

# BCS11120 BATTERY CHARGER SYSTEM



## Features

- » 400 VAC input
- » 110 VDC output
- » Modularity, n+1 redundancy
- » Efficiency up to 98%
- » Forced cooling with fan
- » Coated PCB for rail and metro applications
- » Large temperature ranges from -40° to +55° C and up to +70° with derating

## Product Description

The BCS11120 system is a rack assembly containing two 6kW converters operating in parallel mode. It acts as a single battery charging system and communicates with vehicle via Rack Controller CAN-bus interface.

The BCS11120 contains battery management functionalities for monitoring battery cell voltages, charging / discharging current and temperature.

It is intended to be used with ADC11120, DDU11120 and SCU11120 together in a battery charger system with one or several ADC11120, which is using pre-programmed charging algorithms and continuous monitoring of the battery through a communication interface.

The BCS11120 battery charger system comprises different modules mounted in one rack assembly;

- » Two ADC11120 6kW AC/DC converters
- » One DDU11120 DC distribution unit (busbar and series diode assembly) for vehicles and 110VDC battery circuits
- » One SCU11120 system controller for battery management, vehicle CAN-interface or TDRP communication and charger control.

The battery voltage is measured by two independent systems integrated in the controller:

- » The total battery voltage is directly measured between the battery positive and negative terminals.
- » 4 battery blocks and additional battery link voltage drop are measured, and the resulting battery voltage is calculated from those.

Based on both measurements the status of the battery can be evaluated, and multiple different failures can be detected and signaled to the vehicle

## Standards

- » EN50155:2007 Railway applications – Electronic equipment used on rolling stock
- » EN50124-1:2001 Railway applications – insulation coordination
- » EN50153:2014 Railway applications – Rolling stock – Protective provisions relating to electrical hazards
- » EN45545-2:2013 Railway applications – Fire protection on rail vehicles
- » EN61373:2010 Railway applications – Shock and vibration

Input parameter	Value / range	Note
Input voltage	3x400 VAC rms (+15 % / -20 %)	According to DIN IEC 60038 Same as ADC11120 specification
Input current	10 A <sub>RMS</sub> x number of chargers = 20A <sub>rms</sub>	nominal at 400 V <sub>AC</sub> with 12000W load
Power factor	>0,95	-
Inrush current	0,6 A <sub>peak</sub> /phase x number of chargers = 1,2A <sub>peak</sub>	<150 A <sub>peak</sub> during first 100µs x number of chargers = 300A <sub>peak</sub>
Input frequency	47...63 Hz	-
Input characteristics	inductive	-
Standby power consumption	9W x number of chargers +SCU = 21W	from 3-phase AC input

Output parameter	Value / range	Note
Output voltage	110 VDC	Nominal *
Output voltage adjustment range	70...137,5 VDC	-
Output overvoltage protection	145 VDC	-
Maximum output current	43,6...54,6 ADC x number of chargers	Nominal *
Maximum output power	6000W x number of chargers	BCS11120 system 12000W Output current is automatically reduced to maintain power limits
Efficiency	≥ 93%	at load range 35...100 %
Output voltage regulation	Voltage ±1 %	Accuracy of output voltage
Output current limitation	number of units X 54,6A <sub>DC</sub> ±5 %	-
Output voltage adjustment	Via TRDP bus or vehicle CAN bus	-
Battery temperature compensation	SCU controlled per programmed characteristic of customer requirements	in charging mode (charging curve per customer specification)
Battery temperature compensation	2 X NTC, battery temperature sensor. 10kOhm @25°C	10 kΩ (Murata NXRT15XV103FA1B040)
Output ripple voltage	150 mV <sub>RMS</sub> (f = 20...300kHz, T <sub>amb</sub> = 25°C)	-
Load sharing	Via vehicle CAN-bus or TRDP bus	Load sharing between BCS11120 charger racks.

General parameter	Value / range	Note
<b>Mechanical external dimensions</b>	W:526 mm, H:167 mm, D:440 mm W:526 mm, H:440 mm, D:167	Horizontal mounting Vertical mounting
<b>Enclosure</b>	Sheet metal	2 mm thick EN AW-5754 H111 or equivalent
<b>Weight</b>	20.5kg	
<b>IP class</b>	IP20	

Environmental parameters	Value / range	Note
<b>Operating temperature range</b>	-40 °C...+55 °C	EN 50155, Class T2 Up to +70 °C with powering deration
<b>Extreme cold start-up capability</b>	-50 °C	10 consecutive start-ups at 50% load
<b>Cooling</b>	Rear to front, CPU controlled fan	-
<b>Over temperature protection</b>	-	Software controlled
<b>Shock and vibration</b>	Category 1 class B	EN61373
<b>Relative air humidity</b>	Yearly average ≤ 75% RH 30 consecutive days 95% RH No condensation	EN50155

# Applicable standards

## Fire Safety

Standard	Name	Note
<b>EN 45545-1:2013</b>	Railway applications – Fire protection on rail vehicles Part 1: General	-
<b>EN 45545-2:2013 + A1:2015</b>	Railway applications – Fire protection on rail vehicles Part 2: Requirements for fire behaviour of material and components	-

## Electrical Safety

Standard	Name	Note
<b>EN 50124-1:2017</b>	Railway applications – Insulations coordination Part 1: basic requirements – Clearances and creepage distances for all electrical and electronic equipment	Overvoltage class: OV 2 Pollution degree PD2 (inside the device)
<b>EN 50155:2021</b>	Railway applications – Electronic equipment used on rolling stock	Insulation resistance and voltage withstand according to section 13.4.7
<b>EN 50153:2024 +A1:2017 +A2:2020</b>	Railway applications – Rolling stock – Protective provisions relating to electrical hazards	Voltage category III

## Electromagnetic compatibility

Standard	Name	Note
<b>EN 50121-3-2:2017 +A1:2019</b>	Railway applications – Electromagnetic compatibility Part 3-2: Rolling stock – Apparatus: - Radiated disturbances - Disturbance voltage - Radio-frequency electromagnetic field - Electrostatic discharge - Radio frequency common mode - Fast transients - Surges	

## Software

Standard	Name	Note
<b>EN 50657:2017</b>	Railway applications – Rolling stock applications – Software on Board Rolling stock	
<b>IEC 62443-4-1:2018 ed1.0</b>	Security for industrial automation and control systems – Part 3-1: Secure product development lifecycle requirements	
<b>IEC 62443-4-1:2019</b>	Security for industrial automation and control systems – Part 4-2: Technical security requirements for IACS components	

## Operating Environment

Standard	Name	Note
<b>EN 61373:2010 (IEC 61373:2010) +AC:2017</b>	Railway applications – Rolling stock equipment – Shock and vibration test	Category 1 class B
<b>EN 60529:2014-09</b>	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989 + A1:1999 + A2:2013)	IP 20
<b>EN 50533:2011 + A1:2016</b>	Railway – Three phase train line voltage characteristics	
<b>EN 50125-1:2014</b>	Railway application – Environmental conditions for equipment – Part 1: Rolling stock and on-board equipment	