OPERATING & MAINTENANCE MANUAL

for

DC LOAD BANK

Type

HBN130-350

PowerBank

ISSUE 1

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Hillstone PRODUCTS

Administration Address
Unit 1&2,
Freetown Business Park,
Hucar Lane,
Bury,
Lancashire,
BL9 6HD,
U.K.

Manufacturing Address
Unit 2,
Portland Industrial Estate,
Portland Street,
Bury,
Lancashire.
BL9 6EY,
U.K.

Tel: +44(0)161 763 3100
Fax: +44(0)161 763 3158
Email:info@hillstone.co.uk
Web : www.hillstone.co.uk

INTRODUCTION

Description

The Hillstone **HBN130-350** load bank is designed to provide a manually controlled resistive load, for constant current discharge testing of a 110V nominal Ni-cad or lead acid batteries, plus battery charger testing up to 130V DC

The unit incorporating light weight, naturally cooled resistor elements and includes shrouded voltmeter and current sockets for direct measurement of the battery voltage and discharge current via external multi-meters.

The load bank incorporates panel mounted circuit breaker switch selection of each load channel.

As the unit is naturally cooled an auxiliary supply is not required.

A DC power cable is supplied with the equipment.

SAFETY CONSIDERATIONS

1. The equipment is designed for use in a clean, dry, indoor environment and should only be operated by competent electrical engineers who are completely familiar with the operation and specification of the load bank.
2. Operators must ensure that interconnecting cables are correctly rated to carry the required load current and adequately insulated to prevent the possibility of electric shock when operating at high voltages.
3. When in use the load bank should be cordon off using safety barriers.
4. Always connect both positive cables to the battery positive and also connect both negative cables to the battery negative
5. The load bank should only be operated in an area with adequate ventilation.
6. During operation the top air exhaust outlet grill and outer case may be hot.
7. Operators working with electricity should not wear rings, jewellery or metal watch straps.
8. As with any electrical equipment the load bank should not be used in close proximity to recently charged batteries where a build up of explosive gases may have occurred
9. Only insulated tools should be used when working on battery connections.
10. Refer to the battery manufacturers operating instructions for additional safety precautions.
11. Ensure all personnel are familiar with the location of the nearest safety kit and eye wash facility.
12. During operation the load bank should not be covered or positioned to restrict air flow

CONNECTION PROCEDURE

A. Ensure the power source or battery to be tested is compatible with the load bank operating voltage.
B. Do not attempt to operate the load bank above the maximum operating voltage.
C. Check the power source or battery is isolated before connecting to the load bank.
D. Check all circuit breakers are switch off (DOWN).
E. Connect a digital multimeter (DC volts range) to the voltage sockets
F. Connect a digital multimeter (DC mV range) to the shunt sockets
G. Insert the DC battery cable socket into the front of the load bank.
H. Connect the DC output cable to the power source or battery terminals, ensuring correct polarity.
I. Connect both positive cables to the battery negative
J. Connect both negative cables to the battery negative
K. Check the DC output cable connections are secure.

OPERATING INSTRUCTIONS

Operators should read the SAFETY CONSIDERATIONS and CONNECTION PROCEDURE before carrying out the following operating instructions

1. Ensure all circuit breakers are in the OFF position (DOWN).
2. Switch ON (UP) the appropriate load current channels to the required load current.
3. During battery discharge testing, as the battery voltage falls, the load current can be maintained at a constant current by manual selection of the circuit beakers.
4. At the end of the test switch OFF (DOWN) the load current circuit breakers.
5. The power source or battery may be disconnected while the resistor elements are cooling

Specification

Type ref.	**HBN130-350**
Max current (see note 1)	350 amps
Max power dissipated	45500W
Max constant current at 95V volts	255A
Switched steps (see note 4)	1 x 1A, 1 x 2A, 1 x 5A, 1 x 10A, 1 x 22A, 7 x 44A
Nominal battery voltage	60 volts DC
Current adjustment (see note 1)	Zero to max amps
Max operating voltage (see note 1)	130 volts DC
Max number of lead acid cells	60
Test voltage sockets Test current sockets	4 mm shrouded (DC volts direct reading) 4 mm shrouded (DC amps 1mV = 4 amps)
Protection	Individual circuit breakers
Auxiliary mains supply	Not required
DC power cable set	2.5 metres of twin cable via industrial plug and socket
Case size Length Width Height	830 mm 570 mm 810 mm (plus 50mm for handles)
Weight (approx.)	52Kgs
Finish	RAL 7032
Environmental protection rating	IP20
Movement	Carrying handle and swivel castors
Operating temperature range	0 – 40 deg C
Storage temperature range	0 – 80 deg C

Specification Notes

1) The maximum current is stated at the maximum operating voltage and the equipments are designed for discharge testing of 60 lead acid cells, where the terminal voltage will quickly fall to approx. 2.08 volts per cell (125V) at the start of the discharge test. The units are therefore not designed to operate continuously at the maximum operating voltage.
2) Discharges can be achieved below 60 volts with proportionally reduced output current (see performance tables)
3) Units are designed for indoor use only in a clean, dry and well ventilated environment.
4) Approx current rating at 130 volt
5) External digital multimeters are not supplied with the load bank.
6) Information is intended to be correct at the time of publication, however, Hillstone Products Ltd bears no responsibility for the accuracy of any information given.
7) We reserve the right to make detail changes to specification, components, dimensions or weights at the time of design or manufacture without prior notice.
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Application notes

Lead acid battery discharge testing

All types of lead acid batteries (with the exception of Plante cells) fall in capacity during their service life. The end of life is normally determined when the battery falls to 80% of its original capacity.

This assumes the battery is float charged at the correct voltage and operated in the correct ambient temperature between 20 – 25 degC.
Incorrect charging voltage may reduce service life and high ambient temperature (without adjustment of the charge voltage) will seriously reduce capacity and service life. An increase of 10 deg C ambient could reduce the service life by half.
It is therefore important to determine the actual capacity of a standby battery, periodically during its service life, so that the end of life can be estimated and any premature failure can be detected. This procedure ensures reliability of the emergency system and provides information to allow financial allocation of resources prior to battery replacement.

A general guide to carrying out a full capacity test

Battery capacity tests on lead acid batteries are normally carried out at the 3 hour rate of discharge and should be at a constant current down to 1.8 volts per cell.
When testing 12 lead acid cells this equates to 21.6 volts at the battery terminals, at the end of the discharge test. Ideally a capacity discharge test should be carried out annually.
It is important to perform the discharge until the battery voltage reaches 21.6 volts, this may be greater than three hours. The actual battery capacity is calculated by multiplying the constant discharge current by the time taken to reach 21.6 volts.
This capacity figure should then be recorded and compared during the service life to determine if the capacity is reducing at the expected rate. The fall in capacity is approximately linear, i.e. 90% capacity after 5 years (for a 10 year service life battery)

Note : 1) ensure the battery is fully charged prior to a capacity test.
2) refer to the battery manufacturers performance data to determine the required discharge current.
3) discharge performance should be corrected dependant on temperature
4) Alternative discharge rates can be used to determine capacity, however comparisons should only be made at the same discharge rate and end voltage.

MAINTENANCE PROCEDURES

The load bank should not require any special maintenance, however as with any electrical equipment periodic checks should be carried out to ensure the equipment is in a safe and satisfactory condition.

The following periodic checks are recommended;

1) Check the inlet and outlet grills are free from obstruction.
2) Check the controls, battery socket and battery cables are undamaged.
3) Check all interconnection cables are undamaged

FAULT FINDING PROCEDURES

The following fault finding procedure is intended to identify simple operational errors as follows;

INSUFFICIENT LOAD FAULT

Check the battery is at the required voltage.
Check the expected discharge current against the performance tables.
Check the operation of the controls.

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Note:
Any identified faults should be reported to the manufacturer
Removing the covers is not recommended.
If any covers are removed to inspect internal components, the load bank must be isolated from the battery
Testing the load bank with the covers removed is not recommended.
Repair or replacement should only be carried out by the manufacturer.