Instructions for use

HOPPECKE
POWER FROM INNOVATION

Commissioning Instructions and report

for a vented stationary lead-acid battery

Nominal data:

Nominal voltage _____ Volts

Nominal capacity _____ Ah

Battery No. _____

Start-up by _____

commenced on _____

Cells/blocks _____

Type _____

ended on _____

Commissioning instructions

Observe commissioning instructions! Work on batteries only under instructions of skilled personnel!

Smoking prohibited! Do not expose battery to open flame, glowing fire or sparks as expiosion and fire hazard exists!

When working on batteries wear protective glasses and clothing! Observe the accident prevention rules as well as DIN VDE 0510, VDE 0105 Part 1!

Acid splashes in the eyes or on the skin must be washed out or off with plenty of water. Then see a doctor immediately. Acid splashes on clothing should be washed out with water!

Expiosion and fire hazard, avoid short circuits! Caution! Metal parts of the battery cells are always live, do not place items or tools on the battery!

Electrolyte is strongly corrosive!

Monobloc batteries are very heavy! Ensure secure installation! Only use suitable transport equipment!

Non-compliance with the commissioning instructions, tampering or use of additives for the electrolyte (alleged “enhancing agents”) render the warranty null and void.

The completed commissioning report must be sent back to the battery manufacturer.

1. Inspection/check

The battery installation and charging unit must be inspected for mechanical soundness. All bolted connections within the circuit must be properly tightened for optimum contact as set out in the operating instructions.

The charging unit must be checked for operational readiness. Ensure that the polarity is correct.

Before filling the cells ensure that the conditions as set out in DIN VDE 0510 Part 2 regarding installation and ventilation are observed.

Should a higher charging current be used than permitted for the ventilation layout by start up charging, the ventilation in the battery room must be increased according to the loading current applied for the start-up period and for one hour afterwards, e.g. by additional portable ventilators. The same applies to occasional special battery charging processes.

2. Filling cells

Acid with the density according to Table 1 must comply with the purity specifications according DIN 43 530 Part 2.

If concentrated sulphuric acid is supplied, the mixing instructions must be observed.

The acid temperature should be in the range of 15 °C to 30 °C. Before filling the temperature must be measured and noted in the commissioning report.

Aher removing the transport plugs or opening the vent plugs the cells must be filled to the lower electrolyte level mark using acid-resistant filling devices.

Table 1: Electrolyte density in kg/l at 20 °C

Cell type	Filling (kg/l)	Nominal density (kg/l)
GroE	1.21	1.22
OPzS/OPzS bloc	1.23	1.24
solar.power	1.23	1.24
max.power	1.23	1.24
OGi/OGi bloc	1.23	1.24
OSP*	1.23/1.26	1.24/1.27
OSP.HC	1.23	1.24
USV	1.28	1.29

* depending on type

It is not permitted to use transport plugs when operating the battery. They must be replaced by vent plugs delivered with the batteries.

Higher temperatures reduce the electrolyte density and lower temperatures increase the electrolyte density. The associated correction factor is 0.0007 kg/l per K.

Example: Electrolyte density 1.23 kg/l at 35 °C corresponds to a density of 1.24 kg/l at 20 °C.

3. Reaction time

After filling the cells a reaction time of 2 hours must be observed. Subsequently, depending on the total number of cells, the temperature and electrolyte density of at least 4 to 8 cells (pilot cells) must be measured and noted in the commissioning report.

If the temperature rise is less than 5 K and the electrolyte density has not fallen more than 0.02 kg/l below the acid density, a commissioning charge as under 4.1 or 4.2 is adequate.

Should one of the deviations be higher than an extended commissioning charge as under 4.3 is necessary.

4. Commissioning

With non-transparent cell containers the vent plugs remain open in order to observe whether gassing is taking place evenly in all the cells towards the end of the charge.

It is important that the first charge is carried out to completion. This is only possible with a charging voltage above 2.35 V/cell. Interruptions should be avoided if possible. Commissioning should be recorded in the commissioning report overleaf.
During start-up the cell voltage of the pilot cells must be measured and on start-up completion the cell voltage, electrolyte density and temperature of all cells must be measured and noted with the time and date in the commissioning report.

The electrolyte temperature must not exceed 55 °C, if necessary the charge operation must be interrupted.

4.1 Commissioning charge with constant voltage (IU characteristic)

A charge voltage of 2.35-2.4 V/cell is required.

The charge current on commencing the charge shouid be a minimum of 5 A per 100 Ah C_{10}.

The electrolyte density only rises slowly during the charge. The charge time can therefore take several days before reaching a minimum electrolyte density of nominal electrolyte density –0.01 kg/l.

Subsequently switch to the float charge voltage as set out in the operoting instructions. The electrolyte density rises to the nominal density during operation.

4.2 Commissioning charge with constant (I characteristic) or decreasing current (W characteristic)

The maximum permitted currents can be obtained from Table 2.
Table 2: maximum permitted charging currents in A per 100 Ah C_{10} for I and W charging

Characteristic	Charging current
I characteristic	5 A
W characteristic at: 2.0 V/cell 2.4 V/cell 2.65 V/cell	 14 A 7.0 A 3.5 A

Charging must continue until
— all cells have reached a minimum of 2.6 V
— the electrolyte density in all cells has risen to the nominal value of ± 0.01 kg/l and these cease to rise over a further period of 2 hours.
Subsequently switch to the floot charging voltage as set out in the operating instructions.

4.3 Extended commissioning charge

Extended storage or climatic influences (humidity, temperature fluctuations) reduce the charge state of the cells. This makes an extended commissioning charge along the following procedure necessary:
1. Charge at 15 A per 100 Ah C_{10} until 2.4 V/cell is achieved (ca. 3 - 5 hours),
2. Charge for 14 hours with 5 A per 100 Ah C_{10} (voltage exceeds 2.4 V/cell),
3. Interrupt for one hour,
4. Charge for 4 hours with 5 A per 100 Ah C_{10}.

Repeat items 3 and 4 until
— all cells have reached a minimum 2.6 V
— the electrolyte density in all cells has risen to the nominol value of ± 0.01 kg/l and these cease to rise for a further 2 hours.

Subsequently switch to the float charge voltage as set out in the operating instructions.

4.4 Electrolyte level adjustment

On completion of commissioning top up with acid to bring the electrolyte level to the upper electrolyte level mark.

4.5 Electrolyte density adjustment

If the electrolyte density at the end of commissioning is too high, reploce part of the electrolyte with purified water as specified in DIN 43 530 Part 4.

The comparative electrolyte density in individual cells should not deviate more than 0.01 kg/l. With greater deviations adjust the electrolyte density and then carry out an equalizing charge as set out in the operating instructions.

5. Notes

Carefully remove or neutralise leaked or spilt acid. This can be done with soda solution (1 kg soda to 10 l water) or other neutralising agents. Neutralising agents must not enter the cells.

Finally clean the battery surface (see ZVEI pamphlet on cleaning batteries).

The ZVEI pamphlet on precautionary measures when handling electrolyte for lead-acid batteries must be observed.

The operating instructions apply when operating the battery.

6. Commissioning report

— Was the acid delivered with the battery by the battery manufacturer? yes ☐, no ☐

— If not,
was the acid tested for chlorine, iron and other harmful metals? yes ☐, no ☐

— What did the test show? _____

— What was the density of the new acid before filling? _____ kg/l at _____°C

— Acid filling commenced on: _____ at _____ o'clock on cell no. ____

— Acid filling ended on: _____ at _____ o'clock on cell no. ____

— Mean ambient temperature: _____°C.

— Remarks:

Measured 2 hours after filling Cell or block no. of Pilot cells	No.	No.	No.	No.	No.	No.	No.	No.
Electrolyte density kg/l								
Electrolyte temperature °C								
Temperature-adjusted electro-lyte density (s. item 2) kg/l								

With monobloc batteries the electrolyte density at the cell adjacent to the positive terminal must be measured.

— The commissioning charge was carried out according to item 4.1 ☐, 4.2 ☐, 4.3 ☐.

— Commissioning charge commenced on _____ (date) _____ o'clock.

— During the first 6 hours of the commissioning charge the cell voltage, electrolyte density and temperature must be measured hourly and noted on at least 4 pilot cells. On completion of the commissioning charge a further 3 measurements must be taken at hourly intervals.

Time	Pilot cell/block 1			Pilot cell/block 2			Pilot cell/block 3			Pilot cell/block 4		
	d (kg/l)	ϑ (°C)	U (V)	d (kg/l)	ϑ (°C)	U (V)	d (kg/l)	ϑ (°C)	U (V)	d (kg/l)	ϑ (°C)	U (V)

Time	Pilot cell/block 5			Pilot cell/block 6			Pilot cell/block 7			Pilot cell/block 8		
	d (kg/l)	ϑ (°C)	U (V)	d (kg/l)	ϑ (°C)	U (V)	d (kg/l)	ϑ (°C)	U (V)	d (kg/l)	ϑ (°C)	U (V)

— With monobloc batteries the cell voltage (if not possible the block voltage) and the electrolyte density on the cell adjacent to the positive terminal must be measured.

Cell/block voltage and electrolyte density of all cells at a mean electrolyte temperature of _____°C on completion of the commissioning charge before switching over to float charge.

1)	Voltage (V)	Density (kg/l)	1)	Voltage (V)	Density (kg/l)	1)	Voltage (V)	Density (kg/l)	1)	Voltage (V)	Density (kg/l)	1)	Voltage (V)	Density (kg/l)
1			46			91			136			181		
2			47			92			137			182		
3			48			93			138			183		
4			49			94			139			184		
5			50			95			140			185		
6			51			96			141			186		
7			52			97			142			187		
8			53			98			143			188		
9			54			99			144			189		
10			55			100			145			190		
11			56			101			146			191		
12			57			102			147			192		
13			58			103			148			193		
14			59			104			149			194		
15			60			105			150			195		
16			61			106			151			196		
17			62			107			152			197		
18			63			108			153			198		
19			64			109			154			199		
20			65			110			155			200		
21			66			111			156			201		
22			67			112			157			202		
23			68			113			158			203		
24			69			114			159			204		
25			70			115			160			205		
26			71			116			161			206		
27			72			117			162			207		
28			73			118			163			208		
29			74			119			164			209		
30			75			120			165			210		
31			76			121			166			211		
32			77			122			167			212		
33			78			123			168			213		
34			79			124			169			214		
35			80			125			170			215		
36			81			126			171			216		
37			82			127			172			217		
38			83			128			173			218		
39			84			129			174			219		
40			85			130			175			220		
41			86			131			176			221		
42			87			132			177			222		
43			88			133			178			223		
44			89			134			179			224		
45			90			135			180			225		

1) Cell or block no.

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Teil-Nr. 7140203051/02.09/1 K Printed in Germany