PYLONTECH

Rechargeable Li-ion Battery

US5000 series Operation Manual

Information Version: PM0MUS500255
SD21US501001

This manual introduces US5000 from Pylontech (unless otherwise indicated, all US5000 information are applied to US5000-B). Please read this manual before using and follow the instruction carefully during the installation process. Any confusion, please contact Pylontech for advice and clarification.

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1. Symbol

	Caution! Warning! Reminding. Safety related information. Risk of battery system failure or life cycle reduces.
	Do not reverse connect the positive and negative port.
	Do not place near open flame.
	Do not place at the children or pet touchable area.
	Warning electric shock.
	Warning Fire. Do not place near flammable material
	Read the product and operation manual before operating the battery system!
	Grounding.
	Recycle label.

	The certificate label for EMC/CE.
	The certificate label for UKCA.
	The certificate label for Safety by TÜV Rheinland.
	The certificate label for Safety by TÜV SÜD.
	The certificate label for Safety by CSA.
	Label for Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU)

2. Safety Precautions

Reminding

1) It is important and necessary to read the user manual carefully before installing or using battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage battery, potentially rendering it inoperable.
2) If the battery is stored for long time, it is required to charge every six months, and the SOC should be no less than 90%
3) Battery needs to be recharged within 12 hours after fully discharged.
4) Do not install the product in outdoor environment, or an environment out of the operation temperature or humidity range listed in manual.
5) Do not expose cable outside.
6) Do not connect power terminal reversely.
7) All the power terminals must be disconnected for maintenance.
8) Please contact the supplier within 24 hours if there is something abnormal.
9) Do not use cleaning solvents to clean battery.
10) Do not expose battery to flammable or harsh chemicals or vapors.
11) Do not paint any part of battery, include any internal or external components.
12) Do not connect battery with PV solar wiring directly.
13) Any foreign object is prohibited to insert into any part of battery.
14) The warranty claims are excluded for direct or indirect damage due to items above.

2.1 Before Connecting

Warning

1) After unpacking, please check product and packing list first, if product is damaged or lack of parts, please contact with the local retailer.
2) Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode.
3) Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device.
4) It is prohibited to connect the battery and AC power directly.
5) The embedded BMS in the battery is designed for 48VDC, please DO NOT connect battery in series.
6) Battery must connect to ground and the resistance must be less than 0.1Ω.
7) Please ensured the electrical parameters of battery system are compatible to related equipment.
8) Keep the battery away from water and fire.

2.2 In Using

1) If the battery system needs to be moved or repaired, the power must be cut off and the battery is completely shut down.
2) It is prohibited to connect the battery with different type of battery.
3) It is prohibited to connect batteries with faulty or incompatible inverter
4) It is prohibited to disassemble the battery (QC tab removed or damaged).
5) In case of fire, dry powder fire extinguisher or vast amount of water can be used.
6) Please do not open, repair or disassemble the battery except staffs from Pylontech or authorized by Pylontech. We do not undertake any consequences or related responsibility which because of violation of safety operation or violating of design, production and equipment safety standards.

3. Introduction

US5000 lithium iron phosphate battery is the new energy storage products developed and produced by Pylontech, it can be used to support reliable high power for various types of equipment and systems.

3.1 Features

1) Build-in soft-start function able to reduce current strike when inverter need to start from battery.
2) Dual active protection on BMS level.
3) Automatic address setting when connect in multi-group.
4) Support wakeup by 5~12V signal from RJ45 port.
5) Support upgrade battery module from upper controller via CAN or RS485 communication.
6) Enable 95% depth of discharge, available for the inverter which completely follow Pylontech latest protocol to operate.
7) The module is non-toxic, non-pollution and environmentally friendly.
8) Cathode material is made from LiFePO4 with safety performance and long cycle life.
9) Battery management system (BMS)has protection functions including over-discharge, over-charge, over-current and high/low temperature.
10) The system can automatically manage charge and discharge state and balance voltage of each cell.
11) Flexible configuration, multiple battery modules can be in parallel for expanding capacity and power.
12) Adopted self-cooling mode rapidly reduced system entire noise.
13) The module has less self-discharge, up to 6 months without charging it on shelf, no memory effect, excellent performance of shallow charge and discharge.

14) Small size and light weight, standard of 19-inch embedded designed module is comfortable for installation and maintenance.

15) Compatible with the 48V series battery of Pylontech.

*Mixture using master battery priority:

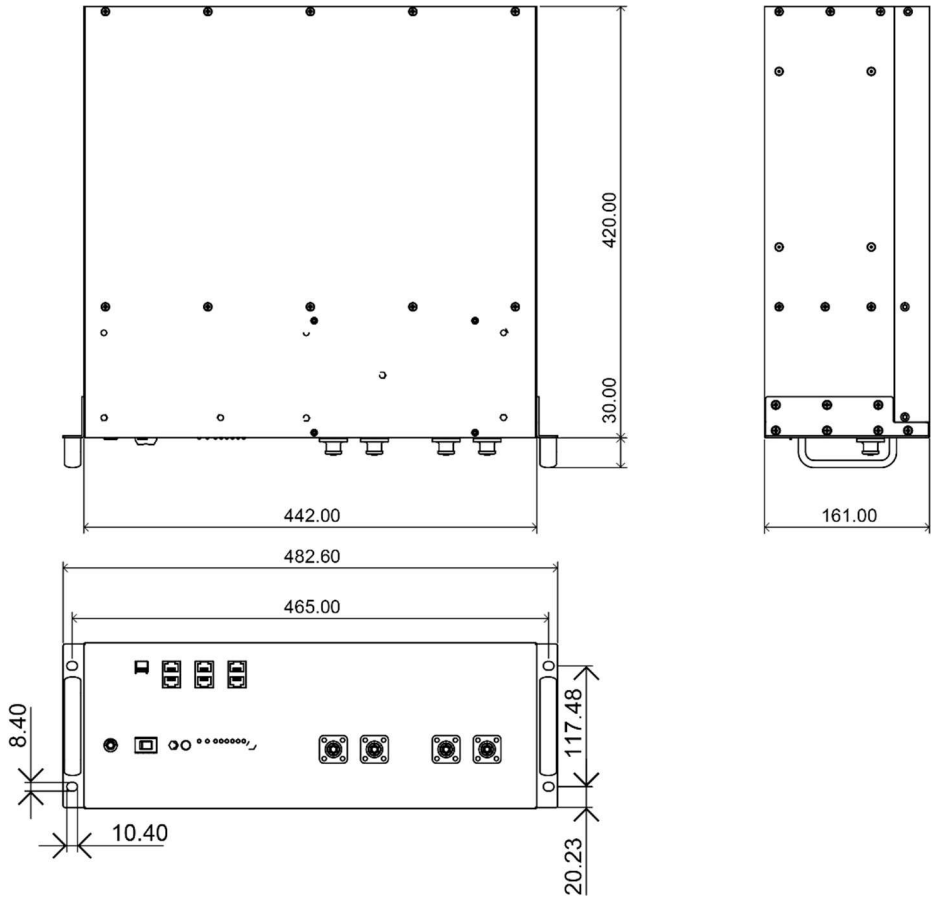
US5000>UP5000/US3000C/US2000C>U3000/US2000

For same type of module always use the latest production unit as master.

*Mixture using battery deployment option:

Master battery (1st)	US5000
Slave 2nd ~8th	US5000/UP5000/US3000C/US2000C/ US3000/US2000
Slave 9th ~16th	US5000/UP5000/US3000C/US2000C

3.2 Specification

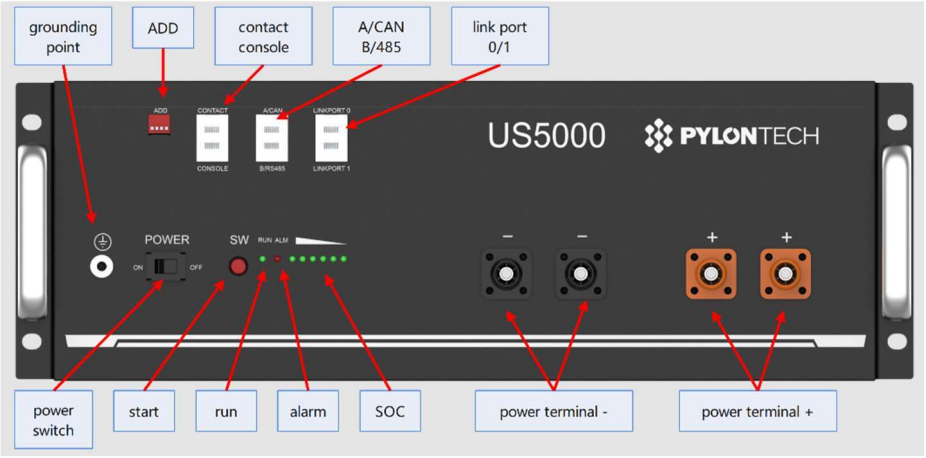


Basic Parameters	US5000	US5000-B
Nominal Voltage (Vdc)	48	
Nominal Capacity (Wh)	4800	
Usable Capacity (Wh)	4560	
Depth of discharge (%)	95	
Dimension (mm)	442*420*161	
Weight (Kg)	39.7	40
Discharge Voltage (Vdc)	43.5 ~ 53.5	
Charge Voltage (Vdc)	52.5 ~ 53.5	
Recommended Charge/Discharge Current (A)	80*	
Max. continuous Charge/Discharge Current (A)	100*	
Peak Charge/Discharge Current (A)	101-120@15min	
	121~200@15sec	
Communication	RS485, CAN	
Configuration (max. in 1 battery group)	16pcs	
Working Temperature	0°C ~50°C Charge	
	-10°C ~50°C Discharge	
Shelf Temperature	-20°C ~45°C	
Short current/duration time	<2000A/1ms	
Cooling type	Natural	
Breaker	No	Yes
Protective class	I	
IP rating of enclosure	IP20	
Humidity	5% ~ 95%(RH) No Condensation	
Altitude(m)	≤4000	
Certification	TÜV / CE / UL / UN38.3	
Design life	15+ Years (25°C /77℉)	
Cycle Life	>6,000 25°C	
Reference standards	IEC62619, IEC63056, UL1973, UL9540A, IEC61000-6-2, IEC61000-6-3, UN38.3	

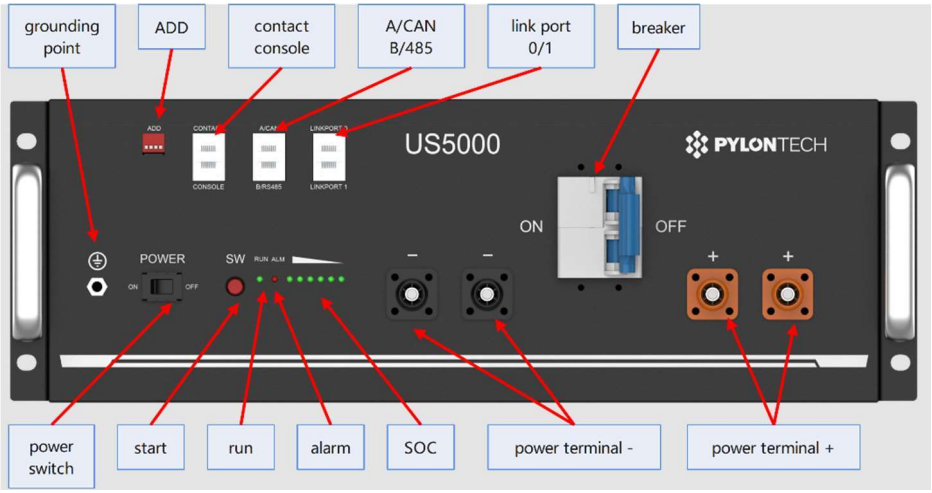
*: The recommended and max. continuous operation current is for a battery cell temperature within 10~40°C to consider, out of such temp. range will cause a derating on operation current.

3.3 Equipment interface instruction

US5000 front panel



US5000-B front panel



Breaker (for US5000-B)

Parameter: type C, rated voltage 60V/DC, rated current 125A, Icu: 10kA. Standard reference: UL1077, IEC60947-2.

ON: power terminals connect with battery.

OFF: power terminals disconnect with battery.

Reminding

When breaker released for protection, check the root cause of current surge and cable connection between battery and inverter first. Then try to connect again.

Power Switch

ON: ready to turn on.
OFF: power off. For storage or shipping.

Start (SW)

Turn on: press more than 0.5s to start the battery.
Turn off: press more than 0.5s to turn off the battery.

RUN

Green LED flashing or lighting to show the battery running status.

Alarm (ALM)

Red LED flashing to show the battery has alarm; lighting to show the battery is under protection.

SOC

LEDs to show the battery's current capacity.

Dip Switch (ADD)

Dip1: RS485 baud rate: 1: 9600; 0: 115200. After change, please restart battery.

Dip2: CAN terminal resistance on BMS side. 1: NONE. 0: connected. After change, no restart required. **In single group mode, please keep dip2 at 0 position.** For multi-groups, please refer to [5.10].

Dip3~4, reversed.
Based on design of BMS, the dip switch is deployed physically reversely.

For instance:

Dip1	Dip2	Dip3	Dip4	The corresponding position of switch	Status
0	0	0	0		RS485:115200 CAN terminal resistance: connected
1	0	0	0		RS485:9600 CAN terminal resistance: connected
0	1	0	0		RS485: 115200 CAN terminal resistance: disconnected.

Console

For manufacturer or professional engineer to debug or service.

Pin3	232-TX
Pin4*	+5~+12V for wake up
Pin5*	GND for wake up
Pin6	232-RX
Pin8	232-GND
*Wake up signal shall ⩾0.5Sec, current between 5~15mA. After send wake up signal, the voltage shall disappear for normal operation.	

Contact

Pin1	Input, passive signal. On: turn off battery. Off: normal.	
Pin2		
Pin3	Output1. On: stop charge.	+
Pin4		-
Pin5	Output2. On: stop discharge.	+
Pin6		-
Pin7	Output3. On: BMS error.	+
Pin8		-

Input terminals: BMS provide 5Vdc internally. External contactor control ON/OFF.

Output terminals: BMS control ON/OFF. External source request signal voltage ≤25V, current <0.3A.

CAN

500 Kbps. Recommended 120Ω. To inverter or upper battery.

RS485

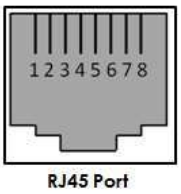
9600 or 115200 bps. Recommended 120Ω. To inverter or slave battery.

Link Port 0, 1

For communication between multiple parallel batteries.

Definition of RJ45 Port Pin

	A/CAN	B/RS485
Pin1	These pins shall be NULL.	
Pin2	If not, may influence communication	
Pin3	between BMS and inverter.	
Pin4	CAN-H	CAN-H
Pin5	CAH-L	CAN-L
Pin6	CAN-GND	CAN-GND
Pin7	485A	485A
Pin8	485B	485B



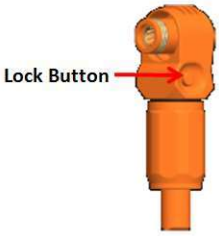
RJ45 Port

RJ45 Plug

Power Terminals

Power cable terminals: there are two pair of terminals with same function, one connects to equipment, the other one paralleling to other battery module for capacity expanding.

For power cables uses self-locked connectors. must keep pressing this Lock Button while pulling out the power plug.



LED Status Indicators

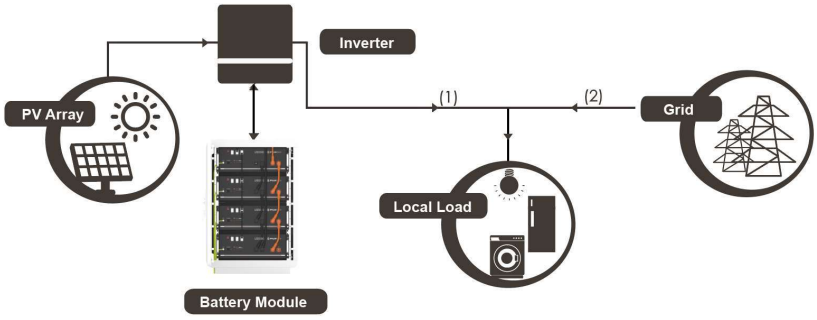
Condition	RUN	ALR	1	2	3	4	5	6
Power off	-	-	-	-	-	-	-	-
Power on	●	●	●	●	●	●	●	●
Idle/Normal	●	-	-	-	-	-	-	-
Charge	●	-	Show soc; highest LED flash, on 0.5s, off 0.5s					
Discharge	●		Show soc					
Alarm	ALR: ●; Other LEDs are same as above.							
System error/Protect	-	●	-	-	-	-	-	
●/●	ON							
●	flash, on: 0.3s; off: 3.7s							
●/●	flash, on:0.5s; off: 1.5s							
SOC level (%)			91-100	70-90	51-70	31-50	11-30	0~10

BMS basic function

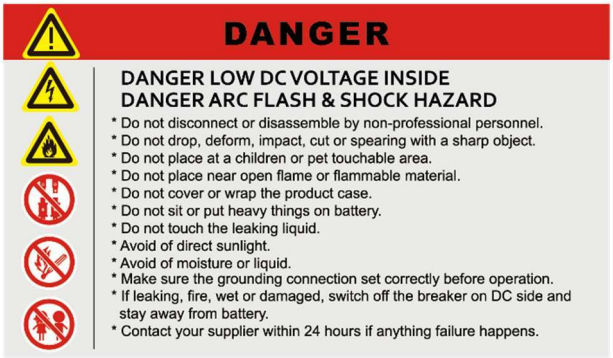
Protection and alarm	Management and monitor
Charge/Discharge End	Cells Balance
Charge Over Voltage	Intelligent Charge Model
Discharge Under Voltage	Charge/Discharge Current Limit
Charge/Discharge Over Current	Capacity Retention Calculate
High/Low Temperature(cell/BMS)	Administrator Monitor
Short Circuit	Operation Record
	Power Cable Reverse
	Soft start of inverter

4. Safe handling of lithium batteries guide

4.1 Schematic diagram of solution



4.2 Label



4.3 Tools

Wire cutter

Crimping modular plier

Screwdriver

NOTE

Use properly insulated tools to prevent accidental electric shock or short circuits.

If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

4.4 Safety gear

It is recommended to wear the following safety gear when dealing with the battery.

Insulated gloves

Safety goggles

Safety shoes

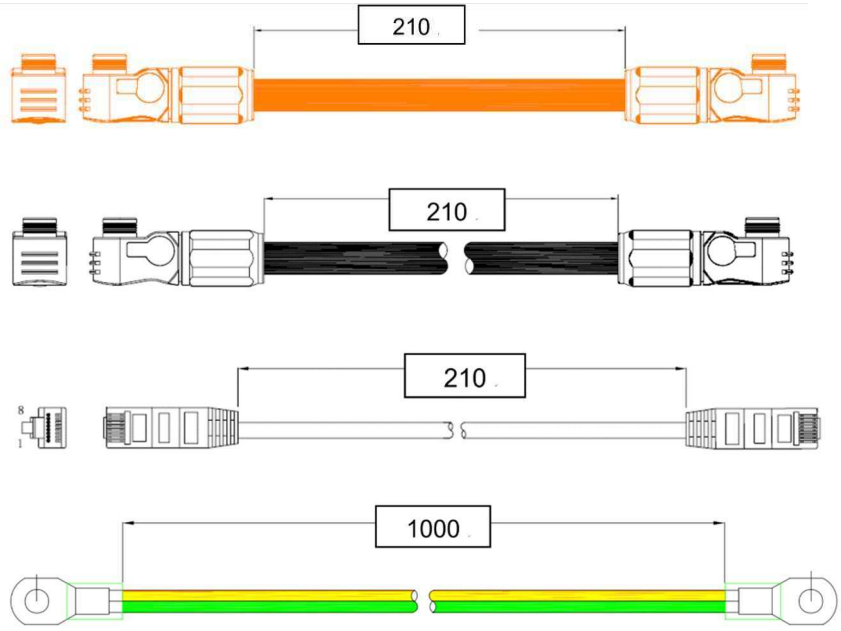
5. Installation and operation

5.1 Package items

Unpacking and check:

1) **For battery module package:**

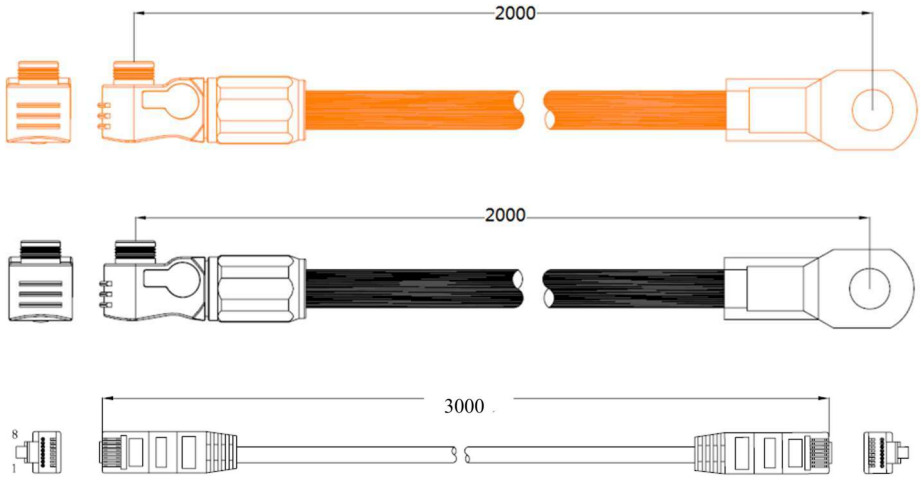
- Battery Module
- 2 * 210mm 4AWG power cables
- 1 * 210mm RJ45 communication cable
- 1 * 1000mm 6AWG grounding cable



2) For External cable kits:

NOTE: Power and communication cables connect to inverter belongs to an **External Cable Kit, NOT include in battery carton box .** They are in another **extra** small cable box. If there is anything missed, please contact dealer.

- 2 * 2000mm power cables (4 AWG, peak current capacity **120A,** constant **100A**) and communication cable for each energy storage system.
- 2 * 3000mm RJ45 communication cable, specification as below:



SN of RJ45cable	Mark	Pin	
WI0SCAN30RJ1	With blue mark: Battery-Inverter	1~3: NULL 4~8: pin to pin	For connection to inverter and HUB
WI0SCAN35RJ3	With silver mark: Battery-Battery	1~8: pin to pin	For parallel connection between master batteries

For the external cables, the length shall less than 3 meters.