

# SCADA Integration

## MODBUS PROTOCOL

Data Type: 16-bit INT

### Modbus-RTU (RS-485 connection)

Serial Port: 9600, 8-bit, 1-bit stop, None Parity

Modbus device address range: 1 to 31

Each pull is limited to 125 registers.

### Modbus-TCP (Ethernet)

Same Modbus table but address goes with Unit#. Address 1 for Unit#1.

For multiple Sentry units per battery bank, data can be pulled from Unit#1 with extended register numbers.

For 2 strings of 220V, Unit#1 and Unit#2 for string-1, Unit#3 and Unit#4 for string-2, use Modbus address **3** to pull data for string-2.

Each pull is limited to 123 registers.

Modbus **Function 3** (holding registers) to read Voltage and Internal resistance data.

Modbus **Function 4** (input registers) to read Connection Resistance and Cell Temperature.

PLC base 1

CR 1 is the connection resistance between BATT#1 to BATT#2.

CR 2 is the connection resistance between Batt#2 and Batt#3, and so on so forth.

## Data on Web Page

Some data on web page may not be available for Modbus Polling.

DTU Web Display	Modbus-TCP	Notes
<b>Battery Name (Unit#1)</b>	Modbus Address	Modbus Address 1 for Unit#1 Modbus Address 2 for Unit#2
<b>Communication Status</b>	N/A	Communication success rate monitoring
<b>Unit Alarm</b>	Alarm summary	Read alarm for each type: 40077 number of CR alarm 40078 number of Temperature alarm 40079 number of Voltage alarm
<b>String Voltage</b>	40101	
<b>String Voltage High (in a day)</b>	N/A	Calculated
<b>String Voltage Low (in a day)</b>	N/A	Calculated
<b>Current</b>	40102	
<b>Float Current</b>	40096	
<b>Avg Cell V</b>	40089	
<b>Max Cell V</b>	40090	
<b>Min Cell V</b>	40088	
<b>Ave IR</b>	40086	
<b>Max IR</b>	40087	
<b>Thermal Risk</b>	40092	
<b>Risk Peak (in a day)</b>	N/A	Calculated
<b>Delta T (°C)</b>	N/A	Calculated
<b>Ambient T(°C)</b>	40103	
<b>Pilot(°C)</b>	40097	
<b>Pilot Peak (in a day)</b>	N/A	Calculated

## Modbus Table for Battery String

Register	Content	
40071	Web Port (default 80)	Updated 1/28/2023
40072	Reserved	
40073	Reserved	
40074	Reserved	
40075	<b>7500 + UnitID, Verification Code</b>	
40076	Total_Alarm_Number	Sum(V,IR,T,CR)
40077	CR_Alarm_Number	1000(string connectivity)+N
40078	T_Alarm_Number	N
40079	IR_Alarm_Number	N
40080	V_Alarm_Number	1000(string voltage)+N
40081	CRmax	x0.001mOhm
40082	Tmin	x0.1C
40083	Tavg	x0.1C
40084	Tmax	x0.1C
40085	Rmin	x0.001mohm
40086	Ravg	x0.001mohm
40087	Rmax	x0.001mohm
40088	Vmin	x0.001V
40089	Vavg	x0.001V
40090	Vmax	x0.001V
40091	Digital IO (8-bit, same as coil#11-18)	
40092	Thermal Risk	
40093	Total Runtime (Not implemented)	
40094	String Ripple Voltage	x0.001V
40095	Runtime (Not implemented)	
40096	Float Current	x0.01A
40097	pilot T	x0.1C
40098	SOH (Not implemented)	
40099	SOC (Not implemented)	
40100	Ripple Current	x0.1A
40101	String Voltage	x0.1V
40102	String Current	x0.1A
40103	Ambient Temperature	x0.1°C
40104	Voltage 1	x0.001V
40105	IR 1	x0.001mohm
40106	Voltage 2	
	continue with more batteries	

## Cell Data

Register	Content (Function 3)		Function 4		
			Register	Content	
40101	String Voltage	x0.1V	30104	CR 1	x0.001mohm
40102	String Current	x0.1A	30105	T 1	x0.1°C
40103	Ambient Temperature	x0.1°C	30106	CR 2	
40104	Voltage 1	x0.001V	30107	T 2	
40105	IR 1	x0.001mohm	30108	CR 3	
40106	Voltage 2		30109	T 3	
40107	IR 2		30110	CR 4	
40108	Voltage 3		30111	T 4	
40109	IR 3		30112	CR 5	
40110	Voltage 4		30113	T 5	
40111	IR 4		30114	CR 6	
40112	Voltage 5		30115	T 6	
40113	IR 5		30116	CR 7	
40114	Voltage 6		30117	T 7	
40115	IR 6		30118	CR 8	
40116	Voltage 7		30119	T 8	
40117	IR 7		30120	CR 9	
40118	Voltage 8		30121	T 9	
40119	IR 8		30122	CR 10	
40120	Voltage 9		30123	T 10	
40121	IR 9		30124	CR 11	
40122	Voltage 10		30125	T 11	
40123	IR 10		30126	CR 12	
40124	Voltage 11		30127	T 12	
40125	IR 11		30128	CR 13	
40126	Voltage 12		30129	T 13	
40127	IR 12		30130	CR 14	
40128	Voltage 13		30131	T 14	
40129	IR 13		30132	CR 15	
40130	Voltage 14		30133	T 15	
40131	IR 14		30134	CR 16	
40132	Voltage 15		30135	T 16	
40133	IR 15		30136	CR 17	
40134	Voltage 16		30137	T 17	
40135	IR 16		30138	CR 18	
40136	Voltage 17		30139	T 18	
40137	IR 17				
40138	Voltage 18				
40139	IR 18				

40140	Voltage 19
40141	IR 19
40142	Voltage 20
40143	IR 20
40144	Voltage 21
40145	IR 21
40146	Voltage 22
40147	IR 22
40148	Voltage 23
40149	IR 23
40150	Voltage 24
40151	IR 24
40152	Voltage 25
40153	IR 25
40154	Voltage 26
40155	IR 26
40156	Voltage 27
40157	IR 27
40158	Voltage 28
40159	IR 28
40160	Voltage 29
40161	IR 29
40162	Voltage 30
40163	IR 30
40164	Voltage 31
40165	IR 31
40166	Voltage 32
40167	IR 32
40168	Voltage 33
40169	IR 33
40170	Voltage 34
40171	IR 34
40172	Voltage 35
40173	IR 35
40174	Voltage 36
40175	IR 36
40176	Voltage 37
40177	IR 37
40178	Voltage 38
40179	IR 38
40180	Voltage 39
40181	IR 39
40182	Voltage 40

30140	CR 19
30141	T 19
30142	CR 20
30143	T 20
30144	CR 21
30145	T 21
30146	CR 22
30147	T 22
30148	CR 23
30149	T 23
30150	CR 24
30151	T 24
30152	CR 25
30153	T 25
30154	CR 26
30155	T 26
30156	CR 27
30157	T 27
30158	CR 28
30159	T 28
30160	CR 29
30161	T 29
30162	CR 30
30163	T 30
30164	CR 31
30165	T 31
30166	CR 32
30167	T 32
30168	CR 33
30169	T 33
30170	CR 34
30171	T 34
30172	CR 35
30173	T 35
30174	CR 36
30175	T 36
30176	CR 37
30177	T 37
30178	CR 38
30179	T 38
30180	CR 39
30181	T 39
30182	CR 40

40183	IR 40
40184	Voltage 41
40185	IR 41
40186	Voltage 42
40187	IR 42
40188	Voltage 43
40189	IR 43
40190	Voltage 44
40191	IR 44
40192	Voltage 45
40193	IR 45
40194	Voltage 46
40195	IR 46
40196	Voltage 47
40197	IR 47
40198	Voltage 48
40199	IR 48
40200	Voltage 49
40201	IR 49
40202	Voltage 50
40203	IR 50
40204	Voltage 51
40205	IR 51
40206	Voltage 52
40207	IR 52
40208	Voltage 53
40209	IR 53
40210	Voltage 54
40211	IR 54
40212	Voltage 55
40213	IR 55
40214	Voltage 56
40215	IR 56
40216	Voltage 57
40217	IR 57
40218	Voltage 58
40219	IR 58
40220	Voltage 59
40221	IR 59
40222	Voltage 60
40223	IR 60
continue	more data if available

x0.001V  
x0.001mohm

30183	T 40
30184	CR 41
30185	T 41
30186	CR 42
30187	T 42
30188	CR 43
30189	T 43
30190	CR 44
30191	T 44
30192	CR 45
30193	T 45
30194	CR 46
30195	T 46
30196	CR 47
30197	T 47
30198	CR 48
30199	T 48
30200	CR 49
30201	T 49
30202	CR 50
30203	T 50
30204	CR 51
30205	T 51
30206	CR 52
30207	T 52
30208	CR 53
30209	T 53
30210	CR 54
30211	T 54
30212	CR 55
30213	T 55
30214	CR 56
30215	T 56
30216	CR 57
30217	T 57
30218	CR 58
30219	T 58
30220	CR 59
30221	T 59
30222	CR 60
30223	T 60

x0.001mohm  
x0.1°C

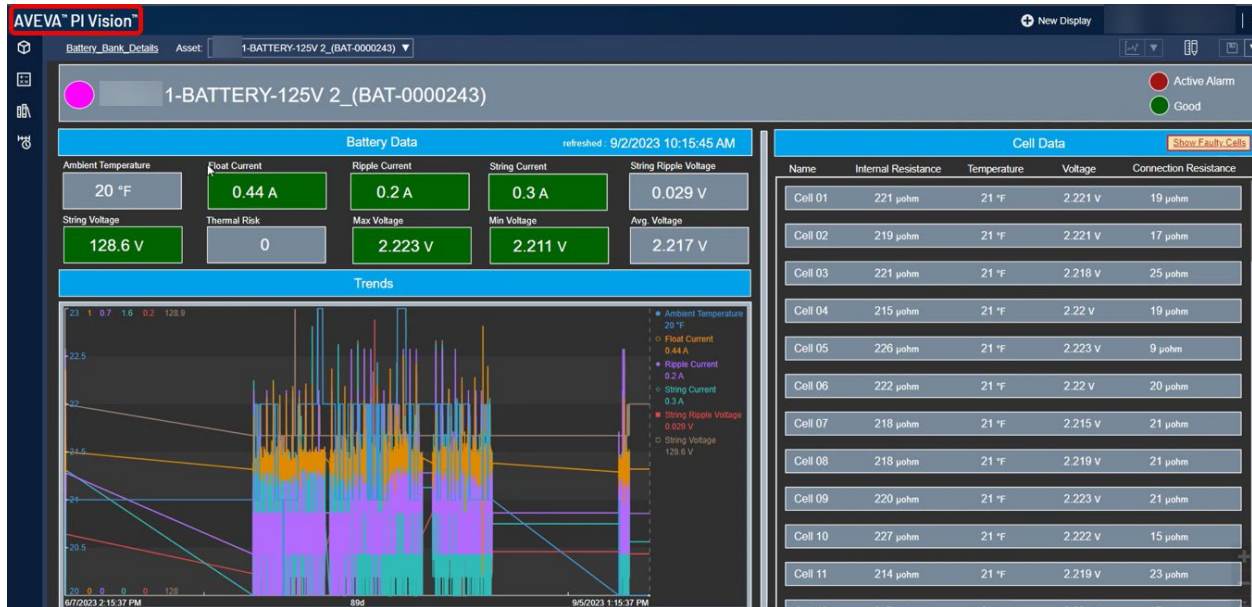
## Alarm Signal

Alarm status can be read with function-1 (coils), start from address 11 (base 1)

Coil Address	Bit Content	Notes
11	Not defined	
12	Not defined	
13	Not defined	
14	DIN-1, digital input	Can be utilized for exhaust fan failure alarm. Normal 0.
15	DIN-2, digital input	
16	DIN-3, digital input	
17	Alarm-1, Service	Normal 0 Alarm 1 [Internal Resistance High, Connection Resistance High]
18	Alarm-2, Urgent	Normal 0 Alarm 1 [Voltage High/Low, or Temperature High/Low, or Connection Resistance 5x higher]

# PI Vision Integration

With Modbus-TCP, data and alarm can be integrated into PI vision.



Further work can be done to achieve a better visual impression, as good as on BatteryDAQ's web page.

