PYLONTECH

Training Course

April 2020

Reliable and balanced electricity

C O N T E N T

01 Company Overview

02 Product Introduction

03 Application & Configuration

04 Installation - 48V

05 Installation - HV

06 Trouble-shooting Steps

PYLONTECH

01

Company Overview

About Us

Pylontech as a unique battery manufacturer dedicated in energy storage, consolidating our expertise in electrochemistry, power electronics and system integration, had provided safe, reliable and affordable ESS products to our worldwide customers and results in a 5-years double folder increasing rates, undoubtably strengthened ourselves in the leading position of ESS.

Your dream of future energy is our heart-oriented motivation, Force awakens.

PYLONTECH

Vertically integrated the whole lithium battery industrial chain
Only **FOCUS** on Energy Storage
With more than **2.0 GWh** serving **120,000+ users.** Globally

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*Pylontech is the **First** Company obtains VDE, UL, JET, IEC, CE certifications in the world.*

*Your Safety is the **MOST** important to us*
Many critical simulation testing had been done by Pylontech

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2009

Found in 2009

2013

2013
1st PV+HESS
in Hongkong

2014

Access into AU, EU market

2015

First Grid-scale BESS
in China
First C&I application
in Europe

2018

2018 1GWH
ESS batteries
Shipped

2019

Double Capacity
Enlarge

Reliable and balanced electricity

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02

Product Introduction

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Product Parameter and Features

Basic Parameters	US2000	Phantom-S	US3000
Nominal Voltage（V）	48	48	48
Nominal Capacity (Wh)	2400	2400	3552
Usable Capacity (Wh)	2200	2200	3200
Dimension（mm）	442*410*89	440*440*88.5	442*420*132
Weight（Kg）	24	24	32
Discharge Voltage（V）	45 ~ 53.5	45 ~ 53.5	45~53.5
Charge Voltage（V）	52.5 ~ 53.5	52.5~53.5	52.5~53.5
Charge / Discharge Current（A）	25(Recommend)	25(Recommend)	37 (Recommend)
	50 (Max)	50 (Max)	74 (Max)
	100（Peak@15s）	100（Peak@15s）	100 (Peak@15s)
Communication Port	RS485，CAN	RS485，CAN	RS485，CAN
Single string quantity(pcs)	8	8	8
Working Temperature/℃	0~50	0~50	0~50
Shelf Temperature/℃	-20~60	-20~60	-20~60
Humidity	5%~85%	5%~85%	5%~85%
Altitude (m)	<2000	<2000	<2000
Design life	15^{+} Years（25℃/77℉）	15^{+} Years（25℃/77℉）	15^{+} Years（25℃/77℉）
Cycle Life	>6000, 25℃	>6000, 25℃	>6000, 25℃
Authentication Level	UL1973/IEC62619/ CE /UN38.3	IEC62619/CE /UN38.3	UL1973/IEC62619/ CE /UN38.3

- **90%**DoD for daily cycle application
- 19inch modular, rack mount design
- Light weight, installation cost saving

- Up to **1C** running, peak **2C**

- Intelligent communication
- Ability of Capacity Expansion
- Up to **5** strings per Hub
- Up to **5** hubs per system

- Long life cycle, **10yrs** warranty
- Most rigorous safety test

Product Parameter and Features

Powercube-H series
200 - 810Vdc

Basic Parameters	Powercube-H1 (720V50AH)	Powercube-H2 (576V74AH)
	H48050	H48074
Battery System Capacity(kWh)	36.00	42.62
Battery System Voltage(Vdc)	720	576
System Voltage Range(Vdc)	664~810	531~648
Efficiency	96%	96%
Depth of Discharge	90%	90%
Dimension(W*D*H, mm)	600*505*2130	600*505*2130
Weight(Kg)	400	450
Design Life	10+Years	10+Years
Operation Temperature (℃)	0~50	0~50
Humidity	5%~95%	5%~95%
Altutude	<2000	<2000
Battery Module Qty.(Optional)	5~15 pcs	5~12 pcs
Authentication Level	UL1973/IEC62619/VDE/CE	UL1973/IEC62619/CE

- **200 – 810Vdc** per rack
- Support widely voltage range
- **90%DoD** for daily cycle application
- 19inch standard rack design
- Long life cycle, **10yrs** warranty
- Flexibility on capacity expansion
- Up to **6** strings per system
- Most rigorous safety test

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03

Application and Configuration

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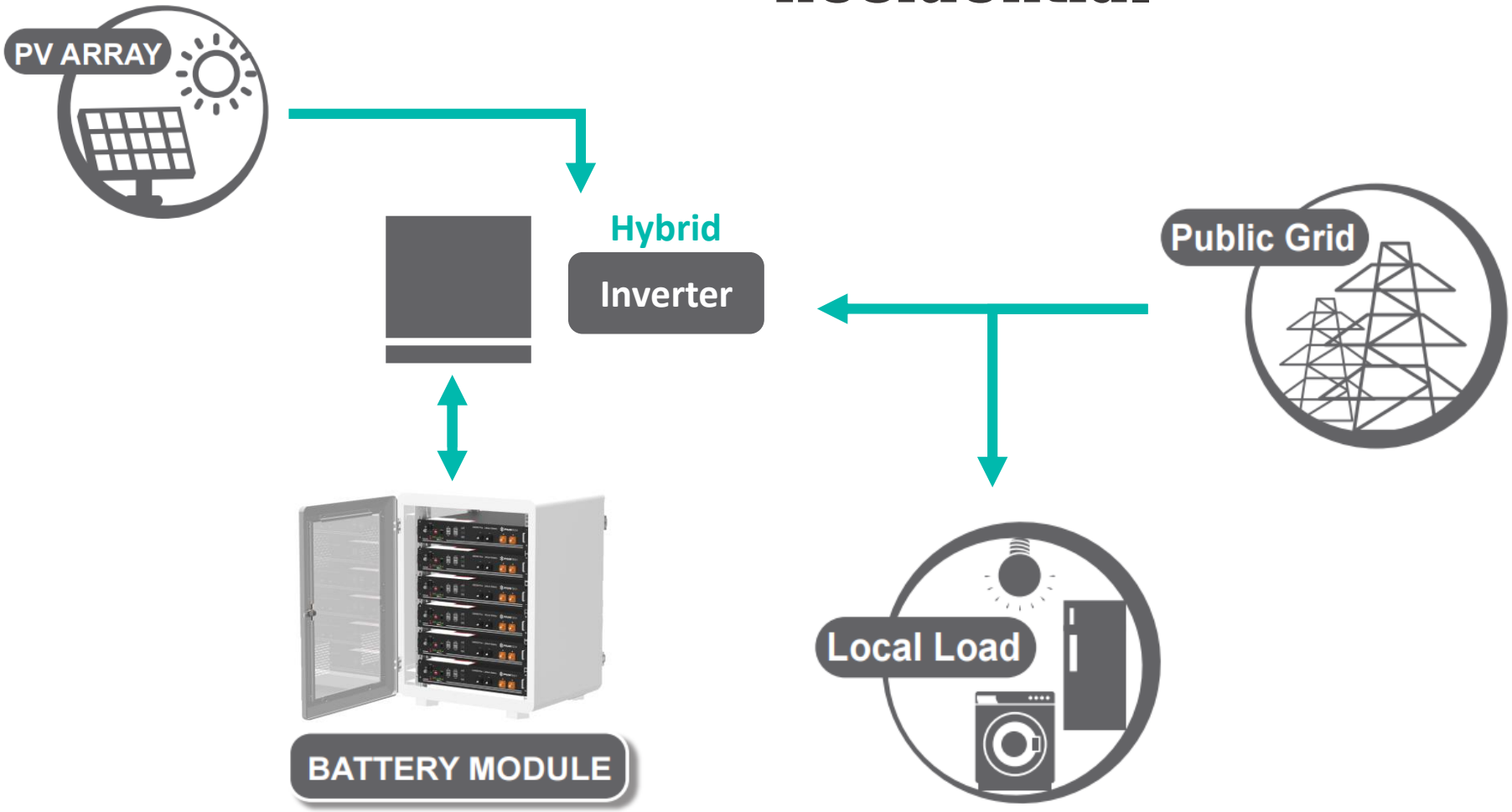
Application

Back Up | Residential | Commercial | Utility | Telecom

Reliable and balanced electricity

Residential



- Back-up
- Peak Shaving
- PV ESS

Reliable and balanced electricity

Residential Configuration

Item	Amount	Rated Power(kW)(1)	Peak Power(kW, 15S)	Nominal Capacity(kWh)	Usable Capacity(kWh)	Min. Back-up time(2)
US2000	1	1.2	2.4	2.4	2.16	1.8hrs
	2	2.4	4.8	4.8	4.32	1.8hrs
	3	3.6	7.2	7.2	6.48	1.8hrs
	4	4.8	9.6	9.6	8.64	1.8hrs
	5	6	12	12	10.8	1.8hrs
	6	7.2	14.4	14.4	12.96	1.8hrs
	7	8.4	16.8	16.8	15.12	1.8hrs
	8	9.6	19.2	19.2	17.28	1.8hrs

(1)Rated Power is base on ideal operation temperature(10 - 40℃), during charging the power will leveling decrease when reaching full capacity.
(2) Min. Back-up time is base on rated power and related condition during beginning of life, in real application please consider the load.

Notes:

1. Check the compatibility of Inverter before make the quote, this is warranty related.

2. US2000 and US3000 are fully compatible for mixture using, when mix, please always use the latest produced US3000 for master battery.

3. If exceed above capacity, add one set of LV-HUB for multiple strings application.

Quotation Item:

1. **Battery Module – varying amount depends on application.**
2. **External Cable Kits – Every 5kW of load/PV/Inverter, requires one set of kits.**
3. **Cabinet/Rack (If necessary).**

Residential Configuration

Item	Amount	Rated Power(kW)(1)	Peak Power(kW, 15S)	Nominal Capacity(kWh)	Usable Capacity(kWh)	Min. Back-up time(2)
US3000	1	1.78	3.55	3.55	3.20	1.8hrs
	2	3.55	7.10	7.10	6.39	1.8hrs
	3	5.33	10.66	10.66	9.59	1.8hrs
	4	7.10	14.21	14.21	12.79	1.8hrs
	5	8.88	17.76	17.76	15.98	1.8hrs
	6	10.66	21.31	21.31	19.18	1.8hrs
	7	12.43	24.86	24.86	22.38	1.8hrs
	8	14.21	28.42	28.42	25.57	1.8hrs

(1)Rated Power is base on ideal operation temperature(10 - 40℃), during charging the power will leveling decrease when reaching full capacity.
(2) Min. Back-up time is base on rated power and related condition during beginning of life,in real application please consider the load.

Notes:

1. Check the compatibility of Inverter before make the quote, this is warranty related.

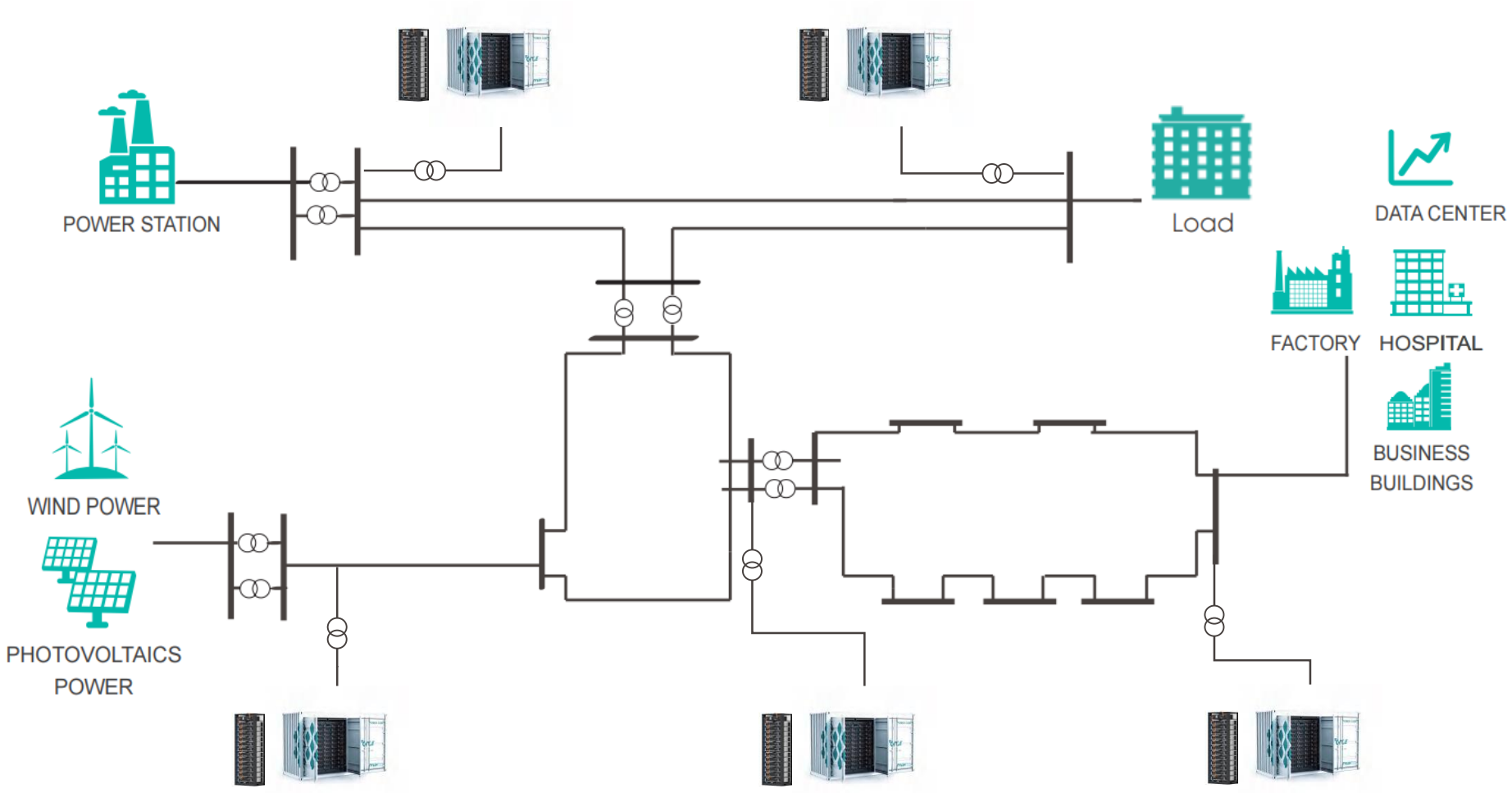
2. US2000 and US3000 are fully compatible for mixture using, when mix, please always use the latest produced US3000 for master battery.

3. If exceed above capacity, add one set of LV-HUB for multiple strings application.

Quotation Item:

1. **Battery Module – varying amount depends on application.**
2. **External Cable Kits – Every 5kW of load/PV/Inverter, requires one set of kits.**
3. **Cabinet/Rack (If necessary).**

C & I



- Grid Support / Service
- Frequency Regulation

- Peak/Load Shifting
- Demand Charge

- Micro-grid
- Energy Shifting
- Renewable Energy Smoothing

- UPS / Back-up
- Peak Shifting/Demand Charge
- EV Charging Station

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C & I Configuration

Item	Amount	Min. Voltage(Vdc)	Max. Voltage(Vdc)	Rated Power(kW)(1)	Peak Power(kW,15S)	Nominal Capacity(kWh)	Usable Capacity(kWh)	Min. Back-up time(2)
Powercube-H1	5	218	270	6	12	12	10.8	1.8hrs
	6	261	324	7.2	14.4	14.4	12.96	1.8hrs
	7	305	378	8.4	16.8	16.8	15.12	1.8hrs
	8	348	432	9.6	19.2	19.2	17.28	1.8hrs
	9	392	486	10.8	21.6	21.6	19.44	1.8hrs
	10	435	540	12	24	24	21.6	1.8hrs
	11	479	594	13.2	26.4	26.4	23.76	1.8hrs
	12	522	648	14.4	28.8	28.8	25.92	1.8hrs
	13	566	702	15.6	31.2	31.2	28.08	1.8hrs
	14	609	756	16.8	33.6	33.6	30.24	1.8hrs
	15	653	810	18	36	36	32.4	1.8hrs

(1)Rated Power is base on ideal operation temperature(10 - 40℃), during charging the power will leveling decrease when reaching full capacity.
(2) Min. Back-up time is base on rated power and related condition during beginning of life,in real application please consider the load.

Notes:

1. Check the compatibility of Inverter and inverter voltage range before make the quote, this is warranty related.

2. If exceed above capacity or inverter voltage insufficient, add one set of Master BMS for multiple strings application.

Quotation Item:

1. **Battery Module – varying amount depends on application.**
2. **BMS – one unit per string.**
3. **External Cable Kits**
4. **Cabinet/Rack (If necessary).**

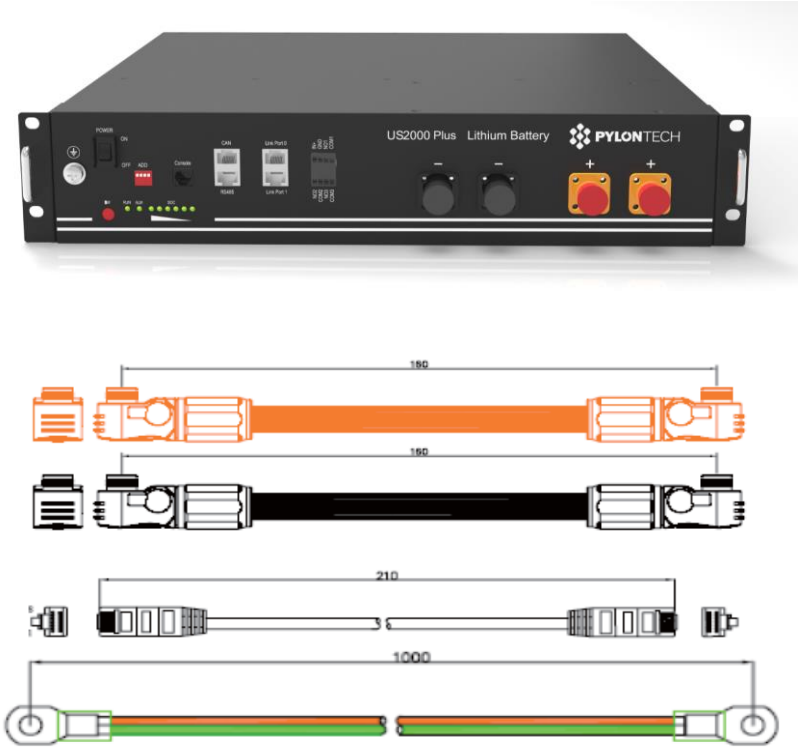
04

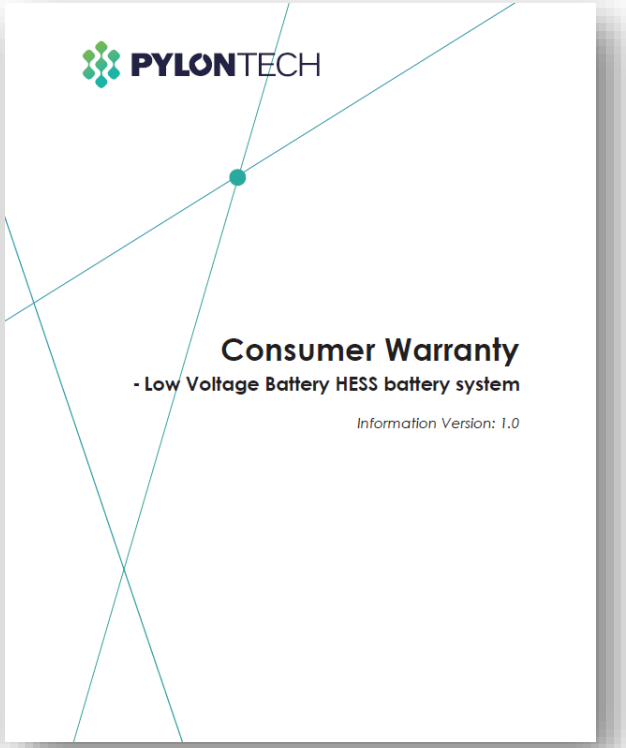
Installation – 48V

CHECKING LIST

1) For battery module package:

One pair of power cables,one communication cable, one grounding cable, user manual and warranty card.

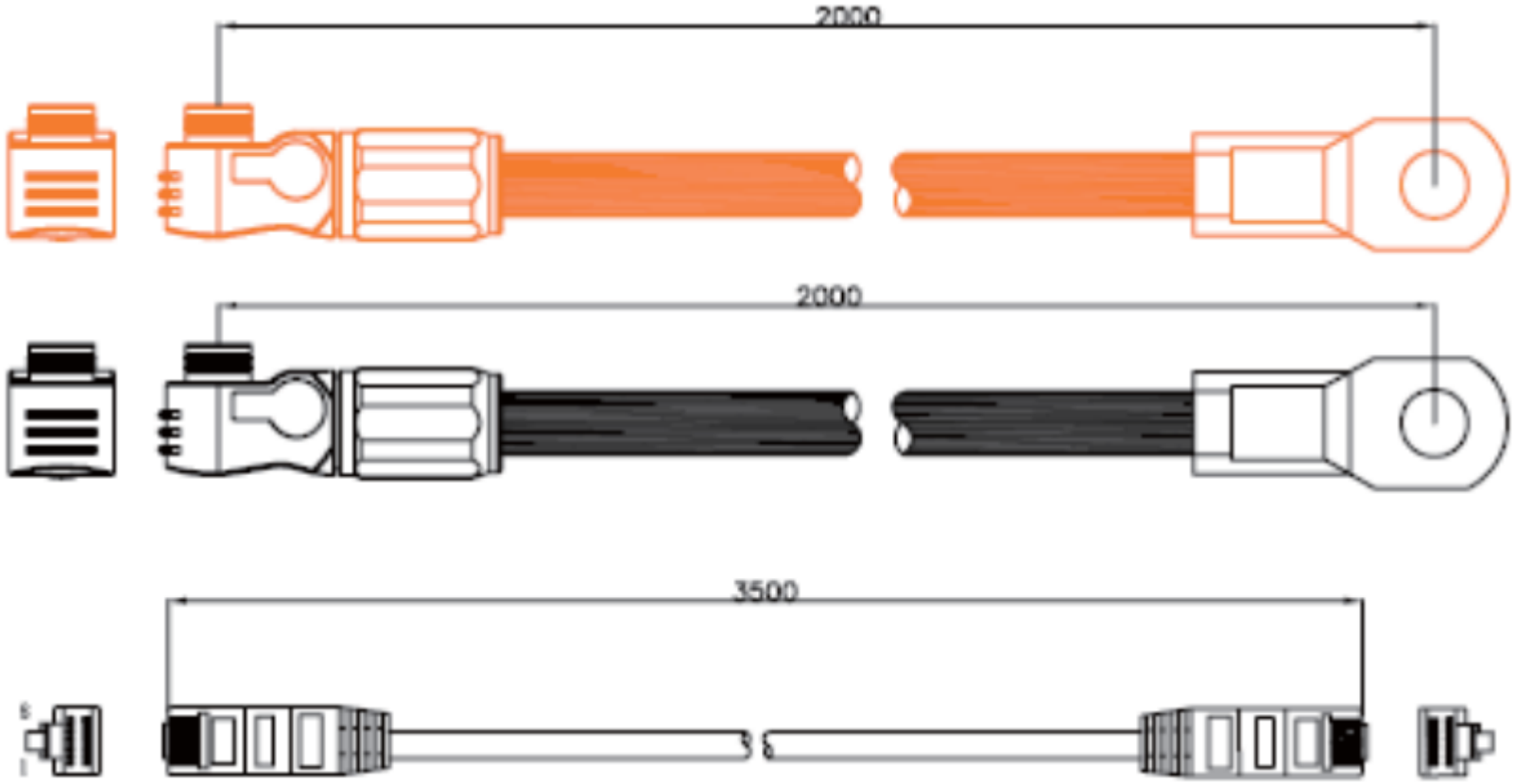




CHECK LIST

2) For battery system connects to inverter, external cable kits:

One pair of power cables and one communication.



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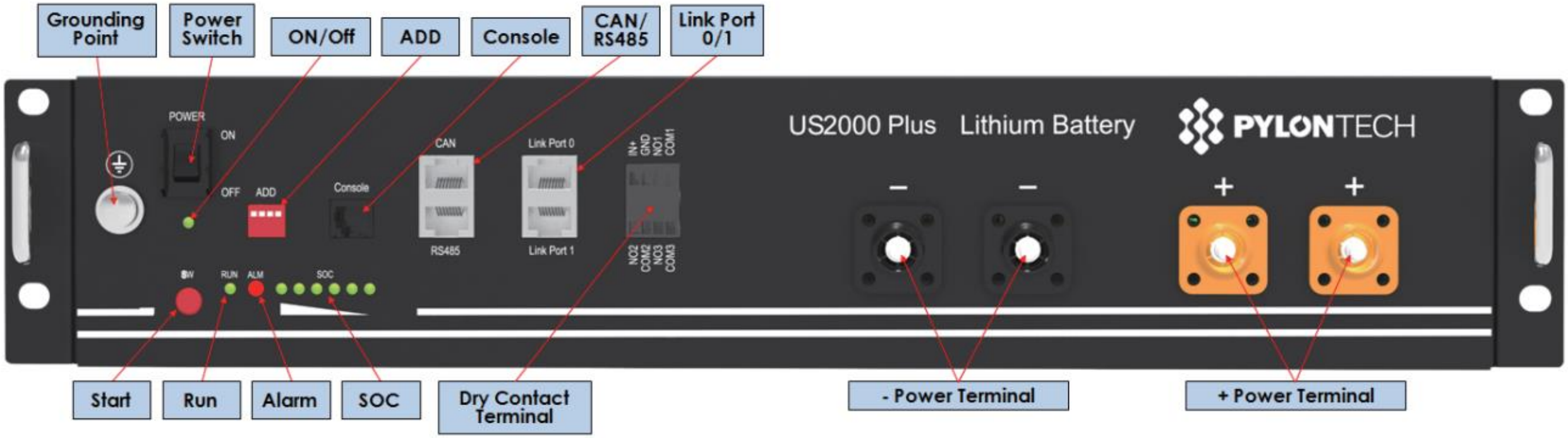
BEFORE YOU START

- Installation Manual
- Location & Environment
- Tools & Accessories
- Compatible Inverter

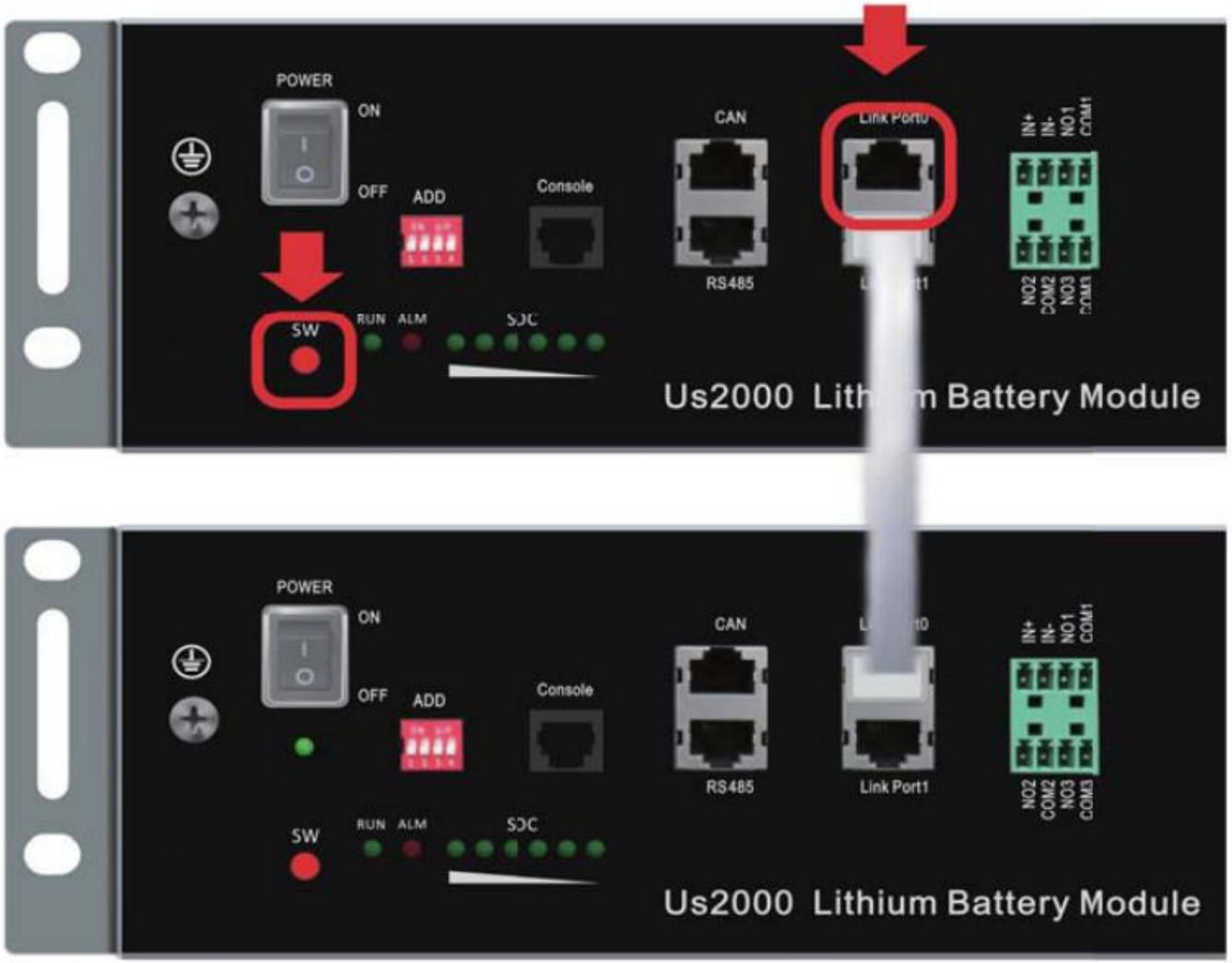
INSTALLATION

1) Battery Module Front Interface:



INSTALLATION

2) Connection:

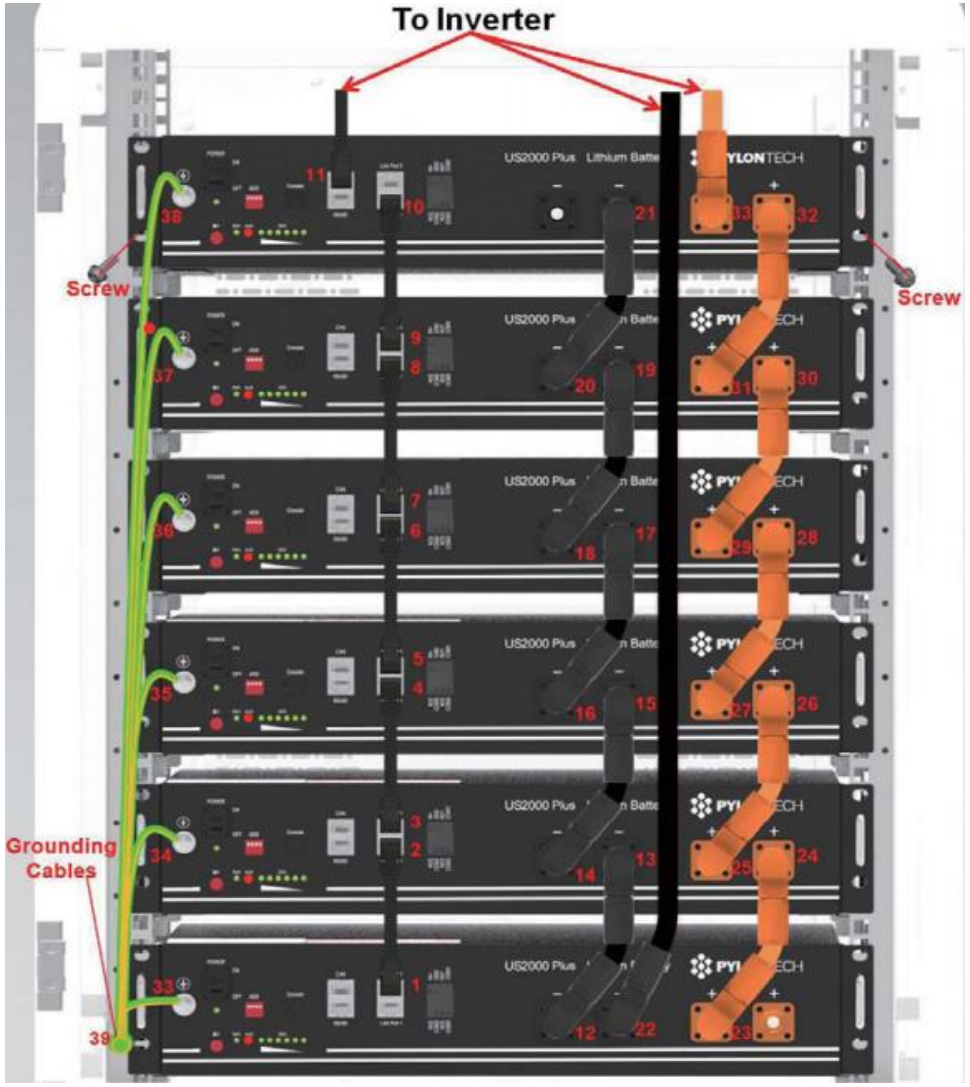


The one with **empty Link Port 0** is the Master Battery Module, Which is **connected to the Inverter**， others are slaves.

1 master battery configure with maximum 7 slave batteries in one string.

INSTALLATION

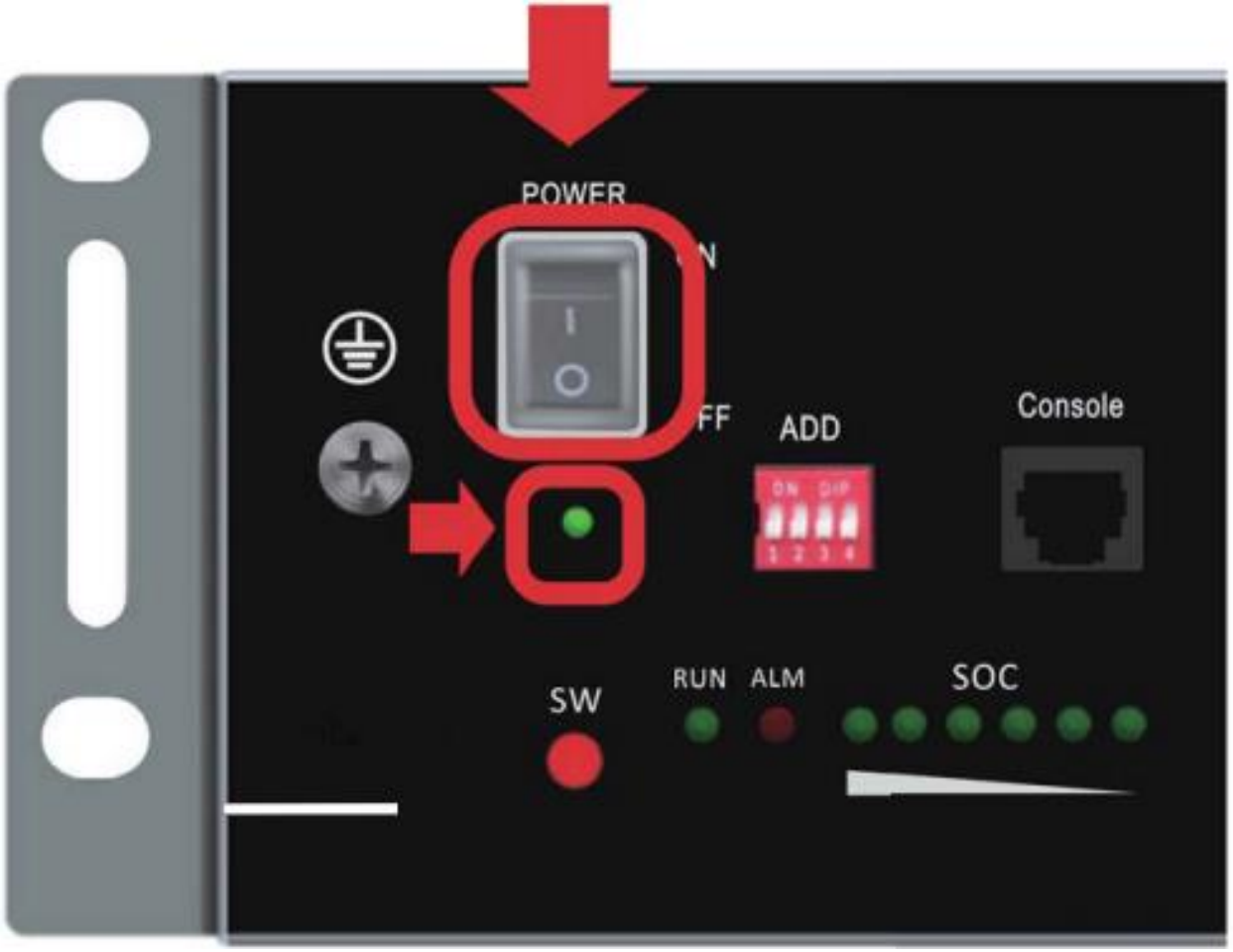
Power ≤ 5kW



5kW < Power < 10kW

POWER ON/OFF

1) Power on:



Double check all the power cable and communication cable.

1.Switch ON all the battery modules by hard switch.

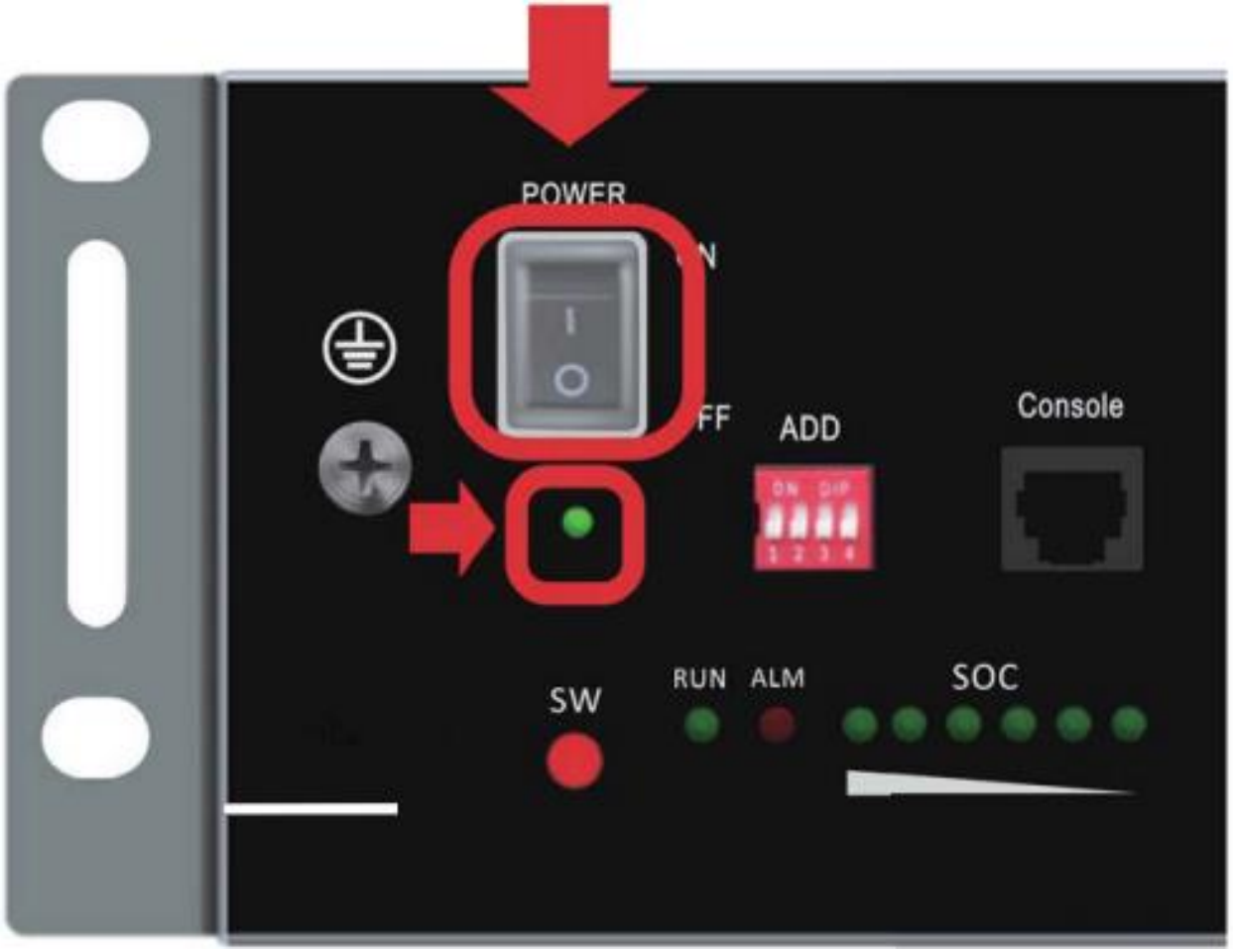
2.Press the Red SW button of master battery(≥ 0.5 sec).

POWER ON/OFF

1) Power on:

POWER ON/OFF

2) Power OFF:



Double check all the power cable and communication cable.

1.Press the Red SW button of master battery(≥0.5 sec).

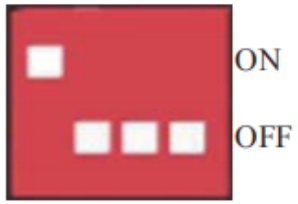
2.Switch OFF the battery modules by the hard switch.

LV-HUB

1) LV-HUB Front Interface:

Address Assignment

1) Dips switch setting:



Dip2	Dip3	Dip4	Group Address Number
0	0	0	0th: Single battery group's master battery should setup as this.
1	0	0	1st: 1st battery group's master battery should setup as this.
0	1	0	2nd: 2nd battery group's master battery should setup as this.
1	1	0	3rd: 3rd battery group's master battery should setup as this.
0	0	1	4th: 4th battery group's master battery should setup as this.
1	0	1	5th: 5th battery group's master battery should setup as this.
0	1	1	6th: 6th battery group's master battery should setup as this.
1	1	1	7th: 7th battery group's master battery should setup as this.

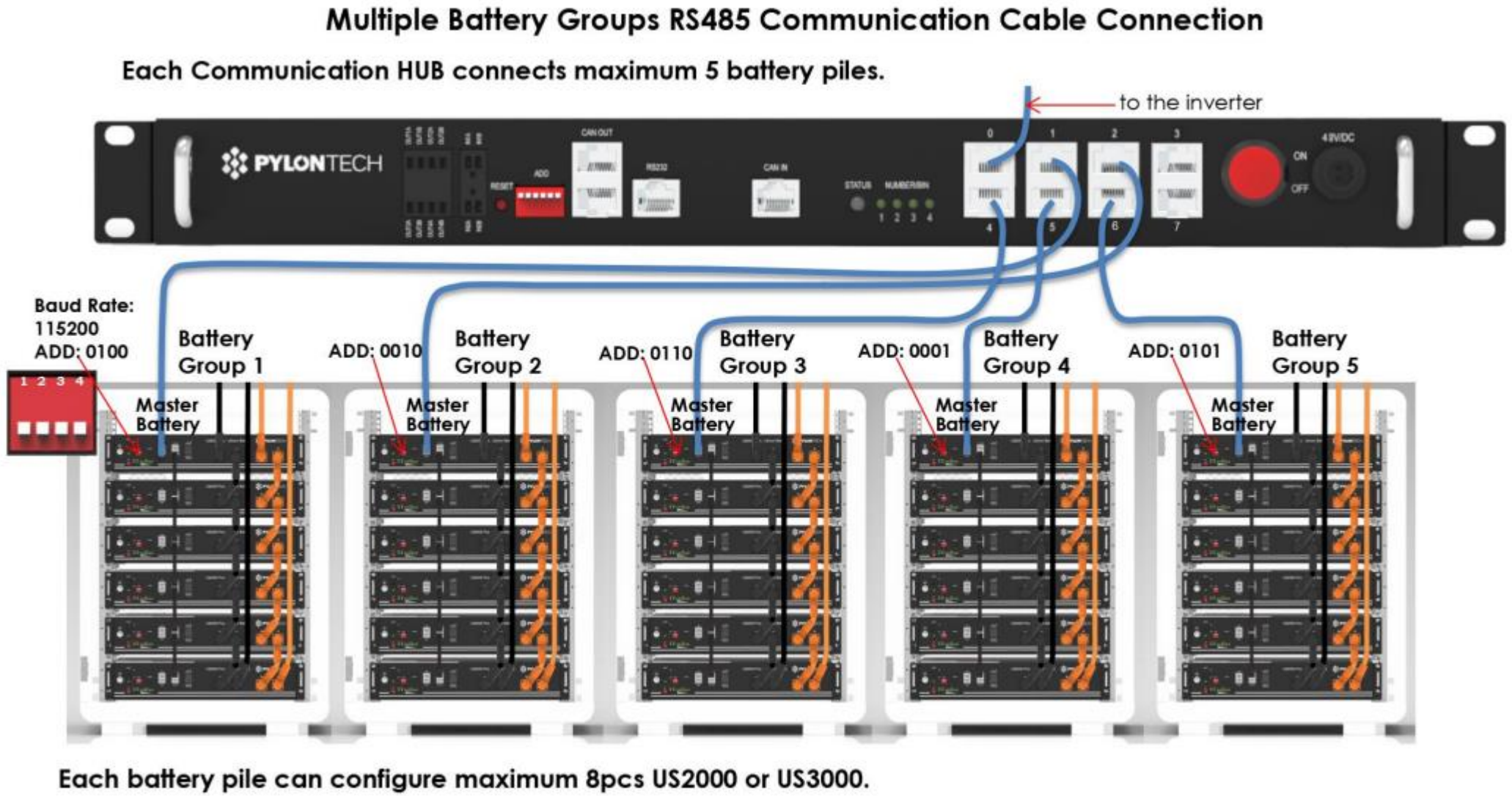
ADD Switch: 4 ADD switches, Dip1 to define different baudrate (ON = 9,600, OFF = 115,200).

Dip2 ~4 to definite the group`s address (ON is 1, OFF is 0).

The settings will be active only after restart the battery.

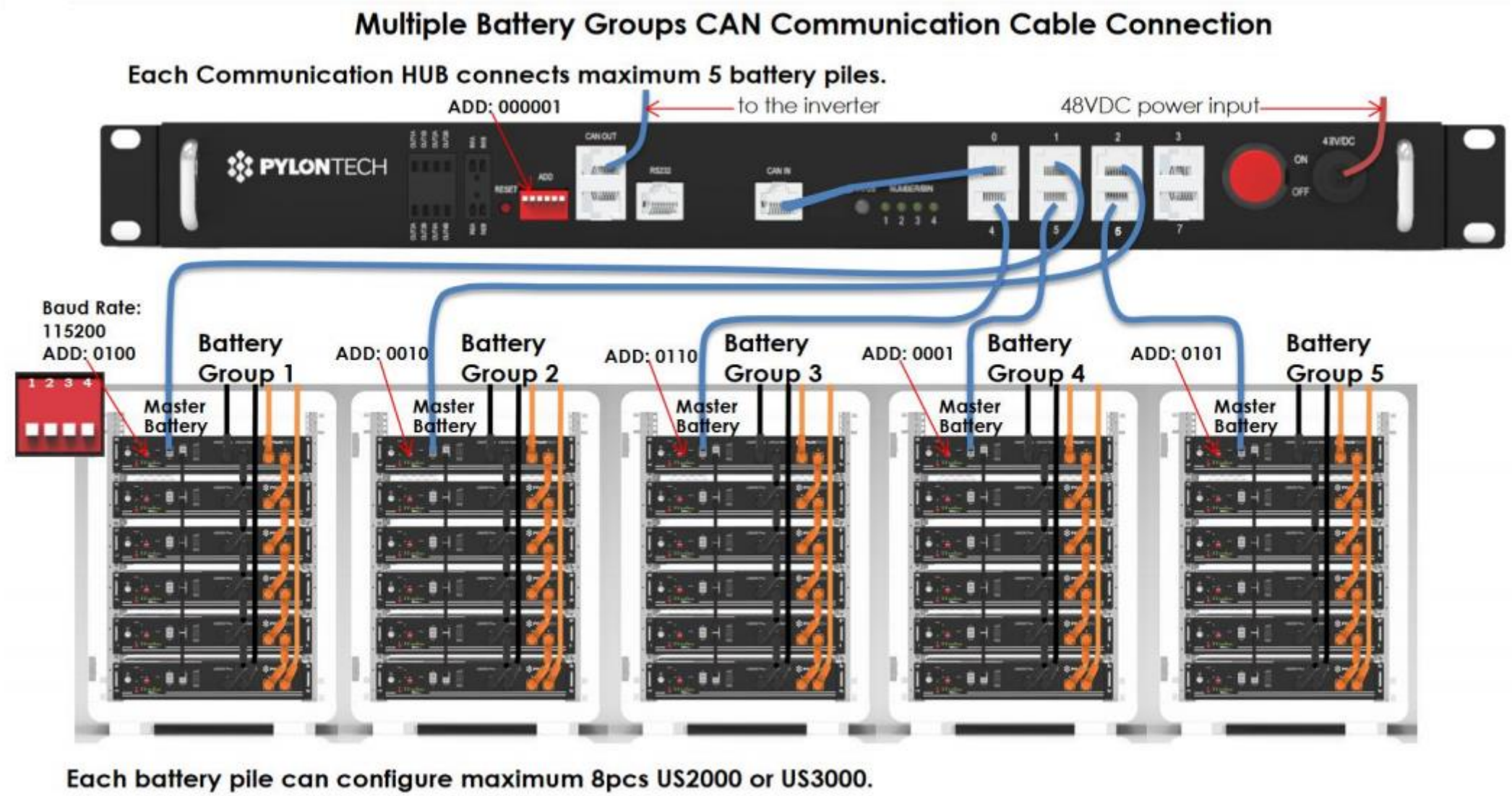
Multiple Strings

1) Cables Connection Diagram for RS485:



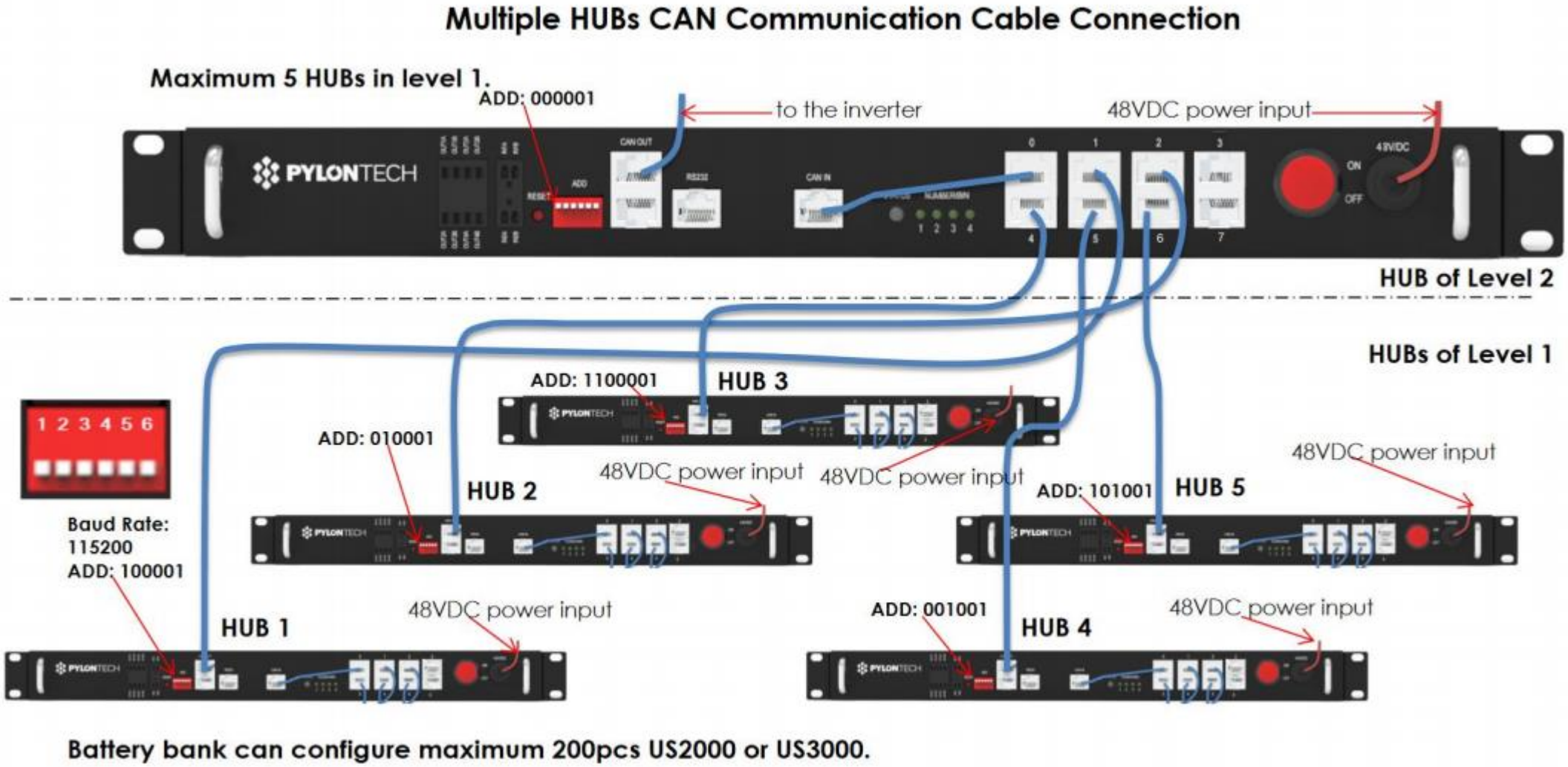
LV-HUB

1) Cables Connection Diagram for CAN:



LV-HUB

1) Cables Connection Diagram for multile HUBs:



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LV-HUB

TIPS:

- Each battery group can configure maximum 8pcs battery modules.
- LV-Hub configures maximum 5 group batteries.;
- When each battery group’s current is >120A, this battery group must configure 2 pair external power cables like the diagram.
- The details of ADD Switch setting also can see the manual of battery.

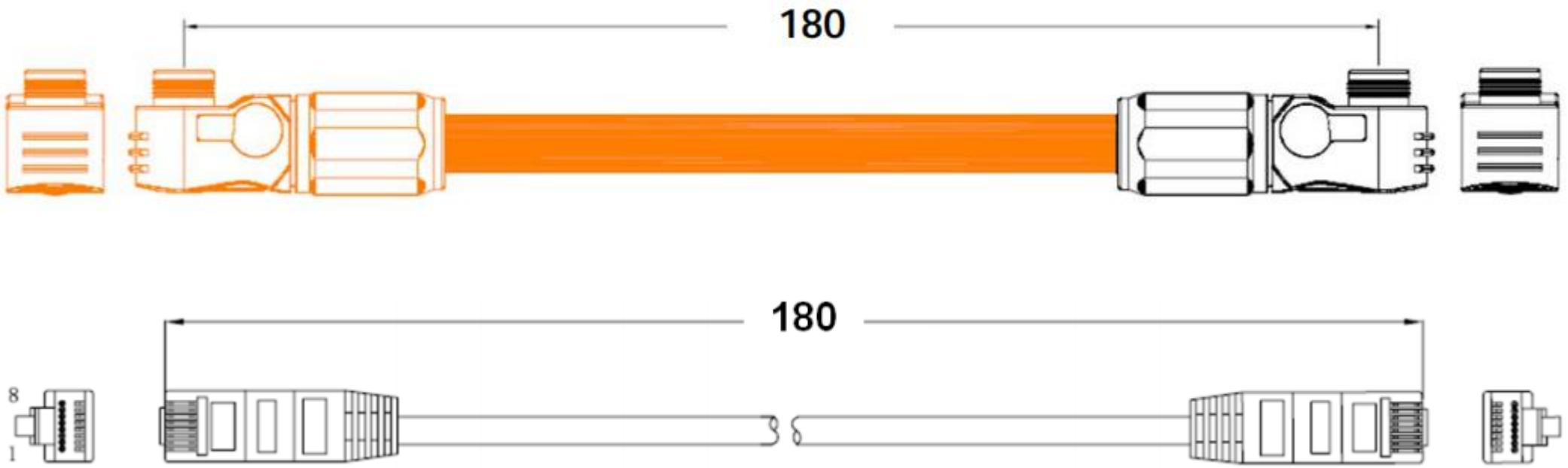
05

Installation - HV

CHECKING LIST

1) For battery module package:

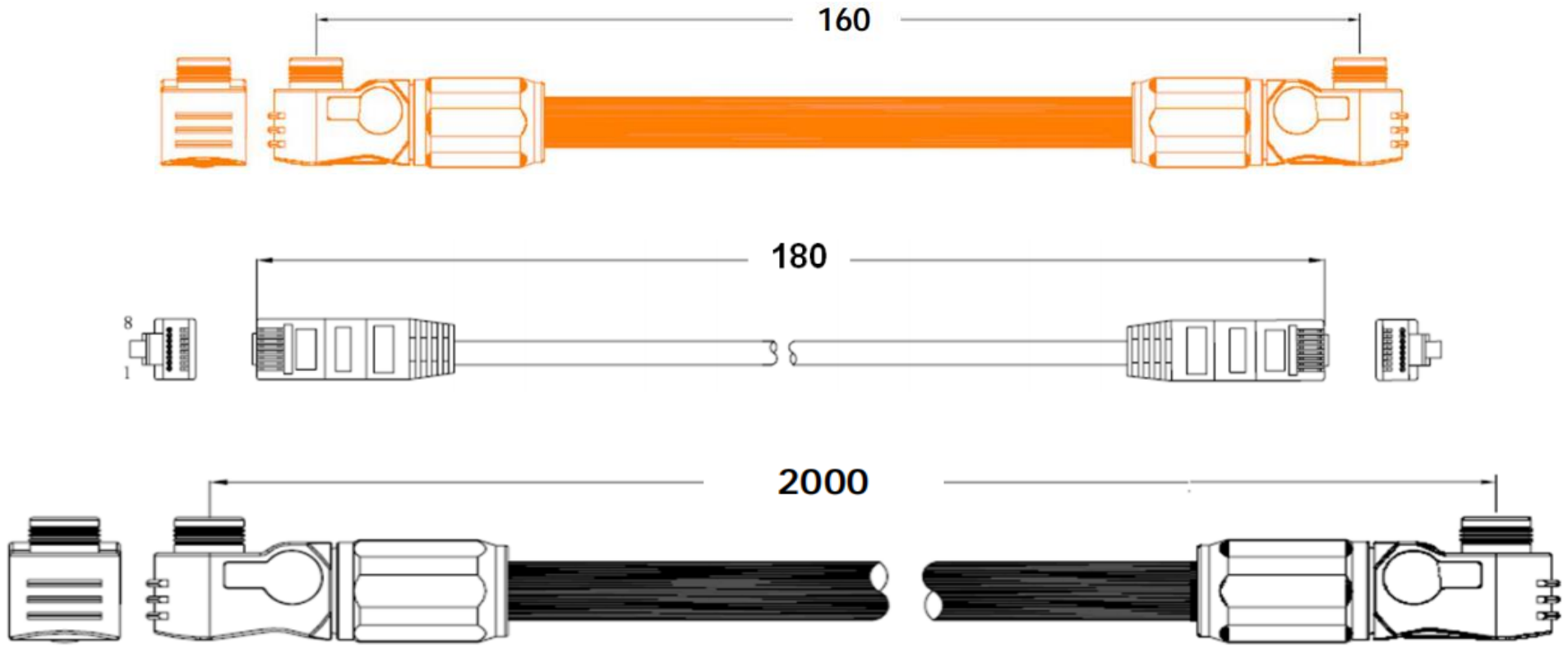
One power cable (Serial Connection) ,one battery communication cable for each battery package:



CHECKING LIST

2) For BMS Controller connects package:

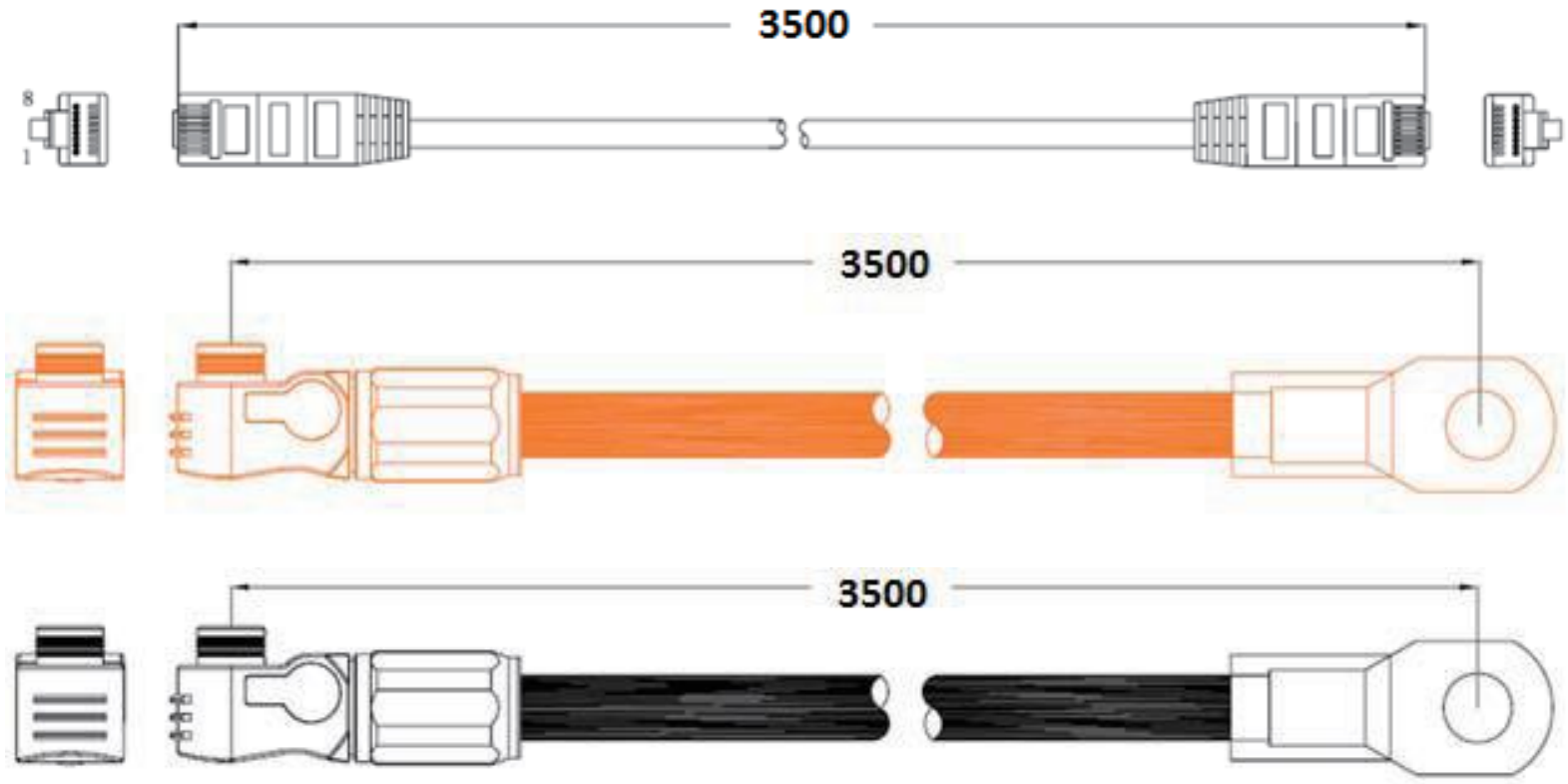
one positive power cable (orange to orange),one communication cable and user manual for each Controller package:



CHECKING LIST

2) For external cable kits:

one pair of power cable(orange and black, 3.5M) and one set of external communication cable(RJ45 – RJ45, 3.5M):



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BEFORE YOU START

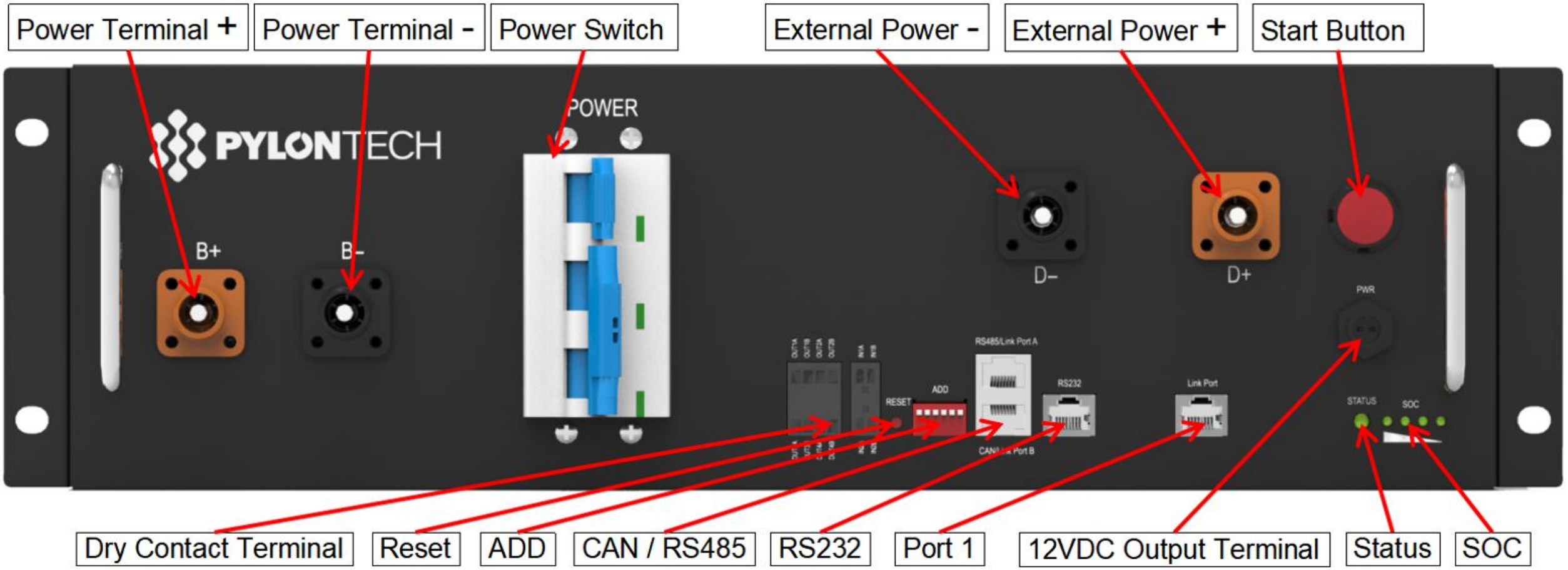
- Installation Manual
- Location & Environment
- Tools & Accessories
- Compatible Inverter

INSTALLATION

1) Battery Module Front Interface:

INSTALLATION

1) BMS Module (SC0500-100S) Front Interface:



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INSTALLATION

BMS Add Switch:

The BMS's first five bits must set in below <**BMS's Address Configure Table**>. The last BMS's terminal resistance must set in "1" (X=1);

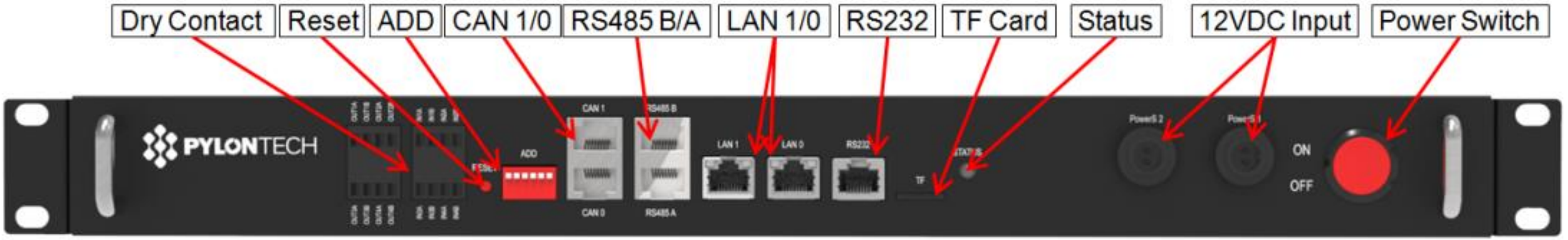
The address is configured follow ASCII code: ("X" is terminal resistance).

BMS's Address Configure Table:

CAN	Modbus	ADD Switch
0	1	00000X
1	1	10000X
2	2	01000X
3	3	11000X
4	4	00100X
5	5	10100X
6	6	01100X

INSTALLATION

1) 3rd Level Control Module (MBMS) Front Interface:



The MBMS's ADD Switch set with "000011". The last 2 bits are terminal resistances.

Attention:

- Power cable connected from orange to orange and black to black.
- HV system's grounding is based on metal directly touch between the module’s surface and rack’s surface.
- Please DO NOT connect battery in parallel;
- Do not connect battery with PV solar or AC power directly;
- Cut off the grid power

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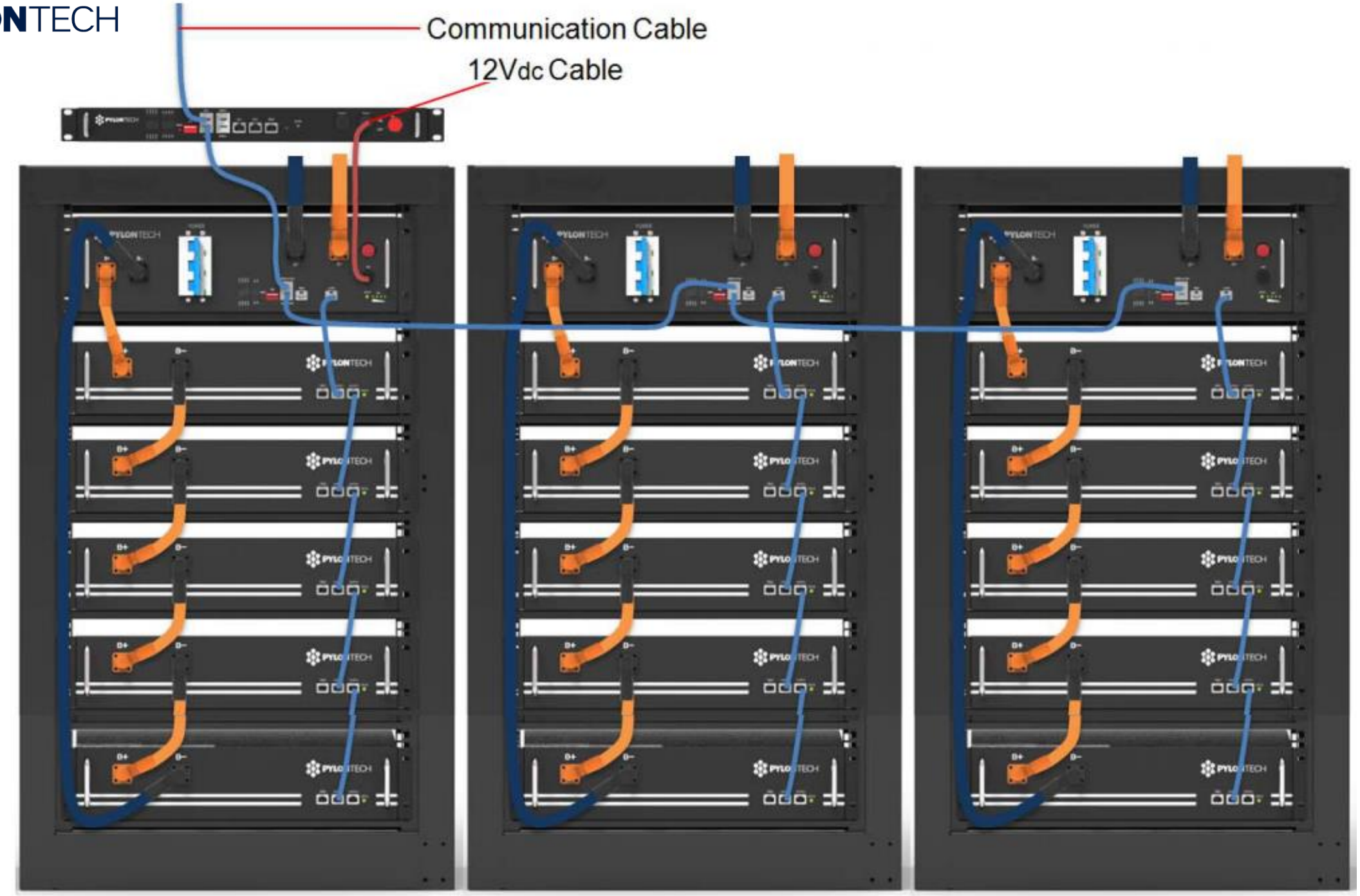

POWER ON/OFF

1) Power on:

- Double check all the power cable and communication cable.
- Turn on the 1st BMS (Battery Control Modules) of battery string.
- The second BMS must be turned on after the first battery string’s self-check is successful.
- From 1st BMS to the last BMS Then turn on the battery strings on one by one.
- MBMS must be turned on after all battery strings self-check finish.

POWER ON

1) Power on:

- Turn on the “POWER SWITCH”

Caution: The time interval between every time switch OFF/ON the “Power Switch” shall >**3 minutes**.

Caution: When the breaker is tripped off because of over current or short circuit, must wait after 30min to turn on it again, otherwise may cause the breaker damage.

POWER ON

1) Power on:

- Turn on the "Start Button":
  Press and hold the Start Button for more than 5sec until the buzzer rings, the LED indicator on front panel will light on if the start-up is successful;

POWER ON

1) Power on:

- Switch the MBMS on after all the BMS turn on successful:

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POWER ON

TIPS:

- System start process:

  The battery string's system will check itself, if work normal the battery string system will go to self-check mode.

  If the BMS and all battery modules are working normally, every status LED will lighting green, that's mean self-check are pass. Self-check will be finish within 10sec.

  If long press the start button within 30s, the "STATUS" lamp will flash red, it is to remind that the black start function is forbidden within 30s.

  If the BMS can't receive communication from upper equipment because of the communication is off, the "STATUS" lamp will light red after 30sec. That doesn't means failure existed, it means this battery string is OK while the external communication is off.

POWER OFF

2) Power OFF:

- Switch off the PCS/Inverter
- Switch off the breaker between PCS/Inverter and Battery String
- Turn off the “Start Button” of the BMS ,then switch off the ‘Power Switch’.

POWER OFF

1) Power off:

- Turn off the “Power Switch” of the MBMS. If the ESS configures only single battery without MBMS, then ignore this operation step.

POWER OFF

TIPS:

- DO NOT turn off the “Power Relay Switch” during normal running condition, only in emergency case it could be turned off directly.

06

Trouble-shooting Steps

Check List

- Environment & Status
- Wiring Connection
- Voltage Measurements
- Power On/Off

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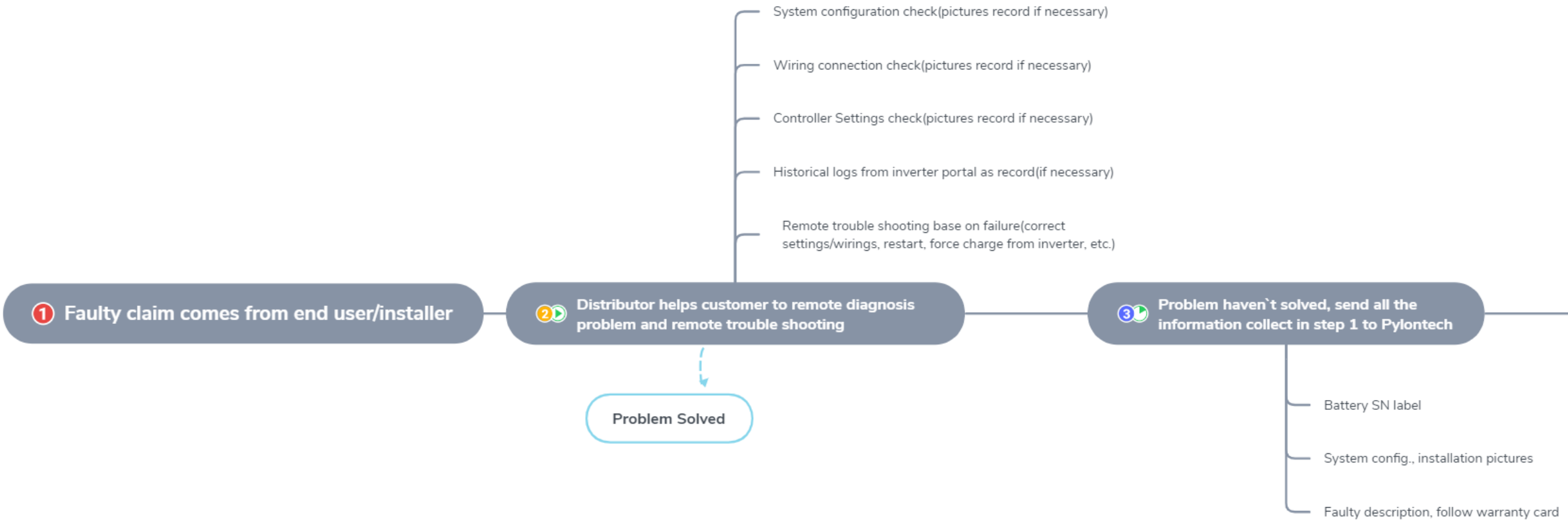
Trouble-shooting Steps



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Warranty Card

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Consumer Warranty

- Low Voltage Battery HESS battery system

Information Version: 1.0

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Consumer Warranty - Low Voltage Battery HESS battery system

1. Consumer Laws

If you acquire the Product from an Authorised Reseller in Territory and the Consumer Law applies, the Product comes with guarantees that cannot be excluded under Territory laws. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

The benefits provided by this Warranty are in addition to all other rights and remedies in respect of the Product which You have under the Consumer Law or any other law that cannot be excluded.

2. Product Warranty

Pylontech warrants that the Product will remain free of defects caused by improper workmanship or defective materials.
This warranty continues for a certain period of years from the earlier of:

1. the date of installation of the Product; or
2. six (6) months after the date the Product was manufactured,

(Warranty Period) subject to the conditions in clause 3 and the Exclusions in clause 5. This warranty does not include any accessories and tool kit items provided with the Product. Pylontech will repair or replace the Product (or provide you with a refund) if the Product is defective and returned during the Warranty Period.

3. Warranty Conditions

The warranties in respect of the Product only apply if the Product:

1. is purchased from Pylontech or an Authorised Reseller in the Territory;
2. has the official Pylontech serial number;
3. is installed in a battery module in the Territory;
4. is installed, operated and maintained in accordance with the Product Instructions; and
5. be used on a daily cycle basis and only for residential Photovoltaic (PV) energy storage;

(Warranty Conditions).

The warranties do not apply if the defect in or failure of the Product's performance is attributable to your misuse, abuse, accident or non-observance of the Product.

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Warranty Card

On behalf to make a faulty claim, please fully read and clarify the warranty terms in advance. Then let the onsite engineer fully fill the information required in this card, sign and send back to Pylontech or their authorized distributor.

1. Distributor name: _____
2. Battery system location: _____
3. Battery serial number: _____
4. Date of faulty happened: _____
5. Faulty description: _____

☐ cannot be turned on ☐ no communication ☐ not charging,
☐ not discharging ☐ ALM on ☐ others:

6. Inverter brand and type: _____
7. Real time battery information showen on inverter or inverter monitor system APP etc:

Voltage:_____ V; Current:_____ A; SOC:_____%; Temperature:_____℃

8. How long had the system been used?

Dead on arrival Faulty after installation
☐ Under 6 months ☐ 6 months to 1 year ☐ 1 year to 3 years
☐ More than 3 years.

9. When did the faulty happen?

☐ Morning, ☐ Afternoon ☐ Nightfall,
☐ Midnight, ☐ Other time:

10.How often did the faulty happen?

☐ Once or twice, ☐ Three times or more ☐ Every day
☐ Other:

Trouble-shooting Steps

- For instance 191010LV3UKMS
  - 1st - 6th - RMA starting date
  - 7th - 9th - product code LV2=US2000, LV3=US3000
  - 10th - 11th - country code
  - 12th - 13th - distributor code

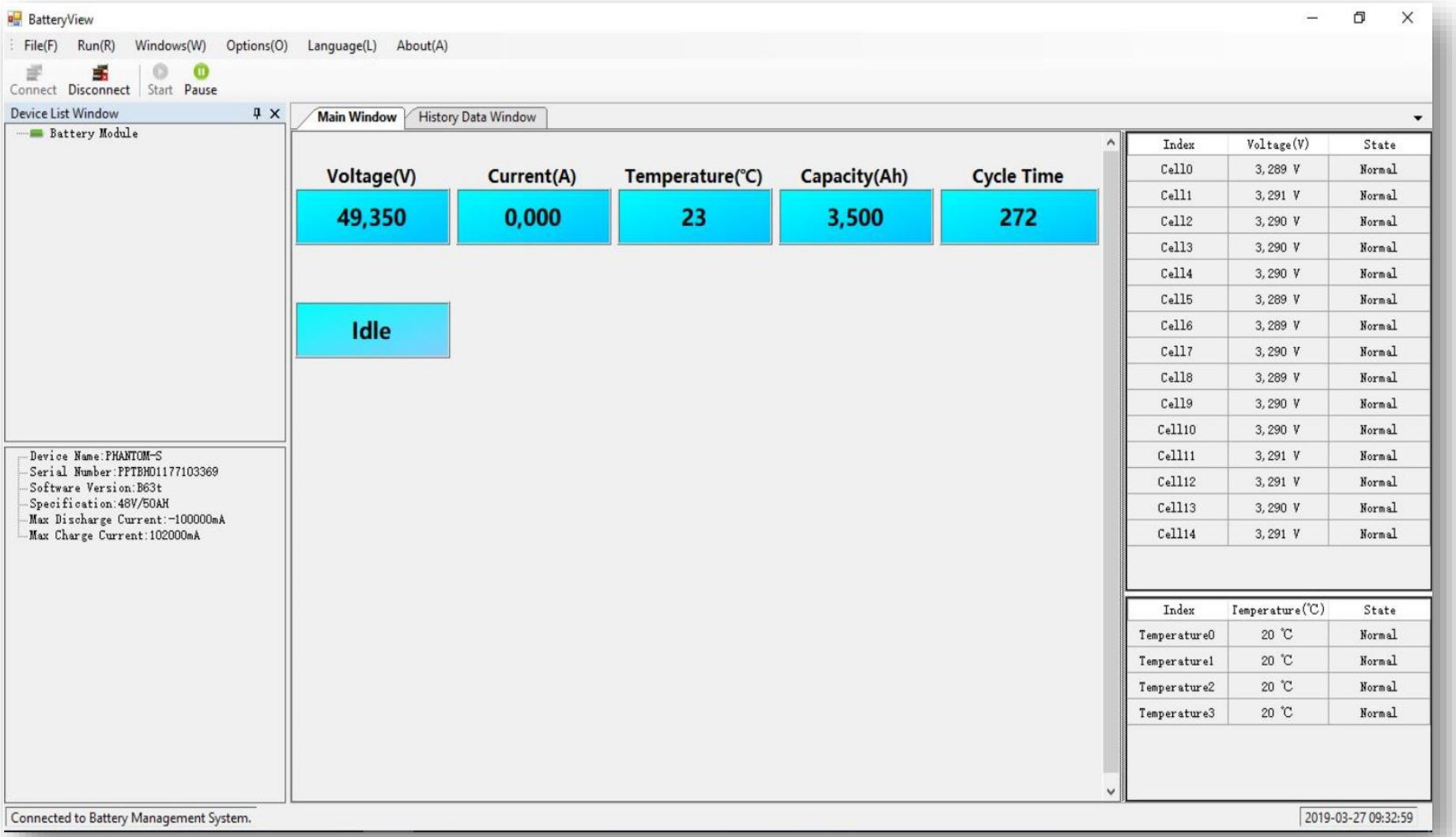
4 Pylontech release a RMA Ref. No. to Distributor as track record.

5 Base on the failure description, Pylontech will analysis the faulty reason, and decide the next step of after-sales process

- Condition a. Dead on Arrival during commissioning - Compensate a brand new module to customer, failure module send to Pylontech Service Partner
  - Delivery cost
  - Module cost: brand new one deduct from upcoming order
  - → Cost cover by Pylontech
- Condition b. Overdischarge issue - send module to Pylontech Service Partner
  - Delivery cost
  - Module cost: from warranty stock pool
  - → Base on the further analysis, condition may convert to Condition d., so cost pending in this stage
- Condition c. PCBA/cell failure - send module to Pylontech Service Partner
  - Delivery cost
  - Module cost: from the warranty stock pool
  - → Base on the further analysis, condition may convert to Condition d., so cost pending in this stage
- Condition d. Failure not in warranty scope -
  - Failure due to inverters failure
  - Failure due to wrong wiring connection
  - Failure due to wrong inverter settings
  - Failure due to installation environment
  - Overdischarged but didn`t report within 48hrs
  - *Rest terms reference to Warranty Terms '5. Exclusions of Warranty'*
  - → No free repairment or replacement service

6 Service Partner confirm to Pylontech about the analysis progress, along with the evidence

Battery View



Connecting through Battery Module / BMS RS232 Port to Laptop

- Monitoring
- Firmware Upgrade
- Acquire Historical Log
- Setting Change
- Error Code

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Sample Log File

No.	TIME	VOLTAGE(V)	CURRENT(A)	TEMP(℃)	Single cell Lowest Temp(℃)	Single cell Highest Temp(℃)	Single cell Lowest voltage(V)	Single cell Highest voltage(V)	Basic Status	Voltage Status	Current Status	Temp. Status	SOC(%)
0	2017/7/17 17:20	49.294	-0.05	19	16	17	3.284	3.287	Dischg	Normal	Normal	Normal	58.00%
1	2017/7/17 17:50	49.282	0	19	16	17	3.284	3.287	Idle	Normal	Normal	Normal	58.00%
2	2017/7/17 18:20	49.28	-0.05	19	16	16	3.284	3.287	Dischg	Normal	Normal	Normal	58.00%
3	2017/7/17 18:50	49.28	0	19	16	16	3.284	3.287	Idle	Normal	Normal	Normal	58.00%
4	2017/7/17 19:20	49.282	-0.025	19	16	16	3.284	3.287	Dischg	Normal	Normal	Normal	58.00%
5	2017/7/17 19:50	49.277	-0.05	19	16	16	3.284	3.286	Dischg	Normal	Normal	Normal	58.00%
6	2017/7/17 20:20	49.277	-0.05	19	15	16	3.284	3.286	Dischg	Normal	Normal	Normal	57.00%
7	2017/7/17 20:50	49.271	0	19	15	16	3.283	3.286	Idle	Normal	Normal	Normal	57.00%
8	2017/7/17 21:20	49.268	0	19	15	16	3.284	3.286	Idle	Normal	Normal	Normal	57.00%
9	2017/7/17 21:50	49.268	0	18	15	16	3.284	3.286	Idle	Normal	Normal	Normal	57.00%
10	2017/7/17 22:20	49.265	-0.05	18	15	15	3.283	3.285	Dischg	Normal	Normal	Normal	57.00%
11	2017/7/17 22:50	49.263	0	19	15	15	3.283	3.285	Idle	Normal	Normal	Normal	57.00%
12	2017/7/17 23:20	49.264	-0.05	21	15	16	3.283	3.286	Dischg	Normal	Normal	Normal	57.00%
13	2017/7/17 23:50	49.264	-0.1	22	16	16	3.283	3.286	Dischg	Normal	Normal	Normal	57.00%
14	2017/7/18 0:20	49.27	-0.104	23	16	17	3.283	3.286	Dischg	Normal	Normal	Normal	57.00%
15	2017/7/18 0:50	49.266	-0.104	24	17	18	3.283	3.286	Dischg	Normal	Normal	Normal	57.00%
16	2017/7/18 1:20	49.274	-0.108	24	18	18	3.284	3.286	Dischg	Normal	Normal	Normal	56.00%
17	2017/7/18 1:50	49.283	-0.108	25	18	19	3.284	3.287	Dischg	Normal	Normal	Normal	56.00%
18	2017/7/18 2:20	49.285	-0.108	25	19	20	3.284	3.288	Dischg	Normal	Normal	Normal	56.00%
19	2017/7/18 2:50	49.285	-0.108	26	20	20	3.284	3.288	Dischg	Normal	Normal	Normal	56.00%
20	2017/7/18 3:20	49.287	-0.108	26	20	21	3.284	3.288	Dischg	Normal	Normal	Normal	56.00%

Trouble-shooting Steps

7 Pylontech send the detailed analysis report to distributor as comfirmation of the result

- In case the failure is covered by warranty, send confirmation of cost compensation, record under RMA Ref. No.
- In case the failure is not covered by warranty, send invoice to distributor, record under RMA Ref. No.

A single RMA case finish. Every time when distributor place an commercial order, should inform Pylontech the RMA Ref. No. list to verify, then ask for the compensation officially by Email, Pylontech should confirm the compensation & invoice situation and record correspondingly

Credit Notes

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Credit Note

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Credit Note:

Supplier:

PYLON TECHNOLOGIES CO., LTD
NO. 73 LANE 887
ZU CHONGZHI ROAD
ZHANGJIANG HI-TECH PARK
PUDONG, SHANGHAI, CHINA

Reason for credit: after-sales returns
NSU-MARKETING SUPOORT

Distributor:

SOLAR SOLUTIONS (DTC)
1/20 HENDERSON ROAD
KNOXFIELD,VIC
3180

Email: solar@solarsps.com.au
Ph: 1300255410
Fax:03-9243-3499

Payable Order No. For Credit Deduction

Battery Type	Battery S/N	RMA No.	Quantity	Unit Price	Total Amount (exc.GST)

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Thank You

For any questions, please contact: service@pylontech.com.cn