

Energy Storage System (ESS) ESI215-100K-M

Installation Guide



This document is applicable to the following models: $\cdot \text{ESI215-100K-M}$

1.1 Appearance



1.2 Operation Panel

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ESTOP	EATOP

NO.	Mark	Item	NO.	Mark	Item
1	STATE	Running status indicator	3	-	Anti-misoperation cover plate
2	ENERGY	Charging/discharging status and SOC indicator	4	E-STOP	E-STOP button

Notes

In order to avoid accidental touch operation, E-STOP is designed with an anti-misoperation cover plate. When it needs to be operated, please pull the cover to the left (or right) and then press the E-STOP button. See the following table for the status description of the ESS indicator.



- The E-STOP button is only used in case of failure or emergency of ESS. During normal use, it shall be shut down by APP shutdown instruction.
- Improper use of the E-STOP button may cause damage to ESS. If the E-STOP button is used with load, it will bring the ESS related devices high pressure. Frequent use will cause damage to the button.
- When only the E-STOP button is pressed, the internal AC/DC side connection terminal is still live and there is still a fatal high voltage inside ESS!

Indicator	Status	Notes
	The blue indicator is always on	 Equipment in operation Minor alarms, without affecting normal operation of equipment
	The blue indicator flashes (frequency: 1s)	 Equipment standby or shutdown Minor alarms, without affecting normal operation of equipment
	The red indicator is always on	·Abnormal equipment, with important alarms
	OFF	·AC/DC power-off
	Flickers in blue	·Charging ·Battery level display
	Blue breathing indicator	·Discharging ·Battery level display

Notes

- There are 10 grids around the ENERGY indicator, with every 10% of electricity as one grid. The existing electricity is displayed in an indicator which is always on.
- During charging, the existing battery level is always on, and the remaining position to be charged is displayed in a cyclic manner with indicators.
- During discharging, the grid corresponding to the highest remaining power is dynamically displayed in the form of a breathing indicator (frequency:
 - 1s), and the grid indicator without power goes out.

1.3 Structural Layout



NO.	Item	NO.	Item	NO.	Item	NO.	Item
1	Lifting ring	6	PCS	1	Wiring terminal (for internal transfer)	16	Miniature circuit breaker for socket outlet
2	Antenna	\bigcirc	Aerosol fire extinguishing device	12	Dehumidifier	1	Socket (European standard)
3	LED	8	DC circuit breaker	13	Fuse	18	AC circuit breaker
4	Liquid-cooled Pack	9	Water immersion detector	14)	External power supply miniature circuit breaker	19	Front air inlet filter cotton
5	Liquid cooling unit	10	Signal lightning arrester	15	External power supply lightning arrester	-	-

1.4 Communication Interface

Notes

ESS is designed with one 9PIN external communication interface (the position is shown in the left figure below, and the definition of each pin is shown in the table below) to realize data acquisition unit communication and BMS communication. At the same time, it is also provided with 2 network signal lightning arrester LAN interfaces (the position is shown in the right figure below) for connecting the reserved interface of the data acquisition unit. Users can easily obtain the current ESS operation data through the connection of communication interface.





9PIN External Communication Interface

Network Signal Lightning Arrester LAN Interface

NO.	Item	Notes	NO.	Item	Notes
1	BMS:CAN2-H	BMS external communication interface	6	GND	Grounding interface
2	BMS:CAN2-L	BMS external communication interface	\bigcirc	PCS_CAN_H	Multiple units in parallel operation
3	GND	Grounding interface	8	PCS_CAN_L	Multiple units in parallel operation
4	KC541:COM3-A	Used to connect the meter	9	GND	Grounding interface
5	KC541:COM3-B	Used to connect the meter	-	-	-

1.5 Grounding Design



1.6 External Dimension



1.7 Heat Dissipation Design



1.8 Design of Bottom Incoming Line Hole



2 Unpacking and Handling

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During loading, unloading and transportation, the operation safety regulations of the country/region where the project team is located must be observed.

A Caution

Please select an appropriate handling device according to the weight (about 2.3t) and overall dimensions (1,000mm × 1,300mm × 2,350mm (width × height × depth)) of the equipment. Improper handling may result in equipment damage or personal injury!

- The equipment must be handled by professionals who have received professional training, and there shall be professionals on site to command the whole process.
- During handling, it is forbidden to tilt or lay down the equipment, otherwise, the internal components will bear great stress, which may cause damage to the components and affect performance of the equipment.

2.1 Forklift Handling



Caution

- It is recommended that the lifting capacity of forklift shall be greater than 3t.
- During handling of ESS with a forklift, the forklift arm must be inserted from the front of the equipment and completely through the bottom of the equipment.
- During lifting of the machine, the center of gravity of the machine shall be at the center of two forks to keep the handling process slow and stable.
- When the forklift lifts the equipment, please pay attention to the stability of the fork and keep left-right balance.
- During the movement, the inclination angle of the equipment shall not exceed 10°. It is not allowed to put down or lift it suddenly, and attention shall be paid to turnings, uphills, downhills and other places to avoid collision with the equipment.

2.2 Hoisting Handling



Caution

- The selected lifting and transportation means must be of sufficient bearing capacity, as well as sufficient boom length and rotation radius.
- In the whole process of lifting ESS, it is necessary to operate in strict accordance with the safe operation procedures of the crane.
- No one is allowed to stand within 5m~10m of the operation area, especially under the lifting boom and the lifted or moved machine, so as to avoid casualties.
- All obstacles that exist or may exist during moving shall be removed, such as trees and cables.
- The equipment shall be ensured to be placed on a solid and flat ground with good drainage and no obstacles or protrusions.
- After the equipment is pre-hoisted 20~30mm above the ground, it shall be suspended to recheck the connection between the lifting appliance and the equipment. The hoisting can only be carried out after confirmation for firm connection.
- The whole lifting process shall be carried out slowly, and attention shall be paid to the ESS balance state, without tilting or moving too fast.
- After it is in place, ESS shall be placed gently to ensure that the equipment as a whole lands smoothly.
- In case of severe weather conditions, such as strong wind, heavy rain and fog, the lifting work shall be stopped.

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It is strictly prohibited to place ESS outside the vertical landing by swinging the lifting appliance.



3.1 Requirements for Installation Environment



3.2 Installation Spacing





- The ESS installation site shall be equipped with a fire water supply system.
- Municipal water supply is preferred as the fire water source, and fire water or natural water sources can also be used. When natural water sources are used, reliable water intake facilities shall be provided.
- The design flow of fire water supply shall be determined according to the sum of the maximum design flows of water extinguishing systems acting simultaneously as required. The fire water consumption shall be calculated according to the number of fires at the same time and the maximum water consumption required for extinguishing a fire.

▲ Caution

The external hydrant system shall be designed to meet the following requirements:

- Fire hydrants should be evenly arranged on the roadside of the site, and the distance from fire hydrants to ESS is recommended not to exceed 20m.
- It is recommended that each ESS be equipped with at least one fire hydrant, and the water consumption of fire hydrants shall not be less than 20L/s.
- Anti-freezing measures shall be taken for outdoor fire hydrants in cold areas.
- Outdoor fire hydrants shall be provided with permanent fixed signs.
- Spray water nozzles shall be provided near the power distribution unit area.
- A special fire control room (box) is set up in the station area, equipped with fire hoses, water guns and fire wrenches.

Mechanical Installation

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ESS can only be installed or commissioned without damage or failure. Before installation, please confirm the following items:

- The ESS appearance and internal devices are intact without damage.
- Before installation, the ESS front and rear equipment are made powered off.

A Caution

ESS can only be installed by professionally trained personnel. Improper installation may cause personal injury. When operating, please wear suitable protective equipment for personal protection in case of accidents.

4.1 Installation of Channel Steel

Notes

Clients can purchase channel steel by themselves or choose from Kehua. During selection of Kehua channel steel for installation, the following materials shall be prepared before installation.

Item	Specification	Qty.	Application	Source
Stainless steel expansion screw	M12	8	For fixing channel steel on the ground	Delivered with channel steel
Stainless steel combination screw	M16	4	For fixing ESS and channel steel	Delivered with machine delivery
Stainless steel flat washer	M16	4	Used with M16 stainless steel combination screw	Delivered with machine delivery
Stainless steel spring washer	M16	4	Used with M16 stainless steel combination screw	Delivered with machine delivery
Anti-rust paint	/	0.3kg	Sprayed on the screw fixing position to avoid corrosion	Provided by the client

Step 1 The channel steel fixing hole position shall be marked according to the size of the fixing hole at the bottom of channel steel.

Caution

Before installation, the flatness of the channel steel mounting surface shall be measured with a level gauge to ensure that the flatness of the channel steel mounting surface shall be less than 5mm.





Notes

If foundation installation is used, the foundation shall be built in advance according to the ESS bottom fixing holes and incoming and outgoing line requirements.

Warning

ESS is heavy as a whole (the weight of the system is about 2.3t). Before foundation construction, various conditions of the installation site (mainly geological conditions and environmental climatic conditions, etc.) shall be surveyed in detail. Only on this basis can the design and construction of foundations be started.

Caution

Foundations shall be constructed to meet at least the following requirements:

- The foundation must ensure the stability and safety of the installation position of the energy storage system
 - -The foundation shall have sufficient bearing capacity to effectively support ESS.

-The soil at the installation site shall be of a certain compactness. In case of loose soil, be sure to take measures to ensure a stable foundation

- -The bottom of the foundation pit for foundation construction must be tamped and filled.
- -The upper surface of the ESS foundation shall be on the same horizontal plane (not more than 5mm).
- The foundation shall be higher than the natural terrace to avoid erosion of the ESS bottom and inside after rain or snowmelt.
- Corresponding drainage measures shall be constructed in combination with local geological conditions.
- · Cement foundations of adequate cross-sectional area and height shall be constructed. The foundation height shall be determined by the construction party according to the site geology.
- Cable trenches are preset in the foundation and conduits are embedded.

-The inner diameter of the conduit shall not be less than 1.5 times the outer diameter of the cable, and the bending radius of the cable shall be greater than 10 times the outer diameter of the cable.

-Signal lines shall be routed separately from power lines to avoid electromagnetic interference.

-Both ends of all embedded pipes shall be temporarily blocked to prevent sundries from entering and affecting cable laying in the later period.

• It is recommended to reserve grounding flat steel for the foundation, and the grounding with ESS shall be fixed by bolts or welded firmly.

Notes

The muck excavated during foundation construction shall be cleaned immediately so as not to affect the subsequent hoisting of PV ESS.

For design of the air outlet direction, it is necessary to consider the wind direction of the installation site.

If foundation installation is used, the following materials shall also be prepared after foundation construction.

Item	Specification	Qty.	Application	Source
Stainless steel expansion screw	M16	4	For fixing ESS on the ground	Provided by the client
Anti-rust paint	1	0.3kg	Sprayed on the screw fixing position to avoid corrosion	Provided by the client



Step 1 The foundation shall be constructed according to the fixed position at the ESS bottom.

Notes

The installation foundation can be constructed with reference to the foundation scheme recommended in the following figure, or the foundation can be designed by yourself, but it shall meet the installation and maintenance requirements of the equipment.





5 Electrical Connection

5.1 Cable Preparation

Monitoring equipment Unitoring equipment Unitoring equipment Unitoring equipment Unitoring equipment Unitoring equipment Unitoring ESS Unitoring ESS Unitoring ESS							
NO.	Cable name		Cable type	Cable specification (mm ²)	Wiring terminal	Source	
1	AC output	L1/L2/ L3		Copper core line: 3×70+1×35	For copper core line: DT-70 For aluminum core line: DTL-120	Provided by the client	
2	Equipment ground wire	PE	core line	Aluminum core line: 3×120+1×70	For copper core line: DT-35 For aluminum core line: DTL-70	Provided by the client	
3	External power supply AC input	L/N	Outdoor multi- core line	4	CE040010	Provided by the client	
4		LAN	Standard network cable	/	RJ45 crystal plug	Provided by the client	
5	Communication	RS485	Shielded twisted pair	0.5	E0508	Provided by the client	
	line	CAN	1	0.75	E7508	Provided by	

Notes

- The size of lines in this table is based on UL copper line/UL aluminum line. If other lines are used, please refer to the standard for reasonable replacement.
- The selection of cable diameter shall conform to local cable standards.
- Factors affecting the selection of cables are: rated current, cable type, laying method, ambient temperature and maximum expected line loss.
- Copper-aluminum transfer terminals are required when aluminum wires are used.
- It is not recommended to use hard cables such as armored cables, so as to avoid poor terminal contact caused by cable bending stress.
- Please select flame-retardant cables.
- If the recommended terminal model is not used, confirmation with our company will be required.

5.2 Wiring Requirements

Notes

- The power line and the communication line shall be routed separately, and the cable spacing shall be greater than 200mm. In order to reduce electromagnetic interference, long-distance parallel routing of the power line and the communication line shall be avoided.
- When the communication line and power line cross, these two lines shall be made perpendicular to each other as much as possible.
- · See the following table for the distance requirements when the shielded communication line and power line are in parallel.

Parallel distance (m)	Minimum spacing (m)	Parallel distance (m)	Minimum spacing (m)	Parallel distance (m)	Minimum spacing (m)
200	0.3	300	0.5	500	1.2

Caution

Communication lines and power lines shall be protected during wiring.

Communication line protection

-The communication line is thin and easy to be damaged. Therefore, during wiring, the power line shall be routed first and then the communication line.

-Telecommunication lines shall be laid in cable trenches or on cable support frames and tied with wire clamps.

-Avoid heat sources or routing with cables with strong electromagnetic fields.

Power line protection

-The power line has a strong electromagnetic field to ensure that its insulation layer is not scratched or damaged. -Fix the power line properly.

5.3 External Grounding Connection

The grounding terminal at the ESS bottom is connected by welding or bolted to the grounding point on the embedded steel plate or channel steel in the foundation, and corrosion treatment shall be made.



Notes

- The specification of grounding flat steel or cable is more than 35m².
- 2 external grounding positions are reserved at the ESS bottom, and either one can be connected.

▲ Caution

- ESS must be grounded first before installation; when ESS is removed, the grounding wire must be removed last.
- The ESS grounding cannot be the same as that of the lightning rod of its installation building, and the two need to be separated (as shown in the following figure). The grounding of the converter shall be directly connected to the grounding system, and the impedance shall be less than 100mΩ.



5.4 AC Output Connection





Step 4 The wiring terminal shall be crimped.



Notes

- The stripping length in the above figure is recommended based on AC output L1/L2/L3/PE multi-core aluminum wire, DTL120 for wiring terminal and DTL70 for PE. If other types of wiring terminals are selected, the stripping length = actual inner length of wiring terminal + $(1\sim2)$ mm.
- When the AC wiring terminal is provided by the client, the installation dimensions of the corresponding wiring terminal shall meet the following requirements: 12.5mm<A<14.5mm; 26mm<B<34mm; 13mm<C<17mm.



Caution

When stripping lines, the cables shall be pulled out of the cabinet to avoid leaving line sheaths and metal cores inside the cabinet, thus affecting the normal operation of the equipment, as shown in the following figure.



The crimped AC cables shall be connected to the corresponding AC copper bars in sequence of Step 5 ground wire, L2, L1 and L3.



Notes

When connecting the wiring terminal and cable of different specification, it is necessary to ensure that (as shown in the following figure):

- When the copper core cable or copper-clad aluminum cable is used, please use the copper wiring terminal.
- When the aluminum alloy cable is used, the copper-aluminum transition wiring terminal shall be used and the requirements of IEC61238-1 shall be met.



A Caution

- It is strictly prohibited to directly connect the aluminum wiring terminal to the AC terminal block, otherwise it will cause electrochemical corrosion and affect the reliability of cable connection.
- Allowance shall be reserved for the length of protective ground wire to ensure that the protective ground wire finally bears stress when the AC output line bears tension due to force majeure.
- The phase sequence connection shall be correct and the cable connection shall be tight when the power grid is electrically connected with AC output, otherwise it will lead to equipment failure or terminal damage due to heating caused by unreliable connection after operation.

Step 6 The cable inlet and outlet gaps shall be sealed with fireproof mud to ensure the tightness between the cable and the ESS connection.

5.5 230V Auxiliary Power Supply Connection



5.6 24V Output Connection



5.7 External Communication Connection



5.8 Network Signal Lightning Arrester LAN Connection



6 Starting



- The AC terminal voltage shall be confirmed to meet the allowable ESS range.
- Grid-connected operation shall be permitted by the local power supply department and operated by professional electricians.

Step 1 The MSD maintenance switch cover of each lithium battery module shall be installed to the corresponding position.









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