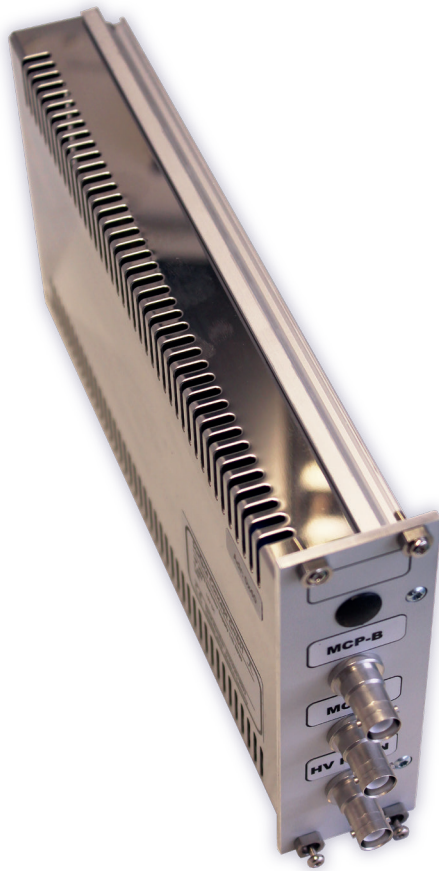


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# 19" HVPS Detector Supply 1 Channel (Release R020)



## Manual



**SURFACE** .....  
.....**CONCEPT**

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User Manual for the  
19" HVPS Detector Supply 1 Channel  
Release: R020  
Manual Version 2.0  
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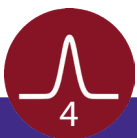


# 1 Table of Contents

1 Table of Contents .....	3
2 Introduction.....	5
2.1 General Information .....	5
2.2 Safety Instructions .....	5
2.3 General Overview.....	6
3 Introduction.....	7
3.1 Initial Inspection.....	7
3.2 Installation .....	7
4 Device Layout & Operation .....	9
4.1 Device Layout.....	9
4.2 General Device Operation.....	10
4.3 Operation of a MCP/CEM Detector .....	11
4.4 Schematic Layout of the 19" HVPS Detector Supply R020 .....	12
5 List of Figure .....	13



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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 020 of the 19" HVPS Detector Supply. 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:



**Note**

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.



**Caution**

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 Detector Supply R020 is a 1 channel high voltage module especially designed for the Surface Concept 19" Basic Unit, a modular supply system.

The 19" HVPS Detector Supply R020 is laid out for the operation of e.g. MCP based detectors with metal anode or CEM detectors. It provides one single high voltage with a positive polarity. It also provides the capability to float on an external reference potential.

The 19" HVPS Detector Supply R020 comes with a maximum output voltage of +3000V and can float on voltages of up to +/- 1000V. Check the specification sheet of your specific 19" HVPS Detector Supply R020 for further specific information.



**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 R019
- 1x SHV Termination Plug

Table1: Packing list for the 19" Basic Unit R019.

### 3.2 Installation

The general connection scheme of the 19" HVPS-HC Module R020 is as follows:

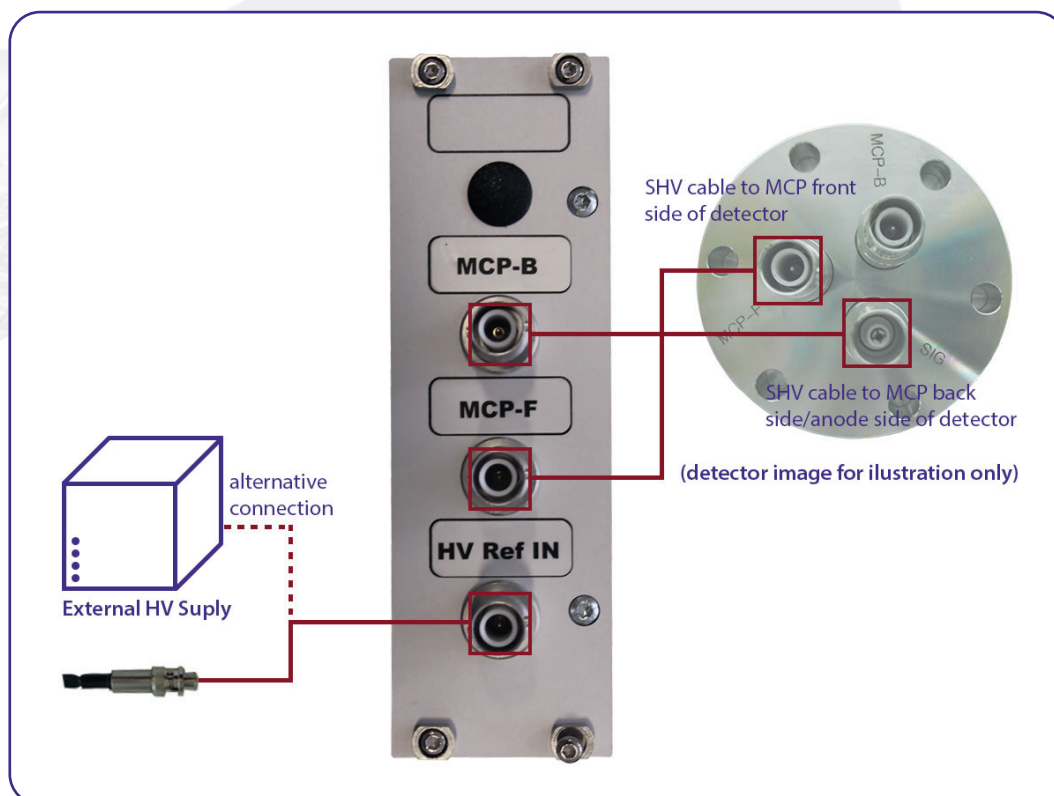


Figure 1: Connection scheme of the 19" HVPS Detector Supply R020 (the detector flange is given for illustration only. Please check the manual of your MCP/CEM detector for the correct flange layout and feedthrough assignment).

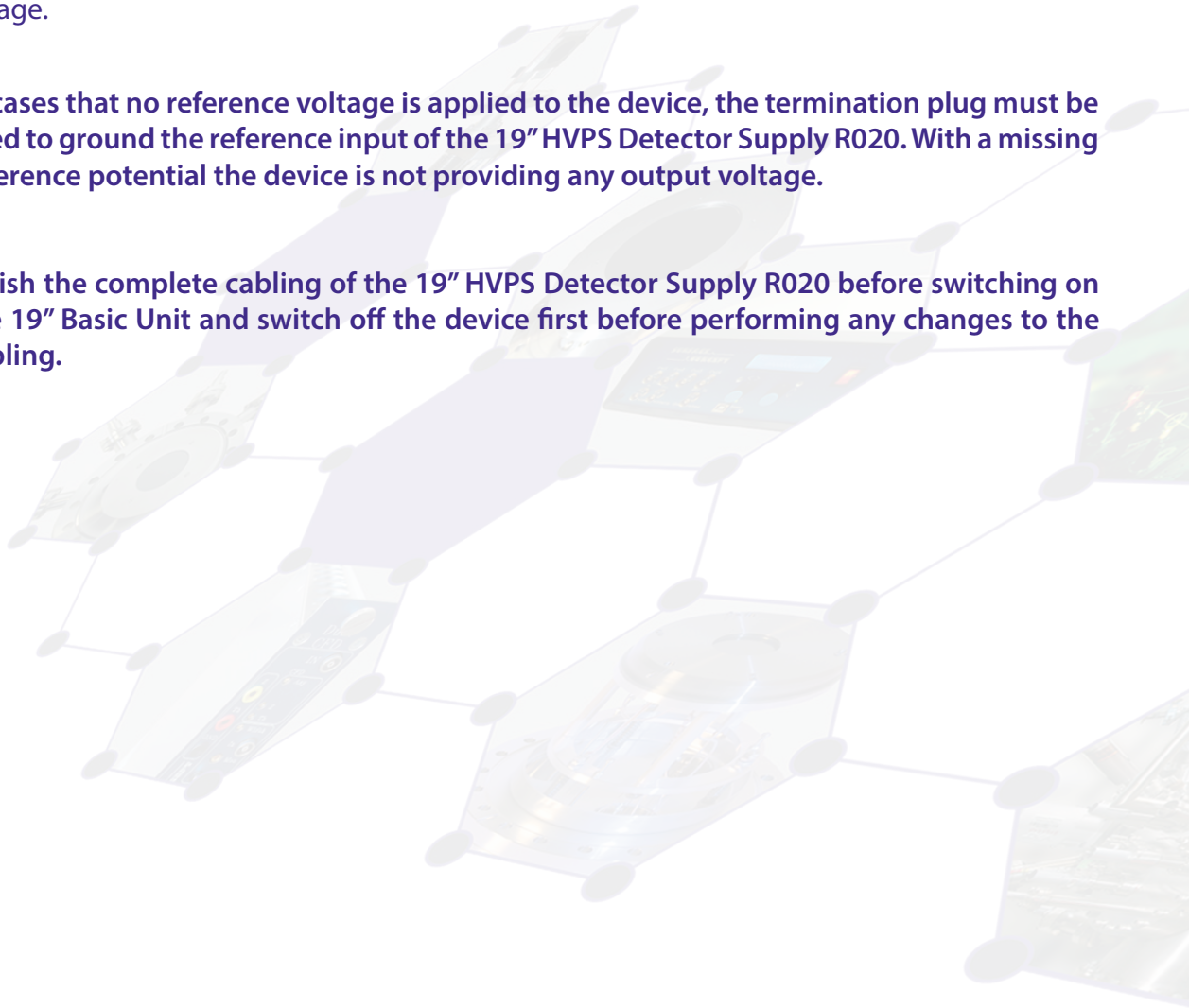
- Install the 19" HVPS Detector Supply R020 into a free slot of the 19" Basic Unit (if not already installed).
- High voltage output is provided to the SHV socket named "MCP-B".
- The socket named "MCP-F" connects the external reference voltage which is given to the device via the "HV Ref. In" input to the front side of the MCP stack/ CEM of the detector
- Use SHV cables to connect the outputs of the 19" HVPS Detector Supply R020 to the corresponding HV input/s of the MCP/ CEM detector (see your MCP/ CEM detector manual for more details).
- Use the SHV termination plug to terminate the "HV Ref. In" input when not working with an external reference voltage.



**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 Detector Supply R020. With a missing reference potential the device is not providing any output voltage.**



**Finish the complete cabling of the 19" HVPS Detector Supply R020 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 R020 is given below.



1. SHV connector for output of operation voltage for a MCP/CEM detector.
2. SHV connector for output of reference potential to the front side of a MCP/CEM detector.
3. SHV connector for input of an external reference potential (max. +/- 1,000V, check with your MCP or CEM detector manual for details on maximum reference potentials).

Figure 2: Layout of the 19" HVPS Detector Supply R020.



The 19" HVPS Detector Supply R020 is specified for the operation with an external reference voltage of maximum +/- 1,000 V (see no. 3 in Figure 2).

Please also respect the corresponding specifications for the maximum voltage for the MCP front potential of your MCP/CEM detector (see the manual and the specification sheet of your MCP/CEM detector for further details).

## 4.2 General Device Operation

After switching on the 19" Basic Unit, its display shows the "Surface Concept" animated logo, while the device is scanning for the 19" HVPS Detector Supply R020 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**).

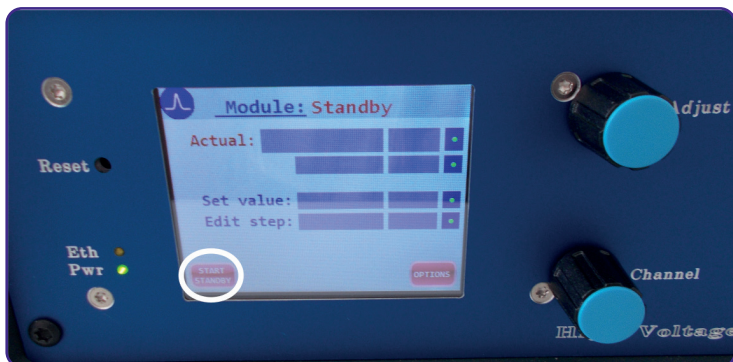


Figure 3: Standby mode.

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.

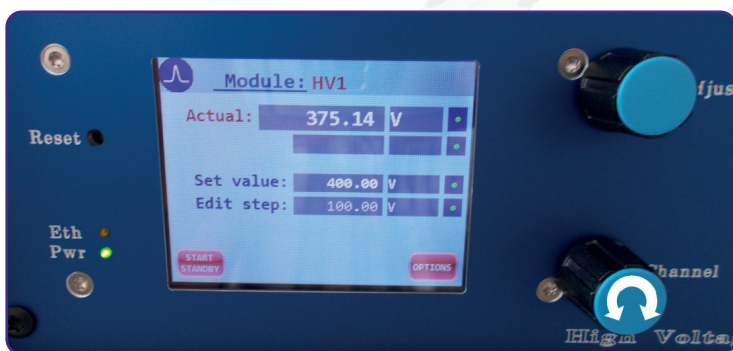


Figure 4: Operation mode.

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.

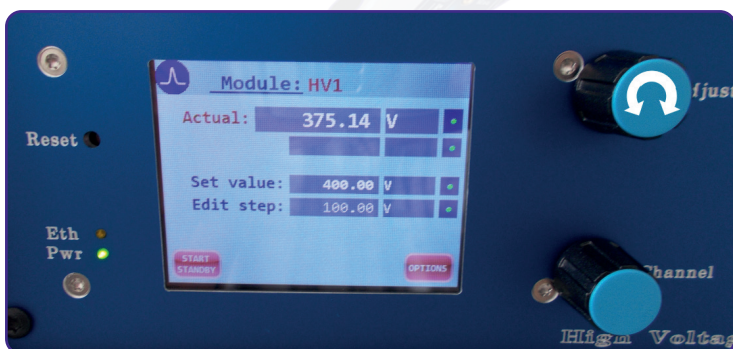
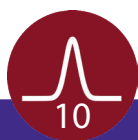


Figure 5: Operation mode – voltage adjustment.

The "Adjust" control knob is used to adjust the output voltage. Turn the "Adjust" control knob clockwise/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 the manual of the specific module 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 Operation of a MCP/CEM Detector

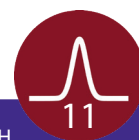
In some cases a MCP detector is operated with the front side of the MCP stack terminated to ground. But for many other applications it is necessary to apply some external reference voltage to the front side. In this case the floating capability of the 19" HVPS Detector Supply R020 allows a more insusceptible supply of the correct detector operation voltage because the external reference voltage must not be taken into account for the MCP operation voltage. Additionally this wiring also saves the detector intrinsically from any over-voltage in case of a sudden drop of the external reference voltage. In general there are three different application cases concerning reference potential to the front side of the detector's MCP stack.

**For example: Assume an operation voltage of a detector of +1,900V.**

Application case 1: The detector should be operated with the MCP front side connected to ground. In this case the SHV termination plug is connected to the "HV Ref. In" input. "MCP-B" is set to the detectors operation voltage. The display shows a value of MCP-B = 1,900 V. The output voltage in respect to the ground potential is MCP-B = +1,900 V.

Application case 2: The detector should be operated with the MCP front side connected to +1000V. In this case the external reference voltage is connected to the "HV Ref. In" input. First set the 19" HVPS Detector Supply R020 to the detectors operation voltage. Then increase the external reference voltage to the +1,000V. The display shows a value of MCP-B = 1,900V, but the output voltage in respect to the ground potential is MCP-B = +2,900V.

Application case 3: The detector should be operated with the MCP front side connected to -500V. In this case the external reference voltage is connected to the "HV Ref. In" input. First set the 19" HVPS Detector Supply R020 to the detectors operation voltage. Then increase the external reference voltage to the -500V. The display shows a value of MCP-B = 1,900V, but the output voltage in respect to the ground potential is MCP-B = +1,400V.



## 4.4 Schematic Layout of the 19" HVPS Detector Supply R020

**Figure 6** shows the schematic layout of the 19" HVPS Detector Supply R020 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). The device comes with an integrated 2-fold fan-out for the output voltage of each channel. **Figure 6** also shows the internal load and measuring resistors.

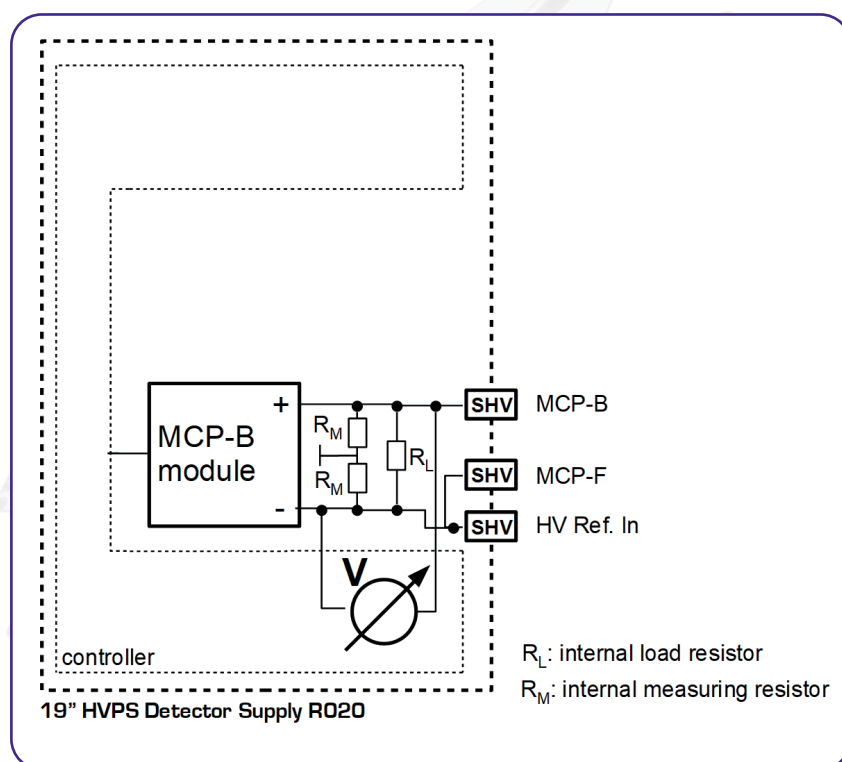


Figure 6: Schematic layout of the 19" HVPS Detector Supply R020 showing also the internal load and measuring resistors.



Note

The 19" HVPS Detector Supply R020 is not producing any output voltage if the reference input "HV Ref. In" is not terminated (either to ground or to an external HV potential), because the HV module always need to be connected to a reference potential. A SHV termination plug is part of the delivery to terminate the "HV Ref. In" input to ground.

## 5 List of Figure

Figure 1: Connection scheme of the 19" HVPS Detector Supply R020 (the detector flange is given for illustration only. Please check the manual of your MCP/CEM detector for the correct flange layout and feedthrough assignment).....7

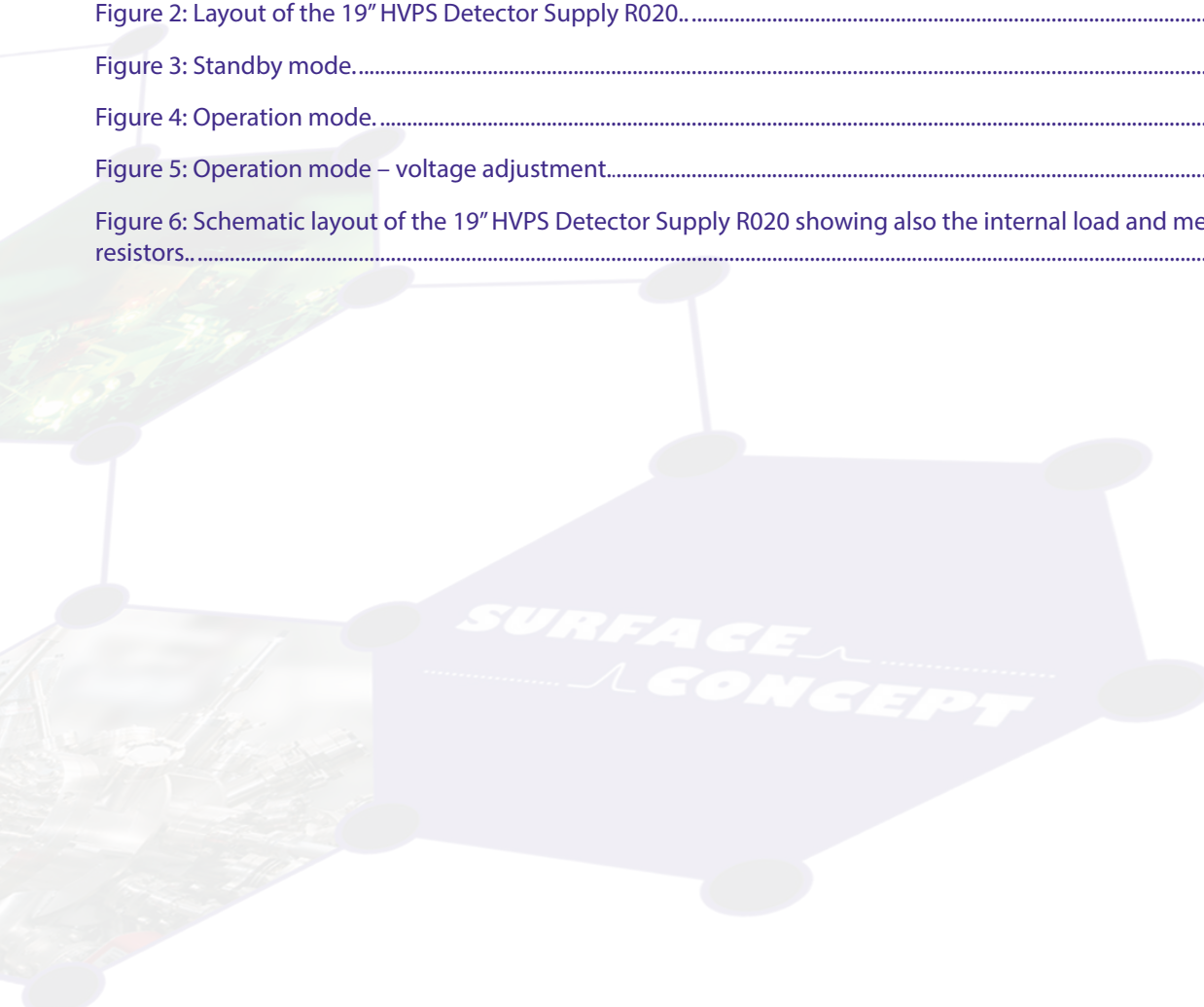
Figure 2: Layout of the 19" HVPS Detector Supply R020.....9

Figure 3: Standby mode..... 10

Figure 4: Operation mode..... 10

Figure 5: Operation mode – voltage adjustment..... 10

Figure 6: Schematic layout of the 19" HVPS Detector Supply R020 showing also the internal load and measuring resistors..... 12





# EC Declaration of Conformity

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Product Model

High Voltage Power Supply  
19" HVPS Detector Supply

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.

