Technical Data Sheet

SA4509-I-X-230-700 Converter

4800W / Wide Range

RECOM
AC/DC Converter

FEATURES

- AC/DC converter with maximum power 4800W at the maximum output voltage of 700V
- The device is a microprocessor-controlled maximum voltage limited current generator specifically designed for LASER applications
- The AC input is equipped with active circuit for current absorption with high power factor in accordance with EN61000-3-2 / EN61000-3-12
- The power supply is equipped with soft start at power-on
- The power supply is forced-air cooled by fan
- The output provides a central socket to facilitate the connection of electrolytic capacitor banks in the series
- The maximum voltage set point must be supplied from the outside via a PWM signal, which then filtered acts directly on the analog regulation
- All signal inputs and outputs are opto-isolated.
- The voltage monitoring function is implemented using a PWM signal with a variable duty cycle.



Dimensions: 130 x 250 x 220mm (5.12 x 9.84 x 8.66 in)

APPLICATION



SAFETY & EMC

CE RoHS² compliant 10 from 10 Reach compliant

- The converter follows LVD 2014/35/EU Directive and EMC 2014/30/UE Directive.
- The converter is CE compliant. EMC radiation must be evaluated and tested in the complete system since mounting and wiring have a large influence on radiation behaviour.

DESCRIPTION

The SA4509-I-X-230-700 is a high-power, microprocessor-controlled AC/DC converter specifically designed for laser applications. It operates from a nominal 230VAC input and provides an adjustable high-voltage DC output from 70VDC to 700VDC, delivering up to 13.71A and a maximum output power of 4800W.
The converter functions as a maximum-voltage-limited current generator and incorporates active power factor correction, achieving a power factor of 0.95 at full load. Its microprocessor-based architecture provides precise output control, while the maximum voltage setpoint can be externally controlled via a PWM signal. Voltage monitoring is also implemented through a variable-duty-cycle PWM signal, and all signal inputs and outputs are opto-isolated for enhanced electrical isolation.

MODELS

Part Number	Input Voltage nom. [VAC]	Input Current Max. [A]	Output Voltage Max. [VDC]	Output Current Max. [A]	Output Power Max [W]
SA4509-I-X-230-700	230	29	700	13.71	4800

SA4509-I-X-230-700

Nominal power
Insulated version
Custom version
Output Voltage
Input Voltage

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RECOM
AC/DC Converter

BASIC CHARACTERISTICS				
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**
AC INPUT				
Rated Input Voltage			230VAC	
Input Voltage Range		200VAC		240VAC
Min Input Voltage		180VAC		
Max Input Voltage				264VAC
Max. Input Current	@180VAC Input			29A
Rated Input Frequency		47Hz		63Hz
Input Frequency		50Hz		60Hz
Max. Inrush Current	@264VAC			<60A
Power Factor	@230VAC Full load – Active Power Factor	0.95W/VA		
Efficiency	@180VAC with 3300/4800Watt			90%
DC OUTPUT				
Max. Output Power	@Full Load Condition	3300W		4800W
Rated Output Voltage			700VDC	
Output Voltage Range		70VDC		700VDC
Output Current		6.86A		13.71A
Min Output Current		0A		
Line Regulation	Ui Min <Ui <Ui, Max		1%	
Load Regulation	Io, Max <-> 0.5* Io, Max		1%	
Load Regulation Recovery	0.95* Uo, Nom < Uo < 1.05* Uo, Nom		10ms	
Ripple	No Laod with 8000uf Load		<1.5Vpp	

ENVIROMENTAL CONDITIONS				
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**
Operating Temperature Range	Pout up to 4.8kW, 50 till 70°C Pout max 3.3kW	0°C		+50°C
Storage Temperature Range		-40°C		+85°C
Operating Relative Humidity Range	Not condensated	10%		90%
Storage Relative Humidity	Not condensated	10%		90%
Operating Altitude	@ 100% Po tot (for Ground Based Version)			3048m
Storage Altitude				57Kpa
Cooling	Forced ventilation			
Shock	Acc.to IEC60068-2-27, 11ms ½ Sine in Earth Main Directions (3 Shocks)			25g, pk
Vibration	acc. to IEC 60068-2-6 . Sinusoidal vibration: 2 hours in each main direction 5-14,1 Hz:15mm; 14,1-55Hz:			6 g pk

SAFETY AND PROTECTIVE FUNCTIONS					
Parameter	**Conditions**		**Min.**	**Typ.**	**Max.**
Dielectrics withstand voltage	EN 60601-1	Input – Output (2MOOP)		4000VAC	
		Input – P.E. (1MOOP)		2000VAC	
		Output – P.E. (1MOOP)		2000VAC	
Input Start-up peak current limitation					40A
Fuses on mains	2x T 40A 6.3x32				
Output short circuit protection	Output regulated current		103%		130%
Output over current protection	Output regulated current		103%		130%
Output overvoltage protection					735V
Capacitors protection	Between Vout-Vout/2 and Vout/2-COM				360V
Overtemperature protection	±5°C		60°C		65°C

MAINS OVERVOLTAGE PROTECTION

Overvoltage protection is integrated into the converter to provide permanent protection against overloading.
Also, on the output side, overvoltage protection is integrated.

MAINS PROTECTION INPUT CURRENT

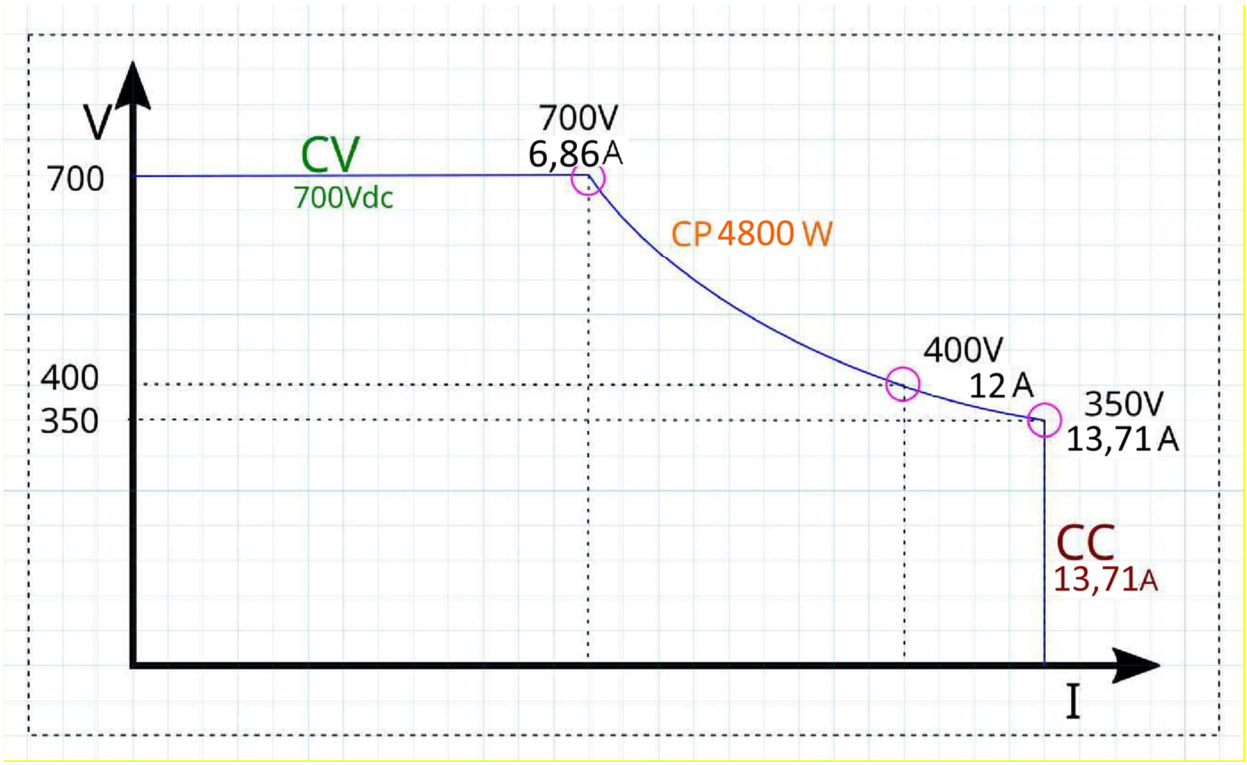
On the converter, each phase is protected by fuse to protect the device and electric systems from damage due to overcurrent. If one of these fuses is blown, the converter must be returned to charger supplier! Do not open the device – no user-serviceable parts inside.

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OVERCURRENT PROTECTION

Overcurrent protection is integrated in the charger to avoid overload damage. The quick sensor system detects any overcurrent and either reduces the current by regulation or shuts the converter down.

OUTPUT POWER BEHAVIOR



CERTIFICATIONS

Safety	
Compliance	**Standard / Criterion**
Medical electrical equipment - Part 1: General requirements for safety	EN 60601-1
RoHS2	RoHS 2011/65/EU + AM2015/863
	CE

CERTIFICATIONS

EMC Compliance	
Compliance	**Standard / Criterion**
Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic disturbances - Requirements and tests	EN 60601-1-2

MECHANICAL DATA

Parameter	Conditions	Min.	Typ.	Max.
Weight				6kg
Enclosure Material	Aluminum box			
IP Protection Class			IP20	
Height			220mm	
Width	28TE		130mm	
Length	Fan excluded		250mm	

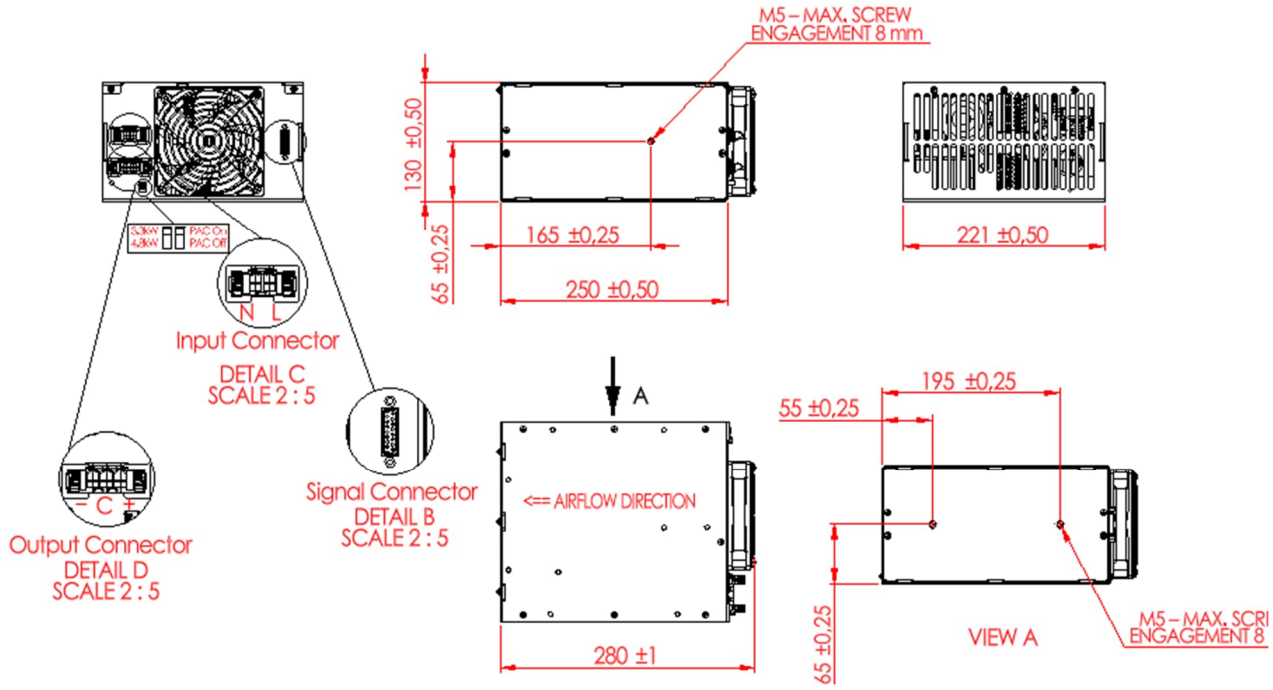
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DIMENSIONS AND INSTALLATION INFORMATION

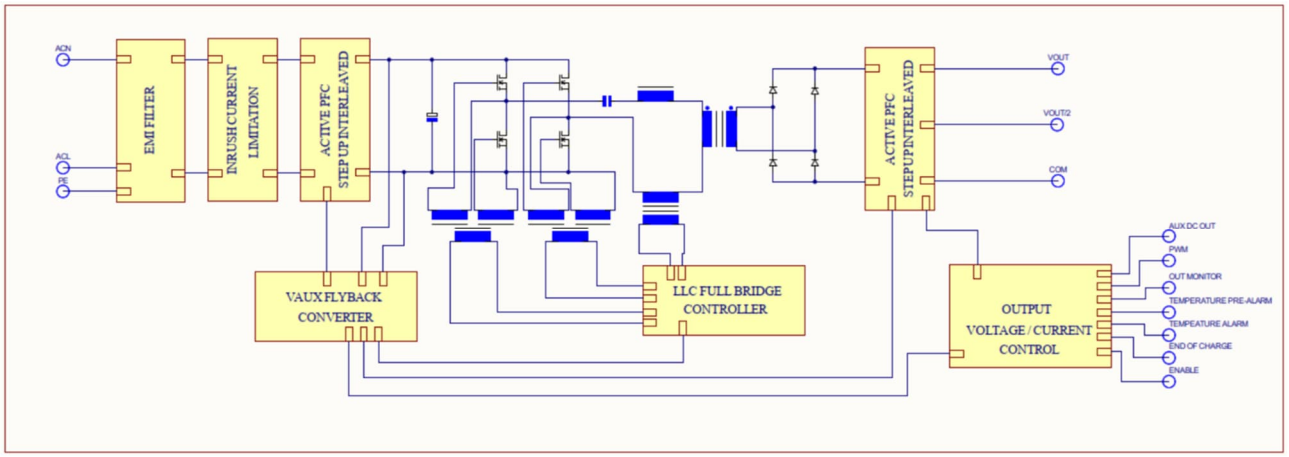
For the installation of converter, the following must be adhered to:

- The converter must be installed in a safe location, out of reach of the user. This is to prevent hazards such as accidental contact with HV potentials.
- When selecting the installation location, ensure sufficient space to allow for proper forced ventilation.
- The mechanical fastening must be designed in such a way that the device is installed in a fixed position and with as little vibration as possible.
- All cable connections must be secured with strain relief elements close to the device (not included in the scope of delivery).
- Cable connections must have sufficient clearance and must not meet components with sharp edges.

DIMENSIONS



BLOCK DIAGRAM



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CONNECTORS

Type	Manufacturer	PN Manufacturer
Input	PHOENIX CONTACT	DFK-PC 5/2-G-7.62 2 Poles (1716506)
Signals		D-SUB 15 P Female Connector with fixed female jackscrews
Output	PHOENIX CONTACT	DFK-PC 5/ 3-ST-7,62 3 Poles (1716519)

MAINTENANCE

The converter does not require any special maintenance apart from replacing the fan after a maximum of 70000 hours at 40°C. The life of the fan may be affected by the operating temperature and the cleanliness of the environment in which it is used. To replace the fan, contact Recom Power Systems.

INTENDED USE

The device may only be installed and operated by qualified and instructed personnel.

WARRANTY AND GUARANTEE

The warranty corresponds to the regulations in our currently valid general terms and conditions.
RECOM Power Systems wants to point out that all warranty claims expire if:

- the device was opened.
- the device was changed mechanically or electrically.
- the device was operated under non-intended use
- prohibitions and instructions of this datasheet were violated.
- accessories not approved by RECOM Power Systems were used

CONTROL BEFORE THE FIRST COMMISSIONING

Check the delivery immediately after receipt for completeness and transport damage such as mechanical damage to the device housing, cables or accessories.
If there is damage to the device, this needs to be reported to the transport company immediately.
If there is damage to the device, to cables or accessory parts detected or suspected, do not proceed with the installation and commissioning under any circumstances. In this case, label the device as defective.
After a hard hit or fall damage, the device should not be used anymore.

DISPOSAL OF THE PACKAGING MATERIAL

A basic requirement for the re-use and recycling of used electronic devices is the 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.
Keep used packaging material for a possible reuse.
If this is not possible, ensure an appropriate and environmentally friendly disposal of the packaging material while considering the current environment protection guidelines.

STORAGE

Incorrect or improper storage may result in damage to the device.
Protect the device during storage against pollution, humidity and extreme temperatures.
After long storage times, check the proper function of the device before use.

INSTALLATIONS



SAFETY REQUIREMENTS FOR THE INSTALLATION PLACE

The device may only be operated in the environmental conditions specified in the data sheet.
The device may not be operated in proximity of aggressive vapors, in explosion-endangered areas or in proximity of ignition sources
Use an external ground fault protection circuit external to the device, which monitors the insulation resistance to chassis. The supplementary protection needs to be operated immediately after fault of basic insulation

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OPERATING SITUATION

The operation of the device is only allowed in the operating situations described in the data sheet.
The user assumes the sole responsibility for professional execution and safety of the installation.
The device is to be screwed to the mounting surface at all designated points.
It is prohibited to make mechanical changes to the device, such as drilling holes, for the mounting of additional installation points.
Each change to the device may lead to life-threatening operating situations or fire.

COOLING



The system integrator bears the sole responsibility for a professional installation in the end application and the control of sufficient heat dissipation from the device to the installation surface.
An excess of the maximum permissible temperature can lead to a protective shut-down.

GENERALLY APPLICABLE SAFETY MEASURES

The following safety measures have been developed based on the knowledge of the manufacturer. They are incomplete as they can be supplemented by local and/or country-specific safety instructions and guidelines for accident prevention.
The distributor of the device must therefore supplement the present general safety instructions with country-specific and local guidelines.

REQUIREMENTS ON THE OPERATION PERSONNEL

All courses of action described in this manual may only be carried out by a qualified electrician! Specialist staff are defined as electricians who have had

- specific professional training
- have knowledge and experience in the field of electronics
- as well as knowledge of relevant provisions and dangers

for which they can provide proof. Furthermore, they must be able to assess the work assigned to them independently, identify possible dangers, and establish necessary protection measures.

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 RECOM'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 RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.

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