



USER'S MANUAL

AZZURRO
ZCS

BATTERY

AZZURRO LV ZSX5120



ZUCCHETTI
Centro Sistemi



GREEN
INNOVATION



Battery

AZZURRO LV ZSX5120

User Manual



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General instructions

This manual contains important safety instructions that must be followed during installation and maintenance of the equipment.

Please keep these instructions!

This manual must be considered an integral part of the equipment, and must be available at all times to everyone who interacts with the equipment. The manual must always accompany the equipment, even when it is transferred to another user or plant.

Copyright statement

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Please check our website at <http://www.zcsazzurro.com> for the latest version.

Technical support

ZCS offers a support and technical consultancy service accessible by sending a request directly from the website <https://www.zcsazzurro.com/it/support>.

The following toll-free number is available for the Italian territory: 800 72 74 64.

1. General information

This manual introduces AZZURRO LV ZSX5120 Battery. Please read this manual before you use the battery. Any confusion, please contact AZURRO technical support immediately for advice and clarification.

1.1. Validity

This user manual is applicable to AZZURRO LV ZSX5120 Battery.

This user manual contains AZZURRO LV ZSX5120 product information, usage guidance, safety information, installation guide and details on common operating issues and subsequent corrective actions.

1.2. Intended Use

AZZURRO LV ZSX5120 is an energy storage unit that is designed to be used in residential on-grid applications with the capability for short-term backup.

Notes regarding intended use:

AZZURRO LV ZSX5120 is not suitable for supporting life-sustaining medical devices.

This product is intended for use only in accordance with the information provided in the enclosed documentation and with the locally applicable standards and regulations. Any other application may cause personal injury or property damage.

The illustrations in this manual are meant only to help explain system configuration concepts, includes usage guidance, safety precautions, and common operating issues and subsequent corrective actions.

Alterations to the product, e.g. changes or modifications, are only permitted with the express written permission of ZCS Technical Support. Unauthorized alterations will void warranty claims. Zucchetti Centro Sistemi S.p.A. shall not be held liable for any damage caused by such changes. Any use of the product other than that described in the Intended Use section does not qualify as appropriate. The enclosed documentation is an integral part of this product. Keep the documentation in a convenient place for future reference and observe all instructions contained therein. The type label must remain attached to the product.

Please contact ZCS Technical Support or local after-service providers within 1 week once the user decides to cease using their ZCS Battery products.

1.3. Identifying The Product

The type labels were attached on the product, which contain the product identification information. For safe usage, the user must be well-informed of the contents in the type labels.

The type labels include:



Figure 1 – Labels on the side of the battery

Safety

This section contains safety information that must be observed at all times when working on or with batteries. To prevent personal injury or property damage and to ensure long-term operation of the batteries, read this section carefully and observe all safety information at all times.



WARNING

Environmental Requirement:

- Do not place the battery outdoor exposed to weathering
- Do not expose the battery to temperature above 50°C.
- Do not place the battery near any heat sources.
- Do not expose the battery to moisture or liquids.
- Do not expose the battery to corrosive gases or liquids.
- Do not expose the battery to direct sunlight for extended periods of time.
- Do not allow the battery power terminals to touch conductive objects such as wires.
- Place battery in secure location away from children and animals.

Operation Precautions:

- Do not disassemble the battery.
- Do not touch the battery pack with wet hands.
- Do not crush, drop or puncture the battery.
- Do not reverse the polarity or connect in series.
- Do not short circuit the terminals, remove all jewelry items that could product a short circuit before installation and handling.
- Always dispose of the product according to local safety regulations.
- Store and recharge battery in a manner in accordance with this user manual.
- Ensure reliable grounding.
- Disconnect battery from power/load and then power off battery before installation and maintenance.
- When storing or handing, do not stack up batteries when outside protective package.
- Packaged batteries should not be stacked more than specified number stipulated on the package.
- Continued operation of a damaged battery can result in dangerous situation that may cause severe

injury due to electrical shock.

Technical Items

No.	Terms	Comment
1	Discharge	Battery output power for load
2	Charge	To put electricity into battery by charger
3	Full charge	Battery had been full charged, SOC is 100%.
4	Standby	Ready for charging or discharging
5	Shutdown	Power off
6	SOC	State of Charge(Useable capacity)
7	Battery voltage	The voltage between B+/B-
8	Cell voltage	Single cell voltage
9	Pack voltage	The voltage between P+/P-
10	Alarm	Indicate that the battery is in abnormal status
11	Protect	Battery stops charging or discharging and is recoverable
12	Fault	Battery or BMS is broken, need to be replaced
13	Over discharged	Battery is lack of electricity, and needs to be recharged in time

2. Product Overview

2.1 Brief Introduction



Figure 2 – Product overview

AZZURRO LV ZSX5120 is a battery system with an operating voltage range between 45.6~56.16V. It is utilized in household energy storage applications and works together with a low-voltage PCS to realize the goal of energy storage for the home.

AZZURRO LV ZSX5120 has built-in BMS (battery management system), which can manage and monitor cells information including voltage, current and temperature. What's more, BMS can balance cells charging to extend cycle life. BMS has protection functions including over-discharge, over-charge, over-current and high/low temperature; the system can automatically manage charge state, discharge state and balance state. Multiple batteries can be connected in parallel to expand capacity and power for larger capacity and longer power supporting duration requirements, AZZURRO LV ZSX5120 support up to 4 parallel operation.

2.2 Button, LED & Communication Port

2.2.1 Switch ON/OFF

Switch ON:

For single ZSX5120, switch ON POWER button, then long press (3 sec) SW button. For multiple ZSX5120 connected in parallel, switch ON POWER buttons of all batteries, then long press (3 sec) SW button of master battery.

Switch OFF:

Switch OFF all POWER button(s).

2.2.2 LED Indicator Definition

Note:

Flash 1 - 0.25s ON / 3.75s OFF

Flash 2 - 0.5s ON / 0.5s OFF

Flash 3 - 0.5s ON / 1.5s OFF

SOC Status while charging

STATUS		CHARGE							
		L8●	L7●	L6●	L5●	L4●	L3●	L2●	L1●
SOC (%)	0~17	ON	OFF	OFF	OFF	OFF	OFF	OFF	Flash 2
	18~33			OFF	OFF	OFF	OFF	Flash 2	ON
	34~50			OFF	OFF	OFF	Flash 2	ON	ON
	51~66			OFF	OFF	Flash 2	ON	ON	ON
	67~83			OFF	Flash 2	ON	ON	ON	ON
	84~100			Flash 2	ON	ON	ON	ON	ON

SOC Status while discharging

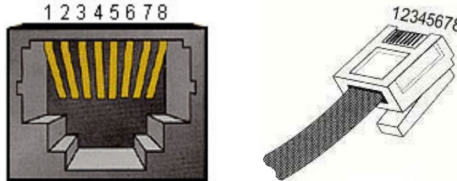
STATUS		DISCHARGE							
		L8 ●	L7 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●
SOC (%)	0~17	Flash 3	OFF	OFF	OFF	OFF	OFF	OFF	ON
	18~33			OFF	OFF	OFF	OFF	ON	ON
	34~50			OFF	OFF	OFF	ON	ON	ON
	51~66			OFF	OFF	ON	ON	ON	ON
	67~83			OFF	ON	ON	ON	ON	ON
	84~100			ON	ON	ON	ON	ON	ON

Work Status

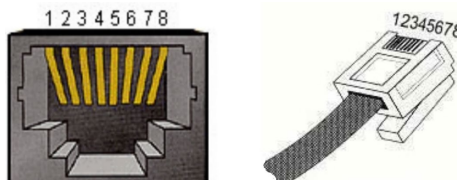
STATUS		RUN	ALM	SOC						DESCRIPTION
		L8 ●	L7 ●	L6 ●	L5 ●	L4 ●	L3 ●	L2 ●	L1 ●	
Shutdown		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
Standby		Flash 1	OFF	According to SOC						
Charge	Normal	ON	OFF	According to SOC						
	Over volt	ON	OFF	ON	ON	ON	ON	ON	ON	Switch to standby mode afterwards
	Protection	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging
Discharge	Normal	Flash 3	OFF	According to SOC						
	Under volt	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	Stop discharging
	Protection	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop discharging
Faulty		OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging and discharging

2.3 Communication Port Pin Definition

2.3.1 CAN/RS485 to PCS

Port definitions	RJ45 Pin	Function
	1	RS485-B
	2	RS485-A
	3	GND
	4	CAN-H
	5	CAN-L
	6	NC
	7	RS485-A
	8	RS485-B

2.3.2 RS232 to PC

Port definitions	RJ45 Pin	Function
	1	RS232-TX
	2	GND
	3	RS232-RX
	4	NC
	5	NC
	6	NC
	7	NC
	8	NC

3. Installation

3.1. Checking Before Installation

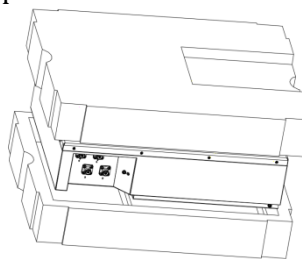
3.1.1. Checking Outer Packing Materials






Packing materials and components may be damaged during transportation. Therefore, check the outer packing materials before installing the battery. Checking the surface of packing materials for damage, such as holes and cracks. If any damage is found, do not unpack the battery and contact the dealer as soon as possible. You are advised to remove the packing materials within 24 hours before installing the battery.




3.1.2. Checking Deliverables

After unpacking the battery, check whether deliverables are intact and complete. If any damage is found or any component is missed, contact the dealer.

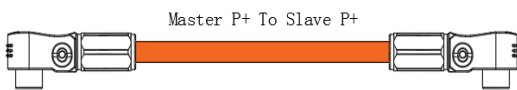
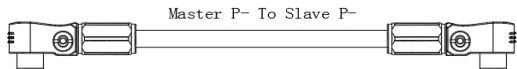
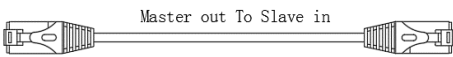
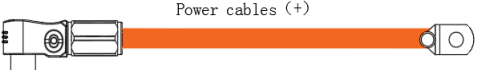
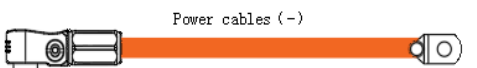
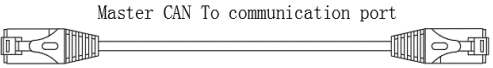
The below table shows the components and mechanical parts that should be delivered.



NO.	Pictures	Quantity	Description
1		1 pc	ZSX5120 Battery
2		4 pcs	Battery hanging bolt
3		4 pcs	Battery hanger
4		1 pc	Wall Bracket
5		6 pcs	Expansion Bolt

6		2 pcs	Wall Bracket Bottom Bolt
7		1 pc	Comm cable
8		1 pc	Manual

The following accessories are configured according to the number of parallel machines in the battery system. For example:

NO.	Pictures	Quantity	Description
1		N-1 "*"	Parallel connections cable (P+)
2		N-1 "*"	Parallel connections cable "*" (P-)
3		N-1 "*"	Parallel communication cable "*" (P-)
4		1pcs	Output Power cables (P+)
5		1pcs	Output Power cables (P-)
6		1pcs	Output communication cable

Note:

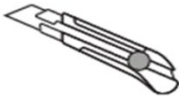

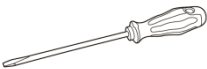


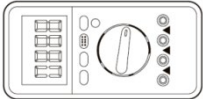
1. The standard output power cable is optional accessories component part, the customer can be according the actual installation requirements customize the output power cable from ZCS when the product sold in local or importers provide.
2. "*" N is indicate the parallel connections number of battery. The number of power cable and


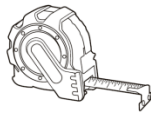
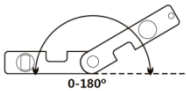




Communication cable is optional accessories according the parallel connection demand for customer.

3. You are advise use the provide standard accessories part from ZCS or customize the identical specification accessories component part from ZCS or importers.

3.1.3. Tools

3.2. Tools

No.	Tool		Function
1		Cutter	To open the outer box
2		Drill Recommended drill bit: 12mm	To drill holes in the wall for fixing the bracket
3		Screwdriver	To screw and unscrew screws for the various connections
4		Rubber hammer	To insert the expansion plugs into the wall holes
5		Socket wrench 10/16 mm	To screw and unscrew screws for the various connections
6		Multi-meter	To check the voltage and current values

7		Marker pen	To mark the wall for better fixing precision
8		Measuring tape	To measure distances
9		Level	To make sure the bracket is level
10		ESD gloves	Protective clothing
11		Safety goggles	Protective clothing
12		Protection mask	Protective clothing
13		Safety shoes	Protective clothing

3.3. Installation requirements

3.2.1. Installation environment requirements

- Install the battery in the indoor environment.
- Place battery in secure location away from children and animals.
- Do not place the battery near any heat sources and avoid sparks.
- Do not expose the battery to moisture or liquids.
- Do not expose the battery to direct sunlight.

3.2.2. Installation carrier requirements

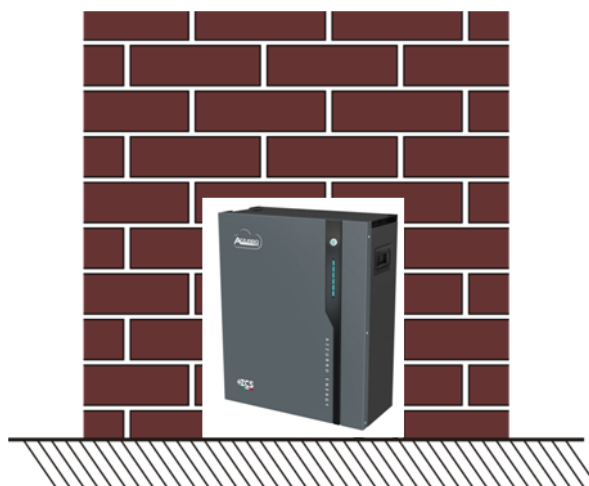
- The mounting carrier shall have fire resistance. Do not install batteries on flammable buildings.
- The mounting carrier surface shall meet the load bearing requirements.

3.3. Installation Method

- Suspended on wall



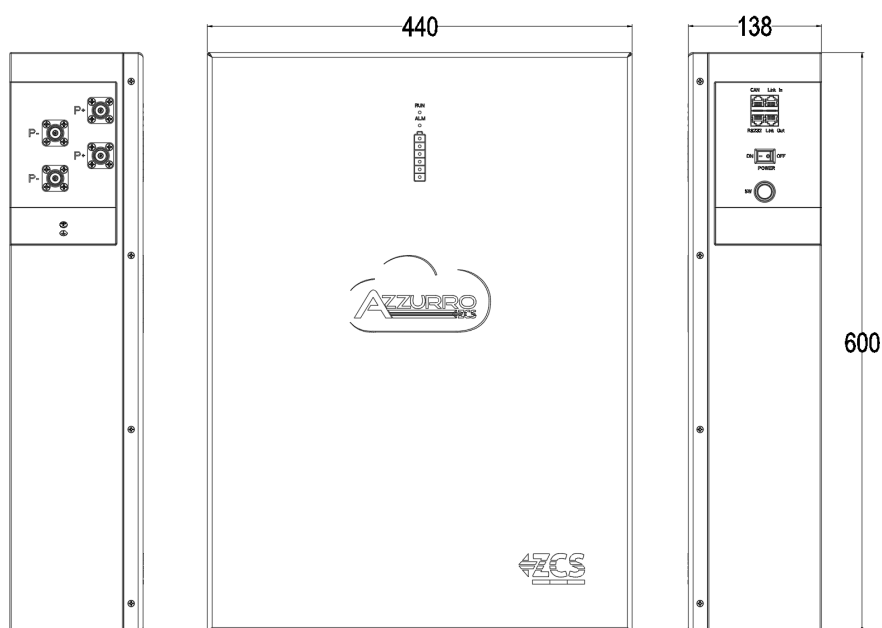
- Pedestal mounted



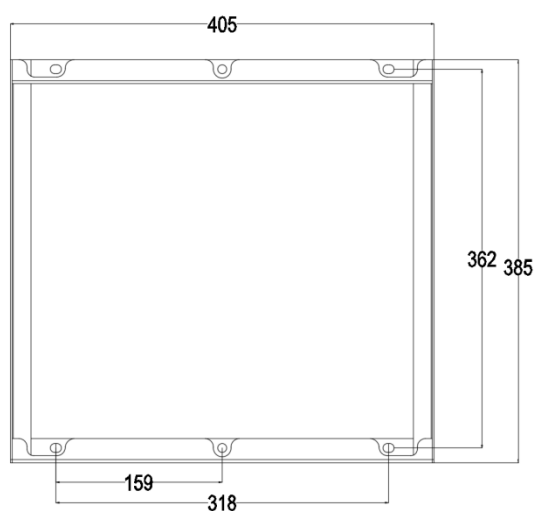
3.3.1. Installation Instruction

3.3.2. Dimensions

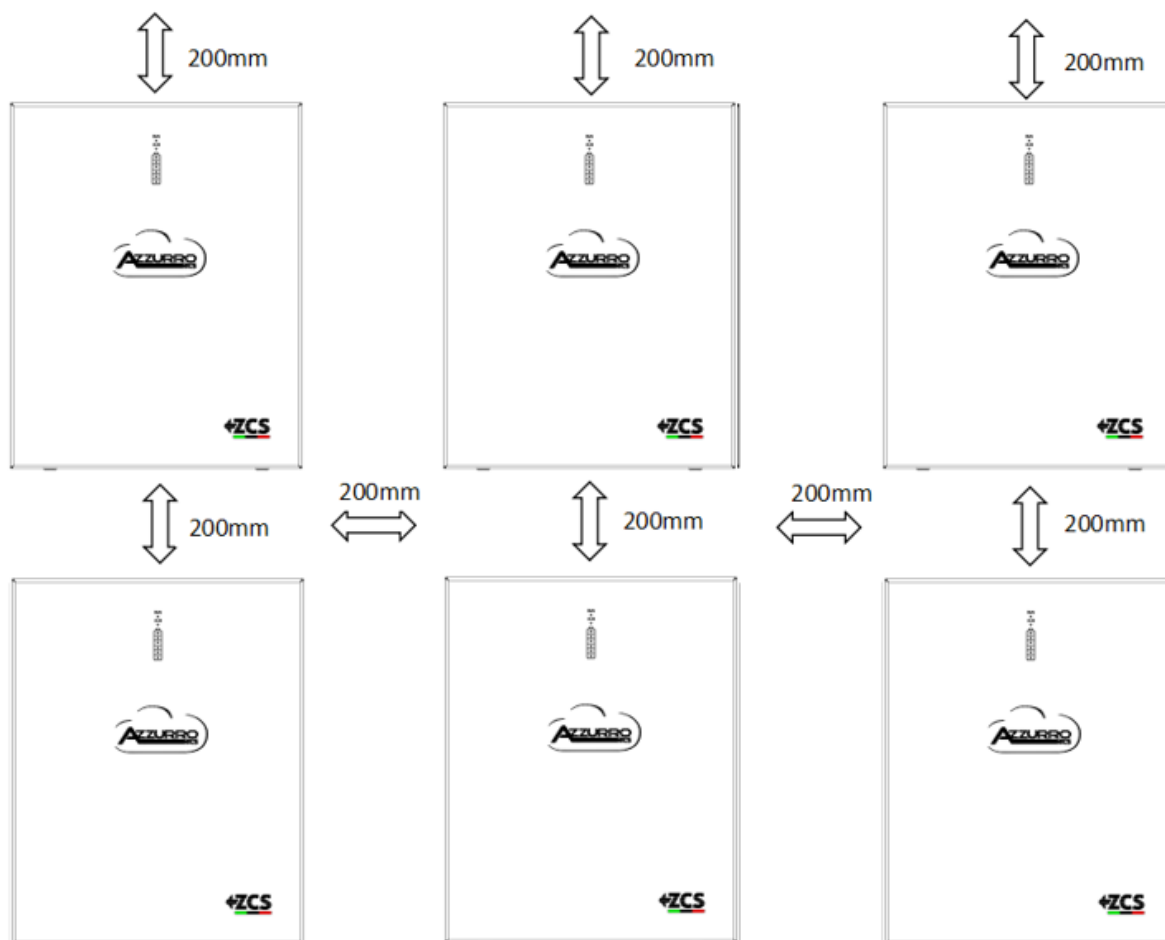
Battery size:



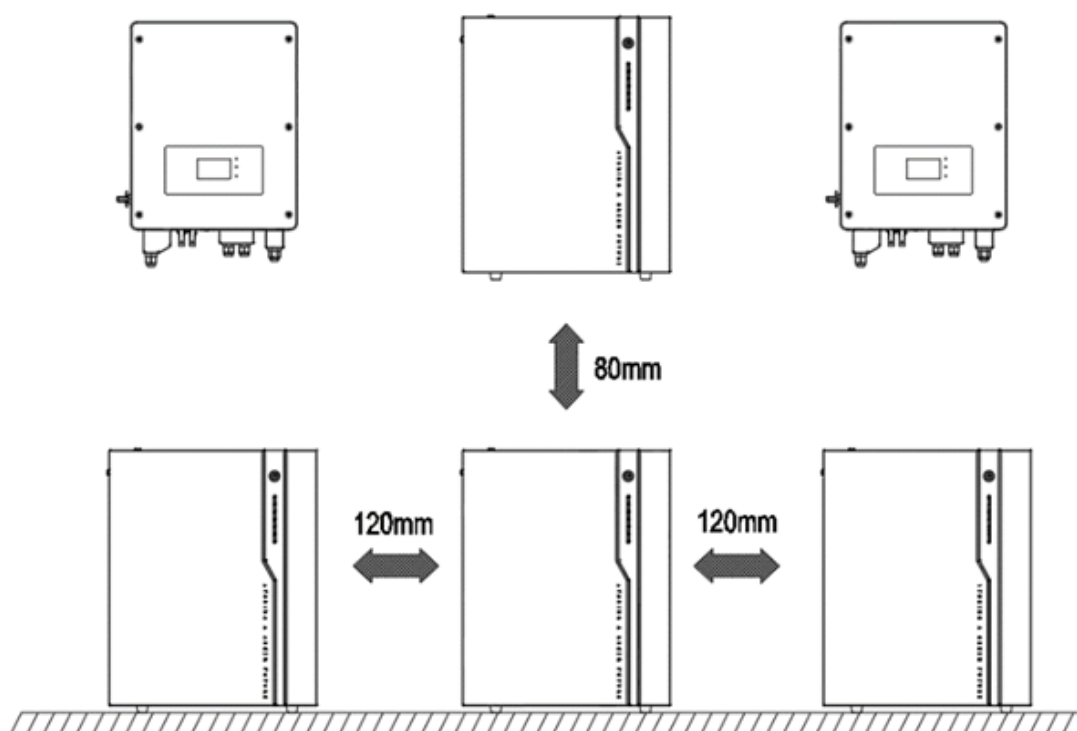
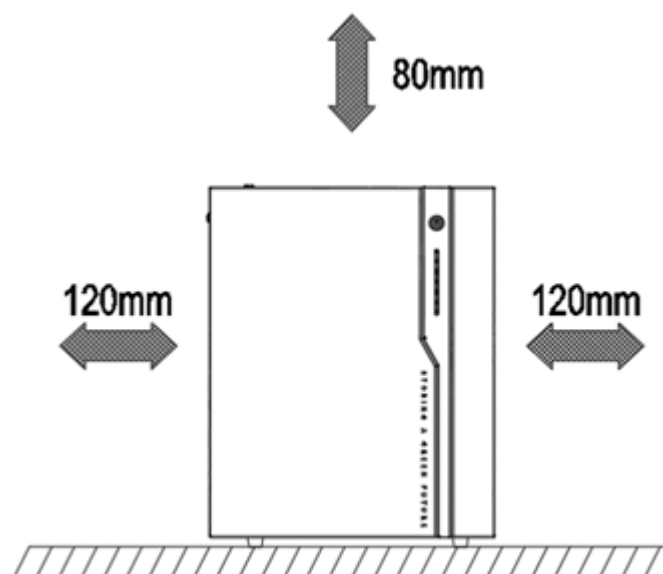
Hanging rack size:



Minimum mounting distance requirement:



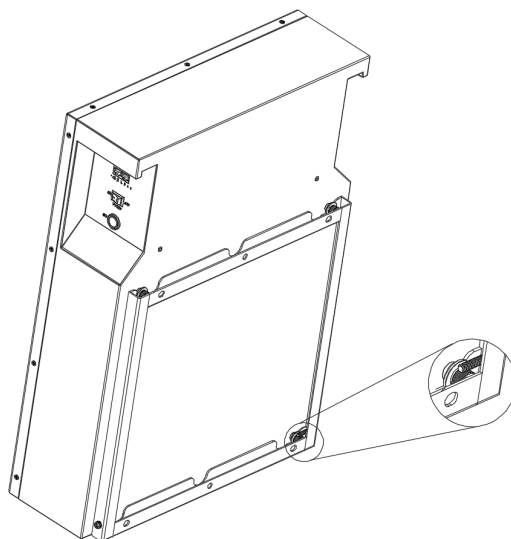
Minimum mounting distance between battery pack and other equipment:



3.3.3. Installation step

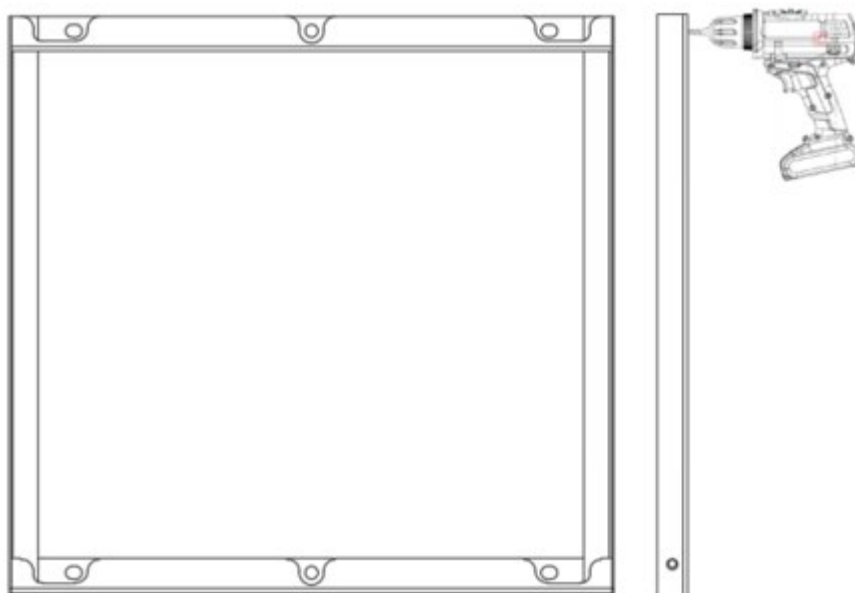
Step 1:

Remove 2 pcs wall bracket bottom bolts. Remove wall bracket from battery.



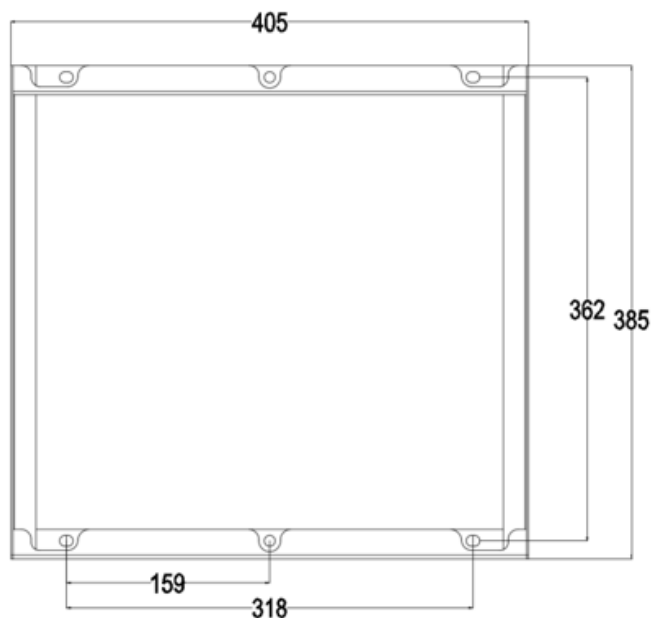
Step 2:

Drill holes in the wall according to wall bracket.



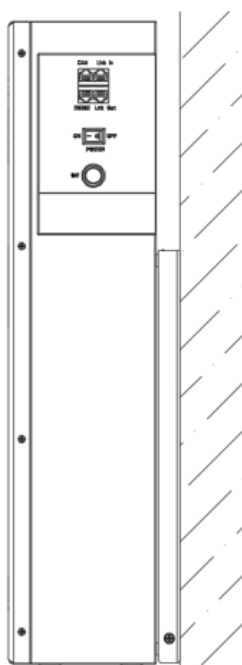
Step 3:

Fix wall bracket to the wall.



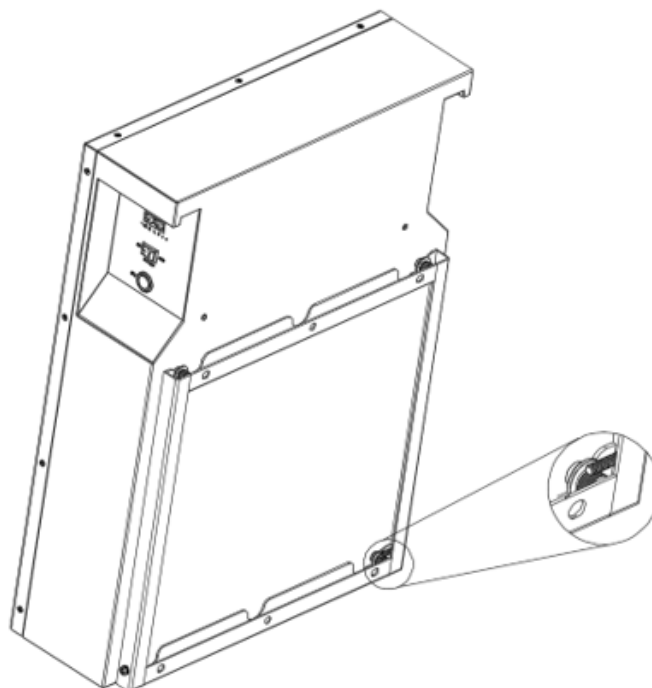
Step 4:

Hang ZSX5120 on the wall bracket and tighten it.



Step 5:

Install 2 pcs wall bracket bottom bolts.



Step 6:

Connect PE cable

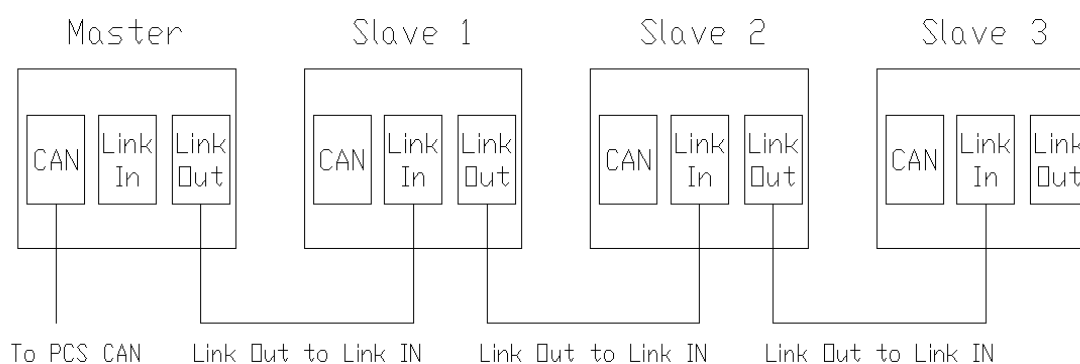




Step 7:
Connect power cable



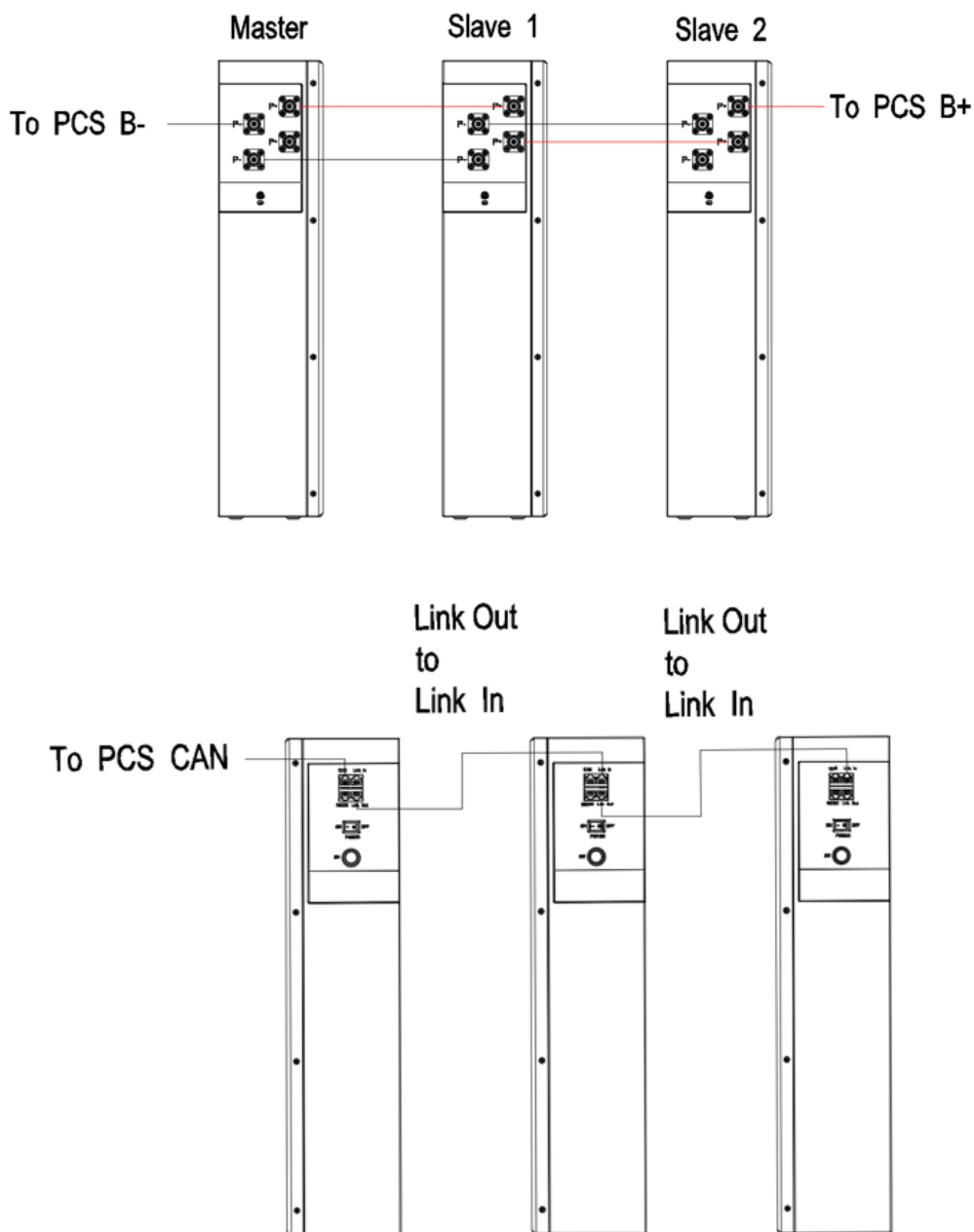
Step 8:
Connect communication cable





Step 9:

Refer to the following diagram when multiple batteries are connected in parallel.



5. Cleaning and Maintenance

5.1. Cleaning

CAUTION:

Please power off the system before cleaning.

It is recommended that the AZZURRO LV ZSX5120 should be cleaned periodically. If the enclosure is dirty, please use a soft, dry brush or a dust collector to remove the dust. Liquids such as solvents, abrasives or corrosive liquids should not be used to clean the enclosure.

5.2. Maintenance

5.2.1. Recharge Requirements During Normal Storage

Batteries should be stored in an environment with a temperature range between $-10^{\circ}\text{C} \sim +45^{\circ}\text{C}$, and maintained regularly according to the following table with 0.2C (20A) current until 50% SOC after a long time of storage.

Recharge conditions when in storage

Storage Environment Temperature	Relative Humidity of Storage Environment	Storage Time	SOC
Below -10°C	-	prohibit	-
$-10 \sim 25^{\circ}\text{C}$	5% ~ 70%	≤ 12 months	$30\% \leq \text{SOC} \leq 60\%$
$25 \sim 35^{\circ}\text{C}$	5% ~ 70%	≤ 6 months	$30\% \leq \text{SOC} \leq 60\%$
$35 \sim 45^{\circ}\text{C}$	5% ~ 70%	≤ 3 months	$30\% \leq \text{SOC} \leq 60\%$
Above 45°C	-	Not Allowed	-

5.2.2. Recharge Requirements When Over Discharged

Please recharge the over discharged (90%DOD) batteries in a timeframe that is in accordance to the following table, otherwise the over discharged battery modules will be damaged.

Recharge conditions when battery is over discharged

Storage Environment Temperature	Storage Time	Note
-10 ~ 25°C	≤ 15 days	Battery Pack disconnect to PCS
25 ~ 45°C	≤ 7 days	
-10 ~ 45°C	< 12 hours	Battery connected to PCS

Attention : Disposal of batteries should follow local regulations.

5.2.3. Replacement or expand capacity

The maintenance of batteries requires a person with professional skills.

1. Before replacement or expand capacity, please cut off the whole system, include PCS and Battery system; at the same time, PCS is disconnected from the power grid;
2. After PCS is confirmed to be disconnected from the power grid, turn off the battery power supply and disconnect the connection line between the battery and PCS.
3. Remove or install new battery and then restart.

6. Common Issues and Solutions

6.1. Emergency

Please cut off the power supply and turn off the battery in an emergency.

1. Wet Batteries

If the battery pack is wet or submerged in water, do not let people access it, and then contact ZCS Technical Support or an authorized dealer for technical support.

2. Fire

NO WATER! Only dry powder fire extinguisher can be used; if possible, move the battery pack to a safe area before it catches fire.

3. Leaking Batteries

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If someone is exposed to the leaked substance, immediately perform the actions described below.

Inhalation: Evacuate the contaminated area, and seek medical attention.

Contact with eyes: Rinse eyes with flowing water for 15 minutes, and seek medical attention.

Contact with skin: Wash the affected area thoroughly with soap and water, and seek medical attention.

Ingestion: Induce vomiting, and seek medical attention.

4. Damaged Batteries

Damaged batteries are dangerous and must be handled with the utmost care. They are not fit for use and may pose a danger to people or property. If the battery pack seems to be damaged, pack it in its original container, and then return it to ZCS or an authorized dealer.

Uninstalling

8.1. Uninstallation steps

- Disconnect the inverter from the AC grid by opening the AC circuit breaker.
- Disconnect the inverter from the photovoltaic strings by opening the DC circuit breaker.
- Wait 5 minutes
- Remove the DC connectors
- Remove the AC terminals.
- Unscrew the fixing bolt of the bracket and remove the product from the wall.

8.2. Packaging

If possible, pack the product in its original packaging.

8.3. Storage

Store the product in a dry place where the ambient temperature is between -25 and +60°C.

8.4. Disposal

Zucchetti Centro Sistemi S.p.a. is not liable for the disposal of the equipment, or parts thereof, that does not take place according to the regulations and standards in force in the country of installation.



The symbol of the crossed-out wheeled bin indicates that the equipment, at the end of its useful life, must be disposed of separately from household waste.

This product must be handed over to the waste collection point in your local community for recycling.

For more information, please contact the waste collection authority in your country.

Inappropriate waste disposal could have negative effects on the environment and on human health due to potentially hazardous substances.

With your cooperation in the correct disposal of this product, you contribute to the reuse, recycling and recovery of the product, and to the protection of our environment.

Technical specifications

ZCS AZZURRO LV ZSX5120

General data	
Type	ZCS- AZZURRO LV ZSX5120
Technology	Lithium Iron Phosphate
Dimensions (H*L*W)	600mm*440mm*140mm
Weight	44Kg
Protection Class	IP20
Mounting	On ground or wall
Operating temperature while charging	-10°C - +50°C
Operating temperature while discharging	-20°C - +50°C
Allowable relative humidity range	0....95% non -condensing
Maximum operative altitude	2000m
Operating cycles under standard conditions *	>6000
Maximum number of batteries that can be installed in parallel on inverters	15
Certifications	IEC62619, IEC62040 -1, CE, UN 38.3
Warranty	10 years
Communication	RS232, RS485, CAN bus
Capacity data	
Nominal capacity of single module	5.12 kWh / 100Ah
Useful capacity of single module (Depth of Discharge 90%)	4.61 kWh
Nominal voltage	51.2 V
Maximum charge current**	50 A
Maximum discharge current**	50 A
Maximum Depth of Discharge (DoD)	90%

* Standard operative conditions for batteries: 25°C , 40% humidity, Depth of Discharge (DoD) 80%

** The actual charging and discharging currents of the system may be limited by the inverters to which the batteries are connected, please refer to the inverter datasheets for the actual charging and discharging current

Warranty terms and conditions

To view the Warranty Terms and Conditions” offered by ZCS Azzurro, please refer to the documentation inside the product box and on the website www.zcsazzurro.com.



THE INVERTER THAT LOOKS AT THE FUTURE

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