Energypac®
Engineering

COMPREHENSIVE SOLUTIONS FROM DESIGN TO DELIVERY

THYRISTOR CONTROL
BATTERY CHARGER

INDEX

BASIC DESIGN

Energypac Battery Charger uses Thyristor Switching principle for achieving the desired DC output. It consists of a transformer, a control circuit and a filter 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 smoothened by the filter circuit. The power output requirement is adjusted by using phase control technique which is provided by the control circuit. The feedback signal from the output to the control circuit is used for maintaining voltage regulation and current limit.

Energypac Engineering

ADVANTAGES

Energypac battery chargers offer numerous advantages, some of which listed below:

Extensive range

Available in a wide range of standard and customized models, Energypac Battery Chargers can be supplied in voltage outputs up to 110V DC and current outputs up to 100Amps. However, since it is customized in-house, it can be cascaded to support any range of voltages and output currents based on the customer's requirements.

Versatility

Energypac Chargers and DC systems find usage in a variety of applications such as process control, telecommunications, emergency lighting, switchgear protection, engine starting and power station control, to mention a few.

High reliability

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

Minimal maintenance

Designed for low maintenance and remote operation, Energypac 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 Energypac Battery Charger.

TYPES OF CHARGERS

- **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.

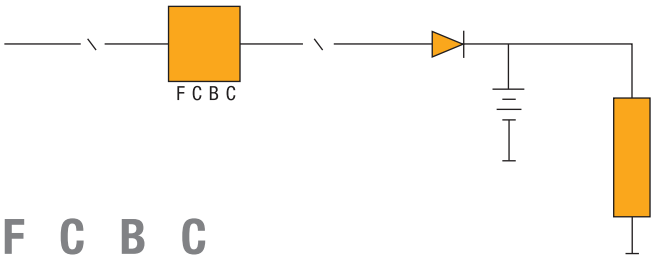
- **Boost charger (BC)** is required for quick recharge of a discharged battery.

- **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, the battery takes over the 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 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 or float mode" operation, a load voltage limiter in the form of a Diode Voltage Regulator (DVR) is used to ensure constant output voltage.

- **End cell switching** which uses a divided battery, tap cell diodes, and change over contractor as yet another method of protecting the load from high boost voltage as well as supply voltage variations during peak and off-peak hours.

- **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. Energypac 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

Energypac Engineering

FEATURES AND SPECIFICATION

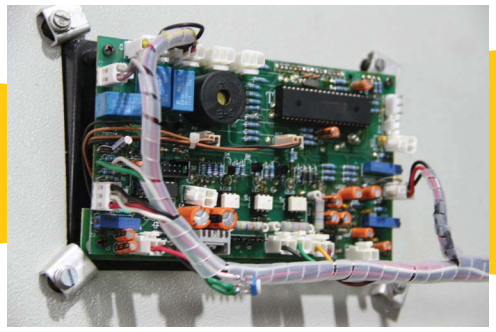
	SP/TP* series	Standard	Optional
Charger characteristics	SP & TP	Constant voltage with current limit	
Applicable standards	SP & TP	IEC	
Input voltage	SP	230V+/-10%	Any other voltage
	TP	415V+/-10%	Any other voltage
Input frequency	SP & TP	50 Hz+/-5%	Any other voltage
Output current	SP & TP	Refer page 8 and 9	
Output voltage			Any other voltage
Nominal	SP & TP	24/48/110/220 VDC	
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)	100mV with battery connected
	TP	3% rms (without Bty connected)	
Voltage stability (with variation in load & input V)	SP TP	+/- 1V of set value for > 48 VDC +/- 1V of set value for < 48 VDC	Or As required by user
Rectifier bridge	SP & TP	Full wave, half controlled	Full wave, half controlled
Magnetics:			
Insulation class	SP & TP	Class F	Class B Class H
Temp rise above ambient	SP & TP	90 Deg C	
High voltage insulation	SP & TP	2.5 Kv for 1 minute with maximum leakage current of 5mA	70 Deg. C, 110 Deg C
Instrument:			
Output voltmeter & ammeter	SP	72x72 Sq. mm analog type Accuracy : 2.5% Deflection : 90 Deg	Digital meters / LCD Display 1% accuracy
Output voltmeter & ammeter	TP	96x96 Sq. mm analog type Accuracy: 1.5%	Digital meters/ LCD display 1% accuracy
Input voltmeter with selector switch	TP	96x96 Sq. mm analog type Accuracy: 1.5% Deflection: 90 Deg	Deflection 240 Deg

FEATURES AND SPECIFICATION

	SP/TP* series	Standard	Optional
Indications & alarms:			
Lamps	SP & TP	Input on, output on	
LED	SP & TP	Charger on float Charger on boost	
Alarms	TP	Input supply fail DC under voltage DC over voltage Charger fail	Ground fault alarm for unearthed systems rectifier fuse fail output fail capacitor fuse fail
	SP		As required by the user
Protection:			
Input	SP	MCB	Switch and fuse
	TP	Switch & fuse	MCB/MCCB/thermal OL relay / contactor
Output	SP	MCB	Switch and fuse
	TP	Switch & fuse	MCB/MCCB
Rectifier bridge	SP & TP	HRC fuse	High speed semi
Filter capacity	TP	HRC fuse	Conductor fuse
Safety features:			
	SP & TP	Short circuit protection	Battery current limit
	SP & TP	Reverse polarity protection Soft start	
Mechanical:		Surge protection	
Enclosure protection	SP & TP	IP20	Up to IP 54
Paint finish	SP & TP	Epoxy based matt/finish	As required by the user
Paint color	SP & TP	External/internal: light gray	As required by the user
Construction	SP & TP	Folded sheet / MS construction	As required by the user
Panel access	SP & TP	Front & rear	Only front
Panel mounting	SP & TP	Floor mounting	Wall mounting for smaller panels
Ventilation	SP	Natural convection	
	TP	Up to 400A natural convection Above 400A / forced air Cooling	Forced Cooling

FEATURES AND SPECIFICATION

	SP/TP* series	Standard	Optional
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	Up to 3000. MSL
Humidity	SP & TP	0 to 95% RH non condensing	
Altitude	SP & TP	Up to 1000 MSL	
Routine tests	SP & TP	Visual & dimensional check	Burn in test on PCB's heat run test (8hrs) efficiency and power factor measurement dynamic response measurement (overshoot/undershoot)
Routine tests conducted at HBL works generally conforming to IEC 146/IS 4540	SP & TP	Insulation resistance test High voltage test Mesurement of voltage regulation Annunciation checks Measurement of ripple Charger functional check	



Energypac Engineering

OTHER FEATURES

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

Energypac Chargers are provided with an " auto function" option; enabling automatic recharging of the battery. When the main supply return while the charger is in "auto function, the control circuit for 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

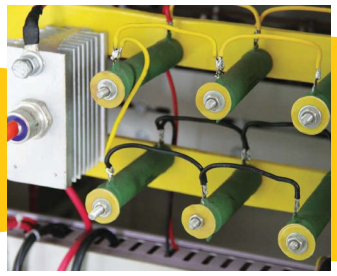
Some of the special options offered for Energypac Charger are:

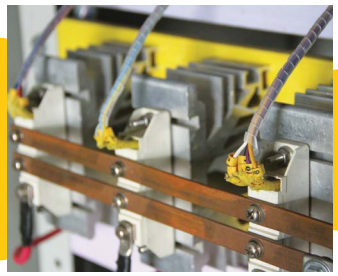
1. LCD Display for panel metering & alarms
2. Input Harmonics limitations as per IEEE 519
3. RS 232/RS 485 Interface with MODBUS protocol
4. High temperature alarm for forced air cooled panels
   Contacts for remote alarm indications
5. Radio interference / Harmonic filters
6. Thermostat controlled space heater for anti-condensation
7. Temperature compensation

Type tests

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

- Surge withstand capability test
- Short circuit tests on transformers for dynamic ability
- Radio Frequency Interference test
- Environmental & soak tests on PCB
- Vibration tests of PCB rack / panels
- Degree of protection tests upto IP5X & IPX2
- Siesmic- Qualification tests





Energypac Engineering

MODELS, WEIGHT AND DIMENSIONS

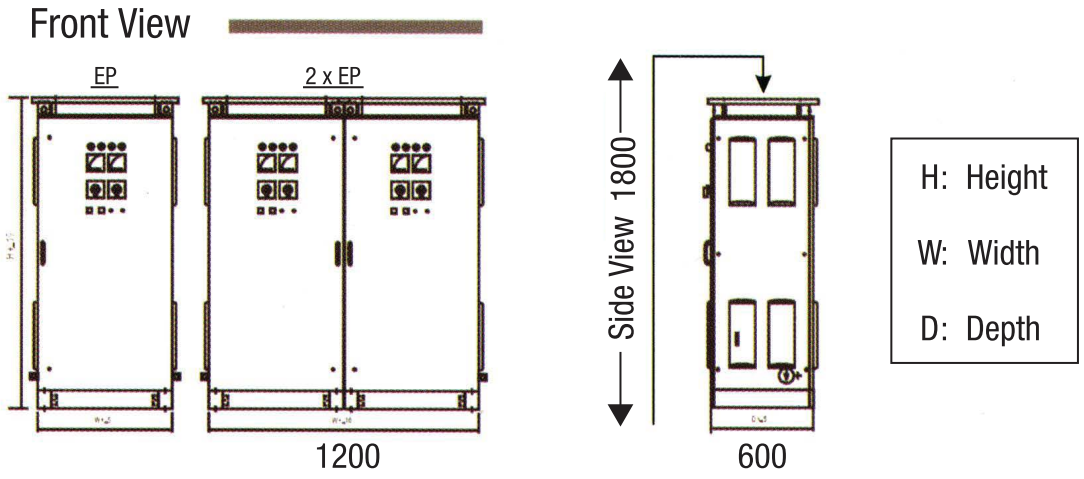
Standard Models, Weight and Dimensions for Single Phase Charger Nomenclature (example): 48 SP 20

20Amps output
Single Phase
48 V DC Nominal

	12 V DC		24 V DC		48 V DC		110 V DC		220 V DC	
Output	Cabinet Type	Weight (kgs)	Cabinet Type	Weight (kgs)	Cabinet Type	Weight (kgs)	Cabinet Type	Weight (kgs)	Cabinet Type	Weight (kgs)
10A	EP90/55/40	45	EP90/55/40	45	EP90/55/40	80	EP90/55/40	80	EP12/80/60	180
15A	EP90/55/40	55	EP90/55/40	55	EP10/60/60	150	EP10/60/60	150	EP12/80/60	200
20A	EP90/55/40	60	EP90/55/40	60	EP12/80/60	180	EP12/80/60	180	EP12/80/60	220
25A	EP10/60/60	65	EP10/60/60	65	EP18/80/60	200	EP15/80/60	200		
30A	EP10/60/60	75	EP10/60/60	75	EP10/80/60	225	EP15/80/60	220		
40A	EP12/80/60	150	EP12/80/60	150	EP12/80/60	250	EP15/80/60	240		
50A	EP12/80/60	180	EP12/80/60	180	EP12/80/60					
80A	EP12/80/60	225	EP12/80/60	225	EP15/80/60					

Panel Dimension for Single and Three Phase Charger

Cabinet Dimensions in mm			
Type	H	W	D
All 110 V & 220 V	1800	600/1200	600
All 12 V, 24 V & 48 V	900	600	600



Energypac Engineering

MODELS, WEIGHT AND DIMENSIONS

Standard Models, Weight and Dimensions for Single Phase Charger Nomenclature (example): 48 SP 20

Output Rating	12 V DC		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)	Cabinet Type	Weight (kgs)
10A	EP90/55/40	45	EP90/55/40	45	EP90/55/40	70	EP15/80/60	180	EP15/80/60	190
15A	EP90/55/40	55	EP90/55/40	55	EP90/55/40	80	EP15/80/60	190	EP18/80/60	210
20A	EP90/55/40	60	EP90/55/40	60	EP10/60/60	90	EP18/80/60	180	EP18/80/60	260
25A	EP10/60/60	65	EP10/60/60	65	EP15/80/60	190	EP18/80/60	220	EP18/80/60	350
30A	EP10/60/60	75	EP10/60/60	75	EP15/80/60	200	EP18/80/60	270	EP18/80/60	380
35A	EP12/80/60	150	EP12/80/60	150	EP15/80/60	180	EP18/80/60	300	EP18/80/60	400
40A	EP12/80/60	180	EP12/80/60	180	EP15/80/60	200	EP18/80/80	340	EP18/80/60	450
50A	EP15/80/60	225	EP15/80/60	225	EP18/80/60	280	EP20/80/80	360	EP18/80/60	480
60A	EP18/80/60	250	EP18/80/60	250	EP18/80/60	300	EP22/80/80	380	EP18/80/60	500
70A	EP18/80/60	280	EP18/80/60	280	EP18/80/80	310	EP22/80/80	420	2xEP18/80/60	550
80A	EP20/80/80	290	EP20/80/80	290	EP20/80/80	330	EP22/80/80	440	2xEP18/80/60	650
90A	EP20/80/80	300	EP20/80/80	300	EP20/80/80	350	EP22/80/80	500	2xEP18/80/60	700
100A	EP20/80/80	350	EP20/80/80	350	EP22/80/80	450	EP22/80/80	600	2xEP20/80/80	750
150A	EP22/80/80	450	EP22/80/80	450	EP22/80/80	650	2xEP18/80/80	780	2xEP22/80/80	900
200A	2xEP18/80/80	500	2xEP18/80/80	500	2xEP18/80/80	700	2xEP18/80/80	900	2xEP22/80/80	1050
250A	2xEP18/80/80	600	2xEP18/80/80	600	2xEP18/80/80	800	2xEP22/80/80	1000	2xEP22/80/80	1200
300A	2xEP22/80/80	750	2xEP22/80/80	750	2xEP20/80/80	850	2xEP22/80/80	1050	2xEP22/80/80	1400
400A	2xEP22/80/80	800	2xEP22/80/80	800	2xEP22/80/80	950	2xEP22/80/80	1200	2xEP22/80/80	1800
500A	2xEP22/80/80	850	2xEP22/80/80	850	2xEP22/80/80	1000	2xEP22/80/80	1400		
600A	2xEP22/80/80	900	2xEP22/80/80	900	2xEP22/80/80	1100				
700A	2xEP22/80/80	950	2xEP22/80/80	950						
800A	2xEP22/80/80	1000	2xEP22/80/80	1000						
1200A	2xEP22/80/100	1300	2xEP22/80/100	1300						
2000A	2xEP22/80/100	180	2xEP22/80/100	180						

In accordance with its policy of continuous improvement the company reserves the 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.

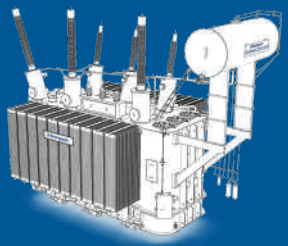
EXPLORE OUR PRODUCTS

1. Open your camera or QR code scanner. Point your device at the QR code

2. Wait for camera to recognize and scan QR code

3. Click proceed or view QR code details, when appears

4. Click the **link** or "visit url" or "go to website" to read the information



POWER TRANSFORMER

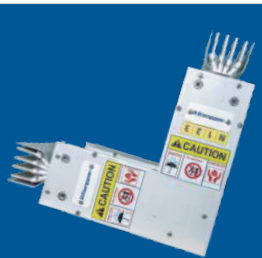
DISTRIBUTION TRANSFORMER
(OIL FILLED)

DISTRIBUTION TRANSFORMER
(DRY TYPE)

INSTRUMENT TRANSFORMER

VACUUM CIRCUIT BREAKER

SWITCHGEAR



BUSBAR TRUNKING SYSTEM

Energypac®
Engineering

Service Hotline Number
01730 33 16 92

Energypac®
Engineering

Head Office
Energy Center, 25 Tejgaon I/A,
Dhaka-1208, Bangladesh
Phone: +88028 87 93 95
Sales: +8801777 78 11 88
Email: marketing@energypac.com.bd
www.energypac.com.bd

Chittagong Office
House 2, Lane 5, Road 1, Block L,
Halishahar Housing Estate,
Chittagong-4216, Bangladesh
Phone: +88031 72 38 07
Fax: +88031 251 43 41, +88031 71 54 73

Khulna Office
84, Khan Jahan Ali Road,
Khulna-9100, Bangladesh
Phone: +8801777 78 11 88

Rajshahi Office
35, Terokhadia, Cantonment Road,
Rajshahi Cantonment-6202, Bangladesh
Phone: +8801713 14 70 22

Bogura Office
Shamsunnahar Plaza, College Road,
Kalitola, Bogura-5800
Phone: +8801713 14 70 41

India Office
KB-22, Bhakta Tower, 4th Floor, Sector 3,
Salt Lake, Kolkata-700098, India
Phone: +91 833 692 02 58
Email: marketing@energypacindia.in
sales@energypacindia.in

Nepal Office
Aayusha Colony, House 4, Kalanki 13,
Kathmandu, Nepal
Phone: +97 798 03 64 57 01
Email: export@energypac.com.bd

Italy Office
Via Dei Prati, 27-25073 Bovezzo (BS)
Phone: +39 030 205 91 49
Fax: +39 030 209 66 02
Email: alessandro.gallo@energypac-europe.com
export@energypac.com.bd

Works
Baroipara, Savar
Dhaka-1750, Bangladesh
Phone: +8801713 28 56 25

Dakshin Joypur Bill,
PO: Ananda Nagar,
Liluah, Howrah–711227
West Bengal, India
Phone: +91 833 690 69 34
+91 833 690 69 35

Via Conicchio, 49/A,
Brescia-25136, Italy
Phone: +39 030 205 91 49

ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 & ISO/IEC 17025:2017

Made in Bangladesh crafted with pride

www.energypac.com.bd