

Operating Instructions

TMH 260 C/ TMU 260 C
TMH 520 C/ TMU 520 C

*Turbomolecular Drag Pumps For
Corrosive Gas Processes*



TMH/U 260 C



TMH/U 520 C



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1. Safety Precautions

- ☞ Read and follow all the instructions in this manual.
- ☞ Inform yourself regarding:
 - Hazards which can be caused by the pump;
 - Hazards which can arise in your system;
 - Hazards which can be caused by the medium being pumped.
- ☞ Avoid exposing any part of your body to vacuum.
- ☞ Comply with all safety and accident prevention regulations.
- ☞ Check regularly that all safety requirements are being complied with.
- ☞ Do not operate the pump with open high vacuum flange.
- ☞ Do not carry out any unauthorised conversions or modifications on the pump.
- ☞ When returning the pump to us please note the shipping instructions.
- ☞ Use at least four bracket screws to connect the high vacuum flange.
- ☞ Fix down the pump in accordance with the instructions on installation.
- ☞ Do not disconnect the pump cable during operations.
- ☞ When the pump is open, disconnect the electronic drive unit from the mains.
- ☞ After switching off the pump, disconnect the electronic drive unit only once the rotor is at rest.
- ☞ When working on the pump, only open the high vacuum flange once the rotor is at rest.
- ☞ When using sealing gas, limit the pressure in the hose connection to 2 bar via the overflow valve.
- ☞ When using sealing gas, the pressure in the hose connection should be limited to 2 bar via the overpressure valve.
- ☞ If a heater is in use temperatures of up to 120 °C can be present in the area of the high vacuum flange. Take care to avoid burns !
- ☞ During operations, temperatures of up to 65 °C can arise in the lower part of the turbopump. Take care to avoid burns!
- ☞ Keep leads and cables well away from hot surfaces (> 70 °C).

Modifications reserved.

1.1. For Your Orientation

In the text

➔ Operating instruction: Here, you have to do something.

Symbols used

The following symbols are used throughout in the illustrations:

- Ⓜ High vacuum flange
- Ⓥ Fore-vacuum flange
- ⓕ Venting connection
- ❄ Cooling water connection
- ⓐ Sealing gas connection
- Ⓛ Power connection

Position numbers

Identical pump and accessory parts have the same position numbers in all illustrations.

1.2. Pictogram Definitions



Danger of burns from touching hot parts.



Danger of an electric shock.



Danger of personal injury.



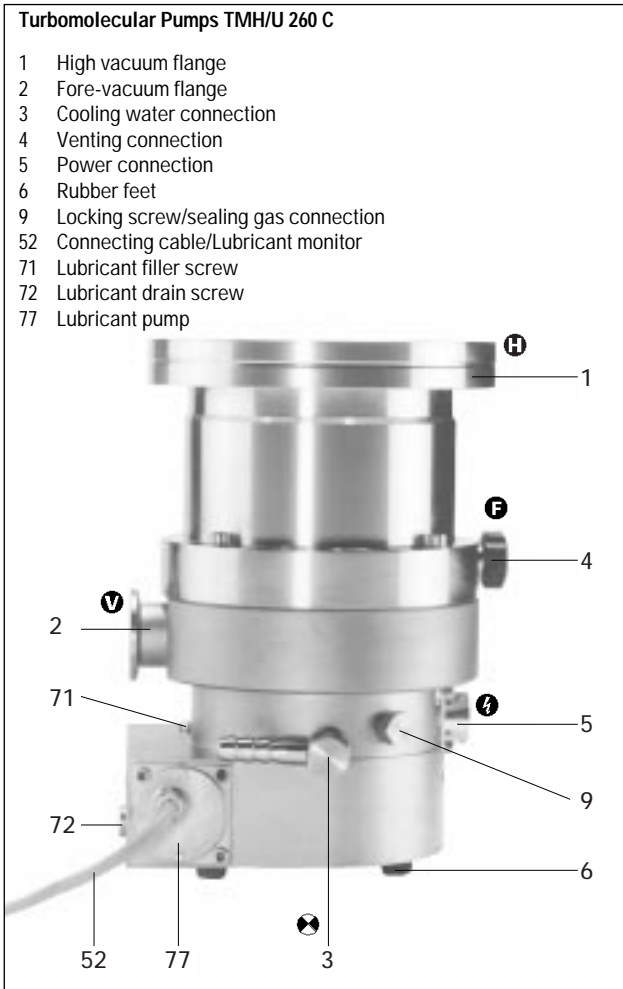
Danger of damage to the pump or system.



Danger of injury from moving parts.

2. Understanding The Pumps

2.1. Main Features



All parts exposed to the media are either manufactured in, or coated with, corrosion-proof materials. Sealing gas can be connected to protect rotor bearing and lubricant (see Section 3.7.).

Cooling

Standard: Water cooling
 Integrated excess temperature safety feature: Electronic drive unit reduces rotor rotation speed to zero.

Bearings

High vacuum side: Wear free, coated permanent magnetic bearing.
 Fore-vacuum side: Oil circulatory lubricated bearings with ceramic balls



Pumps must **not** be transported when containing lubricant. When being fitted into or dosmantled from a system, turbopumps may only be positioned as shown in Section 3.2.

Other positions can cause the pumps to be contaminated with lubricant.

Proper use

- Turbomolecular Pumps may only be used for the purpose of generating vacuum.
- The Turbomolecular Pumps are designed to pump corrosive gases and vapours. Where corrosive gas processes are involved, gas bonding and particels which can damage the surfaces of the pump can be produced. The motor and bearing compartments have to be protected with sealing gas.
- The turbopumps may only be used to pump those media against which they are chemically resistant. For other media the operator is required to qualify the pumps for the processes involved.
- If the process produces dust, the maintenance intervals must be specified accordingly and sealing gas must be used.
- Turbomolecular Pumps may only be operated with a PFEIFFER Electronic Drive Units and relevant cables.
- The turbo pump must be connected to a backing pump as per Section 3.3.

Improper use

Certain types of use are regarded as improper, e.g.

- Pumping explosive gases.
- Operating the pump where explosive processes are involved.
- The pumping of gases and vapours which attack the materials of the pumps.
- The pumping of corrosive gases without sealing gas.
- The pumping of condensating vapours.
- Operations involving impermissibly high levels of gas loads.
- Operations with impermissibly high fore-vacuum pressure.
- Operations with improper gas modes.
- Operations involving too high levels of heat radiation power (see Section 8. "Technical Data").
- Using accessories not named in this manual and/or not authorised by PFEIFFER.

Improper use will cause any rights regarding liability and guarantees to be forfeited.

2.2. Differences Between The Pump Types

Feature	TMH 260 C	TMU 260 C
HV flange	ISO-K	CF-F
Seal	Viton	Metal
Attainable final pressure	< 1 · 10 ⁻⁸ mbar (without baking out)	< 1 · 10 ⁻⁹ mbar (with baking out)
	TMH 520 C	TMU 520 C
HV flange	ISO-K	CF-F
Seal	Viton	Metal
Attainabler final pressure	< 1 · 10 ⁻⁸ mbar (without baking out)	< 5 · 10 ⁻¹¹ mbar (with baking out)

3. Installation

3.1. Preparations For Installation



Do not carry out any unauthorised conversions or modifications on the pump.

- The maximum permissible rotor temperature of the pump is 90 °C. If the vacuum chamber or parts in the vacuum chamber are heated, the values stated in the technical data relating to the level of heat which may be radiated into the pump must not be exceeded. If necessary, suitable shielding must be fitted in the vacuum chamber before the turbopump (constructional suggestions available on request).
- Only remove blank flanges on the high and fore-vacuum side just before connecting.
- Appropriate shielding must be provided (available on request) if magnetic fields >5.5 mT (TMH/U 260 C) and >5.0 mT (TMH/U 520 C) are involved.
- If pumps are to be baked out, the heating jacket and the body of the pump must be insulated (in case of contact).
- The turbo pumps must be filled with lubricant before first start-up (see Section 4.1.).
- In the event of a sudden standstill of the rotor, torques of up to 720 Nm (TMH/TMU 260 C) and up to 2550 Nm (TMH/TMU 520 C) can arise and these must be taken up by the turbopump and frame. Pumps must be anchored as follows:
 - ISO flange with 4 bracket screws, or
 - CF flange with the complete set of M8 screws, or
 - underside of the pump with 4 screws M5, screws quality 8.8.

3.2. Assembling The Pump, Connecting The High Vacuum Side

Important:

Maintain the utmost cleanliness when fitting all high vacuum parts. Unclean components prolong the pumping time.

Use of the splinter shield

A splinter shield in the high vacuum flange protects the pump against foreign particles emanating from the vacuum chamber but it does reduce the volume flow rate of the pump by approx. 15%.

For fitting please refer to "Fitting The Splinter Shield".

The high vacuum side can be flanged onto the vacuum chamber either directly or via a bellows or a vibration compensator (see "Accessories").

Connecting via bellows

If the high vacuum side is to be flanged via a bellows, the turbopump must be secured for example via the holes on the underside of the turbopump (please see dimensions). The fastening must be able to withstand the torque referred to in Section 3.1.

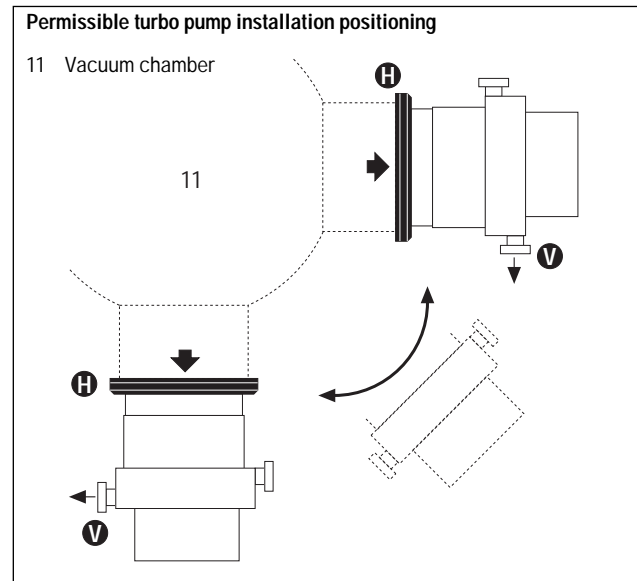
Connecting via a vibration compensator



The maximum permissible temperature at the vibration compensator is 100 °C.

Where a vibration compensator is in use, a freely suspended turbopump can be flanged onto the vacuum chamber. Additional fastening is unnecessary.

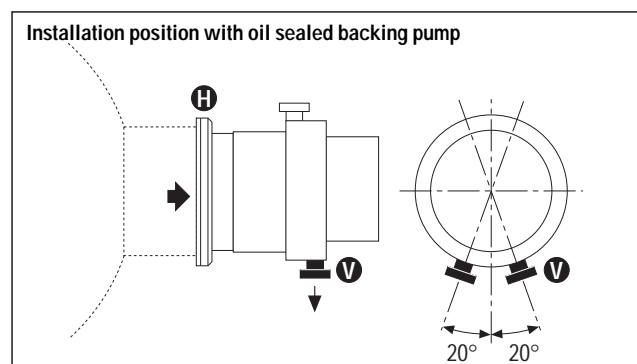
Direct flanging



Maximum high vacuum flange axial loading capacity:
 TMH/U 260 C max. 500 N (corresponds to 50 kg).
 TMH/U 520 C max. 1000 N (corresponds to 100 kg).

No asymmetrical loading on the high vacuum flange.

In horizontal installation, the turbopump fore-vacuum flange must point vertically downwards (deviation max. ±20%) otherwise contamination is possible and the lubricant pump may not function properly.



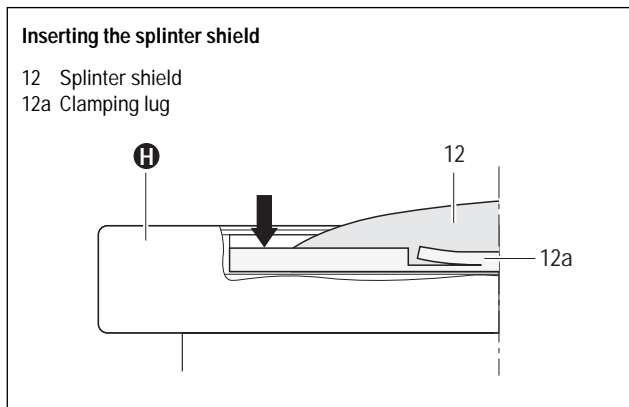
No forces must be transmitted from the pipe system to a pump which is anchored. Support or suspend all pipes to the pump.

Fitting The Splinter Shield

High vacuum flange DN 100 and DN 160

Insert the splinter shield in the high vacuum flange so that the curvature of the grill faces outwards.

- ➔ Bend clamping lugs slightly outwards so that the splinter shield will sit firmly in the high vacuum flange (preventing noise).
- ➔ Insert splinter shield in the high vacuum flange with clamping lugs bent slightly inwards.
- ➔ Press splinter shield outer ring into the high vacuum flange up to the stop limit.



3.3. Connecting The Fore-Vacuum Side

Backing pump: Fore-vacuum pressure ≤ 5 mbar
 Recommendation: Oil free Diaphragm Pump, UniDry or PFEIFFER Rotary Vane Series Vacuum Pump.

Connecting the backing pump

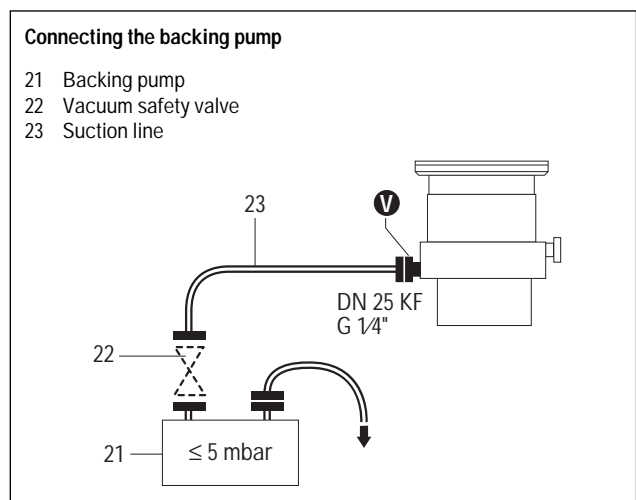
All fore-vacuum line connections: With normal small flange components or screwed hoses.



Exhaust gases from the backing pump must be conducted away safely. Ensure the full width of the fore-vacuum flange is unhindered by upstream components.



The exhausted process gases and vapours can represent a health hazard and can also be environmentally damaging. Comply with all the gas manufacture's safety instructions.



- ➔ Fit the vacuum safety valve in the fore-vacuum line (in PFEIFFER rotary vane vacuum pumps already integrated). This prevents vacuum chamber venting via the backing pump.
- ➔ With rigid pipe connections: Fit bellows in the connecting line to reduce vibration.
- ➔ Backing pump power connection: see operating instructions for the electronic drive unit.

3.4. Connecting The Cooling Unit

The turbopumps are water cooled as standard.

Cooling water either

- from the mains
- or from Water Recycling Unit TZK with closed circuit.

Cooling Water From The Mains

Cooling water must be filtered to prevent deposits forming in the pump.

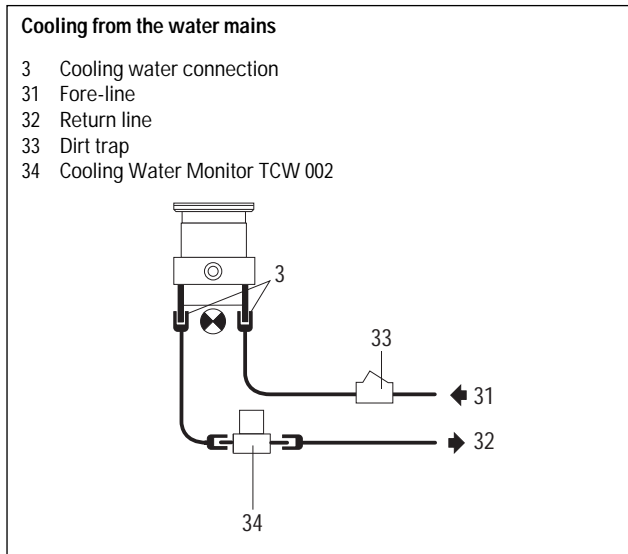
Minimum cooling water requirements

Mechanically clean, optically clear, no turbidity, no sediment, chemically neutral, temperature $>$ dew point.

Minimum oxygen content	4	mg/kg
Maximum chloride content	100	mg/kg
Maximum carbonate hardness	10	$^{\circ}$ dH
Maximum consumption of potassium permanganate	10	mg/kg
Carbon dioxide	Absent	
Ammonia	Absent	
pH-value	7 – 9	
Max. fore-line over pressure	6	bar
Minimum flow rate at gas load max.	100 l/h bei 15 $^{\circ}$ C	

Connecting to the water mains

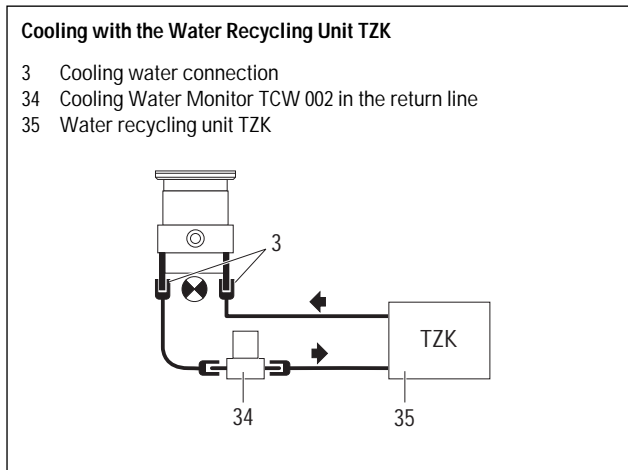
- ➔ Fit dirt trap (accessory) in the fore-line.
- ➔ Using circlips, connect fore-line to one of the two cooling water connections.
- ➔ Fit Cooling Water Monitor TCW 002 (accessory) in return line.
- ➔ Connect return line to the other turbo pump cooling water connection.
- ➔ Tighten the hollow screws on the cooling water connection to a torque of 20 Nm.
- ➔ Tighten all circlips and ensure hose lines are seated firmly.



Cooling With The Water Recycling Unit TZK (Accessory)

Connecting to the TZK

A dirt trap in the fore-line is not permissible.
 All other steps: As for connection to the water mains.



3.5. Connecting The Venting Valves

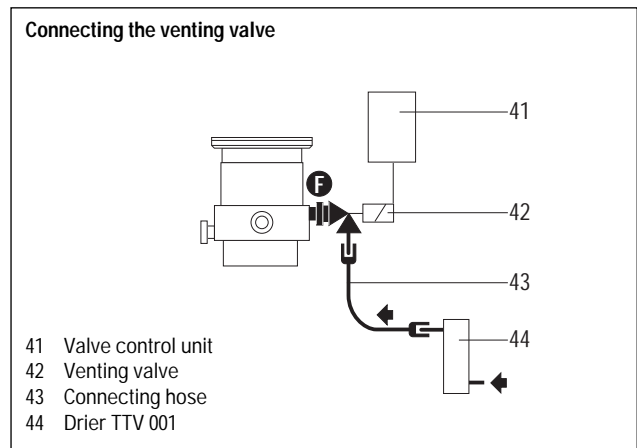
The venting valve (Accessory) provides automatic venting in the event of a power failure and switching off.

Venting Valve	Control Unit	Electronic Drive Unit	Venting Procedure On Switch-Off Or Power Failure
TSF 010	Unnecessary	Independent	Immediate; venting valve remains open
TSF 012	Unnecessary	TCP 380	Delayed (venting begins at approx. 20% of rated rotation speed); venting valve remains open.
TVF 012	TCF/TCV 103	TCP 380	Delayed; adjustable (with TCS 304)

Connecting the venting valve

See operating instructions for the respective unit.

- Connect venting valve with G1/8" connecting thread directly.
- Use Adapter PM 033 737-T for flange size DN 10-KF.



Electrical connections

See operating instructions for the respective unit.

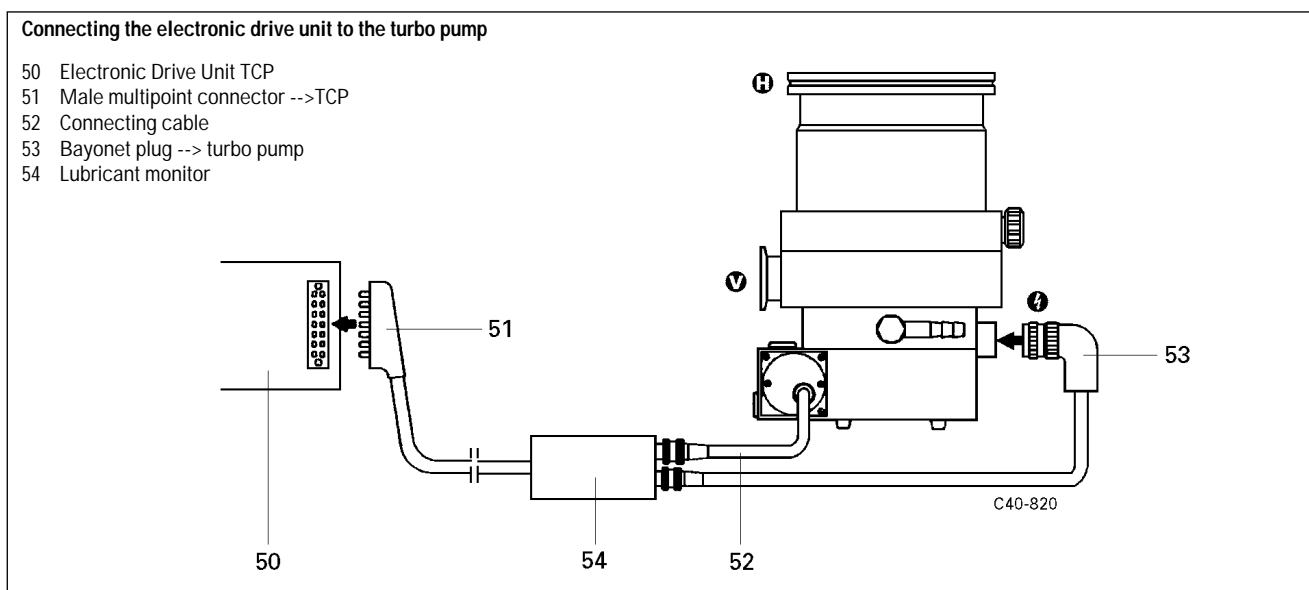
3.6. Connecting The Electronic Drive Unit



Voltages of > 100 V can be present on the open electrical contacts on a running down pump. There is danger of an electrical shock if the contacts are touched.

Disconnect the plug to the electronic drive unit only once the pump is completely at rest and the electronic drive unit has been disconnected from the mains.

- ➔ Plug in connecting cable with integrated lubricant monitor (accessory) between the electronic drive unit, turbo pump and lubricant pump. For details please see the operating instructions for the electronic drive unit.



3.7. Connecting The Sealing Gas Valve

To protect turbo pump, particularly where corrosive or dust producing processes are involved, it is necessary to use sealing gas.

Connection is made via the sealing gas valve (please see "Accessories").

Please refer to Operating Instructions PM 800 229 BN for details on installing the sealing gas valve and adjusting the sealing gas flow.

4. Operations

4.1 Lubricant Filling

The pumps are designed to operate with Lubricant "F3" (not supplied with the pump); "F3" must be ordered separately (see Section 9.1.).



The pumps must be filled with Lubricant "F3" before operating.

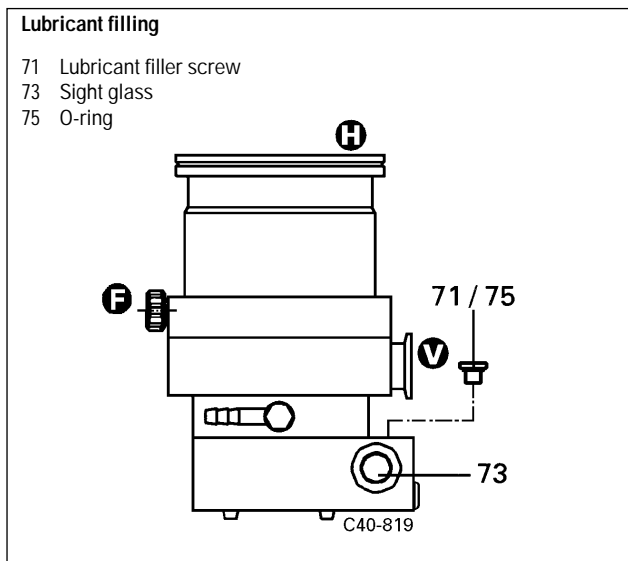


If "F3" is heated to over 300 °C, poisonous gases damaging to the respiratory system are produced. "F3" must not be allowed to come into contact with tobacco products (danger of poisoning when lighting!).

When handling chemicals, the relevant manufacturer's instructions must be followed.

- ➔ Unscrew lubricant filler screw and, using the syringe provided, fill in approx. 35 cm³ Lubricant "F3".
- ➔ Screw in lubricant filler screw with O-ring.

When the pump is operating, the sight glass must be at least one third full of lubricant.



4.2. Before Switching On

- ➔ Open sealing gas supply.
- ➔ Open cooling water supply and check flow.

4.3. Switching ON

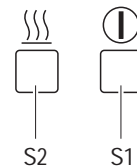


Turbo pump rotors rotate at high speed. When the high vacuum flange is open there is a danger of injury. In addition, objects can fall into the pump and cause serious damage. Therefore never operate the pump with open high vacuum flange.

- ➔ Switch on turbopump with switch S1 on the electronic drive unit.

Electronic drive unit switches (schematically)

- S1 Turbopump ON/OFF
- S2 Heating ON/OFF



- If a Pumping Station Control Unit TCS 303/304 is in use, switch S1 on the electronic drive unit starts turbopump, backing pump and recycled water cooling unit (if fitted) jointly.



Take care when pumping hazardous gases. Comply with all the gas manufacturer's safety instructions.

4.4. Heating (Only Pumps With Heating Jackets)

Heating turbo pumps and vacuum chambers accelerates the attainment of final pressures.

The heating period is dependent on the level of contamination and the required final pressure. Heat for at least four hours.

- ➔ Switch on turbo pump heating via switch S2 on the electronic drive unit.



High temperatures are generated when turbo pump or vacuum chamber are baked out. Contact with hot parts can cause burns, even after the heating has been switched off. Heating jackets, pump casing and vacuum chamber should all be insulated when fitting. Do not touch heating jackets, pump casing and vacuum chambers during baking out.

4.5. Circulatory Lubrication

The ball bearing on the fore-vacuum side is supplied by lubricant via the lubricant pump. Lubricant circulation is monitored by means of a contact which transmits signals to the electronic drive unit which shuts down the turbopump in the event of a lubricant deficiency. Monitoring is active from 45% of final rotation speed. If at rotation speeds of >45% of final rotation speed (e.g. resulting from lubricant degassing) the contact is open ≥ 2 minutes, the electronic drive unit identifies lubricant deficiency and shuts down the turbopump.

- ➔ Check lubricant filling level.
- ➔ Re-start turbopump with "reset" (S3 on electronic drive unit).
- ➔ Check lubricant pump function.

4.6. Switching Off And Venting

To avoid contamination occurring when switching off, the pump should be vented before shut-down.

- ➔ Close vacuum safety valve in the fore-vacuum line.
- ➔ Operate turbopump at least a further 15 minutes with sealing gas.
- ➔ Switch off both turbo pump and backing pump at the same time with switch S1.
- ➔ Open locking screw or venting valve in venting connection. (With PFEIFFER venting valves and respective control units, venting proceeds automatically).
- ➔ Shut off water supply.
- ➔ Close sealing gas supply.

4.7. Shutting Down For Longer Periods



Vacuum pumps are sometimes used to pump aggressive or hazardous gases. There is a danger of personal injury resulting from coming into contact with process gases.

Before removing a turbo pump from the system, first:

- Vent the turbo pump with a neutral gas or dry air.
- Ensure that there is no residual process gas in the system nor in the feeder lines.

If the turbo pump is to be shut down for more than a year:

- ➔ Remove turbo pump from the system.
- ➔ Replace lubricant (see Section 7.1.).
- ➔ Close high vacuum flange and evacuate pump via the fore-vacuum flange.
- ➔ Vent turbo pump via the venting connection with nitrogen or dry air.
- ➔ Close fore-vacuum and venting connections by blank flanging.
- ➔ Place the pump vertically on its rubber feet.
- ➔ In rooms with moist or aggressive atmospheres, the turbo pump must be air-sealed in a plastic bag together with a bag of dessicant, e.g. silicagel.

5. What To Do In Case Of Breakdowns?

Problem	Possible Cause	Remedy
Pump doesn't start	<ul style="list-style-type: none"> • Power supply interrupted • Lubricant pump dirty 	<ul style="list-style-type: none"> • Check fuse in the electronic drive unit • Check plug contacts on the pump and the electronic drive unit • Check feeder lines • Clean lubricant pump as per 7.2.
Pump doesn't attain rated rotation speed; Pump cuts out during operations	<ul style="list-style-type: none"> • Fore-vacuum pressure too high • Leak or too much gas • Rotor sluggish owing to defective bearing • Run-up phase in the Electronic Drive Unit TCP too short • Thermal overloading caused by: <ul style="list-style-type: none"> – Insufficient water flow – Insufficient air supply – Fore-vacuum pressure too high – Ambient temperature too high • Lubricant dirty • Lubricant deficiency 	<ul style="list-style-type: none"> • Check backing pump function • Check seals • Seek leak and repair • Check bearing (noisy?): request replacement by PFEIFFER • Extend run-up phase setting time • Ensure free flow • Ensure adequate air supply • Reduce fore-vacuum pressure • Reduce ambient temperature • Clean lubricant pump as per 7.2. • Check lubricant and replace as necessary.
Pump doesn't attain final pressure	<ul style="list-style-type: none"> • Pump dirty • Leak in vacuum chamber, lines or pump 	<ul style="list-style-type: none"> • Bake out pump • If seriously contaminated: request cleaning by PFEIFFER Service • Seek leak starting with vacuum chamber • Repair leak
Unusual operating noises	<ul style="list-style-type: none"> • Bearing damaged • Rotor damaged • Splinter shield (if fitted) not seated firmly 	<ul style="list-style-type: none"> • Inform Balzers-Pfeiffer Service of need for repair • Inform PFEIFFER Service of need for repair • Check splinter shield: Press clamping lugs away from each other (see Section 3.2.).

6. Service

Do make use of our service facilities

In the event that repairs are necessary a number of options are available to you to ensure any system down time is kept to a minimum:

- Have the pump repaired on the spot by our Service Engineers;
- Return the pump to the manufacturer for repairs;
- Replace the pump.

Local PFEIFFER representatives can provide full details.

Before returning:

- ➔ Please attach a clearly visible notice "Free of harmful substances" (both on the unit and also on the delivery note and any accompanying letters).

"Harmful substances" are defined in the current, local regulations and in the U.S.A. as "materials in accordance with the Code of Federal Regulations (CFR) 49 Part 173.240 Definition and Preparation".

We will carry out the decontamination and invoice this work to you if you have not attached this note. This also applies where the operator does not have the facilities to carry out the decontamination work. Units which are contaminated microbiologically, explosively or radioactively cannot be accepted as a matter of principle.

Fill out the contamination declaration

- ➔ In every case the "Contamination Declaration" must be completed diligently and truthfully.
- ➔ A copy of the completed declaration must accompany the unit: any additional copies must be sent to your local PFEIFFER Center.

Please get in touch with your local PFEIFFER representatives if there are any questions regarding contamination.



Decontaminate units before returning or possible disposal. Do not return any units which are microbiologically, explosively or radioactively contaminated.

Returning contaminated units

If contaminated have to be returned for maintenance/repair, the following instructions concerning shipping must be followed:

- ➔ Neutralise the pump by flushing with nitrogen or dry air.
- ➔ Seal all openings to the air.
- ➔ Seal pump or unit in suitable protective foil.
- ➔ Ship units only in appropriate transport containers.

Please note:

Repair orders are carried out according to our general conditions of sale and supply. If repairs are necessary, please send the unit to your nearest PFEIFFER Service Center.

Contact addresses and telephone hotline

Contact addresses and telephone numbers can be found on the back cover of these operating instructions.

7. Maintenance

Important:

No liability for personal injury nor material damage will be accepted for damages and operational interruptions which have been caused by improper maintenance; in addition, all guarantees become invalid.

- You can change the lubricant yourself (see Section 7.1.).
- Your pump can be cleaned on the spot if it is not very dirty.

Please check with your PFEIFFER regarding procedures and also regarding all other maintenance and service work.

7.1. Changing The Lubricant

Lubricant must be replaced at least once a year but where exceptional loads and/or unclean processes are involved your PFEIFFER Service can advise regarding intervals.

- ➔ Switch off turbopump, vent to atmosphere (see Section 4.5.) and allow to cool down as necessary.
- ➔ Remove turbopump from the system if necessary.
- ➔ Unscrew lubricant drain screw and collect lubricant in a container.
- ➔ Re-screw drain screw with O-ring.
- ➔ Unscrew lubricant filler screw. Using the syringe provided, fill in approx. 35 cm³ Lubricant "F3" (please see Section 4.1. for the lubricant level).
- ➔ Re-screw lubricant filler screw with O-ring.

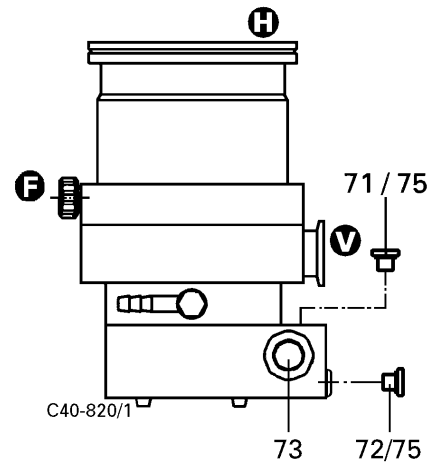
When the pump is operating, the sight glass must be at least one third full of lubricant.



Lubricant can contain toxic substances stemming from the media.
Dispose of lubricant in accordance with the applicable regulations.
Safety instructions data sheet on request.

Changing the lubricant

- 71 Lubricant filler screw
- 72 Lubricant drain screw
- 73 Sight glass
- 74 O-ring



7.2. Cleaning The Lubricant Pump

If the pump does not accelerate to its operational rotation speed after a malfunction, the lubricant pump must be cleaned.

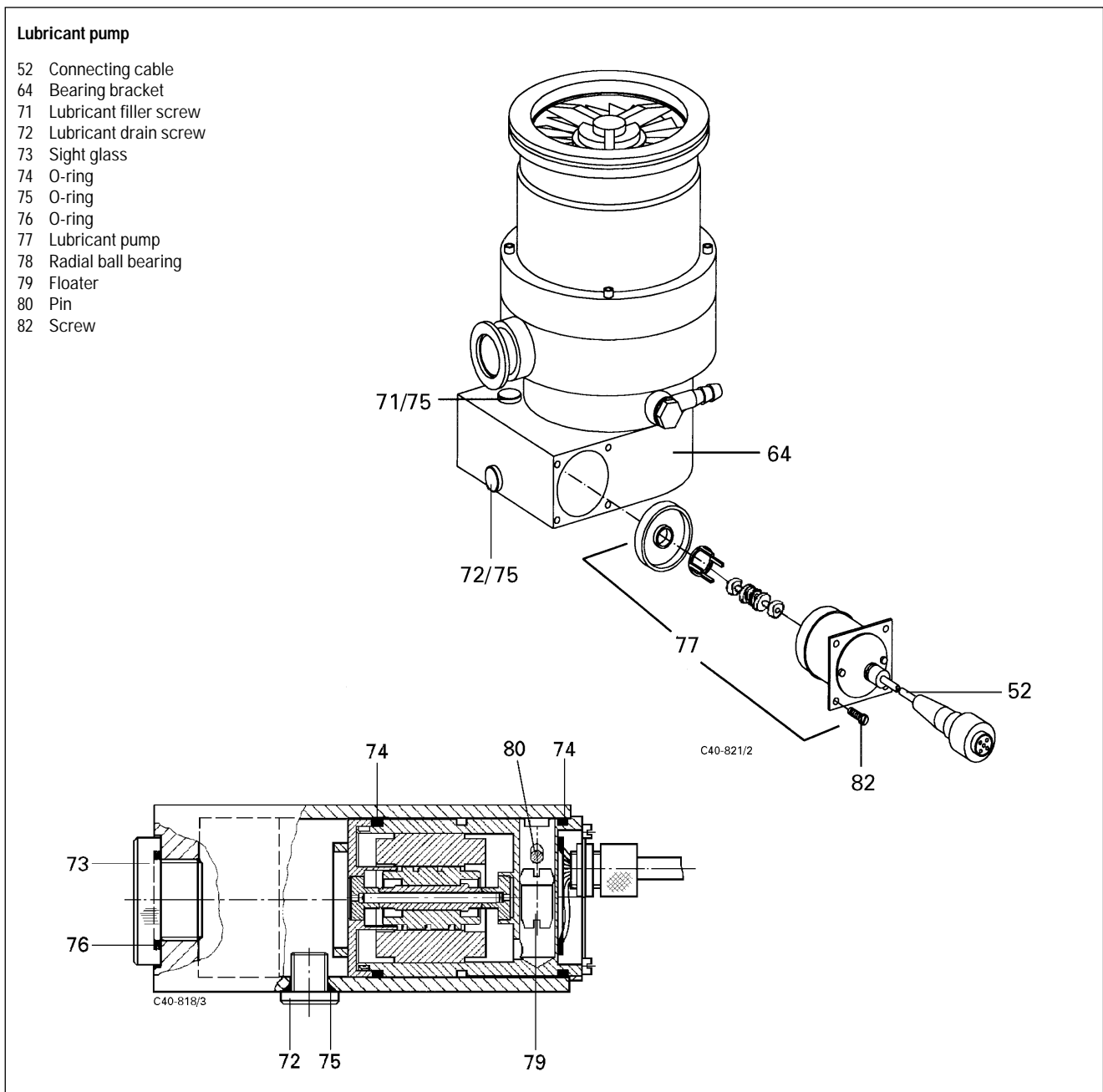
- ➔ Drain and dispose of lubricant as per Section 7.1. Remove lubricant pump and drain off residual lubricant:
- ➔ Unscrew the two screws 82, screw in two M5 forcing screws to press lubricant pump out of the bearing bracket 64 and lift out.
- ➔ Clean lubricant pump and the boring in the bearing bracket with a fluff free cloth and pure alcohol.
- ➔ Dismantle lubricant pump as per the following illustration and clean.

- ➔ To remove float 79, press out pin 80. When re-fitting, the head of the float must point to the pin.
- ➔ Check free movement of the two radial ball bearings 78.
- ➔ Carry out bearing change if the bearing is defective; clean the new bearing with alcohol and moisten with lubricant before fitting; push onto the shaft manually.



When fitting the new bearing, only the inner ring may be subjected to pressure.

- ➔ Re-fit lubricant pump; careful with O-ring.
- ➔ Re-screw lubricant drain screw 72 with O-ring 75.
- ➔ Fill in approx. 40 cm³ (after cleaning) of lubricant as per Section 4.1.



8. Technical Data

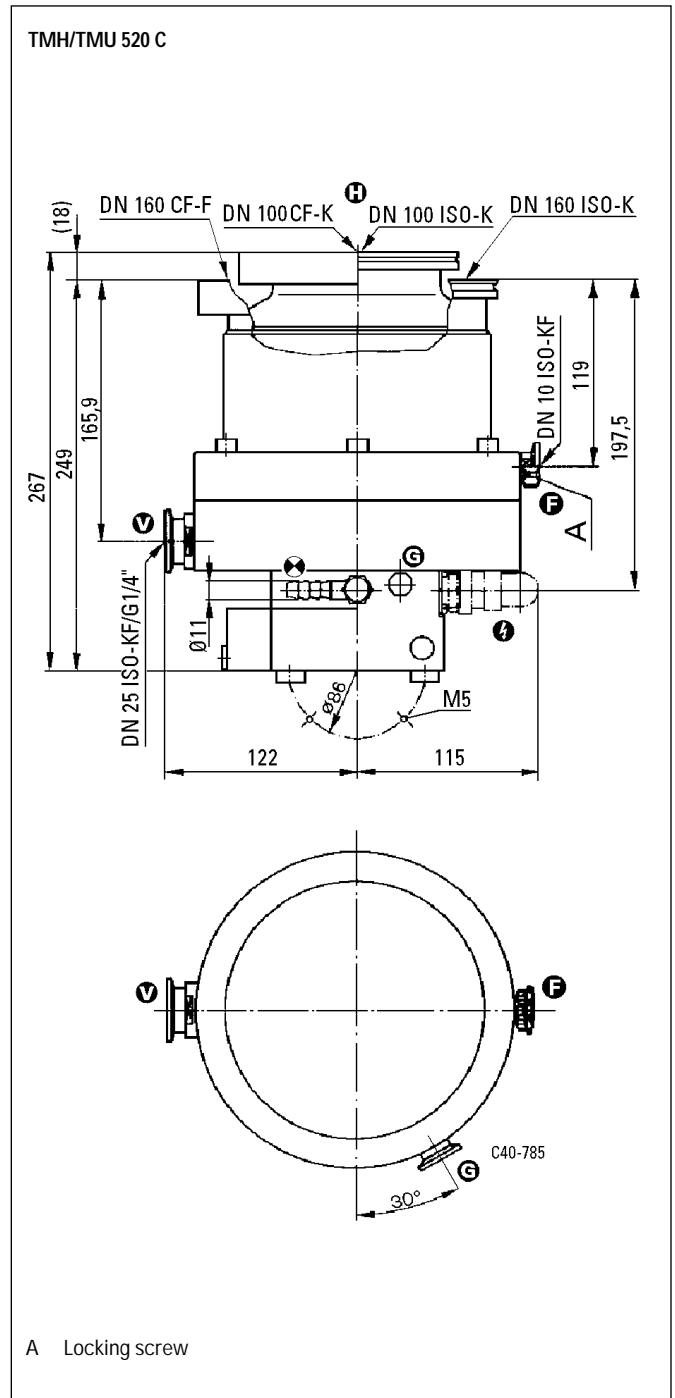
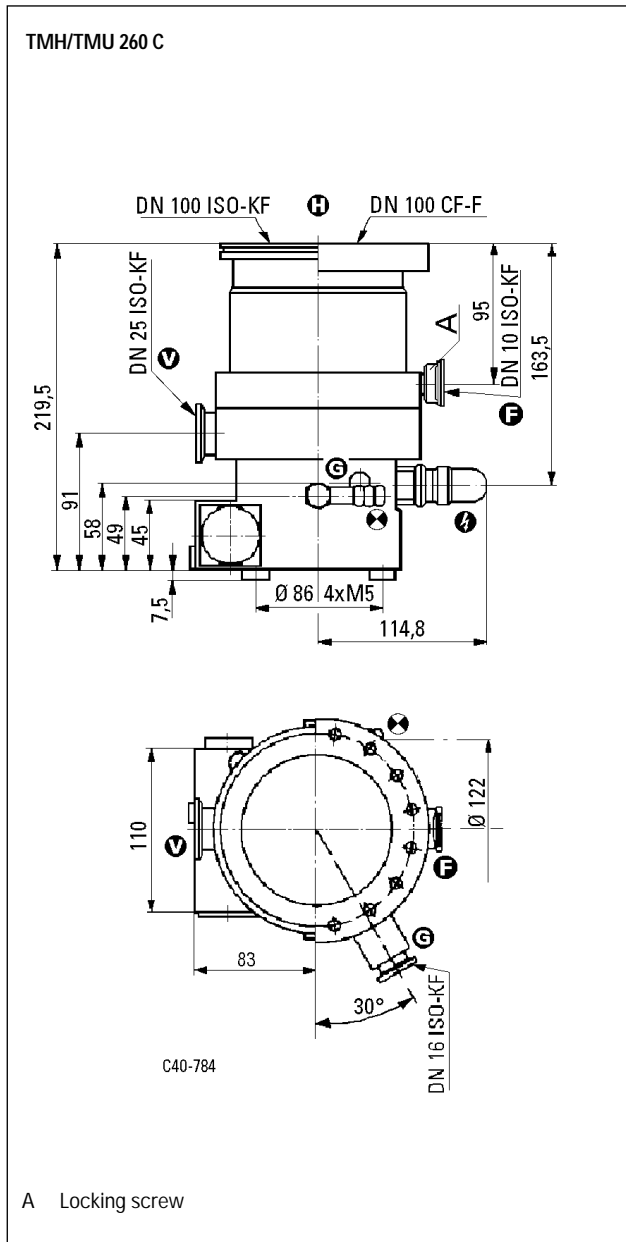
Feature	Unit	TMH 260 C TMU 260 C	TMH 520 C TMU 520 C	TMH 520 C TMU 520 C
Connection nominal diameter				
Inlet		DN 100 ISO-K DN 100 CF-F	DN 100 ISO-K DN 100 CF-F	DN 160 ISO-K DN 160 CF-F
Outlet		DN 25 ISO-KF G 1/4"	DN 25 ISO-KF G 1/4"	DN 25 ISO-KF G 1/4"
Electronic drive unit		TCP 380	TCP 380/TCP 600	
Rated rotation speed	1/min	60 000	50 000	
Stand-by rotation speed	1/min	40 000	33 000	
Run-up time (up to 90% of the rated rotation speed with TCP 380)	min	1,5	7	
Noise level	dB (A)	< 50	< 50	
Maximum permissible rotor temperature	°C	90	90	
Permissible heat radiation power	W	6	10,5	
Volume flow rate (with oil sealed rotary vane vacuum pump)				
Nitrogen N ₂	l/s	170	300	500
Helium He	l/s	170	400	500
Hydrogen H ₂	l/s	150	400	480
Compression ratio for				
N ₂		> 1 · 10 ⁹	> 10 ¹²	
He		3 · 10 ⁵	5 · 10 ⁷	
H ₂		1,3 · 10 ⁴	5 · 10 ⁶	
Max. fore-vacuum pressure				
N ₂	mbar	10	16	
He	mbar	8	14	
H ₂	mbar	4	7	
Max. gas throughput ¹⁾				
N ₂	mbar l/s	2,5	4	
He	mbar l/s	2,5		
H ₂	mbar l/s	2	9	
Sealing gas throughput ²⁾	mbar l/s	0,1 - 0,5	0,1 - 0,5	
Final pressure, backing pump	mbar	< 5	< 5	
Final pressure (with diaphragm pump < 1·10 ⁻⁹ mbar)	mbar	< 1 · 10 ⁻⁸	< 1 · 10 ⁻⁹	
Lubricant "F3", required amount	cm ³	35	35	
Cooling water requirements with water at 15 °C ³⁾	l/h	100	100	
Cooling water temperature	°C	5 - 25	5 - 25	
Power consumption, heating	W	60	100	
Permissible magnetic field	mT	5,5	5,0	
Weight	kg	8,5 / 9	12,5	13

1) Measured with a rotary vane vacuum pump 1.5 m³/h.

2) With sealing gas valve, adjustable; for sealing gas valve, see "Accessories".

3) With maximum gas throughput.

8.1. Dimensions



9. Accessories

Description	Size	Number	Comments/ Operating Instructions	Order Quantity
Electronic Unit TCP 380 TCP 600	100 - 240 V; 50/60 Hz 100 - 240 V; 50/60 Hz	PM C01 490 PM C01 320	PM 800 188 BN PM 800 234 BN	
Connecting cable				
Turbo pump - TCP 380	3 m	PM 031 972 -U	(Other lengths on request)	
Turbo pump - TCP 600	3 m	PM 041 299 -U	(Other lengths on request)	
Heating jacket, TMH/U 260 C TMH/U 520 C	115 V/230 V 115 V/230 V	PM 043 444 -T PM 043 445 -T		
Vibration compensator, TMH TMU TMH TMU	DN 100 ISO-K DN 100 CF-F DN 160 ISO-K DN 160 CF-F	PM 006 459 -X PM 006 488 -X PM 006 492 -X PM 006 493 -X		
Splinter shield	DN 100 DN 160	PM 006 125 AX PM 006 771 -X		
Protective mesh	DN 100 DN 160	PM 006 596 -R PM 006 823		
Sealing ring, TMH	DN 100 ISO-K DN 160 ISO-K	PF 303 110 -T PF 303 116 -T		
Collar flange, TMH	DN 100 ISO-F DN 160 ISO-F	PF 307 110 -T PF 307 116 -T		
CU seal (10 pieces),TMU	DN 100 CF DN 160 CF	PF 501 410 -T PF 501 416 -T		
Set of screws, TMU	DN 100 CF DN 160 CF	PF 505 003 -T PF 505 003 -T		
Pumping Station Control Unit TCS 303 TCS 304 R TCS 304 R	100 - 240 V; 50/60 Hz 100 - 240 V; 50/60 Hz 208 - 415 V; 50/60 Hz	PM C01 502 PM C01 537 PM C01 537	PM 800 186 BN PM 800 192 BN (Only with thermistor print PM 021 721 -X)	
Fore-Vacuum Safety Valve TVV 001	DN 16 ISO-KF	PM Z01 205	PM 800 263 BN	
Sealing gas valve	DN 10 ISO-KF	PM Z01 142	PM 800 229 BN	
Hose nipple for sealing gas valve	DN 16 ISO-KF-10	PF 144 020		
Syringe	50 ml	PM 006 915 -U		
Components for cooling				
Cooling Water Monitor TCW 002	110 V, 50/60 Hz 220 V, 50/60 Hz 240 V, 50/60 Hz	PM C00 131 PM C00 130 PM C00 132	PM 800 133 BN	
Connection set for TCW 002		PM 006 802 -T		
Dirt trap	R 3/8"	P 4161 300 2R		
Water Recycling Unit TZK 400	230 V, 50/60 Hz	PM Z01 245	PM 800 369 BN	
Components for venting				
Venting Control Unit TCF 103	110/220 - 240 V; 50/60 Hz	PM C01 356	PM 800 196 BN	
Venting And Valve Control Unit TCV 103	110/220 - 240 V; 50/60 Hz	PM C01 366	PM 800 196 BN	
Venting valve, after pressure equalisation open: (only with TCF 103 oder TCV 103) TVF 012	G 1/8" DN 10 ISO-KF	PM Z01 082 PM Z01 080	PM 800 126 BN	
Venting valve, after pressure equalisation closed: TVF 012	G 1/8" DN 10 ISO-KF	PM Z01 087 PM Z01 085	PM 800 126 BN	
Power Failure Venting Unit TSF 010	110 V, 60 Hz, G 1/8" 110 V, 60 Hz, DN 10 ISO-KF 220 V, 50/60 Hz, G 1/8" 220 V, 50/60 Hz, DN 10 ISO-KF 240 V, 50/60 Hz, G 1/8" 240 V, 50/60 Hz, DN 10 ISO-KF	PM Z01 110 PM Z01 017 PM Z01 111 PM Z01 010 PM Z01 112 PM Z01 016	PM 800 032 BN	
Venting Valve TSF 012	G 1/8" DN 10 ISO-KF	PM Z01 106 PM Z01 105	PM 800 168 BN	
Drier (filled with zeolite) Venting Flange	DN 10 ISO-KF DN 10 ISO-KF	PM Z00 121 PM 033 737 -T	PM 800 022 BN	

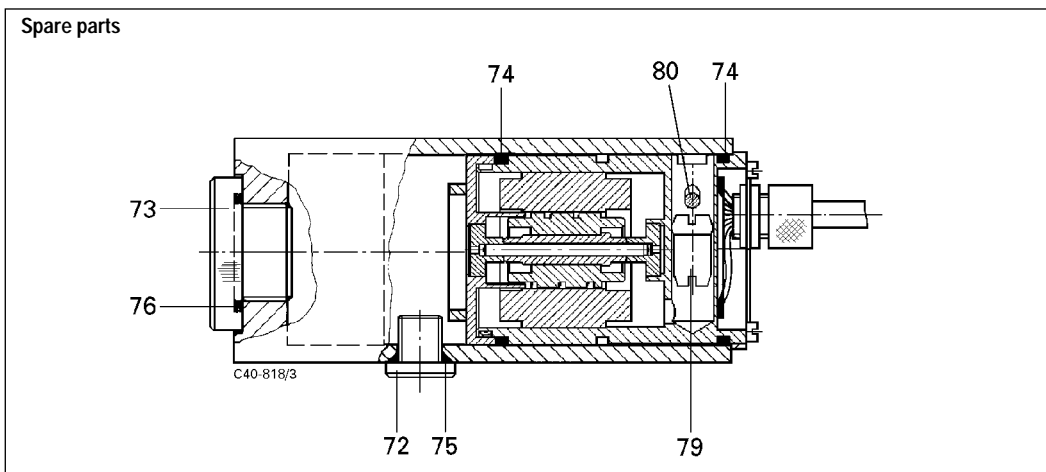
9.1. Lubricant

Type	Amount	Order Number
"F3"	0,05 l	PM 006 336 -T
"F3"	0,25 l	PM 006 313 -T

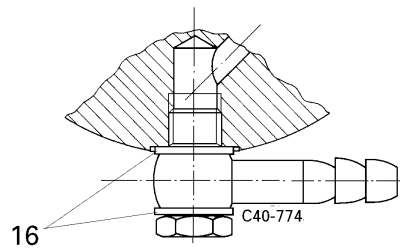
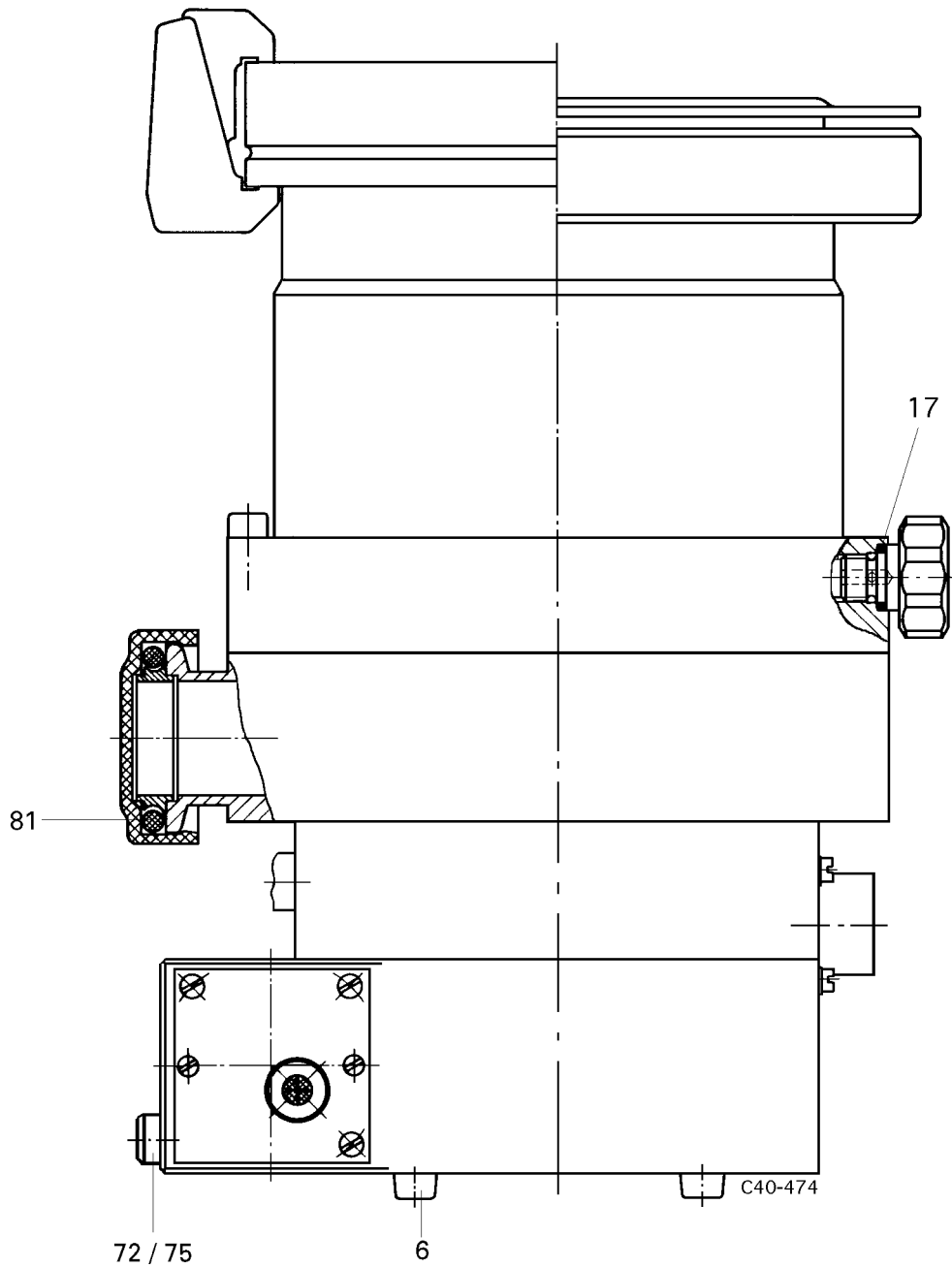
10. Spare Parts

Pos.	Description	Pieces	Size	Number	Comments	Ordering Quantity
	Spare Parts TMH/TMU 260 C TMH/TMU 520 C					
	Set of seals					
	TMH/U 260 C	1		PM 043 500 -T		
	TMH/U 520 C	1		PM 063 984 -T		
6	Rubber foot	4		P 3695 700 ZE		
16	USIT-ring	4	U 12,7/18 x 1,5	P 3529 142		
17	QUAD-ring	1	VI 10,82 x 1,78	P 4081 630 C		
71	Lubricant filler screw					
	TMH/U 260 C	1	A2-50, G1/8" A	N 3191 382 X		
	TMH/U 520 C	1	A2-50, G1/8" A	N 3191 402 X		
72	Lubricant drain screw	1	A2-50, G1/8" A	N 3191 382 X		
73	Sight glass	1		PM 003 251		
74	O-ring	2	Vi 36 x 2	P 4070 594 PV		
75	O-ring	2	Vi 6 x 2,2	P 4070 088 PV		
76	O-ring	1	Vi 22x3	P 4070 384 PV		
77	Lubricant pump	1		PM 083 452 -T		
79	Floater	1		PM 033 306 -X		
81	Seal	1	AL/NE, DN25 ISO-KF	BP 213 316 -T		

When ordering accessories and spare parts please be sure to state the full part number. When ordering spare parts please state additionally the unit type and unit number (see rating plate). Please use this list as an order form (by taking a copy).



Spare parts



Declaration of Contamination of Vacuum Equipment and Components

The repair and/or service of vacuum components will only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay.

The manufacturer could refuse to accept any equipment without a declaration.

This declaration can only be completed and signed by authorised and qualified staff:

1. Description of component:

- Equipment type/model: _____
- Code No.: _____
- Serial No.: _____
- Invoice No.: _____
- Delivery Date: _____

2. Reason for return:

3. Equipment condition

- Has the equipment been used?
yes no
- What type of pump oil was used?

- Is the equipment free from potentially harmful substances?
yes (go to section 5)
no (go to section 4)

4. Process related contamination of equipment

- toxic yes no
- corrosive yes no
- microbiological hazard*) yes no
- explosive*) yes no
- radioactive*) yes no
- other harmful substances yes no

*) We will not accept delivery of any equipment that has been radioactively or microbiologically contaminated without written evidence of decontamination!

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

Tradename Product name Manufacturer	Chemical name (or Symbol)	Danger class	Precautions associated with substance	Action if spillage or human contact
1.				
2.				
3.				
4.				
5.				

5. Legally Binding Declaration

I hereby declare that the information supplied on this form is complete and accurate. The despatch of equipment will be in accordance with the appropriate regulations covering Packaging, Transportation and Labelling of Dangerous Substances.

Name of Organisation: _____

Address: _____ Post code: _____

Tel.: _____

Fax: _____ Telex: _____

Name: _____

Job title: _____

Date: _____ Company stamp: _____

Legally binding signature: _____

⇒ **DE, AT****Herstellererklärung im Sinne folgender EU-Richtlinien:**

- Maschinen 89/392/EWG
- Elektromagnetische Verträglichkeit 89/336/EWG
- Niederspannung 73/23/EWG

Hiermit erklären wir, daß das unten aufgeführte Produkt zum Einbau in eine Maschine bestimmt ist und daß deren Inbetriebnahme so lange untersagt ist, bis festgestellt wurde, daß das Endprodukt den Bestimmungen der EU-Richtlinie 89/392/EWG, Anhang II B entspricht.

Wir bestätigen Konformität mit der EU-Richtlinie über elektromagnetische Verträglichkeit 89/336/EWG und der EU-Niederspannungsrichtlinie 73/23/EWG. Die angewandten Richtlinien, harmonisierten Normen, nationalen Normen und Spezifikationen sind unten aufgeführt.

⇒ **GB, IE****Manufacturer's declaration pursuant to the following EU directives:**

- Machinery Directive 89/392/EEC
- Electromagnetic Compatibility Directive 89/336/EEC
- Low Voltage Directive 73/23/EEC

We hereby certify that the product specified below is intended for installation in a machine which is forbidden to be put into operation until such time as it has been determined that the end product is in accordance with the provision of EU Directive 89/392/EEC, Annex II B.

We certify conformity with EU Electromagnetic Compatibility Directive 89/336/EEC and EU Low Voltage Directive 73/23/EEC.

The guidelines, harmonized standards, national standards and specifications which have been applied are listed below.

⇒ **BE, FR****Déclaration du constructeur conformément aux directives CE suivantes:**

- directive machine CE 89/392/CEE
- directive CE 89/336/CEE concernant la compatibilité électromagnétique
- directive CE 73/23/CEE concernant la basse tension

Nous déclarons par la présente que le produit mentionné ci-dessous est prévu pour le montage sur une machine et que sa mise en service est interdite tant qu'il n'a pas été déterminé que le produit final répond bien aux dispositions de la directive CE 89/392/CEE, appendice II B.

Nous confirmons la conformité du produit avec la directive CE 89/336/CEE concernant la compatibilité électromagnétique et la directive CE 73/23/CEE concernant la basse tension. Les directives appliquées, normes harmonisées et les normes et spécifications nationales appliquées figurent ci-dessous.

⇒ **IT****Dichiarazione del costruttore ai sensi delle seguenti direttive UE:**

- Macchinari 89/392/CEE
- Compatibilità elettromagnetica 89/336/CEE
- Bassa tensione 73/23/CEE

Si dichiara che il prodotto qui menzionato è destinato al montaggio in una macchina e che la sua messa in funzione è vietata sin quando non è stato accertato che il prodotto finale non rispetta le disposizioni della direttiva UE 89/392/CEE, Appendice II B.

Attestiamo la conformità con la direttiva UE sulla compatibilità elettromagnetica 89/336/CEE e la direttiva UE sulla bassa tensione 73/23/CEE.

Sono riportate in basso le direttive applicate, le norme standardizzate nonché le norme e le specifiche nazionali utilizzate.

⇒ **ES****Declaración del fabricante al tenor de las siguientes Directivas de la UE:**

- Maquinarias 89/392/MCE
- Compatibilidad Electromagnética 89/336/MCE
- Baja Tensión 73/23/MCE

Por la presente declaramos que el producto mencionado más abajo está previsto para ser incorporado en una máquina y que la puesta en servicio de la misma queda prohibida en tanto que no se haya verificado que el producto final concuerda con las disposiciones resultantes de la Directiva 89/392/MCE de la UE, Apéndice II B.

De nuestra parte certificamos la conformidad con la Directiva 89/336/MCE de la UE sobre Compatibilidad Electromagnética y la Directiva 73/23/MCE de la UE sobre Baja Tensión.

Las directivas aplicadas, normas armonizadas y las normas y especificaciones nacionales aplicadas se mencionan abajo.

⇒ **NL****Verklaring van de fabrikant in de zin van de volgende EU-richtlijnen:**

- machinerichtlijn 89/392/EEG
- richtlijn over elektromagnetische compatibiliteit 89/336/EEG
- richtlijn over laagspanning 73/23/EEG

Hiermee verklaren wij dat het hieronder genoemde product is bedoeld om te worden ingebouwd in een machine en dat de ingebruikneming hiervan zolang verboden is, totdat is vastgesteld dat het eindproduct voldoet aan de bepalingen van EU-richtlijn 89/392/EEG, appendix II B.

Wij bevestigen de conformiteit met de EU-richtlijn over elektromagnetische compatibiliteit 89/336/EEG en de EEG-richtlijn over laagspanning 73/23/EEG

De toegepaste richtlijnen, geharmoniseerde normen en de toegepaste nationale normen en specificaties zijn hierna aangegeven.

⇒ **DK****Producenterklæring i henhold til følgende EU-direktiver:**

- Maskiner 89/392/EWG
- Elektromagnetisk kompatibilitet 89/336/EWG
- Lavspænding 73/23/EWG

Hermed erklærer vi, at det nedenstående produkt er beregnet til indbygning i en maskine og at dennes idriftsættelse er forbudt, indtil det er fastslået, at slutproduktet er i overensstemmelse med EU-direktiv 89/392/EWG tillæg II B.

Vi attesterer konformitet med EU-direktiv vedrørende elektromagnetisk kompatibilitet 89/336/EWG og med EU-lavspændingsdirektiv 73/23/EWG.

De anvendte direktiver, harmoniserede standarder og de anvendte nationale standarder og specifikationer er angivet nedenfor.



Tillverkarens förklaring enligt följande EG-direktiv:

- Maskindirektiv 89/392/EEC
- Elektromagnetisk tolerans 89/336/EEC
- Lågspänning 73/23/EEC

Härmed förklarar vi, att den nedan nämnda produkten är avsedd för inmontering i en maskin och att denna maskin inte får tas i drift förrän det har konstaterats, att slutprodukten stämmer överens med EG's direktiv 89/392/EEC, annex II B.

Vi bekräftar konformitet med EG's-direktiv om elektromagnetisk tolerans 89/336/EEC och EG's lågspänningsdirektiv 73/23/EEC.

De riktlinjer, anpassade standarder, nationella standarder och specifikationer som har blivit accepterade, anges här nedan.



Valmistajan vakuutus seuraavien EU-direktiivien mukaisesti:

- konedirektiivi 89/392/ETY
- sähkömagneettinen siedettävyyden 89/336/ETY
- pienjännite 73/23/ETY

Vakuutamme täten, että allamainittu tuote on tarkoitettu asennettavaksi koneeseen ja sen käyttöönotto on kielletty kunnes on todettu, että lopullinen tuote vastaa EU-direktiivin 89/392/ETY vaatimuksia.

Vahvistamme vaatimustenmukaisuuden EU-direktiivin sähkömagneettinen siedettävyyden 89/336/ETY ja EU-pienjännitedirektiivin 73/23/ETY kanssa.

Soveltamamme suuntaviivat, harmonisoidut standardit, kansalliset standardit ja rakennemääräykset on lueteltu alempana.



Declaração do fabricante, de acordo com as seguintes Directivas CE:

- Máquinas, na redacção 89/392/CEE
- Compatibilidade electromagnética, na redacção 89/336/CEE
- Baixa tensão, na redacção 73/23/CEE

Com a presente, declaramos que o produto abaixo indicado se destina à montagem numa máquina e que é proibida a colocação em serviço da mesma antes de se ter declarado, que o produto final está em conformidade com o disposto na Directiva CE, na redacção 89/392/CEE, Apêndice II B.

Certificamos haver conformidade com o disposto na Directiva CE sobre compatibilidade electromagnética, na redacção 89/336/CEE, e o disposto na Directiva CE sobre baixa tensão, na redacção 73/23/CEE.

Abaixo, dá-se indicação das directivas aplicadas, das normas harmonizadas e das normas e especificações aplicadas no respectivo país.



Δήλωση κατασκευαστή κατά το νόημα των εθνικών οδηγιών της Ε.Ε:

- περί μηχανών 89/392/Ε.Ο.Κ.
- περί ηλεκτρομαγνητικής συμβατότητας 89/336/Ε.Ο.Κ.
- περί χαμηλής τάσης 73/23/Ε.Ο.Κ.

Με την παρούσα δήλωση βεβαιώνουμε ότι το κατωτέρω αναφερόμενο προϊόν προορίζεται για την προσαρμογή σε μία άλλη μηχανή, και ότι η έναρξη λειτουργίας της απαγορεύεται μέχρις ότου διαπιστωθεί, ότι το συνολικό συγκρότημα ανταποκρίνεται στους ισχύοντες κανονισμούς της οδηγίας της Ε.Ε. 89/392/Ε.Ο.Κ., παράρτημα Β Β.

Οι εφαρμοσθέντες κανονισμοί, οι εναρμονισμένες προδιαγραφές και οι εφαρμοσθείσες εθνικές προδιαγραφές και τεχνικές προδιαγραφές αναφέρονται κατωτέρω:

Produkt/Product/Produit/Prodotto/Producto/Produkt/Produkt/Producto/ Προϊόν:

TMH 260 C / TMU 260 C

TMH 520 C / TMU 520 C

Angewendete Richtlinien, harmonisierte Normen und angewendete, nationale Normen in Sprachen und Spezifikationen:

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

Les directives appliquées, normes harmonisées et les normes nationales appliquées en langues et spécifications:

Direttive applicate, norme standardizzate e norme nazionali utilizzate in lingue e specifiche:

Directivas aplicadas, normas armonizadas y normas nacionales aplicadas en idiomas y especificaciones:

Toegepaste richtlijnen, geharmoniseerde normen en toegepaste nationale normen met betrekking tot talen en specificaties:

Anvendte direktiver, harmoniserede standarder og de anvendte nationale standarder med sprog og specifikationer:

Directivas aplicadas, normas harmonizadas e normas aplicadas na linguagem e nas especificações do respectivo país:

Εφαρμοσθέντες κανονισμοί, εναρμονισμένες προδιαγραφές και εφαρμοσθείσες εθνικές προδιαγραφές σε γλώσσες και τεχνικές προδιαγραφές:

EN 292-1

EN 61 010

EN 292-2

EN 1012-2

EN 294

Unterschriften/Signatures/Signature/Firme/Firmas/Handtekening/Underskrifter/Underskrift/ Allekirjoitukset/Assinaturas/ Υπογραφές:

Geschäftsführer (W. Dondorf)

Managing Director

Gérant d'affaires

Gerente

Διευθύνων Σύμβουλος

Administrerende Direktør

Verkställande Direktör

Directeur

Zentrale/Headquarters

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