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RAILWAY

POWER SOLUTIONS

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DC-DC Converters for General Purpose Rail Applications

RCM SERIES

The RCM Series (Railway Chassis Mount) DC-DC converters are reliable power supplies for railway and transportation systems. There are two wide input voltage ranges available for 60 W, 150 W and 300 W models. 500 W and 1000 W models are optimised for 72 V or 110 V railway batteries. The RCM Series is designed for chassis mount applications, with integrated enclosure, operating in convection cooled environments.

Many options are available, such as an output ORing FET for redundant operation, output voltage adjustment, interruption time, out-ok signals, and a shutdown input.

- Input voltage ranges:
  - » 60 W models: 12 / 24 V or 24 to 110 V batteries (ultra wide range)
  - » 150 W / 300 W models: 24 / 36 V or 72 / 110 V batteries
  - » 500 W / 1000 W models: 72 V or 110 V battery
- Single or dual output voltages of 12 V, 15 V and 24 V
- Integrated enclosure for chassis mounting
- Extremely high efficiency and high power density
- Low inrush current
- Reliable cage clamp terminal (Option: pluggable connector)
- Over-temperature, over-voltage, over-current & over-load protection
- Compliant to EN 50155 and EN 45545, AREMA compliant

MODEL	DC INPUT VOLTAGE (cont.)	DC OUTPUT VOLTAGE	OUTPUT CURRENT	EFFICIENCY	POWER	DIMENSIONS [in / mm]
12RCM60-12	12/24 V (8 – 36 V)	12 V	5 A	84%	60 W	1.97 x 1.26 x 6.77 / 50 x 32 x 172
12RCM60-15		15 V	4 A	85%		
12RCM60-24		24 V	2.5 A	85%		
XRCM60-12	110 V (16.8 – 137.5 V)	12 V	5 A	89%	60 W	1.97 x 1.26 x 6.77 / 50 x 32 x 172
XRCM60-15		15 V	4 A	89%		
XRCM60-24		24 V	2.5 A	89%		
24RCM150-12	24 V (16.8 – 45 V)	12 V	12.5 A	90%	150 W	3.78 x 1.42 x 6.48 / 96 x 36.1 x 164.5
24RCM150-15		15 V	10 A			
24RCM150-24		24 V	6.25 A			
110RCM150-12	110 V (50.4 – 137.5 V)	12 V	12.5 A	90%	150 W	3.78 x 1.42 x 6.48 / 96 x 36.1 x 164.5
110RCM150-15		15 V	10 A			
110RCM150-24		24 V	6.25 A			
24RCM300-12	24 V (16.8 – 45 V)	12 V	25 A	92%	300 W	3.78 x 1.42 x 6.48 / 96 x 36.1 x 164.5
24RCM300-24		24 V	12.5 A			
24RCM300-2424		± 24 V	6.25 A			
110RCM300-12	110 V (50.4 – 137.5 V)	12 V	25 A	92%	300 W	3.78 x 1.42 x 6.48 / 96 x 36.1 x 164.5
110RCM300-24		24 V	12.5 A			
110RCM300-2424		± 24 V	6.25 A			
72RCM500-24 110RCM500-24	72 V (50.4 – 90 V) 110 V (77 – 137.5 V)	24 V	21 A	96%	500 W	1.57 x 5.55 x 8.23 / 40 x 141 x 209
72RCM1000-24 110RCM1000-24	72 V (50.4 – 90 V) 110 V (77 – 137.5 V)	24 V	42 A	96%	1000 W	1.81 x 5.55 x 8.23 / 46 x 141 x 209

3U Cassettes for 19 inch Rack or Chassis Mount

RUGGED CASSETTE SERIES

The rugged MELCHER products offer the industry's premier line of standard products for DC-DC and AC-DC power conversion, including custom design capability for application specific power conversion solutions.

For more than 50 years Bel's MELCHER lineup of DC-DC and AC-DC cassette-style power converters with extremely robust electrical and mechanical designs have demonstrated to provide consistent power to a diverse array of railway, signaling, communications, transportation and industrial infrastructure applications.

- DC-DC converters with extremely wide input covering battery applications from 12 V to 220 V nominal
- Universal AC input with identical form factors
- Inrush current limitation
- Reverse polarity protection
- Up to 500 W output power
- High efficiency, up to 94.5% including input filter
- Ultra-wide output voltage adjustment
- Remote on/off control input
- Current share, redundancy
- Rugged aluminum extruded case, conformally coated assemblies
- Self-cooling, no derating over the specified temperature range
- Compliance with EN 50155, EN 50121-3-2, EN 45545-2, UL/CSA 62368-1 & National deviations (AREMA, RIA, NFF-F 16)
- Input / output overvoltage protection
- All products are fully transient protected
- No-load, overload and short-circuit protection
- Thermal protection

PRODUCT SERIES #	AC INPUT VOLTAGE	DC INPUT VOLTAGE	DC OUTPUT VOLTAGES	# OF OUTPUTS	POWER
M Series (8 TE)	85 – 264 VAC*	8 – 385 VDC (6 ranges)	5 – 60; ±12, ±15; 5/±12, 5/±15 V	1, 2 or 3	50 W
S Series (12 TE)	85 – 264 VAC* (PFC)	8 – 385 VDC (6 ranges)	5, 12, 15, 24, 48; ±12, ±15, ±24 V	1 or 2	100 W
K Series (16 TE)	85 – 264 VAC* (PFC)	8 – 385 VDC (6 ranges)	5, 12, 15, 24, 48; ±12, ±15, ±24 V	1 or 2	150 W
LKP Series (16 TE)	187 – 255 VAC (PFC)	N/A	12, 24, 48; ±12, ±24 V	1 or 2	250 W
T Series (28 TE)	70 – 140; 85 – 255 VAC (PFC)	N/A	24 – 54.5 V	1	500 W
Q Series (4 TE)	N/A	14.4 – 154 VDC (5 ranges)	3.3 – 48; ±5, ±12, ±15, ±24 V	1 or 2	82 – 132 W
P Series (4 TE)	N/A	14.4 – 154 VDC (5 ranges)	3.3 – 96 V	1, 2, 3 or 4	100 – 192 W
HP Series (4 TE)	N/A	12.5 – 154 VDC (1 range)	5 – 96 V	1, 2, 3 or 4	120 – 192 W
HR Series (12, 16 TE)	N/A	12 – 168 VDC (1 range)	±12, ±15, ±48 V	1 or 2	144 – 288 W
ER Series (12, 16 TE)	N/A	66 – 168 VDC (1 range)	±12, ±15, ±48 V	1 or 2	144 – 288 W
LR Series (12, 16 TE)	90 – 264 VAC (PFC)	120 - 300 VDC (1 range)	±12, ±15 V	1 or 2	240 – 300 W

* 47 – 440 Hz # 1 TE = 0.2"

Isolated Board Mount DC-DC Converters

Bel Power Solutions offers a wide range of PCB-mount DC-DC converters that are especially designed and manufactured for the railway and transportation markets.

IMX / IMY / IBX SERIES

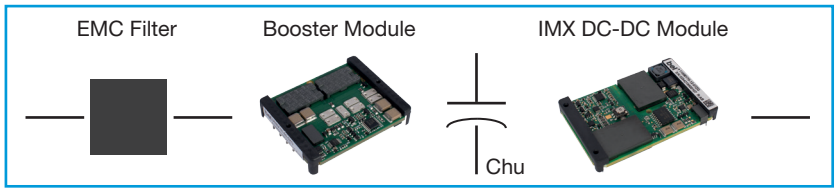
- Wide DC input voltage ranges with or without isolation from 4.7 – 154 VDC (including platforms with 10:1 ratio)
- Output voltages from 3.3 – 48 V with trim ranges 75 – 105% Vout nom
- Wide operating temperature range -40 °C to 85 °C with no derating
- Dip-varnished circuits without potting material for maximum reliability
- Isolated converters with magnetic feedback and I/O test voltages up to 3 kVAC
- Low output ripple and excellent dynamic response
- Maximum flexibility for modular type platforms instead of custom designs
- Multiple I/O protections

SERIES	DC INPUT VOLTAGE	DC OUTPUT VOLTAGES	# OF OUTPUTS	POWER	DIMENSIONS [in / mm]
IMX4	4.7 – 121 VDC (4 ranges)	3.3, 5, 12, 15 or ±5, ±12, ±15, ±24 V	1 or 2	4 W	1.3 x 0.8 x 0.33 / 33 x 20 x 8.5
IMX7	8.4 – 150 VDC (4 ranges)	3.3, 5 or ±5, ±12, ±15, ±24 V	1 or 2	7 W	2 x 1 x 0.42 / 51 x 25.4 x 10.5
IMX15 / IMY15	8.4 – 150 VDC (3 ranges)	3.3, 5 or ±5, ±12, ±15, ±24 V	1 or 2	15 W	2 x 1.6 x 0.42 / 51 x 40.6 x 10.5
IMX35	9.0 –150 VDC (4 ranges)	4x 5, 4x 12, 4x15; 5/±12, 5/±15 V	4	35 W	3 x 2.5 x 0.42 / 76.2 x 62.5 x 10.5
IMX70 / IMY70	12 –154 VDC (2 ranges)	5, 12, 15, ±24 V	1 or 2	70 – 90 W	3 x 2.5 x 0.49 / 76.2 x 62.5 x 12.5
Non-Isolated Boost DC-DC Converter					
IBX15 Series	16.8 – 154 VDC	49 – 80 V	1	80 – 110 W	2.15 x 2.16 x 0.45 / 54.7 x 54.9 x 11.5

Modular Building Blocks for Maximum Flexibility and 10:1 Input (15 VDC - 154 VDC)

The IBX15 and IMY70 / IMY15 Series combined offer a 10:1 ratio input platform for battery voltages from nominal 24 V to 110 V, with a multitude of isolated DC output options. In order to explore the unique benefits of the IBX/IMY power solutions, a bare PCB demo board is available for free on request.

The IBX/IMY concept practically replaces full custom solutions:



0RQB SERIES

The 0RQB series is an isolated DC-DC converter series providing up to 200 W of output power from a wide input range. When a large hold-up capacitor is added, the converter can still work up to 10 ms when the input supply is interrupted.

- DOSA approved footprint
- Remote on/off
- 5 V / 5 mA auxiliary supply
- Wide operating temperature range -40 to 105°C
- Input under-voltage protection, output over-voltage protection,
- over-current and short-circuit protection

SERIES	DC INPUT VOLTAGE	DC OUTPUT VOLTAGE	POWER	DIMENSIONS [in / mm]
0RQB-15Y05x	14.4 – 154 VDC	5 V	15 W	2.30 x 1.10 x 0.42 / 58.42 x 27.94 x 10.8
0RQB-30Y	14.4 – 154 VDC	5, 12 V	30 W	2.30 x 1.45 x 0.59 / 58.42 x 36.83 x 15.0
0RQB-50Y	14.4 – 154 VDC	5, 12, 15, 24, 48 V	50 W	2.30 x 1.45 x 0.59 / 58.42 x 36.83 x 15.0
0RQB-C5U24L	16 – 67 VDC	24 V	150 W	2.30 x 1.45 x 0.57 / 58.42 x 36.83 x 14.5
0RQB-C5U54L	16 – 67 VDC	54 V	162 W	2.30 x 1.45 x 0.59 / 58.42 x 36.83 x 15.0
0RQB-C5W24x	50 – 160 VDC	24 V	144 W	2.30 x 1.45 x 0.50 / 58.42 x 36.83 x 12.7
0RQB-C5W54L	43 – 154 VDC	54 V	162 W	2.45 x 1.45 x 0.59 / 62.24 x 36.83 x 15.0
0RQB-D0W12x	50 – 154 VDC	12 V	200 W	2.45 x 1.45 x 0.59 / 62.24 x 36.83 x 15.0

AREMA Compliant AC-DC Power Systems

LRS & LRSA SERIES SUBRACK SYSTEMS

The power supply system is designed for railway and subway applications to accommodate LK and LR Series converters. The power supply rack system supports also battery charging with temperature sensors controlling the LK and LR converters.

- High current sub-rack, 8 – 120 A systems, fully redundant
- 1 – 6 LK/LR Series AC-DC converters per rack
- Universal fully redundant input 110 / 230 VAC
- Fully redundant outputs from 12 V up to 60 V
- Scalable output power up to 1500 W
- Isolation test voltage 3000 VAC
- Relay contacts for alarm signals
- Inhibit for remote ON/OFF
- Extremely rugged, reliable design for harsh environment

Battery Chargers

LBC SERIES

The LBC Series is 12 kW ruggedized battery charger consisting of two or three parallel independent AC-DC converter modules TXP4000 employing PFC stage and insulated DC-DC stage to convert the 3-phase input voltage 400 / 480 VAC (line to line) to a bus voltage suitable for 110 V battery charging. The system includes a DSP for control and monitoring.

- Input voltage: 3x 400 / 480 VAC (350 - 528 VAC)
- 110 VDC output decoupled with a diode for load separating
- Output voltage for 110 V battery (adjustable 85 – 137.5 VDC)
- Parallel operation with active current sharing
- Operating temperature -25 to 55 °C without derating
- CAN bus / Ethernet Interface
- Compliant to railway standards EN 50155, EN 50121-3-2, EN 50533, EN 45545 (HL3), NFPA 130

LBM SERIES

The LBM Series is a 15 kW air cooled on-board battery charger, that consists of two independent power modules working in parallel. It converts 3-phase AC input voltage to DC bus voltage with battery charging capability. Features include high efficiency and reliability, compact design with redundancy and precise battery charging that makes it suitable for different requirements of railway rolling stock on-board power grids and vehicle control systems.

- Input voltage: 3x 400 / 480 VAC
- Output voltage for 110 V battery (adjustable 80 – 140 VDC)
- Lossless output OR-ing circuit
- Digital control based on DSP
- Compact mechanical design with flexible mounting options
- CAN bus / Ethernet communication with vehicle control unit
- Compliant to Railway standards EN 50155, EN 50121-3-2, EN 50533, EN 45545 (HL3), NFPA 130, EN 50657, IEC 62443-4-1 / 4-2

Non-Isolated Buck DC-DC Converters

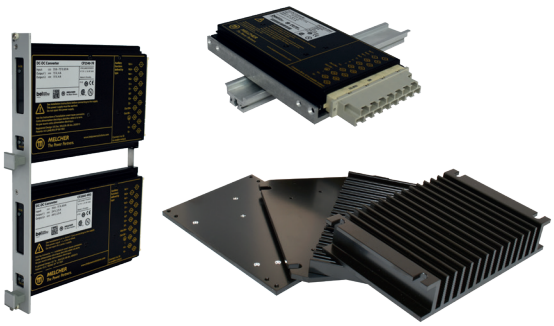
PSx SERIES

Bel Power Solutions offers a wide range of positive switching regulators designed as power supplies for electronic systems, where no input-to-output isolation is required.

- High reliability
- High efficiency up to 96%
- Low output ripple
- Excellent dynamic response
- Output ratings from 50 W to 720 W
- Operating temperature -40°C to +71°C, no derating or air flow
- Full metal jacket, rack / chassis mount

MODEL	INPUT VOLTAGE	OUTPUT VOLTAGES	OUTPUT CURRENT	MOUNT	DIMENSIONS [in / mm]
PSR Series	7 – 40, 8 – 80 VDC	0 – 36 VDC	2 – 4 A	PCB, Chassis	2 x 2.8 x 1 / 50 x 70 x 25
PSA Series	7 – 35, 18 – 156 VDC	0 – 48 VDC	1 – 5 A	PCB, Chassis	2 x 2.8 x 1 / 50 x 70 x 25
PSB Series	7 – 40, 8 – 80, 15 – 156 VDC	0 – 48 VDC	4 – 8 A	PCB, Chassis	2.7 x 4.2 x 1.3 / 60 x 106 x 32
PSC Series	7 – 40, 8 – 80, 18 – 156 VDC	0 – 48 VDC	6 – 12 A	PCB, Chassis	3.5 x 5.9 x 1.3 / 88 x 151 x 32
PSL Series	7 – 40, 8 – 80, 18 – 156 VDC	0 – 48 VDC	6 – 12 A	Cassette 3 U / 8 TE	19” Rack 1.5 x 6.6 x 4.2 / 37 x 168 x 107
PSS Series	8 – 40, 8 – 80, 18 – 156 VDC	0 – 48 VDC	9 – 18 A	Cassette 3 U / 12 TE	19” Rack 2.4 x 6.6 x 4.4 / 60 x 168 x 111
PSK Series	8 – 40, 8 – 80, 18 – 156 VDC	0 – 48 VDC	12 – 25 A	Cassette 3 U / 16 TE	19” Rack 3.2 x 6.6 x 4.4 / 80 x 168 x 111

Accessories for Melcher Railway Converters



Platform Products

- 19” racks and backplanes
- Base plates or heat sinks for chassis mounting
- Mating female connectors for solder, cage clamp or faston connections
- Connector retention devices
- Front panels for 19” rack mount
- Filters and ring core chokes
- Chassis and DIN Rail mounting kits
- Temperature sensors for optimal battery charging

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Railway Converters by Bel Power Solutions

Bel Power Solutions is one of the largest power supply manufacturers in the world and has a long history of providing leading edge, innovative power solutions.

Under the MELCHER brand, Bel provides the leading manufacturers in the railway and transportation industry worldwide with high performance, rugged DC-DC and AC-DC converters. With almost 50 years of design and manufacturing experience MELCHER products are designed to meet the highest national and international standards for harsh environments, safety and EMC/EMI and undergo rigorous and extensive EVT/DVT and HALT/HASS test. Our strict engineering guidelines ensure low component stress, thermal profiling and high phase margins for stability and dynamic response – all part of our highly reliable converter designs.

Features

- Compliance with International and National standards (EN, UL, AREMA, RIA, NFF) in particular, EN 50155, EN 50121
- Fire safety according to EN 45545 for hazard level HL3
- Ultra-wide DC input voltage, up to 10:1 ratio, suitable for all common battery input voltages worldwide
- Extremely high efficiencies
- Fully featured, full fault protection: Transient, overtemperature, over/undervoltage, overcurrent
- 3.3 to 96 V output voltages with wide trim range
- Series and parallel or fully redundant configurations
- On/off control, current share and other options
- Extended ambient operating temperature to -40 °C or lower on request
- Convection and conduction cooling with no derating up to 85 °C
- All PC boards dip-varnished for high mechanical durability and humidity withstand, without use of potting material
- Basic or reinforced insulation, test voltages up to 3000 VAC
- Shock and vibration resistance
- Multi-platform approach for highest flexibility
- All products are fully RoHS compliant
- 5 year warranty (product / model dependent)

5 YEAR warranty

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