Innovation in energy storage

Version 1.2 – 30-05-2023

MG RS PPS Tank

MGRS00100017

- Manual -

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1 GENERAL

Before continuing read the instructions in this chapter carefully and be sure the instructions are fully understood. If there are questions after reading the instructions please consult MG Energy Systems.

1.1 Document history

Table 1 - Document history

Version	Date	Changes	Revision author
1.0	06-12-2021	Initial document.	M. Scholten
1.1	31-03-2023	- Updated example schematic in chapter 6.1.2 - Added chapter “Maintenance”	M. Scholten
1.2	31-05-2023	- Added technical specs.: Material/weight	M. Scholten

1.2 Terms, definitions, and abbreviations

Table 2 - List of terms, definitions, and abbreviations

Battery cell	The smallest building block in a battery, a chemical unit with a positive and negative terminal.
Battery cell cassette	An assembly of a cassette with a battery cell.
Battery cell block	An assembly of multiple battery cassettes.
Battery module	An assembly of battery cell cassettes including BMS.
Battery pack	Consists of one or more battery modules in combination with a battery management controller (BMS).
Battery system	Consists of one or multiple battery packs connected to a common DC-bus.
Battery management controller	Controls, manages and protects one or multiple battery modules.
BMS	Battery Management System that is integrated in the battery pack.
Master BMS	Shorthand for a *battery management controller* in a MG energy systems battery system.
Slave BMS	The part of the BMS that is integrated in the battery module.
Redundancy BMS	The redundancy BMS that is integrated in the battery module.
PPS	The Propagation protection system which is used to stop cell-to-cell thermal runaway propagation.

1.3 This revision

This revision replaces all previous revisions of this document. MG Energy Systems B.V. has made every effort to ensure that this document is complete and accurate at the time of writing. In accordance with our policy of continuous product improvement, all data in this document is subject to change or correction without prior notice.

1.4 Scope

This product manual contains technical description, installation, safety and commissioning instructions and other relevant information for the RS PPS tank assembly.

1.4.1 Document structure

This document is structured into two categories:

- System design: Guidelines and general recommendations for system integrators and designers.
- Installation, commissioning and maintenance: Procedures and instructions for installers and maintenance personnel.

1.5 Related documents

More related documents for the can found on our Download Center.

2 SAFETY INSTRUCTIONS

2.1 Safety message level definition

Table 3 - Safety message levels overview

WARNING:
A hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION:
A hazardous situation which, if not avoided, could result in minor or moderate injury.

LIMITATION:
A limitation to use which must be considered for safe use of the equipment.

ELECTRICAL HAZARD:
The possibility of electrical risks if instructions are not followed in a proper manner.

NOTICE:

- A potential situation which, if not avoided, could result in an undesirable result or state.
- A practice not related to personal injury.

2.2 User health and safety

2.2.1 General precautions

This product is designed and tested in accordance with international standards. The equipment should be used according the intended use only.

ELECTRICAL HAZARD:
The product is used in combination with a permanent energy source (battery). Even if the equipment is switched off.

- Wear applicable personal protective equipment when working on a battery system.
- Use insulated tools during when working on a battery system.
- Make sure the locale regulations for working on battery systems are followed.

2.2.2 Qualifications and training

The personnel responsible for the assembly, operation, inspection, and maintenance of the battery system must be appropriately qualified. The user company must do the following tasks:

- Define the responsibilities and competency of all personnel working on the battery system.
- Provide instruction and training.
- Ensure that the contents of the operating and safety instructions have been fully understood by the personnel.
- Check the local safety rules and guidelines they have higher priority over the manufacturers specification in this manual in case of regulatory conflicts.

Instruction and training can be carried out by MG Energy Systems B.V. by order of the user company.

2.2.3 Non-compliance risks

Failure to comply with all safety precautions can result in the following conditions:

- Death or serious injury due to electrical, mechanical, and chemical influences.
- Environmental damage due to emission of hazardous substances.
- Product damage.
- Property damage.
- Loss of all claims for damages.

2.2.4 Unacceptable modes of operation

The operational reliability of this product is only guaranteed when it is used as intended. The operating limits on the identification tag and in the data sheet may not be exceeded under any circumstances. If the identification tag is missing or worn, contact MG Energy Systems B.V. for specific instructions.

3 GENERAL DESCRIPTION

The battery module is equipped with a thermal Propagation Prevention Systems (PPS). At the rear of each battery module a connection point is available to connect a pressure tank (PPS tank) with fluid to prevent cell-to-cell and module-to-module thermal runaway propagation.

This PPS tank can be connected to multiple battery modules in parallel. It is recommended to install at least one PPS per six batteries. It is mandatory to use at least one PPS per battery string.

3.1 Functional description

The PPS tank is filled with 12 litre of fluid under a pressure of 2.5 Bar. If a thermal runaway event occurs in one of the connected battery modules, the pressure relief valve opens. At this moment the PPS inlet on the battery will be opened as well and fluid from the PPS tank flows into the battery module and cools down the cell(s) to stop thermal propagation. The PPS is fully mechanical and triggered by over-pressure inside the battery enclosure. This design is not depending on localized temperature acting or electronics malfunctioning, only acting in case of a thermal runaway induced pressure increase.

4 MODELS

There is only one model of PPS tank available.

Article number	Description	Remarks
MGRS00100017	RS Series PPS tank 25 liter	

5 OVERVIEW

This chapter shows an overview of the PPS tank and its connections.

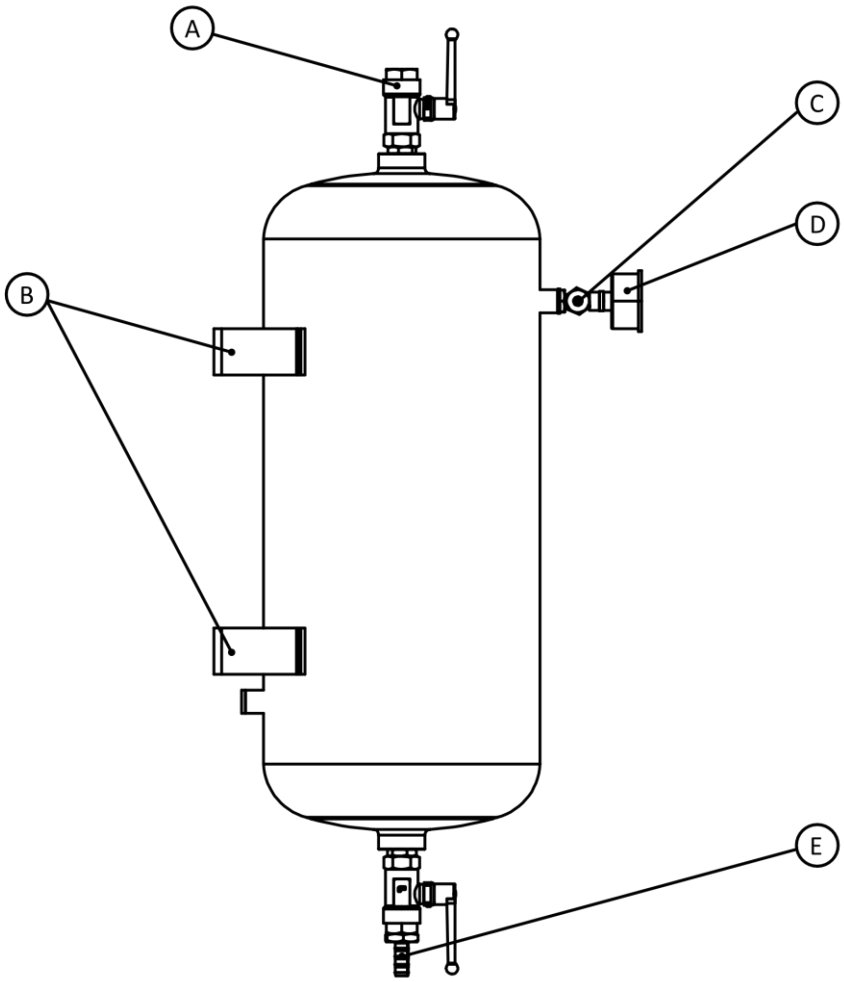

Figure 1 - PPS tank connection overview

Table 4 - Module connection overview

Part	Description
A	Filling point including valve. 15 mm.
B	Mounting points. 14 mm holes.
C	Schrader valve for pressurizing the PPS tank.
D	Pressure gauge.
E	PPS fluid outlet (connections to battery modules). Use 9 mm inner hose diameter.

6 INSTALLATION

Read the installation instructions in this chapter before commencing installation activities.

6.1 Installation procedures

Below the basic installation procedures.

1. Mounting the PPS tank;
2. Connect the PPS tank to the battery modules;
3. Pressure test of the PPS circuit;
4. Fill and pressurize the PPS tank;

6.1.1 **Mounting the PPS tank**

The PPS tank must be mounted vertically to maintain the fluid at the bottom of the outlet.

Use the four mounting point as shown in Figure 2 to mount the PPS tank. These are 14 mm holes.

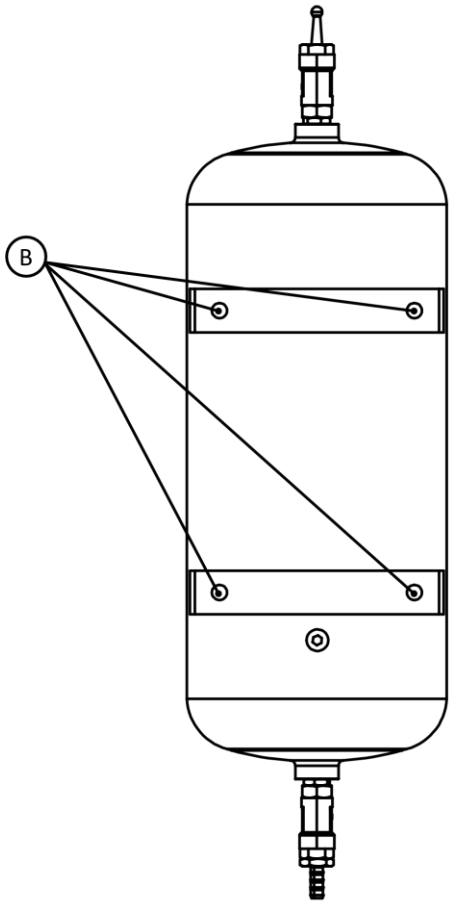

Figure 2 - Mounting points

NOTICE:
The maximum inclination angle is ±7.5 °. Main reason for this is the functioning of the PPS.

6.1.2 Connecting the PPS tank to the battery modules

Connection from the PPS tank to all battery modules must be in parallel. Use hoses and/or rigged pipes for all connections. Figure 3 shows the example schematic. For each battery module a T-coupling can be used.

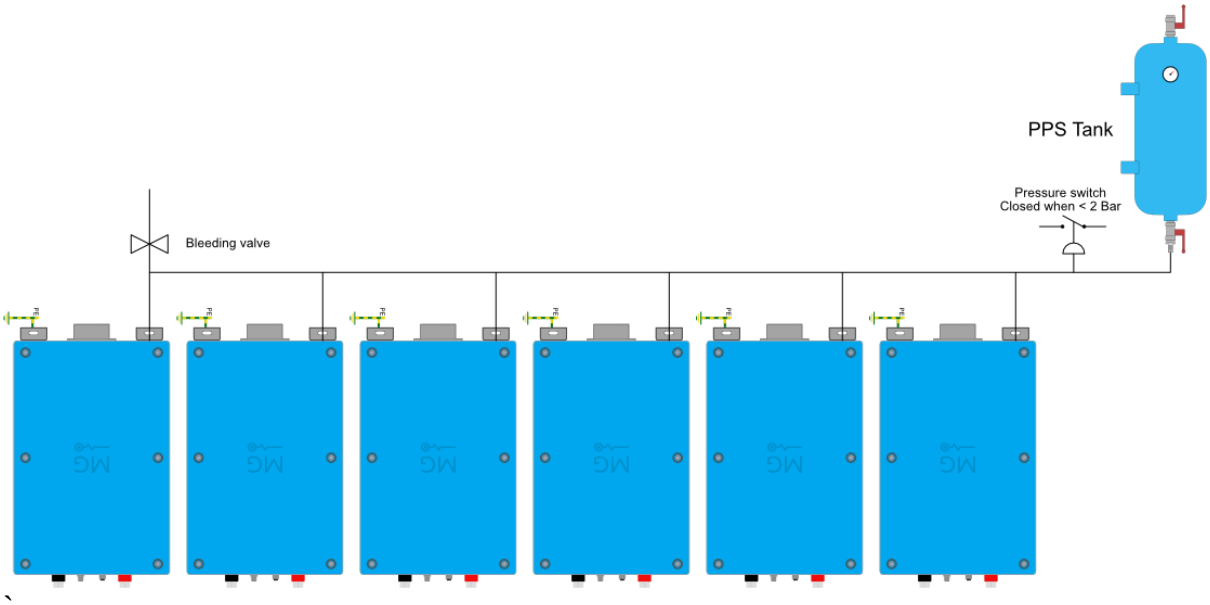

Figure 3 - PPS tank connection example

NOTICE:
It is highly recommended to install a pressure switch at the PPS system to monitor the pressure. If the pressure is < 2.0 Bar it need to be pressurized to 2.5 Bar again. Some regulation require a “failure leakage alarm”.

NOTICE:
Multiple battery modules can be connected in parallel to one Propagation Protection System. It is recommended to install at least one PPS per six batteries. It is mandatory to use at least one PPS per battery string.

6.1.3 Pressure test of the PPS circuit

Before filling the PPS tank first perform a pressure test to check if all connection are leak free.

Procedure for pressure testing:

1. Close the fill valve (A);
2. Pressurize the tank to 2.5 Bar using a compressor on the Schrader valve (C). Make sure the outlet valve (E) is open;
3. Check the pressure after 15 minutes;
4. Check the pressure after 2 hours. If the pressure is below 2.5 Bar then there is a leakage in the system.
5. Troubleshoot in case of a leakage and repeat the procedure.

6.1.4 Fill and pressurize the PPS tank

The PPS tank can be filled and pressurized when the PPS system is leak free. For filling medium use a mixture of demineralized water and Ethylene Glycol including corrosion inhibitor. With a maximum Ethylene Glycol percentage of 50%.

Procedure for filling:

1. Fill the PPS tank with 12 liters of fluid at connection A;
2. Close the filling valve;
3. Pressurize the tank to 2.5 Bar using a compressor on the Schrader valve (C). Make sure the outlet valve is open; Use the bleeding valve in the system to de-air the pipes;
4. PPS system is armed and ready for use;

6.2 MAINTENANCE

It is recommended to check the PPS pressure and liquid level on a regular bases. The pressure must be in range of 2 - 3 bar gauge pressure and the level of fluid must be 12 litres. Frequency of this check depends on the applicable rules, but must be done at least annually or the system can be applied with a pressure switch connected to an alarm system.

7 TECHNICAL SPECIFICATIONS

Weight	12.1 kg (not filled)
Material and surface finish	Steel, galvanized
Dimensions	See link in chapter 7.1

7.1 DIMENSIONS

Dimensions of this product can be downloaded from the MG Download Center.

https://downloads.mgenergysystems.eu/rs/drawings/pps-tank-assembly

8 CONTACT DETAILS

For specific questions please feel free to contact us.

8.1 Sales

For sales related questions, please contact a local dealer.

For specific sales questions, please contact our sales team:

MG Sales team
sales@mgenergysystems.eu

8.2 Technical support

For technical support, please follow the steps below:

1. Consult the Manual.
   Manual can be found on the MG Download Center.
2. Watch the Installation Videos.
   Videos can be found on MG's You Tube channel.
3. Contact MG Service Point.
4. Contact MG technical support.
   Send an email with your technical questions to support@mgenergysystems.eu.