










Commissioning Instructions and Report

ENGLISH

Dry pre-charged traction batteries Hawker Perfect PzS and PzB

This document is complementary to Instructions for use Hawker® Perfect Plus™.

SAFETY INSTRUCTIONS:

	<ul style="list-style-type: none"> Pay attention to the operation instruction and fix them close to the battery. Work on batteries to be carried out by skilled personnel only! 		<ul style="list-style-type: none"> Risk of explosion and fire, avoid short circuits! Caution: Metal parts of the battery are always live. Do not place tools or other metal objects on the battery!
	<ul style="list-style-type: none"> Use protective glasses and clothes when working on batteries. Pay attention to the accident prevention rules as well as DIN EN 50272-3 and DIN EN 50110-1. 		<ul style="list-style-type: none"> Electrolyte is highly corrosive.
	<ul style="list-style-type: none"> No smoking! Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode. 		<ul style="list-style-type: none"> Batteries and cells are heavy. Ensure secure installation! Use only suitable handling equipment e.g. lifting gear in accordance with VDI 3616.
	<ul style="list-style-type: none"> Acid splashes in the eyes or on the skin must be washed with water. In case of accident consult a doctor immediately! Clothing contaminated by acid should be washed in water. 		<ul style="list-style-type: none"> Dangerous electrical voltage!
			<ul style="list-style-type: none"> Pay attention to the hazards that can be caused by batteries

Ignoring the operation instructions, repair with non-original parts or using additives for the electrolyte will render the warranty void. For batteries according to the ATEX directive 94/9 EC, the instructions for maintaining the appropriate protection class during operation must be complied with (see relevant certificate).

The completed commissioning reports should be sent back to the battery manufacturer!

Description

The dry charged batteries are supplied charged but without electrolyte inside the cells. On request containers with electrolyte ready to use can be supplied. The negative plates are protected against oxidation. Each cell is closed by a cap during the storage. Store the cells or the battery in a dry and cool zone, wind moisture, rain and snow free. Do not store more than 2 years. It is very important not to remove the caps.

1. Checking

The battery installation and the charging equipment should be inspected to ensure they are in perfect mechanical condition. All cables must be connected to ensure a good contact, taking care that the polarity is correct. All threaded connectors in the circuit must be tightened in order to ensure a reliable contact. For bolt on connectors, check the torque loading of the polscrews:

M 10

25 ± 2 Nm

A check must be made to ensure the charger equipment is ready for operation. Ensure that the polarity is correct (positive to positive and negative to negative). Before filling the cells care should be taken to ensure that the specifications DIN EN 50272-3 or currently applied in the country of use with regard to the installation and ventilation have been complied with.

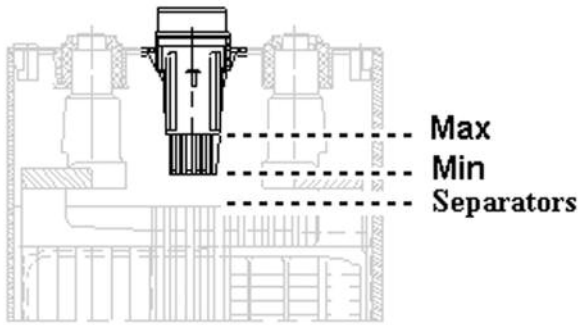
2. Filling of cells

If the cells are supplied in bulk, put them in the battery crate according to the connecting instruction. If the filling electrolyte is not supplied by EnerSys®, the impurities levels must respect DIN 43530-2. The filling acid must have a specific gravity (S. G.) in accordance with the following table. If the s.g. of available filling electrolyte is different from the values mentioned in table 1, take required precautions to prepare the mix of acid and water.

Table 1

Cell range	Filling S. G. [kg/l]		Nominal S. G. [kg/l] to be obtained after charge
	30°C	15°C	
PzS and PzB	1.28	1.29	1.29

The temperature of the acid used for filling should be between 15°C and 30°C. The temperature must be measured and recorded before filling. After removing the transport plugs, the cells should be filled until the anti-surge baffle or the top of the separator. Acid resistant filling equipment should be used for this. Transport plugs are not permissible for use when operating the battery. They must be replaced by vent plugs.



Higher temperatures reduce the specific gravity of the electrolyte, lower temperatures increase it. The temperature correction factor for the specific gravity is $-0.0007 \text{ kg/l per } ^\circ\text{C}$.
 Example: A specific gravity of the electrolyte of 1.28 kg/l at 45°C corresponds to a S.G. of 1.29 kg/l at 30°C .

3. Rest period

After filling the cells the filled battery should stand for a period of 2 hours for impregnation of the plates and separators.
 During this period, for cells supplied in bulk, check with a voltmeter that the battery polarities are corresponding to those indicated on the terminals or on the lids. Place the intercell connectors and tight the screws with respect of torque loading. Place the plugs with level indicator. Fill in each cell with electrolyte until the anti-surge baffle or the top of the separator. Connect the socket on the battery, regarding the polarities in order to avoid an inversed charge and the destruction of the charger and the battery Next, depending on the number of cells, the temperature and the specific gravity of the electrolyte should be measured and recorded for at least 2 to 4 cells (pilot cells, see point 6).

4. Commissioning

It is important that the first charge be carried out fully and as far as possible without interruption.
 The temperature of the electrolyte however must not exceed 55°C during commissioning and if it does the charge must be discontinued.
 After commissioning is completed, the voltage, the specific gravity of the electrolyte and the temperature of all cells should be measured and recorded with details of date and time (see point 6). During commissioning check if all the cells are gassing at the end of charge.
 Complete charging has been achieved when the specific gravity of the electrolyte and the cell voltages have not risen in two hours.

4.1 Commissioning by normal recharging

The recharging is carried out on the appropriate charger.
 At the end of the recharging the nominal specific gravity of the electrolyte should be achieved with a deviation of $\pm 0.01 \text{ kg/l}$. If a uniform specific gravity of the electrolyte is achieved and all cells or blocs release gas identically without rising of the voltage in individual cells or bloc batteries (for IU chargers no more drop of charging current value), then the battery is ready for operation.
 During charge, the electrolyte level will still rise.

4.2 Commissioning with an equalising charge

The equalising charge is carried out on the appropriate charger by selecting "equalisation" (see Technical manuals)

Table 2

Maximum permissible charging currents per 100 Ah C_5	
charging characteristic	charging current
I - charging characteristic	5A
Wa/WoWa - characteristic at 2.4 V/cell at 2.65 V/cell	8 A, decreasing to 4 A

Conditions of end of charge are same as related in paragraph 4.1.

4.3. Electrolyte level

During charge, the electrolyte level will still rise.
 If then the max. level of the electrolyte is exceeded, the excess must be drawn up. However if then the electrolyte level is below the max.level, top up with electrolyte to the specified.level.

4.4. Electrolyte specific gravity

If the S.G. of the electrolyte at the end of the commissioning is too high, replace a part of the electrolyte by purified water according to DIN EN 43530-4.

5. Notes

Acid which escapes or spills must be carefully removed or neutralised.
 This can be done with a soda solution (1 kg of soda to 10 litres of water) or other neutralisation agents. Neutralisation agents must not get into the cells. Liquid in the battery tray should be sucked out and disposed in accordance with the regulations.
 The "Instructions for use batteries Hawker® Perfect Plus™" apply when using the battery. The battery will reach its rated capacity after the 10th cycle at the latest.

Warning: The dry charged cells or batteries must not be connected with standard Perfect connectors because of the difference in design of the terminals pillars. Use the DRY PERFECT CONNECTOR for cells or batteries dry charged.

Cell / bloc voltage, temperature and specific gravity of electrolyte for all cells at the end of the commissioning charge.

No. ¹⁾	Voltage [V]	S. G. [kg/l]	Temperature [°C]
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

No. ¹⁾	Voltage [V]	S. G. [kg/l]	Temperature [°C]
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
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44			
45			
46			
47			
48			

¹⁾ Cell or bloc no. beginning at the positive terminal of the battery.

For bloc batteries the specific gravity of the electrolyte of the cell next to the positive pole must be measured in each case.

Back to the manufacturer!

Batteries with this sign must be recycled. Batteries which are not returned for the recycling process must be disposed of as hazardous waste!

When using motive power batteries and chargers, the operator must comply with the current standards, laws, rules, and regulations in force in the country of use!



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