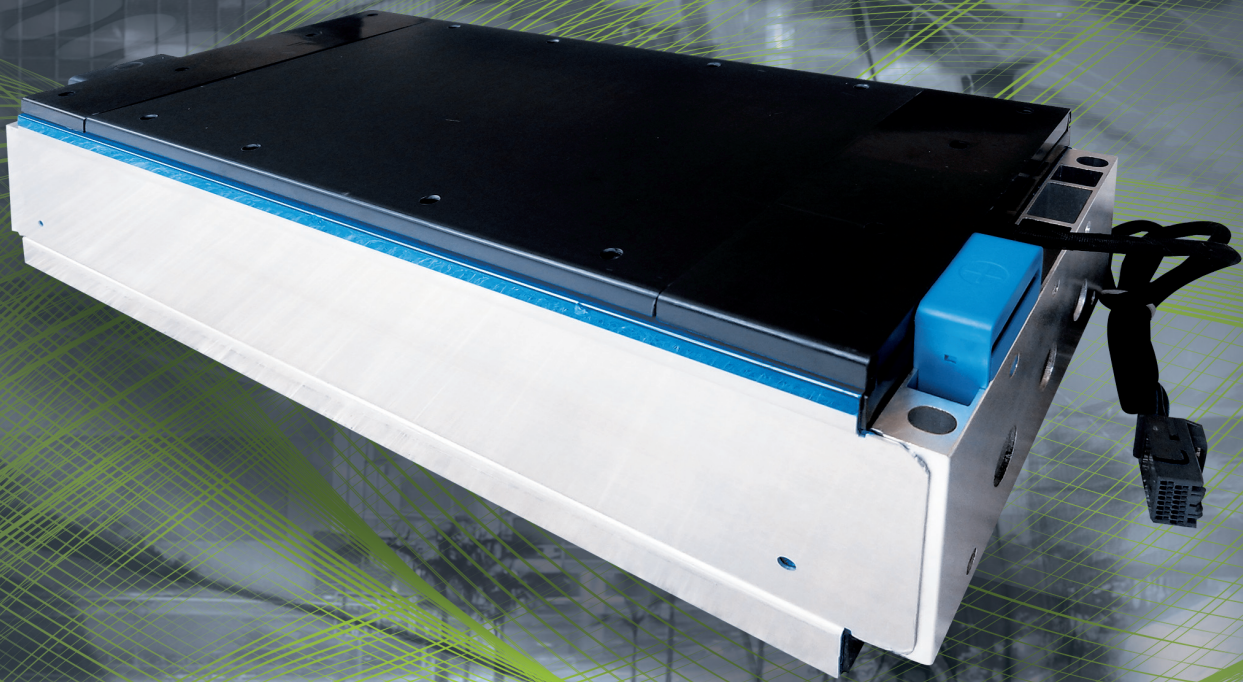




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1.88 kWh Battery Module 3P4S

**High Cycle Life Battery With Flexible Connections
In Parallel & Series For Various Applications**

Range

This product specification applies to the VDA standard battery module 3P4S manufactured by MW Motors s.r.o. It must be tested in strict accordance with the method specified in this specification. If there is any dissent to the test project or test method, please contact MW Motors s.r.o. for coordination. Some of the contents not covered in this specification are under the national standard.

Product type and model

1. Product Type: VDA Standard Battery Module
2. Product Model: 3P4S Positive Discharge Module

Main Cell technical parameters

No.	Items	Technical Parameters	Remarks													
1	Rated Capacity	43Ah	Cell voltage range is 2.7V-4.2V													
2	Nominal voltage	3.65V														
3	AC internal resistance	≤2.0mΩ														
4	Size	27×148×97	Maximum size in mm													
5	Weight	0.86kg														
6	Maximum charging voltage	4.2V														
7	Maximum continuous charging current	43A	Maximum continuous charging current 1.0C													
8	Minimum discharge voltage	2.7V														
9	Maximum sustained discharge current	64.5A														
10	DCIR	≤6.0mΩ														
11	Operating temperature	-20°C-55°C														
12	Charging temperature	0°C-55°C														
13	Storage temperature	-20°C-35°C														
14	Life cycle	1200	Normal temperature environment: 25±5°C, 2.8V-4.195V, 1C charge 1C discharge													
15	Self discharge rate	<table border="1"> <thead> <tr> <th></th> <th>Loss</th> <th>Recovery</th> </tr> </thead> <tbody> <tr> <td>1st month</td> <td>4.8%</td> <td>100.3%</td> </tr> <tr> <td>2nd month</td> <td>6.5%</td> <td>98.1%</td> </tr> <tr> <td>3rd month</td> <td>7.2%</td> <td>97.9%</td> </tr> </tbody> </table>			Loss	Recovery	1st month	4.8%	100.3%	2nd month	6.5%	98.1%	3rd month	7.2%	97.9%	Normal temperature environment: 25±5°C, fully charged
			Loss	Recovery												
		1st month	4.8%	100.3%												
2nd month	6.5%	98.1%														
3rd month	7.2%	97.9%														
16	Positive electrode materials	Nickel cobalt manganese ternary material														
17	Shell materials	Aluminum														



Warning: All the parameter list in this document are standard substance, any value set out of this range need calibration by MWM.



Warranty: Full 3 year warranty IF the part is used in a vehicle produced by MW Motors & installed by a MW Motors staff member. Otherwise no warranty.



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Main Module parameters

Basic parameters		Remarks
Mode	3P4S	
Maximum instantaneous discharge current (duration $\leq 10s$)	322.5A(2.5C)	Limited to 21°C-25°C only
Maximum continuous charging current	129A	1C
Default state of charge	About 50%	Default voltage 3.65-3.7V
Nominal voltage	14.6V	
Single 3P working voltage	2.7-4.2V	Set by system control strategy 2.8V-4.195V
Default capacity	$\geq 129Ah$	Normal temperature environment: 25 \pm 5°C, tentative value, will be revised after the supplementary technical agreement
Rated capacity	129Ah	Single 3P charging up to 4.2V discharging up to 2.7V
Module internal resistance	$\leq 2m\Omega$	
Dimensions	366 \times 153 \times 108 mm	
Module weight	11.5kg	
Voltage consistency	$\leq 10mv$	Voltage difference between each bunch after shipping
Insulation	$\geq 550M\Omega$	
Withstand voltage	2000V	No spark, no flashover, no breakdown
Outbound direction	/	A total set of 24 modules, 12 positive electrode outlet wire, 12 negative electrode outlet wire
Discharge temperature	-20°C-55°C	
Charging temperature	-5°C-55°C	
Elevation	$\leq 2000m$	
Short-term storage temperature range (within 1 month)	-10°C-45°C	
Battery module life cycles (temporary, specifically based on technical agreement)	1200	Normal temperature environment: 25 \pm 5°C, 1C charge 1C discharge to 100% DOD, residual nominal capacity 80%, single 3P voltage range 2.8V-4.195V
Heating film	N/A	

Battery shape, installation size, and electrical interface definition

The temperature sensor model and parameters are shown in the annex, and the module outlet length is tentatively set to 100 \pm 10mm.

Packing method as shown below, divided into the upper and lower layers



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Module performance test requirements

Appearance requirements

The battery module should be free of rust, mildew, plating, cracking, deformation, etc.; the series and parallel connection are good, the marked content is clearly visible.

AC Impedance

The maximum difference in AC impedance between static modules shall not exceed $0.3m\Omega$.

-20 °C discharge perform.

When the battery module at $-20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, the discharge capacity should not be lower than 70% of the rated capacity.

Dimensions and weight requirements

The dimensions and quality of the module shall be in accordance with the technical conditions of the products provided by the battery manufacturer. The maximum difference between the quality of the modules shall not exceed 2% of the average value.

Room temperature discharge capacity

When testing the battery module, 1C is charged to 4.19V, 0.2C is charged to 4.19V, 0.1C is charged to 4.195V full, and when placed at room temperature. Its 1C discharge capacity is not lower than 100% of the specified rated capacity, and the temperature rise is not higher than $20\text{ }^{\circ}\text{C}$.

Storage

The recovery capacity is not lower than 95% of the rated capacity when the battery module is stored at $25\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for 90 days.

Open circuit voltage

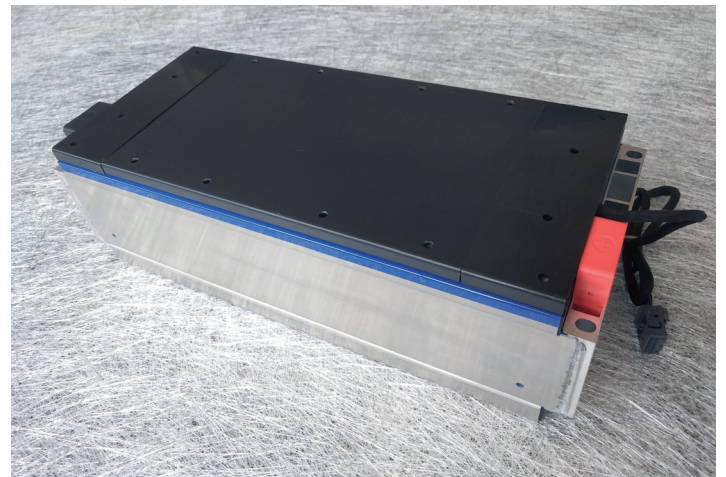
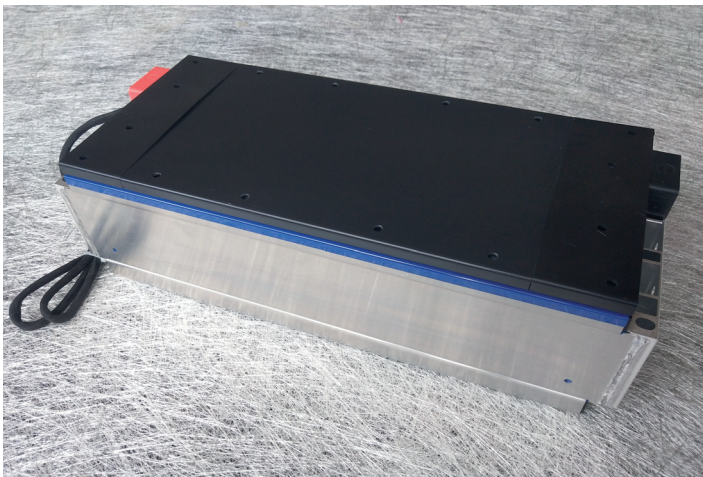
Within 15 days leaving from the factory, the maximum difference between the single 4P and open circuit voltage should be no more than 15mV.

40 °C discharge perform.

When the battery module at $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$, the discharge capacity should not be lower than 95% of the rated capacity.

Safety

The safety of the single battery should meet the requirements of GB/T-31485-2015, and should not explode, ignite or leak.



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Acceptance test items

1. Appearance meets requirements;
2. Size meets requirements;
3. Performance test meets 6.3-6.9;
4. Shipment inspection report (in electronic form) for every shipment will be provided to the assigned personnel in the client's quality department for each shipment and a paper copy of the shipment inspection report will also be attached with the shipment.

Battery reliability and warranty requirements

Battery module cycle life meets 100% DOD1C charge 1C discharge \geq 1200 times, and the capacity is not lower than 80%.

Battery Module Safe Use and Precautions

1. It is forbidden for non-professionals to disassemble the battery module;
2. It is forbidden to short circuit the positive and negative electrodes of the battery module with the conductor;
3. Prohibit the battery module from approaching the high-temperature heat source;
4. Charging under direct sunlight is forbidden;
5. The battery module is prohibited from being placed in a damp place or water;
6. It is forbidden to apply external force to the battery module or drop the battery from a height;
7. Strictly comply with the technical parameters during use.

Revision of the product specification

The company has the right to amend the product specification. After the revision of the product specification, MW Motors s.r.o. will notify the customer.



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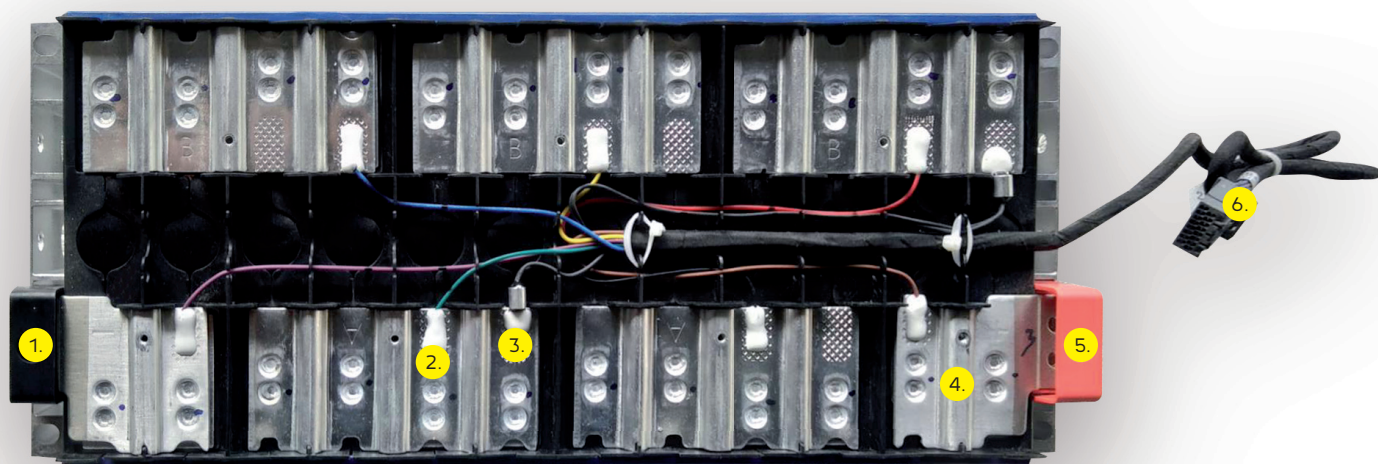


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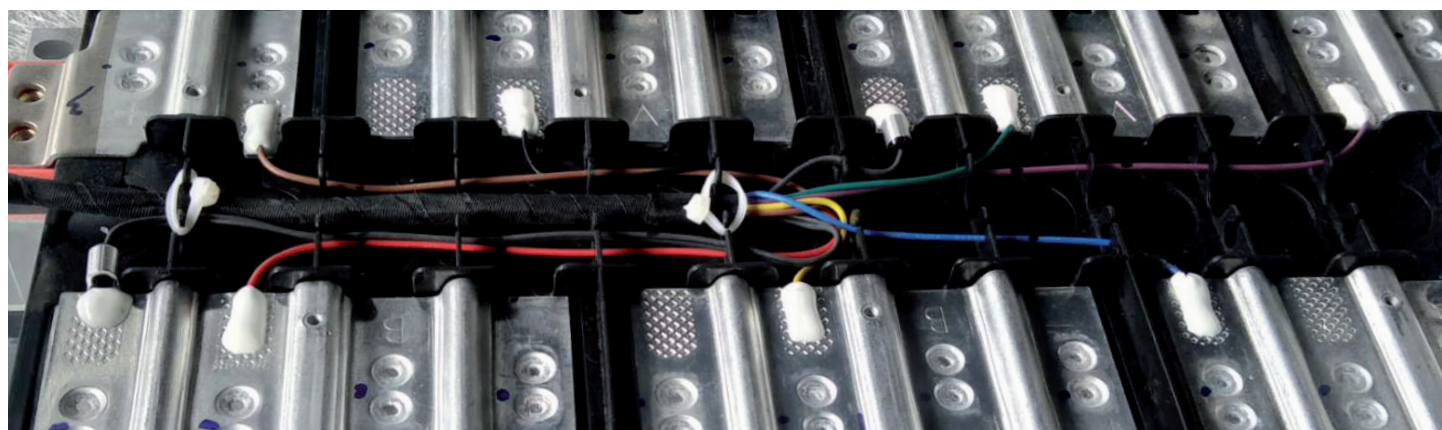


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Product Interior View



- 1. Negative electrode
- 2. Voltage detector
- 3. Temperature detector
- 4. Connection strap
- 5. Positive electrode
- 6. BMS connector



Related Modules

Cell module	Numbers of parallel & series connection	Rated voltage (V)	Rated capacity (Ah)	Rated power (kWh)	Dimension			Weight (kg)	Energy Density (Wh/kg)
					L (mm)	W (mm)	H (mm)		
3.65V/43Ah	2P6S	21.90	86	1.88	365	155	113	11.50	163.47
3.75V/40Ah	4P3S	11.25	160	1.80	406	153	108	11.80	152.54
3.65V/43Ah	3P4S	14.60	129	1.88	366	153	108	11.50	163.47



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