



HZL

Thyristor Control
Rectifiers

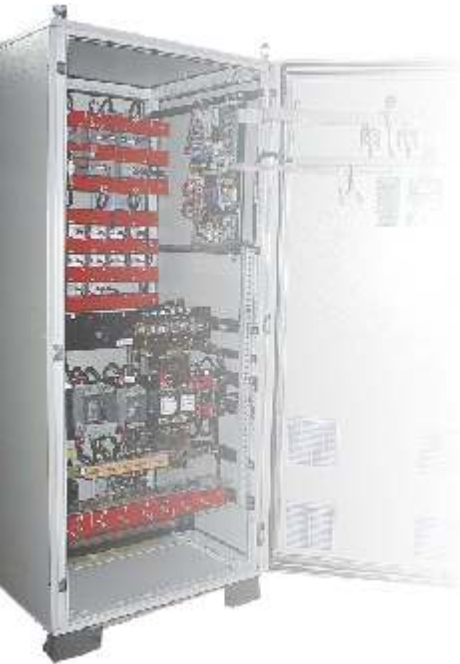




The Basic Design

HBL Battery Charger uses Thyristor switching principle for achieving the desired DC output. It basically consists of a transformer, a semi conductor bridge rectifier, a filter circuit and a control circuit.

The AC mains voltage is transformed to a suitable level and fed to the rectifier bridge which rectifies the AC input and feeds controlled DC output to the battery and load, after being smoothed by the filter circuit. The power output requirement is adjusted by using phase control technique which is provided by the control circuit. The feedback signals from the output to the control circuit are used for maintaining voltage regulation and current limit.



Advantages

HBL Battery Chargers offer numerous advantages, some of which are listed below :

Extensive Range

- Available in a wide range of standard and customised models, HBL Battery chargers can be supplied in voltage outputs upto 500V DC and current outputs upto 2000 Amps.

High Reliability

- Conservative design and high quality standards ensure absolute reliability of the equipment and failsafe operation.

Versatility

HBL chargers and DC systems find usage in variety of applications such as Process Control, telecommunications, Emergency Lighting, Switch Gear protection, Engine starting and Power Station Control, to mention a few.

Minimal Maintenance

- Designed for low maintenance and remote operation, HBL Battery Charger can work for many years, without any special attention.

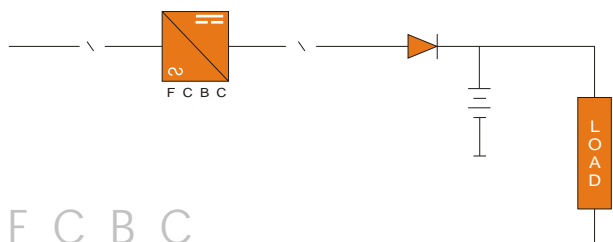
User Friendly

Cautiously conceived alarms and annunciations, easily accessible component layout, meticulously designed Operation Manual and easy availability of spare parts enable the users to quickly attend to the equipment, in the unlikely event of a fault arising in the HBL Battery Charger.

System Solutions

HBL designs and manufactures under one roof, the complete DC System consisting of Nickel Cadmium Batteries, VRLA, Battery Chargers and Distribution Panels. This facilitates the company to offer integrated systems solution to meet individual customer needs.





F C B C

Float charger (FC) rectifies the input AC to DC and does the dual function of float or trickle charging the battery and supplying DC power to the load.

Boost Charger (BC) is required for quick recharge of a discharged battery.

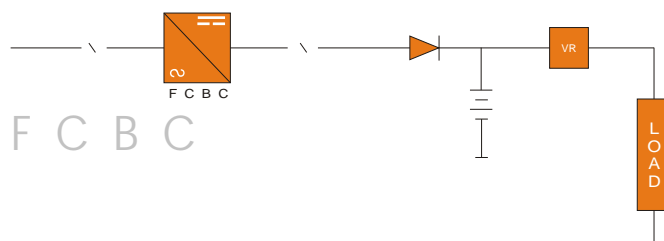
Float Cum Boost Charger (FCBC) as the name indicates, is a two-in-one functional combination of a float charger and a Boost charger. Under normal condition FCBC works as a float Charger. When the mains fail, battery takes over supply to the load. On resumption of power, FCBC switches to the "Boost Mode," Boost charges the discharged battery and returns to the "Float Mode", after the battery is restored to full charge. All along, it supplies uninterrupted DC power to the load.

Load Voltage Limiters (VR) - In order to protect the load against the voltage variation during the "Boost Mode" operation, a load voltage limiter in the form of Diode Voltage regulator (DVR) is required

End Cell Switching which uses a divided battery, tap cell diodes and change over contactor is yet another method of protecting the load from high boost voltage.

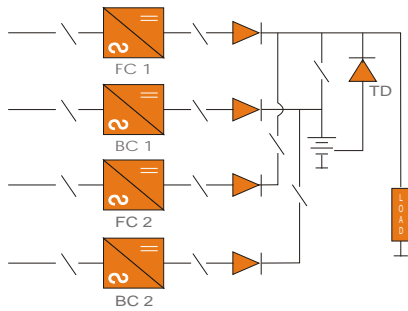
Redundant Systems

The increasing criticality of DC power requirement has led to the evolution of systems with redundant configuration, using more than one rectifier and one or more battery banks, operating either in parallel or independently. HBL offers a variety of such redundant systems with various combinations of interlocks and features. Each of these systems differ from the other, depending on the level of redundancy and functional features required by the user. Some typical examples are given on the next page.



F C B C



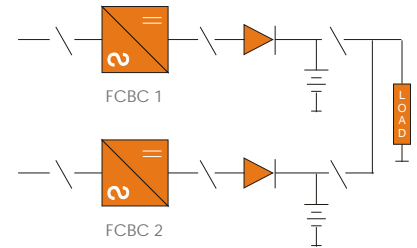
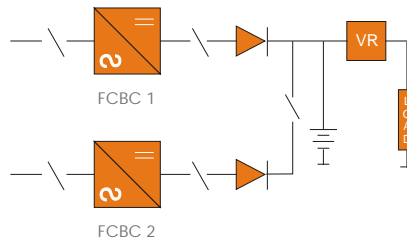


Hot Standby Redundant System

It consists of a single battery bank and two charger systems, one designated as 'Main' and other as 'Standby'. Each of these charger systems consists of one float charger and one boost charger. Interlocks are provided in such a way as to enable the standby float charger or standby boost charger to take over respectively, in the event of failure of the main float charger or main boost charger. Tap cell connection provides uninterrupted DC Power to the load, should the mains fail during boost charging.

Parallel Redundant System using two nos. FCBC + one VR + one Battery

Under normal condition, two FCBCs function in parallel and share the total (load current + battery current). When Mains fail, battery supplies to the load. On Mains return, battery gets charged 'online'. Load is protected from the higher boost voltage through the VR. When one FCBC fails, the other FCBC takes over the function. This system can also be designed for 'offline' charging, without VR, providing tap cell connection.



Parallel Redundant System using two nos. FCBC + two Batteries

Under normal conditions, total current is shared by the two chargers. Each charger float charges the respective battery. When Mains fail, both batteries share the load. On Mains return, batteries get charged 'offline' one after the other. The charger and the battery on boost get isolated from DC bus while the other charger meets the full load current. When one FCBC fails, the other FCBC takes over. One battery provides redundancy for the other.





Features and Specifications - HBL Battery Charger

	SP/TP* Series	Standard	Optional
Charger Characteristics	SP & TP	Constant voltage with current limit	
Applicable Standards	SP & TP	IEC	
Input Voltage	SP	230 V +/- 10%	Any other voltage
	TP	415 V +/- 10%	Any other voltage
Input Frequency	SP & TP	50 Hz +/- 5%	Any other Frequency
Output Current	SP & TP	Refer page 8 and 9	
Output Voltage:			
Nominal	SP & TP	24/48/110/220 VDC	Any other voltage
Float V adjustment	SP & TP	80% to 115% of Nominal	
Boost V adjustment	SP & TP	80% to 135% of Nominal	
Ripple Voltage	SP	5% rms (without Bty connected)	As required by user
	TP	3% rms (without Bty connected) +/- 1V of set value for > 48 VDC	As required by user
Voltage stability (with variation in load & input V)	SP & TP	+/- 1V of set value for < 48 VDC	
Rectifier Bridge	SP & TP	Full wave, half controlled	Full wave, full controlled
Magnetics :			
Insulation class	SP & TP	Class F	Class B
Temp. rise above ambient	SP & TP	90 Deg C	70 Deg C
High voltage insulation	SP & TP	2.5 KV for 1 minute with maximum leakage current of 5mA	
Instrument:			
Output voltmeter & ammeter	SP	72 X 72 Sq. mm. analog type Accuracy : 2.5 % Deflection : 90 Deg	
Output voltmeter & ammeter	TP	96 X 96 Sq. mm analog type Accuracy 1.5 % Deflection : 90 deg	Deflection 270 Deg
Input voltmeter with selector switch	TP	96 X 96 Sq. mm analog type Accuracy : 1.5 % Deflection : 90 Deg.	Deflection 270 Deg.





	SP/TP* Series	Standard	Optional
<p>Indications & Alarms:</p> <p>Lamps</p> <p>LED</p> <p>Alarms (LED+Buzzer)</p>	<p>SP & TP</p> <p>SP & TP</p> <p>TP</p> <p>SP</p>	<p>Input ON, Output On</p> <p>Charger on Float</p> <p>Charger on Boost</p> <p>Input supply fail</p> <p>DC under voltage</p> <p>DC over voltage</p> <p>Charger fail</p> <p>---</p>	<p>Ground fault alarm for unearthed systems</p> <p>Rectifier fuse fail</p> <p>output fuse fail</p> <p>Capacitor fuse fail</p> <p>As required by the user</p>
<p>Protection :</p> <p>Input</p> <p>Output</p> <p>Rectifier bridge</p> <p>Filter capacitor</p>	<p>SP</p> <p>TP</p> <p>SP</p> <p>TP</p> <p>SP & TP</p> <p>TP</p>	<p>MCB</p> <p>Switch & Fuse</p> <p>MCB</p> <p>Switch & Fuse</p> <p>HRC Fuse</p> <p>HRC Fuse</p>	<p>Switch and Fuse</p> <p>MCB/MCCB/Thermal OL relay/ Contactor</p> <p>Switch and Fuse</p> <p>MCB / MCCB</p> <p>High speed semi</p> <p>Conductor Fuse</p>
<p>Safety Features:</p>	<p>SP & TP</p> <p>SP & TP</p>	<p>Short circuit protection</p> <p>Reverse polarity protection</p> <p>Soft Start</p>	<p>Battery Current limit</p>
<p>Mechanical:</p> <p>Enclosure protection</p> <p>Paint finish</p> <p>Paint colour</p> <p>Construction</p> <p>Panel access</p> <p>Panel mounting</p>	<p>SP & TP</p> <p>SP & TP</p> <p>SP & TP</p> <p>SP & TP</p> <p>SP & TP</p> <p>SP & TP</p>	<p>Surge protection</p> <p>IP 20</p> <p>Epoxy based matte finish</p> <p>External/Internal : Light Gray</p> <p>Folded sheet / MS construction</p> <p>Front & rear</p> <p>Floor mounting</p>	<p>Upto IP 54</p> <p>As required by the user</p> <p>As required by the user</p> <p>As required by the user</p> <p>Only Front</p> <p>Wall mounting for smaller panels</p>





	SP/TP* Series	Standard	Optional
Ventilation	SP TP	Natural convection Upto 400 A Natural convection Above 400 A natural convection / Forced air cooling	
Cable entry	SP & TP	Bottom entry	Top entry
Noise Level	SP & TP	Typically 65 dBA for panels with natural convection & 75 dBA for panels with forced air cooling	
Environment: Operating ambient temperature (surrounding the panel)	SP & TP	0 to +50 Deg C	
Storage Temperature	SP & TP	-30 to +70 Deg C	
Humidity	SP & TP	0 to 95% RH Non condensing	
Altitude	SP & TP	Upto 1000 MSL	
Routine Tests Routine tests conducted at HBL works generally conforming to IEC 146/IS 4540	SP & TP	Visual & Dimensional check Insulation Resistance test High Voltage test Measurement of voltage regulation Annunciation checks Measurement of ripple Charger functional Checks	Burn in test on PCB's, Heat run test (8hrs) Efficiency and Power Factor measurement. Dynamic response measurement (overshoot / undershoot).





Soft Start : Specially designed 'walk in feature' ensures gradual development of DC output after the charger is switched ON, protecting the charger from heavy inrush currents.

Automatic charging control

HBL chargers are provided with an "Auto function" option; enabling automatic recharging of the battery. When the mains supply return while the charger is in "Auto function, the control circuit of the charger senses state of charge of battery and switches to "Boost mode" if required. The charger will automatically return to "Float mode" after fully charging the battery.

Special options

Some of the special options offered for HBL chargers are...

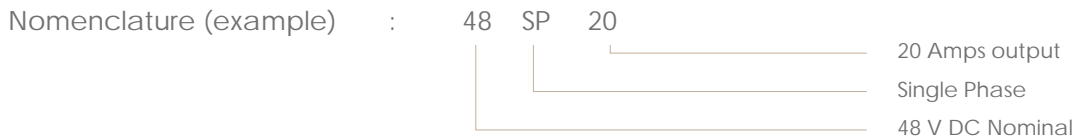
- > Fan failure alarm for forced air -cooled panels.
- > High temperature alarm for forced air - cooled panels. Contacts for remote alarm indications.
- > Additional components as required.
- > Radio interference / Harmonic filters.
- > Thermostat controlled space heater for anti condensation
- > Temperature compensation.

Type Tests

In addition to the routine tests, HBL chargers have undergone special tests listed below

- > Surge withstand capability test
- > Short circuit tests on transformers for dynamic ability.
- > Heat run test at 50 Deg. C
- > Radio Frequency Interference test.
- > Environmental & Soak tests on PCB.
- > Vibration tests of PCB rack / panels.
- > Degree of protection tests upto IP5X & IPX2.

Standard Models, Weight and Dimensions for Single Phase Charger



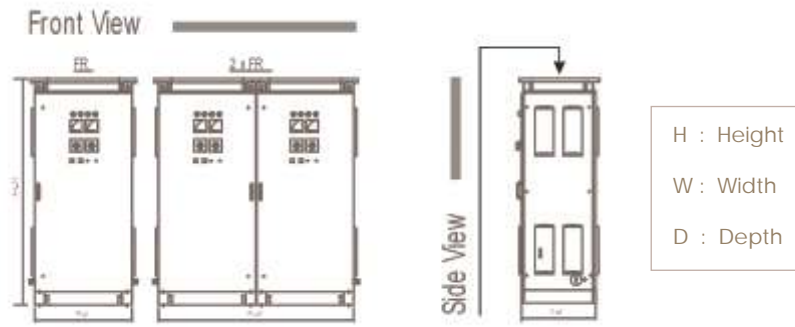
Output Rating	24 V DC		48 V DC		110 V DC		220 V DC	
	Cabinet Type	Weight (Kgs)	Cabinet Type	Weight (Kgs)	Cabinet Type	Weight (Kgs)	Cabinet Type	Weight (Kgs)
10 A	FR 90/55/40	45	FR 90/55/40	80	FR 90/55/40	80	FR 12/80/60	180
15 A	FR 90/55/40	55	FR 10/60/60	150	FR 10/60/60	150		
20 A	FR 90/55/40	60	FR 12/80/60	180	FR 12/80/60	180		
25 A	FR 10/60/60	65						
30 A	FR 10/60/60	75						
40 A	FR 12/80/60	150						
50 A	FR 12/80/60	180						
80 A	FR 12/80/60	225						

Panel Dimension for Single and Three Phase Charger

Cabinet Dimensions In mm			
Type	H	W	D
FR 90/55/40	850	550	400
FR 10/60/60	1000	600	600
FR 12/80/60	1200	800	600
FR 15/80/60	1500	800	600
FR 18/80/60	1800	800	600
FR 18/80/80	1800	800	800
FR 20/80/80	2000	800	800
FR 22/80/80	2200	800	800
FR 22/80/10	2200	800	1000

Cabinet Dimensions In mm			
Type	H	W	D
-	-	-	-
-	-	-	-
-	-	-	-
2 x FR 15/80/60	1500	1600	600
2 x FR 18/80/60	1800	1600	600
2 x FR 18/80/80	1800	1600	600
2 x FR 20/80/80	2000	1600	600
2 x FR 22/80/80	2200	1600	600
2 x FR 22/80/10	2200	1600	600





Standard Models for Three Phase Charger

Nomenclature (example) : 48 TP 200

_____ 200 Amps output
 _____ Three Phase
 _____ 48 V DC Nominal

Output Rating	24 V DC		48 V DC		110 V DC		220 V DC	
	Cabinet Type	Weight (Kgs)	Cabinet Type	Weight (Kgs)	Cabinet Type	Weight (Kgs)	Cabinet Type	Weight (Kgs)
10A	FR 90/55/40	45	FR 90/55/40	70	FR 15/80/60	180	FR 15/80/60	190
15A	FR 90/55/40	55	FR 90/55/40	80	FR 15/80/60	190	FR 18/80/60	210
20A	FR 90/55/40	60	FR 10/60/60	90	FR 18/80/60	180	FR 18/80/60	260
25A	FR10/60/60	65	FR 15/80/60	190	FR 18/80/60	220	FR 18/80/60	350
30A	FR 10/60/60	75	FR 15/80/60	200	FR 18/80/60	270	FR 18/80/60	380
35A	FR 12/80/60	150	FR 15/80/60	180	FR 18/80/60	300	FR 18/80/60	400
40A	FR 12/80/60	180	FR 15/80/60	200	FR 18/80/60	340	FR 18/80/60	450
50A	FR 15/80/60	225	FR 18/80/60	280	FR 18/80/80	360	FR 18/80/80	480
60A	FR 18/80/60	250	FR 18/80/60	300	FR 20/80/80	380	FR 20/80/80	500
70A	FR 18/80/60	280	FR 18/80/80	310	FR 22/80/80	420	FR 22/80/80	550
80A	FR 20/80/80	290	FR 20/80/80	330	FR 22/80/80	440	2x FR 18/80/60	650
90A	FR 20/80/80	300	FR 20/80/80	350	FR 22/80/80	500	2x FR 18/80/60	700
100A	FR 20/80/80	350	FR 22/80/80	450	FR 22/80/80	600	2x FR 18/80/60	750
150A	FR 22/80/80	450	FR 22/80/80	650	2xFr 18/80/80	780	2xFR 20/80/80	900
200A	2xFR 18/80/80	500	2xFR 18/80/80	700	2xFR 18/80/80	900	2xFR 22/80/80	1050
250A	2xFR 18/80/80	600	2xFR 18/80/80	800	2x FR 22/80/80	1000	2x FR 22/80/80	1200
300A	2xFR 22/80/80	750	2xFr 20/80/80	850	2xFR 22/80/80	1050	2xFR 22/80/80	1400
400A	2xFR 22/80/80	800	2xFR 22/80/80	950	2xFR 22/80/80	1200	2xFR 22/80/100	1800
500A	2xFR 22/80/80	850	2x FR 22/80/80	1000	2xFR 22/80/80	1400		
600A	2xFR 22/80/80	900	2xFR 22/80/80	1100	*			
700A	2xFr 22/80/80	950	*		*			
800A	2xFR 22/80/80	1000	*		*			
1200A	2xFR 22/80/100	1300	*		*			
2000A	3xFR 22/80/100	180	*		*			

In accordance with its policy of continuous improvement the company reserves right to change specifications and designs without notice. All illustrations, descriptions, dimensions and weight in this catalogue are for guidelines only and cannot be held binding on the company.

* Consult HBL





ISO 9001 Certified

Other Electronic Products

- ◆ DC - DC Converters
- ◆ Integrated Power Supplies (IPS)
- ◆ Data Loggers
- ◆ Special Power Supplies for Defence Applications
- ◆ Inverters
- ◆ Battery Monitoring Systems
- ◆ Earth leakage Monitors





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