

# INSTALLATION INSTRUCTIONS / NOTICE

## BCV200-350-8

### 20 kW Combo Unit System



<b>CHARGER MODE:</b>	<b>AC INPUT:</b> 1-phase 100-195V / 195-240 V; 1W+N+PE; max.16A / max. 70 A, 50/60 Hz; max. 16.8 kW
	<b>DC OUTPUT:</b> 250-435 VDC; 40 A; 10-15 kW
<b>INVERTER MODE:</b>	<b>DC INPUT:</b> 250-435 VDC; 40 A; 10-15 kW
	<b>AC OUTPUT:</b> 2-phase 120/240 V; 2W+N+PE, max.60 A; 50/60 Hz; 14.4 kW
<b>DOWN CONVERTERS:</b>	<b>12 V OUTPUT:</b> 9-14.4 VDC; 278 A; 4 kW
	<b>24 V OUTPUT:</b> 18-28.8 VDC;34.7 A; 1 kW
	<b>SIGNAL BATTERY DC INPUT:</b> 9-16 V; max.6 A
	<b>SAFETY APPROVALS:</b> N/A

#### IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS — This manual contains important instructions for model BCV200-350-8 that should be followed during the maintenance of the unit. These component level chargers are intended exclusively for installation within other equipment by an industrial assembly operation or by professional installers. Component chargers are to be installed in end-use equipment according to the requirements of the safety standard used for that equipment.

#### INSTALLATION

For details please see datasheet (BCD.01095) and mechanical drawing (BCV200-350-8.FD). Installation category II.

#### FUSING

The Charger must be properly fused to remain safe in operation at the end user. It is essential to keep following fusing in the final application:

- AC INPUT:** Maximum 100 A type D UL approved circuit breaker shall be provided by EVSE (Electric Vehicle Supply Equipment) charge station installation.
- AC OUTPUT:** Electronic output overcurrent protection is implemented.
- DC OUTPUT:** 63 A or 80 A External fuse shall be used to protect the DC Output wiring for Battery connection. An external inrush current limiter shall be connected to limit the inrush current of the fuse and on the converter system for a safe level. An inrush current limiter can be part of battery management system. A minimum of a 25 Ohm inrush resistor is recommended.
- 12 V BATTERY:** A 7.5A Automotive (Car) external fuse shall be used to protect VBAT signal circuits.
- 12 V OUTPUT** No internal fuse. Electronic output overcurrent protection is implemented.
- 24 V OUTPUT** No internal fuse. Electronic output overcurrent protection is implemented.

#### CAUTION



**CAUTION – READ THIS CAREFULLY BEFORE INSTALLATION!** Before operating, read this document thoroughly and retain it for future reference. Not respecting these instructions may reduce the performance and safety of the unit along with its connected devices. Using this equipment with the respect and caution demanded will reduce the possibilities of personal injury or property damage.

**CAUTION – Heavy**

**CAUTION – Do not use this product if there is any damage to the unit.**

**CAUTION – To reduce the risk of electric shock, connect only to properly grounded outlets.**

**CAUTION – Risk of electric shock.** Do not remove the top cover or attempt to open the unit. No user serviceable parts are inside. Servicing is only allowed to qualified service personnel.

**CAUTION – Hot Surfaces – The Charger has to be installed in such a way that no user can touch the charger directly -** This Charger is designed to be operated with lithium ion batteries; use of other types of batteries needs to be discussed with a BEL representative (manufacturer).

**CAUTION – High voltage;** Turn off the Charger before disconnecting any terminal. Discharge the power terminals or wait 5 minutes before servicing. Do not turn on the Charger when any terminal is not connected.

**WARNING – Warranty is void if the seal is broken.**

**WARNING – Do not operate the Charger without proper cooling.** Do not add cold coolant when the unit is hot as there is a risk of inducing cracks in the chassis. Coolant needs to be added prior to any operation of unit.

**WARNING – This Charger is not provided with a GFDI device on the HV-DC side.** This Charger must be used with an external GFDI device as required by Article 690 of the National Electrical Code for the installation location. This Charger is not provided with a GFCI device on the HV-AC side. This Inverter must be used with an external GFCI device as required by Article 690 of the National Electrical Code for the installation location.

**WARNING – An external pre-charging circuit is required as part of battery management system.**

**WARNING – Mounting holes are designed to support the charger only & cannot be used to support other assemblies.**



5 minutes

## ENVIRONMENTAL CONDITIONS:

**TRANSPORTATION & STORAGE:** Ambient Temperature Range: -40°C to +85°C  
 Relative Humidity Range: SAE J1455  
 Altitude: Non-operating up to 12200 m (18.6 kPa)

**OPERATION:** Ambient Temperature Range: -30°C to +50°C  
 Coolant Temp. Range: -30°C to +50°C (no derating)/ +50°C to +60°C (with derating, see datasheet for more details)  
 Relative Humidity Range: SAE J1455  
 IP 67 and IP 6K9K (watertight when all mating connectors are installed)  
 Altitude: Operating up to 4000 m (61.4kPa).

## SERVICING

In case of failure, the Charger must be returned to a Bel Fuse Authorized Service Centre for repair, with a Bel Fuse pre-assigned RMA (Return Material Authorization) number. Refer servicing to the vehicle manufacturer.

## LIMITED WARRANTY

Bel Fuse warrants each Charger of its manufacture for a period of two years from the date of original shipment. This warranty applies to defects in materials and workmanship that result in the charger not performing to published specifications. Bel Fuse assumes no liabilities for consequential damages of any kind through the misuse of its products by any user. No other obligations are expressed or implied.

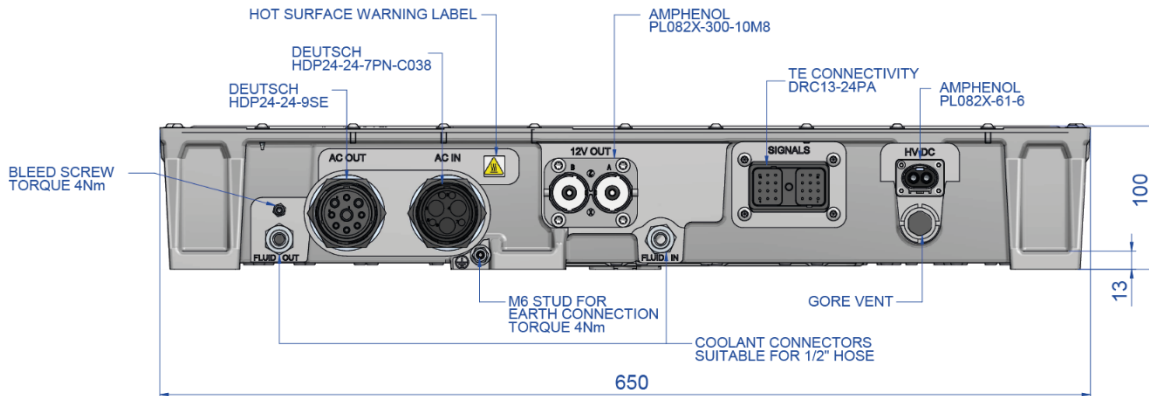
## NUCLEAR AND MEDICAL APPLICATIONS

Products are not designed, intended for use in, or authorized for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems without the express written consent of the respective divisional president.

## TECHNICAL REVISIONS

The appearance of product, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

## CONNECTOR DESCRIPTION UNIT SIDE



## AC INPUT (AC IN)

	MFG:	P/N:
<b>Inverter Charger side:</b>	Deutsch	HDP24-24-7PN-C038
<b>Mating connector:</b>	Deutsch	HDP26-24-7SN-C038

Use copper conductors only with an insulation rating of 120 °C.  
**Follow connector MFG instructions for correct connector assembly.**

PIN	FUNCTION
1	Control Pilot*
2	Proximity*
3	L2 or N - Input
4	L1 - Input
5	Not Used
6	PE (connected to chassis)
7	Not Used

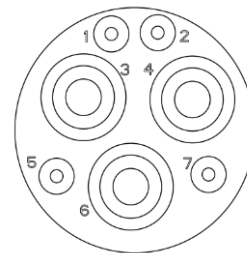


Fig. 1: AC input connector, Converter side

\* Function and levels according SAE J1772;  
 Insulated from AC side; Referenced to  $V_{out12}$  RTN = PE

**AC OUTPUT (AC OUT)**

	MFG:	P/N:
<b>Inverter Charger side:</b>	Deutsch	HDP24-24-9SE
<b>Mating connector:</b>	Deutsch	HDP26-24-9PE-L015

Use copper conductors only with an insulation rating of 120 °C.  
**Follow connector MFG instructions for correct connector assembly.**

PIN	FUNCTION
R	N - Output
S	L1 - Output
T	PE*
U	L2 - Output
V	PE* (connected to chassis)
W	PE*
X	PE*
Y	PE*
Z	PE*

\* All PE terminals (T, V, W, X, Y, Z) shall be connected together to keep safety rating requirements.

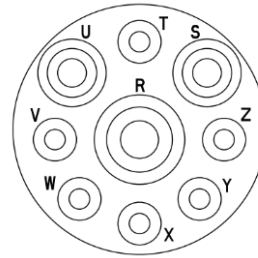


Fig. 2: AC output connector, Converter side

**DC OUTPUT**

	MFG:	P/N:
<b>Inverter Charger side:</b>	Amphenol	PL082X-61-6
<b>Mating connector:</b>	Amphenol	PL182X-61-6

Use copper conductors only with an insulation rating of 120 °C, 6 mm<sup>2</sup>.  
**Follow connector MFG instructions for correct connector assembly.**

It is highly recommended to use screened connecting cables (e.g. Coroplast, FHLR2GCB2G 1x6mm<sup>2</sup> T180).

Note: HVIL pins shall be shorted on the mating part (cable side).

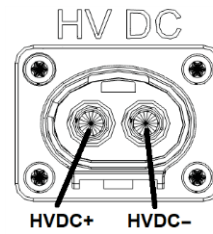


Fig. 3: DC output connector, Converter side

**12 V OUT**

	MFG:	P/N:
<b>Inverter Charger side:</b>	Amphenol	PL082X-301-10M8
<b>Mating connector:</b>	Amphenol	PL182X-301-70

Use copper conductors only with an insulation rating of 120 °C, 70 mm<sup>2</sup>.  
**Follow connector MFG instructions for correct connector assembly.**

PIN	FUNCTION
A	Vout12+
B	Vout12- (Return) connected to chassis

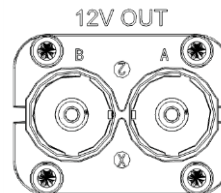


Fig. 4: DC output connector, Converter side

**SIGNALS**

	MFG:	P/N:
<b>Inverter Charger side:</b>	Deutsch	DRC13-24PA
<b>Mating connector:</b>	Deutsch	DRC16-24SA

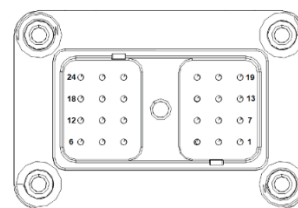


Fig 5: Signal connector, Converter side

PIN	SIGNAL NAME	SIGNAL DESCRIPTION	REFERENCE PIN
1	Vout24+	+24 V output	Pin 13, 14, 19, 20
2	Vout24+	+24 V output	Pin 13, 14, 19, 20
3	Control Pilot Out	Copy of Control Pilot	Pin 13, 14, 19, 20
4	+SENSE V <sub>out12</sub>	Remote sense for V <sub>out12</sub>	Pin 13, 14, 19, 20
5	Sync	Synchronization of AC outputs into 3 phase system	Pin 13, 14, 19, 20
6	CAN_L_int	Internal CAN - for production purpose, DO NOT CONNECT	-
7	Vout24+	+24 V output	Pin 13, 14, 19, 20
8	Vout24+	+24 V output	Pin 13, 14, 19, 20
9	VBAT	12 V supply of internal Bias	Pin 13, 14, 19, 20
10	HVIL_OUT	HVIL loop OUT	Pin 13, 14, 19, 20
11	IGN	(Key Switch) Supply of CAN and Bias converter enable.	Pin 13, 14, 19, 20
12	CAN_H_int	Internal can - for production purpose, DO NOT CONNECT	-
13	Vout24-	+24 V output RTN and VBAT RTN (connected to chassis)	Pin 13, 14, 19, 20
14	Vout24-	+24 V output RTN and VBAT RTN (connected to chassis)	Pin 13, 14, 19, 20
15	VBAT	12 V supply of internal bias	Pin 13, 14, 19, 20
16	HVIL_IN	HVIL loop IN	Pin 13, 14, 19, 20
17	CAN_BAUD_RATE	Open – 500 kBit; Grounded – 250 kbit	Pin 13, 14, 19, 20
18	CAN_H	CAN Bus H	-
19	Vout24-	+24 V output RTN and VBAT RTN (connected to chassis)	Pin 13, 14, 19, 20
20	Vout24-	+24 V output RTN and VBAT RTN (connected to chassis)	Pin 13, 14, 19, 20
21	Reserve	NA	-
22	-SENSE V <sub>out12</sub>	Remote sense for V <sub>out12</sub>	Pin 13, 14, 19, 20
23	EVSE_WAKE_OUT	Signal to wake up Vehicle Control Unit (VCU module)	Pin 13, 14, 19, 20
24	CAN_L	CAN Bus L	-

Note: Maximum recommended current per terminal is 10A. Follow connector manufacturer specification for recommended wire size and current rating.

## EARTH CONNECTION

Wire of protective earth PE screwed to grounding stud (located on the chassis) needs to be 10 mm<sup>2</sup>.

Cable lug suitable for M6 needs to be used.

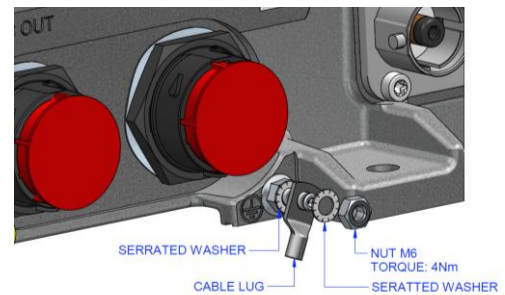


Fig.6: Earth connection installation

## COOLANT REQUIREMENTS

The Converter system shall be liquid cooled.

Minimum Inlet Coolant Temperature: -30°C

Maximum Inlet Coolant Temperature: +50°C (no derating)  
+50°C to +60°C (with derating)

Operational Ambient Air Temperature: -30°C to +50°C

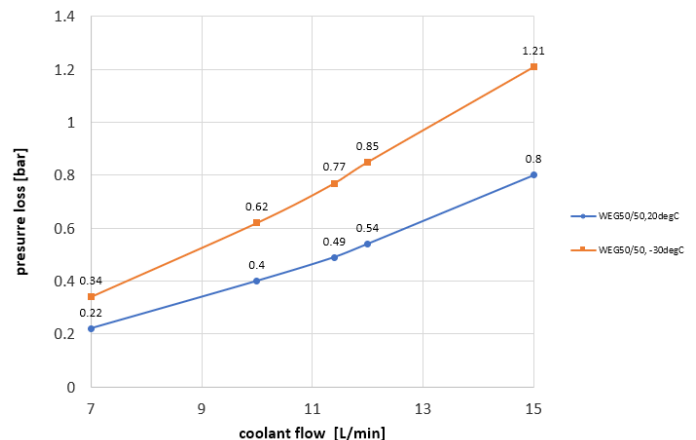
Coolant Medium / Mixture: 50/50 Ethylene Glycol/Distilled Water with proper corrosion inhibitor

Coolant volume in cooling system 0.3 L

Minimum/Maximum Coolant Flow: 7 – 10 LPM  
For short-term operation, 20% duty cycle, 15 LPM can be used

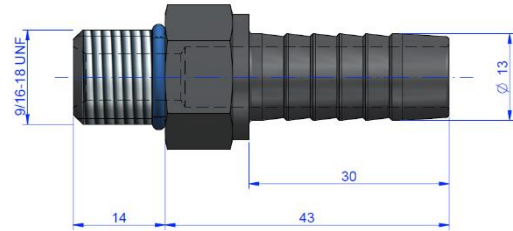
Typical pressure drop @ +20°C: 5.8 psi (0.4 bar)

Maximum coolant pressure: 26 psi (1.8 bar)



**COOLANT CONNECTION**

Inlet/Outlet Coolant Connection (hydraulic ports): 1/2" Hose fittings  
 Material of fittings: Stainless steel AISI 304  
 Fittings provided with charger



**COOLING SYSTEM BLEEDING**

To remove trapped air from the cooling line of the converter system, the bleed screw can be used.  
 The bleed screw is the highest point of the cooling line and works only in the horizontal position of the converter system.

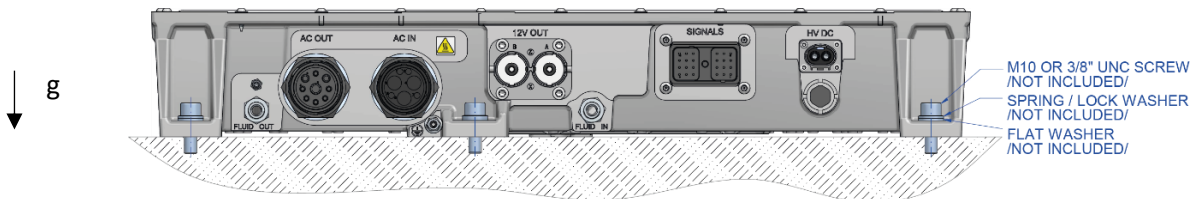


**MOUNTING REQUIREMENTS**

**The user is responsible for ensuring the reliability of mounting in final application and testing its safety.**

Mounting holes are designed to support the charger only and cannot be used to support other assemblies.

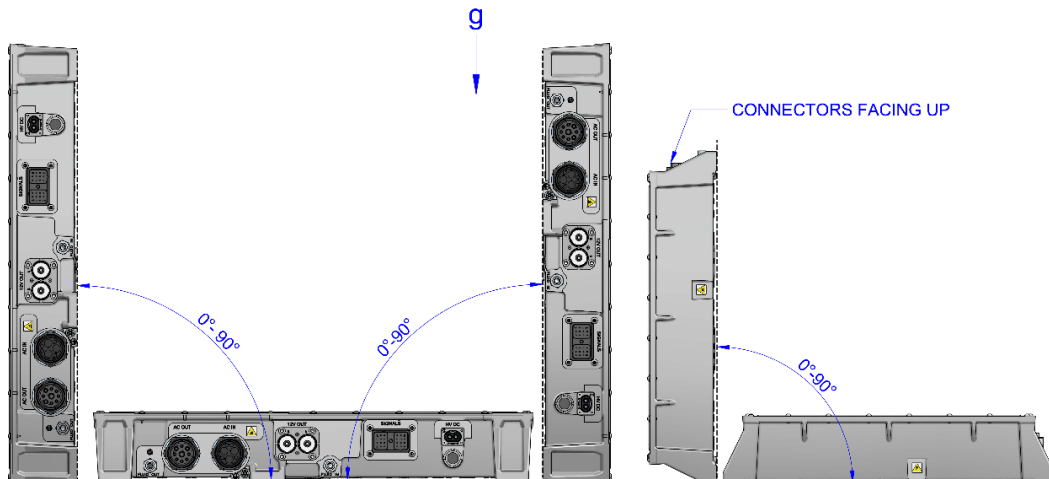
The converter system shall be mounted securely on the supporting frame by 6 screws. Recommended diameter screw size is M10 or 3/8" UNC, tightening torque is 48 Nm. The mounting screws are not provided with the converter system.



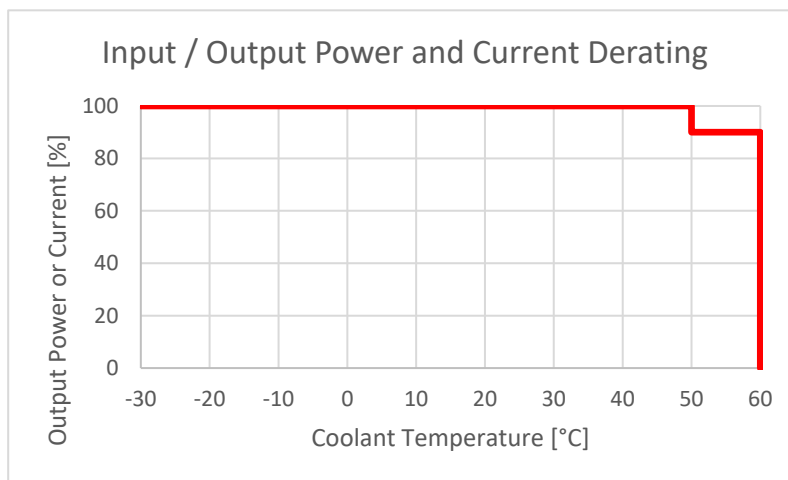
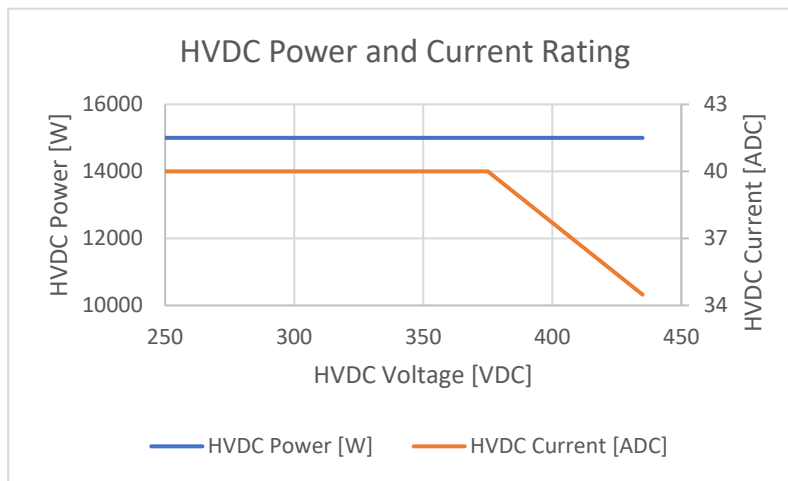
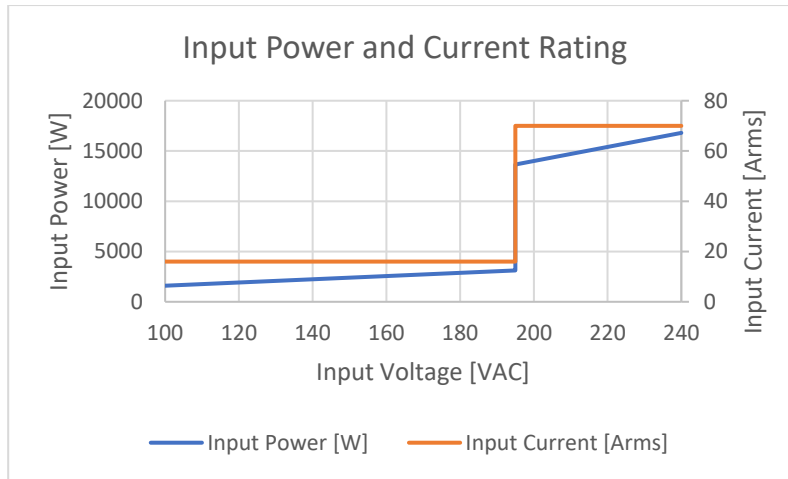
The charger can be installed in the installation positions depicted below: horizontally and vertically. In the vertical position, please make sure that the connectors are facing up.

Deviating installation may lead to insufficient cooling.

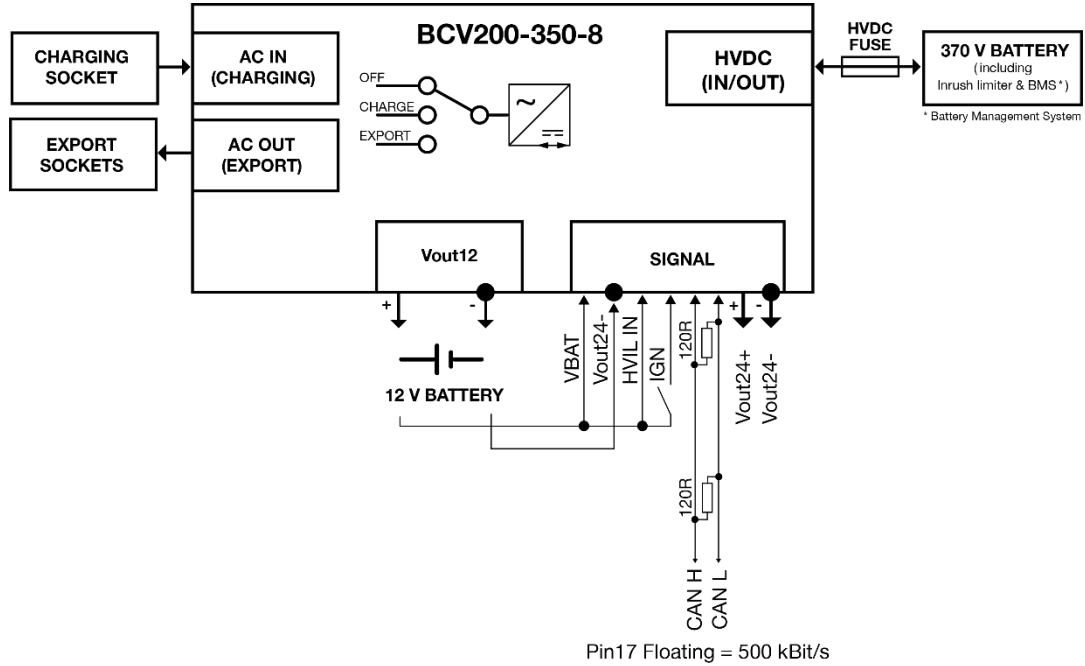
**INSTALLATION POSITIONS**



MAXIMUM WORKING RATINGS AND DERATINGS

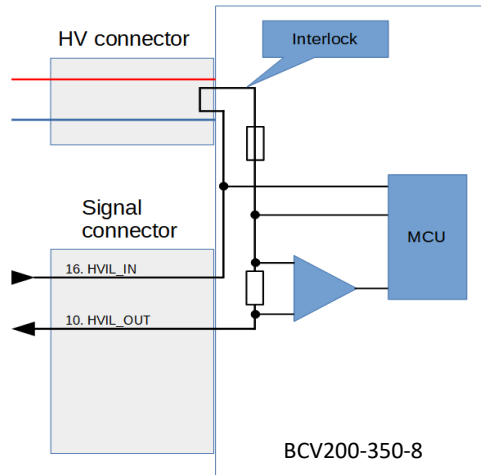


**RECOMMENDED WIRING DIAGRAM**



Notes:  
 CAN\_BAUD\_RATE pin #17 floating => CAN baud rate = 500 kbps  
 CAN\_BAUD\_RATE pin #17 grounded => CAN baud rate = 250 kbps  
 CAN communication manual reference document: BCA.20014 (provided on request).

**HVIL SIGNAL WIRING DIAGRAM**



HVIL protection is unlocked when both HVIL\_IN and HVIL\_OUT are set High (> 7.5V).  
 HVIL loop is possible to disable, but it is not recommended. VBAT can be connected to HVIL\_IN to create simple HVIL loop.