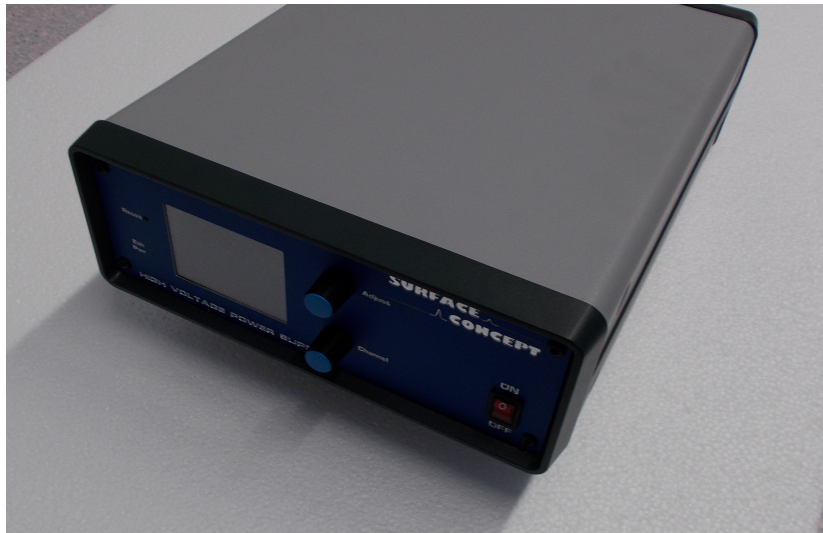


# High Voltage Power Supply Economy Series (Release 041)



## Manual

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## 2 Introduction

### 2.1 General Information

This manual is intended to assist users in the installation, operation and maintenance of [Release Version 041](#) of the High Voltage Power Supply Economy Series (HVPS Eco). It is divided into 8 chapters.

### 2.2 Safety Instructions

Please read this manual carefully before performing any electrical or electronic operations and strictly follow the safety rules given within this manual.

The following symbols appear throughout the manual:



The “note symbol” marks text passages that contain important information/hints about the operation of the device. Follow this information to ensure a proper operation of the device.



The “caution symbol” marks warnings, which are given to prevent an accidentally damaging of the device. Do **NOT** ignore these warnings and follow them strictly. Otherwise no guarantee is given for arose damages.



The “high voltage symbol” marks warnings, given in context with the description of the operation/use of high voltage supplies and/or high voltage carrying parts. Hazardous voltages are present that can cause serious or fatal injuries. Therefore only persons with the appropriate training are allowed to carry out the installation, adjustment and repair work.



## 2.3 General Overview

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The Surface Concept HVPS Eco is a HV supply in a stand-alone housing with up to 4 independent HV channels. Each channel holds two SHV connectors, which allow to select the polarity of the output voltage of each channel individually by connecting either to the one or to the other output channel.



The device can produce lethal high voltages of up to several kV. Hazardous voltages are present, therefore only persons with the appropriate training are allowed to carry out the installation, adjustment and repair work.



Do not open the power supply, while it is in operation. Hazardous voltages are present. In case that the device must be opened, turn off the device first **AND** pull out the power plug.

# 3 Installation

## 3.1 Initial Inspection

Visual inspection of the system is required to ensure that no damage has occurred during shipping. If there are any signs of damage, please contact SURFACE CONCEPT immediately. Please check the delivery according to the packing list (see Table 1) for completeness.

- 1x High Voltage Power Supply Economy Series Release 041
- 1x BNC termination plug
- 1 - 4x SHV termination plug (depending on specific device layout)

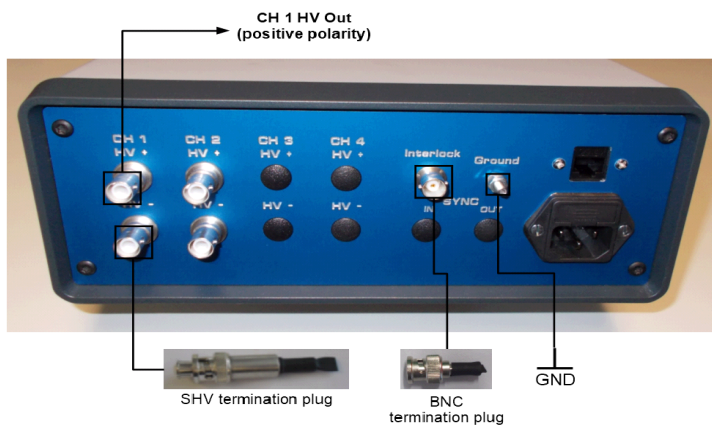
**Table 1: Packing list for the HVPS Eco**

## 3.2 Installation

The general connection scheme of the HVPS Eco is shown in 4.3.



**Finish the complete cabling before switching on the HVPS Eco and switch off the device first before performing any changes to the cabling.**



**Figure 1: Exemplary cabling of the HVPS Eco for the use of the positive output polarity of CH 1.**

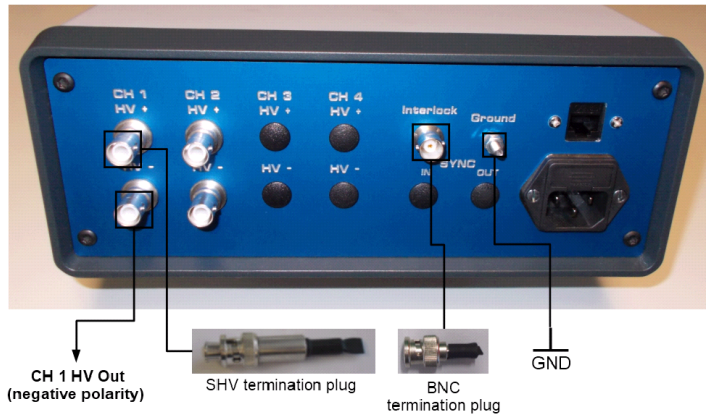


Figure 2: Exemplary cabling of the HVPS Eco for the use of the negative output polarity of CH 1.

- First, use the "Ground" connector (M4 screw) to ground the device.
- High voltage output for each channel CH 1 to CH 4 (number of channels is device dependent), is provided selectively to the SHV socket named "HV +" or "HV -". The naming corresponds to the polarity of the output voltage in respect to the ground potential.



**Note** Only one output polarity per channel can be used at one time. The connector for the other output polarity is used to define the reference potential for the corresponding output channel (see 4.3 for details).

- Use the SHV termination plug to terminate the connector for the unused output polarity (+) or (-) to ground or to an external reference voltage (for floating operation, see section 4.3)



**Note** In cases that no external reference voltage is applied to the device, the termination plug must be used to ground the socket of the unused output polarity "HV +" or "HV -" (reference potential of the corresponding channel). With a missing reference potential the HVPS Eco module is not providing any output voltage.

- Connect the power cable to the main connector.
- Check if the Interlock-Plug (BNC termination plug) is connected.

# 4 Device Layout & Operation

## 4.1 Device Layout

The layout of the HVPS Eco is given below in Figure 3:



Figure 3: Layout of the HVPS Eco

1. Hardware reset button
2. Status LEDs for Power (lightens up when device is switched on) and Ethernet connection (lightens up only when a software is connected to the HV supply).
3. Touch Display
4. Control knob for high voltage adjustment
5. Control knob for channel selection
6. Power switch, to turn ON/OFF the device (lighted, when switched ON)
7. SHV connectors for output voltages with positive ["HV+"] and negative ["HV-"] polarity for channel 1 ["CH 1"].
8. SHV connectors for output voltages with positive ["HV+"] and negative ["HV-"] polarity for channel 2 ["CH 2"].  
 (Availability dependent on specific device layout.)
9. SHV connectors for output voltages with positive ["HV+"] and negative ["HV-"] polarity for channel 3 ["CH 3"].  
 (Availability dependent on specific device layout)



Figure 4: Layout of the HVPS Eco

10. SHV connectors for output voltages with positive ["HV+"] and negative ["HV-"] polarity for channel 4 ["CH 4"].  
 [Availability dependent on specific device layout]
11. BNC connector for hardware interlock (output of BNC connector must be grounded to deactivate interlock)
12. Ground connector for device grounding
13. Ethernet Socket
14. BNC sockets for device synchronization (availability dependent on specific device layout)
15. Power socket

## 4.2 General Device Operation

After switching on the device [14], the display [3] shows the "Surface Concept" animated logo, while the device is scanning for internal available HV modules and their specific settings. This can take up to several seconds. If the device is ready for operation, it switches into the standby mode and shows an empty mask for the voltage adjustment (see Figure 8).

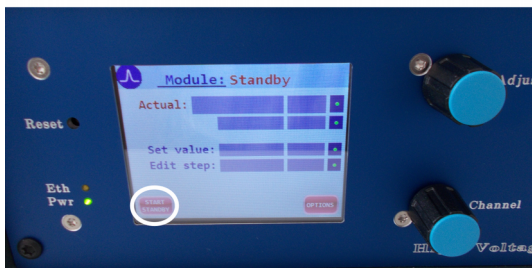


Figure 5: Standby mode

Push the "Start/Standby" button in the lower left corner of the display to switch on the high voltage. Alternatively one can press the "Channel" control knob.

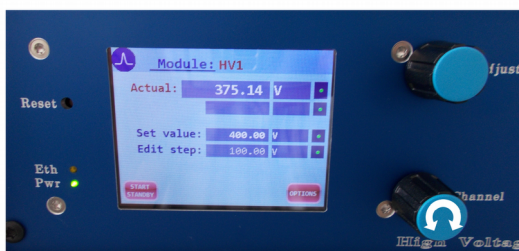


Figure 6: Operation mode

After switching on the high voltage the device is in the so called operation mode. In operation mode the display shows the name of the selected channel in the top line (in this case "HV 1") as well as the output voltage of that channel. The different HV channels can be selected by turning the "Channel" control knob (R033 & R036 only).

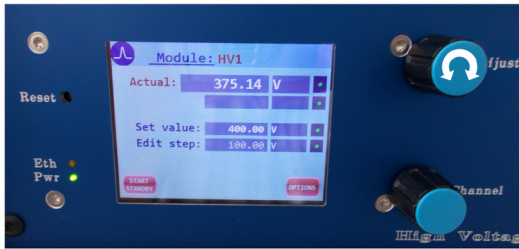


Figure 7: Operation mode – voltage adjustment

The “Adjust” control knob is used to adjust the output voltage.

Turn the “Adjust” control knob clockwise/counterclockwise to increase/decrease the value of the output voltage in a step width as defined in the line “edit step”.

The line “set value” displays the nominal value for the output voltage as adjusted by the user. Voltage adjustment can only be made in this line.

The line “actual” displays the actual value for the output voltage on the output connector as measured by the device.

The device always regulates the actual value of the output voltage to fit to the nominal value as set by the user.

Hereby the voltage measurement is always a relative measurement between the two HV outputs of one channel. Additional reference voltages (e.g. in floating operation) are not measured and therefore are also not displayed (see chapter 4.3 for further details)

Turn the “Adjust” control knob clockwise/counterclockwise while pushing it to increase/ decrease the step width in the line “edit step”.

Push the “Start/Standby”-button in the lower left corner of the display again to switch back to the “Standby” mode.

### 4.3 Floating Operation on an external potential



The HVPS is specified for the floating operation on an external reference voltage of maximum +/- 1000 V. Higher voltages can lead to internal HV sparking and to a damage of the device.

Application case 1: Channel 1 should be set to an output voltage of +1000 V floating on an external reference potential of -500 V. In this case the external reference voltage is connected to the connector of the negative polarity of channel 1 (“HV-”). First set the output voltage of Channel 1 to +1000 V. Then increase the external reference voltage to the -500V. The display shows a value of CH 1 = 1000 V, but the output voltage in respect to the ground potential is CH 1 = +500 V. The output voltage of +500V is given out on connector “HV+” of channel 1.

Application case 2: Channel 1 should be set to an output voltage of -500 V floating on an external reference potential of +1000 V. In this case the external reference voltage is connected to the connector of the positive polarity of channel 1 (“HV+”). First set the output voltage of Channel 1 to -500 V. Then increase the external reference voltage to the +1000V. The display shows a value of CH 1 = 500 V, but the output voltage in respect to the ground potential is CH 1 = +500 V. The output voltage of +500V is given out on connector “HV-” of channel 1.

### 4.4 Schematic layout of the HVPS Eco

Figure 8 shows the schematic layout of the HVPS Eco and especially the layout of the HV outputs. An internal controller measures the output voltage and regulates it to the nominal value entered by the user or set as default value within the device. Hereby the voltage measurement is always a relative measurement. The output polarity is defined by determine one of the outputs as reference potential (e.g. by termination to ground). Voltage measurement and regulating is also only respecting the relative output voltage of the single HV module in case of a floating operation. The absolute output voltage (as result of output voltage and reference voltage) is not determined by the device. Figure 8 also shows the internal load and measuring resistors. The specific values for the load and measuring resistors are given in the specification sheet.

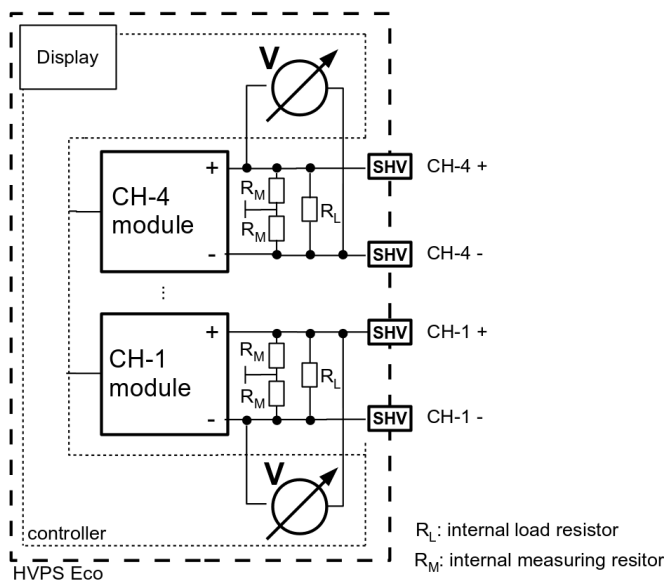


Figure 8: Schematic layout of the HVPS Eco showing also the internal load and measuring resistors.



**Note**

The single channels of the HVPS Eco are not producing any output voltage if the socket of the unused output polarity (reference potential of the corresponding channel) is not terminated (either to ground or to an external HV potential), because the HV modules always need to be connected to a reference potential. A SHV termination plug for each channel is part of the delivery.



## 5 Additional Device Options

Pressing the “Option” button in the lower right corner of the device display, the device will switch to the overview display of the additional device options. The available options are device depending. Press the “Exit” button to switch back to the display of the operation voltages.

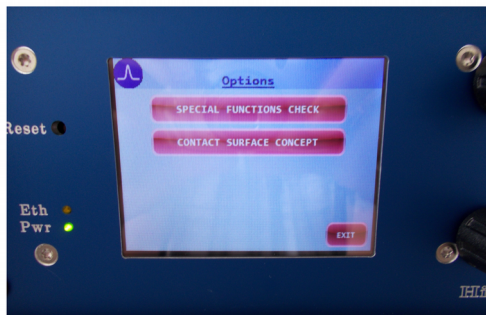


Figure 9: “Device Options” sub-menu

The overview of the device options show the different available options like the contact page for surface concept or special device specific functions. Open the specific sub-menu by pressing the corresponding button in the touch display.

### 5.1 Special Function Check

The sub-menu “Special Function Check” in the device options display the different special functions currently available for the Surface Concept HVPS D Series. Not all listed functions are available for each single device layout.

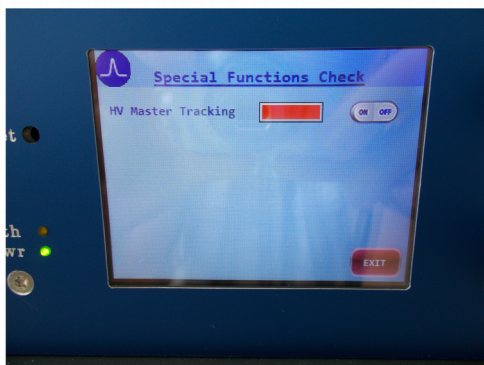


Figure 10: “Special Functions Check” sub-menu

The “HV Master Tracking” allows the HVPS to track an external reference voltage and to produce an output voltage which is in a fixed defined relation to the master voltage.

Please note: This function differs from the floating functionality, because the master voltage is “only” measured within the device and the HVPS is producing a corresponding output voltage.

The “HV Master Tracking” can be switched ON/ OFF by clicking on the corresponding button on the display (not available for the R033 – R036).



## 5.2 Contact Surface Concept

The sub-menu “Contact Surface Concept” in the device options displays the Surface Concept contact information. Press the “Exit” button to leave this sub-menu.

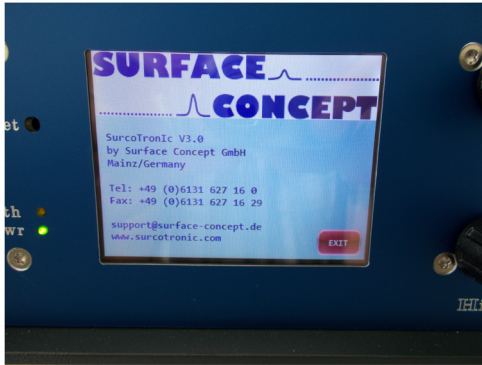


Figure 11: “Contact Surface Concept” sub-menu.

## 6 Error states

Error states of the device are indicated by error messages in the display.



Figure 12: Error code – Interlock.

### Err – Interlock

The device interlock is active and is blocking the HV output.

Please terminate the interlock to ground using either the BNC termination plug (part of the delivery) or check the proper functionality of the use device which is providing the interlock.

## 7 Technical Data

### High Voltage Power Supply Eco Series

HV Output Channels:	1 – 4 (number of output channels are device dependent)
HV Output Connector:	SHV5
Output voltage range (channel CH-1 to CH-4):	see specification sheet
Output Polarity:	see specification sheet
Input Connector for Reference Input :	SHV5
Maximum Voltage for external reference potential:	+/- 1000 V

### Line Input

Electrical Input (LINE):	230 V, 50 Hz
Power:	65 Watt (max.)
Fuse:	1x T 1.6 A

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## EU Declaration of Conformity

Manufacturer **Surface Concept GmbH**  
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**Product:** High Voltage Power Supply  
**Model:** HVPS Eco

The above named products comply with the following European directive:

89/336/EEC	Electromagnetic Compability Directive, amended by 91/263/ EEC and 92/31/ EEC and 93/68/EEC
73/23/EEC	Low Voltage Equipment Directive, amended by 93/68/EEC

The compliance of the above named product to which this declaration relates is in conformity with the following standards or other normative documents where relevant:

EN 61000-6-2:2005+AC:2005	Electromagnetic compatibility (EMC): Generic standards - Immunity for industrial environments
EN 61000-6-4:2007+A1:2011	Electromagnetic compatibility (EMC): Generic standards - Emission standard for industrial environments
EN 61010-1: 2010	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use

For and on behalf of **Surface Concept GmbH**

Mainz,.....01.04.2013.....  
(Date)

Legal signature.....  
(Dr. Andreas Oelsner)

This declaration does not represent a commitment to features or capabilities of the instrument. The safety notes and regulations given in the product related documentation must be observed at all times.