CEP Series

CVP Emergency Power System

Installation Manual

Version 1.2

Applicable Models:
CEP30H
CEP30L
CEP60H
CEP60L

IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:

a)READ AND FOLLOW ALL SAFETY INSTRUCTIONS.

b) Do not use outdoors

c) Do not let power supply cords touch hot surfaces

d) Do not mount near gas or electric heaters

e) Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in eyes, flush acid with fresh water and contact a physician immediately.

f) Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by unauthorized personnel.

g) The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.

h) Do not use this equipment for other than intended.

SAVE THESE INSTRUCTIONS

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The specifications and descriptions in this document were in effect at the time of publication. MicroNOC continuously seeks to improve our product offerings andthus reserves the right to change specifications and product appearance, or to discontinue products at any time. For the latest Installation documentation, please contact your MicroNOC representative.

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1. Important Safety Instructions

Review this installation manual fully before commencing work. A qualified individual is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation, and maintenance of this equipment; and with all the hazards involved. Qualified personnel must be trained in Safety-Related Work Practices, Job Hazard Analysis, First Aid and CPR, Arc Flash Hazards, and PPE Requirements (both classroom and on-the-job training are required in accordance with NFPA 70E requirements). Retraining is required in intervals not to exceed three years. MicroNOC assumes no liability for injury or damage that may result from failure to abide by these instructions.

The following symbols and words are used throughout this document to highlight important information.

 Warning:	Indicates a hazardous situation which, if not actively avoided could result in injury, death, or damage.
 Caution:	Indicates a hazardous situation which, if not actively avoided could result in damage to the equipment or performance degradation.
Note:	**Indicates an important step or best practice.**

1.1 General Advisories

 Warning! Be sure to read and *understand* this entire document before installing or using the system. Failure to follow these instructions can result in product damage, injuries, or death.

 Warning! Only qualified installers with knowledge and experience working on high voltage equipment should carry out installation and startup of this system.

 Warning! All U.S. and Canada electrical installations must be done in accordance with local codes and the National Electric Code (NEC), ANSI/NFPA 70, or the Canadian Electric Code CSA 22.1.

 Warning! Battery systems and cells are potentially dangerous. Proper precautions must be observed in handling, operation and maintenance.

 Warning! Proper Personal Protective Equipment including safety glasses, gloves, and protective footwear should be utilized.

 Warning! Never touch any conductors or busbar without first confirming they are de-energized.

 Warning! Take care to site the system properly. Proper clearances should be maintained, and the unit(s) situated indoors, on level ground and away from water, heat sources, or high dust environments. Ensure the temperature of the selected site is within the specified range.

Warning! Keep the work area tidy. Make sure all cable runs are secured properly to avoid damaging cables.

Warning! Use the system only as intended.

Warning! The battery trays are heavy and can be challenging to lift. Employ proper lifting techniques and utilize mechanical assistance to reduce injury potential.

Warning! **Do not proceed if a component appears damaged or you do not fully understand a step. Contact MicroNOC.**

Caution! Do not use harsh cleaning products or chemicals on the system.

Caution! Do not make any modifications to the system

Caution! Do not make substitutions for parts.

Caution! Perform scheduled maintenance.

1.2 Warning Icons on Labels

	Warning:	Indicates an electrical shock hazardous situation which, if not actively avoided could result in injury, death, or damage.
	Caution:	Indicates a hazardous situation which, if not actively avoided could result in damage to the equipment or performance degradation.
	Hot surface:	Indicates heat hazard or hot surface. Use caution to prevent burns.
	See Manual:	Indicates a reference to the Installation and Operation & Maintenance Manuals for more information.

2. Scope of this Document

MicroNOC CEP Series utilizes a Battery Energy Storage System (BESS) which is a complete AC coupled energy storage system designed to be deployed quickly and cost effectively to meet a variety of applications. Because each installation site will likely be different, this document only covers the installation of the CEP30H components and does cover any site-specific modifications that may be necessary to support the CEP30H product or associated models.

2.1 Model Definition

The CEP Series CVP Emergency Power System includes the following models.

Model #	Maximum Output Power	Nominal Voltage	Transformer
CEP30H	29 kW	277/480V, 3-phase	NO
CEP30L	29 kW	120/208VAC	YES
CEP60H	58 kW	277/480V, 3-phase	NO
CEP60L	58 kW	120/208VAC	YES

3. System Specifications & Single Line Diagram

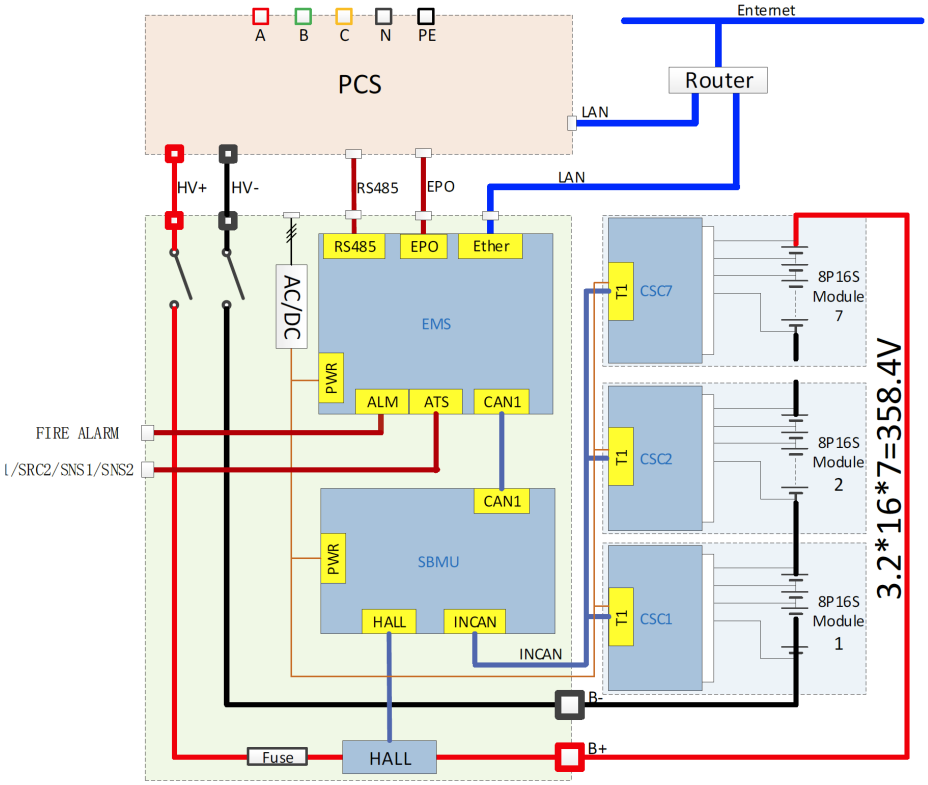
CEP30H Cabinet with PCS

3.1 Specifications

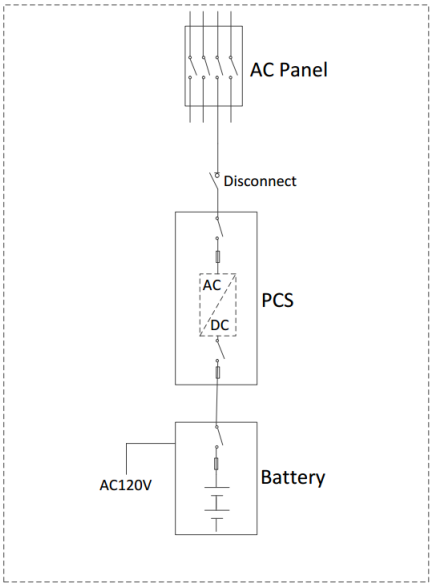
	Model No.	
	CEP30H CEP30L*	CEP60H CEP60L*
General		
Certification	UL924 / UL1973 / UL 1741sa / UL9540	
RoHS	Compliant	
Altitude above sea without de-rating	< 6,500 feet (2,000 m)	
De-rating slope above 1500 m	3 % / 328 ft (100 m)	
Operating Temperature	Charging: 0 C to 55 C; Discharging: -20 C to 55 C	
Storage Temperature	-30 C to 60 C	
Humidity	0 to 95%	
Enclosure Rating	IP20	
Power		
AC Output Power – To Critical Load		
Maximum Output power (kVA)	29	58
Maximum Power per Phase (kVA)	9.7	19.3
Nominal Voltage (Vac L-N) / (Vac L-L)	277/ 480*	
Phases (Poles)	3	
Frequency (Hz) / accuracy	50 or 60 / ± 0.03%	
CEC Efficiency	97%	
Overload Capacity	105%~115% >10min; 115%~125% > 1min ; 125%~150% > 200ms	
Output THD	≤3%	
Crest Factor at Nominal Power	1.414	
Rated / Maximum Current per Phase (A)	35 / 90	70 / 180
Recommended Wire Size (AWG) @ 75°C	#6 AWG	#2 AWG
Refer to NEC and local code for proper cable sizing		
AC Output Power – Recovery From Load		
Power Routing – Primary	Battery Recharge	
Power Routing – Secondary	Dissipating Resistor (when batteries fully charged)	
AC Input Power – From AC Mains		
Nominal Voltage (Vac L-N) / (Vac L-L)	277 / 480*	
Phases (Poles)	3	
Voltage Range (Vac L-N)	263 - 291	
Frequency Range (Hz)	59.5 to 60.5 Hz	
Input Power Factor	0.8 leading to 0.8 lagging	
Short Circuit Current Rating (SCCR)	62 amps	
Recommended Wire Size (AWG) @ 75°C	#6 AWG	#2 AWG
Communications		
Ports	1x Ethernet/ TCP/IP, 1x Modbus (RS485)	
Relay Outputs	2x Digital Output Relays / 3x Phase Output Relay	
Module LED's / Monitoring	3x Status LED's / Touchscreen	
Mechanical		
Dimension (D x W x H, In.)	40" x 24" x 80"	40" x 48" x 80"
Weight	1,500 lbs. (681 kg.)	3,000 lbs. (1362 kg.)
Max No. of Modules	16	32
Battery Module Weight (ea.)	23.6 lbs. (10.72 kg.)	
Agency Compliance		
UL	UL 9540 / UL 1741sa / UL 924	

*TX Models include a separate transformer. (i.e. for 120/208VAC power requirements.)

3.2 System Layout and Simplified One-Line Diagram



Block Diagram

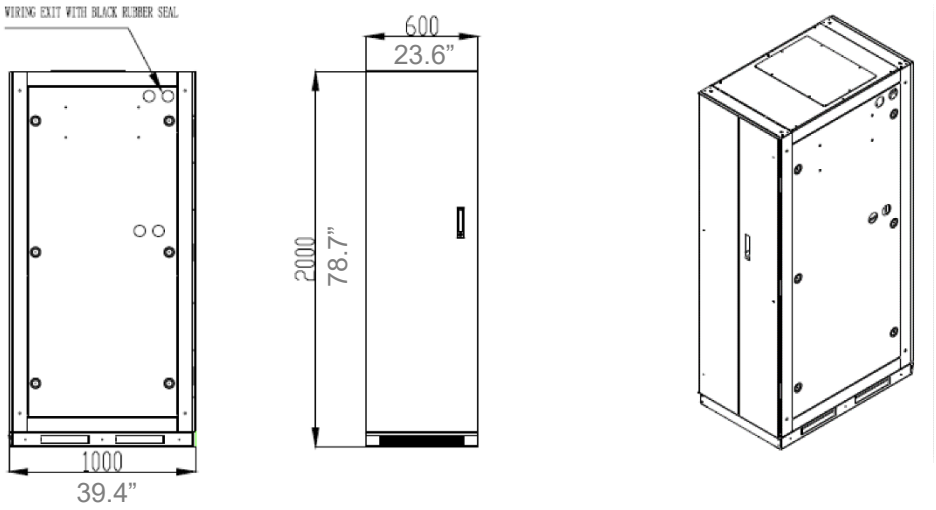


Simplified One-Line Diagram

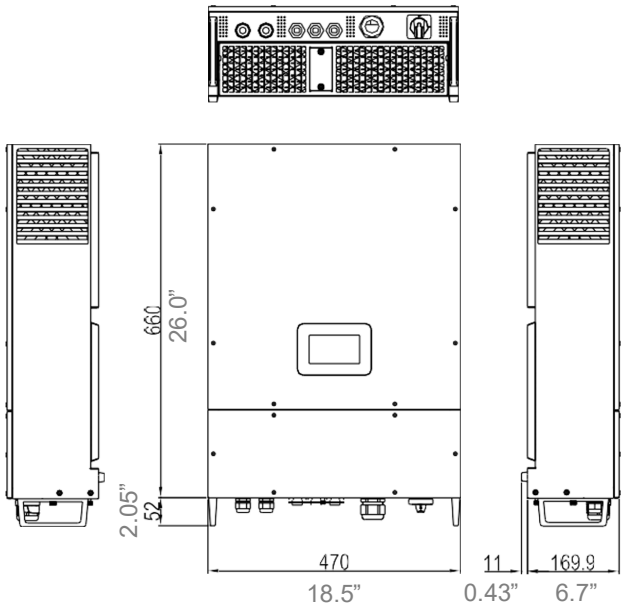
4. Cabinet Drawings

Measurements in metric (mm) unless otherwise specified.

4.1 Battery Cabinet



4.2 Power Conversion System (Inverter)



5. Installation Site Requirements & Necessary Tools

5.1 Environmental Requirements

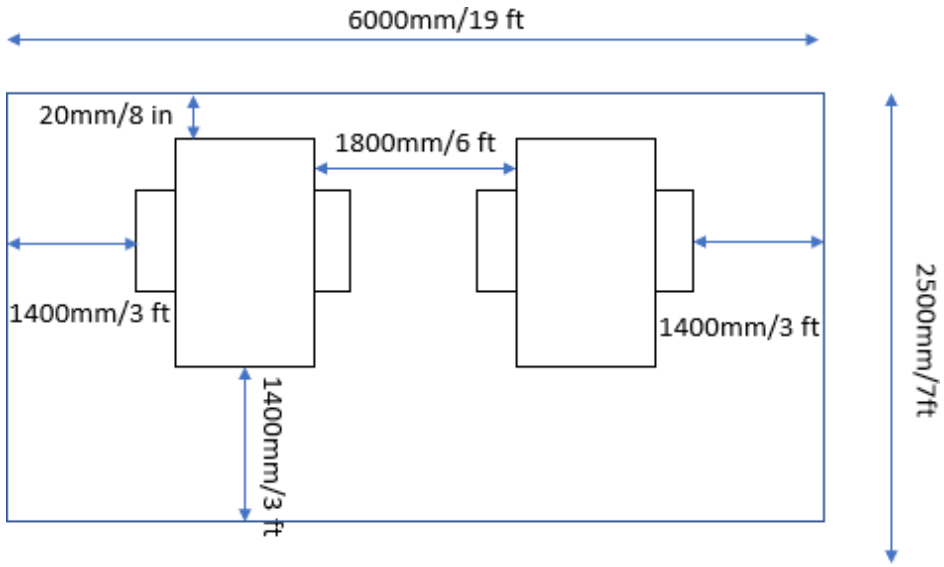
1. The CEP30H system is designed for indoor use only with dry conditions and a low dust environment. Direct sunshine and exposure to the elements (rain, snow, etc.) or moisture should be strictly avoided.
2. The installation should be conducted in a well-ventilated environment to ensure sufficient heat dissipation.

5.2 Foundation Requirements

1. Review listed system weight and ensure the foundation is properly designed. The equipment must be secured to the foundation to prevent tipping or movement.

5.3 Clearance Requirements

1. The mechanical dimension of system (battery cabinet with PCS and other enclosure) is 31.5” W x 39.4” D x 78.7” H (800mm W x 1000mm D x 2000mm H). Please ensure there is enough room to install the system. Minimum clearance with multiple units is shown below:



All U.S. and Canada electrical installations must be done in accordance with local codes and the National Electric Code (NEC), ANSI/NFPA 70, or the Canadian Electric Code CSA 22.1. The following clearances should be maintained:

Left	Right	Front	Behind	Top
750mm 29.5 Inches	50mm 2 Inches	914mm 36 Inches	50mm 2 Inches	200mm 7.9Inches

5.4 Personnel Requirements

1. Installation and servicing shall be performed by qualified personnel.

5.5 Other Auxiliary Requirements

1. Users need to provide a 120V AC power line for BMS/EMS controllers. (100W is adequate).
2. Users need to provide an Ethernet interface for system networking.
3. If emergency backup application is desired, the auxiliary power needs to be connected to a 300W UPS.

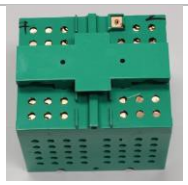
5.6 Tool List

Tool	Requirement
Utility Knife	
Hammer	
Pry Bar	
Mechanical Lift	
Multimeter	
Needle nose pliers	
Drill Driver	
Oblique cutting pliers	
Slotted screwdriver	
Phillips screwdriver	
8mm socket wrench	⚠Caution! Short Circuit Risk. The tool must have an insulated handle*
13mm socket wrench	⚠Caution! Short Circuit Risk. The tool must have an insulated handle*
Adjustable wrench	⚠Caution! Short Circuit Risk. The tool must have an insulated handle*

* If insulated hand tools are not readily available, standard tools can be utilized by wrapping the tool's handle in electrical tape or by applying heat/cold shrink tubing. This will help guard against short circuiting if the tool is inadvertently dropped during installation.

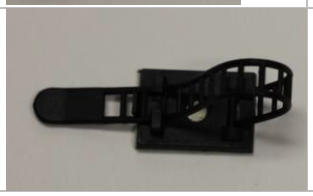
6. Parts List

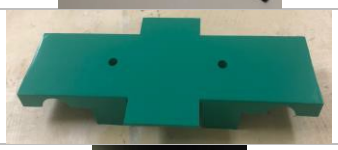
Parts list and quantity listed is for a CEP30H. For CEP60 models, part quantities are multiplied by 2.

Number	Name	Picture	Quantity	Comments
#1	Cabinet		1	Dimension： 23.6”W x 39.4”D x 78.7”H (600mmW x 1000mmD x 2000mmH)
#2	Battery tray		7	Dimension: 17.7”W x 32.7”D x 1.2”H (450mmW x 831mmD x 30mmH) Location： Located in cabinet
#3	Main control tray		1	Dimension： 17.7”W x 3.2”D x 7.9”H (450mmW x 800mmD x 200mmH) Location: Located in cabinet
#4	Battery module		56	Dimension: 8.3”W x 7.0”D x 6.9”H (212mmW x 178mmD x 174mmH) Location： Located in wooden crate
#5	CSC		7	Location： Located in cabinet
#6	Electric meter like eGauge	Optional	1	

#7	30 kW PCS		1	Dimension: 18.5”W x 26.0”W x 6.9”D (470mmW x 660mmH x 176mmD) Location: Located in wooden case of PCS
#8	PCS Mounting Bracket.		1	Location: Located in wooden case of PCS
#9	Communications wiring harness of CSC		7	Length: 11.8” (300mm) Number of ports: 2
#10	Wiring harness between CSCand main control tray		1	Length: 89.4” (2270mm) Number of ports: 8
#11	Module sampling wire harness		7	Length: 38.8” (985mm) Number of ports: 24
#12	Module internal connection cable1		42	Length: 7.3” (185mm)
#13	Module internal connection cable2		7	Length: 19.7” (500mm)
#14	Positive output cable of No.7 battery tray		1	Length: 43.3” (1100mm)
#15	Negative output cable of No.7 battery tray		1	Length: 15.7” (400mm)

#16	Positive output cable of No.6 battery tray		1	Length: 16.1” (410mm)
#17	Negative output cable of No.6 battery tray		1	Length: 15.7” (400mm)
#18	Positive output cable of No.5 battery tray		1	Length: 16.1” (410mm)
#19	Negative output cable of No.5 battery tray		1	Length: 15.7” (400mm)
#20	Positive output cable of No.4 battery tray		1	Length: 16.1” (410mm)
#21	Negative output cable of No.4 battery tray		1	Length: 15.7” (400mm)
#22	Positive output cable of No.3 battery tray		1	Length: 16.1” (410mm)
#23	Negative output cable of No.3 battery tray		1	Length: 15.7” (400mm)
#24	Positive output cable of No.2 battery tray		1	Length: 16.1” (410mm)
#25	Negative output cable of No.2 battery tray		1	Length: 15.7” (400mm)
#26	Positive output cable of No.1 battery tray		1	Length: 16.1” (410mm)
#27	Negative output cable of No.1 battery tray		1	Length: 15.7” (400mm)

#28	DC-Switch (HV+) to PCS (+) cable		1	Length: 70.9” (1800mm)
#29	DC-Switch (HV-)to PCS (-) cable		1	Length: 70.9” (1800mm)
#30	M8*16 combination bolts		112	Used to fasten the modulepower line
#31	M5*12 combination bolts		56	Used to fasten the modulesampling wire harness
#32	M4*10 bolts		28	Used to fasten the CSC
#33	M10*35 combination bolts and nuts		4	Used to fasten the PCS
#34	M5*12 combination bolts		28	Location ： Mounted in cabinet
#35	Cable Strap (optional)		7	Used to fasten the communication wiring harness of CSC

#36	Wire cable tie (optional)		60	Used to fasten the sampling wire harness of module
#37	Plastic cover		56	Used to cover module screw terminals
#38	Communication harness		1	Length: 98.4” (2500mm)
#39	UPS		1	300W
#40	AC Disconnect		1	
#41	Emergency stop switch (optional)		1	Includes base and button
#42	EPO Relay (optional)		1	
#43	EPO Cable Set (optional)		6	Include 6 cables: relay driver -, relay driver +,relay output, and 3 extension cables;

7. Unpacking

1. MicroNOC suggests allocating a minimum of a 10 x 15 foot working area for staging, unpacking, and assembly. A minimum two people are required to do the assembly.
2. Use hand tools including a utility knife, hammer, and pry bar to carefully unpack the system components from the cardboard and wooden containers. Take care when opening packages to not damage any component.

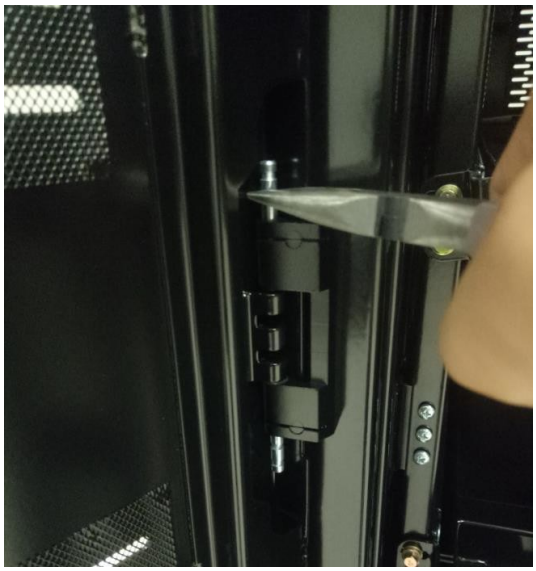
8. Step by Step Installation Instructions

8.1 Installation Overview Summary

Task Grouping	Step Number	Process Name
Cabinet Preparation	Step 1	Remove the front door of cabinet
	Step 2	Remove the battery tray and main control tray from cabinet
	Step 3	Install the PCS mounting bracket on the side of cabinet
	Step 4	Install the wiring harness between CSC and main control tray
Battery Tray Assembly & Installation	Step 5	Install 8P2S battery modules into the battery tray
	Step 6	Install module sampling wiring harness
	Step 7	Install the power cable and the remaining terminals of thesampling wire harness
	Step 8	Install CSC of battery tray
	Step 9	Test the battery tray unit
	Step 10	Install battery tray into the cabinet
Control Tray Installation	Step 11	Main control tray inspection, EPO relay installation
	Step 12	Install main control tray into the cabinet
PCS Installation	Step 13	Install PCS, AC Disconnect, and E-stop button
Battery String Wiring	Step 14	Install the communication wiring harness of CSC
	Step 15	Connect battery tray power cables
	Step 16	Battery system inspection
Connect AC Disconnect	Step 17	Connect AC disconnect
Labels	Step 18	Install labels

9. Cabinet Preparation

9.1 Step 1 – Remove the front doors of cabinet.



1. Use needle nose pliers to remove the front door. This will allow easier access to the cabinet for later installation steps.
2. Set the door aside in a safe location and be sure to retain door hinges.

9.2 Step 2 - Remove the battery tray and main control tray from cabinet

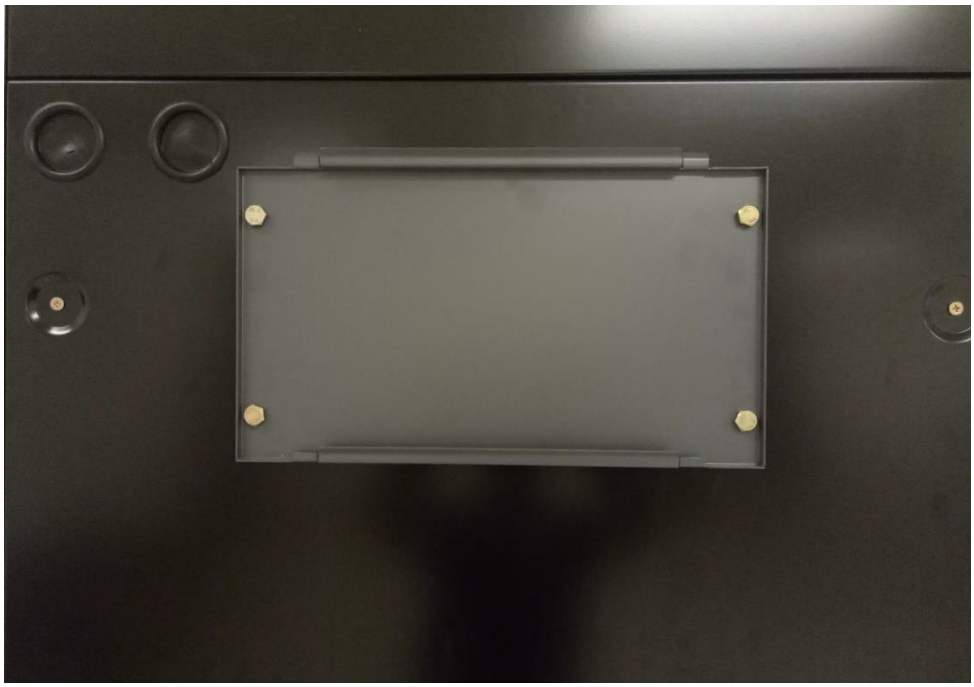
Cabinet

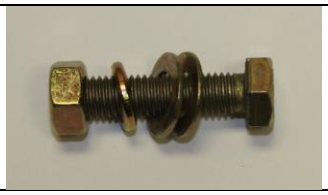
Battery tray

Main control tray

1. Use 8mm socket wrench to remove the M5 bolts of the battery trays and main control tray.
2. Remove the battery tray and main control tray from cabinet.
3. Set the battery tray and main control tray aside in a safe location.
4. Use the four ground bolts fixed bottom of cabinet to make sure the cabinet is stable. Refer to Appendix A for cabinet mounting drawing.
5. Inset main control tray. Tuck the main battery positive and negative cables to the sides and under the tray.
6. Route the PCS cables (positive, negative, EPO, RS485) to the side opening for later PCS installation. Use cable ties to fix them on the frame.

9.3 Step 3 – Install the PCS Mounting Bracket on the side of cabinet



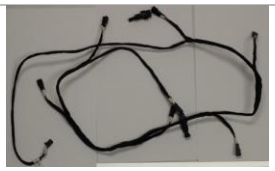
Part Name	PCS Mounting Bracket	M10*35 combination bolts and nuts
Part Number	#8	#33
Part Quantity	1	4
Part Picture		

1. Install the PCS Mounting Bracket on the left or right side of cabinet by inserting bolts through backboard and cabinet and tightening using an adjustable wrench.

9.4 Step 4 - Install the wiring harness between CSC and main control tray

Install the #10 wiring harness

Tuck the communication ports out of the way

Part Name	Wiring harness between CSC and main control tray	Wire cable tie
Part Number	#10	#36
Part Quantity	1	7
Part Picture		

1. Install the #10 “wiring harness between CSCs and main control tray”. This will run along the right side of the cabinet and span from the bottom of the cabinet, where the control tray resides, to the top of the cabinet.
2. Use wire cable tie to fasten the harness at front pillar of cabinet, ensure each tray position has one wire tie. Use oblique cutting pliers to clip excess cable tie.
3. Tuck the communication ports inside the side frame and out of the way to ensure the cable / ports are not damaged or pinched during insertion of trays.

Notes: Be careful when trimming excess cable tie, do not snip wire or damage the insulation. Ensure cable is secured, neat, and tidy.

⚠ **Caution!** Tuck the communication ports inside of the side frame to avoid pinching or damaging during battery tray installation.

10. Battery Tray Assembly & Installation

10.1 Step 5 – Install 8S2P Battery Modules into Battery Tray

-	+	-	+
+	-	+	-
-	+	-	+
+	-	+	-

Note: The following steps (05 to 10) show the preparation ofthe battery trays. This process will be repeated 7 times until all the battery trays are completed.

Start from the second slot fromthe bottom of the cabinet.

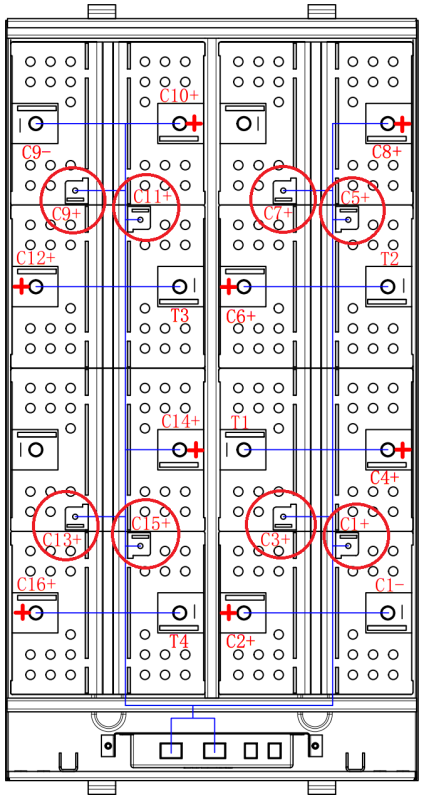
Assemble Battery trays and work your way to the top of the cabinet.

Part Name	Battery Tray	Battery module
Part Number	#2	#4
Part Quantity	1	8
Part Picture		

1. Gather battery modules and note the positive and negative polarity of each module.
2. Install the battery modules by placing them into the tray according to the above pictures.
3. After the installation, use a multimeter to measure each battery module's voltage and polarity is correct. Each 8P2S battery module should read between 6.2 and 6.6 Vdc.
4. This process will be repeated for each battery tray.

⚠ Caution! Ensure proper orientation of battery modules as shown in picture. Take special care in handling to avoid contact with battery module terminals.

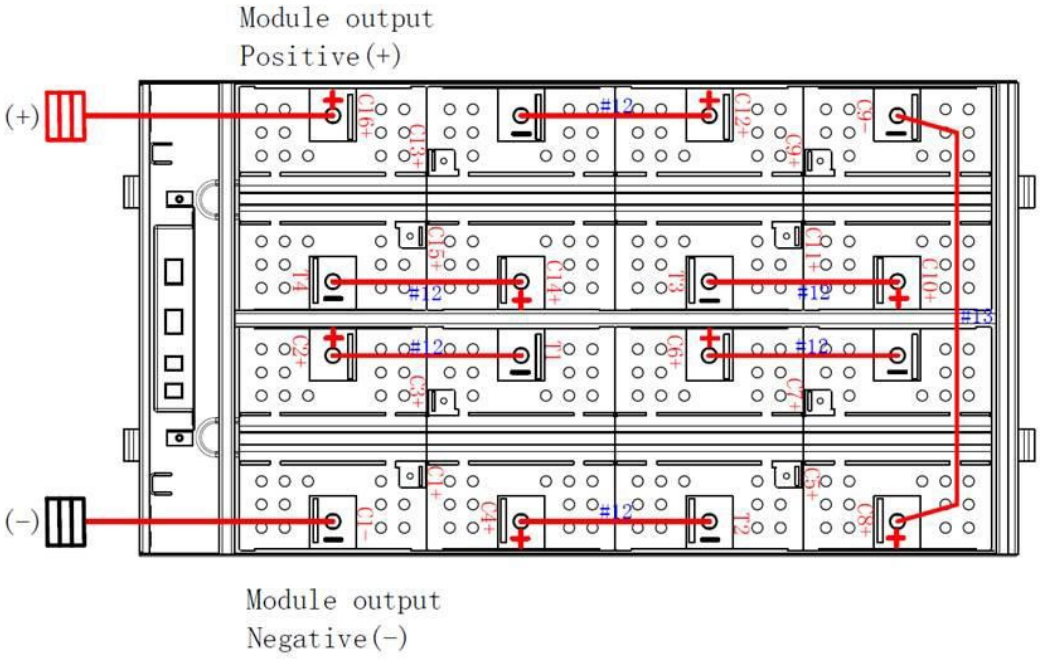
10.2 Step 6 – Install module sampling wiring harness



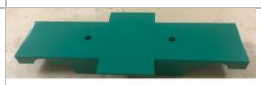
Material Name	Module sampling wire harness	M5*12 combination bolts	Wire cable tie
Material Number	**#11**	**#31**	**#36**
Material Quantity	1	8	10
Material Picture			

1. Install wiring harness according to the above picture. For this step, only fasten C1+, C3+, C5+, C7+, C9+, C11+, C13+, and C15) using an 8mm socket with 7 Nm torque. Ring Terminals shall be attached to modules with plastic encased connectors oriented towards the front of the module. Refer to the above picture.
2. Tie wiring harness with wire cable tie to organize, and make sure each of the 8 battery modules has one cable tie. Snip of excess cable tie.
3. This process will be repeated for each battery tray.

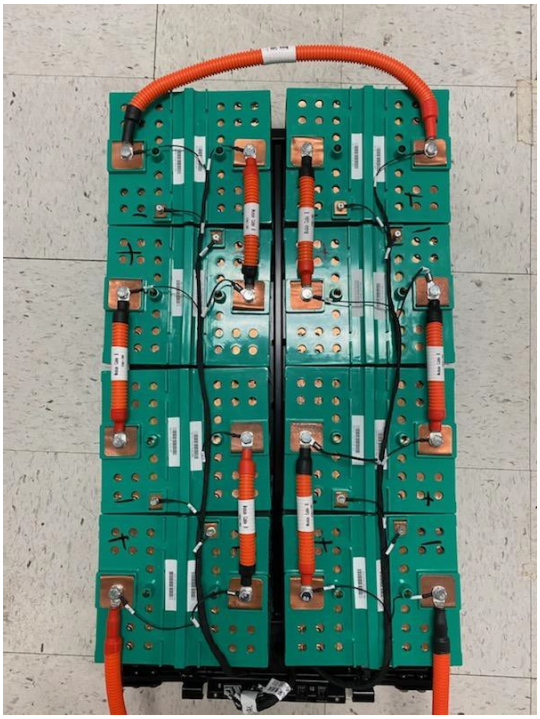
10.3 Step 7 - Install the power cable and the remaining terminals of the sampling wire harness.

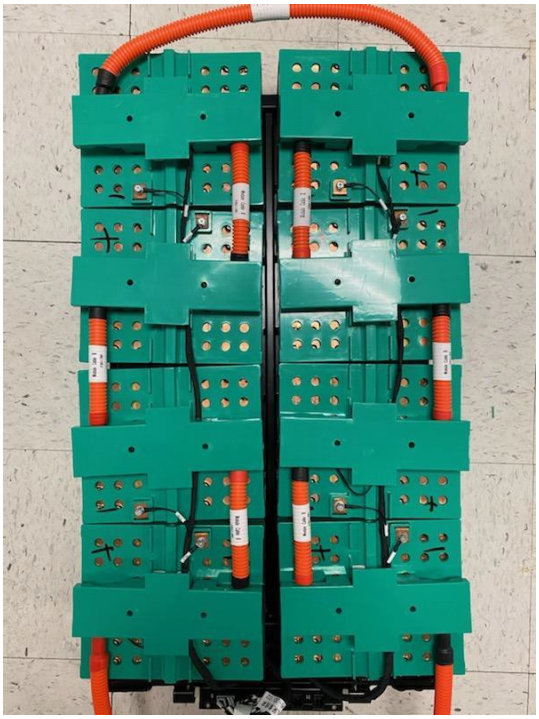


Caution! DO NOT Short Cables between Output (+) and (-)!

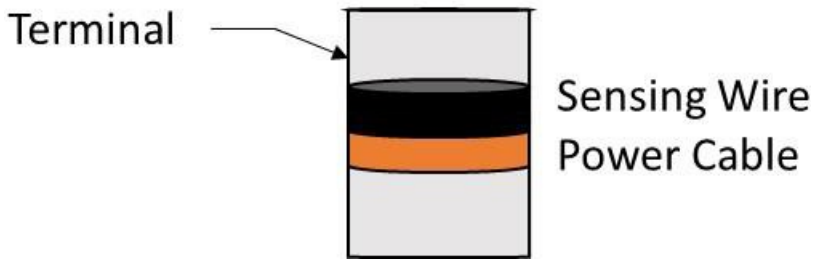
Part Name	Module internal connection cable 1	Module internal connection cable 2	M8*16 combination bolts
Part Number	#12	#13	#30
Part Quantity	6	1	16
Part Picture			
Part Name	Negative output cable of No.x battery tray	Positive output cable of No.x battery tray	Plastic cover
Part Number	#27 (#25, #23, #21, #19, #17, #15 step by step)	#26 (#24, #22, #20, #18, #16, #14 step by step)	#37
Part Quantity	1	1	8
Part Picture			

1. Install the #12, #27, and #26 power cables using a 13mm socket wrench with 30Nm torque according to the picture above.
2. Install the rest of the module sampling wire harness using the diagram of step 6 for reference.
3. Install the #13 (Module internal connection cable 2)
4. Cover the terminals of the module with the plastic cover.
5. This process will be repeated for each battery tray.

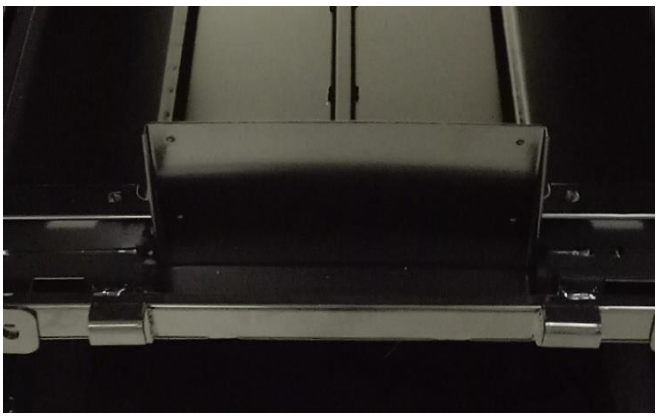




Note: The Module Sample Wiring will be placed on-top of the power cabling. Pay attention to polarity and insulation protection during installation.



10.4 Step 8 - Install CSC of battery tray



Note: The CSC number mark is on the right side of CSC

Install the CSC as follows:

Battery tray 01: BMU-01#-16S

Battery tray 02: BMU-02#-16S

Battery tray 03: BMU-03#-16S

Battery tray 04: BMU-04#-16S

Battery tray 05: BMU-05#-16S

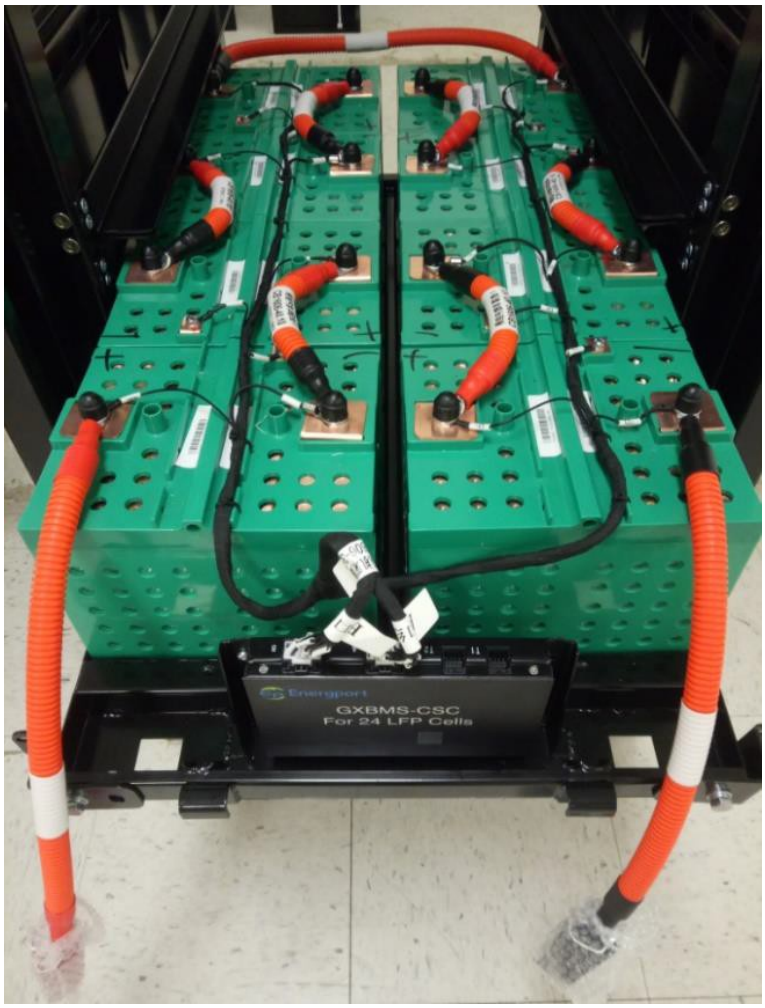
Battery tray 06: BMU-06#-16S

Battery tray 07: BMU-07#-16S

Part Name	CSC	M4*10 bolts
Part Number	#5	#32
Part Quantity	1	4
Part Picture		

1. Check the serial number of CSC, ensure the number is the same as the battery tray number.
2. Install the CSC using a Philips head screwdriver and M4*10 bolts. Make sure the Energport Logo and wiring ports of the CSC are oriented to face up.
3. Insert the module sampling wire harness (#11) into corresponding port A and B of CSC.
4. This process will be repeated for each battery tray.

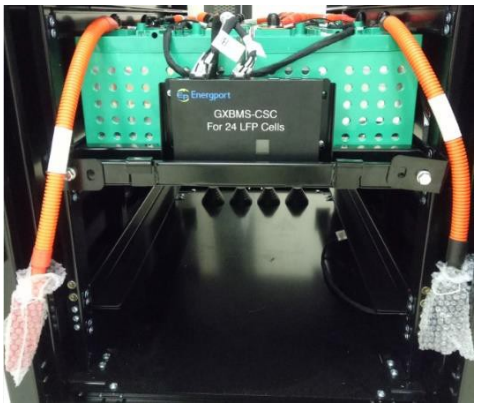
10.5 Step 9 - Test the battery tray unit



1. With a multimeter, test the voltage of the main positive and main negative terminal of the tray. The voltage range of should fall between 51Vdc and 53Vdc. If it does not, check the individual module voltages and polarity connections.
2. This process will be repeated for each battery tray.

⚠ **Caution! Pay special attention to not short terminals. Do not rest tools or other material on battery tray.**

10.6 Step 10 - Install battery tray into the cabinet



Part Name	Cabinet	Battery tray (with modules)	M5*12 combination bolts	Fireproof cotton
Part Number	#1	#2	#34	#41
Part Quantity	1	1	4	4
Part Picture				

1. Cover the top of the battery tray with the fireproof cotton sheet and tape down as indicated in the above picture.
2. Lift the battery tray #1 to the open slot that is second from the bottom of the cabinet. Push the battery tray into the cabinet.
3. Use an 8mm socket wrench with the M5*12 combination bolts to fasten the battery tray in the cabinet.
4. Repeat this process for each battery tray working from the bottom of the cabinet to the top.

Warning! Battery trays are extremely heavy. A mechanical material or battery lifting device is highly recommended to aid in placement of the battery trays.

Caution! Push battery tray into cabinet using lower metal portion of battery tray. Do not push on the CSC as this could bend the bracket.

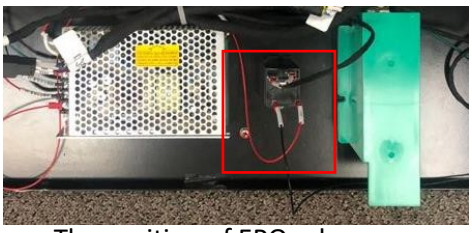
Caution! Ensure all cables are clear when sliding battery trays into cabinet.

11. Control Tray Installation

11.1 Step 11 - Main control tray inspection, EPO relay installation (If included)

Note: The following step may have been completed at the factory prior to shipping. Please review the instructions below in detail to determine if the step needs to be completed. If this step has been completed prior to receipt of the unit, please doublecheck the connections, and move to step 12.

Main control tray with EPO relay



The position of EPO relay

The position of EMS board

EPO cable
(#44 relay driver -)

EPO cable
(#44 relay driver +)

EPO cable
(#44 relayoutput)

1. Install the Emergency Power Off (EPO) relay with two #10-3/4" self-tapping screws according to the above picture using a drill driver.
2. Install the EPO cable (#44 relay driver-). Insert-type terminal connects to one pole of EPO relay coil. Pin-type terminal insert into Pin_5 (labeled Fault_Neg) of connector.
3. Install the EPO cable (#44 relay driver+). Insert-type terminal connects to another pole of EPO relay coil. U-type terminal connects to the 24V+ of AC/DC power.
4. Install the relay output cable; there is no need to distinguish polarity of EPO+ and EPO-

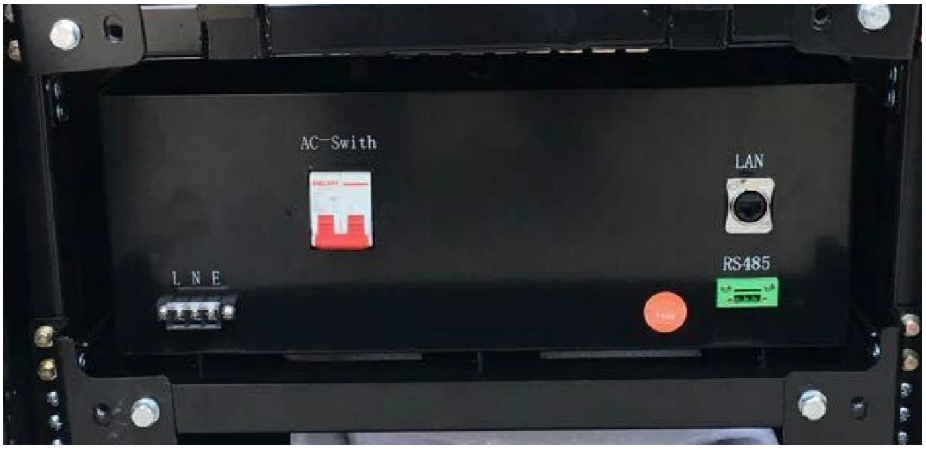
Tools:

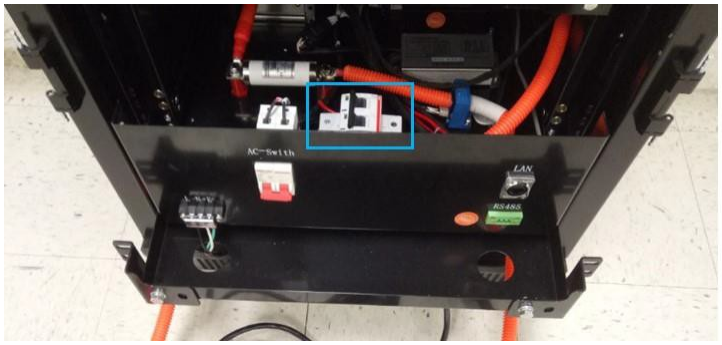
Electric drill, Phillips screwdriver, 8mm socket wrench

11.2 Step 12 - Install main control tray into the cabinet

1. Install the main control tray by sliding it into the bottom slot on the cabinet.
2. Connect the end port of #10 “wiring harness between CSC and main control tray” to “to slave port” of main control tray.
3. Leave main control tray positive, negative connector in the front (ensure that the DC-disconnect of main control is in open status).
4. Connect 120VAC cable of main control tray （Pin1: L, Pin2: N, Pin3: G）

Wiring Reference





L N E: AC power of battery system input.

AC-Switch: Used to control the input of battery system’s AC power. Power “on” when switch is up, power “off” when switch is down.

DC-Switch: Not visible from exterior. Accessible inside of control tray. Used to control the DC output of battery string.

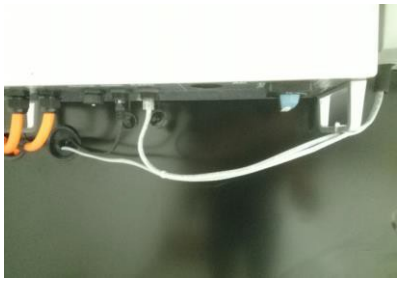
LAN: Ethernet communication interface of battery cabinet which connects to the router **RS-485:** RS485 communication interface of battery cabinet which used to communicate with PCS.

12. PCS Installation

12.1 Step 13 – Install PCS, AC Disconnect, and E-stop button

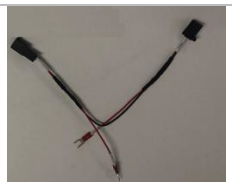







Part Name	PCS	DC-Switch (HV+)to PCS (+) cable	DC-Switch (HV-)to PCS (-) cable	Communication harness
Part Number	#7	#28	#29	#38
Part Quantity	1	1	1	1
Part Picture				

Part Name	AC Disconnect	Emergency stop switch (Optional)		
Part Number	#40	#42		
Part Quantity	1	1		
Part Picture				

Part Name	EPO cable (extension cable-1)	EPO cable (extension cable-2)	EPO cable (extension cable-3)	
Part Number	#44	#44	#44	
Part Quantity	1	1	1	
Part Picture				
Note	*Connect to the EPO relay of main control tray*	*Connect to emergency stop switch*	*Connect to R-EPO port of PCS*	

1. Hang the PCS on the PCS Mounting Bracket.
2. Optionally install the AC disconnect box on a nearby wall. (The PCS is already equipped with an AC disconnect on the bottom of the unit).
3. Optionally install #42 emergency stop switch. Emergency Stop Switch should face towards the front of the cabinet and be easily accessible.
4. Connect the #28 and #29 cables between PCS and DC-Disconnect of main control tray
5. Connect the #38 RS-485 communication harness between PCS and RS- 485 port of main control tray
6. If included, Connect the #44 EPO cables between PCS and EPO-relay of main control tray.

Wiring Reference

HV+: The positive input high voltage of PCS, and the positive output high voltage of battery cabinet.

HV-: The negative input high voltage of PCS, and the negative output high voltage of battery cabinet.

LAN: Ethernet communication interface of battery cabinet which is connected to the router.

RS-485: RS485 communication interface of PCS which used to communicate with battery cabinet.

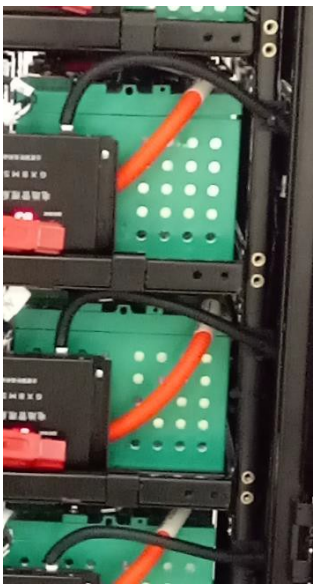
CAN: CAN communication interface of PCS which is reserved.

AC-Grid: Used to connected to grid.

Note: Reference CVP Emergency Battery Energy Storage System Operation and Maintenance Manual

13. Battery String Wiring

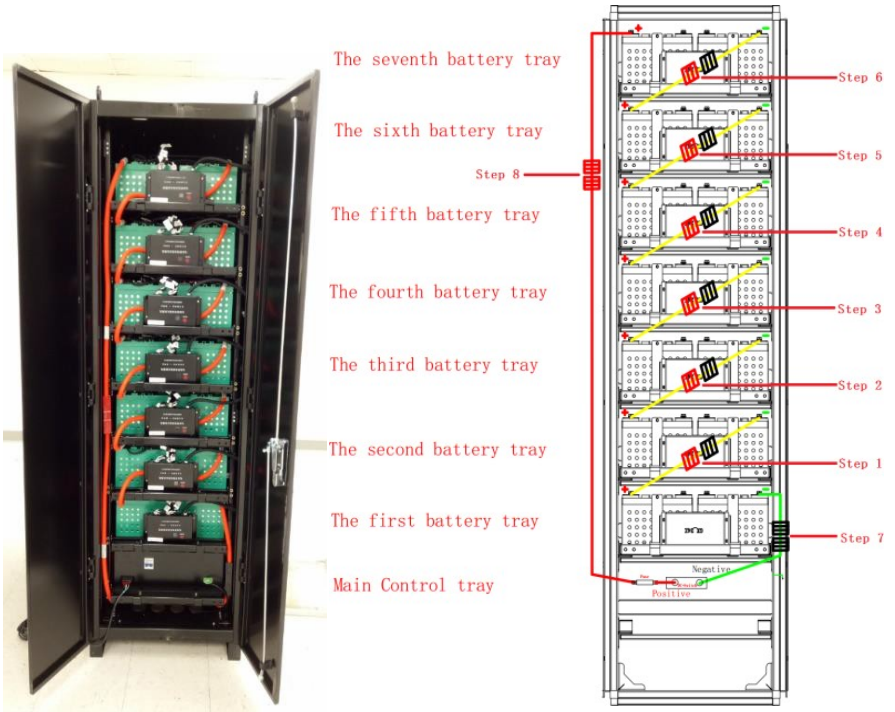
13.1 Step 14 - Install the communication wiring harness of CSC



Part Name	Communications wiring harness of CSC	Cable Strap
Part Number	#9	#35
Part Quantity	7	7
Part Picture		

1. Connect the #9 communication wiring harness between CSC (T1 port) and 10# wiring harness (Note: 10# is the wiring harness between CSC and main control tray). Utilize cable strap to secure.
2. Repeat for each battery tray.

13.2 Step 15 – Connect Battery Tray Power Cables



Caution!

DO NOTshort cables from the same tray.

1. Connect “Positive output of No.1 battery tray” to “Negative output of No.2 battery tray”
2. Connect “Positive output of No.2 battery tray” to “Negative output of No.3 battery tray”
3. Connect “Positive output of No.3 battery tray” to “Negative output of No.4 battery tray”
4. Connect “Positive output of No.4 battery tray” to “Negative output of No.5 battery tray”
5. Connect “Positive output of No.5 battery tray” to “Negative output of No.6 battery tray”
6. Connect “Positive output of No.6 battery tray” to “Negative output of No.7 battery tray”
7. Connect “Negative output of No.1 battery tray” to “Negative of main control tray”
8. Connect “Positive output of No.7 battery tray” to “Positive of main control tray”
9. Install the door by reversing process used in step 1.
10. Connect the bonding jumper of door grounding tabs.

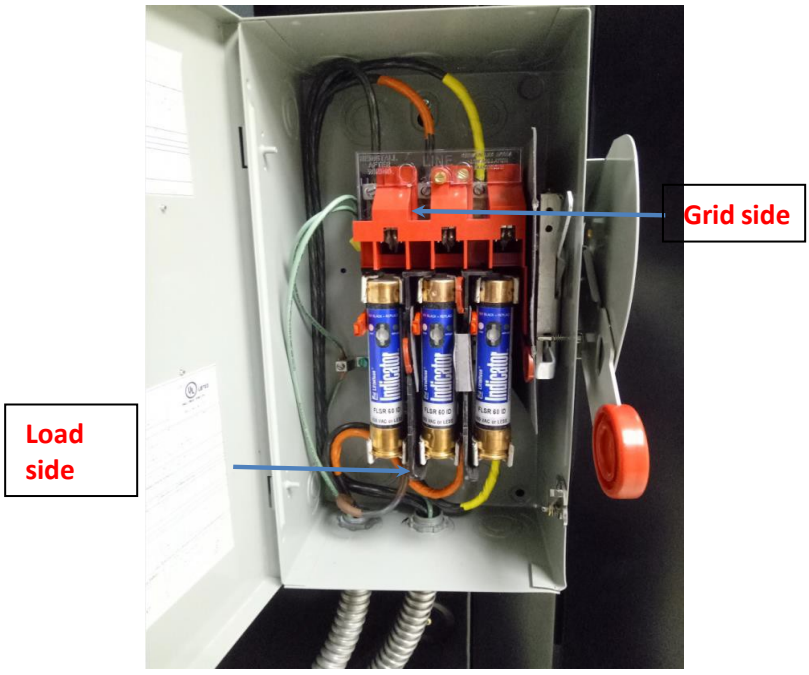
⚠ Warning! High Voltage. Perform steps in order.

13.3 Step 16 – Battery System Inspection

1. Check that all the parts have been installed in system
2. Use a multimeter to test the inside voltage of the DC-disconnect, check that the voltage is between 350~368V
3. Close the DC-disconnect and ensure the PCS is automatically powered on.
4. Open the DC-disconnect.

14. Connect AC Disconnect – change to make grid connection

14.1 Step 17 - Connect AC disconnect （optional）



1. Using a slotted screwdriver. Connect AC disconnect (load side) to PCS AC input.
2. Connect the grounding bar of cabinet to ground point of AC-Disconnect to protect grounding protection and enable the ground cable to connect reliably.
3. Connect 480VAC 3 phase from distribution panel to the AC disconnect (grid side)

Warning! High Voltage.

15. Install Labels

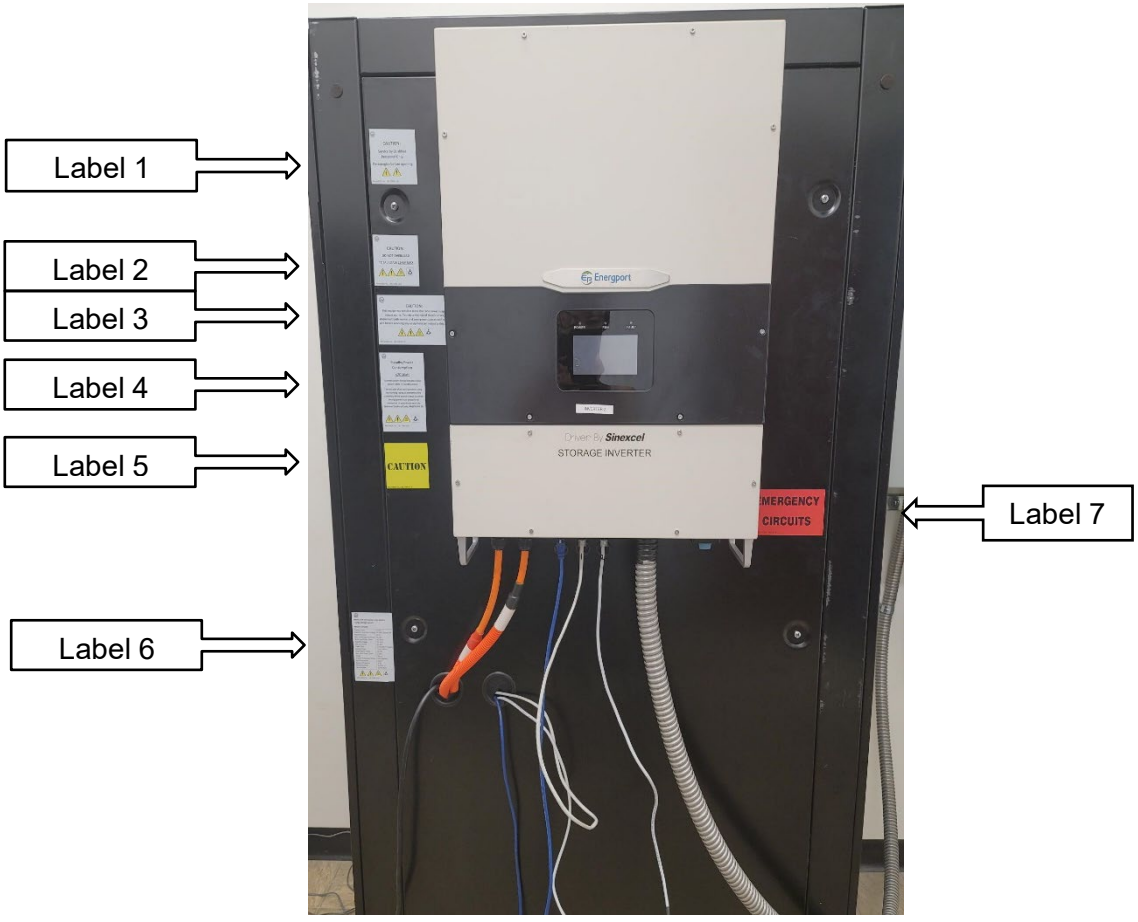
15.1 Label Markings

Labels are marked with the following safety symbols.

	Warning:	Indicates an electrical shock hazardous situation which, if not actively avoided could result in injury, death, or damage.
	Caution:	Indicates a hazardous situation which, if not actively avoided could result in damage to the equipment or performance degradation.
	Hot surface:	Indicates heat hazard or hot surface. Use caution to prevent burns.
	See Manual:	Indicates a reference to the Installation and Operation & Maintenance Manuals for more information.

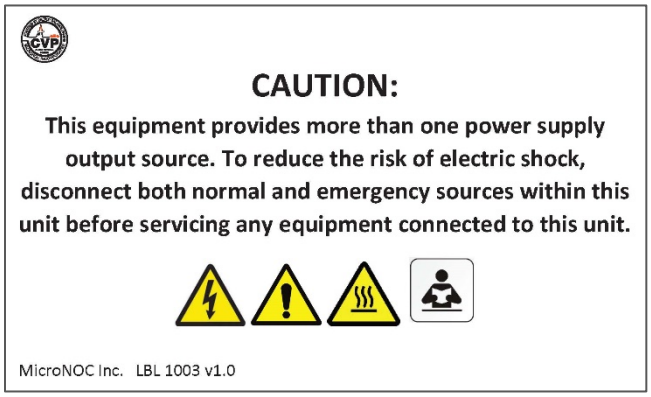
15.2 Step 18 - Label Placement

1. Install the labels on the cabinet side with the PCS as indicated below:



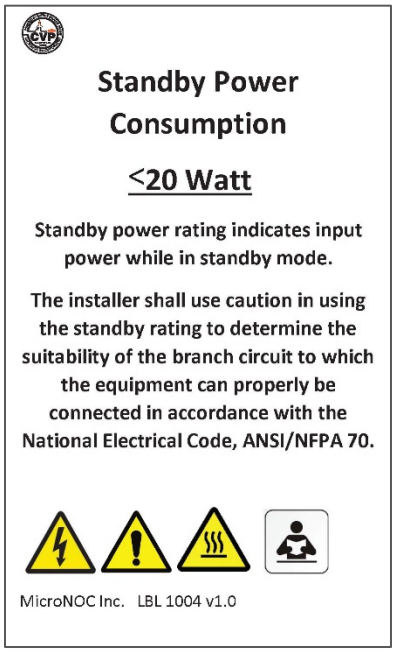
Label 1

Label 2

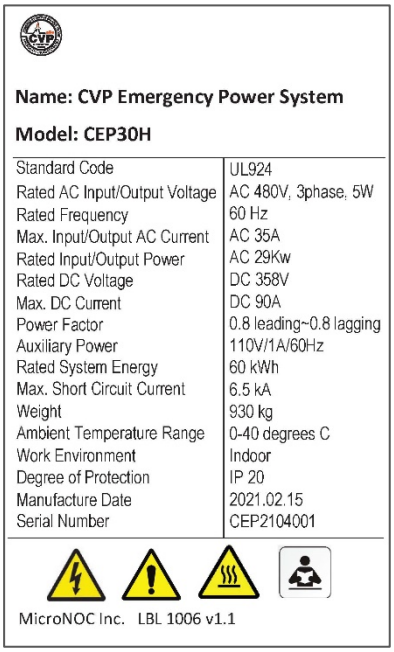


Label 3

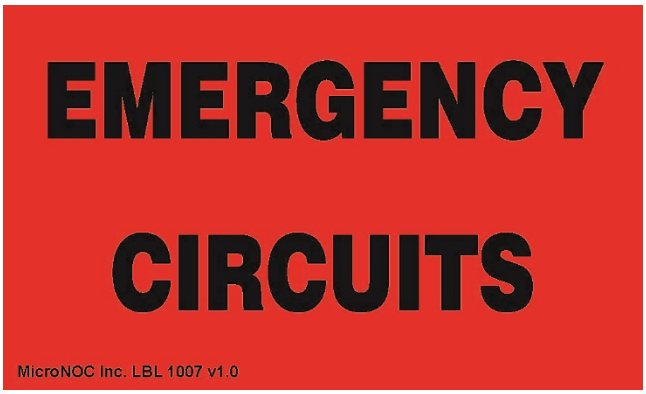
Label 5



Label 4

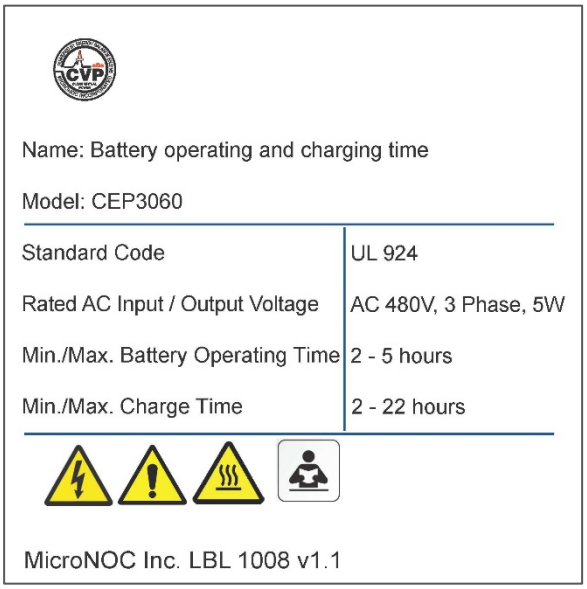


Label 6



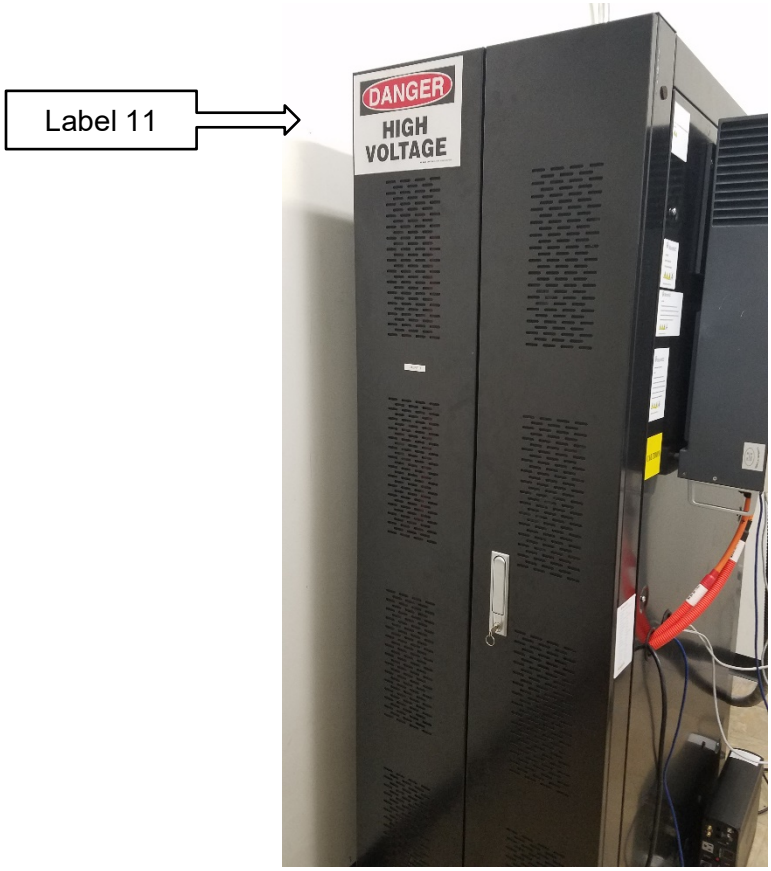
Label 7

2. Install Label LBL 1008 on the inside of the left front door



Label 8

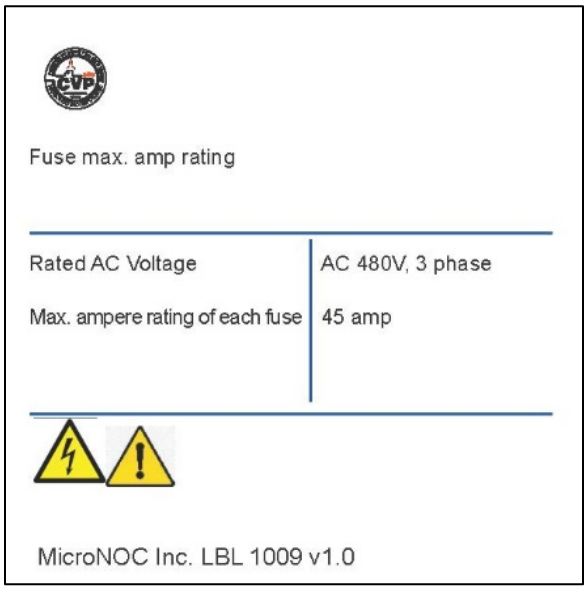
3. Install the Label 11 on near the top of the of the left front door.



Cabinet Front

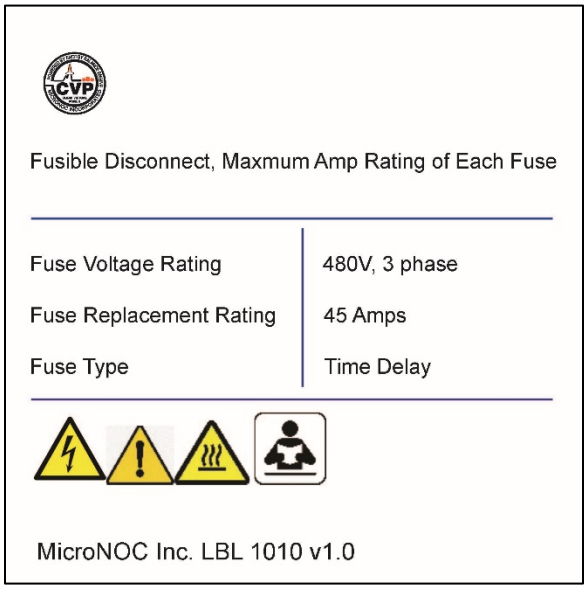
Label 11

4. Install the Label 9 on the front of the disconnect.



Label 9

5. Install the label on the inside of the disconnect.

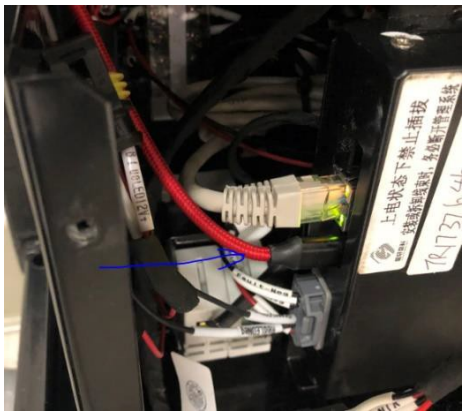


Label 10

16. Step 18 – Firmware Update （optional when needed）

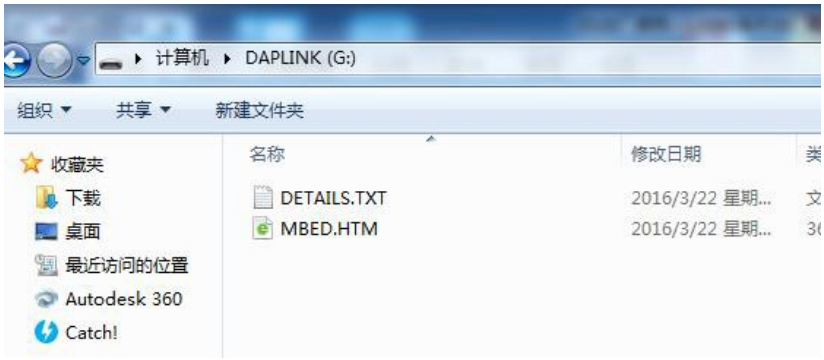
16.1 Step 18 – Firmware Update

1. Plug in micro USB cable to the EMS box.



1. Plug in the USB into a PC.
2. Once the USB device is detected, it shows as DAPLINK drive as shown below.

3. Copy the .bin firmware file into the DAPLINK drive. The EMS will reset once it is updated. Disconnect the USB cable and then turn off and on the AC switch on the main control tray.



17. Initial Startup and Troubleshooting

17.1 Switch Status Check

1. Make sure the DC-Switch on the main battery control tray is set to “off”.
2. Make sure the AC-Switch on the main battery control tray is set to “off”.
3. Make sure the AC-Switch on the PCS is set to ‘off.

Note: The DC-Switch is located inside of the main control tray. Users will need to slide out the main control tray by about 8 inches / 200mm from the cabinet to access the switch.

17.2 Connection Check

1. Prior to power on, check the connections of the system to ensure all are correct and there is no damage to any connector or wire.
2. Check the DC high voltage power output connection and make sure if it is correct.
3. Check the 120V AC connection and make sure it is right.
4. Check all the communication cable and plugs, and make sure all the connections are correct.

Note: User should supply 110~120VAC single phase grid power

17.3 System Power On

1. Close the AC-Switch of the main control tray of the battery cabinet. The EMS and BMS will power on.
2. Close the DC-Switch of main control tray, then it can output high DC-voltage to PCS.
3. Close the AC-Switch of the PCS, then PCS is on-grid.

Note: The DC-Switch is located inside of the main control tray. Users will need to slide out the main control tray by about 8 inches / 200mm from the cabinet to access the switch.

⚠ **Warning! While protected by an insulating cover, take caution when sliding out the main battery control tray and do not touch any bare power wires or busbar.**

17.4 Emergency Stop

In the process of charging or discharging of the system if any abnormal behavior is observed, press the emergency stop switch immediately and the system will be stopped.

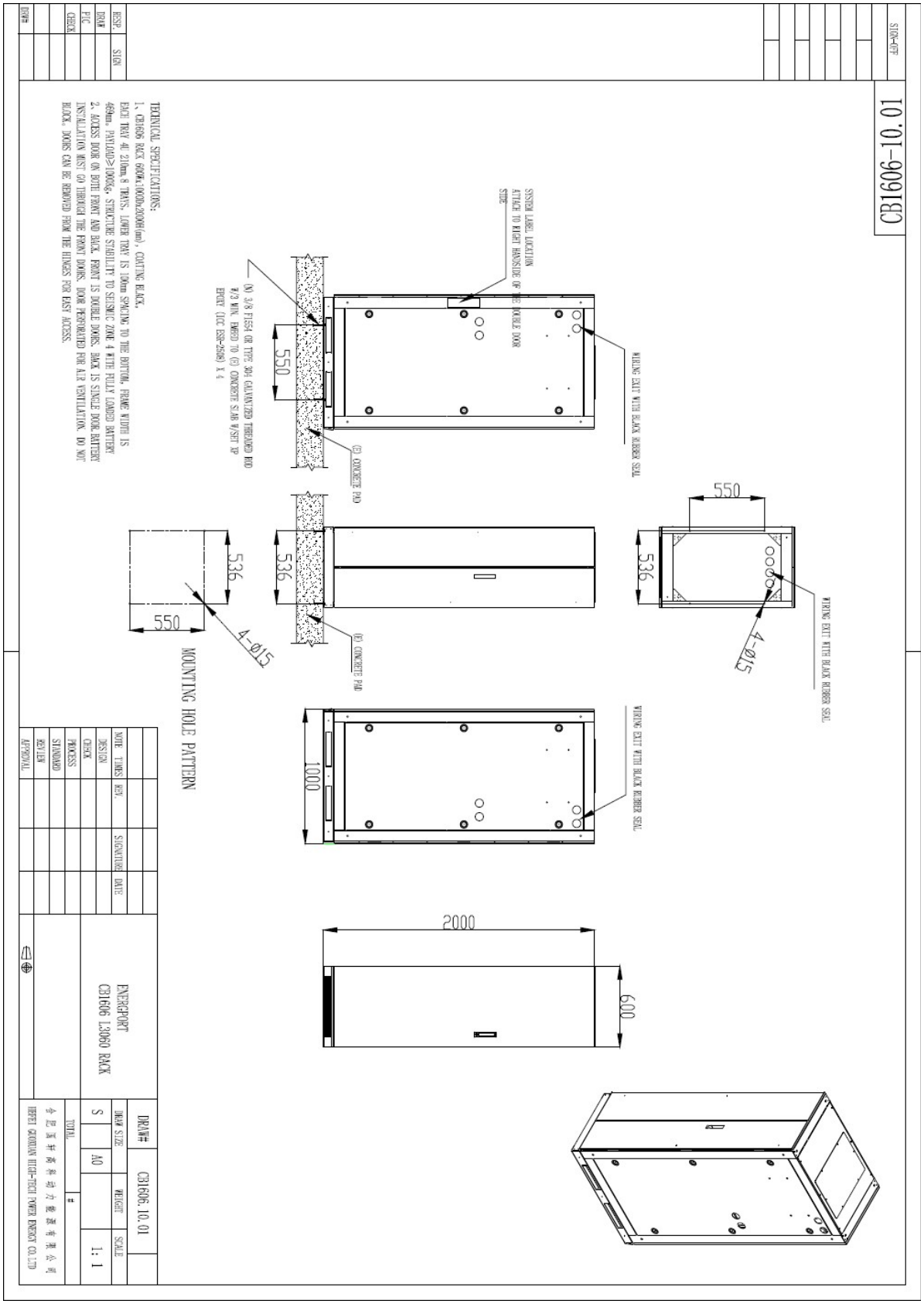
Note: Remember to reset the estop after activation

17.5 System Power Off

1. Turn the DC-Switch of the main control tray to “off”. This will cut off the high DC-Voltage output to the PCS.
2. Turn the main AC Switch of the PCS to off. The PCS is now off-grid.
3. Turn the AC-Switch of main control tray of the battery cabinet to off. The EMS and BMS will power off.

⚠ **Warning! While protected by an insulating cover, take caution when sliding out the main battery control tray and do not touch any bare power wires or busbar.**

Appendix A: Cabinet Mounting Drawing



Appendix B: Battery System Schematic