EXZON

The Keys To Success In Power Electronics

Rectifier Chargers
Single-Phase/Three Phase

Proven Technology for Reliability

The EXZON battery chargers are solid-state controlled and are designed for charging stationary lead-acid or nickel-cadmium batteries. The charging characteristic conforms to IU-curve per the latest DIN41 773 for independent and parallel operation with the associated batteries. Many features are added without extra cost to customer.

The rectifier chargers have been developed to conform to the National Electrical Manufacturer Association, NEMA-PE5, The Utility Type Battery Charger, and the Semi-conductor Converters standard, IEC 146.

Features

❑ Soft-start

Soft start is crucial when your charger needed to connect with the sensitive loads enabling the smooth start voltage and current will raise to the operating level over a 5- second interval.

❑ Dynamic Behavior

The charger output voltage will return to, and remain within, the deviation limit of voltage regulation not exceeding 2 seconds for step-load changing from 20% to 100% or 100% to 20% of rated output. No excursion of voltage results in activation of the over-voltage shutdown.

❑ Float and Boost charge

To accommodate all battery types - lead acid, lead calcium, nickel cadmium : EXZON provides both float and equalize charge with separated voltage adjustment over a range of ±10% of U_{2N}.

With Equalize Charging Mode, the output voltage increases to the equalize level within preset time (0-24 hours) after that switches to the float level automatically.

❑ Indication and alarms

To ensure user friendly operation, the Exzon rectifier chargers are equipped with comprehensive indicators and alarms.

- Voltmeter & ammeter
- Button for Float charge
- Button for Equalize charge
- Button for Reset equalize
- Button for Lamp test
- Green LED for Power on
- Yellow LED for Equalize
- Red LED for High DC
- Red LED for Low DC
- Red LED for Charger fail
- Red LED for AC fail
- Red LED for GND fault

In addition, there are equipped with the alarm contacts for remote monitoring.

- Main failure contact
- Charger fault contact
- High DC contact
- Low DC contact

❑ Minimal maintenance

Only seldom maintenance and inspection is needed since EXZON equips with all high-grade electrical components. To assure longer component life and trouble free operation, minor preventive maintenance procedures should be performed annually.

❑ Protection

The charger includes the following protection features:-

- Input & output circuit breakers
- High speed fuse for the power semiconductor (3phase)
- Lightning arrester at both input and output sides
- Auxiliary fuses

❑ Current Limiting

The output current limit is factory-set at 100% of rated current to reduce output voltage for protecting battery from overcharge and charger from overload or short circuit. The output current limit can be adjusted over a range of 50-110% of rated current.

❑ High voltage shutdown

The output voltage is switched off automatically when the sensing circuit detects overvoltage (preset at + 10% of boost voltage) and switched on again automatically once the fault has been removed.

❑ Reverse polarity protection

If the charger is inadvertently reverse - connected to the battery, the fast-fuse on the output side will blow. Upon replacement of the fast-fuse and clearance of fault, the output voltage returns to normal without any future degradation in the performance of the rectifier charger.

Type	Input		Output		Physical			
	Voltage (V)	Current (A)	Voltage (V)	Current (A)	Height (mm)	Width (mm)	Depth (mm)	Weight (mm)
LFB1-012-005	230	0.8	12	5	600	450	300	38
LFB1-012-010	230	1.4	12	10	600	450	300	43
LFB1-012-015	230	2.2	12	15	600	450	300	57
LFB1-012-020	230	3.0	12	20	600	450	300	62
LFB1-012-030	230	4.4	12	30	900	600	400	72
LFB1-012-040	230	6.4	12	40	900	600	400	92
LFB1-012-050	230	8.2	12	50	900	600	400	112
LFB1-012-080	230	12.5	12	80	1200	600	400	126
LFB1-012-100	230	15.6	12	100	1200	600	400	152
LFB3-012-005	400	0.2	12	5	750	600	300	40
LFB3-012-010	400	0.3	12	10	750	600	300	45
LFB3-012-015	400	0.5	12	15	750	600	300	60
LFB3-012-020	400	0.6	12	20	750	600	300	75
LFB3-012-030	400	0.9	12	30	750	600	300	85
LFB3-012-040	400	1.3	12	40	1200	600	500	105
LFB3-012-050	400	1.6	12	50	1200	600	500	127
LFB3-012-080	400	2.5	12	80	1500	600	500	137
LFB3-012-100	400	3.2	12	100	1500	600	500	170
LFB3-012-125	400	3.9	12	125	1500	600	500	180
LFB3-012-160	400	5.0	12	160	1500	600	500	200
LFB3-012-200	400	6.3	12	200	1800	600	600	245
LFB3-012-250	400	8.5	12	250	1800	600	600	287
LFB3-012-300	400	10.0	12	300	1800	600	600	360
LFB3-012-400	400	12.7	12	400	1800	800	600	405
LFB3-012-500	400	16.0	12	500	1800	800	600	515
LFB3-012-600	400	20.0	12	600	1800	800	600	635
LFB1-024-005	230	1.5	24	5	750	600	300	60
LFB1-024-010	230	3.0	24	10	750	600	300	65
LFB1-024-015	230	4.5	24	15	750	600	300	70
LFB1-024-020	230	6.0	24	20	750	600	300	75
LFB1-024-030	230	9.0	24	30	750	600	300	80
LFB1-024-040	230	11.9	24	40	750	600	300	99
LFB1-024-050	230	14.0	24	50	750	600	300	105
LFB1-024-080	230	22.0	24	80	1200	600	400	135
LFB1-024-100	230	29.0	24	100	1200	600	400	160
LFB1-024-125	230	36.5	24	125	1200	600	400	190
LFB1-024-160	230	46.0	24	160	1500	600	600	230
LFB1-024-200	230	57.0	24	200	1500	600	600	290
LFB3-024-005	400	0.4	24	5	750	600	300	68
LFB3-024-010	400	0.7	24	10	750	600	300	70
LFB3-024-020	400	1.4	24	20	750	600	300	80
LFB3-024-030	400	2.0	24	30	750	600	300	95
LFB3-024-040	400	2.6	24	40	1200	600	600	105
LFB3-024-050	400	3.5	24	50	1200	600	600	120
LFB3-024-080	400	5.0	24	80	1500	600	600	150
LFB3-024-100	400	7.0	24	100	1500	600	600	170
LFB3-024-125	400	9.0	24	125	1500	600	600	190
LFB3-024-160	400	11.0	24	160	1500	600	600	240
LFB3-024-200	400	14.0	24	200	1500	600	600	300
LFB3-024-250	400	17.5	24	250	1800	600	600	350
LFB3-024-300	400	21.0	24	300	1800	600	600	410
LFB3-024-400	400	28.0	24	400	1800	800	800	500
LFB3-024-500	400	35.0	24	500	1800	800	800	620
LFB3-024-600	400	42.0	24	600	1800	1000	800	720
LFB3-024-800	400	56.0	24	800	1800	1000	800	780
LFB3-024-1000	400	70.0	24	1000	1800	1000	800	850
LFB3-024-1200	400	84.0	24	1200	1800	1000	800	950
LFB3-024-1500	400	105.0	24	1500	1800	1000	800	1120
LFB3-024-1800	400	126.0	24	1800	1800	1000	800	1220
LFB1-048-005	230	2.5	48	5	750	600	300	70
LFB1-048-010	230	4.5	48	10	750	600	300	70
LFB1-048-015	230	7.0	48	15	750	600	300	70
LFB1-048-020	230	9.0	48	20	750	600	300	85
LFB1-048-030	230	13.0	48	30	750	600	300	105
LFB1-048-040	230	17.7	48	40	1200	600	400	125
LFB1-048-050	230	23.0	48	50	1200	600	400	135
LFB1-048-080	230	36.0	48	80	1200	600	400	150
LFB1-048-100	230	45.5	48	100	1200	600	400	180
LFB3-048-005	400	0.65	48	5	900	600	400	90
LFB3-048-010	400	1.3	48	10	900	600	400	100
LFB3-048-015	400	1.95	48	15	1200	600	600	105
LFB3-048-020	400	2.6	48	20	1200	600	600	110
LFB3-048-030	400	3.25	48	30	1200	600	600	115
LFB3-048-040	400	3.9	48	40	1200	600	600	120

Other voltages and higher currents available on requrest!

Technical Data

INPUT

Voltage U_{1N}	220/230V ±10% single phase 380/400V ±10% three phase
Unbalanced voltage (3Φ)	Less than 5%
Frequency	50Hz ±5%
-optional	extended range as well as other voltages & frequencies on request

Power factor

at float voltage and I_{2N}	approx. 0.7 lag
-optional	0.8 lag

OUTPUT

Constant current	I_{2N} rated current ±2%
Float charge	U_{2N} voltage ±1%
Equalize charge	U_{2N} voltage ±1%
Low DC alarm	-20% of float voltage
High DC alarm	Equalize voltage
High DC shutdown	+10% of equalize voltage

Setting range in

-DC output current limit	50-110%
-Battery current limit	10-100%
-Low DC alarm	70-100%
-High DC alarm	100-120%
-High DC shutdown	110-130%

Overload

DC output current	110% 1 hour
-optional	110% continuous
Short-circuit protection	units are short-circuit proof since the current limitation is effective up to short-circuit

Residual ripple voltage

Standard	Less than 5% rms. without battery
-optional	Less than 2% rms. without battery Less than 1% rms. without battery

Cooling

Standard	Natural convection up to I_{2N} 50A thereon forced ventilation.
-optional	With redundant, supervised thermostat controlled fans
Radio interference supper.	VDE 0875 class N
Acoustic noise level	< 70 dBA @ 1meter
-optional	< 65 dBA @ 1meter
-optional	< 60 dBA @ 1meter

Ambient conditions

Operating temperature	-5°C… + 40°C
-optional	-5°C… + 55°C
Relative humidity	…95%
Altitude	up to 1000 m above sea level

CONSTRUCTION

Housing	steel sheet: floor-mounted: all key parts accessible from front: top and bottom can be unscrewed
Connections	from bottom: easily accessible after opening door.
Connectors	a.c. side and d.c. side with battery parallel
Protection	IP 20
-optional	IP 21, 31, 41, 51… NEMA 3, 5, 12…
Painting	Epoxy powder-painted: light Grey

Standards

Power semiconductor	Vishay : USA
Power transformer	Class F
Measuring instruments	Class 1.5
Circuit breaker	ABB : MG : FUJI
Control fuse	ABB : LEGAND : SIEMENS
Power fuse	BUSSMANN : SHINOHAWA
Power terminal	IDEC-ISUMI, Japan
Timer	OMRON, Japan
Wires-cables	LAPP KABEL : THAI-YAZAKI

Type	Input		Output		Physical			
	Voltage (V)	Current (A)	Voltage (V)	Current (A)	Height (mm)	Width (mm)	Depth (mm)	Weight (mm)
LFB3-048-050	400	6.5	48	50	1500	600	600	125
LFB3-048-080	400	10.5	48	80	1500	600	600	170
LFB3-048-100	400	13.5	48	100	1500	600	600	205
LFB3-048-125	400	17.0	48	125	1500	600	600	230
LFB3-048-160	400	22.0	48	160	1500	600	600	280
LFB3-048-200	400	26.5	48	200	1800	600	600	340
LFB3-048-250	400	31.5	48	250	1800	800	600	410
LFB3-048-300	400	48.0	48	300	1800	800	600	450
LFB3-048-400	400	65.0	48	400	1800	800	800	620
LFB3-048-500	400	80.0	48	500	1800	1000	800	700
LFB3-048-600	400	96.0	48	600	1800	1000	800	800
LFB1-130-005	230	6.5	130	5	750	600	300	80
LFB1-130-010	230	11.0	130	10	750	600	300	90
LFB1-130-015	230	15.0	130	15	750	600	300	105
LFB1-130-020	230	21.0	130	20	1200	600	400	115
LFB1-130-030	230	31.5	130	30	1200	600	400	135
LFB1-130-040	230	41.0	130	40	1200	600	600	148
LFB1-130-050	230	54.0	130	50	1200	600	600	160
LFB1-130-080	230	84.0	130	80	1500	800	600	210
LFB1-130-100	230	105.0	130	100	1500	800	600	300
LFB3-130-005	400	1.5	130	5	1200	600	400	100
LFB3-130-010	400	3.0	130	10	1200	600	400	110
LFB3-130-015	400	4.5	130	15	1200	600	400	125
LFB3-130-020	400	5.9	130	20	1200	600	400	140
LFB3-130-030	400	9.0	130	30	1500	600	600	150
LFB3-130-040	400	11.9	130	40	1500	600	600	165
LFB3-130-050	400	15.0	130	50	1500	600	600	185
LFB3-130-080	400	23.5	130	80	1500	600	600	240
LFB3-130-100	400	29.5	130	100	1500	600	600	280
LFB3-130-125	400	37.0	130	125	1500	800	800	310
LFB3-130-160	400	48.0	130	160	1500	800	800	390
LFB3-130-200	400	59.5	130	200	1800	800	800	540
LFB3-130-250	400	70.0	130	250	1800	1000	800	600
LFB3-130-300	400	89.5	130	300	1800	1000	800	650
LFB3-130-400	400	134.0	130	400	1800	1000	800	750
LFB3-130-500	400	156.0	130	500	1800	1000	800	850
LFB3-130-600	400	180.0	130	600	1800	1200	800	970
LFB1-260-005	230	11.0	260	5	1200	600	400	100
LFB1-260-010	230	21.5	260	10	1200	600	400	110
LFB1-260-015	230	32.0	260	15	1200	600	400	135
LFB1-260-020	230	43.0	260	20	1200	600	600	200
LFB1-260-030	230	64.0	260	30	1500	600	600	260
LFB1-260-040	230	85.0	260	40	1500	600	600	292
LFB1-260-050	230	106.5	260	50	1500	600	600	325
LFB3-260-005	400	2.4	260	5	1200	600	400	110
LFB3-260-010	400	5.0	260	10	1200	600	400	135
LFB3-260-015	400	10.0	260	15	1500	600	600	145
LFB3-260-020	400	12.5	260	20	1500	600	600	165
LFB3-260-030	400	20.0	260	30	1500	600	600	210
LFB3-260-040	400	25.5	260	40	1500	600	600	260
LFB3-260-050	400	29.0	260	50	1500	600	600	300
LFB3-260-080	400	45.0	260	80	1800	800	600	400
LFB3-260-100	400	57.0	260	100	1800	800	800	450
LFB3-260-125	400	72.0	260	125	1800	800	800	550
LFB3-260-160	400	88.0	260	160	1800	1000	800	680
LFB3-260-200	400	116.0	260	200	1800	1000	800	800
LFB3-260-250	400	145.0	260	250	1800	1000	800	950
LFB3-260-300	400	176.0	260	300	1800	1000	800	1250
LFB3-260-400	400	222.0	260	400	1800	1500	800	1400
LFB3-260-500	400	275.0	260	500	1800	1500	800	1650
LFB3-260-600	400	345.0	260	600	1800	1500	800	1800

Other voltages and higher currents available on request!

Technical Data

INPUT

Voltage U_{1N}	220/230V ±10% single phase 380/400V ±10% three phase
Unbalanced voltage (3Φ)	Less than 5%
Frequency	50Hz ±5%
-optional	extended range as well as other voltages & frequencies on request

Power factor

at float voltage and I_{2N}	approx. 0.7 lag
-optional	0.8 lag

OUTPUT

Constant current	I_{2N} rated current ±2%
Float charge	U_{2N} voltage ±1%
Equalize charge	U_{2N} voltage ±1%
Low DC alarm	-20% of float voltage
High DC alarm	Equalize voltage
High DC shutdown	+10% of equalize voltage

Setting range in

-DC output current limit	50-110%
-Battery current limit	10-100%
-Low DC alarm	70-100%
-High DC alarm	100-120%
-High DC shutdown	110-130%

Overload

DC output current	110% 1 hour
-optional	110% continuous
Short-circuit protection	units are short-circuit proof since the current limitation is effective up to short-circuit

Residual ripple voltage

Standard	Less than 5% rms. without battery
-optional	Less than 2% rms. without battery Less than 1% rms. without battery

Cooling

Standard	Natural convection up to I_{2N} 50A thereon forced ventilation.
-optional	With redundant, supervised thermostat controlled fans
Radio interference supper.	VDE 0875 class N
Acoustic noise level	< 70 dBA @ 1meter
-optional	< 65 dBA @ 1meter
-optional	< 60 dBA @ 1meter

Ambient conditions

Operating temperature	-5°C… + 40°C
-optional	-5°C… + 55°C
Relative humidity	…95%
Altitude	up to 1000 m above sea level

CONSTRUCTION

Housing	steel sheet: floor-mounted: all key parts accessible from front: top and bottom can be unscrewed
Connections	from bottom: easily accessible after opening door.
Connectors	a.c. side and d.c. side with battery parallel
Protection	IP 20
-optional	IP 21, 31, 41, 51… NEMA 3, 5, 12…
Painting	Epoxy powder-painted: light Grey

Standards

Power semiconductor	Vishay : USA
Power transformer	Class F
Measuring instruments	Class 1.5
Circuit breaker	ABB : MG : FUJI
Control fuse	ABB : LEGAND : SIEMENS
Power fuse	BUSSMANN : SHINOHAWA
Power terminal	IDEC-ISUMI, Japan
Timer	OMRON, Japan
Wires-cables	LAPP KABEL : THAI-YAZAKI

RECTIFIER CHARGER

OUTSTANDING FEATURES

- THYRISTOR CONTROLLED RECTIFIER
- 12-VOLTS, 24-VOLTS
- EFFICIENCY > 80%
- CONSTANT VOLTAGE REGULATED
- CURRENT LIMITED PROTECTION
- SHORT CIRCUIT PROTECTION
- LOW VOLTAGE AND SURGE PROTECTION
- MANUFACTURE UNDER ISO9001-2008

A function designed confined with proven technology

The EXZON LFB series rectifier charger comprises open type, enclosure type and optional modules to provide flexible solutions for Lead acid and Nickel cadmium battery.

EQUIPMENT TECHNOLOGY

Thyristor Controlled rectifier — incorporated power thyristors and diodes use as full-wave, precise time required to maintain a constant average output voltage value. During current limit, SCRs are phased back to a sufficient firing angle to maintain output current not exceed rectifier rating.

Soft-start -— the output voltage and current of rectifier are gradually to the rated level over a 5 second interval without overshoot.

Current limiting — An intelligent current monitoring circuit detects overcurrent within a few millisecond. It can be adjusted 80 - 100% of current rating. This protects the rectifier even it the output terminals are accidentally short-circuited.

Float charging — With main power available, the charging unit charges the battery with the float charger current, so that the battery maintains it's fully charge. The battery charger compensates for short-term discharge current from the battery. As defined in DIN 41773 with an IU characteristic, float voltage is factory set at 2.23V/cell for lead-acid batteries and 1.40V/cell for NiCd batteries.

Reverse protection — Due to high feedback voltage of battery or alternator which cause battery charger damage. EXZON design the circuit to protect this fault.

Fault indicators — EXZON provide LED indicators to monitor all malfunctions and faults occurring in the main power unit.
- Power on indicator
- Low DC alarm
- High DC alarm
- Charger fail alarm

CASING
Two versions of LFB series are available:

Open type
EXZON Open type rectifier had been designed for compact size. The mounting plate can be mounted in any direction as enough space, see direction as enough space, see dimension in type table. They have only Input Output terminal, no metering, no indicators, no control switch.

Enclosure type
The wall-mounted unit is provided with a well-designed, sturdy steel-sheet casing with a front door, allowing easy access to the components. The units are consist of dc ammeter & dc voltmeter, fully indicators with lamp test and control switch.

OPTIONS

Boost charging — This unit accelerates recharging by switching the curve IU from continuous float charging (2.23 V/cell) to boost charging(2.35 V/cell). The boost charge is terminated after a period of 5 hours and switched back automatically to float charge.

Interface relay — is the relay board provided free contacts to remote monitor power on or overvoltage or undervoltage or AC failure or battery failure or charger failure.

Technical Data Sheet

AC Input

System:	1 phase 2wires + N
Voltages:	220/230/240 VAC
Voltage range:	+/- 10%
Frequency:	50 Hz.
Frequency range:	+/- 5%
Surge protection	2.5kA @ 8/20usec.

DC Output

Nominal Voltages :	12/24 VDC +/- 1%
Ripple voltage:(DC filtered)	< 5% Vrms.
Overload:	110% 10min.
Output current	max.105%
Voltage adjustment	10-20 VDC (12V)
Voltage adjustment	15-30 VDC (24V)

Ambient conditions

Operating temperature	0C... + 40C
Relative humidity	...95%
Altitude	up to 1000 m above sea level

Construction

Housing	steel sheet 1.0 mm.: wall-mounted: all key parts accessible from front.
Connections	from top or bottom: easily accessible after opening door.
Connectors	AC. side and DC. side
Protection	IP 20 for enclosure type
Cooling	Natural
Painting	Epoxy powder-painted

Order Information

Type	Input		Output		Physical (mm)				
	Voltage (V)	Current (A)	Voltage (V)	Current (A)	Height	Width	Depth	Weight (kg)	Color
CONAN ENCLOSURE TYPE ②									
LFB1-012-005W	230	0.5	12	5	500	355	185	15	green
LFB1-012-010W	230	1.9	12	10	580	350	200	30	green
LFB1-024-005W	230	1.0	24	5	500	355	185	16	green
LFB1-024-010W	230	2.8	24	10	580	350	200	32	green
LFB1-024-015W ②	230	4.8	24	15	720	420	270	42	green
LFB1-024-020W ②	230	7.2	24	20	720	420	270	51	green
DK ENCLOSURE TYPE									
LFB1-012-005DK	230	0.5	12	5	520	350	170	28	cream
LFB1-012-010DK	230	1.9	12	10	570	400	200	33	cream
LFB1-012-015DK	230	2.2	12	15	700	550	250	42	cream
LFB1-012-020DK	230	4.0	12	20	700	550	250	48	cream
LFB1-024-005DK	230	1.0	24	5	520	350	170	30	cream
LFB1-024-010DK	230	2.8	24	10	570	400	200	35	cream
LFB1-024-015DK	230	4.8	24	15	700	550	250	48	cream
LFB1-024-020DK	230	7.2	24	20	700	550	250	65	cream
LFB1-024-003DK3	230	1.1	24	3	570	400	200	30	cream
LFB1-024-005DK3	230	1.5	24	5	570	400	200	31	cream
LFB1-024-006.3DK3	230	1.9	24	6.3	570	400	200	35	cream
OPEN TYPE									
LFB1-012-005	230	0.5	12	5	120	310	145	4	grey
LFB1-012-010	230	1.9	12	10	150	330	220	8	grey
LFB1-012-015	230	2.2	12	15	160	410	350	15	grey
LFB1-012-020	230	4.0	12	20	160	410	350	25	grey
LFB1-024-003	230	0.3	24	3	120	310	145	4	grey
LFB1-024-005	230	1.0	24	5	130	350	150	5	grey
LFB1-024-010	230	2.8	24	10	170	330	220	10	grey
LFB1-024-015	230	4.8	24	15	180	410	350	25	grey
LFB1-024-020	230	7.2	24	20	180	410	350	35	grey

*Some options caused the dimensions differ from type table.