
19" HVPS-HC Module 1Channel/2Channel (Release R012)



Manual



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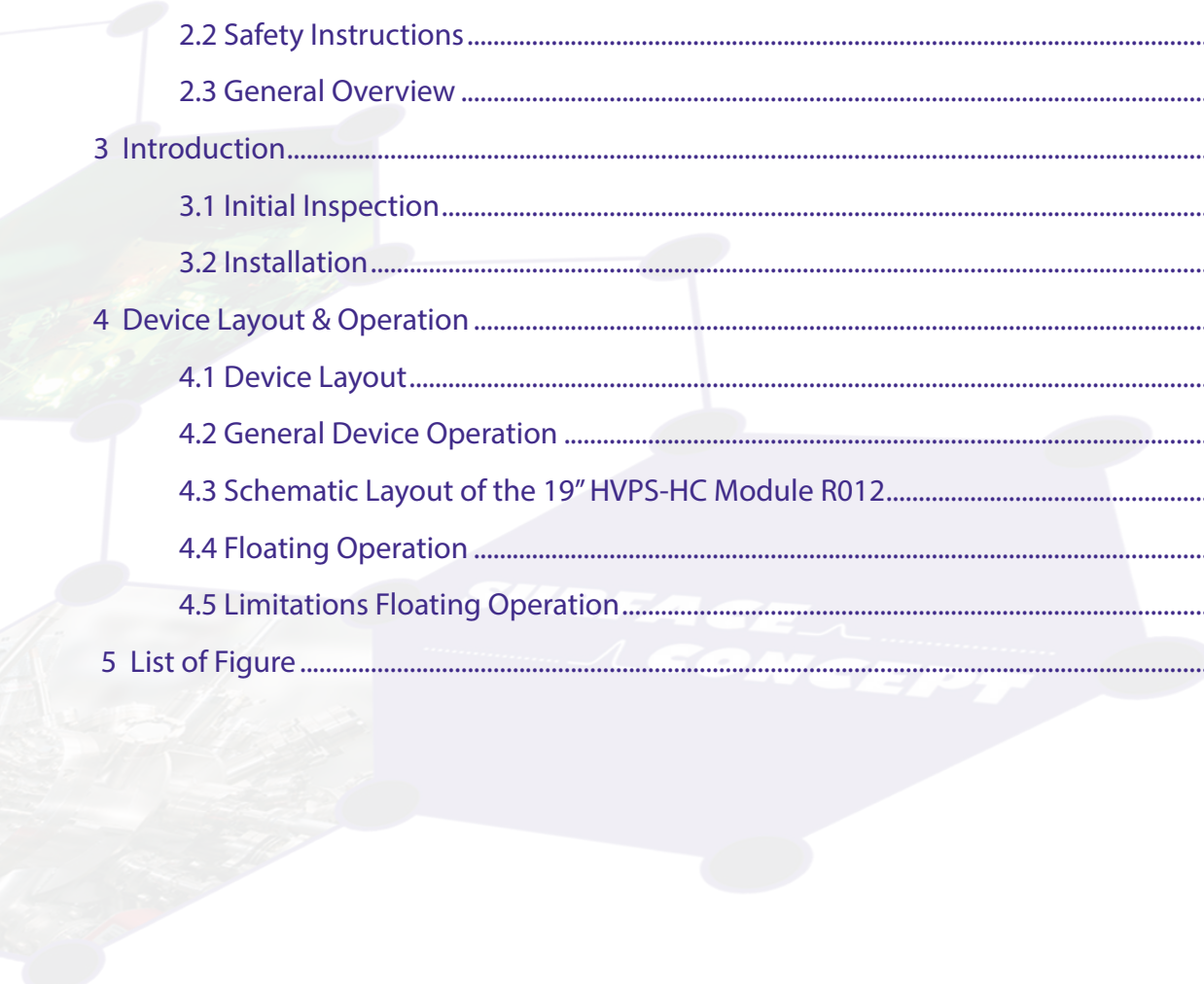
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User Manual for the
19" HVPS-HC Module 1Channel/2Channel
Release: R012
Manual Version 2.3
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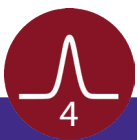


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2 Introduction

2.1 General Information

This manual is intended to assist users in the installation, operation and maintenance of Release Version 012 of the 19" HVPS-HC Module. It is divided into 5 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 may 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 accidental 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

The Surface Concept 19" HVPS-HC Module R012 is a high voltage module especially designed for the Surface Concept 19" Basic Unit, a modular supply system.

The 19" HVPS-HC Module R012 comes as a 1 channel/ 2 channel version, which provides one/two separate high voltages with a switchable polarity (must be manually switched by the user). It also provides the capability to float on a reference potential. Hereby each channel has its own, individual reference input. For the 2 channel version, the both channels work absolutely independent on reference potential and output polarity.

Depending on the maximum output voltage the 19" HVPS-HC Module R012 comes with either SHV connectors (maximum output voltage $\leq 5\text{kV}$) or with 10kV LEMO connectors type ERA.1S.405.CTL (maximum output voltage $> 5\text{kV}$).



Note

The 19" HVPS-HC Module R012 is available with different output voltages and different maximum floating voltages. Check the specification sheet of your specific 19" HVPS-HC Module R012 for detailed information on those parameters.



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 Introduction

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 19" HVPS-HV Module R012
- 1x Termination Plug (SHV or LEMO 15) per channel

Table1: Packing list for the 19" HVPS-HC Module R012.

3.2 Installation

The general connection scheme of the 19" HVPS-HC Module R012 is as follows:

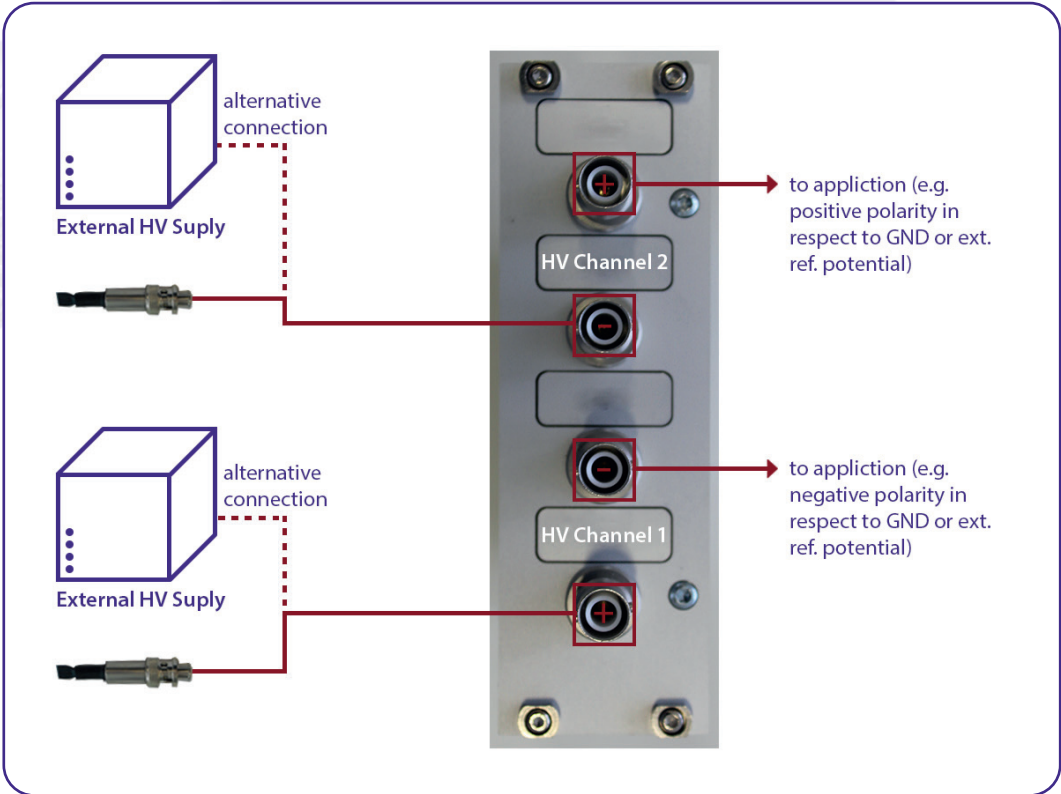


Figure 1: Exemplary basic connection scheme of a 2 channel Module R012 with SHV connectors.



- Install the 19" HVPS-HC Module R012 into a free slot of the 19" Basic Unit (if not already installed).
- Use appropriate cables (SHV or LEMO 1S) to connect the outputs with the corresponding polarity suitable for your application.
- Use the termination plugs (SHV or LEMO 1S) to terminate the output with the opposite polarity to GND (e.g. terminate the negative output of channel 1 in case that the positive output of channel 1 should be used).
- Alternatively an external reference potential can be applied instead of using the termination plug for a termination to GND.

The 19" HVPS-HC Module R012 is specified for the operation with an external reference voltage. Please check the specification sheet of your specific module for the maximum allowed reference voltage.

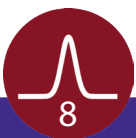
All 19" HVPS-HC Module R012 with a maximum output voltage $\leq 5\text{kV}$ come with SHV connectors, independent on their maximum floating voltage.

Therefore it must be taken care off, that the sum of the module output voltage and the applied floating voltage is not exceeding 5kV in total.



In cases that no reference voltage is applied to the device, the termination plug must be used to ground the reference input of the 19" HVPS-HC Module R012. With a missing reference potential the device is not providing any output voltage.

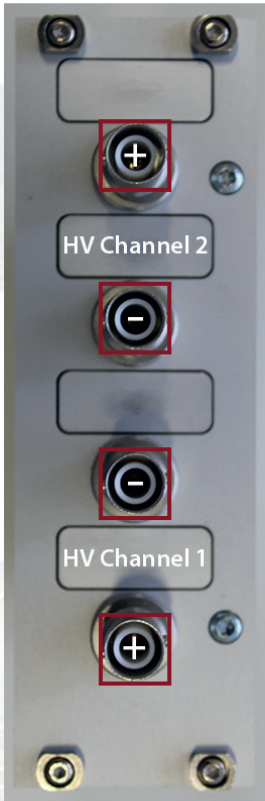
Finish the complete cabling of the 19" HVPS-HC Module R012 before switching on the 19" Basic Unit and switch off the device first before performing any changes to the cabling.



4 Device Layout & Operation

4.1 Device Layout

The layout of the 19" HVPS-HC Module R012 is given below.



1(+)/2(+) SHV connector for output of operation voltage with positive polarity for the first/second HV channel.

(Must be terminated to GND or to an external reference potential when using the output voltage with negative polarity. Check the specification sheet for the maximum allowed reference voltage).

1(-)/2(-) SHV connector for output of operation voltage with negative polarity for the first/second HV channel.

(Must be terminated to GND or to an external reference potential when using the output voltage with positive polarity. Check the specification sheet for the maximum allowed reference voltage).

Figure 2: Layout of the 19" HVPS-HC Module R012.



4.2 General Device Operation

After switching on the 19" Basic Unit, the display shows the "Surface Concept" animated logo, while the device is scanning for the 19" HVPS-HC Module R012 and its specific settings. This can take up to several seconds. If the 19" Basic Unit is ready for operation, it switches into the standby mode and shows an empty mask for the voltage adjustment (see **Figure 3**).

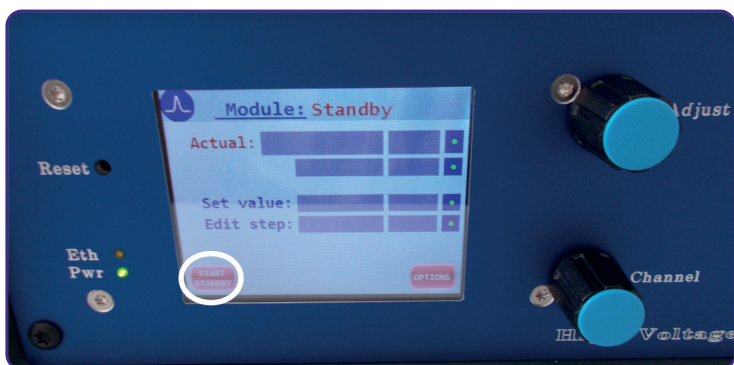


Figure 3: Standby mode.

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.

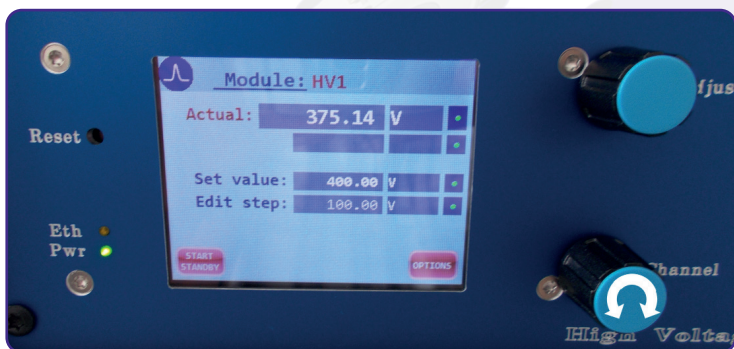


Figure 4: Operation mode.

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.

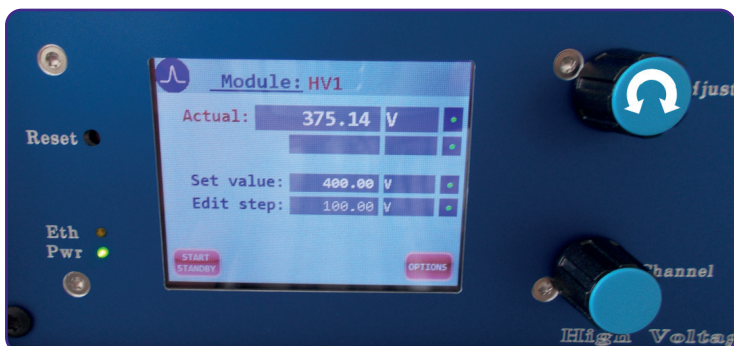


Figure 5: Operation mode – voltage adjustment.

The "Adjust" control knob is used to adjust the output voltage. Turn the "Adjust" control knob clockwise/counter-clockwise 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 the manual of the specific module for further details). Turn the "Adjust" control knob clockwise/counter-clockwise 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 Schematic Layout of the 19" HVPS-HC Module R012

Figure 6 shows the schematic layout of the 19" HVPS-HC Module R012 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 fixed defined (see the specific specification sheet for details on the max. output voltage and the polarity). **Figure 6** also shows the internal load and measuring resistors.

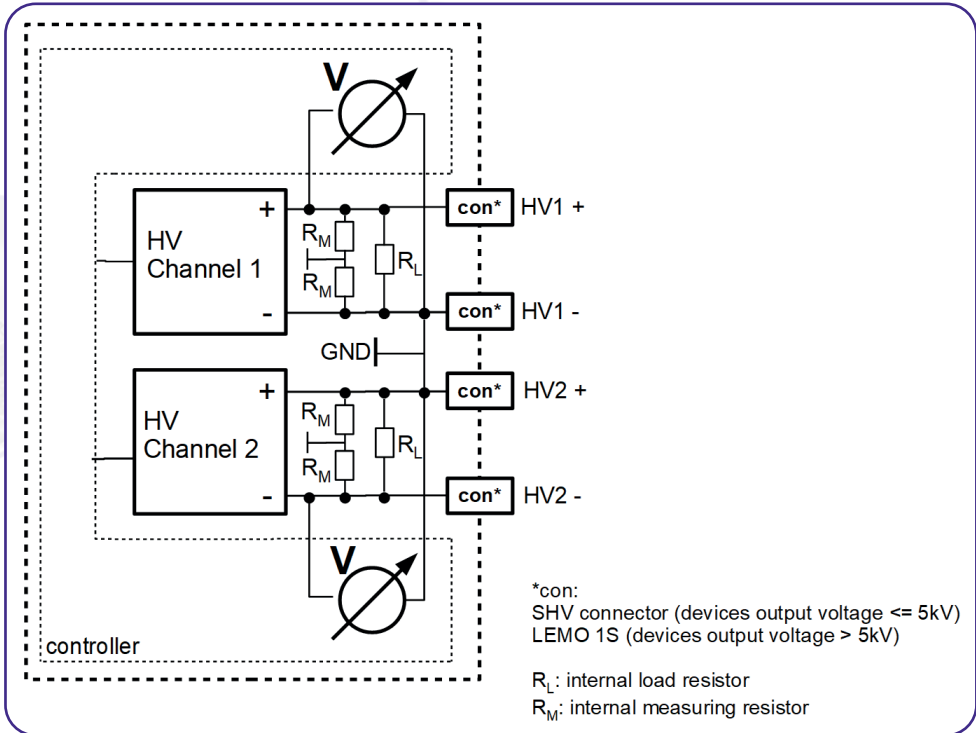


Figure 6: Schematic layout of the 19" HVPS-HC Module R012.

4.4 Floating Operation

For the 2 channel version of the 19" HVPS-HC Module R012, one can not only use external HV supplies to provide a reference voltage, but also one of the both channels of the R012 can be used as reference potential for the other HV channel.

The connection scheme of one HV channel of the 19" HVPS-HC Module R012 in floating operation in reference to the second HV channel is shown in Figure 7.

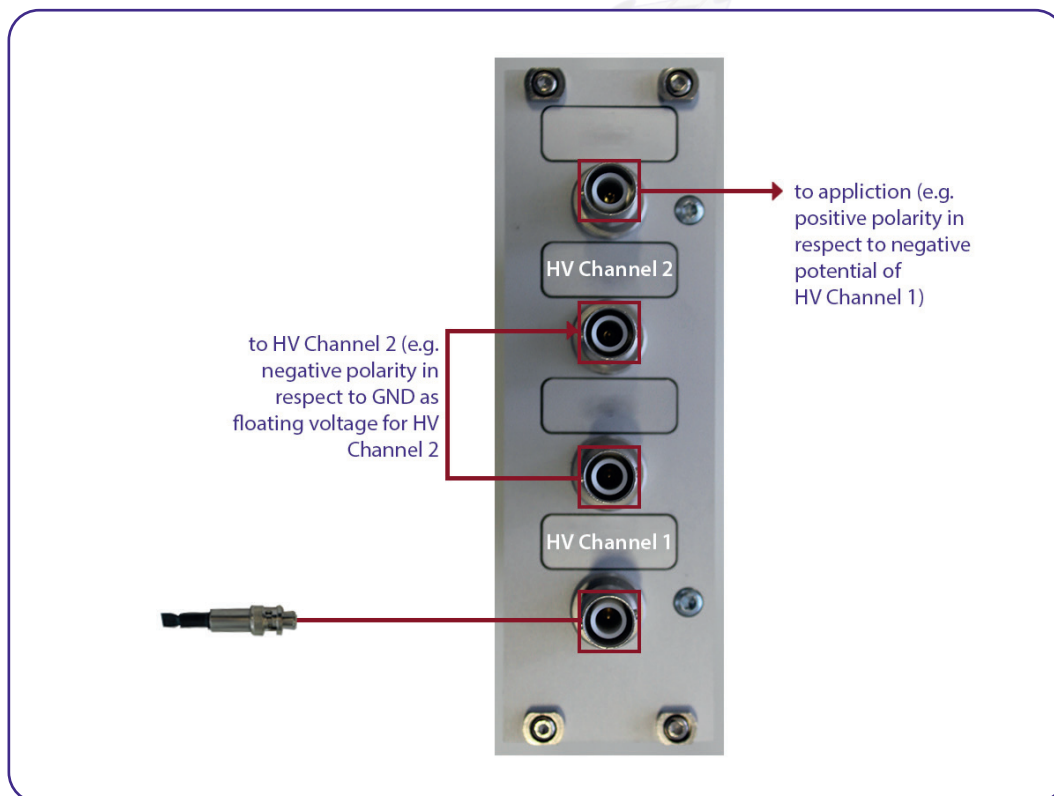


Figure 7: Connection scheme for floating operation of one HV channel of Module R012 in respect to the second HV channel.

4.5 Limitations of Floating Operation

when a HV module with floating capability is stacked on top of a reference voltage, then it can happen that the floating, "upper" HV module "pulls up" the reference voltage of the "lower" reference HV module when operating. This "pulling up" effect is caused by cross current flows from the one to the other HV module and it depends on the output voltage of the floating HV module in respect to the output voltage of the reference HV module as well as on the internal resistances to ground within the different modules and on the polarity of the output voltages of the both HV modules (e.g. the "pulling up" effect is much stronger for different polarities between the both modules than when both polarities are the same).

This effect occurs independent on using an external HV module or using the second HV channel of the R012.

This "pulling up" effect can be minimized by installing an addition resistance to ground on the HV output of the reference HV module, to create an additional current flow out of the reference HV module. The value of the resistance depends on the necessary current flow, which should be larger than the current flow out of the floating HV module (a typical resistance values for the floating operation of MCP based detectors is 10MOhms).

External resistances in a compact housing with SHV connectors are available from Surface Concept to connect in between the HV line of the reference HV module.

The connection scheme of the 19" HVPS-HC Module R012 in floating operation with such external resistance is given in Figure 8.

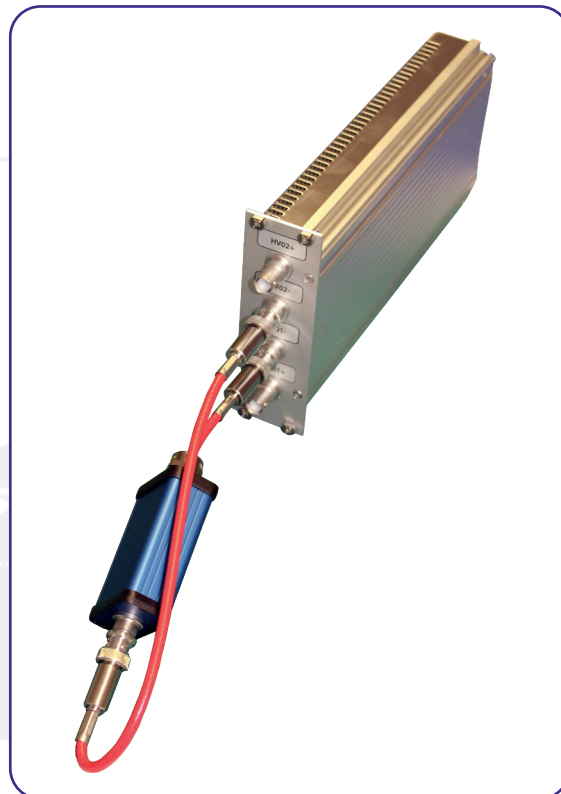


Figure 8: Connection example for the floating operation of HV channel 2 with positive polarity in reference to the negative output of HV channel 1 with an external resistance to ground connected to minimise the "pulling up" effect.

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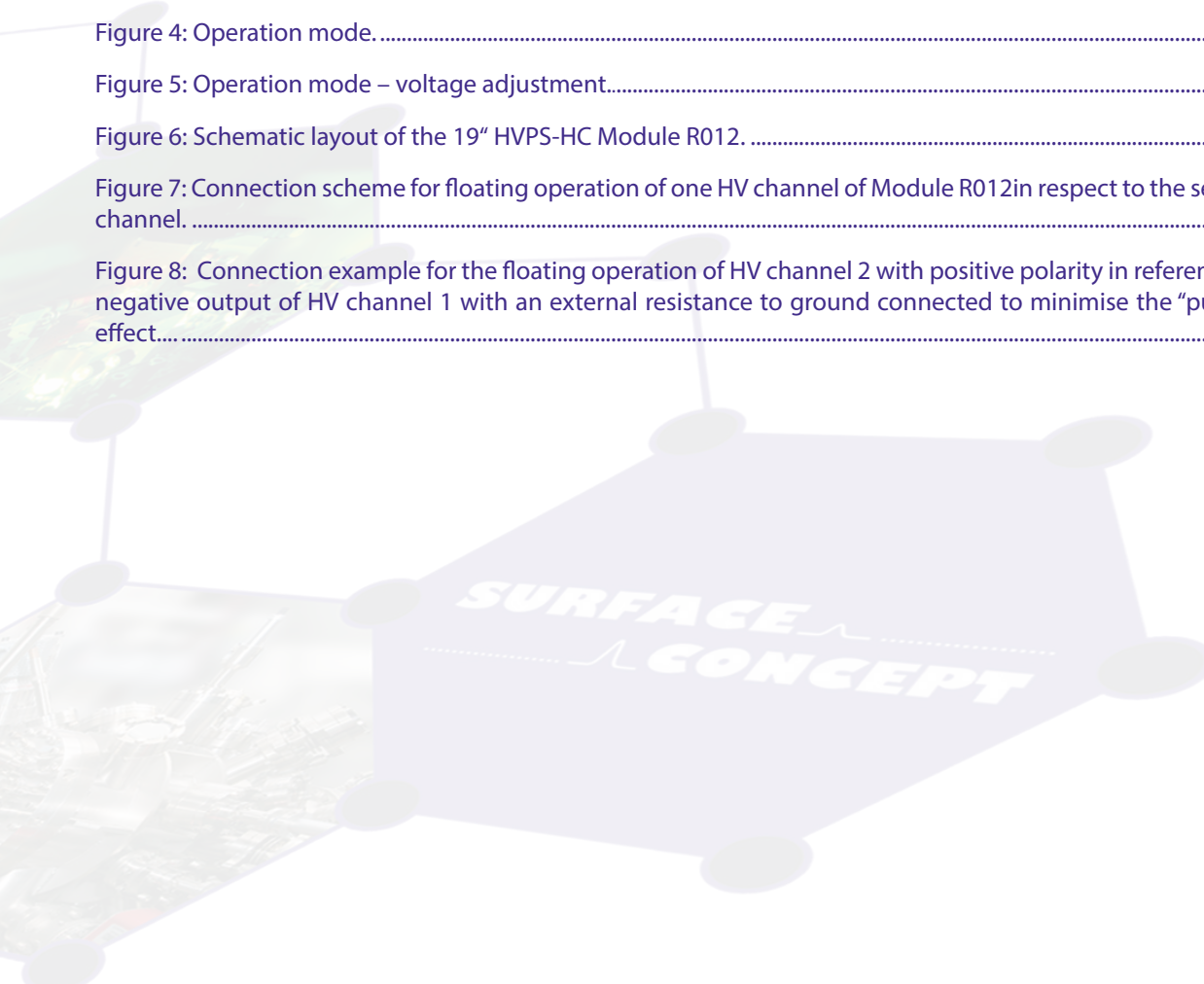
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Figure 8: Connection example for the floating operation of HV channel 2 with positive polarity in reference to the negative output of HV channel 1 with an external resistance to ground connected to minimise the “pulling up” effect..... 13





EC Declaration of Conformity

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Product
Model

High Voltage Power Supply
19" HVPS-HC Module

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,.....01.10.2019.....
(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.

