MODBUS TCP COMMUNICATIONS

AERL Nexus

Modbus TCP Communications Protocol

Doc · NEXUS-MODBUS-TCP

STANDARD	Modbus TCP
PORT	502
ACCESS	Read-only
FUNCTION CODES	0x03 · 0x04
UNIT IDS	1 SP PRO · 2 LiFe²
DATA TYPES	16 / 32-bit scaled integers
WORD ORDER	MSW first

DOCUMENT	REVISION	EFFECTIVE	PRODUCT
NEXUS-MODBUS-TCP	1.0.4	11 / 2026	AERL Nexus
AUDIENCE	FIRMWARE	FORMAT	
Integrators	1.15.1 and later	A4 · 13 pages	

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CHAPTER 01

Connection

The AERL Nexus gateway publishes the data it has acquired from the connected Selectronic SP PRO inverter and AERL LiFe² battery bank over **Modbus TCP**. The interface is read-only. Values are served from the gateway's live cache; a Modbus read never triggers a request to the equipment. Every numeric value is a 16 or 32-bit scaled integer: no floating-point or 64-bit data type is needed in the client.

ITEM	VALUE
Transport	Modbus TCP, port **502**, on the gateway's LAN address
Function codes	FC03 and FC04 (identical data). All write functions are rejected with exception 01.
Registers per request	1 to 125
Concurrent clients	Up to 16. Further connections are closed immediately.
Idle timeout	A connection that has sent no request for 10 s is closed. Poll at least that often, or reconnect for each poll cycle.
Register addressing	Zero-based protocol (PDU) addresses. In 1-based "4xxxx" notation add 40001 (FC03) or 30001 (FC04): address 256 is 40257.
Data types	INT16, UINT16, INT32, UINT32 and fixed-length ASCII or byte fields
Word order	Most-significant word first (ABCD) for all 32-bit values; signed values are two's complement

Unit IDs

UNIT ID	DEVICE
1	SP PRO inverter
2	Battery bank (LiFe²)

Each connected device is a separate Modbus **unit ID** with its own register space. A unit that is not assigned answers descriptor reads with an "unassigned" descriptor and returns exception 0B for its values. Unit IDs outside 1 to 32 return exception 0B. Confirm the profile and source identity of each unit at commissioning. Other equipment connected to the same gateway may be published on further unit IDs in a later revision of this document.

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CHAPTER 02

Device Descriptor

Registers 0 to 127 of every unit. Read this block after every connection and whenever the session value changes. Registers not listed read 0.

REGISTER	CONTENT
0	Magic `0xA3E1`
1	Register map format identifier. Reads 3 for the map described in this document.
2 to 3	Session identifier, UINT32. Changes on every gateway restart: discard cached values when it changes.
4 to 5	Server heartbeat in seconds, UINT32. Shows that the Modbus service is running, not that the equipment is answering.
6 to 7	Update sequence, UINT32, increments on every new reading and wraps
10	Number of assigned units
11	Unit capacity (32)
16	Number of fields for this unit
17	Number of module slots for this unit (80 for a battery, 0 otherwise)
18	Layout identifier. Reads 1 for the layout described in this document.
19	First value register (256)
20 to 21	First module block (2048) and module block length (128)
22 to 23	First quality register (1024) and first age register (1280)
64	1 if this unit is assigned, 0 if not
65	Profile: 2 = LiFe², 3 = SP PRO
68 to 69	Stale threshold in milliseconds, UINT32
72 to 87	Label, 32 ASCII bytes
88 to 119	Source identity, 64 ASCII bytes

CHAPTER 03

Register Layout

Every field *F* of a unit has three fixed locations: its **value**, a **quality** register and an **age**. The field tables list all three addresses for every field.

ITEM	ADDRESS	CONTENT
Value	From 256	At the fixed address in the field tables: 1 register for a 16-bit value, 2 for a 32-bit value, more for text
Quality	1024 + F	1 register, UINT16 (see below)
Age	1280 + 2 × F	2 registers, UINT32: milliseconds since the gateway received the value. `0xFFFFFFFF` when never received.

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Register Layout, Continued

Quality

Quality is a bit field: 1 = supported, 2 = received, 4 = valid, 8 = stale, 16 = out of range. Use a value only when its quality register reads **7**.

QUALITY	MEANING
0	Field is not defined for this unit
1	Field exists, nothing received yet
3	Received, but no valid value
7	**Valid and fresh. The only value to act on.**
15	Last valid value, older than the stale threshold
19	Received, but outside the range of the register
11, 27	As 3 and 19, and older than the stale threshold

Types

TYPE	ENCODING
INT16 / UINT16	One register. Engineering value = register × scale.
INT32 / UINT32	Two registers, most-significant word first. Engineering value = raw × scale. Read both registers in one request.
ASCII *n*	*n* characters, two per register, first character in the high byte, zero padded.
BYTES *n*	*n* raw bytes as sent by the equipment, two per register. Not text.

Scales are fixed per field and listed in the field tables; there are no offsets. A value register reads 0 whenever its quality is not 7 or 15, so **0 is never evidence of a real zero**: always read the quality register with the value.

No Data

A read that includes value registers returns **exception 0B** when none of the fields in it has been received since the gateway started, and for every value read of a unit that is not assigned. Treat 0B as a communication failure: keep the last value and mark it bad. A read that includes at least one received field is answered normally; any other field in it that has not been received reads 0 with quality 1. Descriptor, quality and age registers always answer.

> **WORKED EXAMPLES**
>
> SP PRO battery voltage (unit 1, field 0): INT16 at **256**, scale 0.1. A reading of `0x020E` = 526 is 52.6 V. Use it only while register **1024** reads 7; its age is the UINT32 at 1280 to 1281.
>
> Battery bank current (unit 2, field 7): INT16 at **263**, scale 0.1. A reading of `0xFF71` = −143 is −14.3 A. Total energy charged (field 41) is the UINT32 at **318 to 319**: `0x0000 0x30D4` = 12500 is 1250000 Wh.
>
> Reading a whole unit: the SP PRO's 96 values occupy registers 256 to 358 (one read), their quality registers 1024 to 1119 (one read) and their ages 1280 to 1471 (two reads). Each read returns a consistent snapshot; values within one read may have different ages.

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CHAPTER 04

Freshness and Timing

DATA	TYPICAL REFRESH	STALE THRESHOLD
SP PRO (all registers)	Every 45 to 60 s. A full sweep of the inverter takes about 30 s.	80 s
Battery bank	1 to 5 s (limits, voltage, current, SOC, alarms); up to 10 s for names and cell addresses	150 s
Battery modules	Each module about once per minute	150 s

Each unit has one stale threshold, reported in registers 68 to 69 of its descriptor; the values above are typical. For fast values such as battery voltage, current and SOC, apply your own tighter limit to the age registers.

Age counts from the moment the gateway received the value. When the equipment stops responding, values keep their last reading, age keeps climbing and the stale bit sets when the threshold is passed.

Any restart of the gateway closes open TCP sessions and starts a new session identifier. Reconnect, re-read the descriptor and treat all previous values as unknown. Values return 0B until each device reports again.

CHAPTER 05

Exception Codes

CODE	NAME	RETURNED WHEN
01	**Illegal function**	Write function, or unsupported function
02	**Illegal data address**	Address range not mapped
03	**Illegal data value**	Register count 0 or more than 125
0B	**Gateway target failed to respond**	Unit ID not in 1 to 32, unit not assigned, or no data yet (see No data)

CHAPTER 06

Client Checklist

1. Connect to port 502 and read registers 0 to 63 and 64 to 127 of each unit you use; confirm magic `0xA3E1`, map format 3, layout 1 and *assigned* = 1.
2. Map each value you need at its fixed address with the type and scale from the field tables, and map its quality register beside it.
3. Use a value only when its quality register reads **7**; treat 15 as stale and 1 as not yet received. Treat exception 0B as no data, never as 0.
4. Watch registers 2 to 3: a new session means the gateway restarted; re-read the descriptor and clear cached values.
5. Poll at your own rate; polling faster does not refresh the equipment faster. Keep the connection open only if you poll at least every 10 s, otherwise reconnect for each cycle.

Questions about the data, the equipment behind it, or additional points you would like exposed: contact AERL support.

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CHAPTER 07

SP PRO Inverter (Unit 1)

Profile 3. All read-only registers of the Selectronic SP PRO Modbus map are included. **Source** is the SP PRO's own register number. Power is in W (not kW), and battery power and current carry the SP PRO's native signs: verify against a known charge and discharge before using signs in alarms. Values are for the accessed inverter, not automatically a site total.

ID	VALUE	TYPE	SCALE	UNIT	FIELD	QUALITY	AGE	SOURCE	VALUES
0	256	INT16	0.1	V	battery_voltage	1024	1280	8000	
1	257	INT16	0.1	%	battery_soc	1025	1282	8001	
2	258	INT16	10	W	battery_power	1026	1284	8002	
3	259	INT16	0.1	A	battery_current	1027	1286	8003	
4	260	INT16	10	W	ac_load_power	1028	1288	8004	
5	261	INT16	0.1	V	ac_load_voltage	1029	1290	8005	
6	262	INT16	0.1	Hz	ac_load_frequency	1030	1292	8006	
7	263	INT16	0.1	kWh	ac_load_energy	1031	1294	8007	
8	264	INT16	10	W	ac_source_power	1032	1296	8008	
9	265	INT16	0.1	V	ac_source_voltage	1033	1298	8009	
10	266	INT16	0.1	A	ac_source_current	1034	1300	8010	
11	267	INT16	0.1	Hz	ac_source_frequency	1035	1302	8011	
12	268	INT16	10	VAr	ac_source_reactive	1036	1304	8012	
13	269	INT16	0.1	kWh	ac_source_input_energy	1037	1306	8013	
14	270	INT16	0.1	kWh	ac_source_export_energy	1038	1308	8014	
15	271	INT16	10	W	ac_inverter_power	1039	1310	8015	
16	272	INT16	0.1	A	ac_inverter_current	1040	1312	8016	
17	273	INT16	10	VAr	inverter_reactive	1041	1314	8017	
18	274	UINT16	1		output_status	1042	1316	8018	0 = Off; 1 = Econo; 2 = On; 3 = Sync
19	275	INT16	0.1	°C	battery_temperature	1043	1318	8019	
20	276	INT16	0.1	°C	transformer_temperature	1044	1320	8020	
21	277	INT16	0.1	°C	heatsink_temperature	1045	1322	8021	
22	278	UINT16	1		solar_hybrid_priority_active	1046	1324	8022	0 = None; other = a priority is active
23	279	INT16	10	W	ac_source_input_limit	1047	1326	8023	
24	280	INT16	10	W	grid_export_limit	1048	1328	8024	
25	281	INT16	10	W	charge_limit	1049	1330	8025	
26	282	INT16	10	W	ac_load_support_limit	1050	1332	8026	
27	283	UINT16	1		battery_charging_status	1051	1334	8027	0 = Normal charge; 1 = Override charge; 2 = Charger Off; 3 = Renewable charge; 4 = Restricted charge
28	284	UINT16	1		inverter_shutdown_status	1052	1336	8028	0 = Not Active; 1 = Active
29	285	UINT16	1		grid_disconnect_status	1053	1338	8029	0 = Not Active; 1 = Active

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SP PRO Inverter (Unit 1), Continued

ID	VALUE	TYPE	SCALE	UNIT	FIELD	QUALITY	AGE	SOURCE	VALUES
30	286	INT16	10	W	active_power_override_target	1054	1340	8030	
31	287	UINT16	1		soc_shutdown_recovery_active	1055	1342	8031	0 = Not Active; 1 = Active
32	288	UINT16	1		passcode_status	1056	1344	8039	
33	289	UINT16	1		output_digital_control_1_status	1057	1346	8040	0 = inactive; 1 = active
34	290	UINT16	1		output_digital_control_2_status	1058	1348	8041	0 = inactive; 1 = active
35	291	UINT16	1		output_digital_control_3_status	1059	1350	8042	0 = inactive; 1 = active
36	292	UINT16	1		output_relay_1_status	1060	1352	8043	0 = inactive; 1 = active
37	293	UINT16	1		output_relay_2_status	1061	1354	8044	0 = inactive; 1 = active
38	294	UINT16	1		output_relay_3_status	1062	1356	8045	0 = inactive; 1 = active
39	295	UINT16	1		output_relay_4_status	1063	1358	8046	0 = inactive; 1 = active
40	296	UINT16	1		inputs_digital_control_1_status	1064	1360	8047	0 = inactive; 1 = active
41	297	UINT16	1		inputs_digital_control_2_status	1065	1362	8048	0 = inactive; 1 = active
42	298	UINT16	1		inputs_digital_control_3_status	1066	1364	8049	0 = inactive; 1 = active
43	299	UINT16	1		inputs_digital_control_4_status	1067	1366	8050	0 = inactive; 1 = active
44	300	UINT16	1		ac_source_status	1068	1368	8059	See status codes
45	301	UINT16	1		generator_status	1069	1370	8060	See status codes
46	302	UINT16	1		generator_start_reason	1070	1372	8061	See status codes
47	303	UINT16	1		generator_running_reason	1071	1374	8062	See status codes
48	304	UINT16	1		attention_required_0	1072	1376	8063	0 = None; other: see status codes
49	305	UINT16	1		attention_required_1	1073	1378	8064	0 = None; other: see status codes
50	306	UINT16	1		attention_required_2	1074	1380	8065	0 = None; other: see status codes
51	307	UINT16	1		attention_required_3	1075	1382	8066	0 = None; other: see status codes
52	308	UINT16	1		attention_required_4	1076	1384	8067	0 = None; other: see status codes
53	309	UINT16	1		attention_required_5	1077	1386	8068	0 = None; other: see status codes
54	310	UINT16	1		attention_required_6	1078	1388	8069	0 = None; other: see status codes
55	311	UINT16	1		attention_required_7	1079	1390	8070	0 = None; other: see status codes

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SP PRO Inverter (Unit 1), Continued

ID	VALUE	TYPE	SCALE	UNIT	FIELD	QUALITY	AGE	SOURCE	VALUES
56	312	UINT16	1		attention_required_8	1080	1392	8071	0 = None; other: see status codes
57	313	UINT16	1		attention_required_9	1081	1394	8072	0 = None; other: see status codes
58	314	UINT16	1		attention_required_10	1082	1396	8073	0 = None; other: see status codes
59	315	UINT16	1		attention_required_11	1083	1398	8074	0 = None; other: see status codes
60	316	UINT16	1		attention_required_12	1084	1400	8075	0 = None; other: see status codes
61	317	UINT16	1		attention_required_13	1085	1402	8076	0 = None; other: see status codes
62	318	UINT16	1		attention_required_14	1086	1404	8077	0 = None; other: see status codes
63	319	UINT16	1		attention_required_15	1087	1406	8078	0 = None; other: see status codes
64	320	UINT16	1		attention_required_16	1088	1408	8079	0 = None; other: see status codes
65	321	UINT16	1		attention_required_17	1089	1410	8080	0 = None; other: see status codes
66	322	UINT16	1		attention_required_18	1090	1412	8081	0 = None; other: see status codes
67	323	UINT16	1		attention_required_19	1091	1414	8082	0 = None; other: see status codes
68	324	UINT16	1		charging_mode	1092	1416	8083	0 = Initial; 1 = Bulk; 2 = Absorb; 3 = Short Term Float; 4 = Initialise Float; 5 = Equalise; 6 = LongTerm Float
69	325	INT16	10	W	shunt_1_power	1093	1418	8084	
70	326	INT16	10	W	shunt_2_power	1094	1420	8085	
71	327	INT16	10	W	5_minute_battery_load	1095	1422	8086	
72	328	INT16	10	W	15_minute_battery_load	1096	1424	8087	
73	329	UINT16	0.1	%	ac_coupled_solar_target	1097	1426	8088	
74	330	INT16	10	W	ac_coupled_solar_1_power	1098	1428	8089	
75	331	INT16	10	W	ac_coupled_solar_2_power	1099	1430	8090	
76	332	INT16	10	W	ac_coupled_solar_3_power	1100	1432	8091	
77	333	INT16	10	W	ac_coupled_solar_4_power	1101	1434	8092	
78	334	INT16	10	W	ac_coupled_solar_5_power	1102	1436	8093	
79	335	INT16	0.1	A	target_charge_current	1103	1438	8094	
80	336	INT16	0.1	V	target_charge_voltage	1104	1440	8095	
81	337	UINT16	0.1	%	fan_speed	1105	1442	8096	
82	338	UINT16	0.1	kWh	battery_input_energy	1106	1444	8097	
83	339	UINT16	0.1	kWh	battery_output_energy	1107	1446	8098	
84	340	UINT16	0.1	kWh	ac_coupled_input_energy	1108	1448	8099	
85	341	UINT16	1	min	minutes_of_ac_source	1109	1450	8100	
86	342	UINT16	1	h	sp_pro_total_run_time	1110	1452	8101	

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SP PRO Inverter (Unit 1), Continued

ID	VALUE	TYPE	SCALE	UNIT	FIELD	QUALITY	AGE	SOURCE	VALUES
87	**343**	UINT16	1		unit_serial_number_low	**1111**	**1454**	8102	
88	**344**	UINT16	1		unit_serial_number_high	**1112**	**1456**	8103	
89	**345**	UINT16	1		sp_pro_software_version	**1113**	**1458**	8104	Version × 100 (530 = 5.30)
90	**346**	UINT16	1		comms_card_acc_software_version	**1114**	**1460**	8105	Version × 100 (530 = 5.30)
91	**347**	INT16	10	W	ac_inverter_power_worker_1	**1115**	**1462**	8107	
92	**348**	INT16	10	W	ac_inverter_power_worker_2	**1116**	**1464**	8108	
93	**349**	INT16	10	W	ac_inverter_power_worker_3	**1117**	**1466**	8109	
94	**350**	INT16	10	W	ac_inverter_power_phase	**1118**	**1468**	8110	
95	**351**	ASCII 16			serial_number	**1119**	**1470**	8102 + 8103	

SP PRO Status Codes

Code lists for the SP PRO status registers whose **Values** cell says "see status codes", as defined in Selectronic document OI0010 Rev 13. The generator start reason (8061) and running reason (8062) share one list.

AC SOURCE STATUS (8059)

CODE	MEANING	CODE	MEANING
0	Nothing	5	Charger Locked Out
1	Earth Neutral Fault	6	Ac Source is present
2	Ac Input Locked Out	7	Ac Source is in tolerance
3	Inverter Locked Out	8	Ac Source is too high for frequency
4	Grid Capacity Active	9	Disconnected DRM

GENERATOR STATUS (8060)

CODE	MEANING	CODE	MEANING
0	Not running	6	Generator starting
1	Is running	7	Retry pause
2	Low fuel	8	Generator is stopping
3	No fuel	9	Disabled
4	Fault active	10	AC present
5	Not available		

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SP PRO Status Codes, Continued

GENERATOR START REASON (8061) AND RUNNING REASON (8062)

CODE	MEANING	CODE	MEANING
0	Not running	15	Gen Min Run Time Expired
1	Front panel Gen Request	16	Gen LockOut Active
2	Remote Gen Request	17	Gen Float HoldOn Active
3	Time Schedule Gen Request	18	Gen is Cooling Down
4	Temperature Gen Request	19	Gen Confirmed Start
5	Impending shutdown Gen Request	20	Gen Manual Start
6	Sync fault	21	Gen ACVolts Present
7	SoC Gen Request	22	Gen is Disabled
8	Battery volts Gen Request	23	Gen Start Open Sync
9	Battery mid point Gen Request	24	Gen Equalise HoldOn Active
10	Equalise Gen Request	25	Gen Start Battery Power
11	AcLoad Gen Request	26	Gen Grid Failed So Gen is Available
12	Exercise Gen Request	27	Gen Grid Returned Stop Gen
13	Gen is available	28	Gen ReEvaluate Gen Available
14	Gen Fault Stop	29	Gen is Warming Up

Attention required (8063 to 8082). A packed list, not a bit map: active service codes fill the slots from 0 upward, and when a code clears the later entries move up. If a slot reads 0 every later slot is also 0, so read until the first 0. The service codes are defined and published by Selectronic, not by AERL; contact Selectronic for the code list.

Software versions (8104, 8105). Major version × 100 + minor version: 530 is version 5.30.

Worker and phase power (8107 to 8110). Reported only by inverters with comms card software 5.20 or later. On an older card these four fields keep quality 1, and a read of only these fields returns exception 0B.

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CHAPTER 08

LiFe² Battery Bank (Unit 2)

Profile 2. Field names follow the battery's CAN messages; **Source** is the CAN message the value comes from. Cell addresses are BYTES and name or serial parts are ASCII; *serial_number* and *battery_name* are assembled from their parts. Alarm and warning fields are 0 or 1. The three "alarm battery" fields are only refreshed while a module is in alarm: before the first alarm they read "not yet received" (a read of only these fields returns exception 0B), and after an alarm clears they keep the last report and go stale, so apply the quality rule before acting on them.

ID	VALUE	TYPE	SCALE	UNIT	FIELD	QUALITY	AGE	SOURCE
0	256	UINT16	0.1	V	limits.charge_voltage_limit	1024	1280	CAN 0x351
1	257	UINT16	0.1	A	limits.charge_current_limit	1025	1282	CAN 0x351
2	258	UINT16	0.1	A	limits.discharge_current_limit	1026	1284	CAN 0x351
3	259	UINT16	0.1	V	limits.discharge_voltage_limit	1027	1286	CAN 0x351
4	260	UINT16	1	%	soc_soh.soc	1028	1288	CAN 0x355
5	261	UINT16	1	%	soc_soh.soh	1029	1290	CAN 0x355
6	262	UINT16	0.01	V	actual_values.voltage	1030	1292	CAN 0x356
7	263	INT16	0.1	A	actual_values.current	1031	1294	CAN 0x356
8	264	INT16	0.1	°C	actual_values.temperature	1032	1296	CAN 0x356
9	265	UINT16	1		alarm_warning.cell_high_voltage_alarm	1033	1298	CAN 0x359
10	266	UINT16	1		alarm_warning.cell_low_voltage_alarm	1034	1300	CAN 0x359
11	267	UINT16	1		alarm_warning.high_temperature_alarm	1035	1302	CAN 0x359
12	268	UINT16	1		alarm_warning.low_temperature_alarm	1036	1304	CAN 0x359
13	269	UINT16	1		alarm_warning.high_discharge_current_alarm	1037	1306	CAN 0x359
14	270	UINT16	1		alarm_warning.high_charge_current_alarm	1038	1308	CAN 0x359
15	271	UINT16	1		alarm_warning.bms_internal_alarm	1039	1310	CAN 0x359
16	272	UINT16	1		alarm_warning.cell_imbalance_alarm	1040	1312	CAN 0x359
17	273	UINT16	1		alarm_warning.high_voltage_warning	1041	1314	CAN 0x359
18	274	UINT16	1		alarm_warning.low_voltage_warning	1042	1316	CAN 0x359
19	275	UINT16	1		alarm_warning.high_temperature_warning	1043	1318	CAN 0x359
20	276	UINT16	1		alarm_warning.low_temperature_warning	1044	1320	CAN 0x359
21	277	UINT16	1		alarm_warning.high_discharge_current_warning	1045	1322	CAN 0x359
22	278	UINT16	1		alarm_warning.high_charge_current_warning	1046	1324	CAN 0x359
23	279	UINT16	1		alarm_warning.bms_internal_warning	1047	1326	CAN 0x359
24	280	UINT16	1		alarm_warning.cell_imbalance_warning	1048	1328	CAN 0x359
25	281	UINT16	1		charge_control.force_charge_flag	1049	1330	CAN 0x35C
26	282	ASCII 8			manufacturer_id.manufacturer_name	1050	1332	CAN 0x35E
27	286	ASCII 8			name_1.battery_name_part1	1051	1334	CAN 0x701
28	290	ASCII 8			name_2.battery_name_part2	1052	1336	CAN 0x702
29	294	UINT16	1		counts.batteries_working	1053	1338	CAN 0x703
30	295	UINT16	1		counts.batteries_charge_open	1054	1340	CAN 0x703
31	296	UINT16	1		counts.batteries_discharge_open	1055	1342	CAN 0x703
32	297	UINT16	1		counts.batteries_offline	1056	1344	CAN 0x703
33	298	UINT16	1	mV	cell_extremes.min_cell_voltage	1057	1346	CAN 0x704
34	299	UINT16	1	mV	cell_extremes.max_cell_voltage	1058	1348	CAN 0x704

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LiFe² Battery Bank (Unit 2), Continued

ID	VALUE	TYPE	SCALE	UNIT	FIELD	QUALITY	AGE	SOURCE
35	300	INT16	1	°C	cell_extremes.min_cell_temperature	1059	1350	CAN 0x704
36	301	INT16	1	°C	cell_extremes.max_cell_temperature	1060	1352	CAN 0x704
37	302	BYTES 8			min_voltage_address.min_voltage_address	1061	1354	CAN 0x705
38	306	BYTES 8			max_voltage_address.max_voltage_address	1062	1356	CAN 0x706
39	310	BYTES 8			min_temperature_address.min_temperature_address	1063	1358	CAN 0x707
40	314	BYTES 8			max_temperature_address.max_temperature_address	1064	1360	CAN 0x708
41	318	UINT32	100	Wh	energy.total_energy_charged	1065	1362	CAN 0x709
42	320	UINT32	100	Wh	energy.total_energy_discharged	1066	1364	CAN 0x709
43	322	UINT16	1	Ah	installed_capacity.installed_capacity	1067	1366	CAN 0x70A
44	323	BYTES 8			alarm_battery_1.alarm_state_battery_1	1068	1368	CAN 0x70B
45	327	BYTES 8			alarm_battery_1_address.alarm_battery_1_address	1069	1370	CAN 0x70C
46	331	BYTES 8			alarm_battery_2.alarm_state_battery_2	1070	1372	CAN 0x70D
47	335	BYTES 8			alarm_battery_2_address.alarm_battery_2_address	1071	1374	CAN 0x70E
48	339	BYTES 8			alarm_battery_3.alarm_state_battery_3	1072	1376	CAN 0x70F
49	343	BYTES 8			alarm_battery_3_address.alarm_battery_3_address	1073	1378	CAN 0x710
50	347	ASCII 8			serial_number_1.serial_number_part1	1074	1380	CAN 0x711
51	351	ASCII 8			serial_number_2.serial_number_part2	1075	1382	CAN 0x712
52	355	ASCII 8			serial_number_3.serial_number_part3	1076	1384	CAN 0x713
53	359	ASCII 24			serial_number	1077	1386	assembled
54	371	ASCII 16			battery_name	1078	1388	assembled

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CHAPTER 09

Battery Modules

Module *M* (1 to 80) has its own block of 128 registers starting at **2048 + 128 × (M − 1)**. Register 0 of the block is the module number and register 1 the number of fields (13). The **Value**, **Quality** and **Age** columns below are offsets from the start of the block. Modules beyond the installed count read quality 1, and reads of their values return exception 0B. A module's values refresh together.

ID	VALUE	TYPE	SCALE	UNIT	FIELD	QUALITY	AGE	SOURCE
0	**16**	INT16	1	°C	max_cell_temp	**64**	**88**	module response
1	**17**	INT16	1	°C	min_cell_temp	**65**	**90**	module response
2	**18**	INT16	1	°C	avg_temp	**66**	**92**	module response
3	**19**	UINT16	1		max_temp_sensor_index	**67**	**94**	module response
4	**20**	UINT16	1		min_temp_sensor_index	**68**	**96**	module response
5	**21**	UINT16	0.1	V	total_voltage	**69**	**98**	module response
6	**22**	INT16	0.1	A	current	**70**	**100**	module response
7	**23**	UINT16	1		state	**71**	**102**	module response
8	**24**	UINT16	0.001	V	max_cell_voltage	**72**	**104**	module response
9	**25**	UINT16	0.001	V	min_cell_voltage	**73**	**106**	module response
10	**26**	UINT16	0.1	V	pack_voltage	**74**	**108**	module response
11	**27**	UINT16	1		max_voltage_cell_index	**75**	**110**	module response
12	**28**	UINT16	1		min_voltage_cell_index	**76**	**112**	module response

> **Example.** Module 3 starts at 2048 + 128 × 2 = 2304. Its *current* (field 6) is the INT16 at **2326**, scale 0.1, with quality at **2374** and age at **2404**.

> **State.** The module's operating state as reported by the BMS: 0 = Initialising; 1 = Standby; 2 = Active (normal operation); 3 = Fault; 4 and above = Error. When a module reports 3 or higher, also read the battery bank's alarm and warning fields (unit 2, fields 9 to 24) and the three "alarm battery" fields. Cell indexes are zero-based within the module.

> **Not in this map.** Per-module serial numbers, per-module state of health and a per-module alarm bit field are not provided by the battery's module protocol. Use the bank-level serial, SOH and alarm fields, the three "alarm battery" fields (which name the alarming module's address) and each module's *state*.

CHAPTER 10

Revision History

REV.	DATE	CHANGE
1.0.0	17/09/2026	Initial release: SP PRO inverter and LiFe² battery bank
1.0.1	18/09/2026	Register map changed to fixed 16 and 32-bit scaled values with separate quality and age registers. Replaces the Rev 1.0.0 register map.
1.0.2	22/09/2026	Added SP PRO status code lists and notes (OI0010 Rev 13). No register changes.
1.0.3	24/09/2026	Reads of values with no data return exception 0B instead of 0 (see No data). Requires Nexus firmware 1.15.1 or later; earlier firmware reads 0 with quality 1. No address changes.
1.0.4	17/11/2026	Added full battery module state enumeration (register 23)

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