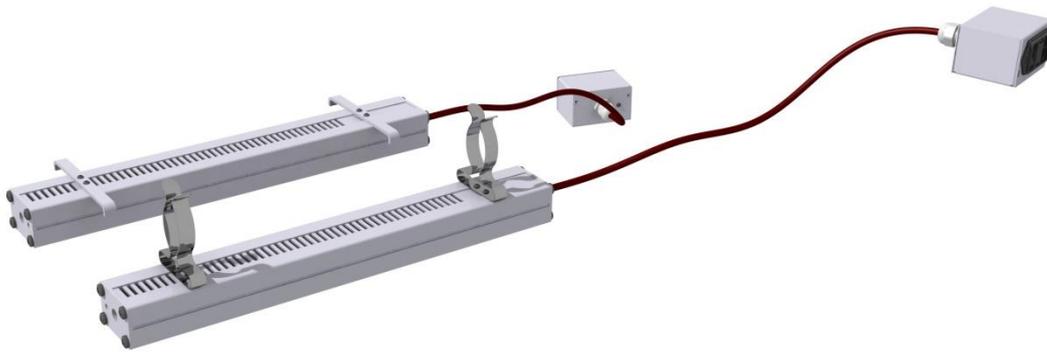


# FERROVAC GMBH

ULTRA HIGH VACUUM TECHNOLOGY

## BKHEVSN40S Heater module for UHV Suitcases



### Operating Instructions

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*Version 1.0, April 2020*

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### **Important!**

It is the sole responsibility of all users to carefully read the operating instructions and keep them safe. Read and follow all safety instructions carefully before using the product described in this document. Ferrovac declines any and all responsibility and liability for any damage/injuries resulting from incorrect use/adjusting/controlling or programming of the product.

### **Warranty**

Ferrovac warrants this product to be free of defects in material and workmanship for 24 months from the date of shipment. In the case of any defects, Ferrovac will either repair or replace the product at our discretion.

### **Warranty limitations**

The warranty for this product does not apply to defects resulting from the following:

- Non-observance of operational- and safety instructions
- Natural wear of components
- Consumables
- Modifications to our products without our written consent
- Misuse of any product or part of the product

This warranty stands in place of all other warranties, implied or expressed, including any implied warranty of implied merchantability or fitness for a particular use. The remedies provided herein are the buyer's sole and exclusive remedies.

Neither the company Ferrovac nor any of its employees shall be liable for any direct, indirect, incidental, consequential or special damages arising out of the use of its products even if Ferrovac has been advised of the possibility of such damages. Such excluded damages shall include but are not limited to: costs of removal and installation, losses sustained as the result of injury to any person, or damage to property.

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## 1. General Information

This manual covers all important information about installation, commissioning and operation of your heater module for UHV Suitcases. It also provides essential safety information, maintenance- and fault finding procedures.

The product described was manufactured in accordance with the applicable national standards and guidelines. The information in this document represents the state of the product at the date of print. Technical changes may be made without notice. Ferrovac makes no warranties or representations with respect to accuracy or completeness of the contents of this publication. Figures and photos are not binding. The product names used are for identification purposes and may be trademarks of their respective companies.

### 1.1. Designated Use

The product described in this document may only be used for its designated application. Designated use of the product is defined by the following rules:

The product is:

- Used with original cable sets supplied by Ferrovac which are explicitly specified for the use with the product described in this publication.
- Used in an indoor research laboratory environment or an industrial production or processing facility.
- Operated by personnel qualified for operation of delicate scientific equipment.
- Used in accordance with all related manuals.



### **Important!**

Carefully read all safety instructions and relevant manuals before using the product and any related equipment!

### 1.2. Non Designated Use

**Non-designated use is defined if any of the following are true:**

- The product is used with other equipment not explicitly acknowledged by Ferrovac in writing.
- The product is used outdoors or at ambient conditions exceeding the values given in the product specification.
- The product is used by non-qualified persons.
- Operation of the product in disregard of the safety instructions.
- Operation of the product with disabled, modified, removed or damaged safety equipment and devices.

## 2. Terms and Symbols

Symbol	Term	Meaning
	<b>Danger!</b>	Risk of mortal danger when not observed
	<b>Warning!</b>	Risk of severe injury or danger to life when not observed
	<b>Caution!</b>	Slight risk of injury or damage to product when not observed
	<b>High voltage!</b>	Potentially lethal voltages are present
	<b>Caution, hot surface!</b>	Potential burn hazard if safety precautions are not followed
	<b>Cryogenic Substances!</b>	Potential cold burn hazard if safety precautions are not followed
	<b>Important!</b>	Important information for proper operation of the product
	<b>Info, hint!</b>	Useful hints, tips and clues

## 3. General Safety Information

Read the safety instructions very carefully. All safety precautions must be strictly observed at all times while using the product described in this manual and any associated instrumentation.

**Study this document** to learn how to operate your product correctly. Keep this instruction manual in a safe place close to the described product and inform all other users of the manual's location. Always include this manual when handing the product over to third party persons.

**Responsible body** is the individual or group of persons that are responsible for the proper use and maintenance of the product, ensuring that the product is operated within its specifications and operating limits. The responsible body must ensure that users of the product are adequately trained.

**Operators** use the product for its intended purpose. Users must be trained in electrical safety, and adequate use of the instrument. They must be protected from electric shock and other potentially dangerous situations.

**Maintenance Personnel** perform routine tasks on the product to keep it in proper operating conditions, i.e. setting up the line voltage or replacing consumables. Maintenance procedures described in this manual must be followed.

**Service Personnel** are trained to work on live circuits as well as perform fault finding measurements and repair work to the product. Only fully trained service personnel qualified to handle potentially lethal voltages may perform servicing and repair.

**Shock hazard:** The American National Standards Institute states that a shock hazard exists when voltage levels are greater than 30 V RMS, 42.2 V peak or 60 VDC. A good safety practice is to assume that hazardous voltages are present in any unknown circuitry.



### Warning!

Always check for correct mains voltage before connecting any equipment!  
Mains supply voltage fluctuation must not exceed  $\pm 10\%$  of the nominal voltage.



### Warning!

- Always observe and strictly follow the safety notes and regulations given in this document
- Always use the originally delivered cables with the product for all electrical connections.
- Always switch off the device before disconnecting cables.
- Never operate the device outside its dedicated environment.
- DO NOT OPEN the device unless you are fully trained service personnel and familiar with live circuits and potentially lethal voltages.



### Important! Ambient conditions and environment:

This product is only to be used indoors, in locations meeting the following requirements:

- Room temperature lies between 5°C/41°F and 40°C/104°F
- Humidity up to maximum of 80%
- Altitudes up to 2000m
- Pollution Degree 2 environments

### 3.1 Specific Safety Precautions for the heater module for UHV Suitcases

The heater module for UHV Suitcases is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions necessary to avoid possible injury.



#### **Warning: Potentially Lethal Voltages!**

This Product operates at potentially lethal voltages of up to 230VRMS

Any adjustment, fault finding procedure, installation and maintenance of the product described in this manual must be carried out only by authorized service personnel

- In case of malfunction, immediately disconnect the unit from the mains power supply
- Do not touch any electrical terminals, connectors or wires
- Report damaged cabling immediately to service personnel
- Always wear electrically isolating safety shoes when performing maintenance



#### **Caution, hot surface!**

- Certain components reach high temperatures during operation and represent a potential hazard. Avoid direct contact
- Covering the device and its components poses a fire hazard. Always keep temperature-sensitive materials, liquids or gases well away from the heat source

## 4. About

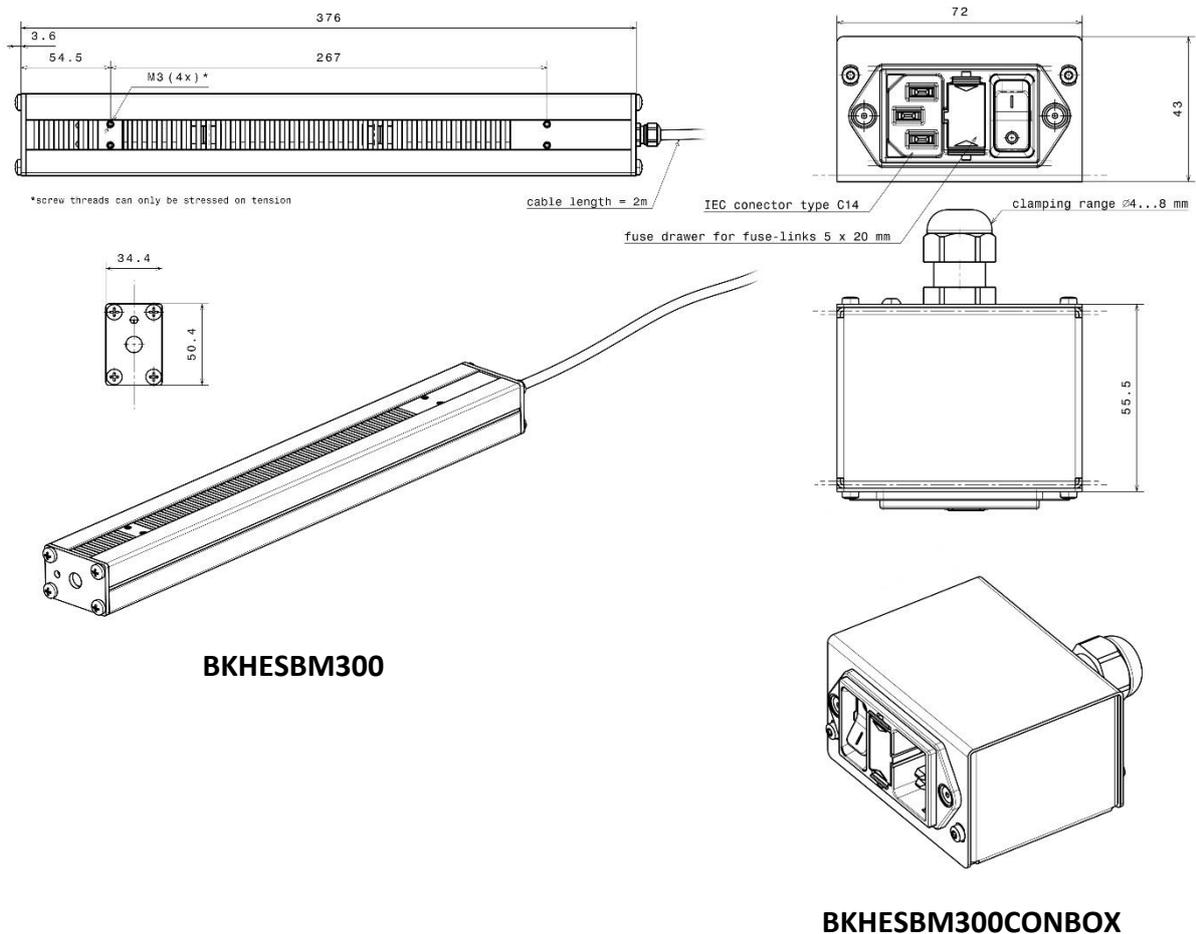
This heater module is a specially designed bake-out heater for Ferrovac UHV-Suitcases. In combination with an isolation tent, the heater module enables a convenient conditioning after venting an UHV-Suitcase.

Different versions are available, depending on your suitcase configuration and required mains voltage. To provide an overview of the different combination possibilities, please refer to the following technical drawing and product configuration list.

### 4.1 Dimensions

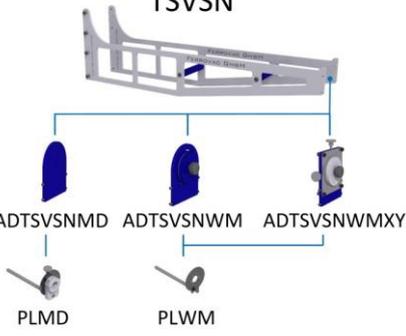
Technical drawing of heater modules for UHV Suitcases. All measures are in mm.

#### Heater base module (BKHESBM300) & Connection box (BKHESBM300CONBOX):



## 4.2 Product Configuration

The following configurations of the base module are available:

On Suitcase Mounted Transfer Manipulator	On Suitcase Mounted Support Type	Main Voltage	Heater Product Key	Heater Installation Option
<b>Sample Transporter:</b> RM40, RMD40, RMDG40, RMJ40, RMJG40, GMD40	TSVSN-ADTSVSNRM 	100-127 VAC	<b>BKHEVSN40RM110</b>	refer to section 5.2
		220-240 VAC	<b>BKHEVSN40RM230</b>	
	TSRMPVSN 	100-127 VAC	<b>BKHEVSN40RM110</b>	refer to section 5.3
		220-240 VAC	<b>BKHEVSN40RM230</b>	
<b>Linear/Rotary Feedthrough or Wobblestick:</b> MD40, MD40HT, MDG40, MDG40(FC)  WM40, WM40HT, WMG40, WMG40(FC)	TSVSN 	100-127 VAC	<b>BKHEVSN40WM110</b>	refer to section 5.4
		220-240 VAC	<b>BKHEVSN40WM230</b>	

### 4.3 Specifications

#### Heater base module: BKHESBM300

- Operating Temperature: -10°C to 150°C
- IP Protection Class: IP20 (according to DIN EN 60529)
- Cable Length: 2m
- Material:
  - Body/housing: EN AW-6082, AISI 303 (1.4305), AISI 304 (1.4301)
  - Anodized: EN AW-6082
  - Cable: Silicone Rubber, Tinned Copper
  - Fasteners : Stainless Steel (grade A2 or higher)
- Tolerances:
  - Machined Parts: ISO 2768 -m -K

#### Connection box: BKHESBM300CONBOX

- Operating Temperature: Ambient temperature (-10°C to 50°C)
- IEC Connector Type: C14
- Gender: Inlet
- Fuse: 5x20mm
- IP Protection Class: IP30 (according to DIN EN 60529)
- Tolerances:
  - Machined Parts: ISO 2768 -m -K

### 4.3 Configuration-specific specifications

#### Product:

BKHEVSN40RM110 / BKHEVSN40WM110

- Power: 300W
- Supply voltage: 110 VAC/60 HZ
- Fuse:
  - Characteristic: Time Lag T
  - Breaking Capacity: 35 A @ VAC
  - Rated Current: 3.15 A
  - Voltage Rating : 250 VAC

#### Product:

BKHEVSN40RM230 / BKHEVSN40WM230

- Power: 300W
- Supply voltage: 230 VAC/50 HZ
- Fuse:
  - Characteristic: Time Lag T
  - Breaking Capacity: 35 A @ VAC
  - Rated Current: 1.6 A
  - Voltage Rating : 250 VAC



#### Caution!

The specification may change if upgrades or accessories are mounted to the main product.

## 5. Unpacking and Installation

Before unpacking, optically inspect the parcel. If any damage is found, take pictures of the parcel and send them to Ferrovac immediately. Package contents depend on each specific heater configuration or UHV-Suitcase package. Compare content with the delivery note. Any damage or missing items must be reported to Ferrovac **within one week of delivery**.



### Caution!

- Ensure enough workspace on a clean table for unpacking and inspection
- Some Ferrovac products are shipped under UHV! Sudden uncontrolled venting can cause damage to pumps and valves
- Read manuals carefully before using any device
- Never expose any component of the product/system to physical shock or aggressive chemicals
- CF-Flange knife edges and edge-welded bellows are particularly vulnerable, any damage to these parts may result in a complete failure of the vacuum integrity

### 5.1 Product Specific Unpacking and Installation Instructions

The product, its components, and accessories are sealed in a clear plastic sleeve. This product is not made for use in vacuum and therefore not cleaned to UHV standards. Carefully unpack the product and perform a visual check for any damage to the package and its contents.

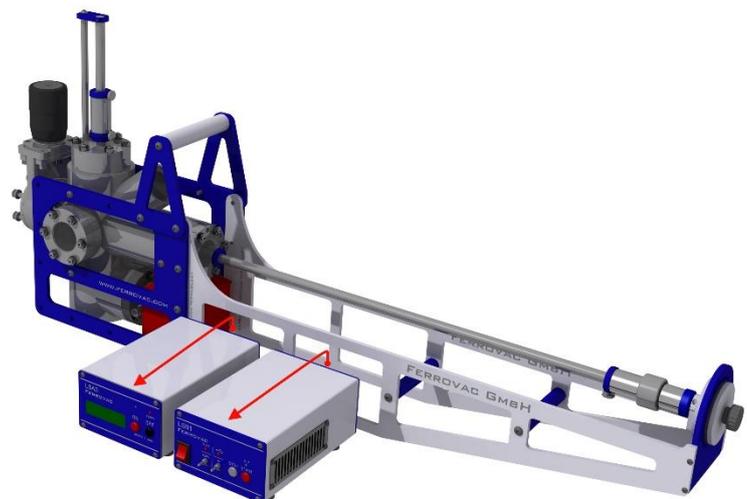
The mounting position of the heater depends on the product and UHV-Suitcase configuration. To select the right way of mounting refer to sections **Fehler! Verweisquelle konnte nicht gefunden werden..2-5.4 Fehler! Verweisquelle konnte nicht gefunden werden. 1-3**.

Once the heater is installed, refer to the *bakeout* section of the UHV-Suitcase manual before starting the bake-out procedure



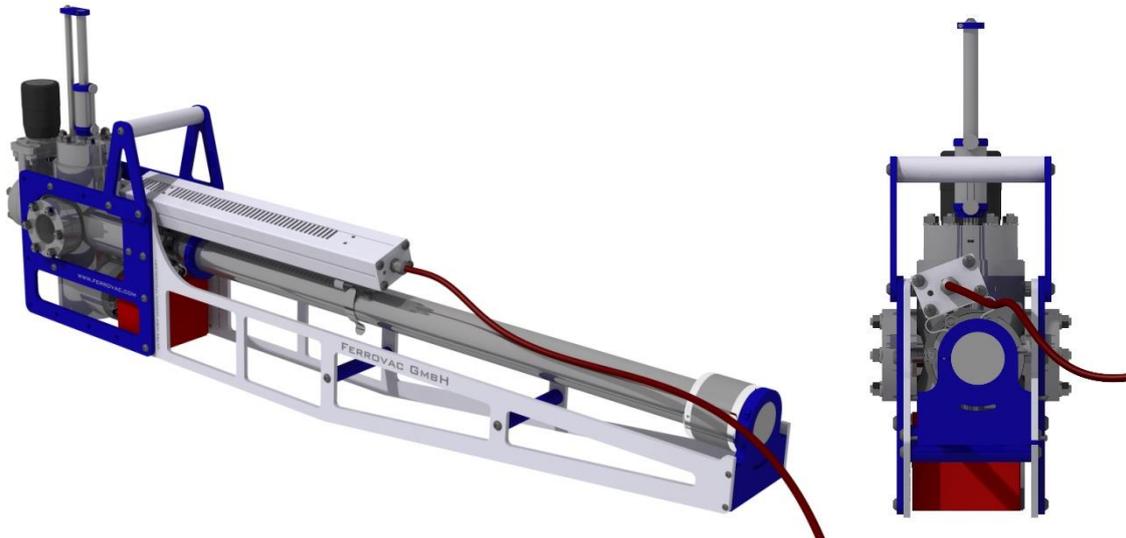
### Caution!

**If present, remove the pump controller LSA and NEG activation controller LSN; this applies for all installation options and configurations!**



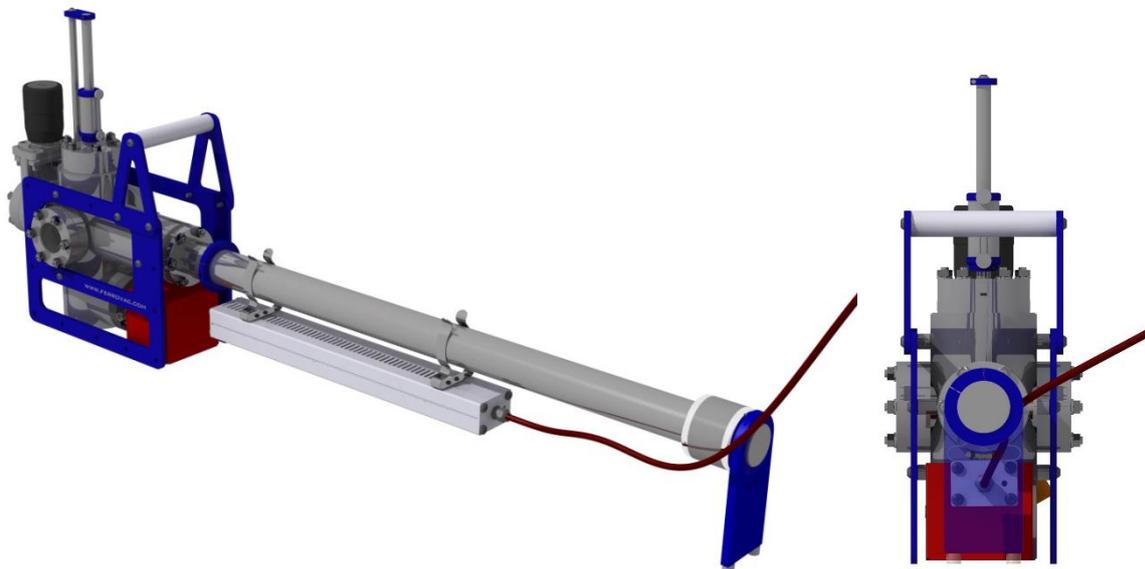
### 5.2 Installation Option 1

The heater is clipped to the sample transporter as close as possible to the UHV-Suitcase chamber. The side-plates of the suitcase prevent the heater from tipping onto the support rails.



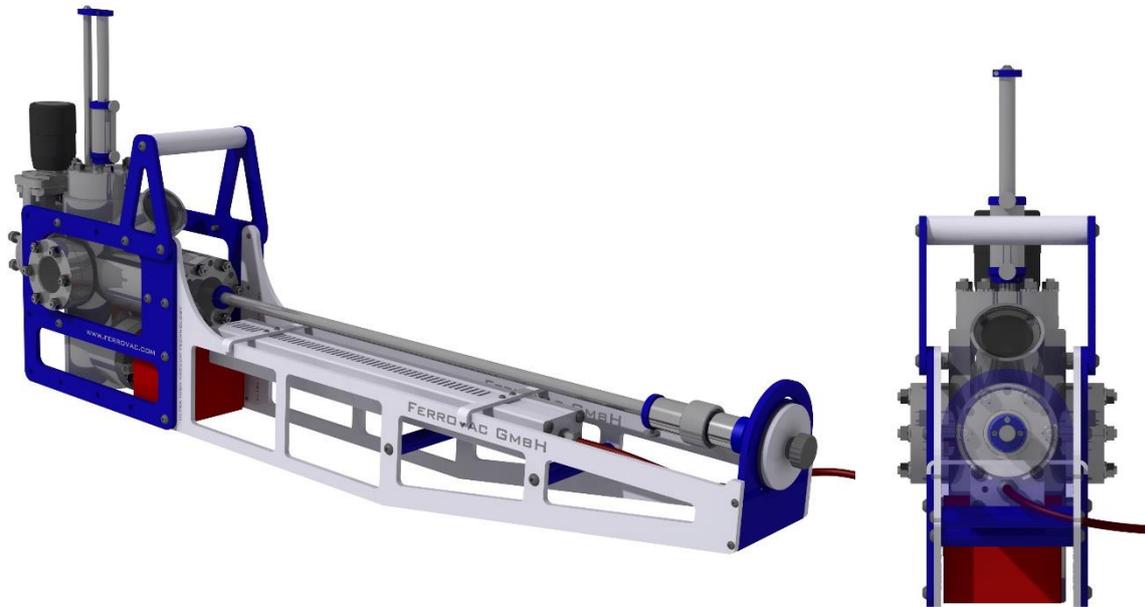
### 5.3 Installation Option 2

The heater is clipped to the underside of the sample transporter. The heater must be more than 20mm away from the NEXTorr NEG/ION combination pump.



### 5.4 Installation Option 3

The heater is inserted lengthways on top of the support rails, hanging from the mounting brackets. Take care around the manipulator shaft, as this is particularly susceptible to damage. The heater must be more than 20mm away from the NEXTorr NEG/ION combination pump.



## 6. Operation



### Caution!

The operator must inspect the product for technical defects before use and monitor the behavior of the product while in use, paying particular attention while the device is heating up to its maximum temperature.



### Caution, hot surface!

- Certain components reach high temperatures during operation and represent a potential hazard. Avoid direct contact.
- Covering the device and its components poses a fire hazard. Always keep temperature-sensitive materials, liquids or gasses well away from the heat source.

This heater module is a convenient component for the conditioning procedure of a Ferrovac UHV-Suitcase. It is designed for easy use and can operate in combination with the Ferrovac UHV Suitcase bakeout isolation jacket (see section **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**) without an additional heat controller.

Once the heater is installed according to section **Fehler! Verweisquelle konnte nicht gefunden werden. Fehler! Verweisquelle konnte nicht gefunden werden.**, please refer to the bake-out section of the UHV Suitcase Manual to start the bakeout procedure.

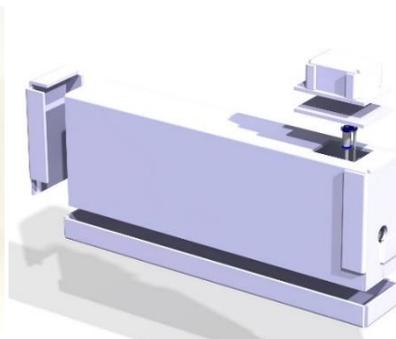
## 7. Options and Upgrades

Options and upgrades for the heater module are listed below. For details, visit our website [www.ferrovac.com](http://www.ferrovac.com).

### 7.1 Bakeout Isolation Jacket

Product code: VSN40SBTHE-XXXX

Multi-piece thermally insulated tent with Velcro™ fastenings. Material: Two layers of glass-fibre fabric with aluminum coating and an insulating interlayer.



## 8. Additional Information

### 8.1 Return of Defective Items

Before any items are returned to the factory, Ferrovac requires a completed declaration of contamination form and will issue a corresponding Return Material Authorization (RMA) number, along with information on how to proceed with the return of defective items.

### 8.2 Downloads

The latest version of this manual can be downloaded from our website [Ferrovac.com](http://Ferrovac.com). For any suggestions or questions concerning this manual, please don't hesitate to contact us.

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