How to solve cell unbalanced problem for US2000 Pylontech batteries?

Dear **Victron Energy Community members**,

I have an off-grid solar system with 1 Victron Quattro 48/15000 Inverter, 1 Venus GX, 1 Pylontech battery hub, 3 Victron MPPT chargers and 25 Pylontech US2000 batteries.

I have installed this system since July 2020 on the mobile clinic boat. (Irrawaddy River Doctors Mobile Clinic Youtube Link)

The boat is a non-profit NGO mobile clinic boat (named as **Irrawaddy River Doctors** Mobile Clinic) that provides health care to people living in villages with difficult access to health in the delta of Myanmar. (Foundation Web page link)

In the past the boat used 32nos 12V 200Ah AGM batteries and 48v5000W CyberPower inverter and in July 2020 Victron Inverter, new Solar Panels and Pylontech batteries were replaced and installed.
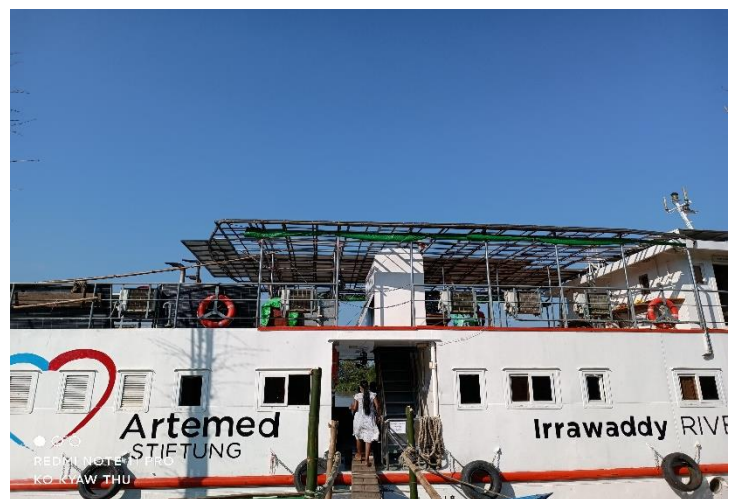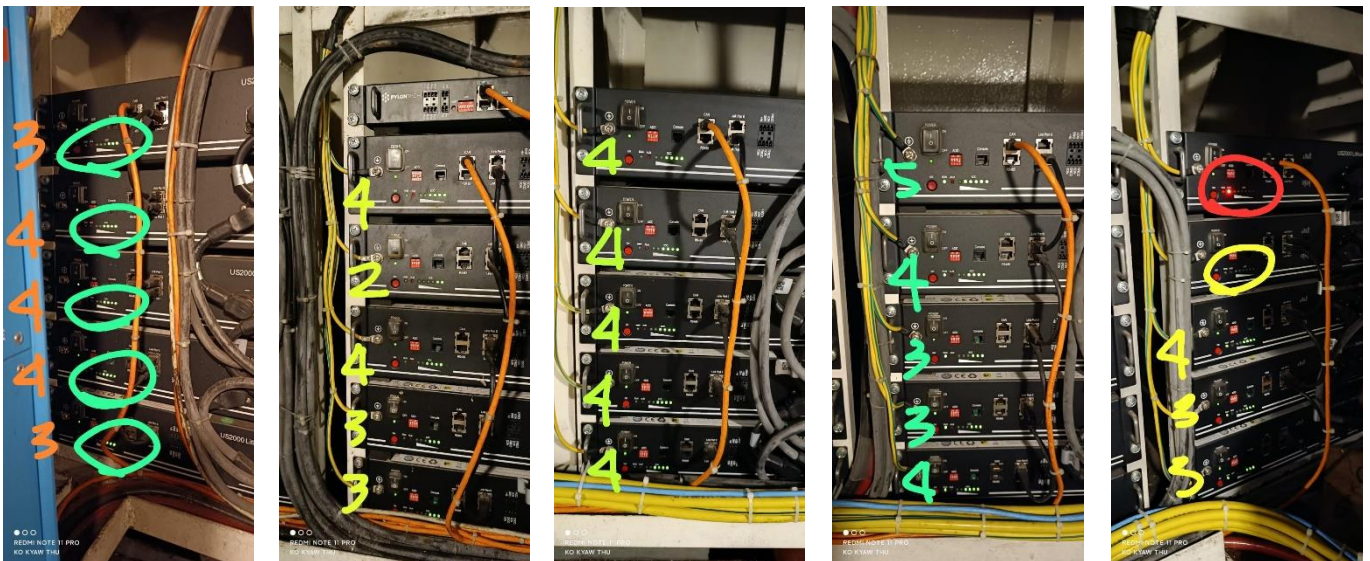
After installing it, there was an Internal failure alarm, but I was able to use it without any other problems.
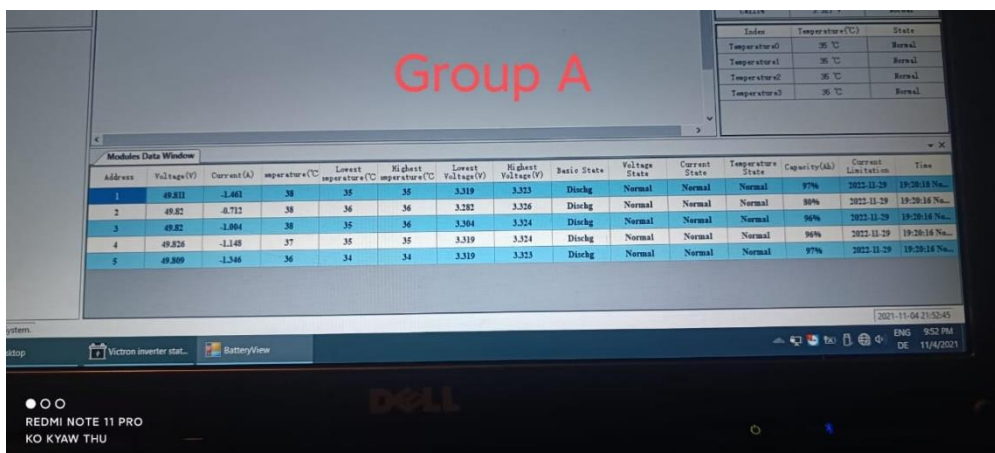
However, in March 2023, High Voltage and Low Voltage alarms appeared and even at SOC 80%, the inverter became a shutdown problem.
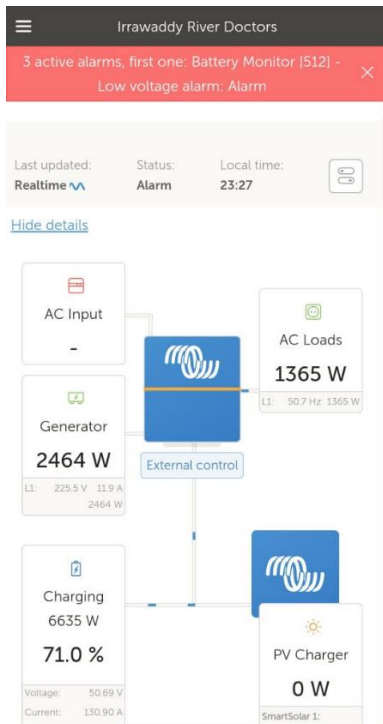
Therefore, I checked the condition of the battery. I noticed that SOC display leds were not the same with each other.

Then I checked the batteries using battery viewer software and the answers are as follows...

Index	Temperature(°C)	State
Temperature0	36 °C	Normal
Temperature1	36 °C	Normal
Temperature2	36 °C	Normal
Temperature3	36 °C	Normal

Group A

Address	Voltage(V)	Current(A)	Temperature(°C)	Lowest temperature(°C)	Highest temperature(°C)	Lowest Voltage(V)	Highest Voltage(V)	Basic State	Voltage State	Current State	Temperature State	Capacity(Ah)	Current Limitation	Time
1	49.811	-1.461	38	35	35	3.319	3.323	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:20:18 No...
2	49.82	-0.712	38	36	36	3.282	3.326	Dischg	Normal	Normal	Normal	80%	2022-11-29	19:20:16 No...
3	49.82	-1.004	38	35	36	3.304	3.324	Dischg	Normal	Normal	Normal	96%	2022-11-29	19:20:16 No...
4	49.826	-1.148	37	35	35	3.319	3.324	Dischg	Normal	Normal	Normal	96%	2022-11-29	19:20:16 No...
5	49.309	-1.346	36	34	34	3.319	3.323	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:20:16 No...

Group B

| | | Cell13 | 3.321 V | | Normal |
| | | Cell14 | 3.321 V | | Normal |

Index	Temperature(℃)	State
Temperature0	36 ℃	Normal
Temperature1	36 ℃	Normal
Temperature2	36 ℃	Normal
Temperature3	35 ℃	Normal

Modules Data Window

Address	Voltage(V)	Current(A)	emperature(℃	Lowest emperature(℃	Highest emperature(℃	Lowest Voltage(V)	Highest Voltage(V)	Basic State	Voltage State	Current State	Temperature State	Capacity(Ah)	Current Limitation	Time
1	49.826	-1.514	38	35	36	3.319	3.323	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:20:04 No...
2	49.824	-1.348	38	35	36	3.315	3.324	Dischg	Normal	Normal	Normal	96%	2022-11-29	19:20:04 No...
3	49.822	-1.232	38	35	35	3.319	3.323	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:20:04 No...
4	49.814	-1.328	37	34	34	3.32	3.322	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:20:04 No...
5	49.808	-1.304	36	33	34	3.319	3.322	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:20:04 No...

2021-11-04 21:51:17

Group C

| | | Cell13 | 3.322 V | | Normal |
| | | Cell14 | 3.320 V | | Normal |

Index	Temperature(℃)	State
Temperature0	35 ℃	Normal
Temperature1	35 ℃	Normal
Temperature2	34 ℃	Normal
Temperature3	34 ℃	Normal

Modules Data Window

Address	Voltage(V)	Current(A)	emperature(℃	Lowest emperature(℃	Highest emperature(℃	Lowest Voltage(V)	Highest Voltage(V)	Basic State	Voltage State	Current State	Temperature State	Capacity(Ah)	Current Limitation	Time
1	49.804	-1.386	37	34	35	3.316	3.322	SysError	Normal	Normal	Normal	97%	2022-11-29	19:19:38 No...
2	49.794	-1.47	37	34	35	3.318	3.32	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:19:38 No...
4	49.828	-1.38	37	35	35	3.321	3.324	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:19:38 No...
5	49.815	-1.364	37	34	34	3.319	3.324	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:19:38 No...

2021-11-04 21:49:30

Group D

		Cell12	3.327 V		Normal
		Cell13	3.331 V		Normal
		Cell14	3.324 V		Normal

Index	Temperature(℃)	State
Temperature0	35 ℃	Normal
Temperature1	35 ℃	Normal
Temperature2	35 ℃	Normal
Temperature3	34 ℃	Normal

Modules Data Window

| Address	Voltage(V)	Current(A)	emperature(℃	Lowest emperature(℃	Highest emperature(℃	Lowest Voltage(V)	Highest Voltage(V)	Basic State	Voltage State	Current State	Temperature State	Capacity(Ah)	Current Limitation	Time
1	49.813	-0.605	37	34	35	3.275	3.333	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:15:56 Na...
2	49.789	-0.756	38	35	36	3.268	3.327	Dischg	Normal	Normal	Normal	76%	2022-11-29	19:15:56 Na...
3	49.811	-1.752	38	35	35	3.319	3.321	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:15:56 Na...
4	49.821	-1.732	37	35	35	3.318	3.324	Dischg	Normal	Normal	Normal	96%	2022-11-29	19:15:56 Na...
5	49.798	-1.57	37	34	35	3.315	3.322	Dischg	Normal	Normal	Normal	96%	2022-11-29	19:15:56 Na...

2021-11-04 21:48:09

Group E

| | | Cell13 | 3.324 V | | Normal |
| | | Cell14 | 3.302 V | | Normal |

Index	Temperature(℃)	State
Temperature0	34 ℃	Normal
Temperature1	34 ℃	Normal
Temperature2	34 ℃	Normal
Temperature3	34 ℃	Normal

Modules Data Window

Address	Voltage(V)	Current(A)	emperature(℃	Lowest emperature(℃	Highest emperature(℃	Lowest Voltage(V)	Highest Voltage(V)	Basic State	Voltage State	Current State	Temperature State	Capacity(Ah)	Current Limitation	Time
1	49.814	-0.972	37	34	34	3.299	3.324	Dischg	Normal	Normal	Normal	87%	2022-11-29	19:15:53 No...
2	49.81	-0.444	37	34	35	3.247	3.328	Dischg	Normal	Normal	Normal	96%	2022-11-29	19:15:52 No...
3	49.812	-1.274	37	34	34	3.319	3.323	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:15:52 No...
4	49.805	-1.428	37	33	33	3.318	3.322	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:15:52 No...
5	49.809	-1.45	36	33	33	3.319	3.323	Dischg	Normal	Normal	Normal	97%	2022-11-29	19:15:52 No...

2021-11-04 21:47:41
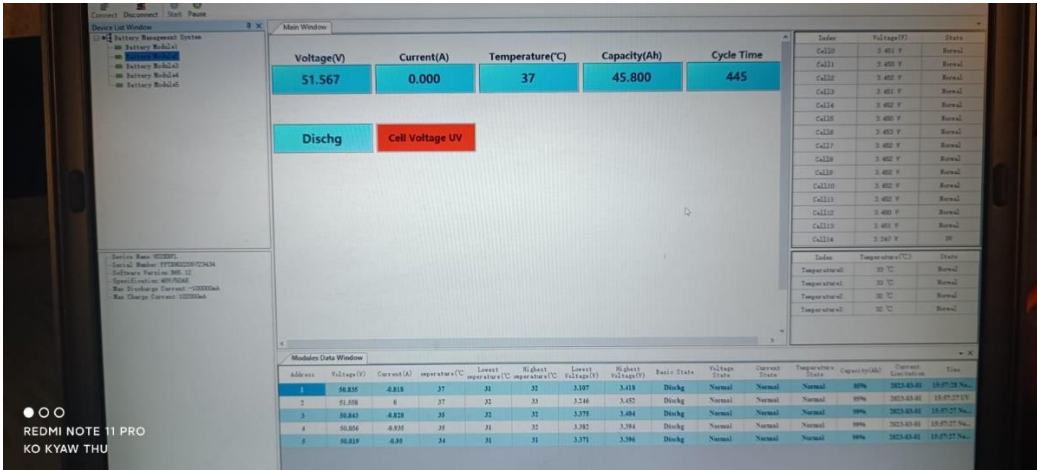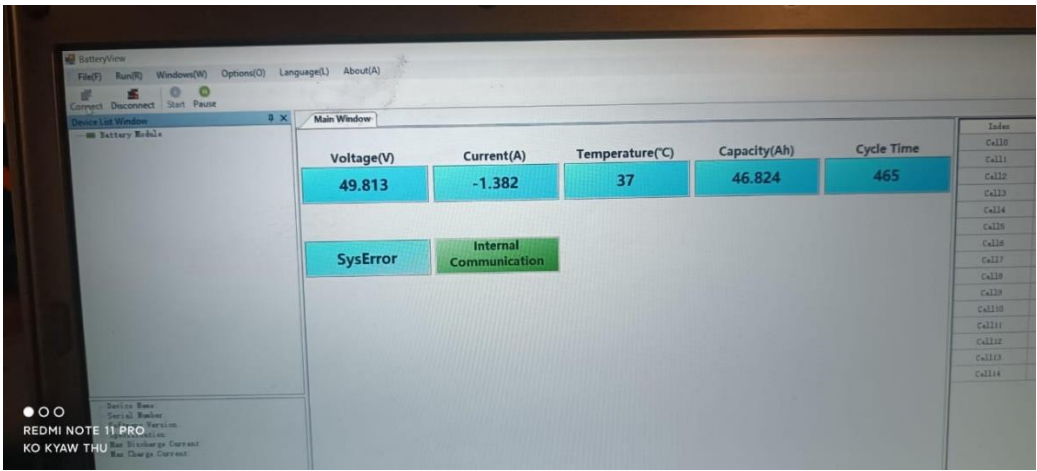
Measurement Result for Batteries SOC Problem (1_3_2023)

Group	No	SOC 99%	Status	SOC 81%	Status
A	1	99%		15%	
	2	51%	Cell Voltage OV when Charging	_	Unreachable (Communication Error)
	3	99%		97%	
	4	98%		95%	
	5	99%		95%	
B	1	99%		_	Sys Error (Internal Communication) / Red Alarm Led is ON
	2	70%	Cell Voltage OV	_	Unreachable (Communication Error)
	3	99%		95%	
	4	99%		95%	
	5	99%		95%	
C	1	99%		95%	
	2	99%		95%	
	3	98%		96%	
	4	99%		95%	
	5	98%		97%	
D	1	99%		98%	
	2	99%		96%	
	3	99%		94%	
	4	99%		95%	
	5	99%		96%	
E	1	51%		5%	Sys Error (Internal Communication) / Red Alarm Led is ON
	2	94%		_	Unreachable (Communication Error) / Red Alarm Led is ON
	3	99%		96%	
	4	99%		95%	
	5	99%		95%	

I found that most of the batteries had cell imbalance problems and about two batteries had communication problems.

That problem cannot be resolved until now and the battery's performance is further degraded.

Therefore, I submit the measurement results and data. I hope to provide technical support and how to solve the problem as soon as possible.

With best regard,