BMS comparison chart　　　　　　version: 1.01　　　　　　date: 16/06/2021

Ref.	Characteristic / Feature	TAO BMS	OrionJr. BMS2	REC Active BMS	123SmartBMS
1	**General**				
1.1	Architecture (*1)	centralized	centralized	centralized	distributed
1.2	number of cells in series	4 – 16	4 - 16	4	2 – 255
1.3	power consumption	0.39 W (4 cells)	1.1 W	0.28 W	?
1.4	fused cell connections	✔ (close to cells)	✔ (in BMS unit)	✔ ?	?
1.5	watertight enclosure	✖	✖	✔ (IP65)	✖
1.6	watertight connectors	✖	✖	✔	✖
1.7	simulation mode to validate installation and configuration	✔	✖	✖	✖
1.8	regular self check of all BMS functions	✔	✔	?	?
2	**Voltage**	✔	✔	✔	✔
2.1	cell voltage resolution	0.1 mV	0.1 mV	1 mV	?
2.2	cell voltage accuracy	0.2 mV	8 mV	3 mV	20 mV
2.3	pack voltage accuracy	1.8 mV	?	6 mV	?
2.4	open cell voltage (compensated for internal resistance)	✔	✔		
3	**Temperature**	✔	✔	✔	✔
3.1	Individual cell temperature	✔	✖	✖	✔
3.2	number of temperature sensors	4 – 16 (1 per cell)	3	2 (up to 8)	2 – 255 (1 per cell)
3.3	temperature accuracy	0.5 °C	?	0.5 °C	?
4	**Current**	✔	✔	✔	✔
4.1	measure principle	shunt	hall effect	shunt	hall effect
4.2	current resolution (250 A)	1 mA	?	19.5 mA	1250 mA
4.3	current accuracy (250 A)	< 1 %	?	?	2.5 A ?

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5	**Other measures**	✔	✔	✔	✔
5.1	cell internal resistance	✔	✔	✔	✖ ?
5.2	cell open voltage	✔	✔	✔	✖ ?
5.3	battery capacity	✔	✔	?	✖ ?
5.4	battery efficiency %	✔	?	?	✖ ?
5.5	state of charge (SOC)	✔	✔	✔	✔
5.6	compensate SOC for actual battery capacity	✔	✔	✔	✖ ?
5.7	state of health (SOH)	✔	✔	✔	✖ ?
6	**Cell balancing**	✔	✔	✔	✔
6.1	balance principle	Active	Passive	Active	Passive
6.2	bi-directional balancing	✔	✖	✔	✖
6.3	balance current	4 A	0.15 A	2 A (2.5A?)	1 A
6.4	start balance on high voltage	✔	✔	✔	✔
6.5	start balance on cell differential voltage	✔	✔	?	✖
6.6	use open cell voltage to initiate balancing	✔	?	?	?
6.7	report cell energy in or out for time period	✔	✖	✖	✖
7	**Current and voltage limits**	✔	✔	✔	✖
7.1	dynamic current limits	✔ (steps)	✔ (progressive)	✔	n/a
7.2	dynamic voltage limits	✔ (steps)	✖	✔ ?	n/a
7.3	based on cell voltage	✔	✔	✔ end of charge / discharge	n/a
7.4	based on cell voltage differential	✔	✖	✖ ?	n/a
7.5	based on cell temperature	✔	✔	✖ ?	n/a
7.6	based on cell temperature differential	✔	✖	✖ ?	n/a
7.7	based on SOC	✔	✔	✖ ?	n/a
7.8	critical BMS fault	✖	✔	✔ ?	n/a

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8	**Relay outputs**	✔	✔	✔	✔
8.1	number of outputs	6	3 (+3)	2 (+2 digital)	2
8.2	output type	dry relay contacts	open drain	dry relay contact	dry relay contact
8.3	hardware NO / NC selection per output	✔	✖ (NO)	✔	✔
8.4	software NO / NC selection per output	✔	✖ (NO)	✖	✖
8.5	max continuous current per output	2 A	0.175 A	0.7 A (DC)	1 A
8.6	max pulse current per output	7 A / 100 ms	0.175 A	2 A (AC)	1 A
8.7	galvanic isolation	✔	✖	✔	✔
8.8	internal output protection (fuse)	✔	✔	✔	?
8.9	relay activation on cell voltage	✔	✔	✔	✔
8.10	relay activation on cell voltage differential	✔	✖	✖	✖
8.11	relay activation on cell temperature	✔	✔	✔ ?	✔
8.12	relay activation on cell temperature differential	✔	✖	✖ ?	✖
8.13	relay activation on SOC	✔	✔	✔ ?	✖ ?
8.14	charge management algorithm (control chargers between min/max SOC + periodic full charge)	✔	✖	✖	✖
8.15	number activation criteria per relay	up to 20 combination of above	algorithm combination of above	3 ? volt, temp, soc?	2 ? volt, temp
8.16	user defined criteria to reset a relay output	✔	✔	✔	soc only?
8.17	user defined time delay between fault and relay activation	✔	?	?	?
9	**Other outputs**	✖	✔	✔	✖
9.1	analog outputs	✖	✔ 3 (CCL, DCL, SOC)	✖	✖
9.2	digital outputs	✖	✖	✔ 2 (15 mA / PWM)	✖
10	**Advanced warnings**	✔	✖	✖	✖
10.1	number of user defined warnings	up to 20	n/a	n/a	n/a
10.2	activation criteria	same as relay outputs	n/a	n/a	n/a
10.3	visual and audible warning	remote status panel	n/a	n/a	n/a

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11	**CAN bus interface**	✔	✔	✔	✖
11.1	number of interfaces	1	1	1	n/a
11.2	standard message ID (11 bits)	✔	✔	✔	n/a
11.3	extended message ID (29 bits)	✔	✔	✖	n/a
11.4	CAN bus speed (Kbps)	125, 250, 500, 1000	125, 250, 500, 1000	125, 250, 500, 1000	n/a
11.5	standard messages for popular equipment	✔	✔	✔	n/a
11.6	custom messages	✔	✔	✖ ?	n/a
12	**Remote status & control panel**	✔	✔	✖	✖
12.1	normal operation indication	✔	✔	n/a	n/a
12.2	balancing in progress indication	✔	✖	n/a	n/a
12.3	number of led to monitor cell / BMS status	4 2 orange + 2 red	1	n/a	n/a
12.4	buzzer	✔	?	n/a	n/a
12.5	SOC display	✖	✔	n/a	n/a
12.6	relay reset button	✔	✖	n/a	n/a
12.7	emergency shutdown button	✔	✖	n/a	n/a
13	**PC wired connectivity**	✔	✔	✔	✖
13.1	USB	✔	✖ ?	✖ ?	n/a
13.2	RS232 orRS485	✖	✔	✔	n/a
13.3	Windows application	✔	✔	✔	n/a
13.4	Mac application	✔	✖	?	n/a
13.5	Linux application	✖	✔	?	n/a
13.6	Program / configure the BMS	✔ GUI	✔ GUI	✔ GUI / line protocol	n/a
13.7	monitor cell and battery condition	✔	✖ ?	✔	n/a
13.8	diagnostics	✔	✔	✖ ?	n/a
13.9	simulation testing	✔	✖	✖	n/a
13.10	save settings to a file	✔	✔	✖ ?	n/a
13.11	load settings from a file	✔	✔	✖ ?	n/a

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14	**Wireless connectivity**	✓	✓	✓	✓
14.1	Bluetooth	✗	✗	✗	✓
14.2	dedicated application	✗	✗	✗	✓
14.3	WiFi	✓	✓	✓	✗
14.4	use standard web browser	✓	✓	✓	✗
14.5	WiFi access point	✓	?	✓	✗
14.6	display battery measures	✓	✓	✓	✓
14.7	display cell measures	✓	✓ min max volt only?	✓	✓
14.8	edit BMS parameters	✓	✗	✓	✓
14.9	run diagnostics	✓	✗	?	✗
14.10	run cell voltage and temperature simulation	✓	✗	✗	✗
14.11	view and analyze events log	✓	✓	?	✗
14.12	view and analyze measures history	✓	?	?	✗
15	**Display monitor**	✓	✗	✓	✗
15.1	size	3.5 "	n/a	2.8 "	n/a
15.2	control	touch	n/a	touch	n/a
15.3	battery measures	✓	n/a	✓	n/a
15.4	cells measures	✓	n/a	✓	n/a
15.5	relay outputs status	✓	n/a	✗	n/a
15.6	events log	✓	n/a	✗	n/a
15.7	graph measures history	✓	n/a	✗	n/a

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16	**Data logging**	✔	✔	✔	✘
16.1	measures log	✔	✔	✔	n/a
16.2	events log	✔	✔	✘ ?	n/a
16.3	retained log history	> 10 years	?	?	n/a
16.4	history storage	time series	discrete files	discrete files	n/a
16.5	local graphing and analysis application	✔ WiFi + browser	✔ Wired PC + utility app	✔ WiFi + browser	n/a
16.6	cell warranty data	✔	✔	?	n/a
17	**Cloud data access**	✔	✔	✘	✘
17.1	automatic data upload & synchronization	✔	?	n/a	n/a
17.2	events log	✔	?	n/a	n/a
17.3	measures history	✔	?	n/a	n/a
17.4	view live data	✔	?	n/a	n/a
17.5	cloud data analysis tools	✔	?	n/a	n/a
17.6	can be used as data backup	✔	?	n/a	n/a
17.7	history time span	unlimited	?	n/a	n/a