Premium
Powering Your Challenge

BDS-50k

50KW 3-PHASE ISOLATED CHARGER MODULE

GENERAL FEATURES:

- 50kW constant power, 300 … 1000Vdc
- 260 … 530Vac in, 50kW from 340Vac
- 150 … 1000Vdc output voltage
- Efficiency 97.3% @ 800Vdc, 400Vac
- Peak efficiency 97.6%
- Power factor 0.99, THD < 5% (full load)
- Reinforced isolation, input to output
- Operating range –40 … +75°C
- Full power to +55°C, 50% at +75°C
- Up to 4000m altitude
- Forced air, silicone top-layer potting
- CAN 2.0B, enable input, address switch



3 YEAR WARRANTY INDUSTRY

ROHS REACH

Part number	Input voltage range [Vac L-L]	Output voltage range [Vdc]	Output current max. [A]	Efficiency typ. [%]	Output power max. [W]
BDS-50K-35166	260 … 530	150 … 1000	166.7 @ 300Vdc	97.3	50000

Efficiency at 400Vac / 800Vdc, full load (peak 97.6%). Full power for 340 … 530Vac input and 300 … 1000Vdc output.

INPUT	
Grid connection	3P3W + PE (three-phase, no neutral)
Input voltage range	260 … 530Vac (L-L), nom. 400Vac
Full-power input range	340 … 530Vac (L-L)
Line frequency	45 … 65Hz (50 / 60Hz nom.)
Max. input current	90A @ 340Vac, full load
Power factor	0.99 @ full load
Input current THD	≤ 5% @ full load
Leakage current	≤ 3.5mA @ 400Vac
OUTPUT	
Output voltage range	150 … 1000Vdc
Constant-power range	300 … 1000Vdc
Max. output current	166.7A @ 300Vdc and 50kW
Output power	50kW (340 … 530Vac in, 300 … 1000Vdc out)
Typical efficiency	97.3% @ 400Vac, 800Vdc, full load
Peak efficiency	97.6%
Startup current	110% of nominal operating current
Voltage setting resolution	0.5V
Current setting resolution	0.1A
Voltage measurement accuracy	±0.5% @ 500 … 1000Vdc
Current measurement accuracy	±1A
Regulation, ripple, current control delay	Designed to meet IEC 61851-23 requirements
ENVIRONMENTAL	
Operating temperature	–40 … +75°C
Full-load temperature range	–40 … +55°C, linear derating to 50% at +75°C
Storage temperature	–40 … +85°C
Relative humidity	0 … 95%, non-condensing
Operating altitude	up to 4000m (full power at 25°C)
Cooling	Forced air, ≥ 400CFM per module
Pollution degree	II
Overvoltage category	III (AC input)
EMC	
Emission	Designed to meet EN IEC 61851-21-2 Class B, EN IEC 61000-6-3; EN 50121-3-2 (conducted emissions)
Immunity	Designed to meet EN IEC 61851-21-2 and EN IEC 61000-6-2
SAFETY	
Safety standards	Designed to meet IEC 61851-23 / IEC 61851-1
Isolation	Reinforced, AC input to DC output; basic to enclosure; Class I
Isolation, signal circuit (SELV)	Reinforced, to AC input and DC output
Dielectric strength, input–output	4242Vdc
Dielectric strength, input/output–enclosure	2121Vdc
Impulse withstand (1.2/50μs)	7385V input–output; 4923V to enclosure
Insulation resistance, input–output	> 7MΩ @ 500Vdc
Insulation resistance, to enclosure	> 1MΩ @ 500Vdc
Insulation resistance, to SELV circuit	> 7MΩ @ 500Vdc
MECHANICAL	
Dimensions (W × H × D)	385 × 110 × 390mm
Front panel / overall depth	421 × 110mm / 415mm
Weight	22kg
Enclosure material	SGLCC
Protection level	IP20 (connectors mated); 2 … 3mm silicone top potting
Mounting	Horizontal or vertical
Acoustic noise	55dB @ 25°C (400Vac / 400Vdc, full load)

CONTROL

Communication	CAN 2.0B, 29-bit identifier, 125kbps default (CAN1H / CAN1L)
Enable input	EN-sys / CGND-sys: output inhibited when shorted; output voltage below 60V within 1s
Module address	Dial ID switch on front panel
Status indicators	LED: green OK, yellow derating, red alarm (RFA)
Soft start	Enabled by default; 5s ramp from 0 to rated current
Parallel operation	Active current sharing, up to 60 modules
System functions	Group control, sleep mode, address-conflict alarm (red LED)

PROTECTIONS

AC over-voltage (OVP)	> 530Vac (±4Vrms)
AC under-voltage (UVP)	< 260Vac (±4Vrms)
AC over- / under-frequency	> 65Hz / < 45Hz (±0.2Hz)
DC over-voltage (software)	Vcmd × 1.1 (high-voltage mode)
DC over-voltage (software, low mode)	Vcmd + 50V
DC over-voltage (hardware)	Vcmd + 100V
Over-temperature (OTP)	Shutdown at ambient > 75°C
Other protections	OCP, output short-circuit protection

ORDERING CODES

Part Number	Input voltage range	Output voltage range	Output current max.	Output power max.
BDS-50K-35166	**260 … 530Vac (L-L)**	**150 … 1000Vdc**	**166.7A @ 300Vdc**	**50000W**

Refer to the derating curves for input-voltage and temperature limits.

Several references are subjected to special MOQs and lead times. Please consult Premium's Sales Dept. and web site.

DESCRIPTION

The BDS-50k is a 50kW three-phase isolated AC/DC charger module, designed for high-voltage battery charging and industrial electrification. It operates in constant-current or constant-voltage mode from a 3P3W + PE input (no neutral) of 260 … 530Vac and delivers 150 … 1000Vdc, with constant power from 300 to 1000Vdc. It combines high efficiency (97.3% typical, 97.6% peak), a 0.99 power factor, high power density, low current harmonics, low electromagnetic emissions and low acoustic noise. The top layer is encapsulated in two-component silicone potting (2 … 3mm, full coverage of the top side) and critical areas are conformally coated, making it suitable for environments with high humidity (95% RH, non-condensing) and heavy dust.
The module operates from –40°C to +75°C with forced-air cooling: full power up to +55°C and linear derating to 50% at +75°C.

COMMUNICATION AND CONTROL

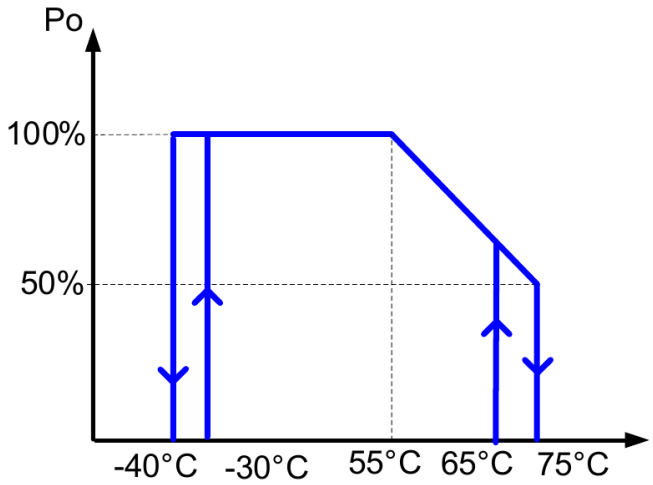
A CAN bus interface lets the system controller operate the module. The module address is set with the dial ID switch on the front panel, and several modules can be paralleled with active current sharing. The EN-sys input inhibits the output when it is shorted to CGND-sys. Front-panel LEDs show the state: green (OK), yellow (derating) and red (alarm). Derating is triggered by AC input voltage, output voltage or high temperature.

INSTALLATION

For correct operation, the following must be met:

- Install a 3P+PE breaker with RCD function on the AC input side and a DC disconnector on the DC output circuit.
- The module is Class I equipment for building-in: connect the PE terminal.
- The system protection grade shall not be lower than IP32 (indoor) or IP54 (outdoor).
- Provide a dust screen or dust cotton so that large particles or flocs do not block the air duct.
- Air flow of at least 400CFM per module (N × 400CFM for N modules).
- Mount the module horizontally or vertically: push it slowly into the system slot and fasten the screws in the middle of the front panel.
- The module is not hot-swappable: power the system down before inserting or removing a module.
- Power cables: insulation rated ≥ 105°C. DC cable ≥ 1000Vdc, AC cable ≥ 600Vac, both 4AWG.
- Signal cable: ≥ 60Vdc, ≥ 80°C, 24AWG.

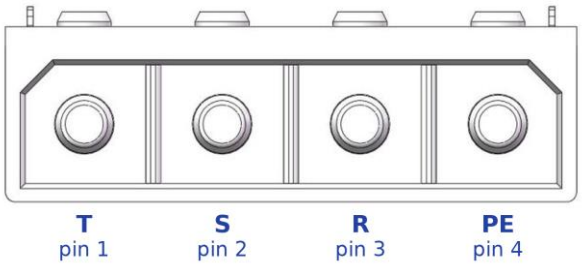
POWER DERATING VS AMBIENT TEMPERATURE



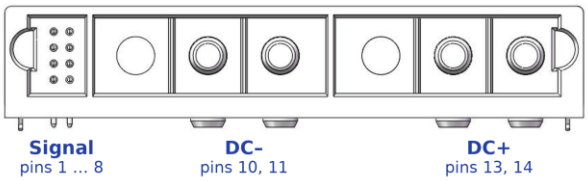
- 100% Pout (50kW) from –40°C up to +55°C.
- Linear derating from +55°C to 50% Pout at +75°C.
- Shutdown at ambient above +75°C (OTP).
- With insufficient air intake or poor heat dissipation the module may derate earlier because of internal over-temperature.

CONNECTIONS

Pin	Signal	Description
AC input connector (4 pins)		
1	T (L3)	AC line 3
2	S (L2)	AC line 2
3	R (L1)	AC line 1
4	PE	Protective earth



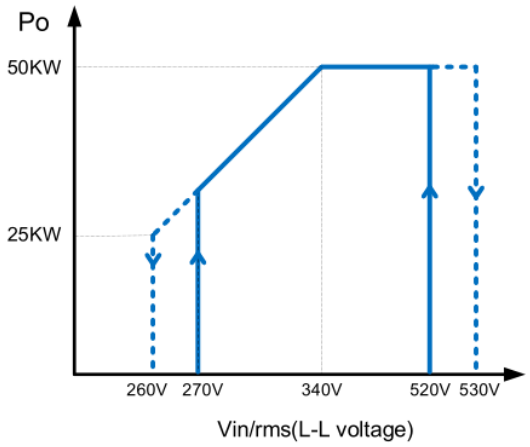
Pin	Signal	Description
DC output and signal connector (14 pins)		
13, 14	DC+	Positive of the main output
10, 11	DC–	Negative return of the main output
1	CAN1H-sys	CAN bus high, for system control
2	CAN1L-sys	CAN bus low, for system control
3	EN-sys	Enable: operation inhibited when shorted to pin 4
4	CGND-sys	Signal reference ground
5 … 8	Reserved	Do not connect



Mating connectors (system side): AC YHR-MPC60-4ZKY-2; DC and signal YHR-MPC60-14G12ZKY-2; terminal YHR8.571.50083.

The signal block has 8 pins in two columns: CAN1H-sys / CAN1L-sys (1, 2) on the top row, then EN-sys / CGND-sys (3, 4) and the reserved pins (5 … 8).

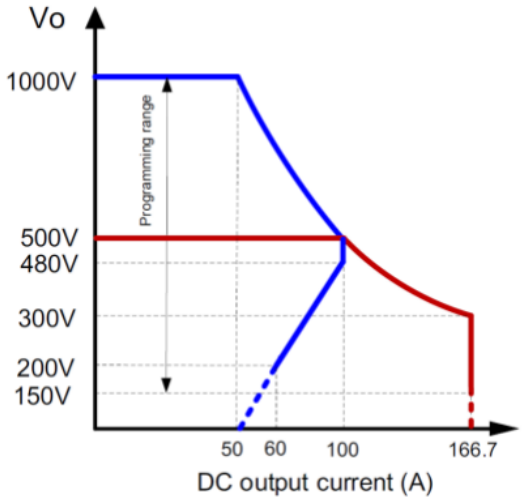
OUTPUT POWER VS AC INPUT VOLTAGE



Shows the maximum output power for each AC input voltage (L-L).

Full power (50kW) is available from 340Vac up to 530Vac; below 340Vac the power is derated.

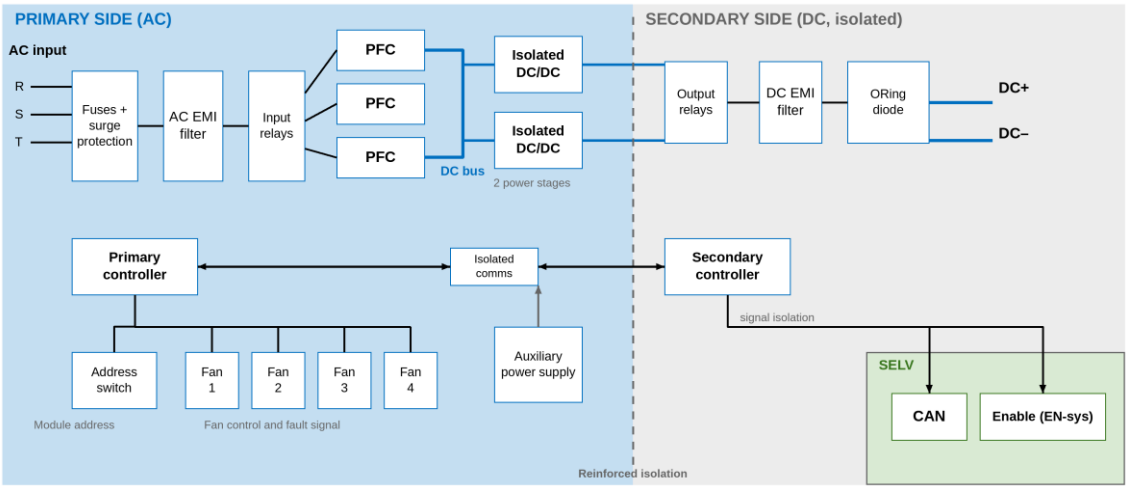
OUTPUT VOLTAGE VS OUTPUT CURRENT



Shows the operating area and the programming range (150 … 1000Vdc).

At 50kW the output current is 50A at 1000Vdc and rises to 166.7A at 300Vdc; the output current never exceeds 166.7A.

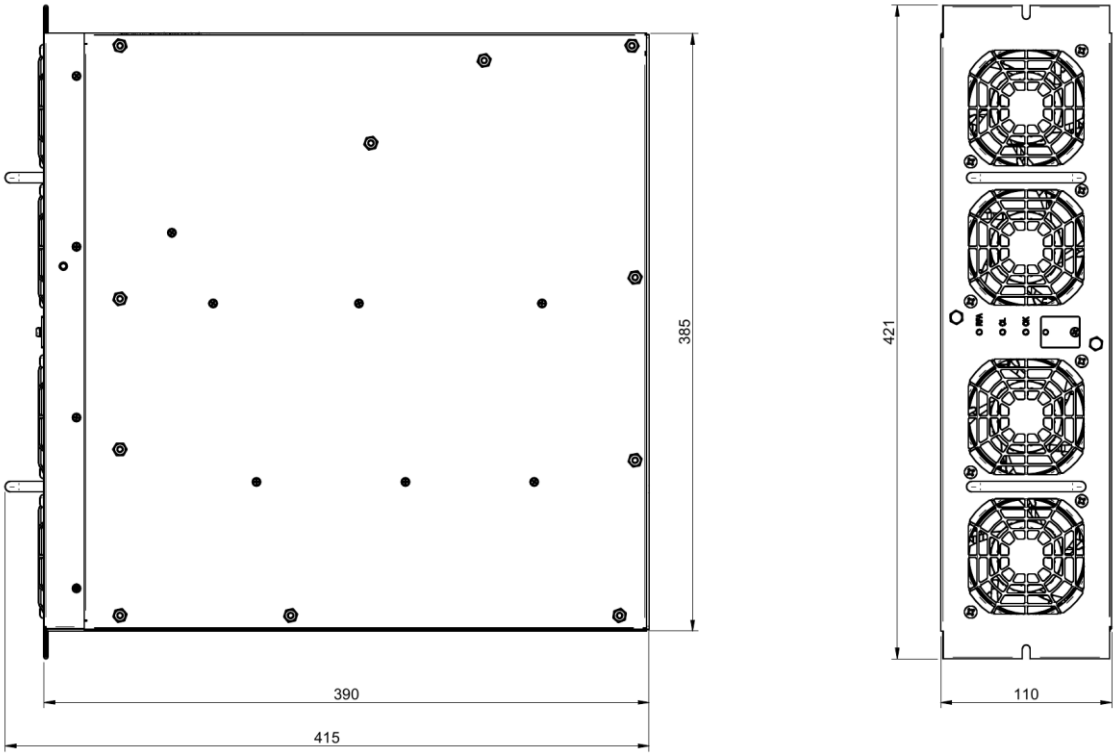
FUNCTIONAL BLOCK DIAGRAM



Simplified functional diagram. The three-phase input passes through fuses, surge protection and an EMI filter into three PFC stages, which feed a common DC bus and two isolated DC/DC stages.

Input and output are separated by reinforced isolation. The signal circuit (CAN and enable) is SELV and isolated from both the AC input and the DC output.

DIMENSIONS



WARRANTY AND GUARANTEE

The warranty corresponds to the regulations in our currently valid general terms and conditions.

INSTRUCTIONS REGARDING DISPOSAL

A basic requirement for the re-use and recycling of used electronic devices is their correct disposal. With the implementation of the electric and electronic device regulation, electronic devices may no longer be disposed of along with ordinary household waste but must be separately collected and recorded by a specialist service. Disposal through a specialist service significantly helps to avoid dangers to people and nature. Therefore, in the case of disposal, we recommend contacting a recognized specialist disposal service.

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without PREMIUM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant shall indemnify and hold harmless PREMIUM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of PREMIUM products in such safety-critical applications.