

Z-RANGE 48V INSTALLATION MANUAL



Contents

Contents of the Box	4							
Handling the Battery	4							
Ports used During Operation of the Battery								
Stacking	5							
Wiring	6							
DC Connections	6							
Communication	7							
Master Configuration	9							
Battery Parameters	9							
Startup Procedure	10							
Restart Procedure	11							

DO NOT INSTALL THE BATTERY BEFORE THOROUGHLY READING THE USER MANUAL

Contents of the Box

Inside each box is the 5.14 kWh battery (51.2 V_{nom} , 100 A capacity), negative and a positive DC cable with amphenol connectors (battery side) and M8 lugs (inverter / DC busbar side). Each box also contains a pin-to-pin CAT cable for communication to either the inverter or between the battery units.

Handling the Battery

Work on the battery should be carried out by qualified personnel only. Please use the provided handles to lift and move the battery. Please handle the battery with care as the battery is sensitive to mechanical shock.

Ports used During Operation of the Battery

Figure 1 shows the ports that are used during the operation of the battery. Please pay close attention to which ports are used and connected during operation. The Figure should be read in conjunction with Table 1.



Figure 1: Z-Range Battery Module

Table 1: Ports and switches used during operation of the Z-Range

No	Instructions	No	Instructions
1	Negative DC post #1	9	Address dial switch
2	Negative DC post #2	10	RS232 port
3	On/ Off switch	11	Link B
4	SOC indicator	12	Link A
5	Alarm indicator	13	Reset button
6	Run indicator	14	CAN/RS485 port
7	Dry contact	15	Positive DC post #1
8	GND	16	Positive DC post #2

Stacking

The Z-Range battery can be stacked in 3 different configurations:

- Standing on its back
- Stacked with brackets
- Stacked in a cabinet (each battery is 3U in height)



Figure 2: 4 Stacked Z-Range Battery Modules

A maximum of 4 units can be stacked when using the brackets. It is recommended to use two or more stacks when more than 4 units are installed. Figure 2 illustrates the stacking methodology of the Z-Range using the brackets.

The battery voltages need to be within +- 0.5 V to be integrated. The batteries are shipped at 100%, and tend to settle around 53.5 V during transport. If an additional battery is added to the system, it is recommended that the existing units be charged to 100% and allowed to settle (be without loads or charging) to integrate the new battery.

Figure 3 shows the Z-Range dimentions



Figure 3: Z-Range Battery Module dimentions

Wiring

Before connecting the DC cables, please ensure the polarity of the connections are correct. Note that it is required to have a DC disconnect between the battery and the inverter.

DC Connections

The Amphenol connections on the battery can only sustain 100 A output. There are two different ways to connect the battery in parallel.

It is recommended that the disconnect be 1.25 x Rated current.

Wiring methodology #1:

Connect all the batteries to a common busbar. Each battery can produce its maximum recommended output current, with this methodology. This methodology allows each battery unit to produce its maximum recommended output current. Connect the provided DC cables to the top DC post of each unit, and the M8 lug to the common busbar. Figure 4 depicts the connection methodology.



Figure 4a: Illustration of 1 x Z-Range battery connected to an inverter



Figure 4b: Illustration of 3 x Z-Range batteries connected to common busbar

Wiring methodology #2:

Daisy chain the DC connections, from bottom to top. This wiring methodology limits the current output to the maximum recommended output of a single battery, but increases the available capacity. Figure 5 illustrates how to connect the batteries with this method. For this configuration we recommend that the provided cable from the master box be connected to the top unit and the DC disconnect. The interconnecting cables can be made from the other batteries' DC cables by cutting the lug side cable, and crimping the provide amphenol connecter. The recommended length of this interconnecting cable is 150 mm.



Figure 5: Illustrating daisy chain DC connections from top to bottom

Communication

The communication cables start from the master unit's Link A port to Link B on the second unit. This A -> B loop continues, in sequence, up to the last unit. No termination plug is necessary on the final Z-Range unit. Figure 6 shows the connection of the communcation cables between the batteries.



Figure 6: Communication connections between the battery modules

Z-RANGE INSTALLATION MANUAL

The communication cables between the units must follow the address of the units. Address 1 needs to be connected to Address 2, and Address 2 is connected to Address 3, as mentioned in Table 3.

The CAN connection between the GX device and the battery connects on the CAN port of the master unit. The battery has a baud rate of 500 kbps.

Table 2 below shows the pin outs of the inverters that the Z-Range battery is compatible with. These are the only cables that are necessary to connect.

Table 2: Inverter and Battery communication pin outs (CAN/RS485)



Master Configuration

The configuration of all the Z-Range units can be set to either be the master or a secondary in a stack. The dip switches are used to change the address of the unit in the stack. Table 3 illustrates the arrangement of dip switches to configure each individual unit in a stack.

Address	Dip Switch Position			Unit Stack			
	1	2	3	4	5	6	
1	1	0	0	0	0	0	Master unit / individual unit
2	0	1	0	0	0	0	First secondary
3	1	1	0	0	0	0	Second secondary
4	0	0	1	0	0	0	Third secondary
5	1	0	1	0	0	0	Fourth secondary
6	1	1	1	0	0	0	Fifth secondary
63	1	1	1	1	1	1	Sixty third secondary

Table 3: Assignment of Addresses to Z-Range Battery

Note that the 1 indicates that the dip switch needs to be in the "up" position, while the 0 indicates a "down" dip switch.

Battery Parameters

The following are the recommended voltage parameters for the Z-Range battery. Note that each battery has a capacity of 100 A.

Low voltage alarm - 50 V Low voltage cut off - 46 V Restart - 48 V

Low voltage alarm - 30% Low voltage cut off - 20% Restart - 30%

Absorption - 56 V Float - 54 V Equalization - 56.2 V

Recommended charge limit - 70A Recommended discharge limit - 90A

Startup Procedure

Refer to Table 1 and Figure 1 for the port and switches layout. Double-check polarity of the DC connections between the battery and inverter.

- 1. Ensure the fuses to the battery are completely open or removed. The communication cable to the GX device/inverter must also be removed.
- 2. Before switching on the battery ensure the wiring of the battery is done correctly, according to this manual
 - a. Communication cable
 - b. Electric cables
- 3. Start by switching on the Master unit (using switch 3).
 - a. The battery will go through a boot up procedure where the SoC, Alarm and Run lights flicker on
 - b. The Run light will flicker on for 1 second and off for 3 seconds if the start up procedure is done correctly and the SoC lights are on
- 4. The next unit can be switched on if the previous unit's Run light flashes as mentioned in step 3b
 - a. The next unit's Run light must flash at the same tempo as the master unit before any additional unit can be switched on
 - b. The lights will not flicker simultaneously, but at the same tempo
- 5. Repeat step 4 for all the additional units
- 6. Connect the communication from the GX device to the CAN port on the master unit once all the units in the stack have been switched on and the Run lights flash correctly
- 7. Close the fuses

The battery bank might indicate an Alarm event when the fuses are closed. If the bank does not recover on its own, it is recommended to first energize the DC busbar with the inverter before start by switching on the Master unit.

The battery bank might indicate an Alarm event, when the fuses are closed. Especially when the inverter:Battery ratio is lower than 1:1. If the battery does not recover on its own, it is recommend to energize the DC busbar with the inverter or PV (if present) before closing the fuses.

Restart Procedure

- 1. Switch system over to grid
- 2. Switch off entire system
 - a. Switch off PV inverter
 - b. Switch off Inverter/charger (Victron)
- 3. Switch off battery
 - a. Start at the top unit and switch the unit off
 - b. Switch off the secondary unit
 - c. Repeat
- 4. Isolate Battery (remove Fuses)
- 5. Restart battery (Start at the top unit and move down sequentially)
 - a. Switch the unit on
 - b. Wait until the "Run" light (green light) flashes
 - i. 1 sec on, 3 sec off
 - c. Switch the second unit on
- 6. Wait until both the units' "run" light flashes at the same tempo
- a. They don't have to flash simultaneously, but just at the same tempo
- 7. Repeat step 5 and 6 until the final unit
- 8. Close the DC disconnect if the battery run light flashes at the same tempo