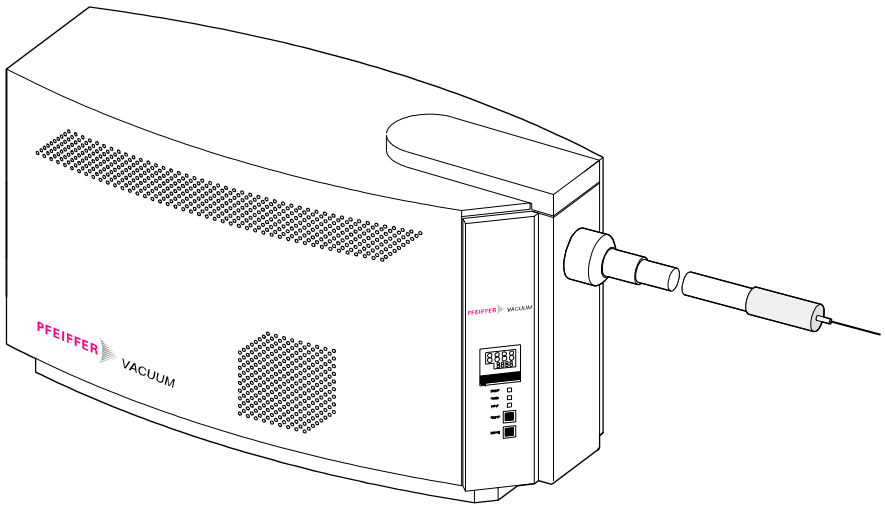
Operating manual
Incl. Declaration of Conformity

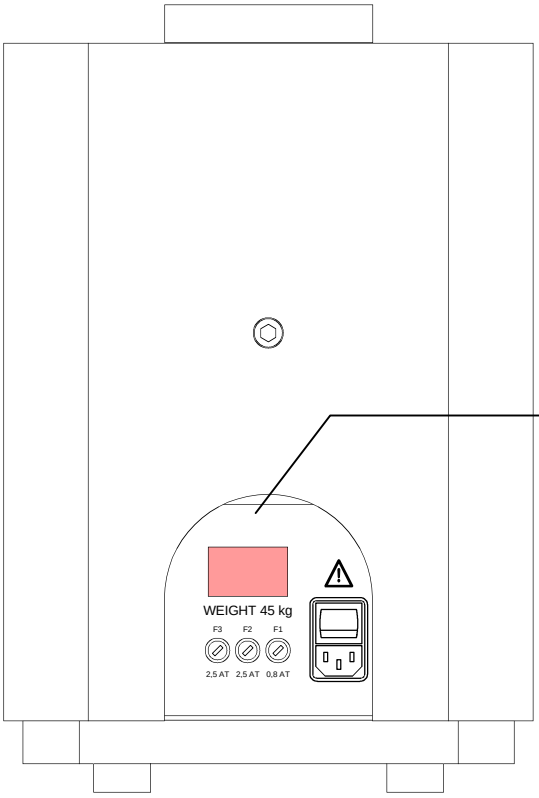
PFEIFFER VACUUM

GSD 300 O
GSD 300 T

Gas analysis system

OmniStar™
ThermoStar™





Product identification

When communicating with Pfeiffer Vacuum, the information given on the product nameplate is required. Transfer therefore that information to this manual.

Pfeiffer Vacuum, D - 35614 Asslar

Typ: _____ No:_____
F-No:_____
_____V _____Hz _____VA

Validity

This manual applies to products with part number

OmniStar™

PT M26 250	(GSD 300 O1, 230 V~)
PT M26 251	(GSD 300 O1, 115 V~)
PT M26 253	(GSD 300 O2, 230 V~)
PT M26 254	(GSD 300 O2, 115 V~)
PT M26 256	(GSD 300 O3, 230 V~)
PT M26 257	(GSD 300 O3, 115 V~)

ThermoStar™

PT M26 260	(GSD 300 T1, 230 V~)
PT M26 261	(GSD 300 T1, 115 V~)
PT M26 263	(GSD 300 T2, 230 V~)
PT M26 264	(GSD 300 T2, 115 V~)
PT M26 266	(GSD 300 T3, 230 V~)
PT M26 267	(GSD 300 T3, 115 V~)

The part number can be taken from the nameplate.

The functions described as well as the illustrations and data contained in this manual are subject to change without notice.

Intended use

The GSD 300 is designed for manually controlled as well automatic analysis of non-corrosive and non-explosive gases, subject to the material compatibility, TLVs as well as the Ɛx-limits[1)].

Courses

Pfeiffer Vacuum offers application, operating and maintenance courses for the best use of this product. Please inquire at your local Pfeiffer Vacuum office.

1) In case of questions please contact your nearest Pfeiffer Vacuum partner.

Table of contents

1 Safety

1.1 Safety Information

a) Technology

The GSD 300 conforms to the latest technology and is safe to operate.

b) Extension of the conforming utilization

Any utilization of this equipment beyond the intended use (measurement of corrosive or explosive gases or the measurement of liquids) requires the prior written approval by the Pfeiffer Vacuum parent company.

Any utilization beyond the (extended) conforming utilization is considered to be non-conforming and the manufacturer declines all liability resulting from such use.

c) Manufacturer's instructions

Conforming utilization also includes the strict adherence to the manufacturer's installation, start-up, operating and maintenance instructions.

d) Personnel training

The GSD 300 may only be operated and maintained by skilled and instructed personnel. The personnel must be informed in particular on potential hazards.

e) Definition of the responsibilities

The responsibility for commissioning, operating and maintenance work must be clearly defined and strictly adhered to so that the competencies are clearly defined under the aspect of safety.

f) Access by unauthorized persons

The owner shall ensure that only trained persons work on the GSD 300.

g) Improper behavior

The equipment may not be operated in any way that impairs the safety of the users and the GSD 300.

h) Unauthorized modifications to the system

The user may not at his own discretion make any changes of modifications that impair the safety of the GSD 300. In any case they are made entirely at his own risk.

i) Obligation to report changes to the system

The user is obligated to report to the owner any changes to the GSD 300 that impair the safety of the system.

k) Maintenance obligation

The owner of the system is obligated to maintain the GSD 300 in proper condition at all times.

l) Proper workplace design

Through appropriate instructions and supervision, the owner shall ensure that the workplaces at the GSD 300 are clean and not obstructed.

m) Shutdown and disconnection from the AC power

The GSD 300 must be switched off and disconnected from the power source before any maintenance work is performed. In particular the switch-off procedures in this Operating manual must be strictly followed.

n) Removal of protective devices

Protective devices may only be removed when the GSD 300 is switched off and disconnected from the power source.

o) Inspections after maintenance or repair work

After maintenance or repair work it is important to check that all protective devices have been installed and that they function correctly. Only then may the GSD 300 be put back into service.

p) Industry-specific accident prevention regulations

The owner shall ensure that the process gases are handled in accordance with the applicable regulations and protective measures. Possible reactions with the process materials must also be taken into consideration. At operating temperatures above 55 °C the operator must wear protective gloves.

In all cases the industry-specific and local accident prevention regulations are applicable to the GSD 300.

q) Disposal of the operating media

The operating media must be disposed of in accordance with local regulations.

r) Maintenance or repair

Products returned to Pfeiffer Vacuum for maintenance or repair should if at all possible be free of harmful substances (e.g. radioactive, toxic, caustic or microbiological). Otherwise the type of contamination has to be declared (→ 🗎 38).

Products that are not clearly declared as "free of harmful substances" are decontaminated at the expense of the customer.

s) Operating instructions

Based on this Operating manual, the owner shall prepare operating instructions that describe the activities and specifications required for safe operation.

The operating instructions shall be posted in a suitable location of the workplace and shall be observed by all persons working with the equipment.

1.2 Gases

a) Take into account the relevant regulations and safety measures for the gases used.

   Consider possible reactions with the materials (→ 🗎 25).

b) Danger signs that conform to national and regional regulations shall be affixed in the appropriate places.

c) If toxic or combustible gases are measured with the GSD 300, the exhaust gases shall be treated and disposed of in conformance with the applicable regulations.

1.3 Explanation of Symbols

DANGER:
Information on preventing any kind of personal injury or extensive equipment damage.

Hot surface:
Danger of burns.

CAUTION:
Special information on damage prevention.

Skilled personnel:
Work marked with this symbol must be done by persons with suitable training and the necessary experience.

NOTE:
Special information on cost-effective use.

Vacuum area:
Always wear clean, lint-free gloves and use clean tools when working in this area.

Tip, recommendation

Lamp / display is lit

Lamp / display flashes

Lamp / display is dark

Waiting, reaction time, duration of test

→  See page ...

→  See document ...

Result o.k.

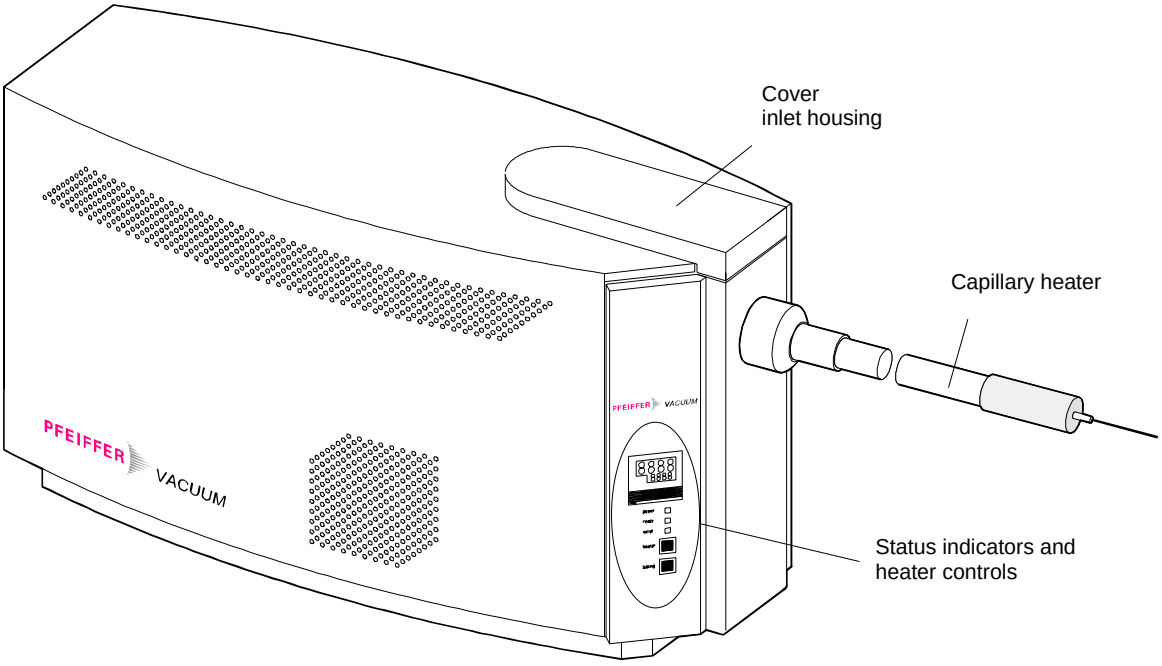
Result not as expected

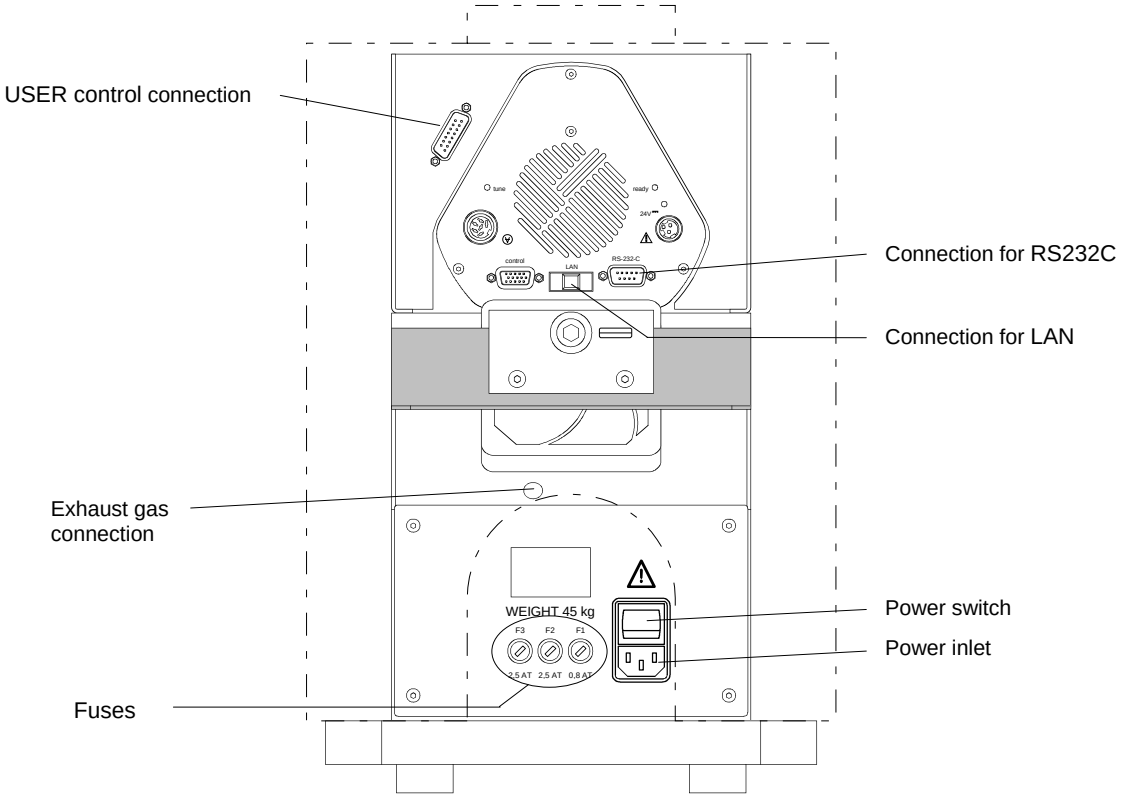
1.4 Responsibility and Warranty

Pfeiffer Vacuum accepts no responsibility nor warranty if the user or third parties

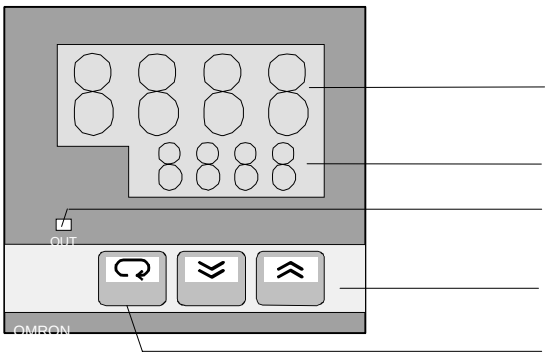
- disregard this document
- utilize the product not according to the defined use
- disregard the technical data
- make any kind of changes (modifications, alterations, etc.) to the product
- use the product with accessories not listed in the product documentation

2 Design


Cover
inlet housing
Capillary heater
Status indicators and
heater controls
PFEIFFER VACUUM


USER control connection
Connection for RS232C
Connection for LAN
Exhaust gas
connection
Power switch
Power inlet
Fuses
WEIGHT 45 kg
F3
F2
F1
2,5 AT
2,5 AT
0,8 AT

2.1 Status Indicators and Heater Controls



Actual temperature tube heater

Set point temperature tube heater

Status indicator

Keys for entering the set point

No function

power — Mains power o.k.

ready — Turbo speed >90 % — Internal overheating

valve — OmniStar™ Gas inlet valve open
ThermoStar™: Calibration unit open (if existing)

heater — Heating gas inlet and capillary heater

baking — Heating vacuum chamber

3 Installation

3.1 Unpacking the Unit

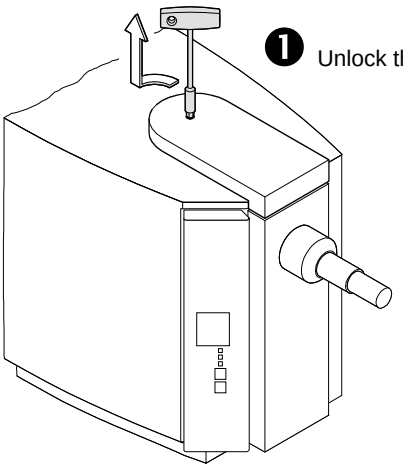
→ Information on packing.

3.2 Checking the Shock and Overturning Indicators

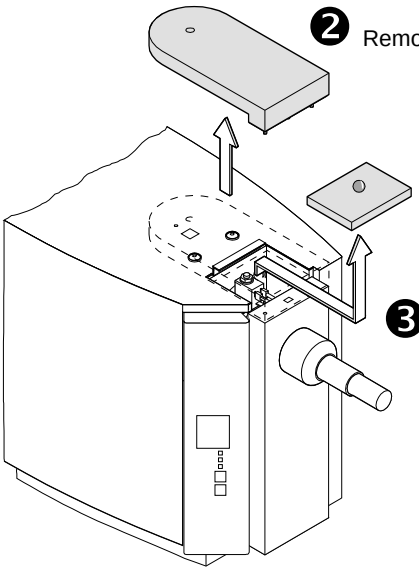
Required tools / material

- Supplied Allen wrench

Procedure

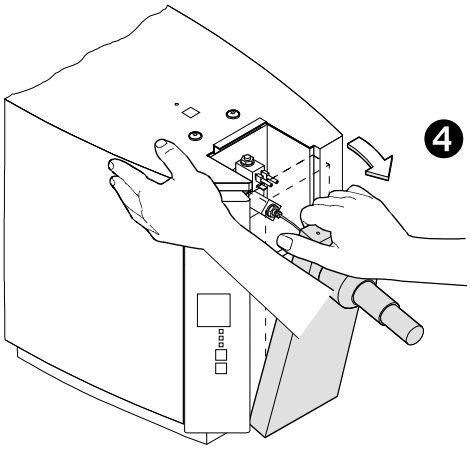


❶ Unlock the cover



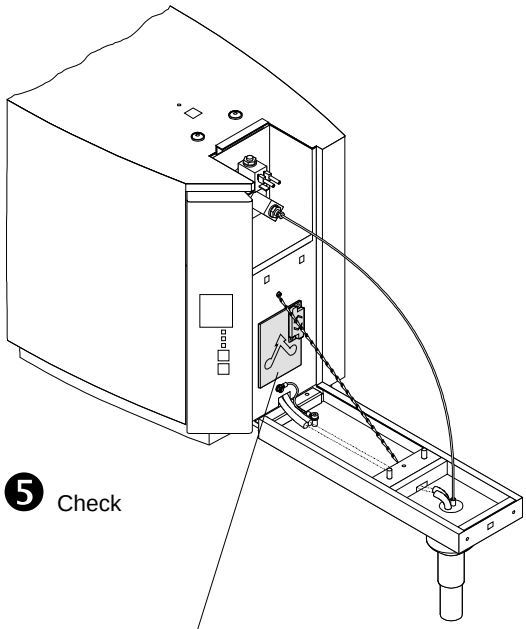
❷ Remove the cover

❸ Remove the insulation cover

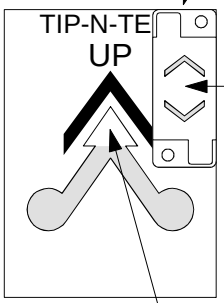


❹ Open the cover

⚠ Do not tear the capillary



❺ Check



Shock indicator

Both arrows have a red color.

One or both arrows have a blue color: The unit may possibly be damaged. Examine the unit for visible external damage and notify the forwarding company, if this is the case.

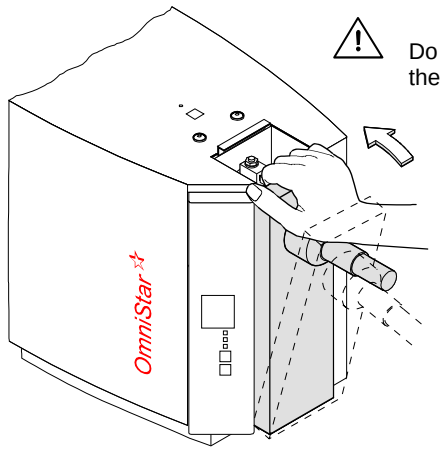
Overturning indicator

There is no blue sand in the tip of the arrow.

There is blue sand in the tip of the arrow: The unit may possibly be damaged. Examine the unit for visible external damage and notify the forwarding company, if this is the case.

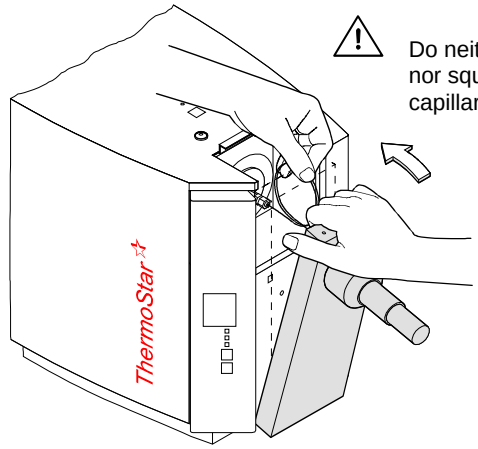
6 Carefully close and engage the hinged cover

OmniStar™:



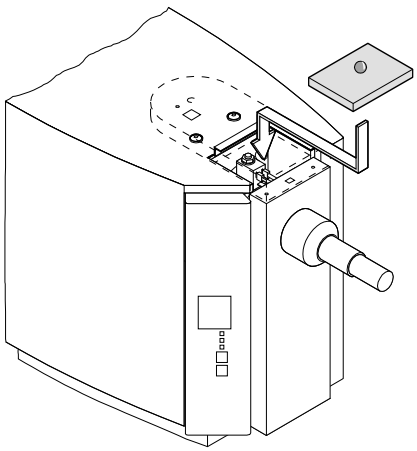
Do not buckle the capillary.

ThermoStar™:

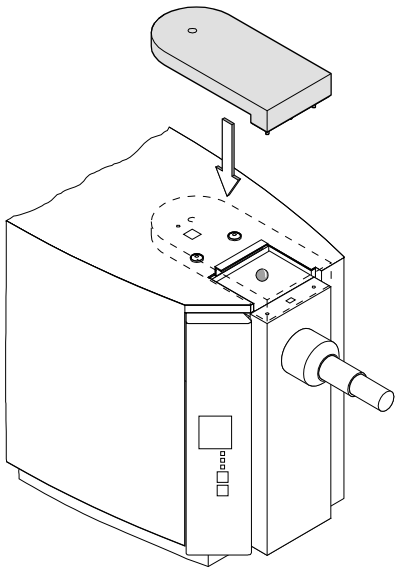


Do neither buckle nor squeeze the capillary.

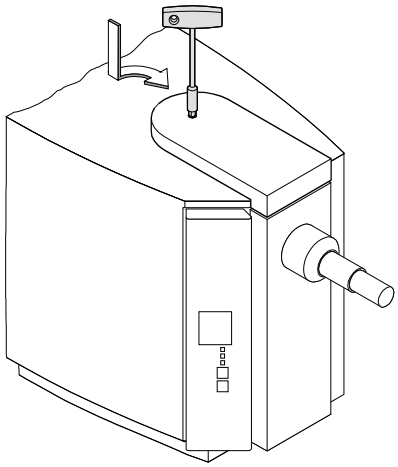
7 Mount the insulating cover



8 Mount the cover

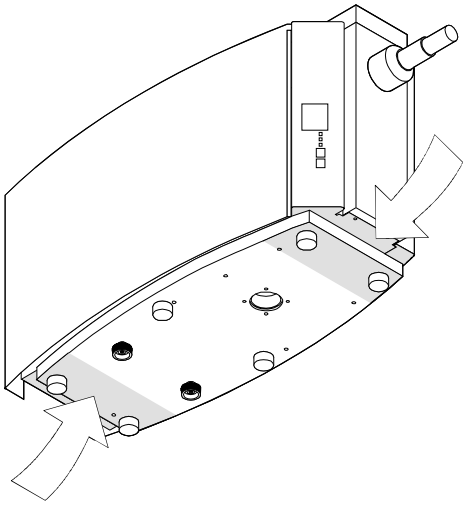


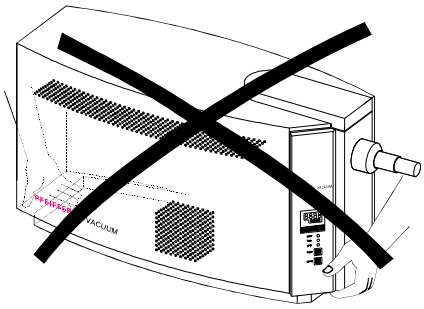
9 Lock the cover

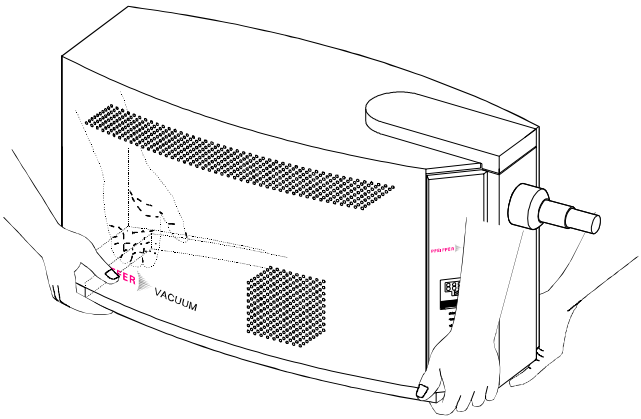


3.3 Carrying the Unit

The unit should be carried by two persons and held at the places marked by arrows.







3.4 Putting the Unit into Place

3.4.1 Preconditions

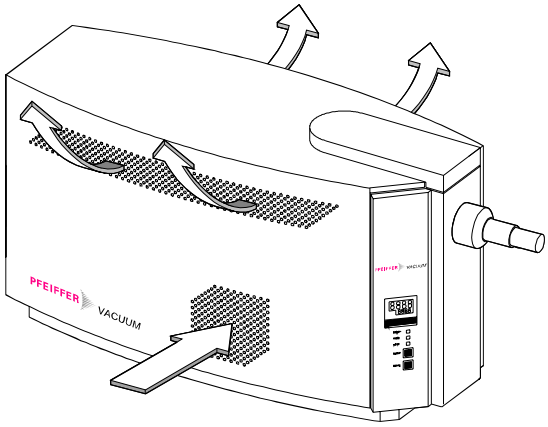
Space requirements

Width	≥ 300 mm
Depth	≥ 700 mm

Media

Mains power	(→ nameplate)	
Voltage	90 ... 127 V	187 ... 253 V
Frequency	50 ... 60 Hz	50 ... 60 Hz
Power	620 W	590 W
Exhaust line		
(for toxic or combustible gases)	→ 11	

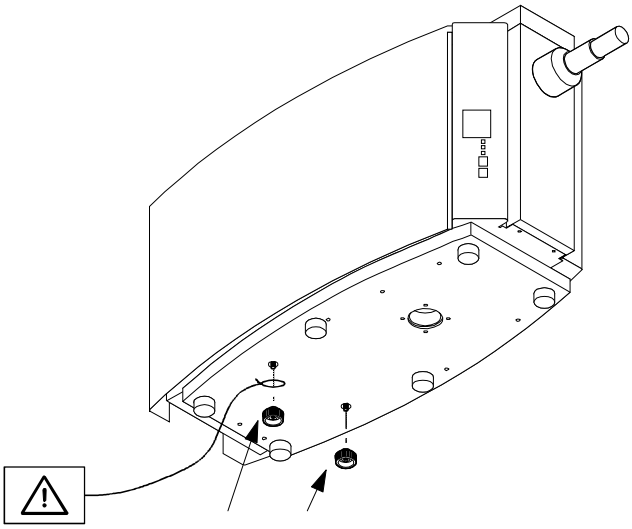
To prevent damage to the equipment, make sure that neither the air inlet nor outlet louvers are covered.



3.4.2 Transport Fixing Parts

Remove both knurled nuts on the bottom of the GSD 300 before starting operation.

Store the knurled nuts and remount them if the GSD 300 is to be transported again.

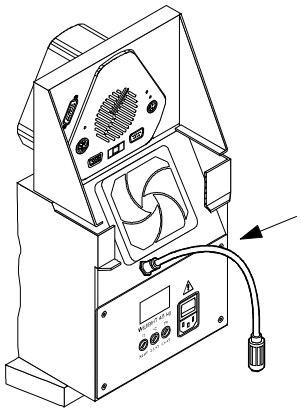


Transport fixing parts

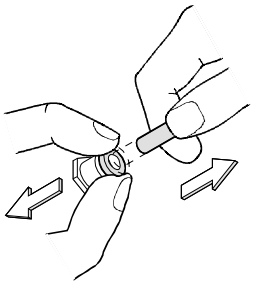
do not throw away

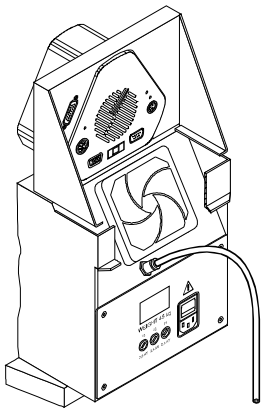
3.5 Connecting the Exhaust Gas Line

If you measure toxic or combustible gases with the GSD 300, the exhaust gas must be treated and disposed of in accordance with the applicable regulations.



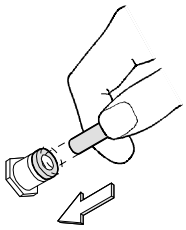
❶ Unfasten the short exhaust gas hose





to exhaust duct

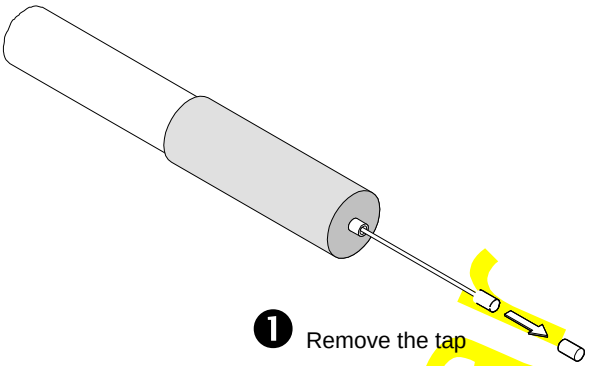
❷ Lead off the exhaust gases through a suitable tube (ø6/4)



3.6 Connecting the Capillary

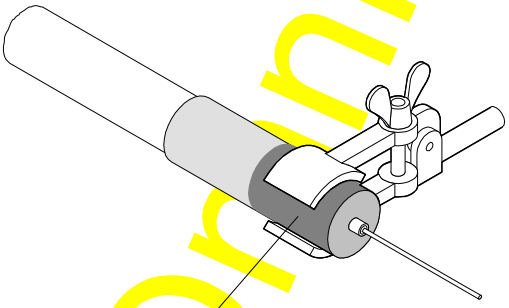
3.6.1 OmniStar™

⚠ Minimum bending radius 150 mm.
Do not additionally insulate or cover the heating tube.
Do not supply any additional heat (for example, heated flange).



❶ Remove the tap

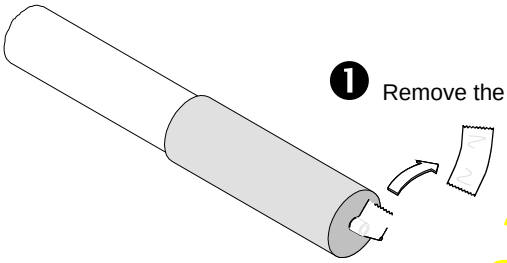
❷ Connect the capillary to your measurement point



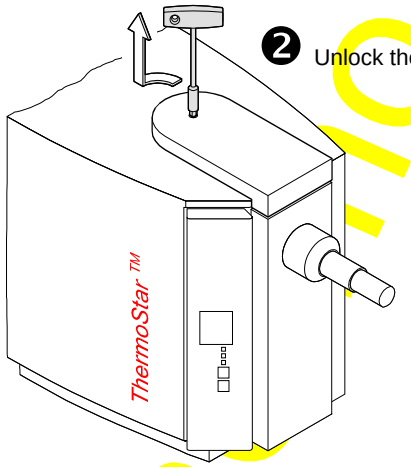
⚠ Firmly connect the front tip of the tube to the measurement equipment. Clamp only the part of the tube which contains a metal bush.

3.6.2 ThermoStar™

⚠ Minimum bending radius 150 mm.
Do not additionally insulate or cover the heating tube.
Do not supply any additional heat (for example, heated flange).



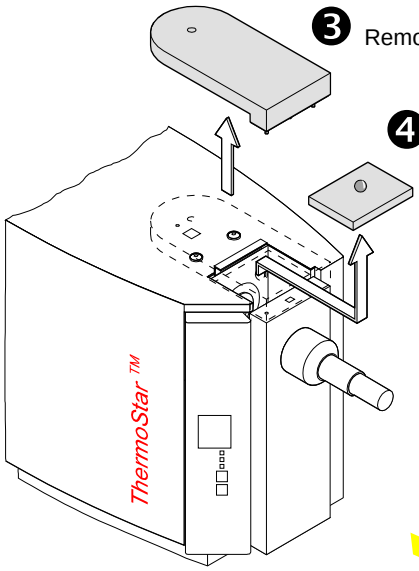
❶ Remove the adhesive tape



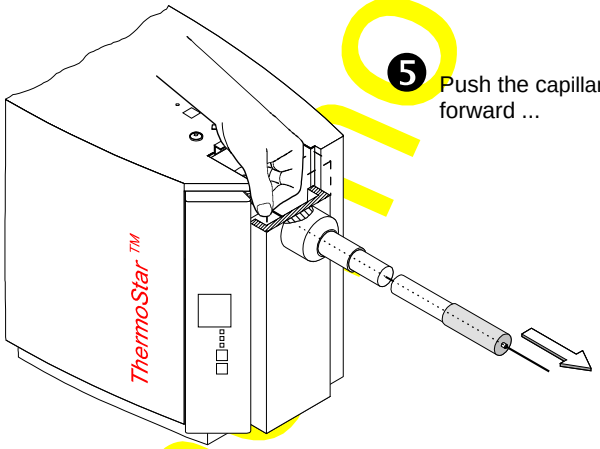
❷ Unlock the cover

❸ Remove the cover

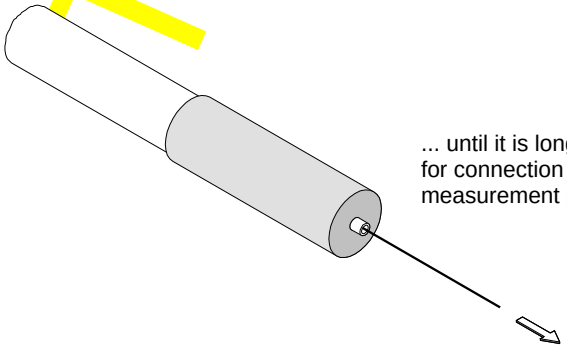
❹ Remove the insulation cover



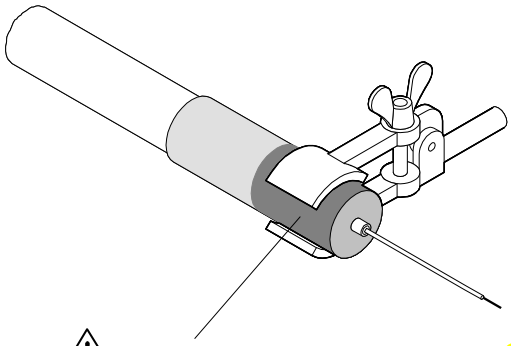
❺ Push the capillary forward ...



... until it is long enough for connection to your measurement point



❻ Connect the capillary to your measurement point



⚠ Do not expose the capillary to mechanical stress. Firmly connect the front tip of the tube to the measurement equipment. Clamp only the part of the tube which contains a metal bush.

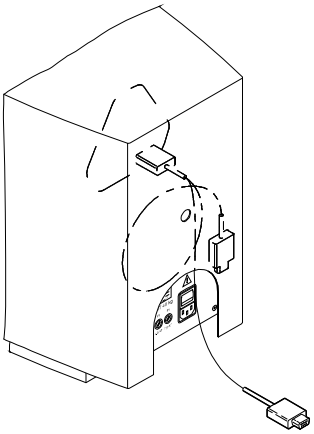
3.7 Connecting the Interface

The GSD 300 features three connectors for communication with customer supplied peripheral devices:

- RS232C interface (→ section 3.7.1)
- ArcNet LAN interface (→ section 3.7.2)
- User control connection (→ section 3.7.3)

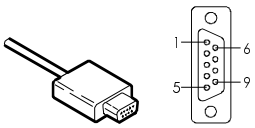
The RS232C interface cannot be used simultaneously with the ArcNet LAN interface.

3.7.1 Connecting the RS232C Interface



❶ Pull out the interface cable (a 3 m cable is installed)

❷ Connect the interface cable to the partner device



Pin	1	Request to send (RTS)
Pin	2	Transmitted data (TXD)
Pin	3	Received data (RXD)
Pin	4	Clear to send (CTS)
Pin	5	Signal ground (SGND)
Pin	6	Data terminal ready (DTR)
Pin	7	Not used
Pin	8	Data terminal ready (DTR)
Pin	9	Not used

3.7.2 Connecting the ArcNet Interface (LAN)

Installing the interface board into the PC: → 🕮 of interface.

Remove the equipment cover to gain access to the interface connector (→ section 3.7.4).

3.7.3 Connecting the Interface (USER control)

Pin assignment→ 🗎 25

Remove the equipment cover to gain access to the interface connector (→ section 3.7.4).

3.7.4 Removing the Cover

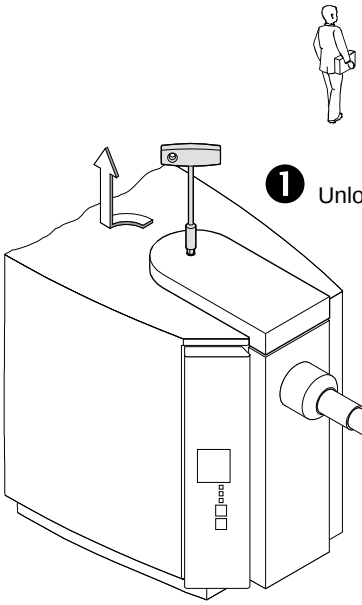
Preconditions

- Unit switched off
- Unit disconnected from the power source

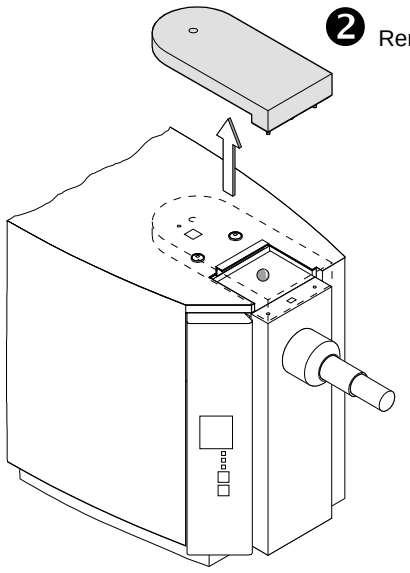
Required tools

- Supplied Allen wrench

Procedure

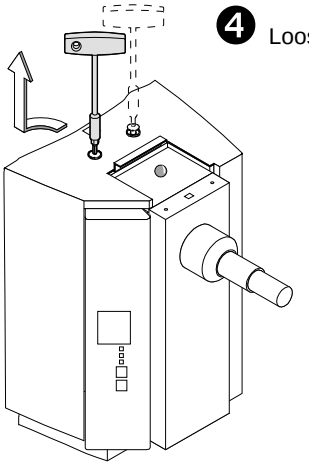


❶ Unlock the cover



❷ Remove the cover

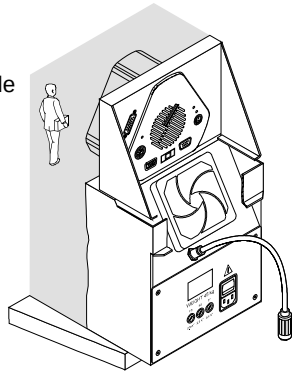
❸ ⚠ Allow the unit to cool off before you continue with the work



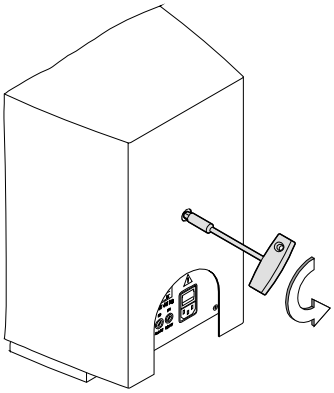
❹ Loosen the lockings

You now have access to the interface connections

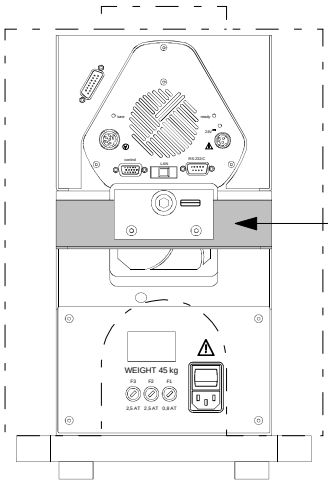
Interventions inside the equipment: only by maintenance or service specialists.



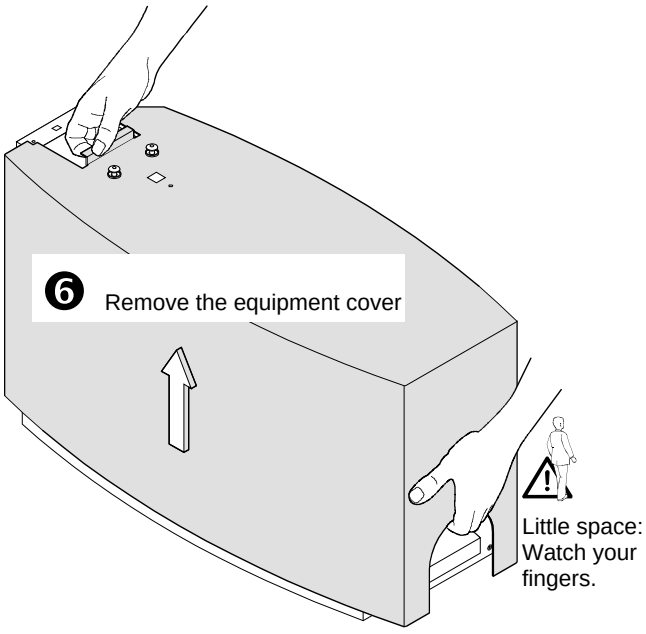
3.7.5 Mounting the Equipment Cover



❺ Loosen the locking

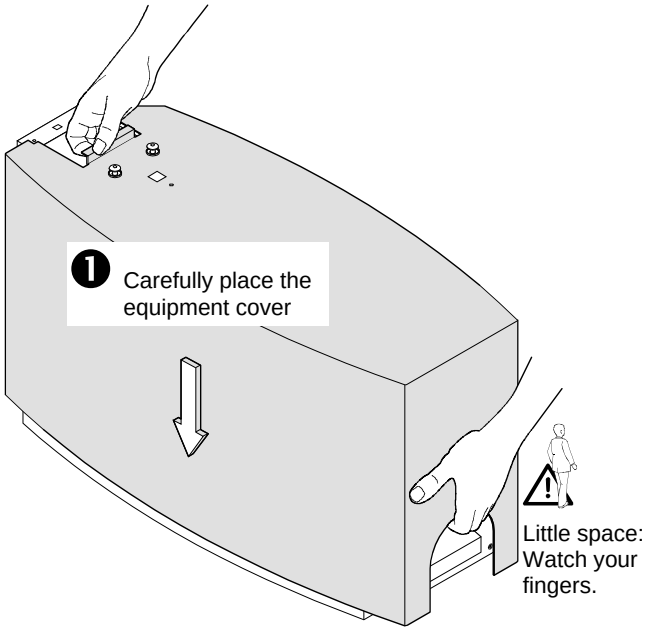


⚠ Lead cables behind this panel



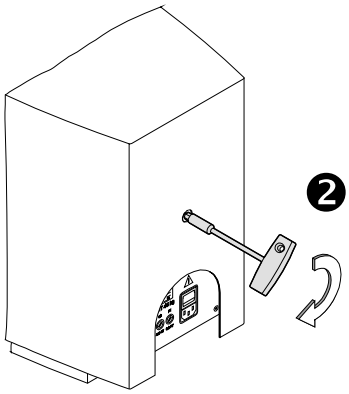
❻ Remove the equipment cover

⚠ Little space: Watch your fingers.

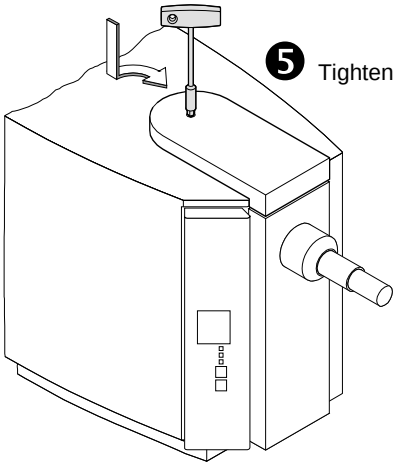


❶ Carefully place the equipment cover

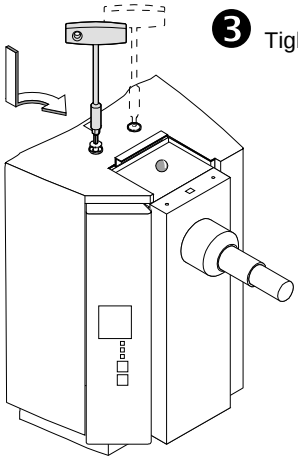
⚠ Little space: Watch your fingers.



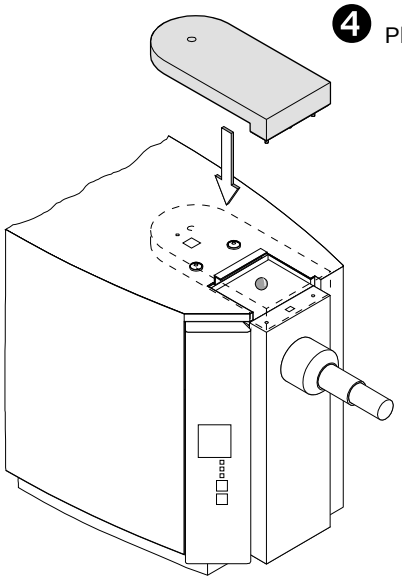
❷ Tighten the locking



❺ Tighten the locking



❸ Tighten the lockings

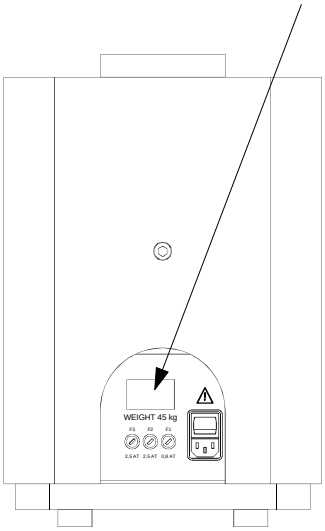


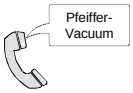
❹ Place the cover

3.8 Power Connection

❶ Turn off the power switch 

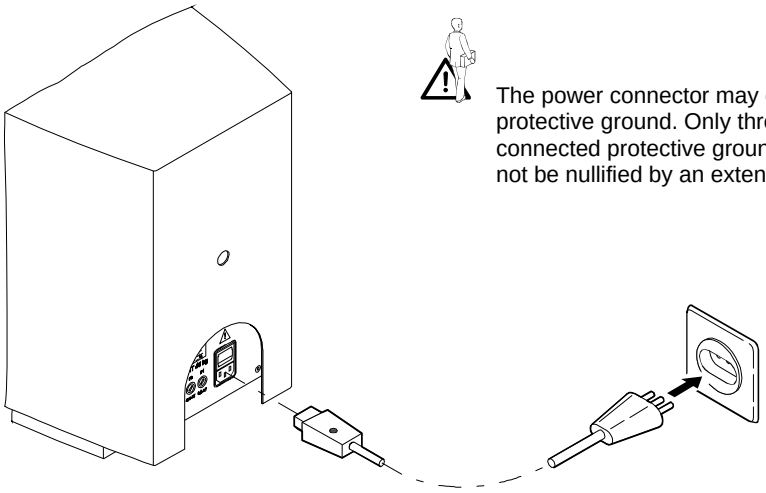
❷ Make sure that the ratings on the nameplate agree with the local line voltage.





If the values do not agree, please contact your Pfeiffer Vacuum partner

❸ Connect the unit



The power connector may only be plugged into a socket with a protective ground. Only three-pin mains cables with a correctly connected protective ground may be used. This protection must not be nullified by an extension cable without ground conductor.

4 Initial Start up

If for any reason you can assume that the unit is not safe to operate, shut it down and secure it so that it cannot be inadvertently turned on again.

You can assume that the unit is not safe to operate when:

- it has sustained visible damage
- it no longer functions
- it has been stored for a longer period under unfavorable conditions
- it has been subjected to severe transport stress

4.1 Switching on

Precondition

- Installation completed (→ 🗎 8 and subsequent)

Procedure

❶ Turn the mains switch on 

  **<power>**

❷  Wait until the turbo pump has attained 90% of the nominal speed

  **<ready>**

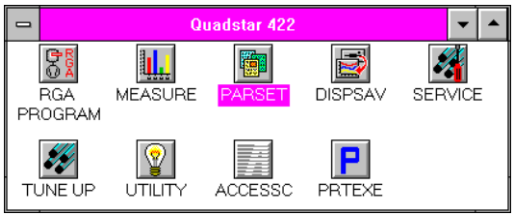
During operation avoid excessive shocks to the GSD 300. Do not transport the unit while the turbo pump is running.

4.2 Balzers Quadstar™ 422 Setup

The Balzers Quadstar™ 422 needs certain GSD 300 specific adaptations which are to be performed or checked after the installation. Therefore, carefully follow the instructions given below before performing any measurements.

Precondition

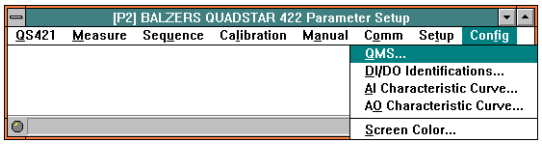
- Balzers Quadstar™ 422 installed (→ corresponding 🕮)



Procedure

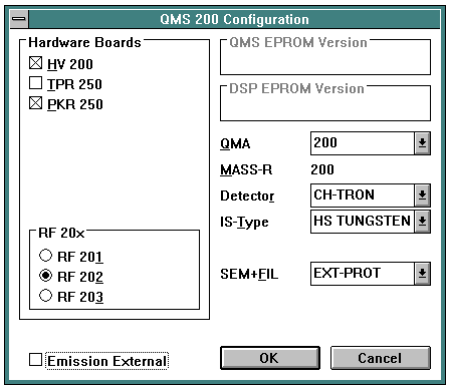
❶ Define the QMS configuration

- Start PARSET
- In the menu bar choose <Config>



- Choose <QMS>
- Accept the following configuration:

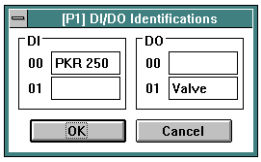
☞ Make sure that you set up the RF 20X in accordance with the mass range of your GSD 300



- Close this window with <OK>

❷ Define the labels for the digital inputs/outputs

- Start PARSET
- In the menu bar choose <Config>
- Choose <DI/DO Identifications>
- Define the following labels for DI00 and DO01:
-

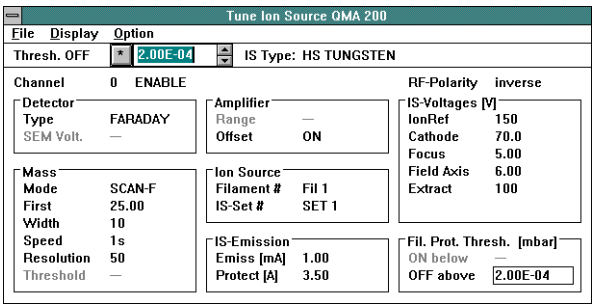


- Close the window with <OK>
- Quit the parameter setup program

❸ Define the switching threshold for SEM/Fil protection

The monitoring of the admissible maximum pressure for Filament and SEM is performed as a standard feature by the PKR 250 gauge. The maximum admissible pressure is defined in the TuneUp program. If the gauge needs to be switched off for special measurement functions, the maximum pressure is monitored via the turbo pump speed (fixed threshold at 90%) rather than via the total pressure.

- Start TUNE UP
- In the menu bar choose <Tune>
- Choose <Ion Source>, the <Tune Ion Source QMA 200> window is displayed
- Choose the <OFF above> parameter
- Enter the value <2.00E-4>



- Close the <Tune Ion Source QMA 200> window
- Answer the prompt whether or not the change is to be saved with <YES>
- Quit the <TuneUp> program

4.3 Optimizing the Ion Source Parameters OmniStar™

Optimize the ion source parameters in regular intervals, in particular during the first time operation and after all service work on the ion source.

The optimization procedure differs, depending on the existing configuration, measurement task, and available test gas.

- Optimizing with test gas air → section 4.3.1
- Optimizing with test gas argon → section 4.3.2

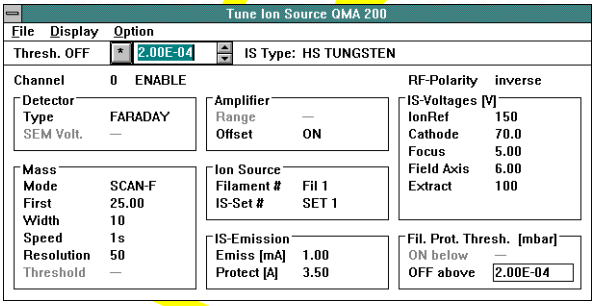
4.3.1 OmniStar™ with Test Gas Air

Optimize with air if no special test gas is available.

❶ Start the <TuneUp> program

- Open the inlet valve:
  - In the menu bar chose <Manual>
  - Choose <DI/DO...>
  - To activate double click **Valve**
  - Close window with <OK>
- In the menu bar choose <Tune>
- Choose <Ion Source>

❷ Adjust all parameters as shown in the picture below:



❸ Choose <Display/Measure Data > for displaying the peak groups of nitrogen and oxygen.

❹ Optimize:

- Test at which **RF Polarity** the better peak shapes are obtained and choose the corresponding polarity.
- Set **Field-Axis** in such a way that a useful resolution and peak shape are obtained.
- Alternatingly optimize **Extraction** and **Focus** to maximum peak height

❺ Quit:

- Close <Tune Ion Source QMA 200>
- Save the changes by confirming the prompt with <YES>
- Close <TuneUp>

4.3.2 OmniStar™ with Test Gas Argon

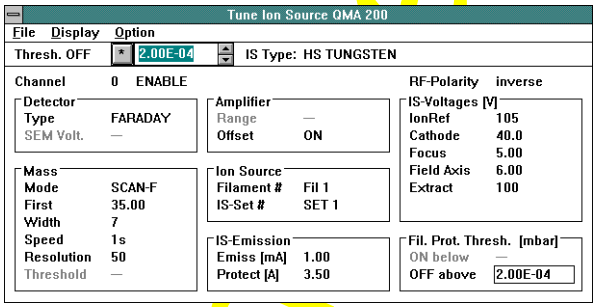
Optimize with the test gas argon if argon is subsequently to be analyzed. Setting of "Cathode" to 40 V prevents formation of Ar^{++} ions and allows detection of low H_2O concentrations on mass 18.

⚠ Make sure that argon is connected to the GSD 300 and that the feeder lines are thoroughly purged.

❶ Start the <TuneUp> program

- Open the inlet valve:
  - In the menu bar chose <Manual>
  - Choose <DI/DO...>
  - To activate double click **Valve**
  - Close window with <OK>
- In the menu bar choose <Tune>
- Choose <Ion Source>

❷ Adjust all parameters as shown in the picture below:



❸ Choose <Display/Measure Data > for displaying the peak groups of argon.

❹ Optimize:

- Test at which **RF Polarity** the better peak shapes are obtained and choose the corresponding polarity.
- Set **Field-Axis** in such a way that a useful resolution and peak shape are obtained.
- Alternatingly optimize **Extraction** and **Focus** to maximum peak height.

❺ Quit:

- Close <Tune Ion Source QMA 200>
- Save the changes by confirming the prompt with <YES>
- Close <TuneUp>

4.4 Optimizing the Ion Source Parameters ThermoStar™

Optimize the ion source parameters in regular intervals, in particular during the first time operation and after all service work on the ion source.

The optimization procedure differs, depending on the existing configuration and available test gas.

- Optimization with test gas air → section 4.4.1
- Optimization with calibration unit (PFTBA) → section 4.4.2
- Optimization with test gas argon → section 4.4.3

4.4.1 ThermoStar™ with Test Gas Air

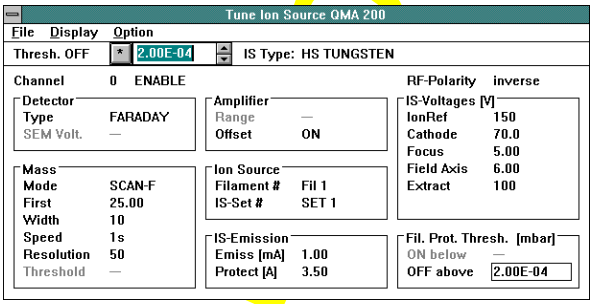
Optimize with air if no special test gas is available.

❶ Start <TuneUp>

❷ In the menu bar choose <Tune>

❸ Choose <Ion Source>

❹ Adjust all parameters as shown in the picture below



❺ Choose <Display/Measure Data > for displaying the peak groups of nitrogen and oxygen

❻ Optimize:

- Test at which **RF Polarity** the better peak shapes are obtained and choose the corresponding polarity.
- Set **Field-Axis** in such a way that a useful resolution and peak shape are obtained.
- Alternatingly optimize **Extraction** and **Focus** to maximum peak height.

❼ Quit:

- Close <Tune Ion Source QMA 200>
- Save the changes by confirming the prompt with <YES>
- Close <TuneUp>

4.4.2 ThermoStar™ with Calibration Unit (PFTBA)

The calibration substance PerFluorTriButylAmin yields mass peaks up to 614 amu. It is ideal for optimizing ion source settings in the high mass range.

❶ Start <TuneUp>

❷ Turn off SEM/Emission:

- In the menu bar choose <Setup>
- Choose <SEM/Emission Control> (or ctrl+c)
- Turn off SEM and Filament
- Close the window with <OK>

❸ Open the valve of the calibration unit:

- In the menu bar choose <Manual>
- Choose <DI/DO...>
- Double click **Valve** to activate it
- Close the window with <OK>

❹ Wait 10s (compensation of the pressure rise caused by opening the calibration unit)

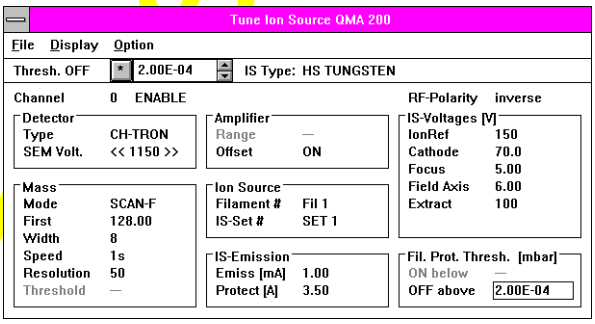
❺ Turn on SEM/Emission:

- In the menu bar choose <Setup> (or ctrl+c)
- Choose <SEM/Emission Control>
- Turn on SEM and Filament
- Close the window with <OK>

❻ In the menu bar choose <Tune>

❼ Choose <Ion Source>

❽ Adjust all parameters as shown in the picture below



❾ Choose <Display/Measure Data > for displaying the peak group around mass 129 amu

❿ Optimize:

- Test at which **RF Polarity** the better peak shapes are obtained and choose the corresponding polarity.
- Set **Field-Axis** in such a way that a useful resolution and peak shape are obtained.
- Alternatingly optimize **Extraction** and **Focus** to maximum peak height.

⓫ Quit:

- Close <Tune Ion Source QMA 200>
- Save the changes by confirming the prompt with <YES>
- Close <TuneUp>

⓬ Close the valve of the calibration unit:

- In the menu bar choose <Manual>
- Choose <DI/DO...>
- Double click **Valve** to deactivate it
- Close the window with <OK>

4.4.3 ThermoStar™ with Test Gas Argon

Optimize with the test gas argon if argon is subsequently to be analyzed. Setting of "Cathode" to 40 V prevents formation of Ar^{++} ions and allows detection of low H_2O concentrations on mass 18.

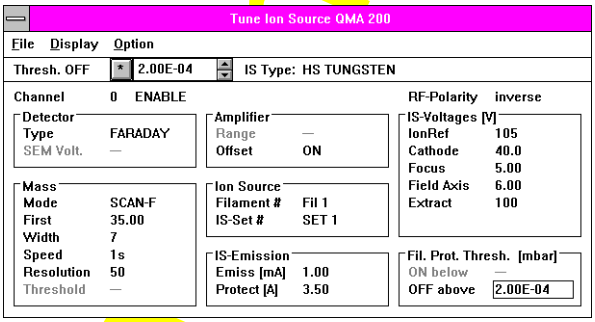
⚠ Make sure that argon is connected to the GSD 300 and that the feeder lines are thoroughly purged.

❶ Start <TuneUp>

❷ In the menu bar choose <Tune>

❸ Choose <Ion Source>

❹ Adjust all parameters as shown in the picture below



❺ Choose <Display/Measure Data > to display the peak groups of argon

❻ Optimize:

- Test at which **RF Polarity** the better peak shapes are obtained and choose the corresponding polarity.
- Set **Field-Axis** in such a way that a useful resolution and peak shape are obtained.
- Alternatingly optimize **Extraction** and **Focus** to maximum peak height.

❼ Quit:

- Close <Tune Ion Source QMA 200>
- Save the changes by confirming the prompt with <YES>
- Close <TuneUp>

5 Operation

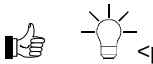
5.1 Switching on

Precondition

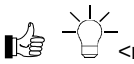
- Initial start up procedure completed (→ 🗎 18 subsequent)
- Balzers Quadstar™ 422 ready for operation

Procedure

❶ Turn on the mains switch 

 <**power**>

❷  Wait until the turbo pump has attained 90% of the nominal speed

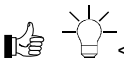
 <**ready**>

⚠ Avoid excessive shocks during operation and up to 15 minutes after power off.

❸ Establish communication with Balzers Quadstar™ 422

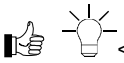
❹ **OmniStar™:**

The valves are controlled by the software.

 <**valve**>

ThermoStar™:

Valve (option) is opened only for calibration.

 <**valve**>

❺ Adjust the heater, gas inlet and hose or vacuum chamber (→ section 5.2).

5.2 Operating the Heater

5.2.1 Tube Heater

❶  <**heater**> (Turn on the tube heater)

 <**heater**>

The actual temperature and the set point temperature are displayed.

Red display: Actual temperature

Green display: Set point temperature

❷ Enter the temperature set point value with the  and  keys (value range 0 ... 200° C).

 <**OUT**> Actual temperature < set point temperature (Heater operates with full power)

 <**OUT**> Actual temperature ≈ set point temperature (Temperature is stabilized)

5.2.2 Inlet Housing Heater

The gas inlet heater is electrically connected in parallel with the hose heater. The temperature of the gas inlet approximately follows the temperature of the heating hose.

5.2.3 Vacuum Chamber Heater

The vacuum chamber is heated for conditioning the analysis chamber.

⚠ During an analysis, the vacuum chamber heater must be switched off. In particular the secondary electron multiplier may not be in operation while the vacuum chamber heater is on.

 <**baking**> (Turn on the vacuum chamber heater)

 <**baking**>

5.3 Interaction with Software

→ section 4.2.

5.4 Switching off

Procedure

❶ Terminate Balzers Quadstar™

❷ Turn off the mains switch 

Turbo pump run out time ≈ 10 min

5.5 Preparation for Transport

Preconditions

- Unit switched off (→ 🗎 24)
- Turbo pump has run out to standstill (≈ 10 min)

Procedure

- Place the transport fixing parts (→ 🗎 11)
- Carefully pack the unit (use the original packing material)

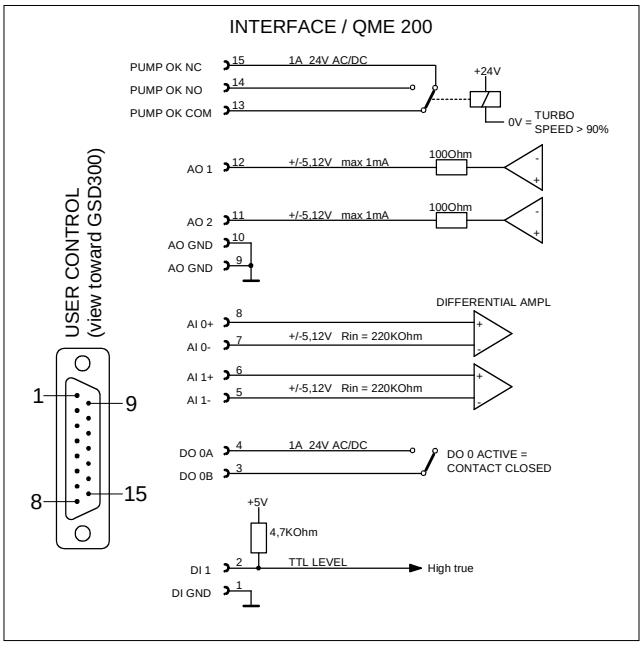
6 Technical Data

Admissible temperatures	
Storage	5 ... 45 °C
Operation	12 ... 35 °C
Relative humidity	Max. 80% at temperatures up to +31°C decreasing to 50% at +40°C
Application	Indoors only height up to 2000 m
Gas flow rate	1 ... 2 sccm
Materials on the vacuum side	
Capillary	
OmniStar™	Stainless steel
ThermoStar™	Quartz
Gas inlet	Stainless steel, FPM
Orifice	Platinum
Vacuum chamber	Stainless steel
Analyzer	Stainless steel, copper, silver, gold, quartz glass, ceramics
Turbo pump	Aluminum, stainless steel, epoxy, lubricant
Tubing	Polyurethane, nickel-plated brass
Diaphragm pump	Aluminum, nickel-plated brass, neoprene
Ready for operation after	10 minutes
Time interval between switching off and restarting	> 10 s
Run out time of the turbo pump after power off	≈ 10 minutes
Display	
Temperature	Set point and actual value
Status	power, ready, valve

Power connection	(→ Nameplate)	
Voltage	90 ... 127 V	187 ... 253 V
Frequency	50 ... 60 Hz	50 ... 60 Hz
Power consumption	620 W	590 W
Fuses		
F1	0.8 AT, 250 V, ø5×20 mm	
F2, F3	2.5 AT, 250 V, ø5×20 mm	

Type of protection	IP 21 (Protection against foreign objects > ø12 mm Protection against water with harmful effect where vertical drops occur)
Noise level	<50 dB in full operation
Safety, noise immunity, interference suppression	→ Declaration of conformity 🗎 39

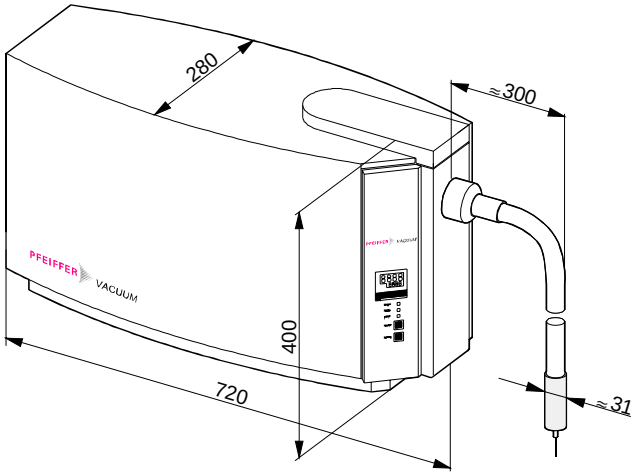
Interfaces	1× RS232C 1×ArcNet LAN 1× USER control



☞ For range ± 10,24 V at analog inputs:
insert 110 kΩ, 1% in series to each line

Other connections	→ 🕮 Prisma™ QMS 200 BG 803 201 BE / C

Dimensions



Weight 45 kg
Box 1120 × 620 × 640 mm (l × w × h)

6.1 Technical Data of the Components

→ 🕮 of the corresponding components

7 Maintenance and Care

Pfeiffer Vacuum offers maintenance courses for this product. Through examples and more detailed documentation these courses enable the user to keep the equipment in proper working condition.

For additional information, please contact the nearest Pfeiffer Vacuum service center.

7.1 Cleaning

Turn the unit off and remove the mains cable before doing any of the work described below.

For cleaning the outside of the unit, a slightly humid cloth will usually do. Do not use under any circumstances an aggressive or scouring cleaning agent. No water must get into the unit! Before putting the unit into operation again, allow it to dry thoroughly.

8 Troubleshooting

If the gas flow of the units is restricted or completely blocked, check for the following causes:

- Capillary clogged → 🗎 27 and 🗎 29
- Orifice clogged → 🗎 34

If the fault is more severe, please contact the nearest Pfeiffer Vacuum Service Center.

8.1 Shortening the Capillary

If the capillary tends to clog, it may be advisable to shorten it.

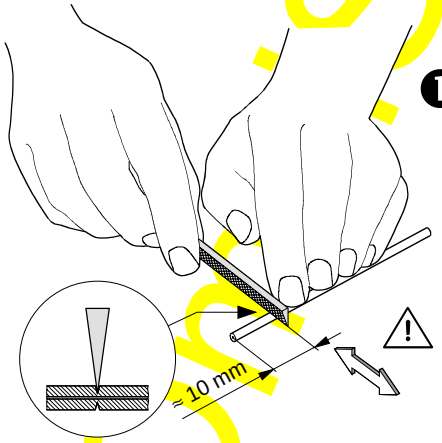
8.1.1 OmniStar™

Preconditions

- Unit switched off
- Capillary detached from measurement point
- Length of capillary still adequate after it has been shortened

Required tools

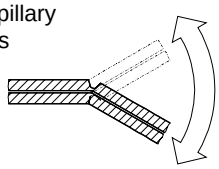
- Tube cutter (recommended → 🗎 36) or knife file



❶ Make two opposing small indentations

⚠ Max. depth of indentations 0.5 mm

❷ Bend the capillary until it breaks



⚠ Do not finish the point of break (capillary gets clogged)

❸ Turn on the unit and wait 10 min (turbo pump acceleration time)

❹ Check the pressure in the analysis chamber as follows:

- Start Balzers Quadstar™ 422 <Service>
- In the <Measure> menu choose <Total pressure>
- The total pressure of the analysis chamber is displayed

👍 Displayed pressure >4×10^{-6} mbar

👎 Displayed pressure <4×10^{-6} mbar

Possible causes:

- Capillary clogged at the end
  ⇒ Shorten the capillary by additional 10 mm
- Orifice clogged
  ⇒ Replace orifice (→ 🗎 34)
- Capillary clogged across the entire length
  ⇒ Replace capillary (→ 🗎 29)

❺ Connect the capillary to the measurement point

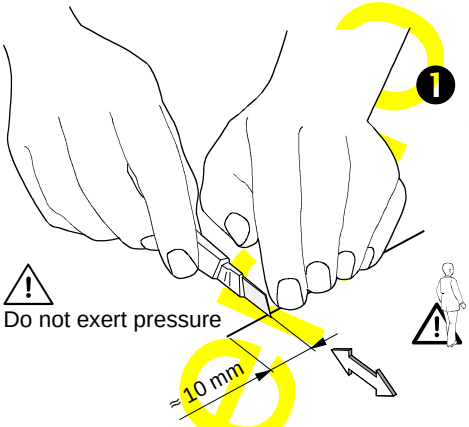
8.1.2 ThermoStar™

Preconditions

- Unit switched off
- Capillary detached from the measurement point
- Length of capillary still adequate after it has been shortened

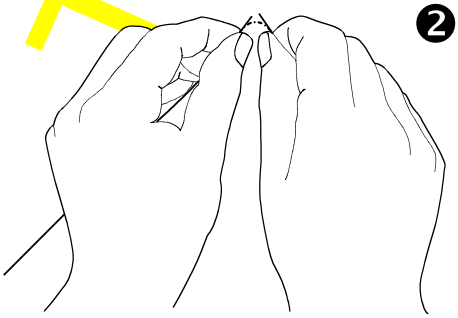
Required tools

- Capillary cutting tool (recommended → 🗎 36) or cutting blade



❶ Carefully notch the capillary

Quartz capillaries may splinter. Wear protective glasses.



❷ Break the capillary at the point notched previously

❸ Turn on the unit and wait 10 min (turbo pump acceleration time)

❹ Check the pressure in the analysis chamber as follows:

- Start Balzers Quadstar™ 422 <Service>
- In the <Measure> menu choose <Total pressure>
- The total pressure of the analysis chamber is displayed

Displayed pressure >4×10^{-6} mbar

Displayed pressure <4×10^{-6} mbar

Possible causes:

- Capillary clogged at the end
  ⇒ Shorten the capillary by additional 10 mm
- Orifice clogged
  ⇒ Replace the orifice (→ 🗎 34)
- Capillary clogged across the entire length
  ⇒ Replace the capillary (→ 🗎 29)

❺ Connect the capillary to the measurement point

8.2 Replacing the Capillary

8.2.1 OmniStar™

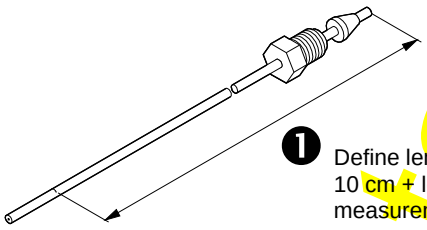
Preconditions

- Unit switched off

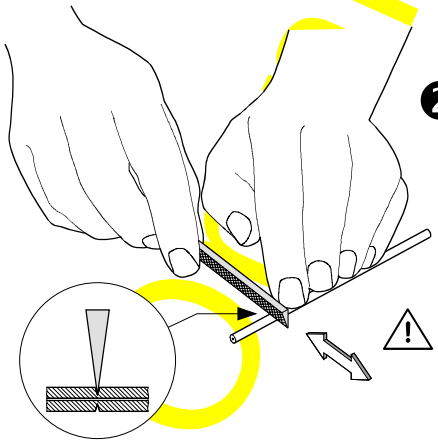
Required tools / material

- Tube cutter (recommended → 🗎 36) or knife file
- Wrench ¼" (6.5 mm)
- Supplied Allen wrench
- Steel capillary, new ferrule, possibly nut (→ 🗎 36)

Preparing the new capillary



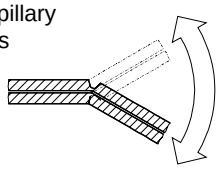
❶ Define length (tube length + 10 cm + length required for measurement point)



❷ Make two opposing small indentations

⚠ Max. depth of indentations 0.5 mm.

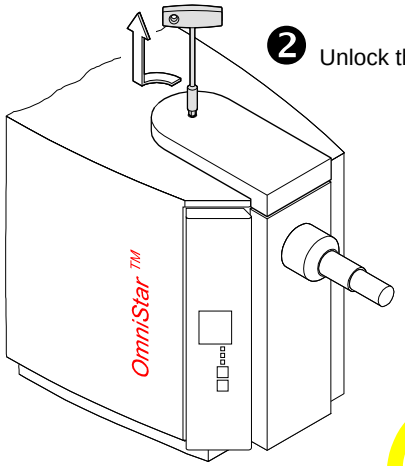
❸ Bend the capillary until it breaks



⚠ Do not finish the point of break (capillary gets clogged)

Removing the old capillary

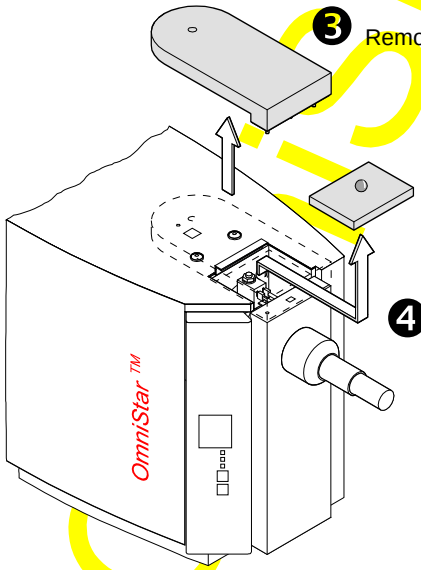
❶ Detach the capillary at the measuring point



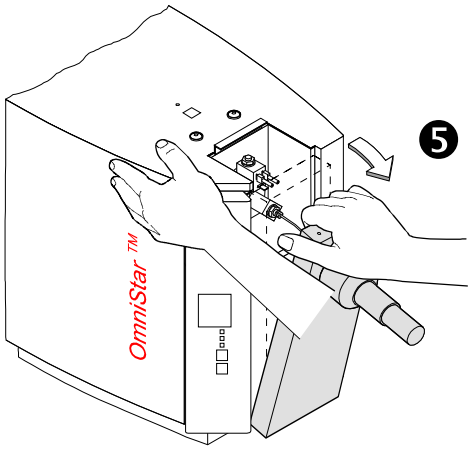
❷ Unlock the cover

❸ Remove the cover

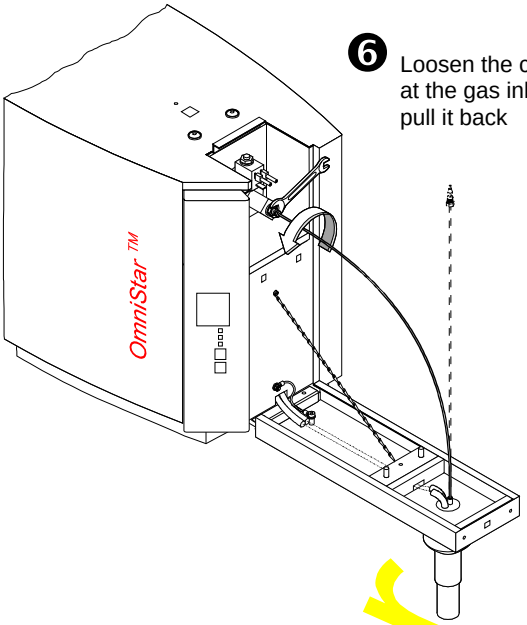
⚠ Hot surface. First allow the gas inlet to cool off.



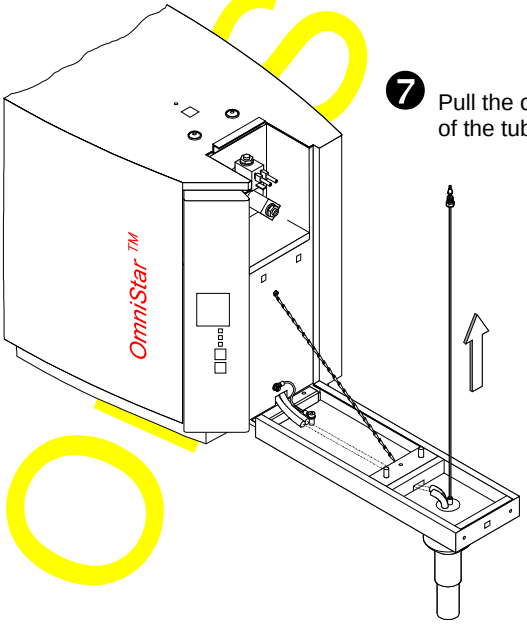
❹ Remove the insulation cover



❺ Open the cover



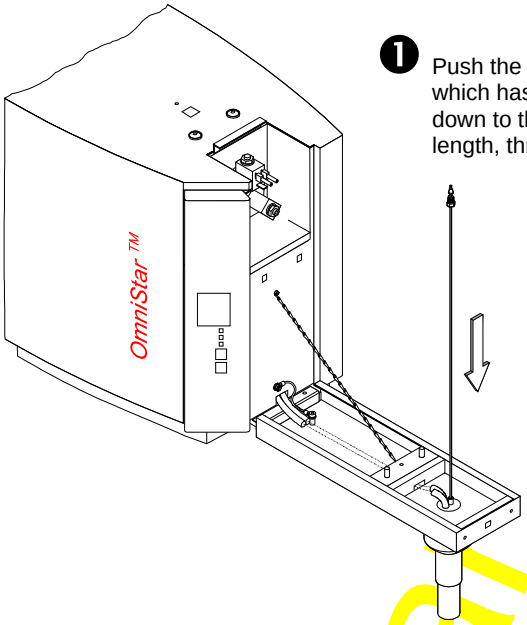
6 Loosen the capillary at the gas inlet and pull it back



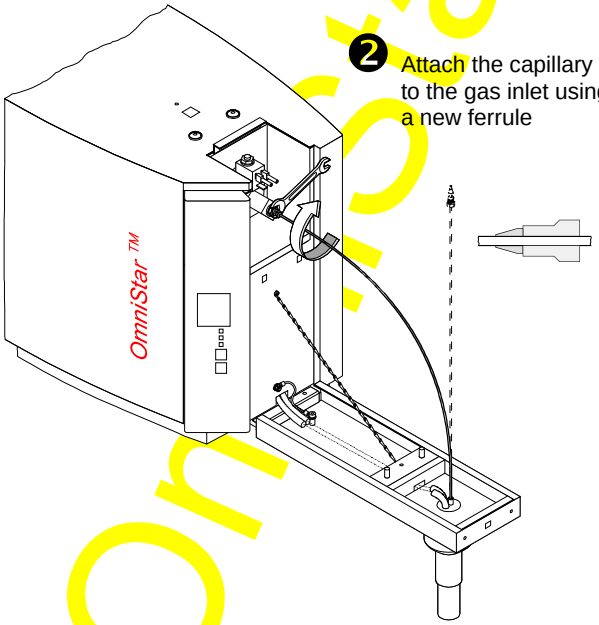
7 Pull the capillary out of the tube

8 Remove the nut (reuse it if in good shape)

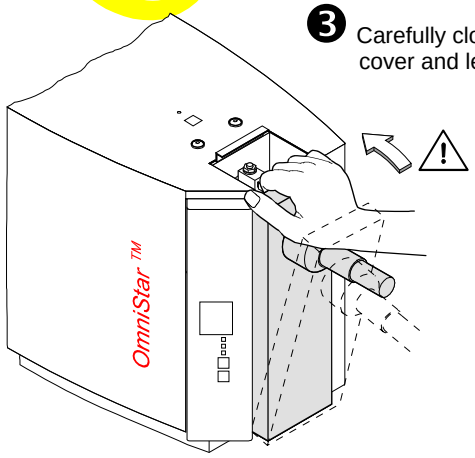
Installing the new capillary



1 Push the capillary, which has been broken down to the correct length, through the tube



2 Attach the capillary to the gas inlet using a new ferrule



3 Carefully close the hinged cover and let it catch

Do not buckle the capillary.

4 Connect the capillary to the measurement point

8.2.2 ThermoStar™

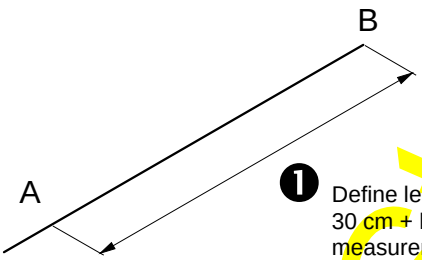
Preconditions

- Unit switched off
- Capillary detached from the measurement point

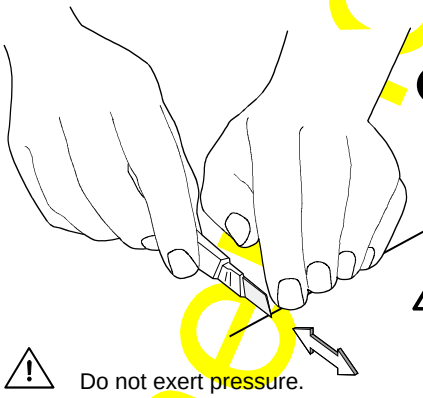
Required tools / material

- Capillary cutting tool (recommended → 🗎 36) or cutting blade
- Wrench 1/4" (6.5 mm)
- Supplied Allen wrench
- Quartz capillary, ferrule, possibly coupling (→ 🗎 36)

Preparing the new capillary



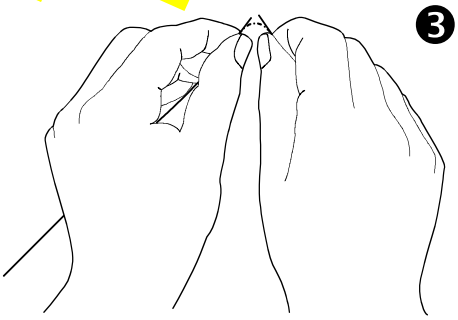
❶ Define length (tube length + 30 cm + length required for measurement point, e.g. thermobalance)



❷ Carefully notch the capillary at A

Quartz capillaries may splinter. Wear protective glasses.

Do not exert pressure.

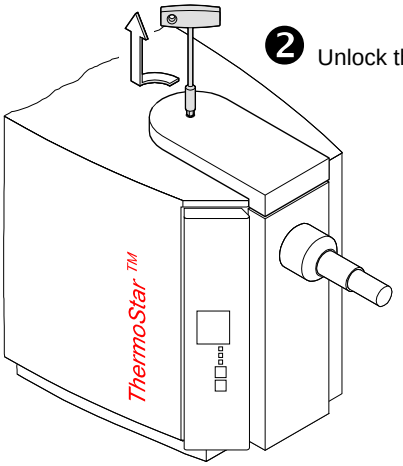


❸ Break the capillary at the point notched previously

Note the position of the end A, which is clean now.

Removing the old capillary

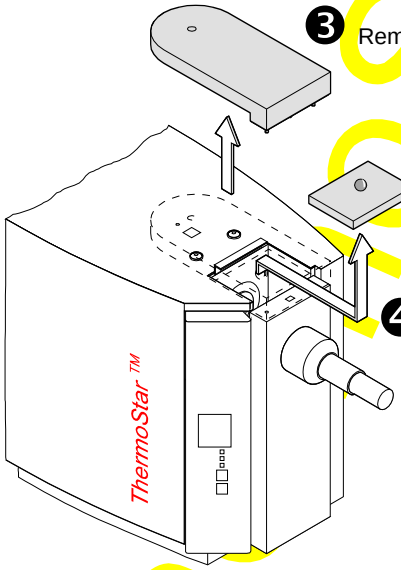
❶ Detach capillary at the measurement point



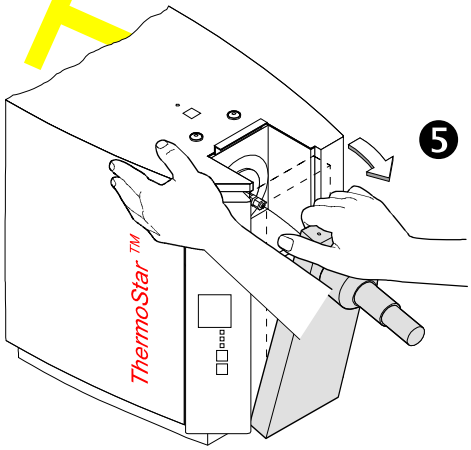
❷ Unlock the cover

❸ Remove the cover

Hot surface. First allow the gas inlet to cool off.



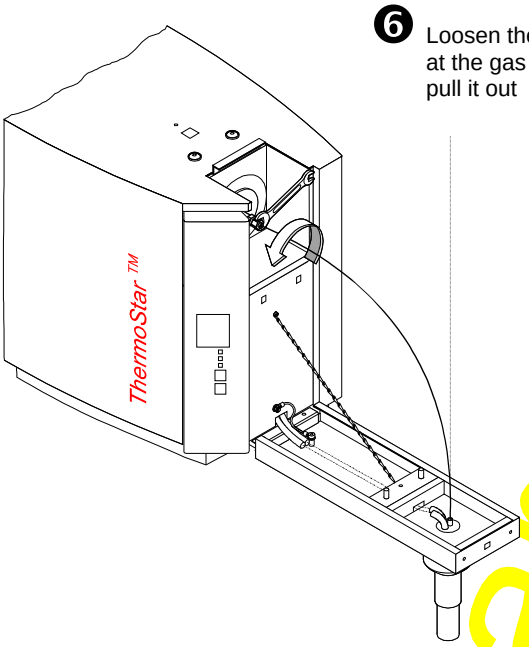
❹ Remove the insulation cover



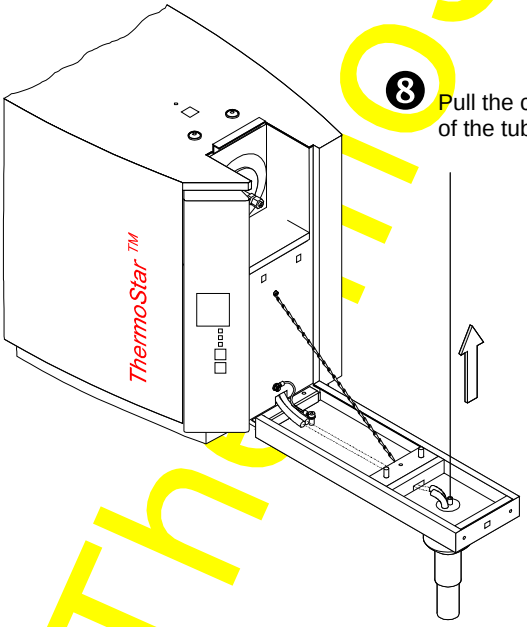
❺ Open the cover

Do not tear the capillary.

❻ Loosen the capillary at the gas inlet and pull it out



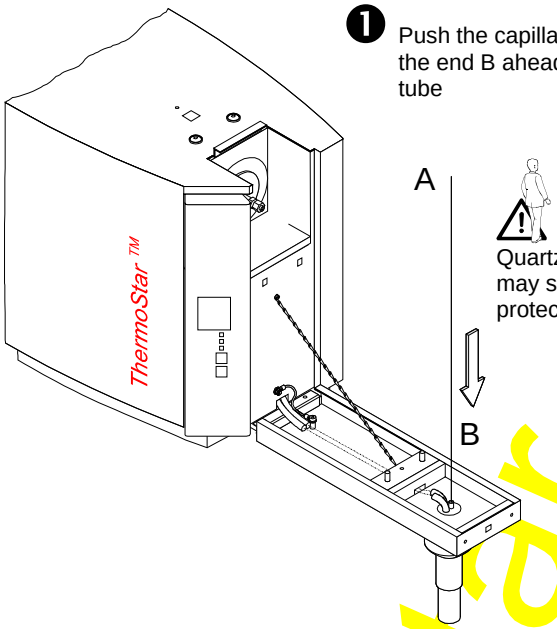
❼ Remove coupling and ferrule



❽ Pull the capillary out of the tube

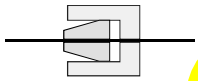
Installing the new capillary

❶ Push the capillary, with the end B ahead, into the tube

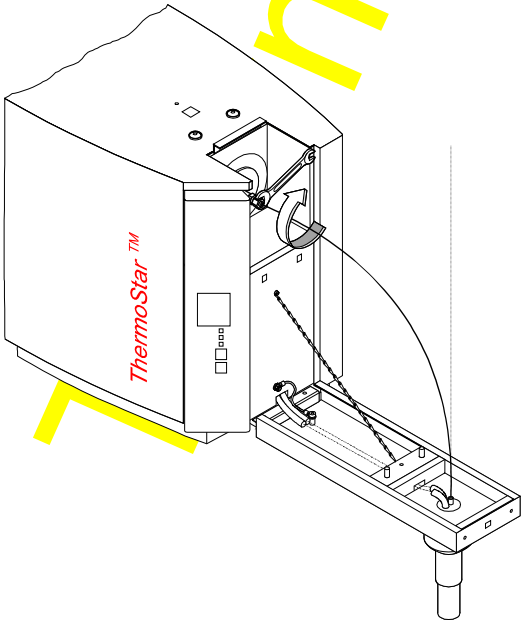


Quartz capillaries may splinter. Wear protective glasses.

❷ Slide the coupling and a new ferrule on the capillary

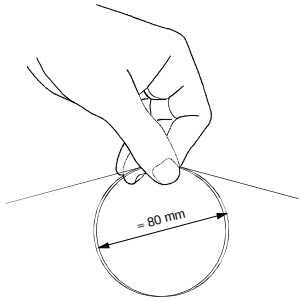


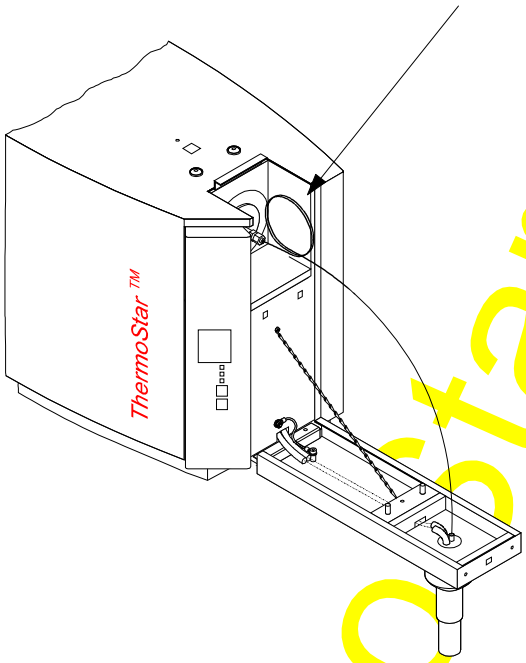
❸ Connect and tighten by hand



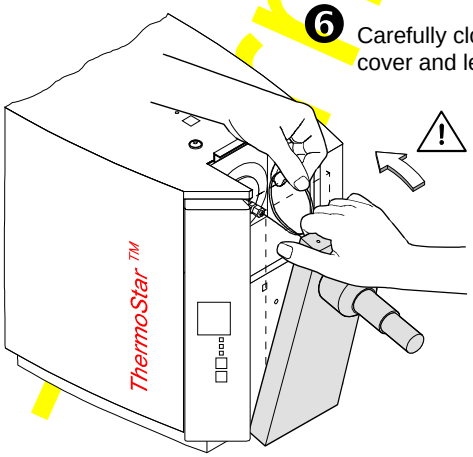
❹ Push the capillary into the gas inlet until the mechanical stop is reached, pull it back ≈ 2 mm. Tighten until the capillary can not be moved any more, tighten ½ turn more.

❺ Loosely loop the capillary once or twice (as reserve for the event of clogging)





❻ Carefully close the hinged cover and let it catch



Do neither buckle nor squeeze the capillary.

❼ Shorten the capillary again (→ 🗎 27)

❽ Connect the capillary to the measurement point

8.3 Replacing the Orifice

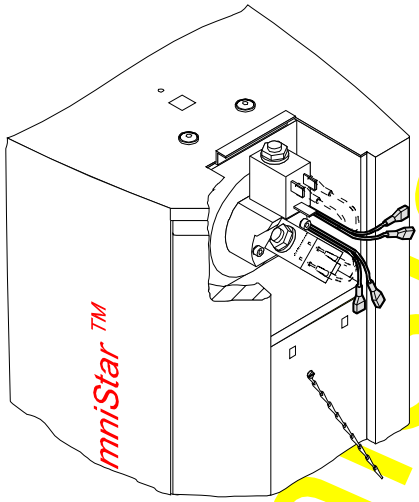
8.3.1 OmniStar™

Preconditions

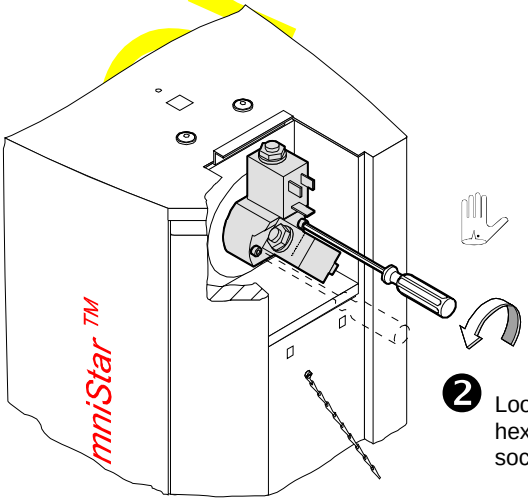
- Unit switched off
- Capillary removed (→ 🗎 29)

Required tools / material

- Allen wrench 2.5 mm
- Screwdriver No. 1
- Orifice (→ 🗎 36)

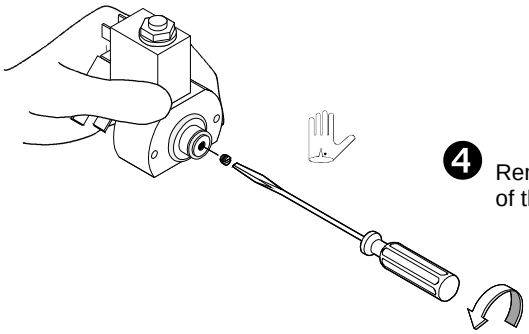


❶ Disconnect the cables from valves V1 and V2

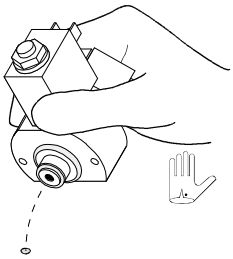


❷ Loosen the two hexagonal socket screws

❸ Remove the gas inlet

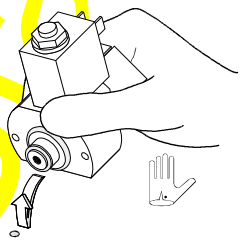


❹ Remove the screw of the orifice



❺ The orifice drops out

If the orifice is stuck, carefully knock the gas inlet against a soft surface until the orifice drops out.



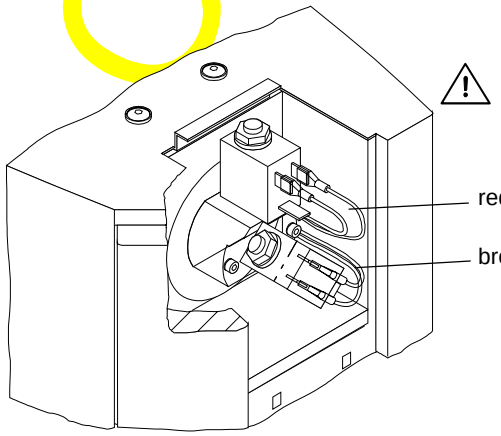
❻ Insert the new orifice

❼ Screw in the orifice screw and firmly tighten it

❽ Insert the gas inlet

❾ Tighten the two hexagon socket screws

❿ Connect the cables to valves V1 and V2



⚠ Do not mix up the cables.

⓫ Connect the capillary (→ 🗎 30)

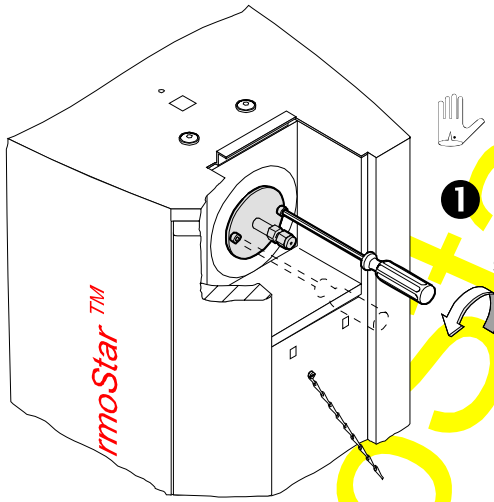
8.3.2 ThermoStar™

Preconditions

- Unit switched off
- Capillary removed (→ 🗎 31)

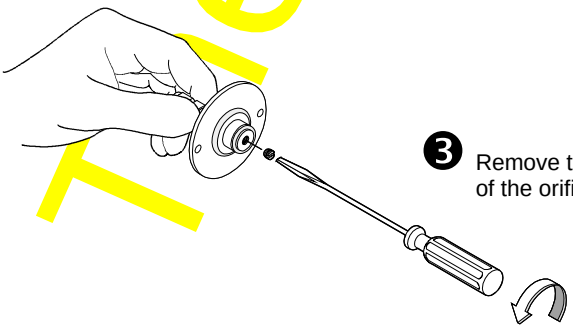
Required tools / material

- Allen wrench 2.5 mm
- Screwdriver No. 1
- Orifice (→ 🗎 36)

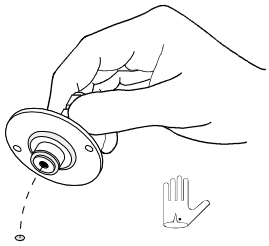


❶ Loosen the two hexagon socket screws

❷ Remove the gas inlet

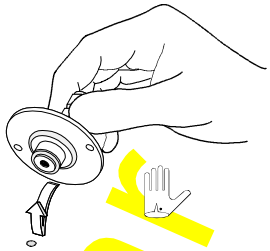


❸ Remove the screw of the orifice



❹ The orifice drops out

If the orifice is stuck, carefully knock the gas inlet against a soft surface until the orifice drops out.



❺ Insert the new orifice

❻ Fasten the orifice screw and firmly tighten it

❼ Insert the gas inlet

❽ Tighten the two hexagon socket screws

❾ Connect the capillary (→ 🗎 31)

ThermoStar

8.4 Replacing the fuses

If a fuse has blown, there is usually a fault inside the unit, too. Call the in-house service department or contact your nearest Pfeiffer Vacuum Service Center.

9 Accessories

Description		Ordering number	
			Available from:
1/16" tube cutter	TT-6	082780	SGE International Pty Ltd, Scientific Glass Engineering 7 Argent Place, Ringwood Vic 3134, Australia or one of their national distributors
Capillary cutting tool	CTT	0625010	
(or comparable products of other manufacturers)			

10 Spare Parts

When ordering spare parts, always mention:

- all information on the nameplate
- description and ordering number to spare parts list

	Description			Ordering number
	Filament assembly[1)]			
	Tungsten			BN 846 281 -T
	Iridium yttriated			BN 846 395 -T
ThermoStar™	Gas inlet consumables set, consisting of:			BN 846 294 -T
	Quartz capillary	ø 0.23 mm / 0.15 mm	5 m	
	Ferrule	ø 1/16" / 0.3 mm	10	
	Coupling		1	
	O-ring FPM	ø 18.77 mm × 1.78 mm	1	
	O-ring FPM	ø 9.25 mm × 1.78 mm	1	
	Orifice	ø 0.02 mm	1	
	Press screw		1	
OmniStar™	Gas inlet consumables set, consisting of:			BN 846 295 -T
	Stainless steel capillary	ø 1/16" / 0.15 mm	5 m	
	Ferrule	ø 1/16"	4	
	O-ring	ø 12.42 mm × 1.78 mm	2	
	O-ring	ø 18.77 mm × 1.78 mm	1	
	O-ring	ø 9.25 mm × 1.78 mm	1	
	Orifice	ø 0.02 mm	1	
	Press screw		1	
	Plunger FPM		2	
	Nut	ø 1/16"	1	

[1)] For replacing → 🕮 Operating manual Prisma™

11 Decommissioning

DANGER

Caution: contaminated parts

Contaminated parts can be detrimental to health.

Before you begin to work, find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

WARNING

Caution: substances detrimental to the environment

Products, operating materials etc. may require disposal in accordance with special regulations.

Dispose of such products in accordance with the relevant local regulations.

Separating the components

After disassembling the product, separate its components according to the following criteria:

Components with exposure to process gases

Components which have been exposed to radioactive, toxic, caustic, or microbiological process gases must be disposed of in accordance with the relevant national regulations

Components which have been exposed to other process gases must be separated according to their materials and recycled.

Components without exposure to process gases

Such components must be separated according to their materials and recycled.

Declaration of Contamination

The repair and/or service of vacuum equipment and components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.
This declaration can only be completed and signed by authorised and qualified staff.

❶ Description of product

Type _____
Article No. _____
Serial No. _____

❷ Reason for return

_____
_____
_____

❸ Operating fluid(s) used

_____
_____

❹ Process related comtamination of product:

toxic	no ❑	yes ❑
corrosive	no ❑	yes ❑
biological hazard	no ❑	yes ❑ *)
explosive	no ❑	yes ❑ *)
radioactive	no ❑	yes ❑ *)
other harmful substances	no ❑	yes ❑

*) Products thus contaminated will not be accepted without written evidence of decontamination!

❺ Harmful substances, gases and/or by-products

Please list all substances, gases and by-products which may have come into contact with the product:

Trade/Product name Manufacturer	Chemical name (or symbol)	Dangerous material class	Measures if spillage	First aid in case of human contact

❻ Legally binding declaration:

I hereby declare that the information supplied on this form is complete and accurate. The dispatch of the contaminated product will be in accordance with the appropriate regulations covering packaging, transportation and labelling of dangerous substances.

Name of organisation or company _____

Address _____ Post code _____

Phone _____ Telex _____

E-Mail _____

Name _____

Date and legally binding signature _____

Company stamp

Copies: Original to manufacturer or representative - 1 copy attach to consignment packaging - 1 copy for file of sender

Declaration of Conformity

Product

GSD 300 O
GSD 300 T

Gas analysis system

OmniStar™
ThermoStar™

EU Declaration of Conformity as defined by the listed Guidelines

We herewith declare that the products listed above comply with the provisions of the listed Guidelines.

Guidelines, harmonized standards, national standards in languages and specifications which have been applied:

73/23/EEC .....

EN 292-1 .....

EN 292-2 .....

EN 61010-1 .....

EN 50081-1 .....

EN 50082-2 .....

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Signature

Asslar, 1.4.1999

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