

Technical specifications	MGRS12S4P176 44 V / 176 Ah	MGRS14S3P132 51 V / 132 Ah	MGRS16S3P132 58 V / 132 Ah	MGRS24S2P088 88 V / 88 Ah
Technology	Lithium-Ion NMC			
Cell configuration	12S4P	14S3P	16S3P	24S2P
Nominal voltage	43.8 V	51.1 V	58.4 V	87.6
Nominal capacity	176 Ah	132 Ah	132 Ah	88 Ah
Nominal energy	7.7 kWh	6.7 kWh	7.7 kWh	7.7 kWh
Weight	75 kg	69 Kg	75 kg	75 kg
<b>Discharge</b>				
Discharge cut-off voltage	36.0 V	42.0 V	48.0 V	72.0 V
Recommended discharge current (2C) <sup>1</sup>	352 A	264 A	264 A	176 A
Maximum continuous discharge current (3C) <sup>1</sup>	500 A <sup>2</sup>	396 A	396 A	264 A
<b>Charge</b>				
Maximum charge voltage (4.20V per cell)	50.4 V	58.8 V	67.2 V	100.8 V
Recommended charge voltage (4.05V per cell)	48.6 V	56.7 V	64.8 V	97.2 V
Recommended charge current (1C) <sup>1</sup>	176 A	132 A	132 A	88 A
Maximum continuous charge current (2C) <sup>1</sup>	352 A	264 A	264 A	176 A
<b>Configuration</b>				
Series configuration	Yes, up to 900 V			
Parallel configuration	Yes, unlimited			
Redundant mode	Yes Using multiple Master BMS's			
<b>Cycle Life <sup>3</sup></b>				
80% depth of discharge	> 8000 cycles			
<b>Environmental</b>				
Recommended operating temperature	+15 to +30 °C			
Operating temperature charge	0 to +40 °C			
Operating temperature discharge	-30 to +50 °C			
Storage temperature (< 50% SoC)	-40 to +60 °C			
IP-Protection class	IP65			
Thermal management	Liquid cooling/heating			
Humidity (non-condensing)	≤ 95 %			
<b>Connections</b>				
Communication	CAN-bus ( M12 connection)			
Power connections	Amphenol PowerLok™ 300 <sup>4</sup> / 500 series			
<b>Safety</b>				
Batteries are always used in combination with a MG Master.	Integrated Slave BMS Passive cell balancing Redundant BMS			
Compatible BMS master	MG Master LV, MG Master HV			
Safety features	Interlock circuit in HV and CAN-Bus connectors Cell level thermal runaway propagation protection Automatic thermal runaway suppression valve input			
Type approval	DNV-GL <sup>5</sup> / Lloyds Register			
In accordance with	IEC 62619:2017 IEC 62620:2014			

<sup>1</sup> Only valid when a proper designed liquid cooling circuit is running.

<sup>2</sup> Limited by the maximum continuous current rating of the Amphenol PowerLok™ 500 series with 150 mm<sup>2</sup> cable.

<sup>3</sup> End-of-Life is 70% of initial capacity at 25 °C. Charge up to max. 4.05V per cell.

<sup>4</sup> Continuous current ratings must be de-rated to ≥ 300 A.

<sup>5</sup> Type approval pending.

# RS Series

## High performance Lithium-Ion batteries



- ▶ Safer by design
- ▶ Cell level propagation protection
- ▶ High voltage solutions: Up to 900 V
- ▶ Plug and Play installation: Automatic configuration
- ▶ Flexible system design
- ▶ Redundant BMS
- ▶ Liquid cooling



**Marine**  
Hybrid propulsion Full-  
electric propulsion

**Industrial**  
Peak shaving  
UPS systems

**Off-grid/Solar**  
Self-consumption  
Off-grid solutions

**Automotive**  
Electric & hybrid vehicles  
Mobile power sources

## RS Series

High safety and flexible system configurations were the design principles during the development of the RS series Lithium-Ion battery. A modular and compact design makes system integration more flexible, especially in refit projects. Adding a redundant BMS and a unique cell-to-cell propagation protection takes safety to the next level. The liquid thermal management keeps the battery cells on temperature to extend cycle life and to improve the peak power performance. These features makes this battery suitable for large energy storage applications as well as small peak power packs in hybrid solutions.



RS battery modules 44 V up to 88 V

- ▶ Safer by design
- ▶ Redundant battery management system
- ▶ Liquid cooling
- ▶ Cell level propagation protection
- ▶ Compliant with highest safety standards
- ▶ Flexible system design



### High power capability

The liquid cooling system makes it possible to use the RS series battery in high peak power applications, like hybrid solutions where high power demands for short times are required. The charge/discharge power of the module can go up to 3C.

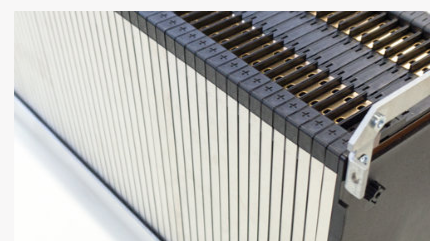
## Redundant BMS

Each battery module has an integrated BMS measuring cell voltages, temperatures and controls balancing. This BMS communicates with a battery management controller like the MG Master HV. If the measured parameters exceed the limits, the battery management controller will automatically take action. Besides this software protection, a redundant BMS is added to each battery module having an independent hardwired protection mechanism to achieve maximum safety.



### Unique Cell-to-Cell propagation protection

The unique cell-to-cell propagation protection consists of an active and passive protection barrier between each cell. These barriers are integrated in the advanced cell cassette design. One of the main features of these protections is to remove the heat from any cells with a thermal runaway event as quickly as possible to prevent other cells from heating. This solution mitigates the risk of large uncontrolled battery fires.



## Battery management controllers

Protecting, monitoring and controlling a battery system is very important to create a safe, reliable and easy-to-use system. The MG Master LV or HV is the safety and control unit of the battery system. It protects the connected battery modules against over-charging, over-discharging, over-temperature, under-temperature and controls the balancing of the battery cells. Besides a safety function, the MG Master LV or HV monitors and tracks other important parameters to give insight in the battery status and energy consumption. MG's battery system CAN-bus protocol can be used to communicate with other equipment and multi functional display's (MFD's) by NMEA2000 and web interface. The MG Master LV and HV ensure an easy and proper installation. Thanks to the built-in safety components a reliable installation is guaranteed.

### MG Master LV



12 V to 96 V  
150 A to 1000 A

### MG Master HV



144 V to 800 V  
300 A and 500 A

## Energy storage systems

System flexibility is one of the main key features of all MG products. Combining RS series batteries together with one of the Master BMSs creates a powerful system for a complete range of applications. Redundant systems can be made by connecting multiple Master BMSs in parallel to increase system reliability and capacity.

## Peak shaving system example: 584 V / 132 Ah / 77 kWh / 750 kg

