STACK SERIES

OWNER'S MANUAL

rubix
STORAGE SOLVED

A PRODUCT OF ARK BATTERY & MILLERTECH

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WHAT'S INCLUDED

BATTERY

WIRING COMPARTMENT COVER

PARALLELING BUSBARS (2)

PARALLELING NETWORK CABLE

TERMINAL COVERS

TOOLS NEEDED

The following tools are required for installing your battery bank:

- Crescent wrench or open end ½" wrench or socket
- Torque wrench
- Dc volt meter
- Utility razor knife

CAUTION

Always use caution when working with tools, especially tools with sharp edges!

UNPACKING YOUR BATTERY

Batteries may be packed with Styrofoam and/or cardboard. Before heading to a job site, confirm how many batteries are in the crate as quantities and crate sizes are subject to change without notice.

CAUTION

CAUTION: Battery should only be unpacked by qualified battery installers.

CAUTION: Do not penetrate, dump, or otherwise damage the battery box prior to the removal of the battery. Abusing the battery in this manner will void the warranty.

CAUTION: Do not store the battery in extreme temperature environments or in direct sunlight.

CAUTION: Do not touch the + or – terminals. High voltage may cause injury or death.

SAFETY & ENVIRONMENT

CAUTION

CAUTION: Do not short-circuit + and – terminals.

CAUTION: Do not reverse polarity when connecting charging/discharging equipment.

CAUTION: Do not install battery in an environment that is less than 32 degrees Fahrenheit or more than 120 degrees Fahrenheit.

CAUTION: Rubix Lithium batteries should only be installed in dry, climate-controlled areas. Washhouses, damp basements, dirty engine rooms, etc., are not suitable environments for lithium batteries.

CAUTION: Do not connect batteries in series. Only parallel connections are permitted.

CAUTION: Rubix Stack batteries should only be paralleled with other Rubix Stack batteries of the same model number. Do not parallel with other sizes, voltages or brands.

CAUTION: Batteries store electricity. Only qualified installers should work with Rubix batteries.

CAUTION: Always follow NEC guidelines to determine proper procedures, techniques, applicable accessories and sizing.

CAUTION: Never puncture, drop or shake Rubix batteries.

CAUTION: Never open a Rubix battery cover without the express permission of Rubix LLC or one of its authorized representatives.

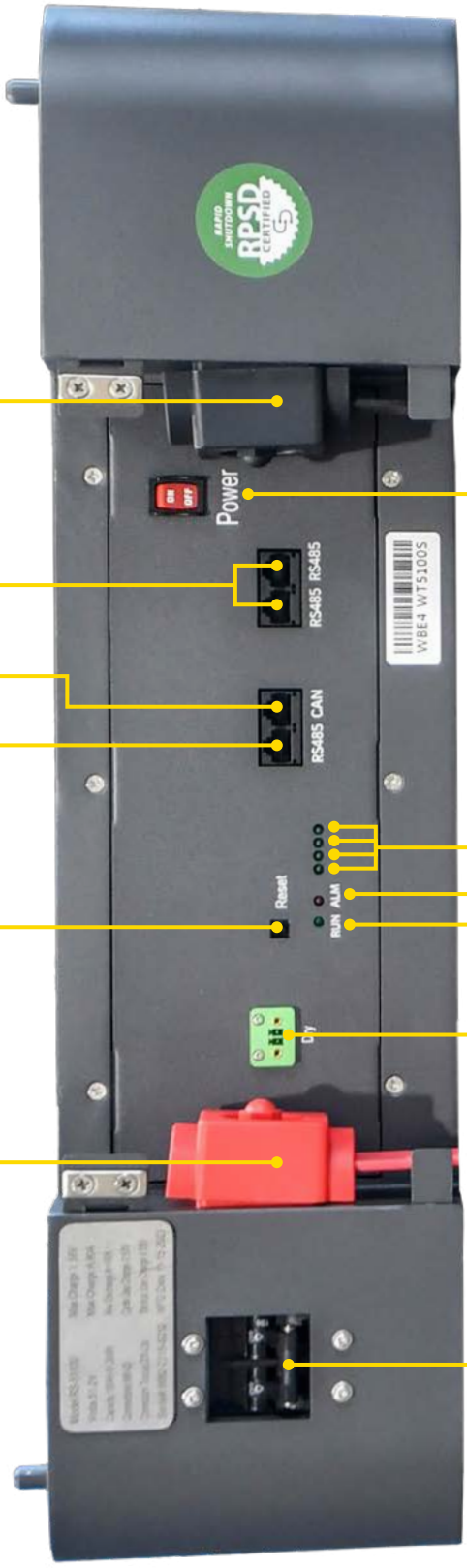
CAUTION: Rubix batteries are designed and built to be used with solar and/or backup energy storage systems only. Do not use Rubix batteries in mobile or marine applications without the express permission of Rubix LLC or one of its authorized representatives.

CAUTION: Do not orient Rubix Stack batteries in any position other than the intended horizontal position. Always use the Rubix Stack base unit to install batteries. Do not exceed the maximum stack height as outlined elsewhere in this manual.

CAUTION: Do not install or assemble/stack your batteries on uneven or sloped terrain.

CAUTION: Do not offer coffee to your battery for wake-up purposes. Coffee shall only be consumed by the installers and that in moderate amounts and temperatures.

WIRING COMPARTMENT GUIDE



NEGATIVE TERMINAL (WITH TERMINAL COVER ON)

POWER BUTTON

BATTERY DAISY-CHAINING (RS485 NETWORKING)

CANBUS PORT

RS485 COMPUTER CONNECTION

BATTERY SOC LIGHTS

BATTERY ALARM LIGHT

RESET BUTTON

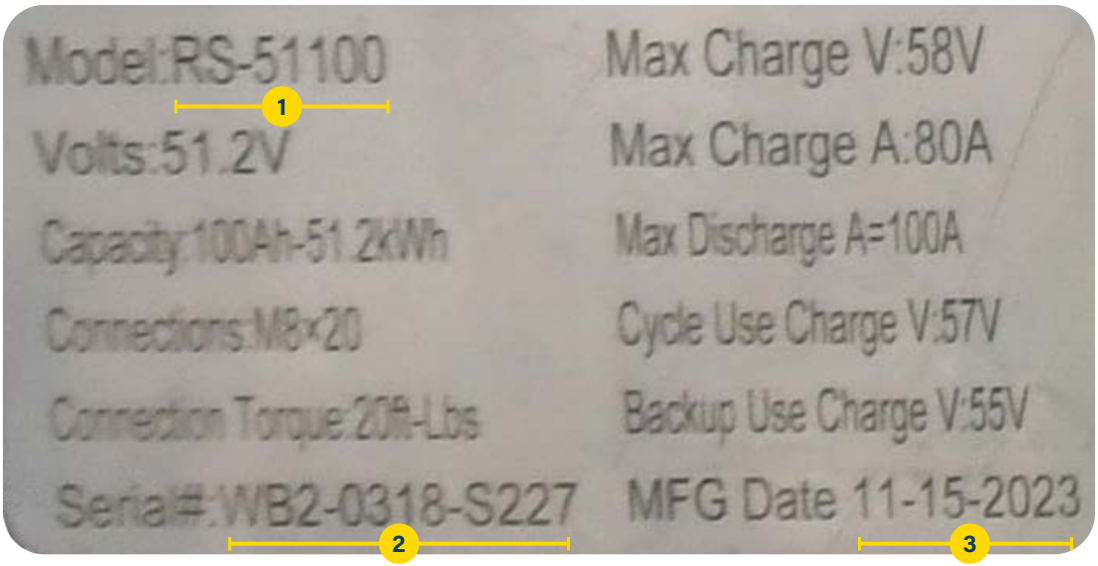
BATTERY RUN LIGHT

RAPID SHUTDOWN TERMINALS

POSITIVE TERMINAL (WITH TERMINAL COVER ON)

BREAKER

BATTERY IDENTIFICATION



1. **MODEL NUMBER**
2. **SERIAL NUMBER**
3. **PRODUCTION DATE**

LCD GUIDE

IMAGE 1 SHOWS THE MAIN MENU.

LCD GUIDE

IMAGE 2

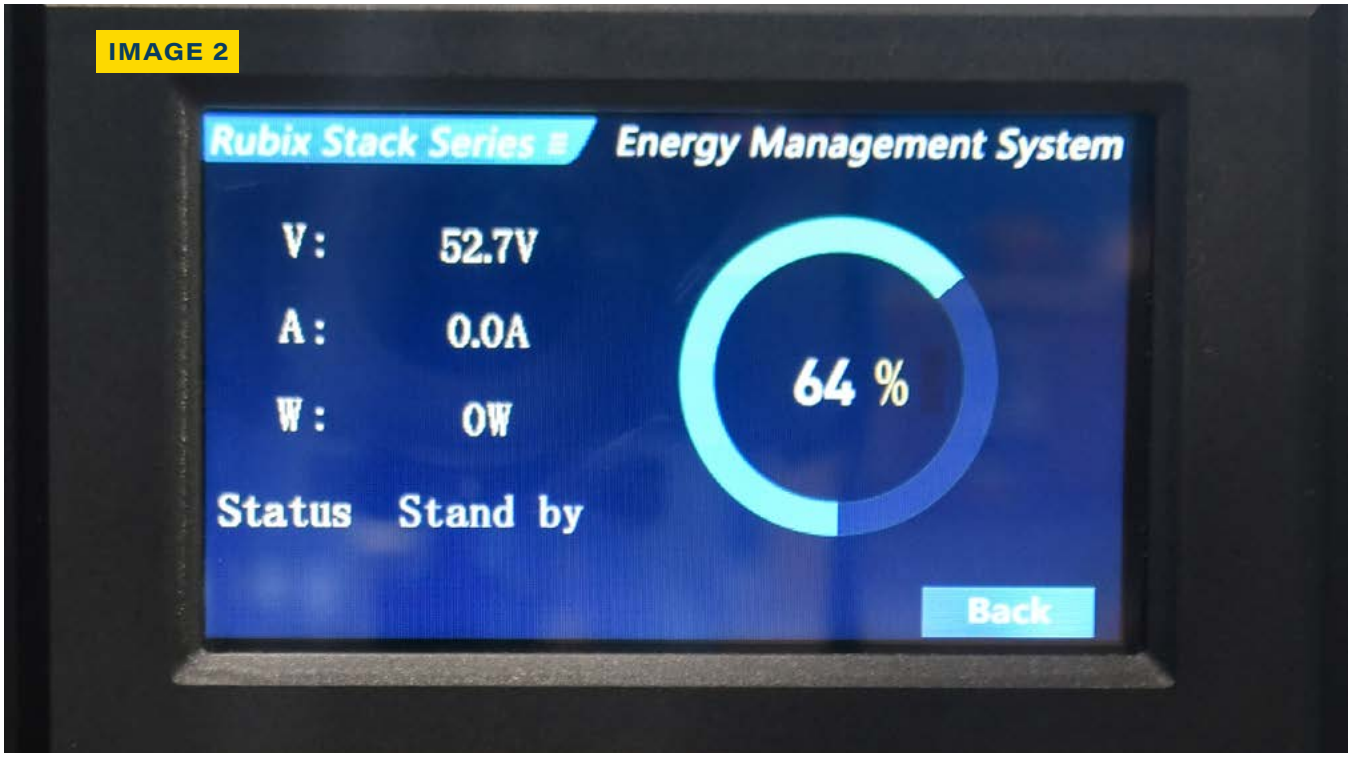
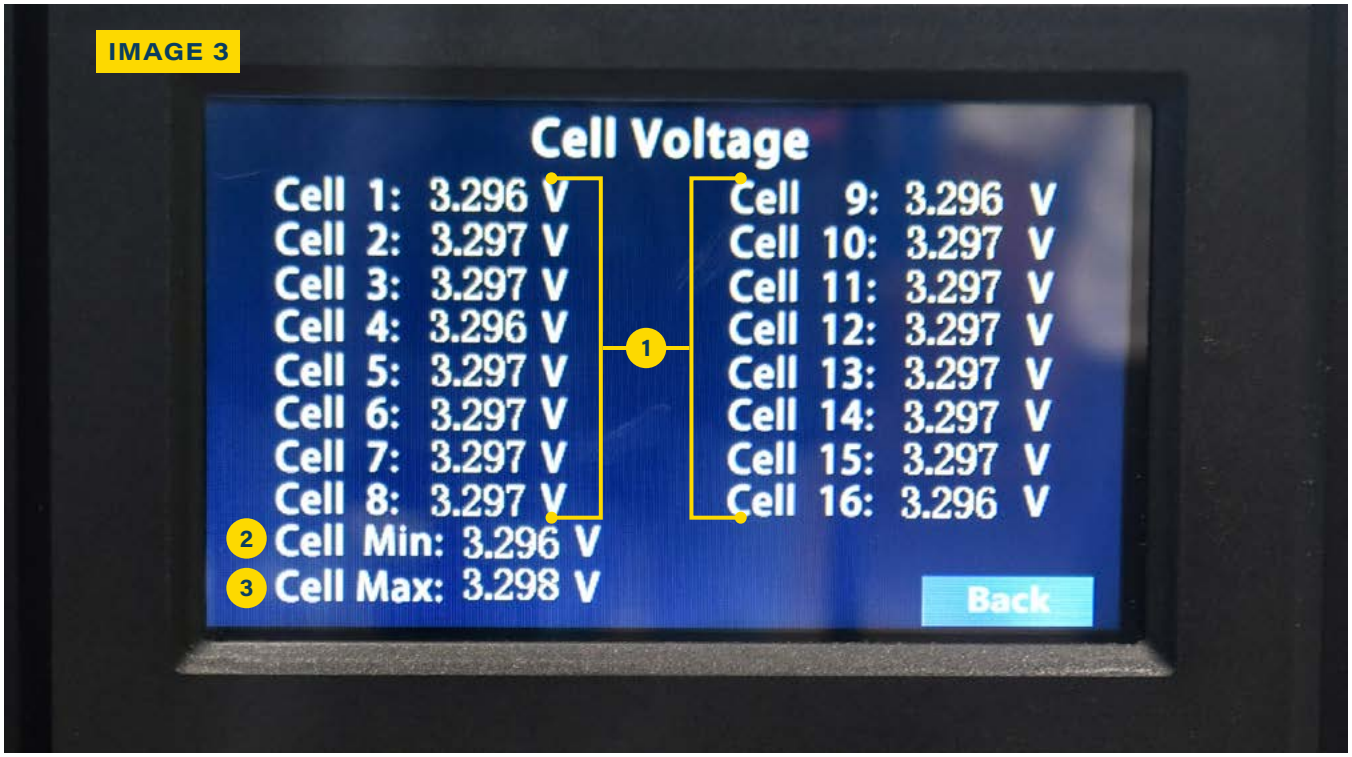


IMAGE 2 SHOWS THE HOME PAGE.

LCD GUIDE



1. SHOWS EACH INDIVIDUAL CELL'S VOLTAGE.
2. SHOWS THE MINIMUM VOLTAGE OF ALL CELLS.
3. SHOWS THE MAXIMUM VOLTAGE OF ALL CELLS.

LCD GUIDE

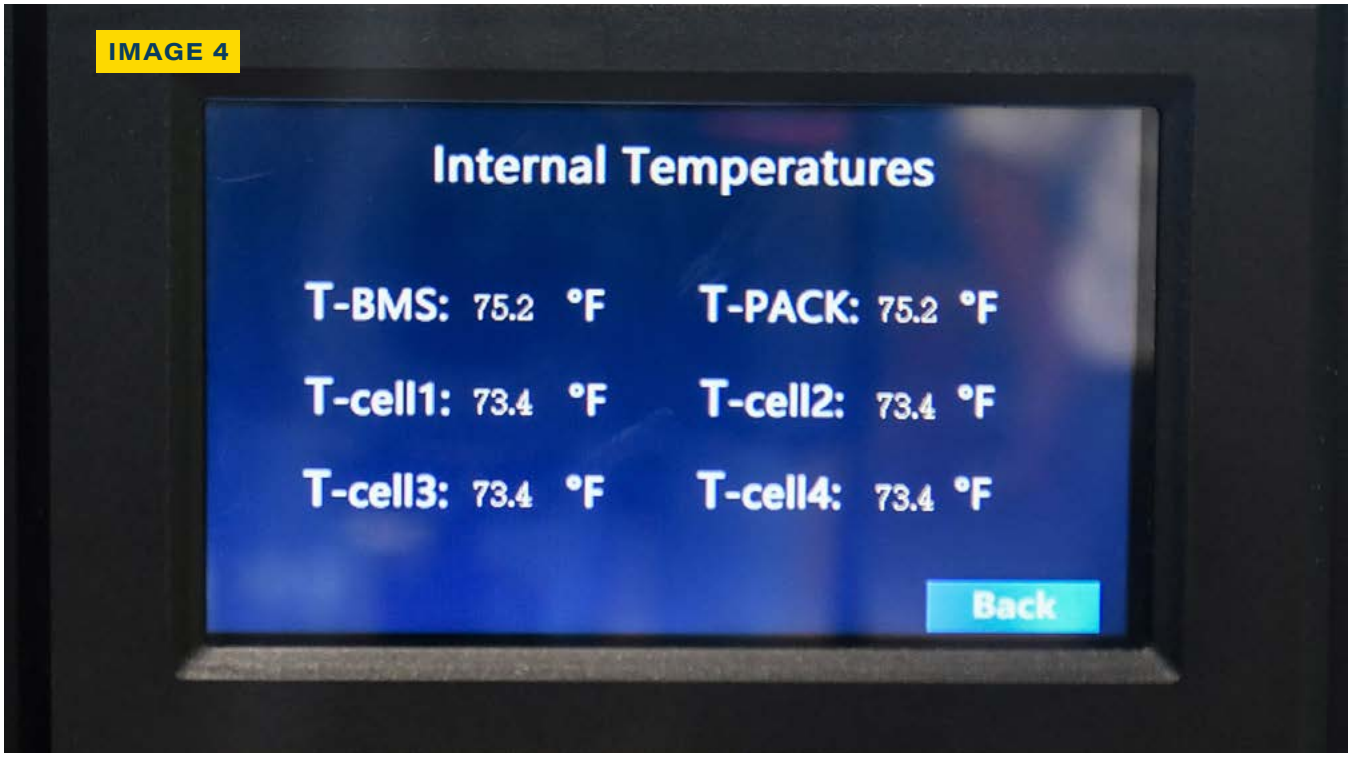


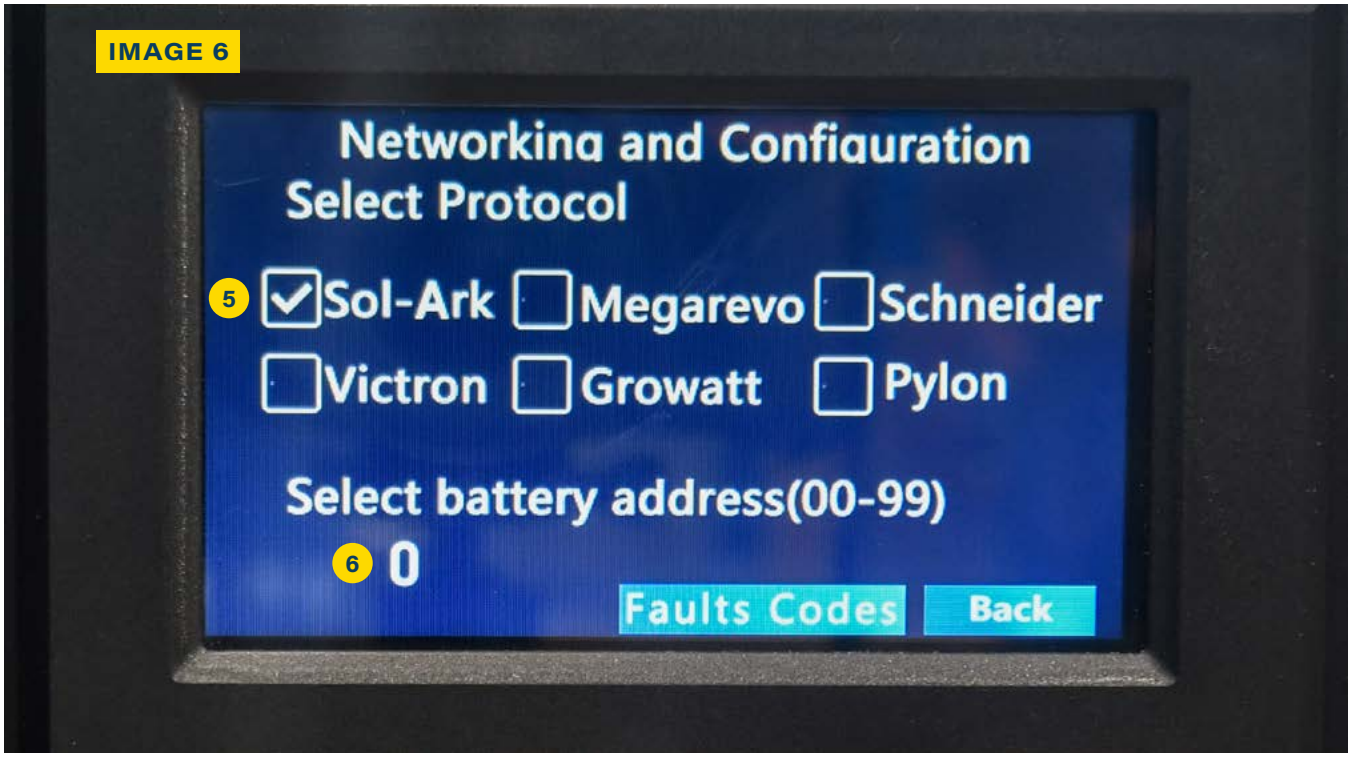
IMAGE 4 SHOWS THE TEMPERATURES.

LCD GUIDE

IMAGE 5

4 ENTER YOUR PASSWORD HERE.

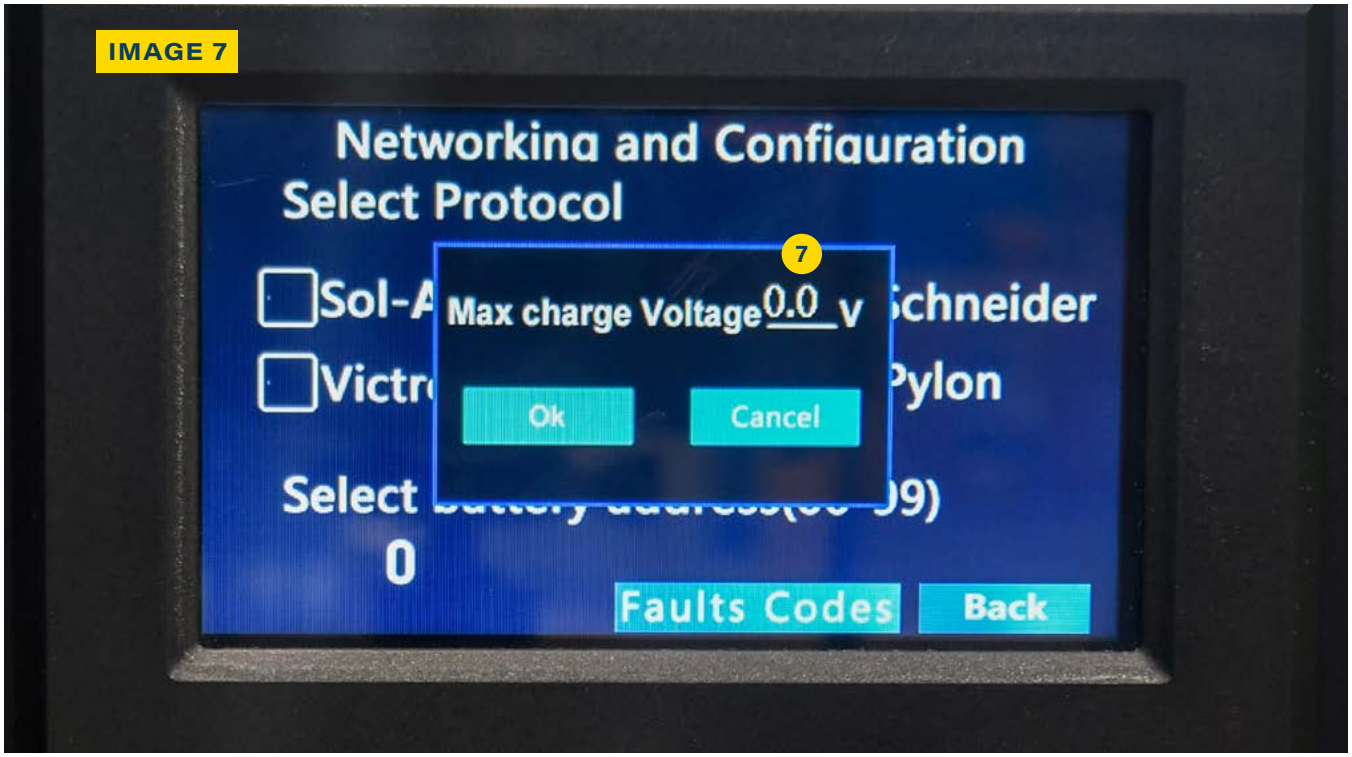
LCD GUIDE



5 **SELECT YOUR INVERTER HERE.**

6 **SELECT YOUR BATTERY ID HERE.**

LCD GUIDE



7 ADJUST YOUR CHARGE VOLTAGE THEN PRESS OK.

LCD GUIDE

IMAGE 8

8 EACH TIME A FAULT IS DETECTED THE NUMBER WILL INCREASE.

INSTALLATION: SECTION A

SECTION A:
STACKING BATTERIES

Rubix Stack batteries are designed to stack on top of each other. Follow this sequence to stack your batteries.

1. Position the base unit in the proximity of the battery bank's long term position.
2. Lock all 4 casters on the base unit using the swivels that raise or lower the brake pads.
3. Stack the first battery onto the base unit.
4. Stack additional batteries on top of the first battery ensuring that the slots on the bottom of the battery slide over the posts of the battery below it. Properly installed, there should be no gap between stacked batteries.
5. Once the batteries are stacked, and all networking and cabling is completed, Unlock the casters and move the batteries to their correct and permanent position. Relock the casters so that the batteries will not move when accidentally bumped or pushed.

BATTERY SPACING AND CLEARANCES

Rubix Battery recommends the following clearances for all battery installations (see spec sheet)

- Minimum spacing between batteries and wall: **3 inches**
- Minimum spacing between parallel battery stacks: **4 inches**
- Minimum spacing between top of battery stack and solar equipment on wall: **6 inches**

INSTALLATION: SECTION B

SECTION B:

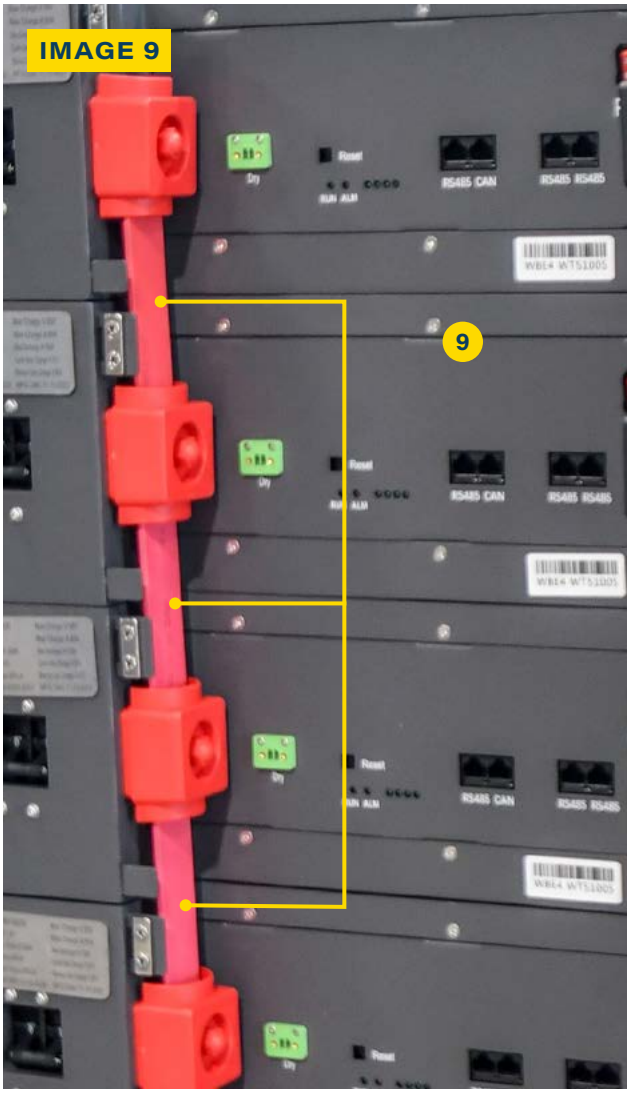
CABLING/PARALLELING

All Rubix batteries should be paralleled (positive to positive and negative to negative)

Never connect lithium batteries in series unless the manufacturer allows it.

See image 9.

1. Use the included busbars to parallel all batteries in the stack. See torque specs on page 25. Ensure that there are no washers between busbars or between busbars and battery terminals. Washers do not conduct current as well as busbar and terminal surfaces!
2. After all busbars are installed, install inverter cables cadre corner (positive on bottom battery, negative on top battery or vice versa). Cables can be brought in through the base unit and/or through the lid. Both the base and lid have 4 entry holes that are closed with a rubber punch-in. Use a knife to cut a small slit in the middle of the rubber punch-in and then push your cable through. The rubber is flexible enough to accommodate most common cable sizes while still keeping the rest of the hole sealed. It is not necessary that all cables are the same length as long as they are sized per NEC guidelines.
3. When paralleling multiple stacks, observe the following guidelines:
   - Maintain 4 inches or more between paralleled stacks.
   - Size paralleling (stack to stack) cables per NEC guidelines.
   - Ensure that paralleling cables are sufficiently protected from sharp edges.



9 PARALLEL BATTERY BUSBARS.

INSTALLATION: SECTION C

SECTION C:
NETWORKING GUIDE

Many of the networking settings in Rubix Stack batteries are password protected. The password is 7777. Do not share it with people who are unauthorized to work on or program the battery. The password is not required for general monitoring purposes.

Rubix Stack batteries communicate with various leading brand inverters. As of May 2024, only communications with Sol-Ark are fully tested. Communicating with other inverter protocols is not supported without express permission from Rubix LLC or one of its authorized representatives.

PARALLEL NETWORKING:

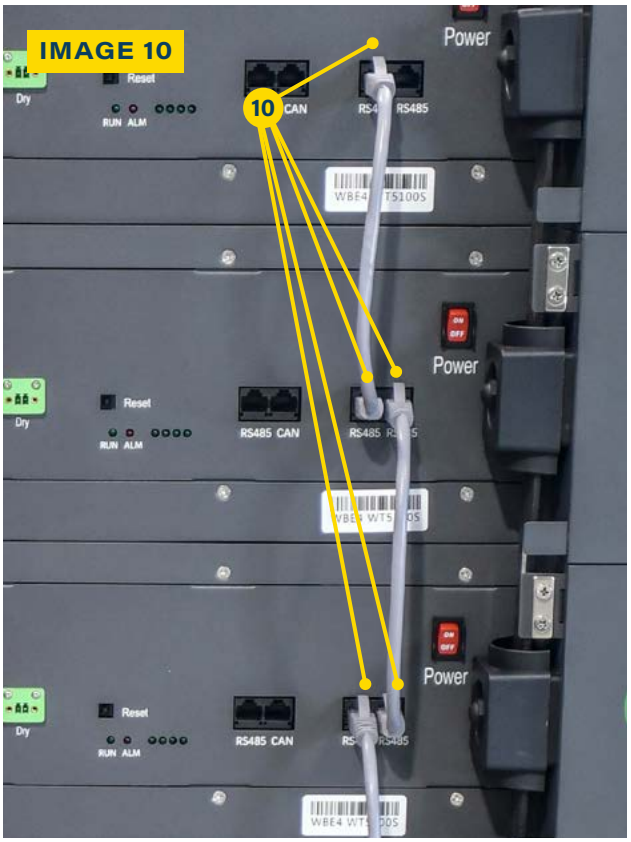
- To communicate with inverters, all batteries in the bank should be parallel networked using the included network cables.
- Daisy chain each battery from the RS485-2 ports. It does not matter which port you use. No termination is needed at the last battery in the chain. When paralleling multiple stacks, use a standard Ethernet cable (not included) to daisy chain from stack to stack. *See image 10.*

BATTERY ADDRESS:

- Each battery in the bank should be assigned a unique address. Set the master battery (that is, the battery that will be communicating with the inverter) as 00. The second battery can be set as 01, the third battery as 02 and so forth.

NOTE

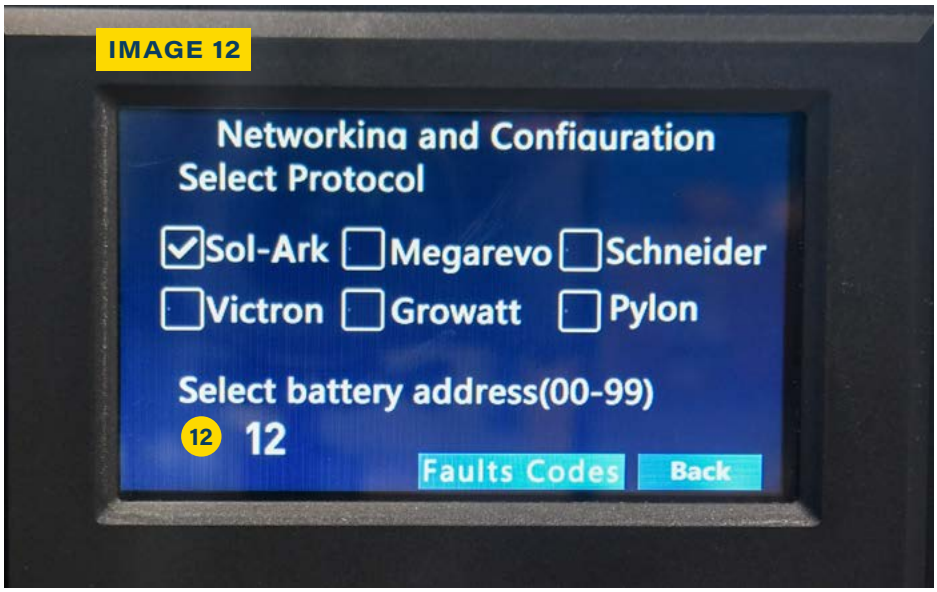
Section C is recommended for open and closed loop applications.



10 USE INCLUDED NETWORK CABLES TO DAISY CHAIN BATTERIES FROM RS485-2 PORTS.

INSTALLATION: SECTION C

11 SELECT BATTERY ADDRESS.



12 BATTERY ADDRESS: USE A DIFFERENT ADDRESS FOR EACH BATTERY. MASTER BATTERY SHOULD BE SET TO 00.

INSTALLATION: SECTION D

SECTION D:

COMMUNICATION WITH INVERTERS

After assigning each battery a unique address number, connect a standard Ethernet cable (included with base and lid kit) from the CAN port of the master battery (the battery with the address set at 00) to the CAN or CANBUS port on the inverter.

See image 13.

INSTALLATION: SECTION E

SECTION E:

ADJUSTING CHARGE VOLTAGES (CLOSED LOOP COMM APPLICATIONS ONLY)

Rubix Stack batteries have a unique feature called multiway closed loop comm that allows flexible charge voltages when batteries are communicating with inverters. The maximum range is 55.0V–57.6V.

Many inverters only allow a single voltage value in closed loop communication. This means EQ, Absorb and Float will all show the same value. This creates challenges when trying to find a happy medium of fully charging batteries yet not 'floating' at a high voltage. We recommend the following:

24/7 GRID CONNECTION AND/OR BACKUP ONLY:

- Set the communicating voltage to **56.0V +/- 0.2V**

SOLAR, GEN, OR OTHER CHARGING SOURCES THAT ONLY PERIODICALLY FULLY CHARGE THE BATTERY BANK:

- Set the communication voltage to **56.4V–57.0V**

NOTE

This setting WILL NOT set or limit charge voltages in open loop applications! Open loop applications require that settings be made on your charging/discharging equipment, not on the batteries.

14 ADJUSTING CHARGE VOLTAGE.

INSTALLATION: SECTION F

SECTION F:

OPEN LOOP INSTALLATIONS

Rubix Stack batteries can be installed in open loop applications. In many cases, this is preferred and allows the installer greater flexibility with settings.

The term 'Open Loop' simply denotes that there is no communication between the battery bank and the inverter(s). Open loop can be used even with inverters that support closed loop communication.

Tips for installing Open Loop systems:

1. Ensure that all charging and discharging parameters are programmed on your inverter, charge controller, or other equipment related to the system.
2. Install the daisy chain cables and set a unique address to each battery.
3. Double check that charging and discharging currents are limited as needed for systems with smaller battery banks.

CLOSED LOOP COMM WITH SOL-ARK

When communicating with a Sol-Ark inverter, follow this sequence:

1. Connect the CANBUS cable from the battery's CANBUS port to the Sol-Ark CANBUS port. *(See image 15)*
2. Navigate to Sol-Ark's Battery Setup page and set the parameters as outlined in the image on the next page. (*See image 16*)
3. The battery will auto populate the following on the Sol-Ark inverter:
   - SOC %
   - Battery capacity
   - Charge voltages

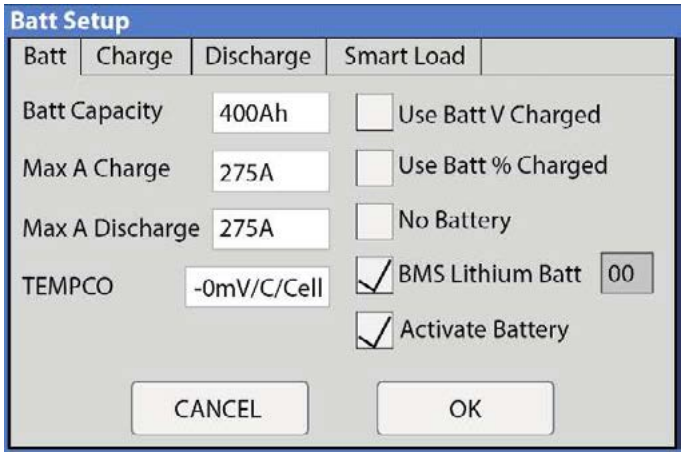
   The battery will NOT auto populate the following on the Sol-Ark inverter:
   - AC coupling
   - Peak shaving
   - Auto start settings
   - Low battery shutdown and restart
   - Max charge/discharge amps

IMAGE 15

23 **CANBUS PORT ON SOL-ARK INVERTER.**

CLOSED LOOP COMM WITH SOL-ARK

IMAGE 16



RAPID SHUTDOWN

Rubix Stack batteries are equipped with a Rapid Shutdown feature.

See image 17.

To use Rapid Shutdown:

1. Using the included connector connect the two terminals to shut down the batteries.
2. There is no need to daisy chain all the batteries from your stack. Always use the battery with the ID 00. This will automatically shut down your whole stack of batteries.
3. There is a 15 sec delay on RPSD to prevent any nuisance shut downs.
4. After any RPSD event the batteries will need to be power cycled to restart.

17 RAPID SHUTDOWN TERMINALS.

GENERAL SPECIFICATIONS

	RS51100(48V100AH)	RS25200(24V200AH)
MODEL		
ENERGY RATING	51.2V 100AH (5.12KWH)	25.6V 200AH (5.12KWH)
ENERGY SCALABILITY	32 × PARALLEL (163.84KWH)	32 × PARALLEL (163.84KWH)
CHARGING/DISCHARGING		
MAX CONTINUOUS DISCHARGE POWER	90A (4.6KW)	180A (4.6KW)
RECOMMENDED DISCHARGE POWER	75A (3.84KW)	150A (3.84KW)
PEAK DISCHARGE POWER (3SEC)	200A (10.2KW)	400A (20.4KW)
MAX CONTINUOUS CHARGING POWER	70A (3.58KW)	140A (3.58KW)
PEAK CHARGING POWER (30MIN)	80A (4KW)	160A (4KW)
RECOMMENDED ABSORB VOLTS	56.8V	28.4V
MAX ABSORB VOLTS (SOLAR ONLY)	57.6V	28.8V
ABSORB DONE AMPS (PER BATTERY)	5A	5A
ABSORB DONE TIME	10MIN	10MIN
FLOAT VOLTAGE	54.4V	27.2V
TEMP COMP—MV DEGREES CELSIUS	0	0
MAX RECOMMENDED DISCHARGE	51V (20%)	25.5V (20%)
INVERTER LOW BATTERY CUTOUT	48V	24V
LOW VOLTS CUTOUT WAKEUP	44V	22V
HIGH VOLTS CUTOUT WAKEUP	55V	27.5V
INSTALLATION REQUIREMENTS		
VENTILATION REQUIRED	NO	NO
MINIMUM ENVIRONMENT TEMP	32 °F	32 °F
MAXIMUM ENVIRONMENT TEMP	120 °F	120 °F

GENERAL SPECIFICATIONS

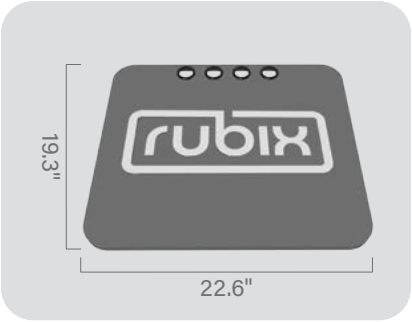
	RS51100(48V100AH)	RS25200(24V200AH)
IP RATING	IP50	IP50
OUTDOOR RATED	NO	NO
INSTALLATION POSITION	HORIZONTAL WITH BASE UNIT ONLY	
MAXIMUM BATTERIES PER STACK	6	6
TERMINAL SPECS		
M8 STAINLESS STEEL	BOLT-ON	BOLT-ON
MAX TERMINAL TORQUE	20FT-LBS	20FT-LBS
CYCLE LIFE RATING		
RATED LIFE CYCLE (100% DOD)	3,000 CYCLES	3,000 CYCLES
RATED LIFE CYCLE (80% DOD)	4,500 CYCLES	4,500 CYCLES
RATED LIFE CYCLE (50% DOD)	7,000 CYCLES	7,000 CYCLES
RETAINED CAPACITY AT END OF CYCLE LIFE	80%	80%
BREAKER CURRENT RATING	150A	250A
BMS LOW VOLTAGE DISCONNECT	41 +/-1V	20.5 +/-1V
BMS HIGH VOLTAGE DISCONNECT	59 +/-1V	29.5 +/-1V
BMS LOW TEMP CHARGING DISCONNECT	32 °F	32 °F
BMS LOW DISCHARGING DISCONNECT	-0 °F	-0 °F
BMS HIGH TEMP DISCONNECT	135 °F	135 °F
PRESSURE VENTED CELLS	YES	YES
RAPID SHUT DOWN FUNCTION (RPSD)	YES	YES
CERTIFICATIONS		
BATTERY CERTIFICATION	UL 9540A	——
TRANSPORT	UN 38.3	UN 38.3

GENERAL SPECIFICATIONS

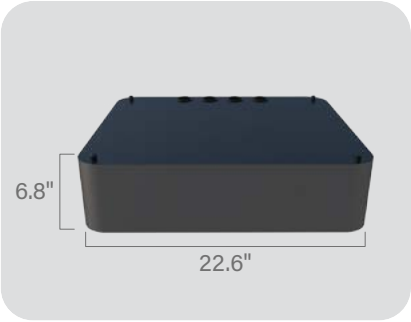
	RS51100(48V100AH)	RS25200(24V200AH)
INTERNAL COMPONENTS		
CELL CHEMISTRY	LIFEP04	LIFEP04
CELL FORMAT	PRISMATIC	PRISMATIC
BALANCING TYPE	IMPACTIVE	IMPACTIVE
MAX BALANCING CURRENT	1.1A	1.1A
CELL CONNECTION	WELDED BUSBAR	WELDED BUSBAR
TOUCHSCREEN LCD FEATURES		
STATE-OF-CHARGE	✓	✓
PACK VOLTAGE	✓	✓
CHARGING/DISCHARING CURRENT	✓	✓
INDIVIDUAL CELL VOLTAGE	✓	✓
FAULT LOGGING	✓	✓
INVERTER COM. SELECTION	✓	✓
PHYSICAL DIMENSIONS		
BATTERY	22.6" × 19.3" × 6.2"	22.6" × 19.3" × 6.2"
BASE	22.6" × 19.3" × 6.8"	22.6" × 9.3" × 6.8"
LID	22.6" × 19.3" × 0.8"	22.6" × 19.3" × 0.8"
WEIGHT		
BATTERY	108 LB	108 LB
BASE	42 LB	42 LB
LID	20.9 LB	20.9 LB

GENERAL SPECIFICATIONS

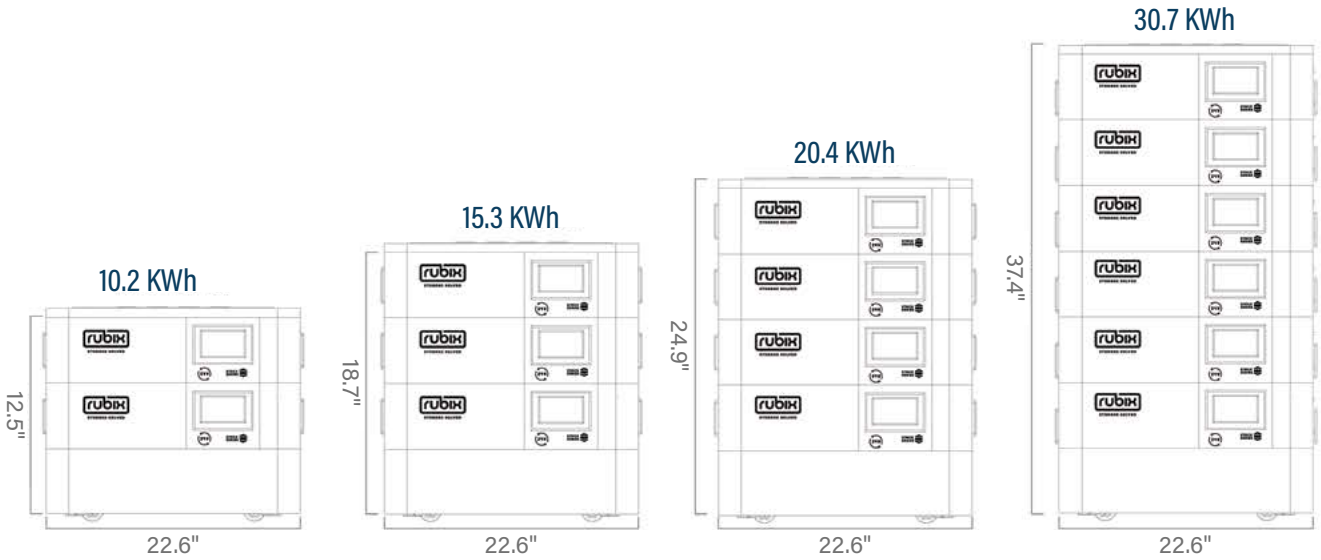
48V100Ah/24V200Ah
(Internal View)



48V100Ah/24V200Ah
(Lid Sizes)



48V100Ah/24V200Ah
(Base Sizes)



24V Battery

48V Battery

Individual Battery Modules

rubix

STORAGE SOLVED

MISSION

To deliver exceptional solar battery systems through practical, hands-on development, excellent service, and strong partnerships with the industry's professionals. Rubix: Built by installers, for installers.

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