc (HV/LV) (%)			

Winding material	AL
Winding manufacturing	Encapsulated
Insulation material class	H
Highest voltage for primary (kV)	34.5
Whitstand volt at ind. freq 50hz, 60sg (kV)	70
Lighting pulse withstand volt 1.2/50 (kV)	150
Maximum ambient temperature (°C)	50
Winding temperature rise (K)	115
Terminals positions	DOWN

HV	LV
AL	AL
Encapsulated	Impregnated
H	H
34.5	2.5
70	10
150	20
50	
115	115
DOWN	UP

**TECHNICAL COMMENTS**

L5381F  
 # Application: Solar  
 # Nominal rated power @50°C AF: 3510kVA  
 # Nominal rated power @40°C AF: 3630kVA  
 # Guaranteed values at 3510 kVA AF and 660 V  
 # X(%) = 8.464  
 # R(%) = 0.783  
 # X/R = 10.809  
 # Tapping: 39864/38915/37966/37031/36130/35300/34500/33628/32775 V  
 # Voltage class primary winding: LI 150 / AC 70 / Um 34.5 kV  
 # Voltage class secondary winding: LI 20 / AC 10 / Um 2.5 kV  
 # Vector group Dy1 (upper connection)  
 # Terminal position (HV/LV): Down / top  
 # Sound pressure LPA at 2m <71 dB  
 # Height 1800mm without wheels  
 # AF Ventilation (\*): IMPORTANT: it is considered a minimum ventilation speed through the transformer ventilation conduits of 1.5 m/s by means of air extraction system from Power Electronics.  
 # Electrostatic screen reinforced to withstand dV/dt: 5kV  
 # Maximum voltage variation ±10%. Voltage and frequency variation combination will not exceed 10% on the most adverse scenario.  
 # Application: Solar

<b>IP00</b>	
Approx. dimensions IP00 (LxWxH)(mm)	2370x1050x1800
Approx. weight (Kg)	5770
Max. dimensions IP00 (LxWxH)(mm)	2370x1050x1800
Max. weight (Kg)	
Wheels	YES
Distance between wheels(mm)	820
Wheels locking device	
Jacking points	
Antivibration device	
Seismic zone	
Finishing	C2H
Bolt and nuts	Zinc coating
Color	RAL 7035

<b>Enclosure</b>	
Protection degree	
Approx. dim (LxWxH) (mm)	
Approx. Weight (Kg)	
Max. dimensions (LxWxH) (mm)	
Max weigh (Kg)	
Panel options	
HV connections entry	
LV connections entry	
Cable box	
Finishing	
Bolt and nuts	
Painting	
Flat packed	

**Asea Brown Boveri, S.A.**  
 Crta. de Madrid Km. 314  
 50012 Zaragoza (España)  
 Phone: +34 976 769300  
 Fax: +34 976 769360  
 NIF: A08002883



**Project Manager:** CONCEPCION JARQUE  
**Phone number:** 56797  
**E-Mail:** concepcion.jarque@es.abb.com

**Sales order:** 101526147/10  
**Item:** 1LES009287-000

**Customer PO:** 4500257150

Accessories

Temperature control unit		Tag plate	
T <sup>3</sup> control send in advance			
Dial thermometer			
Temperature sensors	PT100P	Rating plate	
Temperature sensors at core			
Additional set of sensors			
Fans + control unit			
Fans forecast		Documents	
Force power when fans required		Drawings for approval	
Terminal box		Required date for drawings	
Current transformer			
Earthing screen HV/LV			
Plug-in connector			
Busbar			
Earthing Bullet HV			
Earthing Bullet LV			
LV Copper Terminals	NO		
OLTC	NO		
Anticondensation heaters			
Package			

Language	Qty.	Material
Inglés/English	1	Aluminum

Witness	Tests
Factory acceptance test	
Routine test	
Temperature rise test	
Lightning impulse test	
Noise level test	
Ability to w. short circuit	

**GENERAL COMMENTS**