

6KW 3-PHASE AC/DC CONVERTER

ADC11120 RAIL AC/DC CONVERTER



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 ADC11120 device is a 6 kW AC/DC converter designed for rail applications. It features 3-phase 400 VAC input, capable of delta connection (no neutral) and 110 VDC floating output. The output is galvanically isolated from the input.

It is intended to be used with DDU11120 and SCU11120 together in a battery charger system (BCS1110-20) with one or several ADC11120, which is using pre-programmed charging algorithms and continuous monitoring of the battery through a communication interface.

Another target application is in connected systems where remote controllable 110 VDC power supplies needed for providing optimal load sharing.

ADC11120 device can also be used as a stand-alone general-purpose power supply without interface connectivity.

The ADC11120 AC input is designed to tolerate high harmonic noise content which makes good fit for AC systems powered by rolling-stock auxiliary converters.

For system integration the ADC11120 use CAN bus interface (using CANopen).

In battery management systems and power supply systems, together with SCU11120, the controller handles all power converters the CAN or TRDP communication with 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

TECHNICAL SPECIFICATIONS

Input parameter	Value / range	Note
Input voltage	3x400 VAC _{RMS} (+15% / -20%) 320...460 VAC 1,4 x 400 VAC = 560 VAC, test value	According to DIN IEC 60038 Three wires connected, no neutral Desing requirement 1sec 5 x / 1 min, no failure
Input current	10ARMS	Nominal at 400 VAC with 6000W load
Power factor	>0,95	
Input current	<,6 0A _{peak} / phase	<150A _{peak} / phase during first 100µs Depends on X-cap. size
Input frequency	47...63 Hz	
No load power consumption	9 W	At 400 VAC
External circuit breaker	16A	Characteristic as: S203P-C16, 2CDS283003RO164
Input harmonic interface tolerance		Improved input filtering against harmonic interference generated by auxiliary on-board converters

Note: Operation during input voltage dip (during 3-phase system overload): Output will shut down. System will recover autonomously after the voltage dip and resume operation

Output parameter	Value / range	Note
Nominal output voltage	110 VDC	
Output voltage adjustment range	60 – 137,5 VDC	Design requirement
Overvoltage protection	145V	Separate sense line
Maximum output current	43,6...54,6A	Depending on the output voltage level
Maximum output power	6000 W	Output current is automatically reduced to maintain power limits
Efficiency	96...98%	At load range 35...100%
Regulation	Voltage +/- 1%	Accuracy of output voltage
Output voltage adjustment	Via CAN bus	See Functional and Control specification
Output ripple voltage	< 150 mV _{RMS} (f = 20...300 kHz, T _{amb} = 25 °C)	(Typical < 75 mV)
Load sharing	In system configuration load sharing is controlled by SCU via CAN When standalone load sharing is with programmable output droop	See Functional and Control specification
Rev. -polarity-protection	Mechanical	By output connector
Output grounding	Floating	Maximum voltage between any output line and PE 1500 VDC

Environmental parameters	Value / range	Note
Operating temperature range	-40 °C...+55 °C	EN 50155, Class T2 Up to +70 °C with powering deration
Storage temperature range	-40 °C...+55 °C	EN 50155, Class T2 Up to +70 °C with powering deration
Extreme cold start-up capability	-50 °C	10 consecutive start-ups at 50% load
Cooling	Rear to front, CPU controlled fan	-
Over temperature protection	-	See Functional and Control specification
Shock and vibration	Category 1 class B	EN61373
Relative air humidity	Yearly average ≤ 75% RH 30 consecutive days 95% RH No condensation	EN50155
Shock and vibration	Category 1 class B	EN61373
Pollution degree (PD)	PD2	-

Applicable standards

Fire Safety

Standard	Name	Note
EN 45545-1:2013	Railway applications – Fire protection on rail vehicles Part 1: General	
EN 45545-2:2020	Railway applications – Fire protection on rail vehicles Part 2: Requirements for fire behaviour of material and components	

Electrical Safety

Standard	Name	Note
EN 50124-1:2017	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) Altitude up to 2000 m above sea level
EN 50155:2022	Railway applications – Electronic equipment used on rolling stock	Insulation resistance and voltage withstand according to section 13.4.7
EN 50153:2018 +A2:2020	Railway applications – Rolling stock – Protective provisions relating to electrical hazards	Voltage category III

Electromagnetic compatibility

Standard	Name	Note
EN 50121-3-2:2016 +A1:2019	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	

Operating Environment

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

Software

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

Mechanical parameters

Standard	Name	Note
Mechanical external dimensions	W:151 mm, H:128 mm, D: 385 mm W:151 mm, H:128 mm, D: 439 mm	Net volume With connectors and longitudinal rack mounting extensions
Enclosure	Sheet metal	2 mm thick EN AW-5754 H111 or equivalent
Weight	6,3 kg	
IP class	IP20	

