Global Switching Solutions

RAISE THE BAR

Battery Charger

From 5 A upto 2500 A
24, 48, 110, 220, 360 VDC

POWER

Acrastyle Power (India) Limited

Company Profile

Acrastyle Power , is India's most preferred company in the field of DC Power Solutions. or the last four decades, it has been supplying variety of standard as well as customised DC Power solutions to all types of Power Stations, Distribution and Industrial applications.

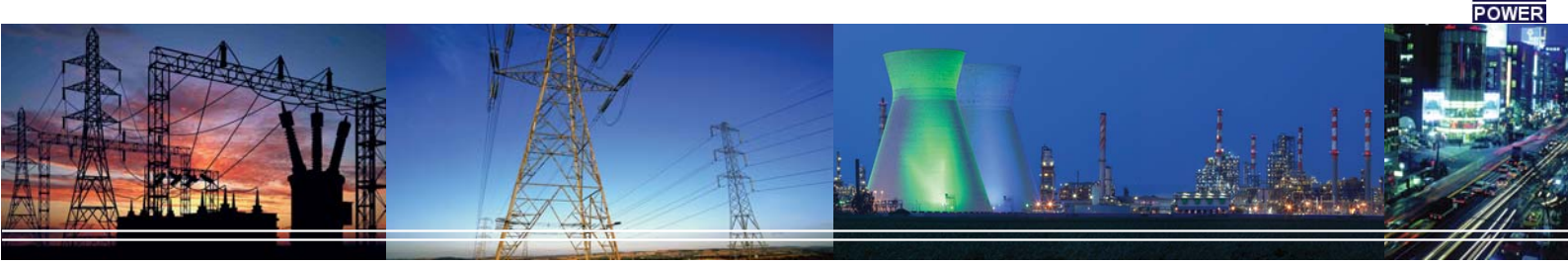
APIL is registered and approved vendor with all the major engineering consultants, thanks to its capability to handle customization and unmatched project execution skills.Export to more than 10 countries has broadened our geographical reach, apart from our pan India presence with installation of more than 10,000 systems. After sale support from our 10 offices, ensures quick response to customer needs and offers other services like AMC, Up-gradation etc.

Integrated Multi Model Engineering, Control & Protection Solution Facility near Chennai, India

AcraBatt-*i*

APIL Manufacturing Plant

- Four Decades in Power Business
- Innovative Designs
- Approved by Leading Engineering Consultants
- Registered & Approved Vendor for Major EPC Companies
- Specialises in Customised DC Power Solutions
- Supplied India's Largest Rated Charger for Power Plant
- Modern Manufacturing Facility
- Exporting to more than 10 Countries
- All India Sales and Service Network



Introduction

APIL produces a wide range of rugged DC power systems for use in the industrial market sector to provide DC uninterruptible supply in conjunction with batteries to 24 V, 48 V, 110 V, 125 V, 220 V, 360 V critical loads.

The range of DC Systems are generally custom designed to provide a rugged, reliable and efficient power solution for critical loads to prevent expensive Outages.

These types of power systems are widely used in the harsh operating environments encountered in the power generation and distribution, oil and gas, industrial instrumentation and onshore or offshore petro-chemical applications.

DC Systems

APIL offer a range of standard DC power systems based around battery charger products. The DC power solution can be customize to meet the most demanding of client requirements. APIL is renowned for their technical expertise and manufacturing capability to provide the optimum solution.

Power Conversion

The AC to DC power conversion element of the system is typically configured from thyristor or switch mode technology depending on the performance and size constraints.

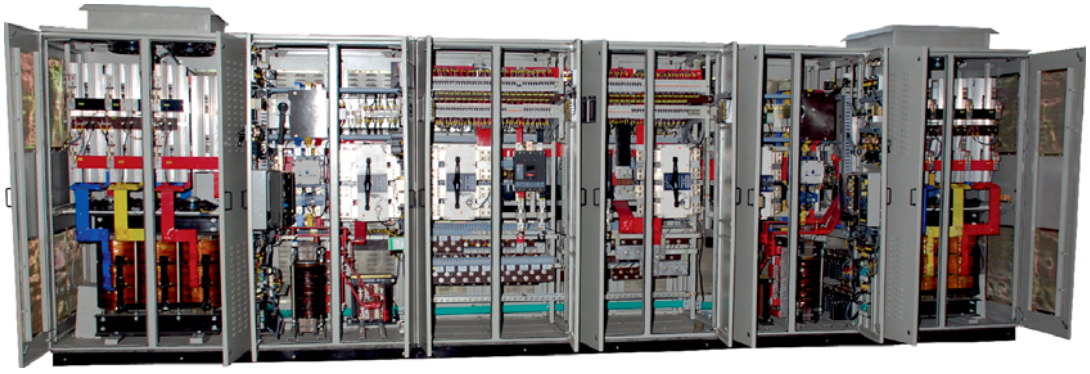
The range of thyristor based systems are highly rugged industrial systems, suitable for the most demanding of environmental and operating conditions. The thyristorised range of single phase and three phase input charger products capable of operating on 24 V to 360 V DC nominal voltage with output currents up to 2500 A. Other ratings are also available as per customer's requirement. Charger with CMU103T Digital Controller

Standard Features offered :

- Overload and short-circuit electronic protection
- Very good time response for step load
- Very high efficiency
- Temperature compensation of battery charging voltage
- Programmable charging curves
- Embedded controller with
- ARM Cortex-M3 processor
- RS485 interface for remote monitoring
- Single phase / Three phase input options
- 6 pulse / 12 pulse / 24 pulse charger designs
- Alarms with annunciation windows

Options available

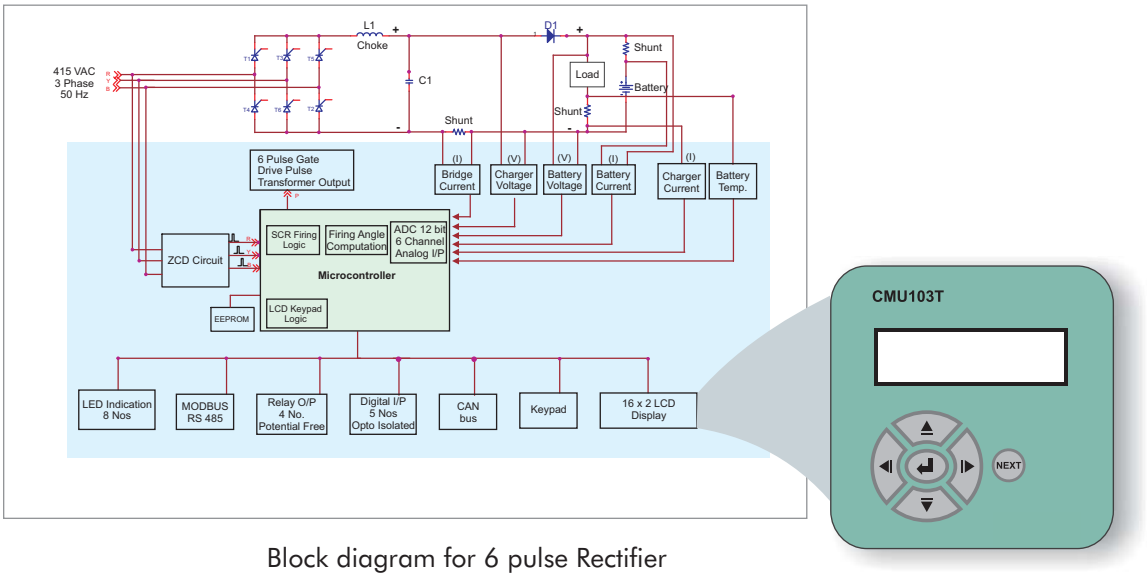
- To meet client specific dedicated requirements and specifications, the DC system is custom designed and configured. Custom designed systems can be configured from numerous options available. These include but are not limited to ;
- Differing enclosure sizes and colours
- Enclosure (IPxx) protection ratings
- Alarm and system monitoring schemes
- Charger and battery redundancy schemes
- Customer specific distribution
- Battery monitoring
- Configurable remote alarms



DC power supplies comprise rectifier units and the appropriate batteries.

Function

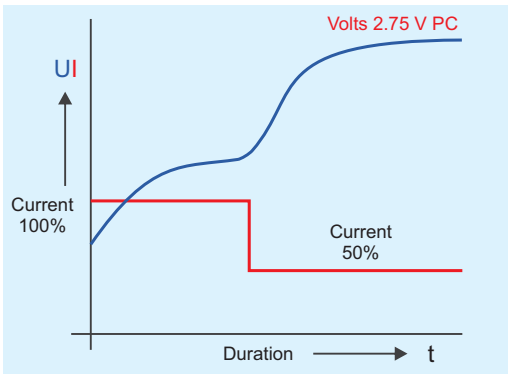
Thyristor regulated rectifier units are designed for a 3-phase input and constructed with a fully- controlled 3-phase bridge circuit (see basic circuit diagram below). Connection to the AC mains supply is made via a contactor in the rectifier unit input. A soft-start facility prevents high-voltage transients being passed through to the loads at the time of switch-on. The loads are electrically separated from the input by an isolation transformer. The set of thyristors is protected by a very quick-acting semiconductor fuses. The central control unit CMU103T is responsible for the operation and supervision of the rectifier unit. It provides drive to the thyristors, monitors, the components of the rectifier unit. A separate micro-controlled unit DAA takes care of measurement, alarms, annunciation etc. It provided digital monitoring facility and it can be interfaced with PC using MODBUS. A proprietary software is available to monitor the charger remotely.



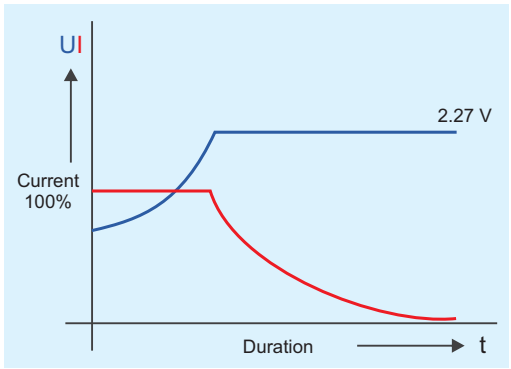
Block diagram for 6 pulse Rectifier

Charging methods

For the enhanced performance different charging methods are pre programmed in the charger controller. For example, IU and I.U I.U. charging methods are shown in the diagram. All the relevant parameters, according to battery requirements, are user configurable using the front panel keypad.



I.U I.U. Characteristic



IU Characteristic

Monitoring, Alarming, Data Logging and Remote monitoring

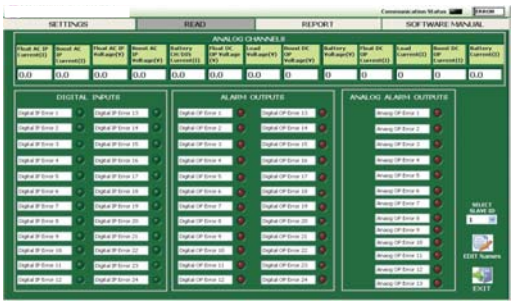
APIL battery charger is supplied with micro-controller based Digital Analog Annunciation and Controller called DAA. It is a sophisticated combined solution for the Metering, Annunciation and Remote monitoring of various parameters for the charger and battery. It is specifically designed keeping in mind the different requirements for the DC Power system and battery charging applications.

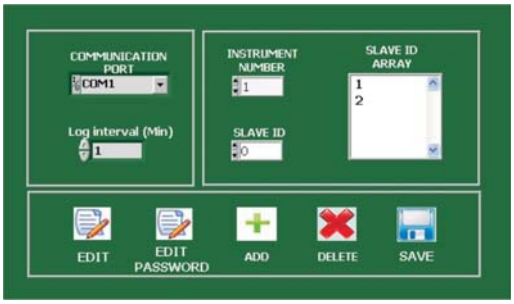
DAA provides a complete solution for alarm and monitoring in the DC power systems. The built in functions of DAA are user programmable via front display panel / keyboard and up to 24 different external alarms can be monitored making DAA extremely flexible and highly configurable supervisory module.

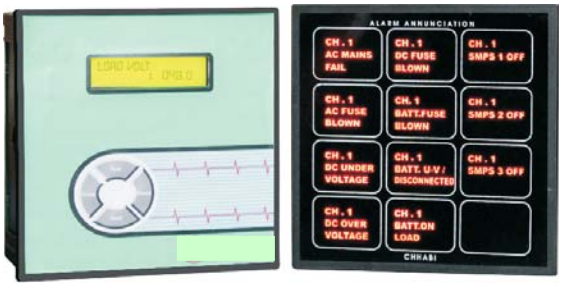
The DAA can be configured for use with an optional expansion relay module for additional remote relay alarm contacts.

DAA has MODBUS RS 485 interface port for monitoring the charger remotely for SCADA, DCS, DDCMIS. APIL has developed a proprietary software, which helps in monitoring the charger remotely on a standard PC. Typical configuration of PC being Pentium IV, with

1 GB RAM and 250 MB hard disk installation space, operating system Windows XP or higher.



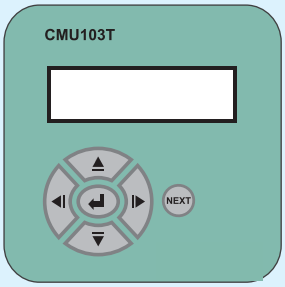




During past four decades APIL has supplied various rating battery chargers (FCB) to variety of Industries, Power plants and power distribution sector. Ratings varies from 5 A upto 3000 A.

Our latest microprocessor based controller **CMU 103 T** is compatible with all our earlier designed battery chargers (FCB) and DC systems. The retrofitting of this controller will enhance the over all performance of the FCB and DC system, as well as it will provide fascilty for the remote monitoring of various parameters.

For more details on the same, please send your charger details along with installation date for our best proposal at sales@acrastyle.com



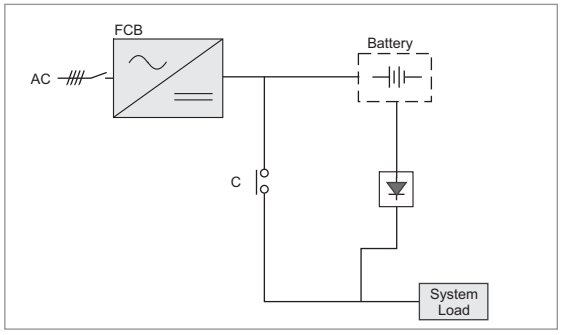
Battery Charger Configurations

The rectifier must be designed in such a way, that it can supply the load and at the same time, the battery should be able to boost charge, even if it is at fully-discharged condition.

When the AC mains supply fails, the battery takes over the load without any interruption and without any switching operation. The different schemes, which are normally used, depends on the criticality of loads and the site requirements.

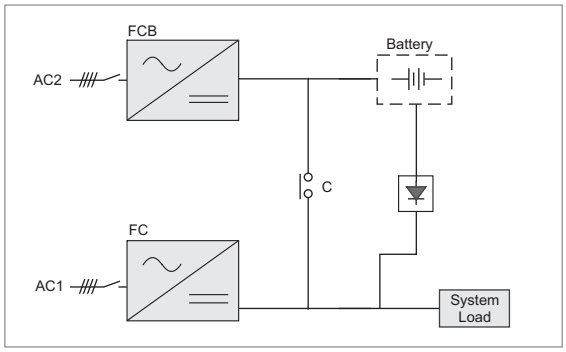
Following different configuration of APIL battery charger, are the standard offerings. A separate operation table provided, describes the functioning of each schematic under different operating conditions.

Float cum Boost charger - Single Batt - Single load



AC	FCB	C	BATT	LOAD	VDD
ON	Float	Close	Float	FCB	Bypass
ON	Boost	Open	Boost	FCB + VDD	In circuit
OFF	OFF	Close	Disc	Batt	Bypass

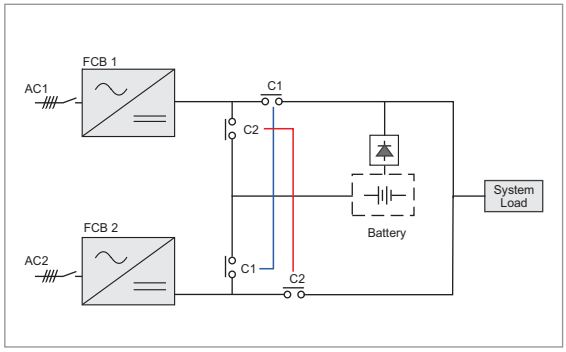
Float and Float cum Boost charger - Single Batt - Single load



AC 1	AC 2	FC	FCB	C	BATT	LOAD
ON	ON	Float	Float	Close	Float	FC/FCB
ON	ON	Float	Boost	Open	Boost	FC
OFF	ON	OFF	Float*	Close	Float	FCB
ON	OFF	Flaot	OFF	Close	Float	FC
OFF	OFF	OFF	OFF	Close	Disc	Batt

* Boost operation not allowed

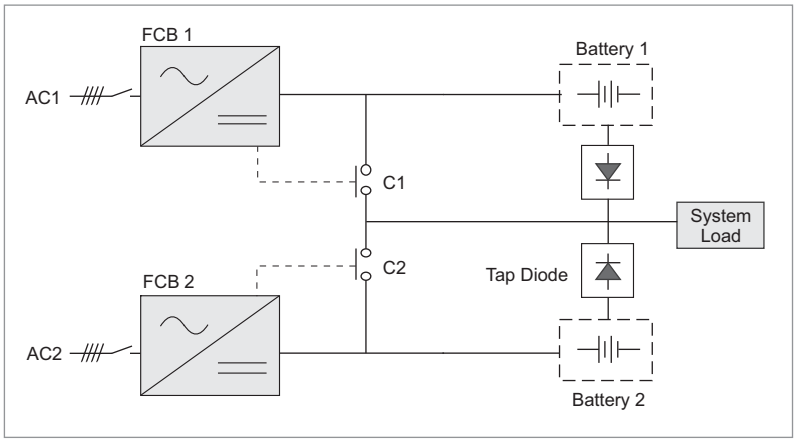
Dual Float cum Boost charger - Single Batt - Single load



AC 1	AC2	FCB1	FCB2	C1	C2	BATT	LOAD
ON	ON	Float	Float	Close	Close	Float	FCB1/2
ON	ON	Float*	Boost	Close	Open	Float	FCB1
ON	ON	Boost	Float*	Open	Close	Boost	FCB2
OFF	ON	OFF	Float*	Close	Close	Float	FCB2
ON	OFF	Float*	OFF	Close	Close	Float	FCB1
OFF	OFF	OFF	OFF	Close	Close	Disch	Batt

* Boost operation not allowed

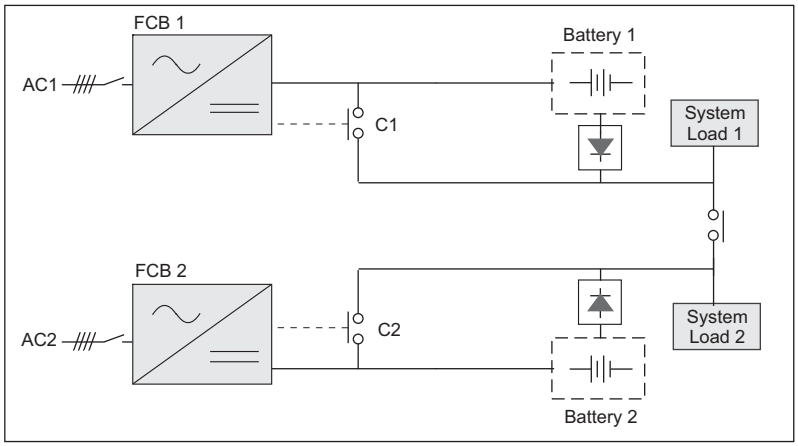
Dual Float cum Boost charger - Two Batt - Single load



AC 1	AC2	FCB1	FCB2	C1	C2	BATT1	BATT2	LOAD
ON	ON	Float	Float	Close	Close	Float	Float	FCB1/2
ON	ON	Float*	Boost	Close	Open	Float	Boost	FCB1
ON	ON	Boost	Float*	Open	Close	Boost	Float	FCB2
OFF	ON	OFF	Float*	Close	Close	Disch	Float	FCB2
ON	OFF	Float*	OFF	Close	Close	Float	Disch	FCB1
OFF	OFF	OFF	OFF	Close	Close	Disch	Disch	Batt1/2

* Boost operation not allowed

Dual Float cum Boost charger - Two Batt - Two load

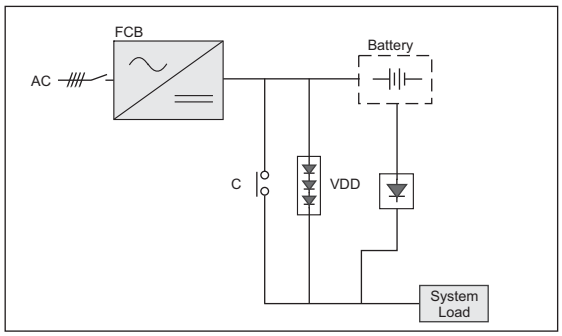


AC 1	AC2	FCB1	FCB2	C1	C2	BATT1	BATT2	LOAD 1	LOAD 2
ON	ON	Float	Float	Close	Close	Float	Float	FCB1	FCB2
ON	ON	Float*	Boost	Close	Open	Float	Boost	FCB1	FCB1**
ON	ON	Boost	Float*	Open	Close	Boost	Float	FCB2**	FCB2
OFF	ON	OFF	Float*	Close	Close	Disch	Float	Batt1	FCB2
ON	OFF	Float*	OFF	Close	Close	Float	Disch	FCB1	Batt2
OFF	OFF	OFF	OFF	Close	Close	Disch	Disch	Batt1	Batt2

* Boost operation not allowed

** Through bus coupler

Float cum Boost charger - Single Batt - Single load



AC	FCB	C	BATT	LOAD	VDD
ON	Float	Close	Float	FCB	Bypass
ON	Boost	Open	Boost	FCB + VDD	In circuit
OFF	OFF	Close	Disc	Batt	Bypass

Technical Specifications for Three phase battery charger

Electrical						
Input AC voltage*	415 VAC –10%, 3PH, 3/4 Wiire, 50Hz.or 60Hz. –5%					
Nominal voltage*	24 VDC	48 VDC	110 VDC	125 VDC	220 VDC	360 VDC
Applicable standard	IS 4540, IEC 146 (To the extent possible)					
Battery Types	Lead acid, Valve regulated Lead Acid or Niickel Cadnium batteries					
Charging Characteristics	Constant current, Constant voltage (IU,IUI.U.)					
Number of Cells	Lead acid		Valve regulated Lead Acid		Niickel Cadnium	
24 V	11 - 13		11 - 13		19 - 21	
48 V	23 - 25		23 - 25		38 - 41	
110 V	53 - 56		53 - 56		85 - 87	
125 V	62		62		98 - 100	
220 V	108 - 111		108 - 111		169 - 176	
360 V	180		180		278 - 284	
DC Output Voltage	Float Mode : For Lead Acid : 2.15 to 2.2 VPC For VRLA : 2.15 to 2.25 VPC For Nickel Cadmium : 1.40 to 1.42 VPC				Boost Mode : For Lead Acid : 2.65 to 2.75 VPC For VRLA : 2.3 to 2.35 VPC For Nickel Cadmium : 1.65 to 1.7 VPC	
DC Voltage Regulation	±1% at 0 to 100% load and specified AC voltage tolerance **(In Float Mode)**					
DC output current Range	5A - 3000A & Other on Request.					
Current Variation	Can be set at 10% -100% of rated current **(In Boost Mode)**			Current Limit	103 % Rated Current (In Float Mode)	
DC Current Regulation	± 2% **(In Boost Mode)**					
Magnetics	Isolation transformer / Filter Choke			Insulation class	Class F	
Temp. rise above ambient	90°C (For Magnetics)			High voltage insulation	2.5 KV for 1 minute	
Rectifier set	Fully controlled bridge circuit with thyristors (6 Pulse / 12 Pulse / 24 Pulse)					
Output ripple	Less than or Equal to 1% RMS without battery connected					
Efficiency **	80 to 93% depending on nominal voltage and power rating.					
Temperature Compensation	Programmable 2 - 6 mv / cell / °C					
Standard instrument	Output : DC V , DC A Battery : DC V , DC A AC I/P : AC V , AC A **(Optional)**			Standard protection	Thyristor protection fuse, Soft Start Feature***, Electronic current limit, Phase sequence reversal and Phase failure protection	
Standard alarms / Annunciation	Mains fail, Rectifier Fuse blown, Filter Capacitor fuse blown, DC Overvoltage, DC Undervoltage, Earth Fault for floating DC system			Status indication LED / Lamps	AC Mains ON, DC ON	
Communication	RS 485					
Remote indications	Potential free Relay contacts **(Optional)**					
Mechanical						
Construction	Folded sheet / MS construction			Sheet Thickness	Frame - 2 mm & Panels - 1.5 mm	
Cable Entry	Bottom **(Top cable entry on Request)**			Panel access	Front & Rear	
Terminal Arrangement	At Back Side			Enclosure protection	IP20 / IP31 / IP42 (other on request)	
Enclosure color	External / Internal : RAL 7032 **(Other shade available on request)**			Paint finish	Powder Coating - Structure Finish	
Panel Installation	Indoor, Self Standing Floor mounting			Acoustic noise	70 dBA & 80 dBA	
Operating conditions	0 - 50° C ≤ 95% humidity (non condensing) ≤ 1000 m above M.S.L.			Ventilation	Natural air cooling / Forced air cooling.	

* Other voltages available on request

** At maximum output parameters & At Nominal AC Input Voltage

*** The soft start feature ensures gradual development of DC output voltage after the charger is switched ON, protecting the charger from heavy inrush currents.

Note : All the data given are the guidelines only & cannot be held binding on the company. In view of continuous improvement, the company reserves right to change the specification & design without notice.

Battery Charger Ratings

Rated current A	24	48	110	220	360
5	FCB-24-05-1PH	FCB-48-05-1PH	FCB-110-05-1PH	FCB-220-05-1PH	FCB-360-05-3PH
10	FCB-24-10-1PH	FCB-48-10-1PH	FCB-110-10-1PH	FCB-220-10-1PH	FCB-360-10-3PH
15	FCB-24-15-1PH	FCB-48-15-1PH	FCB-110-15-1PH	FCB-220-15-3PH	FCB-360-15-3PH
20	FCB-24-20-1PH	FCB-48-20-1PH	FCB-110-20-1PH	FCB-220-20-3PH	FCB-360-20-3PH
25	FCB-24-25-1PH	FCB-48-25-1PH	FCB-110-25-3PH	FCB-220-25-3PH	FCB-360-25-3PH
30	FCB-24-30-1PH	FCB-48-30-3PH	FCB-110-30-3PH	FCB-220-30-3PH	FCB-360-30-3PH
40	FCB-24-40-1PH	FCB-48-40-3PH	FCB-110-40-3PH	FCB-220-40-3PH	FCB-360-40-3PH
50	FCB-24-50-1PH	FCB-48-50-3PH	FCB-110-50-3PH	FCB-220-50-3PH	FCB-360-50-3PH
60	FCB-24-60-3PH	FCB-48-60-3PH	FCB-110-60-3PH	FCB-220-60-3PH	FCB-360-60-3PH
80	FCB-24-80-3PH	FCB-48-80-3PH	FCB-110-80-3PH	FCB-220-80-3PH	FCB-360-80-3PH
100	FCB-24-100-3PH	FCB-48-100-3PH	FCB-110-100-3PH	FCB-220-100-3PH	FCB-360-100-3PH
125	FCB-24-125-3PH	FCB-48-125-3PH	FCB-110-125-3PH	FCB-220-125-3PH	FCB-360-125-3PH
150	FCB-24-150-3PH	FCB-48-150-3PH	FCB-110-150-3PH	FCB-220-150-3PH	FCB-360-150-3PH
175	FCB-24-175-3PH	FCB-48-175-3PH	FCB-110-175-3PH	FCB-220-175-3PH	FCB-360-175-3PH
200	FCB-24-200-3PH	FCB-48-200-3PH	FCB-110-200-3PH	FCB-220-200-3PH	FCB-360-200-3PH
225	FCB-24-225-3PH	FCB-48-225-3PH	FCB-110-225-3PH	FCB-220-225-3PH	FCB-360-225-3PH
250	FCB-24-250-3PH	FCB-48-250-3PH	FCB-110-250-3PH	FCB-220-250-3PH	FCB-360-250-3PH
275	FCB-24-275-3PH	FCB-48-275-3PH	FCB-110-275-3PH	FCB-220-275-3PH	FCB-360-275-3PH
300	FCB-24-300-3PH	FCB-48-300-3PH	FCB-110-300-3PH	FCB-220-300-3PH	FCB-360-300-3PH
325	FCB-24-325-3PH	FCB-48-325-3PH	FCB-110-325-3PH	FCB-220-325-3PH	FCB-360-325-3PH
350	FCB-24-350-3PH	FCB-48-350-3PH	FCB-110-350-3PH	FCB-220-350-3PH	FCB-360-350-3PH
375	FCB-24-375-3PH	FCB-48-375-3PH	FCB-110-375-3PH	FCB-220-375-3PH	FCB-360-375-3PH
400	FCB-24-400-3PH	FCB-48-400-3PH	FCB-110-400-3PH	FCB-220-400-3PH	FCB-360-400-3PH
425	FCB-24-425-3PH	FCB-48-425-3PH	FCB-110-425-3PH	FCB-220-425-3PH	FCB-360-425-3PH
450	FCB-24-450-3PH	FCB-48-450-3PH	FCB-110-450-3PH	FCB-220-450-3PH	FCB-360-450-3PH
475	FCB-24-475-3PH	FCB-48-475-3PH	FCB-110-475-3PH	FCB-220-475-3PH	FCB-360-475-3PH
500	FCB-24-500-3PH	FCB-48-500-3PH	FCB-110-500-3PH	FCB-220-500-3PH	FCB-360-500-3PH
550	FCB-24-550-3PH	FCB-48-550-3PH	FCB-110-550-3PH	FCB-220-550-3PH	FCB-360-550-3PH
600	FCB-24-600-3PH	FCB-48-600-3PH	FCB-110-600-3PH	FCB-220-600-3PH	FCB-360-600-3PH
650	FCB-24-650-3PH	FCB-48-650-3PH	FCB-110-650-3PH	FCB-220-650-3PH	FCB-360-650-3PH
700	FCB-24-700-3PH	FCB-48-700-3PH	FCB-110-700-3PH	FCB-220-700-3PH	FCB-360-700-3PH
750	FCB-24-750-3PH	FCB-48-750-3PH	FCB-110-750-3PH	FCB-220-750-3PH	FCB-360-750-3PH
800	FCB-24-800-3PH	FCB-48-800-3PH	FCB-110-800-3PH	FCB-220-800-3PH	FCB-360-800-3PH
850	FCB-24-850-3PH	FCB-48-850-3PH	FCB-110-850-3PH	FCB-220-850-3PH	FCB-360-850-3PH
900	FCB-24-900-3PH	FCB-48-900-3PH	FCB-110-900-3PH	FCB-220-900-3PH	FCB-360-900-3PH
1000	FCB-24-1000-3PH	FCB-48-1000-3PH	FCB-110-1000-3PH	FCB-220-1000-3PH	FCB-360-1000-3PH
1250	FCB-24-1250-3PH	FCB-48-1250-3PH	FCB-110-1250-3PH	FCB-220-1250-3PH	
1600	FCB-24-1600-3PH	FCB-48-1600-3PH	FCB-110-1600-3PH	FCB-220-1600-3PH	
2000	FCB-24-2000-3PH	FCB-48-2000-3PH	FCB-110-2000-3PH	FCB-220-2000-3PH	
2500	FCB-24-2500-3PH	FCB-48-2500-3PH	FCB-110-2500-3PH		
3000	FCB-24-3000-3PH	FCB-48-3000-3PH	FCB-110-3000-3PH		

With Single Phase input

With 6 Pulse design

With 12 Pulse design

With 24 Pulse design

Note : Higher ratings as per customer's specifications

Reference

APIL is a name associated with chargers, since 1992, is India's top five company in the field of DC Power Solutions. For last four decades, it has supplied variety of standard as well as customised DC Power solutions to various industry verticals.

THERMAL POWER STATIONS

Sipat, Barh, Korba, Trombay (Tata Electric), Chandrapur, Kahalgaon (L&T), Vindyachal, Khaparkheda, Ukai, Gandhinagar, Paricha, Kutch Lignite, Vijaywada, Talchar, Kota, Dadri, Simhadri, Aravli, Durgapur, Koderama, Mauda, Rihand, Anpara

REFINERIES, CHEMICAL, PETROCHEMICALS & FERTILIZERS INDUSTRIES

BPCL, HPCL, IOCL, IPCL, ONGC, SPIC, Zuari Agro, GAIL, GSFC, GNVFC, IFFCO, Bongaigaon Refineries Cochin Refinery, Mangalore Refineries, Madras Refinery, Reliance Petrochemicals, Sun Petrochemicals, Tata Chemicals, Coromoandel Fertilizers, CFCL, RCF, Paradeep Phosphates, Godavari, Deepak Fertilizer

SUB-STATIONS - Power Distribution companies, SEBs

Madhya Pradesh, Haryana, Uttar Pradesh, Rajasthan, Karnataka, Kerala, Tamilnadu, Maharashtra, Gujrat, Andra Pradesh, Bihar, Punjab, Orrisa, Delhi Vidyut Board, BEST, Ahmedabad Electricity Board

HYDRO ELECTRIC POWER STATIONS / PROJECT

Upper Sindh, Bhandardara, Terwanmedhe, Kanher & Dhom, Koyna, Ranganadi, Obra, Anandpur Sahib, Hirakud, Karajwan, Hemavati, Tons & Birsingpur, Tala Hydro Project - Bhutan, Koteshwar, Koldam

EPC COMPANIES

ABB, Alstom, Areva T&D, Aker Kvaerner, BHEL, Desein, EIL, GE Fanuc, Instrumentation Ltd, Jacob H&G, L&T, MECON, Petrofac Int., Siemens, Technimont ICB, Thermax, LANCO, Thyssen Krupp, Toyo Engineering, Yokogawa, Punj Lloyd, TCE, IVRCL Infrastructure, Gammon India, Mukand Ltd., Emerson Process Management, Corrtech International

STEEL INDUSTRIES

Durgapur, Bhilai, Bokaro, Rourkela, Visakhapatanam Steel Plants, SAIL, Lloyds Steel, Sunflag Iron & Steel, Tata Steel, Malvika Steel, Ispat Industries, Zenith Steel Pipes, Essar Steel, Monet Ispat, Jindal Steel

PUBLIC SECTOR

NPCIL, BALCO, NALCO, NMDC, GMDC, NHPC, Mazgaon Docks, Power Grid Corporation, Bhakra Beas Management Board

INDUSTRIES

Reliance Industries, Nicco Corporation, Tata Electric, Kirloskar Brothers, Jindal Strips, Amco Batteries, Tata Motor, Ballarpur Industries, Crompton Greaves, Indian Rare Earth, Samsung Engineering, P. T. Indo Bharat Rayon, Hindalco, Hindustan Dorr Oliver, Cipla, Bajaj Auto, Maruti Udyog Ltd.,

CEMENT INDUSTRIES

ACC, Gujarat Ambuja, Grasim, India Cement, Shree Cement, Prerna Cement, Laxmi, Orient, Saurashtra, Indo Rama, Manikgarh

PIPE LINE PROJECTS

HPCL : Vizag - Vijaywada,
BPCL : Mumbai - Manmad
HMPL : Mundra - Bhatinda

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