



LaCoSys

Laser Control Systems

MANUAL

SmartPower Series L
up to 5kW



1 Introduction

To know this manual is essential for operating with the system. Please read it carefully and comply with the hints for safe work with the device.

It is our policy to constantly improve the design and specifications. Accordingly, the details represented here cannot be regarded as final and binding.

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More information is available at the manufacturer <http://www.lacosys.com/> or at the responsible distributor.

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2 Safety information

2.1 General notes / Symbols

Please read the manual carefully before putting the device into operation.

For more information or if you have questions you can contact our service or website www.lacosys.com.

The used pictures are exemplary and can deviate from the respective type and the stage of development.

The device was designed and built according to the standard DIN EN 61010-1 (IEC 61010-1) "Safety requirements for electrical equipment for measurement, control and laboratory use".

The device complies with the European Directive 2004/108/EG "Electromagnetic compatibility".

The device is labelled with the **CE** - sign.

The device will be disposed according the guideline WEEE- 2002/96/EG.

Warning notes and symbols in this manual:



NOTE

This symbol marks if special attention must be paid for a fact while using the device.



ATTENTION

This symbol marks if danger for the user of the device may occur.



ATTENTION

This symbol marks a danger for the device.



ATTENTION

Laser-radiation may be emitted!



ATTENTION

Electrostatic delicate components.



ATTENTION

Please use appropriate safety precautions against electrostatic discharge (safety pack, antistatic wristband etc.)

2.2 Electric safety / Personnel protection insulation

The device operates with dangerous voltages internally. Do not open the device or remove parts of the case. It is not allowed to work inside the case or at parts under dangerous voltage by the user.



The device must be used as delivered. Every modification voids warranty or liability.



All cables must be electrically insulated. The customer service or authorized staff is allowed to open the device only.



The IP code of the device is IP2X.



Please switch off the device if you do not intend to use it for a longer time.



ATTENTION

Electrostatic charges on persons and objects may cause voltages up to 4000 V. They can discharge invisible. To prevent aging or damage it is important to use precautions against electrical charging.

2.3 Laser safety / labelling

The device is designed for use with lasers. Please respect the signs and regulations of DIN EN 60825-1.



Fig. 1 Identification label on the backside of device



RoHS statement

The device and all components comply with RoHS Directive 2011/65/EU (RoHS).



WEEE-sign (ElektroG) - Waste of Electrical and Electronic Equipment.

The device is labelled with the symbol



2.4 Intended use

The device is intended for safely driving up to eight laser diodes in CW mode with up to 600W each.



Please store the manual near to the device and accessible for all users.

Furthermore, please take care that all necessary documents like laser safety regulations or country-specific safety regulations are present.

3 Description of the system

Device name: SmartPower L *ccc.vv Cn*

(*ccc* = Max. current per channel, *vv* = Max voltage per channel, *n* = Number of channels)

Description: Single- / Multi channel laser driver



Fig. 2 Front panel

- 1 Control display
- 2 Keylock
- 3 System power-ON indication LED
- 4 Power switch



Fig. 3 Rear panel

- | | |
|--------------------------|------------------------|
| 1 Optional water cooling | 6 Power supply |
| 2 Circuit breakers | 7 Optional RS-232 |
| 3 Service interface | 8 Optional Ethernet |
| 4 User interface | 9 Emission light (EMI) |
| 5 Protective earth | 10 Power output |

3.1 General

The SmartPower Series L is characterized by:

- 19" standard rack mount
- Easy to use touch panel
- Key switch and interlock
- Safety circuit according to EN ISO 13849-1 and SIL CL 3 according to IEC 62061
- Low noise
- Up to 4,8kW of total power output
- Up to 45A per channel
- Optional RS-232 and Ethernet interfaces



The device is intended for use in rack mounting or as tabletop device. It must be used in horizontal position only. Please protect it against shifting.


3.2 Connectors


Following up are the connectors, as previously seen in **Fig. 3**, described in more detail.

3.2.1 Water cooling

Water cooling	
Connector:	KSG 18 NW7 BA
Minimum flow rate:	2l/min
Maximum flow rate:	10l/min
Coolant:	Regular clean tap water

The input and output connectors are labelled as follows:

Connect the input hose to connector 

Connect the output hose to connector 



Before operating the device, make sure that the input and output hoses are connected properly, that the flow rate is enough and that the coolant is cooled properly.

3.2.2 Power input

Power input	
Connector:	WIELAND RST 2015G
Voltage:	208 - 400Vac Y
Power draw:	max. 20A

The pins of the connector are assigned as follows:

PIN Nr.	Description
1	PE
2	N
3	L3
4	L2
5	L1

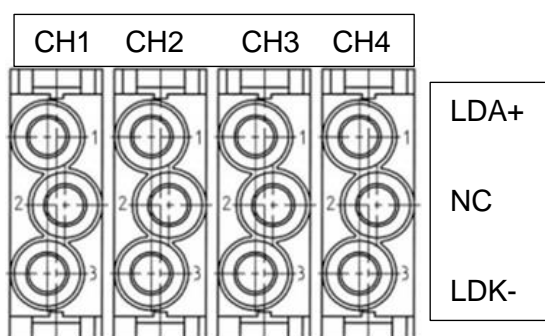
3.2.3 Power output

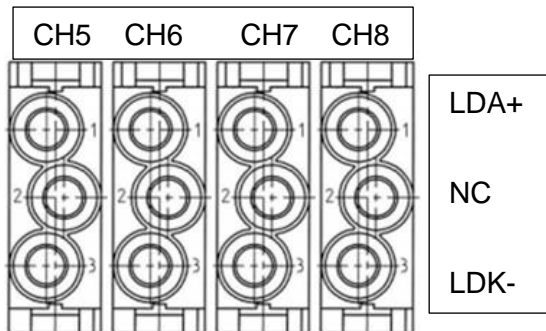
Output e.g. Type 045.15.C8	
Connector:	LAPP EPIC® H-B 16 AG
Voltage per channel:	1 ... 15V
Current per channel:	0 ... 45A

The pins of the connector for each channel are assigned as follows:

PIN Nr.	Description
1	LASER ANODE
2	n.c.
3	LASER CTHODE

The channels are laid out as follows:





Never connect the independent channels LDA+ or LDC- of different channels. Please check your laser configuration to be floating on both terminals. It is also not allowed to connect the LDC- pins to any ground or protective earth.

3.2.4 User Interface

The pins of the user interface connector are as follows:

PIN Nr.	Description
1	Contacteur status (dry contact)
2	N.c.
3	N.c.
4	Contacteur status (dry contact)
5	LASER ON GND galvanic isolation
6	N.c.
7	Remote Shut down (connect to 8 with dry contact)
8	Remote Shut down (connect to 7 with dry contact)
9	Laser ON Output TTL 5V galvanic isolation

3.2.5 Emission light (EMI)

The pins of the emission light are as follows:

PIN Nr.	Description
1	Red (24Vdc max. 100mA)
2	Green (24Vdc max. 100mA)
3	Yellow (24Vdc max. 100mA)
4	GND

3.2.6 Optional RS-232

Optional RS-232	
Connector:	D-SUB D-9

3.2.7 Optional Ethernet

Optional Ethernet	
Connector:	Standard RJ-45

4 Use of the device

4.1 Unpacking and installation

Please verify that the packaging is undamaged. Any damage must be announced to the carrier and the manufacturer after receipt. Please verify if the package is complete:

Description	Number
SmartPower device	1
Mains cable	1
Documentation (manual, usb-stick)	1
Optional power output cable	1-2

4.2 First steps

If the device has a water cooling: Connect your cooling system to the appropriate connectors on the device and start the cooling system.

Connect the mains cable to the power input on the device and the wall socket.

Connect the power output on the device to your laser diodes.

Power up the system via the *POWER* switch on the front of the device.

Close the connection between PIN 7 and 8 on interface at rear panel via dry contact (e.g. with your Interlock system). And turn the keylock on front panel in position 1.



Only use the delivered power supply cable!



The individual power outputs must be floating, do not interconnect any channels!



Do **not** connect the channels in parallel to e.g. increase power output!



Do **not** connect the channels in series to e.g. increase voltage output!



If the device has a cooling fan, it must not be covered!

4.3 Operation principle of the SmartPower

The SmartPower can be fully controlled by the integrated touch panel on the front of the device.

To limit the information that is shown simultaneously on the panel, the user interface is divided into several pages.

Following up is an overview of the functionality of each page.

4.3.1 MAIN-Page

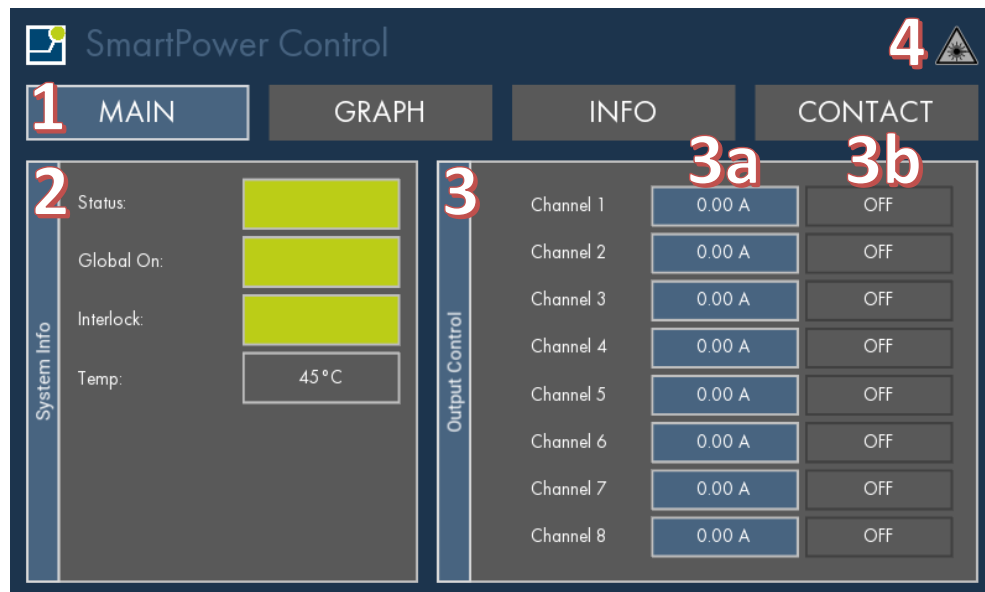


Fig. 4 MAIN-Page of the control panel

After system start-up the main page is shown. Here you find a brief overview of the system and the channels.

The controls are as follows:

- 1) On top of the panel you can select the page to be shown by clicking on the desired page name. The currently selected page is highlighted in blue.
- 2) The *System Info* block is a summarization of the system status. A green light indicates that the system is working properly. A red light indicates that an error occurred somewhere in the corresponding component.
- 3) The *Output Control* block is used to control and observe each single channel.
 - a) In the ampere-column the present current of each channel is shown individually. By clicking into a field, one can set the current of a chosen channel. To see this in more detail, refer to **Fig. 5**.
 - b) In the power-switch-column the state of the channel is shown (on/off). By clicking on the button next to each channel, the state of the channel can be switched.



Note: A channel always starts with **0 Amps** after enabling it, independently of what it has been set to, previously. This means that one can only set the current for a previously enabled channel. Setting the current for a disabled channel will be ignored.

- 4) The emission indicator shows in yellow that a channel is active and may be outputting power. A gray indicator means that no channel is active.

MAIN-Page (continued)



Fig. 5 Setting the current for a channel

By clicking into one of the current fields a popup will appear in which the current for the chosen channel can be set.

The controls are as follows:

- 1) By clicking the up/down arrows, the value of each digit can be changed individually.
- 2) Clicking on "CANCEL" or somewhere outside of the popup will cancel the current change. Clicking on "OK" will initiate the current change of the channel.

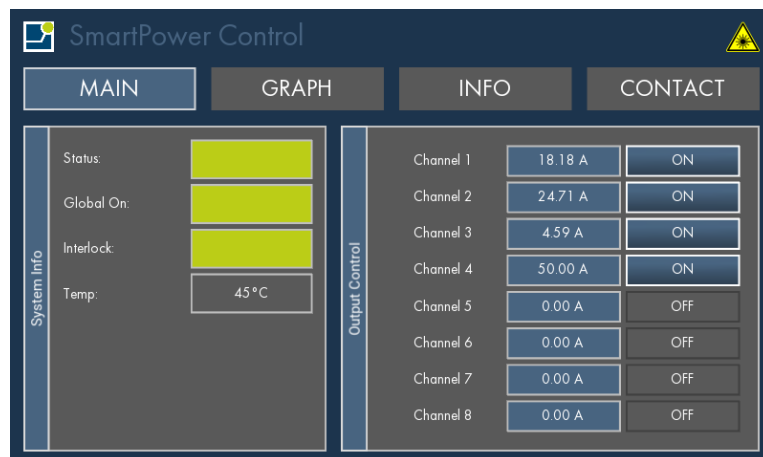


Fig. 6 Example

Fig. 6 shows an example of a SmartPower L with 8 channels of which the first four are enabled and set to desired currents. Note how the emission indicator turned yellow, indicating that at least one channel is active.

4.3.2 GRAPH-Page

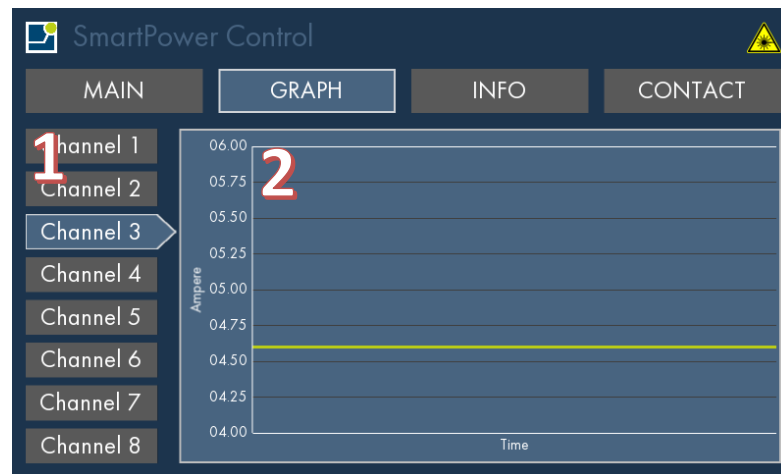


Fig. 7 GRAPH-Page

Each channel can be monitored via an individual time/impedance diagram on the GRAPH page.

The controls are as follows:

- 1) On the left side each channel can be selected by clicking on the desired channel. The selected channel is highlighted in blue.
- 2) On the right-hand side the corresponding graph is displayed. The graph will auto-scale to an appropriate scale.

4.3.3 INFO-Page

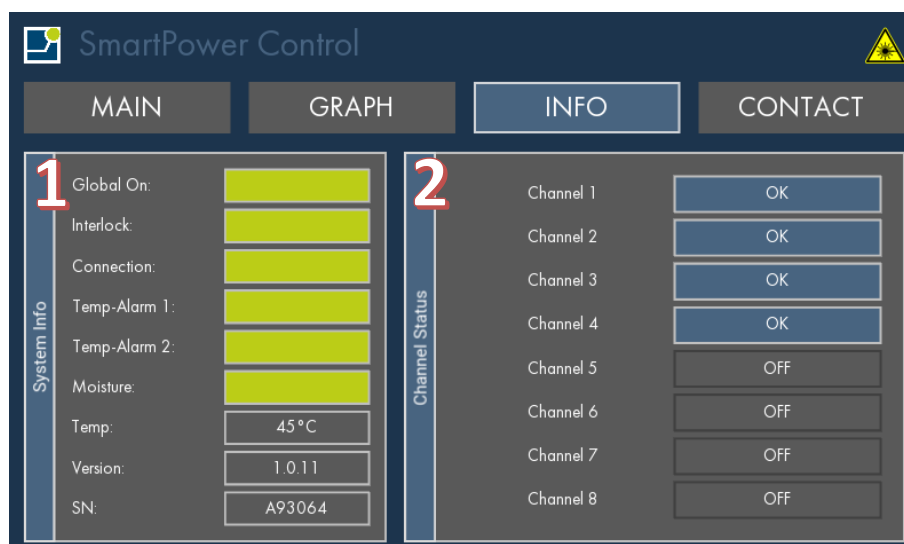


Fig. 8 INFO-Page

On the INFO-Page additional information about the system and the channels is shown.

The controls are as follows:

- 1) The *System Info* block shows all system status. A green indicator shows that the system is working properly. A red indicator means that an error occurred somewhere in the corresponding component.
- 2) The *Channel Status* block shows the status of each channel. If there is a failure in any of the channels, the corresponding status will turn red and “*ERROR*” is displayed.

4.4 Remote Control

The SmartPower can be provided with an optional RS-232 or Ethernet connection for remote control via an external Software. For additional information contact the vendor.

5 Maintenance information

5.1 Warranty

The device manufacturer guarantees that the device is free of material or production faults. Please tell us immediately if faults occurred.

There is no warranty if the fault is caused by natural wear (especially at wear parts) or incorrect use.

The device manufacturer is not liable for damages which are caused by incorrect use, negligence or interference at the device, especially by removal or exchange of device parts and the use of accessories of other manufacturers. The warranty expires in this case.

LaCoSys GmbH declines any liability for damages which are due to disregard of the safety information.

5.2 Maintenance



Please switch off the device and remove the mains cable before maintenance!



Please respect the cleaning instructions of the devices of other manufacturers which are used in combination with the SmartPower device.

- Don't use cleaning powders, diluents or solvents like benzine or acetone because this might affect the devices surface.
- Cleaning should be done using a soft wet tissue and mild soap.
- Use display cleaner

5.3 Service

Any service-, maintenance-, adjustment- and cleaning-work must be done by the service or authorized staff.



Only authorized staff is allowed to open the device.

5.4 Transport

Please respect the following hints for safe transport. The warranty expires at if they are disregarded!



The SmartPower device is sensitive against electrostatic discharge. The discharge of static electricity for example from the fingers can shorten the devices lifetime or damage it. Please use appropriate safety precautions against electrostatic discharge (grounding, antistatic wristband etc.)



Only use packing or wrapping materials which are appropriate for electrostatic sensitive devices. Please don't use Styrofoam or simple air cushion foils.



Please use the original package preferably.

5.5 Disposal



Defect devices must be disposed according the legal rules. Do not put it into the domestic waste.



The device manufacturer is obligated by law to withdraw defect devices.

6 Technical Data

6.1 General data all available types

Parameter	1 Channel	4 Channel	8 Channel
Dimensions [mm]	602 mm x 483 mm x 132 mm (Length x Width x Height)		
Weight	25kg	30kg	35kg
Input voltage	208-400Vac Y		
Power consumption	14kW	2,8kW	5,6kW
Power Output	12kW	2.4kW	4.8kW
Current per channel	Up to 400A	Up to 100A	
Voltage per channel	Up to 30V		
Location of use	Only for inside use		
Protection class	II		
Degree of protection	IP 20		
Radio interference suppression	DIN EN 55011 class A		
Noise immunity	EN 61000-6-2 (industrial environment)		
Environmental conditions: Temperature range: Operation: Storage: Relative Humidity: Operation: Storage: Vertical height of use: Operation: Storage:	10 ... 40 °C -10 ... 60 °C ≤ 80 % (non-condensing) ≤ 99 % (non-condensing) 3000 m 12000 m		
Installation position	Horizontal		

Please visit our website www.lacosys.com . You will find more information about further models.

