



Instruction Manual

Vented Wet Cell Battery







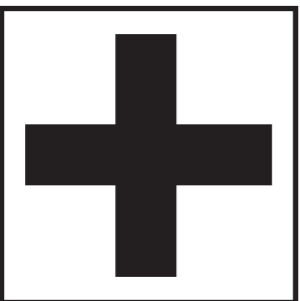
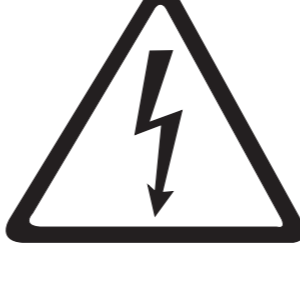

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Battery Part Number	<input type="text"/>
Battery Serial Number	<input type="text"/>
Date Supplied	<input type="text"/>
Despatch Voltage	<input type="text"/>
Vehicle Model	<input type="text"/>
Invoice / Spec Number	<input type="text"/>
Fleet / Serial Number	<input type="text"/>

Rating Data

Nominal Capacity C ₅	: See Battery plate
Nominal Voltage	: 2.0V X No. of cells (See Battery plate)
Discharge Current	: C ⁵ / 5h
Nominal S.G of Electrolyte*	: 1.29 kg/l
Rated Temperature	: 30°C
Nominal Electrolyte Level	: up to electrolyte level mark “max”

Traction batteries with positive tubular plates type PzS / PzB

* Will be reached within the first 10 cycles

	Pay attention to the operating instructions and keep them close to the battery. Work on batteries should be carried out by a qualified technician!		Risk of explosion and fire. Avoid short circuits! Caution: Metal parts of a battery are always live. Do not place tools or other metal objects on the battery!
	Use protective glasses and clothes when working on batteries. Pay attention to the accident prevention rules as well as AS/NZ1337, EN50272-3 & EN 501110-1		Electrolyte is highly corrosive. Avoid contact with skin and eyes Do not mix with alkaline solutions
	No smoking ! Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode.		Batteries and cells are heavy. Ensure secure installation. Use only suitable handling equipment Lifting hooks must not damage the cells, connectors or cables
	Acid splashes in the eyes or on the skin must be washed with plenty of fresh clean water. In case of accident, consult a doctor immediately ! Remove contaminated clothing		Dangerous electrical voltage!
			Pay attention to the environmental hazards of batteries.

Ignoring the operating instructions, repair with non-original parts, using additives for the electrolyte or disconnection of the Wi-IQ[®] electronics 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)

1. Commissioning Battery

For the commissioning of unfilled batteries see separate instructions!

The battery, including all cables, links and plugs should be inspected upon receipt to ensure it is in perfect physical condition.

The battery should be in a fully charged condition. If it requires charging, see Item 2.2

The charging cables must be connected to ensure a good contact, taking care that the polarity is correct, otherwise battery, vehicle or charger could be damaged.

The specified torque loading for the terminal screws of the charging cables and connectors is

M10 perfect connector 25Nm +/- 2Nm.

The battery is filled at the factory, however the level of the electrolyte should be checked. If it is below the anti-surge baffle “MIN LEVEL” (fig1.) or the top of the separator, top up with purified water complying to AS2668-1983, DIN 43530 part 4.

Batteries should be watered AFTER charging.

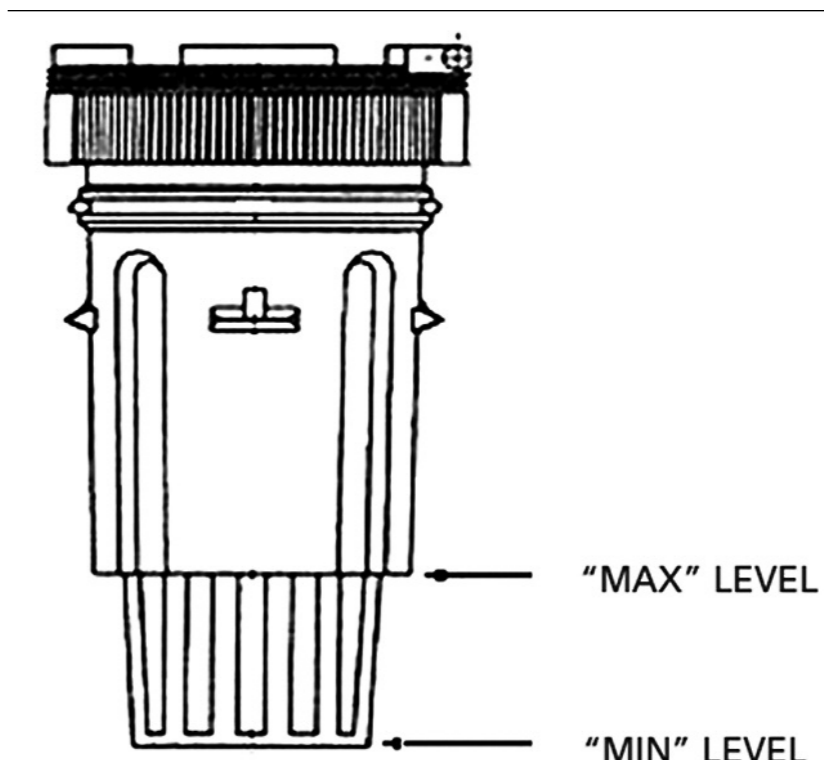


Fig.1 - Electrolyte Level on the Vent Plug

2. Operation

Standards AS2402.1.2 -2005 & DIN EN 50272-3 apply to the installation and usage of vented cell (wet) traction batteries in industrial trucks.

2.1 Discharging

Be sure that all breather holes in vent plugs are not sealed or covered.

Electrical connections (e.g. plugs) must only be made or broken with the battery in open circuit.

To optimise battery life, deep discharges of more than 80% of rated C5 capacity should be avoided. This corresponds to an electrolyte specific gravity of 1.140 kg/l at 30°C at the end of the discharge

Both partially and fully discharged batteries must be recharged immediately and not left in a discharged condition.

2.2 Charging

Only direct current must be used for charging.

Procedures in accordance with DIN 41773-1, DIN 41774 & AS2402.1.2-2005 are permitted.

Only connect to a charger suitable for the type and size of battery, in order to avoid overloading of the electric cables and contacts, unacceptable gassing and the escape of electrolyte from the cells.

In the gassing stage, the current limits given in EN 50272-3 & AS2548.1-1998 must not be exceeded.

If the charger was not purchased together with the battery, check with EnerSys® for its suitability.

During charging, proper provision must be made for venting of the charging gases complying to EN 50272-3 & AS2402.1.2-2005. Lids and covers of battery compartments must be opened or removed and in the case of a closed battery compartment, the battery must be removed. The vent plugs should stay on the cells and remain closed.

With charger switched off, connect the battery ensuring that the polarity is correct.
(Positive to Positive, Negative to Negative).

Now switch on the charger.

During charge the temperature of the electrolyte rises by about 10°C, so charging should only begin if the electrolyte temperature is below 45°C. Conversely, the electrolyte temperature should be at least +10°C before charging, otherwise a full charge will not be achieved (e.g cold stores)

Whilst the charger will indicate a fully charged condition, a charge is finished when the specific gravity of the electrolyte and the battery voltage have remained constant for two hours.

**Do not interrupt the charge cycle.
Only water the battery AFTER charging.**

If optional Electrolyte Circulation system is fitted:

If the warning light on the charger is illuminated or if a defect signal on the system appears, check that the piping system is connected and examine the piping circuit for leaks or defects. The air pipe or tubing should never be removed during charge.

2.3 Equalising Charge

Equalising charges are used to safeguard the life of the battery and to maintain its capacity.

They are necessary after deep discharges, repeated incomplete recharges and charges to an IU or Taper characteristic curve.

Equalising charges are carried out following normal charging. The charging current must not exceed 5A/100 Ah of rated capacity (for end of charge - see point 2.2).

Watch the temperature!

2.4 Temperature

An electrolyte temperature of 30°C is specified as the rated temperature. Higher temperatures shorten the life of the battery, lower temperatures reduce the capacity available.

55°C is the upper temperature limit and is not acceptable as an operating temperature.

2.5 Electrolyte

The rated specific gravity (S.G.) of the electrolyte is related to a temperature of 30°C and the nominal electrolyte level in a fully charged condition.

Higher temperatures reduce the specified gravity of the electrolyte, lower temperatures increase it.

The temperature correction factor is -0.0007 kg/l per °C, e.g. a reading of 1.28 kg/l at 45°C corresponds to that of 1.29 kg/l at 30°C.

The electrolyte purity must conform to DIN43530 part 2, AS2669-1983 & AS2668-1983.

7. Single Point Water System - Optional

The Aquamatic™ Single Point Watering system is used to automatically maintain nominal electrolyte levels with one simple connection to the battery. The displaced charging gasses escape through the vent on each cell.

In the BFS float system, a valve and float control the topping up process and maintain the correct water level in each cell. The valve allows the flow of water into each cell and the float closes the valve when the correct water level has been reached.

The Injector system is similar however water control is determined by injector tube length and higher water pressures are acceptable.

The tubing system to the individual battery cells must follow the battery's electrical circuit. This reduces risk of current leakage in the presence of electrolytic gas causing an explosion EN 50272-3.

The system should not be modified in any way.

For fault-free operation of the system, please note the instructions below.

7.1 Working Pressure

The Single Point Watering system should be installed in such a way that an optimal water pressure is obtained.

7 - 25 psi (BFS Float system)

25 - 35 psi (Injector system)

Any deviation from this means that the system may not function properly.

7.2 Connection

The battery should be topped up shortly before the completion of a full charge, or at the end.

Do not water the battery prior to charge.

If Manual connection (Gun, Tank or Cart) is used, it is recommended the battery is only connected to the filling system once a week.

If Automatic charger coupling is used (Autofill) the charger software should be programmed for filling at the end of charge with correct duration and frequency. In this case, at least once a week is recommended.

In multiple shift and warm ambient temperature operations, it may be necessary to have shorter topping up intervals.

In winter, batteries fitted with the water refilling option should only be charged or refilled in ambient temperatures above 0 °C.

Filling must only be done with the following devices.

Gravity fed tank

A small water supply tank, mounted at least 2m above the battery, feeding water via gravity.

Pressure reduced filling gun

Hand held trigger gun incorporating a pressure reduction valve.

Portable powered watering cart

Water cart incorporating a powered pump.

Autofill Electrovalve solenoid - Modular only

Charger controlled automatic watering solenoid. Requires a plumbed manifold feed.

7.3 Filling Time

Filling time depends on the utilisation rate, battery type and flow pressure from supply. Generally, the top up process should only take a few minutes.

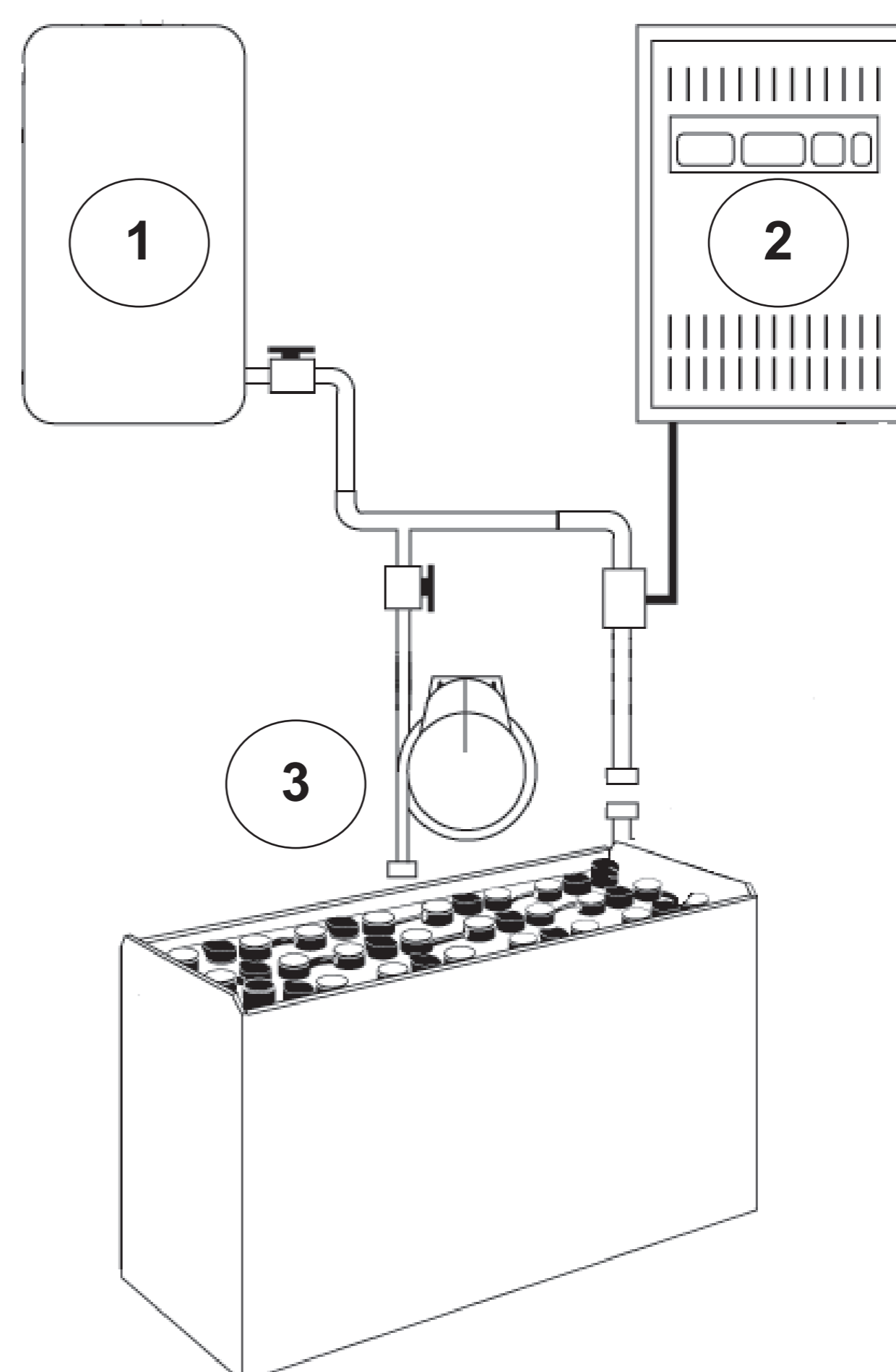
A flow indicator built into the supply tubing monitors the filling process. During filling the water flow causes the built-in disc in the flow indicator to turn. When all the plugs are closed the disc stops, indicating that the filling process is complete.

Each BFS cap also has a built in white level indicator which further acts as a visual aid.

The water supply to the battery should be disconnected and turned off after completion.

7.4 Water Purity

Water must comply to AS2668 -1983 with a conductance of not more than 30µS/cm. The tank and pipes must be clean before operating the system.



1. Gravity Tank
2. Charger Autofill Electrovalve
3. Filling Gun

8. Electrolyte Circulation System - Optional

The Electrolyte Circulation System is based on the principle of pumping air into the individual battery cells. This system prevents electrolyte stratification and the battery charge is optimised using a charge factor of 1.07.

The system consists of pipes and tubing fitted in the cells. A Hawker Aeromatic diaphragm pump is fitted in the charger. This diaphragm pump sends a low rate airflow into each cell which creates a circulating air stream inside the cell box. The air stream is continuous or pulsed depending on the battery voltage and pump type and is adjusted in accordance to the number of cells in the battery.

The pipe system to the individual battery cells must follow the existing electrical circuit. This reduces risk of current leakage in the presence of electrolytic gas causing an explosion DIN EN 50272-3.

8.1 Connection

Air is supplied when the charger tubing system is connected to the battery pipe system.

Connecting the charge plug, with integrated air tube, automatically supplies air to the battery.

8.2 Maintenance and Repair

Depending on the working conditions, the pump air filter on the charger should be changed at least once a year. In work areas with high levels of air-pollution, the filter should be checked and replaced more frequently.

The system must also be checked for leakage. The charger will display an error message to indicate leakage whilst the characteristic charging curve is switched over to the characteristic standard curve (without electrolyte mixing).

Broken or damaged components must be repaired or replaced promptly.

Use only original spare parts, as these are designed for the pump air supply and will ensure correct functioning.

9. Wi-IQ® Monitor - Optional

The battery can be fitted with a WiIQ onboard battery monitoring device.

The WiIQ is suitable for use on all battery technologies with voltage range 24V - 80V.

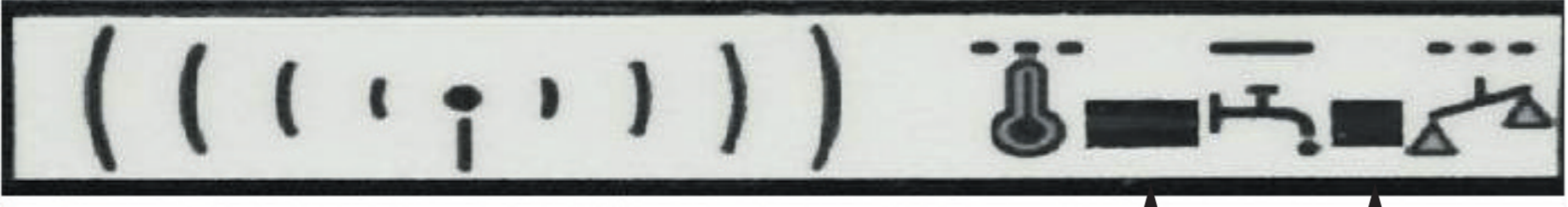
These devices capture battery operating data for later reporting and analysis whilst at the same time offer visual warnings to the operator on the current status of the battery - refer table below.

The device is fitted to a main DC cable on the battery to monitor and record the data of current, Ah throughput, voltage, balance, temperature and electrolyte level (via optional external sensor). The LED's on the WiIQ provide real time status of the battery's condition.

The information is stored in memory and can be transferred wirelessly to a computer via USB key. Plug in the USB key to the PC, scan the WiIQ and upload the data to the PC.

The WiIQ Report software will quickly enable you to get a handle on your battery fleets charging and discharging characteristic through a comprehensive set of simple reports and graphs.

When fitted to a battery and used in combination with the Hawker Life IQ™ series charger, the WiIQ can enable charge profile adaptation for the specific battery type and operating conditions. It will also allow the charger to display visible warnings from the battery on the charger display.


<p>Tri Colour LED Blue LED</p>
<p>Tricolour LED</p>
<p>Green blinking = hardware OK Blue rapid blinking = wireless identification Red blinking = temperature warning >55°C</p>
<p>Blue LED</p>
<p>Rapid blinking = wireless identification Slow blinking = voltage balance warning OFF = electrolyte level is OK ON constant = electrolyte level is low (please top up)</p>

Maintenance Log

Month _____ Year _____

Weekly Pilot Cell Reading

Week	Before Charge		After Charge		Water Added(L)
	Density	Temperature	Density	Temperature	
1					
2					
3					
4					
5					

Monthly Full Readings (After Equalising)

Cell No.	Density	Cell Volts	Cell No.	Density	Cell Volts
1			21		
2			22		
3			23		
4			24		
5			25		
6			26		
7			27		
8			28		
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Pilot Cell Temperature			°C		

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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