

Turbomolecular Drag Pumping Stations



TSH 071 / TSU 071
TSH 261 / TSU 261
TSH 521 / TSU 521

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Please note: Current operating instructions are available via www.pfeiffer-vacuum.net.

1. Safety Instructions

- ☞ Read and follow all instructions in this manual.
 - Inform yourself regarding:
 - Hazards which can be caused by the pumping station;
 - Hazards which can be caused by your system;
 - Hazards which can be caused by the medium being pumped.
- ☞ Avoid exposing any part of the body to vacuum.
- ☞ Observe the safety and accident prevention regulations.
- ☞ Regularly check that all accident prevention measures are being complied with.
- ☞ Do not operate the turbo pumping station with open high vacuum flange.
- ☞ Use at least 4 bracket screws to connect the high vacuum flange.
- ☞ The unit has been accredited protection class IP 30. When the unit is operated in environments which require other protection classes, the necessary measures must be taken.
- ☞ Do not carry out any unauthorised conversions or alterations to the turbo pumping station.
- ☞ The control of turbopumping stations has been so designed that the pumps re-start automatically following an interruption to the mains power supply. For this reason, access to the vacuum chambers (for example, via doors, flanges, valves) may only be opened once the pumping station has been switched off.
- ☞ When returning individual components please observe the shipping instructions (refer to the operating instructions for the pumping station components).

Modifications reserved.

1.1. For Your Orientation

Instructions in the text

➔ Working instruction: here, you have to do something.

Symbols used

The following symbols are used throughout in illustrations.

- ⊕ High vacuum flange
- ⊗ Cooling water connection
- ⚡ Electric connection
- ⬆ Exhaust

Abbreviations used

DCU = Display and operating unit

TC = Electronic drive unit, turbopump

TPS = Power supply

Position numbers

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

1.2. Pictogram Definitions



Warning, danger of personal injury.



Caution, danger of damage to the pump or the system.



Warning, danger of burns from touching hot parts.



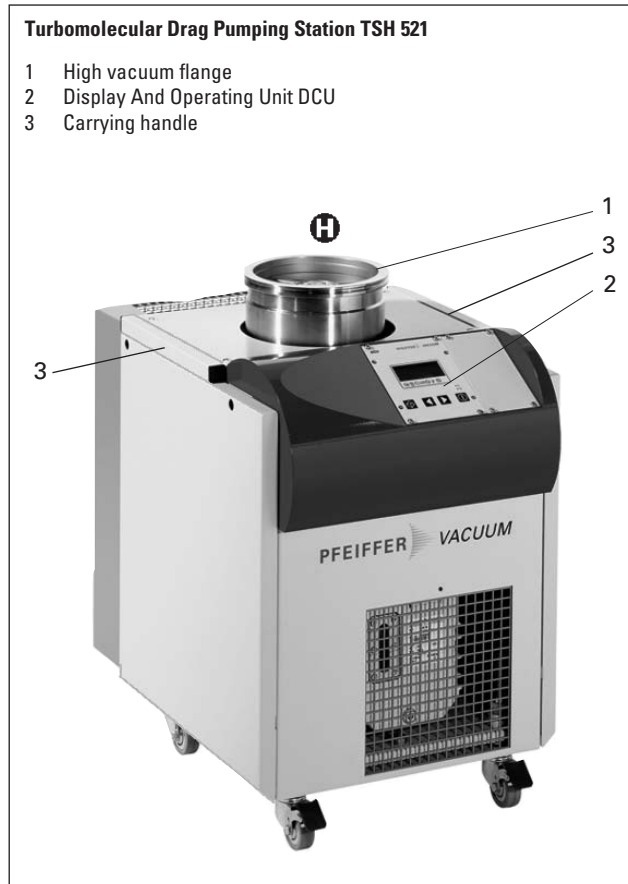
Warning, danger of injury from rotating parts.



Please note, attention to particularly important information on the product, handling the product or to a particular part of the documentation.

2. Understanding The Pumping Stations

2.1. Main Features



The plug and play type pumping stations are fully automatically operating pumping units.

The integrated power part with the Display And Operating Unit DCU 001 serves to control and monitor the pumping station and works in conjunction with the Electronic Drive Unit TC 600.

Cooling

Standard type: Air cooling integrated in the casing (up to 35 °C ambient temperature).

Alternative: Water cooling (please see Section 9. Accessories).



Details regarding the pumping station components can be found in the respective operating instructions. The possible pumping station variants and their components are set out in Section 2.3. of these operating instructions.

Transport

Lifting gear, which may only be attached to the ring screws, can be used to transport the pumping stations. The threaded holes for the ring screws are located in the high vacuum flange. The two carrying handles 3 (please see the illustration above) are provided only for manual carrying.



Where the delivery of pumping stations include a rotary vane vacuum pump it must be noted that this rotary vane pump is supplied without a filling of operating fluid.

Before first time starting, the rotary vane vacuum pump must be filled with operating fluid. The operating fluid is contained in a pack included with the delivery consignment.



Before first-time starting on pumping stations equipped with a Diaphragm Pump MVP 055-3 or a rotary vane vacuum pump, the transportation protection must be removed (please see the sticker on the pumping station).

For the procedure please refer to Section 4.1..

Proper Use

- The turbomolecular pumping stations may only be used for the purpose of generating vacuum.
- The turbomolecular pumping stations may only be operated in the existing configuration.

Improper Use

The following is regarded, inter alia, as improper:

- The pumping of explosive or corrosive gases.
- Operating the pumping stations in areas where there is a danger of explosion.
- The use of accessories which are not named in this manual or which have not been agreed by the manufacturer.

Improper use will cause all claims for liability and guarantees to be forfeited.

2.2. Pumping Station Control

Pumping Station	Pumping Station Control	Operating Instructions for DCU/TPS
TSH 071 TSU 071	TC 600 with DCU 001 and TPS 100	PM 0477 BN/ PM 0521 BN
TSH 261 TSU 261	TC 600 with DCU 001 and TPS 200	
TSH 521 TSU 521	TC 600 with DCU 001 and TPS 300	

2.3. Pumping Station Components

Pumping Station Components	TSH 071 TSU 071	TSH 261 TSU 261	TSH 521 TSU 521	Operating Instructions
Turbomolecular Drag Pump	TMH 071 TMU 071	TMH 261 TMU 261	TMH 521 TMU 521	PM 0504 BN PM 0470 BN PM 0496 BN
Diaphragm Pump	MVP 015-2 MVP 035-2 MVP 055-3	MVP 035-2 MVP 055-3	MVP 055-3	PU 0012 BN PU 0011 BN PU 0011 BN
Rotary Vane Vacuum Pump	DUO 2.5 UNO 005 A DUO 5 DUO 10	DUO 2.5 UNO 005 A DUO 5 DUO 10	DUO 2.5 UNO 005 A DUO 5 DUO 10	PK 0152 BN PK 0152 BN PK 0197 BN PK 0170 BN
Venting Valve	TVF 005	TVF 005	TVF 005	PM 0 507 BN

For further accessories please refer to Section 9.

3. Installation

3.1. Preparations For Installation



Do not carry out any unauthorised conversions or alterations to the turbo pumping station.

- Only remove the blank flange from the high vacuum side immediately before connection.
- The lubricant reservoir is already fitted to turbopumps and filled.
- Where the use of rotary vane vacuum pumps is involved, the operating fluid is included in the delivery consignment and must be filled into the pump before first time operating.
- Diaphragm pumps do not require lubricant.
- Permissible magnetic fields:
TSH 071/TSU 071 ≤ 4 mT
TSH 261/TSU 261 ≤ 5.5 mT
TSH 521/TSU 521 ≤ 5 mT
- The pumping station should be erected on a horizontal surface.

On delivery, the pumping station is provided with four elastic buffers on the underside.

In addition, and to render the pumping station mobile, rollers can be fitted (please see Section 9. Accessories).

3.2. Laying The Exhaust Line



Please observe the backing pump operating instructions when laying the exhaust line. Exhausted gases and vapours can be hazardous to health and cause environmental pollution.

3.3. Venting Units

The pumping stations are equipped with Venting valve TVF 005 as standard.

Control is effected via the pre-selected setting on Electronic Drive Unit TC 600.

The venting mode of the TVF 005 is selected via the DCU.

Drying Unit TTV 001 (Accessory)

The drying unit keeps moisture away from the apparatus when venting with atmospheric air.

- ➔ Secure Drying Unit TTV 001 to the rear side of the pumping station casing using the two knurled screws.

Where the casing variant with additional cover for the rotary vane vacuum pump is involved the drying unit must be fitted within this cover.

- ➔ Make the connection to the venting valve with a PVC hose (please refer to Section 9. Accessories).

3.4. Electrical Connections



The electrical connections must be effected in accordance with local regulations. The voltage requirements shown on the rating plate must comply with the mains voltage.

Alternating current is required for operating the pumping station.

The mains connection cable (length 2.5 m) is provided on the pumping station.

- ➔ Plug in mains connection plug (the pumping station can now be operated).

Accessory Connections:

For the electrical connections of accessories please refer to Section 3.7. "Connections Plan".

3.5. Connecting The Vacuum Unit



There should be no unilateral loading on the high vacuum flange.

The weight of a vacuum chamber freely flanged on the vacuum flange must not exceed, with the TSH/TSU 071 maximum 200 N (20 kg), with TSH/TSU 261 maximum 500 N (50 kg), and with TSH/TSU 521 maximum 1000 N (100 kg).



The utmost cleanliness must be observed when fitting all high vacuum parts. Unclean components prolong the pumping time.

- ➔ Only remove the blank cover on the high vacuum flange once the vacuum unit is ready for connection so that no moisture, which would prolong the pumping time to attainment of final vacuum, precipitates in the pump.
- ➔ The use of a splinter shield in the high vacuum flange protects against foreign bodies (please see accessories for the turbopump).

Connecting The Pumping Station Via A Bellows

Advantage: Reduced vibration transmission.

The pumping station must be mechanically anchored.

- ➔ Screw the pumping station to a holder with threaded screws M10. The elastic buffers need not be removed.



Piping must be connected free of stress. A bellows fitted in the piping will compensate for any stress arising.

3.6. Cooling

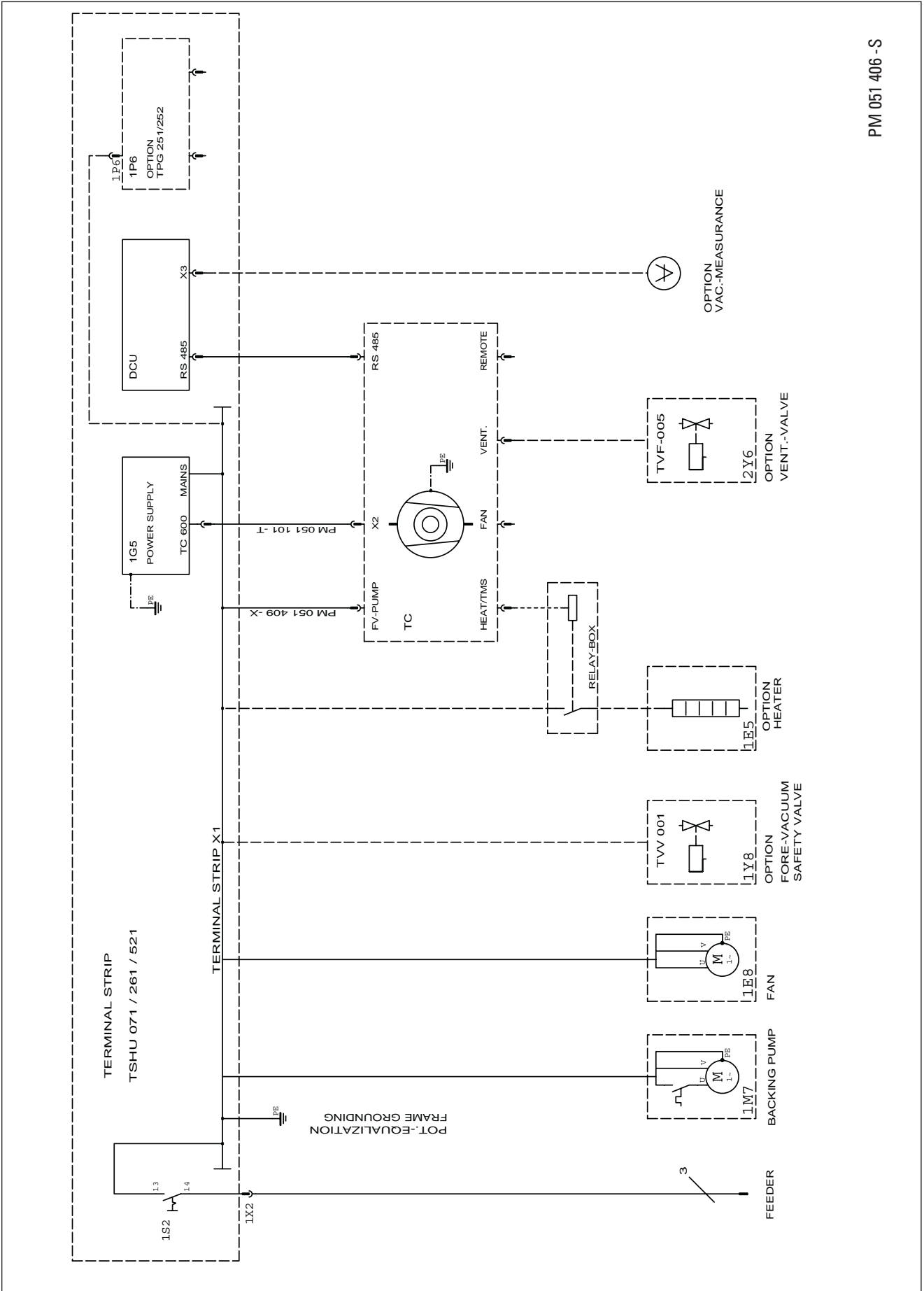
The pumping stations have been designed to be air cooled as standard where ambient temperatures of up to 35 °C are involved.

If required, conversion to water cooling is possible (for water cooling please refer to the "Accessories").



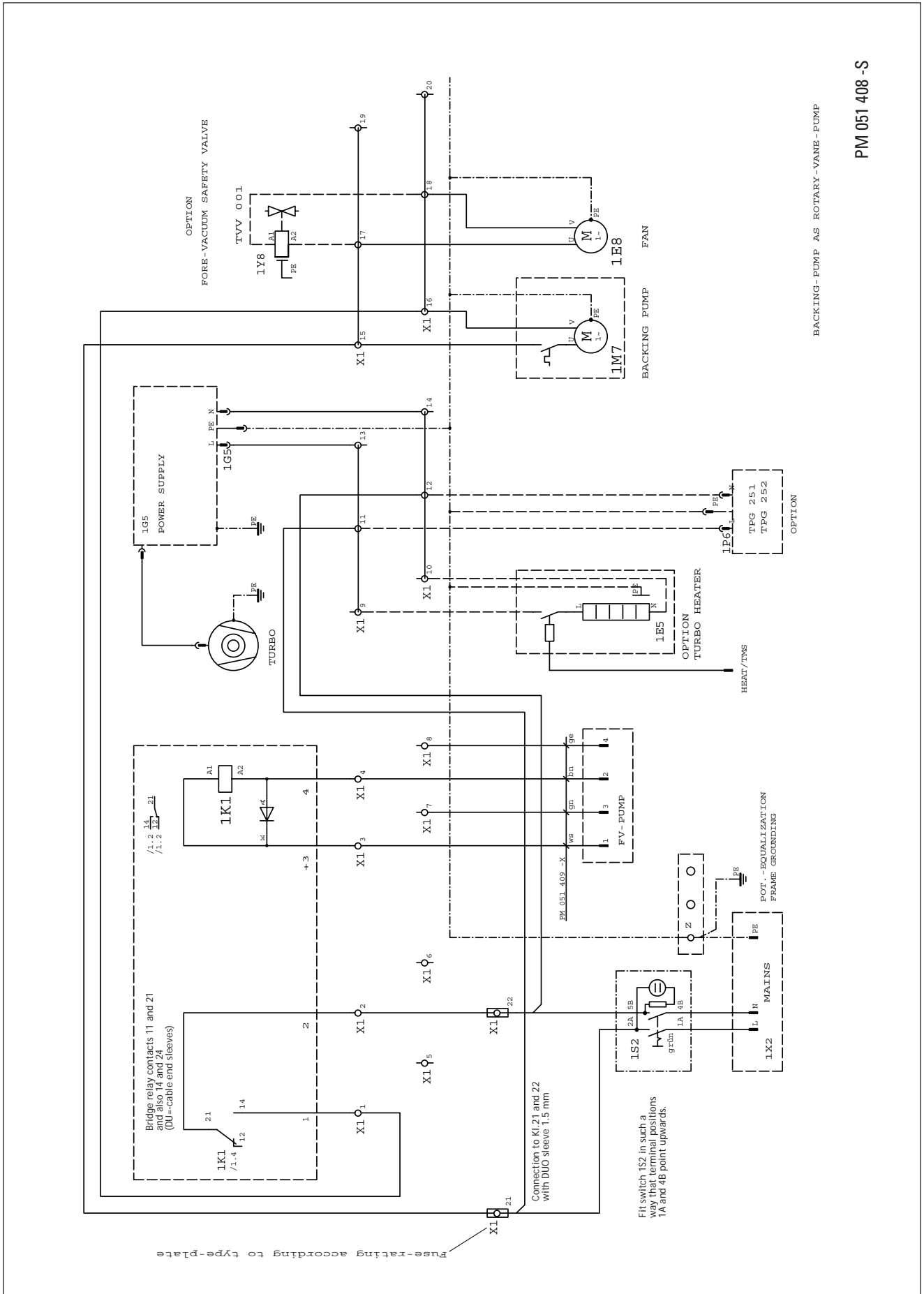
Water cooling is necessary where casing heating is being used.

3.7. Pumping Station Connections Plan General Schema



PM 051 406 -S

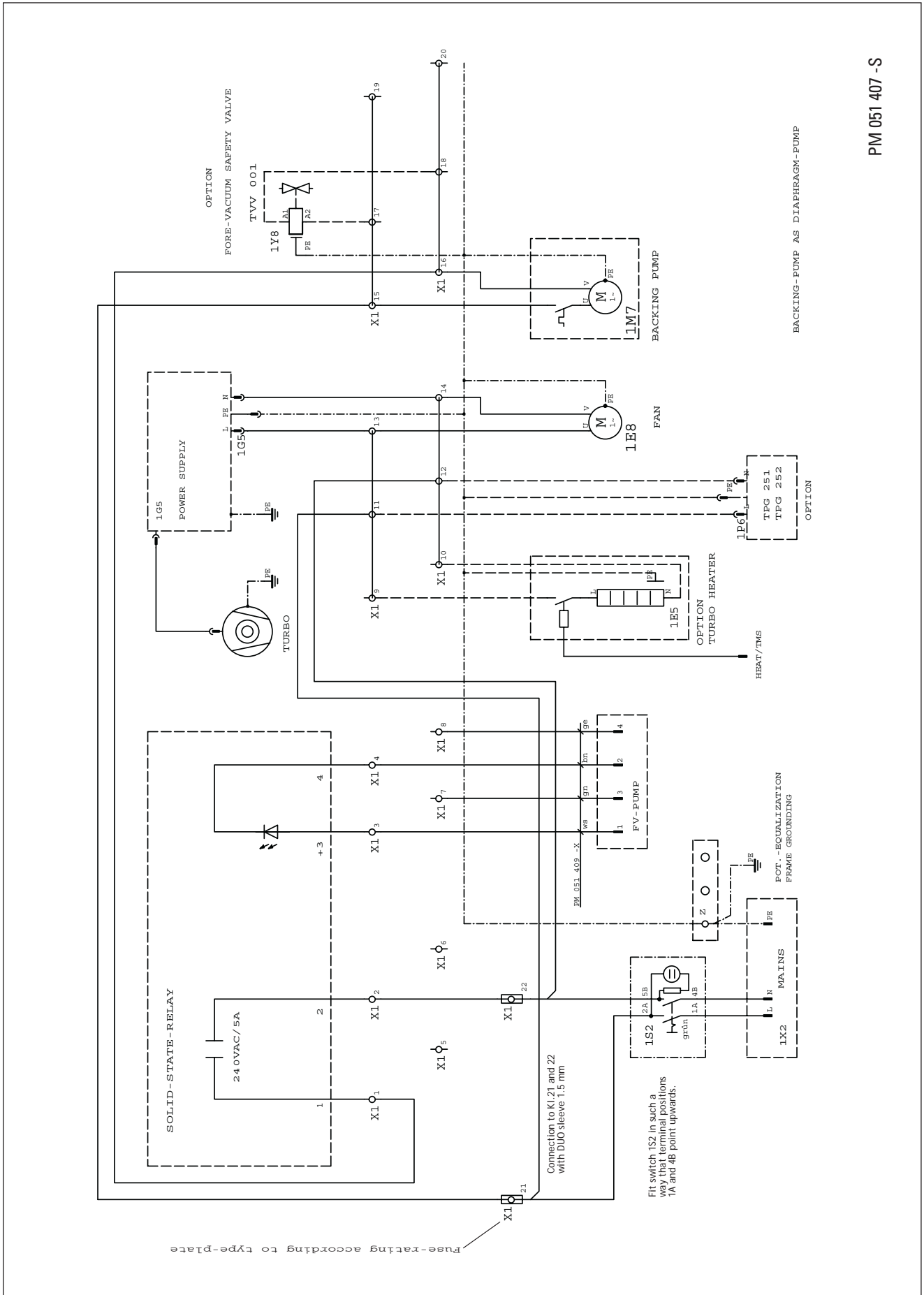
Connection Involving Rotary Vane Vacuum Pumps



BACKING-PUMP AS ROTARY-VANE-PUMP

PM 051 408 -S

Connection Involving Diaphragm Pumps

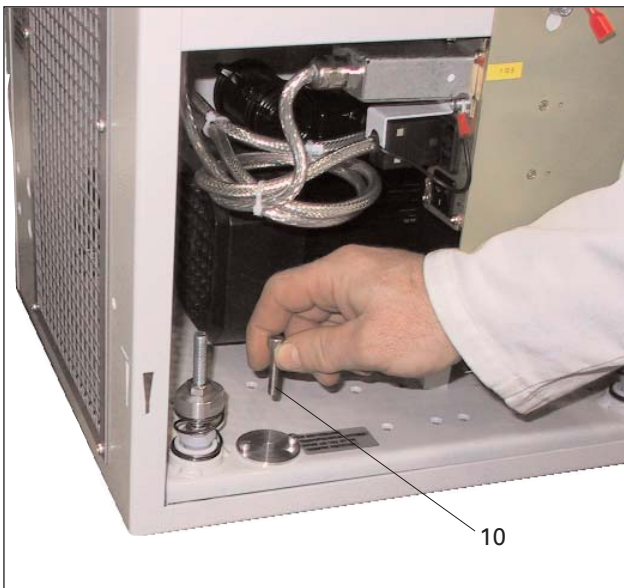
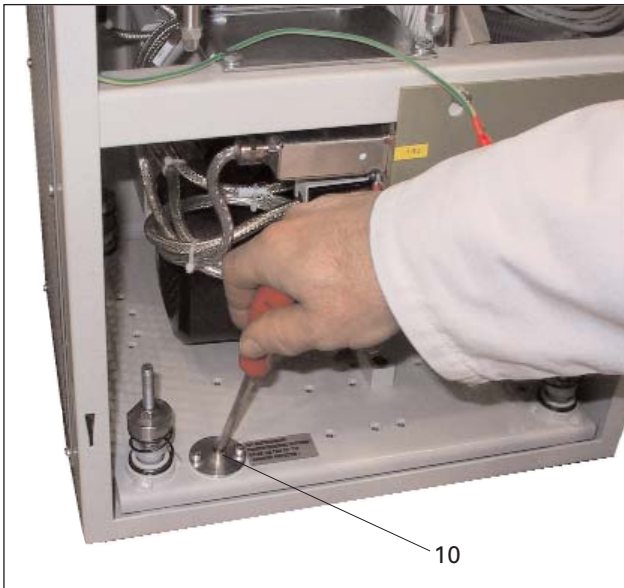


4. Operations

4.1. Transportation Protection

Pumping stations which contain a Diaphragm Pump MVP 055-3 or a rotary vane vacuum pump are shipped with transportation protection (please see also the sticker on the pumping station). The following must be removed before first-time starting:

- ➔ Remove both side panels from the pumping station by unscrewing each two screws.
- ➔ Disconnect the earthing cable from the side panels.
- ➔ Unscrew the Allan head screws 10 (M6) from both sides of the pumping station base.



- ➔ The transportation protection is now removed. The side panels can be re-fitted. Caution: Re-connect the earthing cable.

4.2. Filling In The Lubricant

- The **turbomolecular drag pump** bearing has been filled with the required amount of lubricant in the works.
- The **diaphragm pump** is lubricated for the whole of its working life.
- The **rotary vane vacuum pump** must be filled with operating fluid P3 before first time starting. A filling of operating fluid is included with the delivery consignment.

Procedure:

(please also refer to Section 6.1.).

- ➔ Unscrew two screws on the right-hand side panel. Slightly lift the panel and remove.
- ➔ Unscrew operating fluid filler screw 8.
- ➔ Unscrew the locking screw on the operating fluid flask (included) and screw on the filling hose (in the side panel).
- ➔ Insert the filling hose in the operating fluid filler opening and allow operating fluid to flow in; the amount and type of operating fluid is shown on the rating plate.
- ➔ Screw in operating fluid filler screw 8 and take care with the O-ring.
- ➔ Re-secure the filling hose in the side panel.
- ➔ Fit the side panel back onto the pumping station.

4.3. Operational Behaviour With Gas Load



Water cooling is necessary if the pumping station is to be operated with gas load.

Details regarding the operational behaviour with gas load can be found in the respective turbopump operating instructions.

4.4. Starting



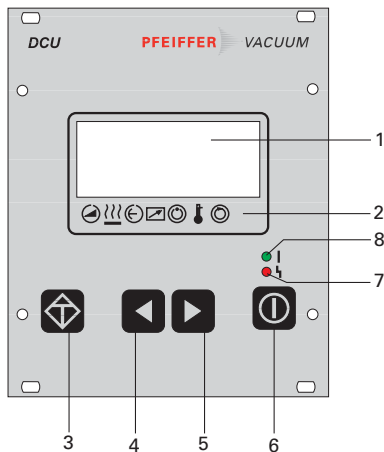
Turbopump rotors turn at great speed. When the high vacuum flange is open there is a danger of personal injury and of damage to the pump resulting from the falling in of objects.

Therefore, never operate the pump with an open high vacuum flange.

- ➔ With water cooling: Open the cooling water supply and check flow.
- ➔ Switch on the pumping station with the "Pumpstand EIN/AUS" ("pumping station ON/OFF") key (6) on the front panel.

Pumping station front panel

- | | |
|----------------------------------|--|
| 1 LCD display | 6 Pumping station ON/OFF key |
| 2 Status display | 7 Red illuminating diode for malfunction status |
| 3 Malfunction acknowledgment key | 8 Green illuminating diode for operations status |
| 4 Key "left" | |
| 5 Key "right" | |



- Once the self test has been successfully completed (duration: TSH/TSU 071 approximately 10 s; TSH/TSU 261 approximately 10 s; TSH/TSU 521 approximately 15 s), the pumping station begins to operate.
- If the vacuum pump does not start after being switched on please refer to "What To Do In Case Of Breakdowns" in the respective operating instructions for the turbopump.
- The turbomolecular drag pump starts up automatically. The start up phase up to attainment of the rotation speed switchpoint is dependent on the size of the vacuum chamber. For start up times in respect of the turbopump please refer to "Technical Data" in the relevant operating instructions.



Where the incidence of water vapour is anticipated, before starting the pumping station it is recommended to open the gas ballast valve on the backing pump by hand. If it is ascertained that the intake pressure of the pump increases or is unusually high, the valve can be opened while the pumping station is running. Once the final pressure has stabilized the valve can be closed again.

4.5. Switching OFF And Venting

- ➔ The complete pumping station is switched off with the key 6 "Pumpstand EIN/AUS" / "pumping station ON/OFF".
- Turbopump and vacuum chamber are vented via Venting Valve TVF 005 which opens for 0.3 seconds when the venting frequency does not attain 50% of the final rotation speed. It then closes again for 10 seconds and is then opened for the venting time of 3,600 seconds (1 hour).
- The venting mode can be changed via the DCU.
- ➔ Where water cooling is involved: Shut off water supply.

5. What To Do In Case Of Breakdowns?

Please refer to the operating instructions for the individual components for information on the elimination of malfunctions.

6. Maintenance



Maintenance on the individual components of the pumping station should be carried out in accordance with the instructions in the respective sections of the relevant operating instructions.

6.1. Replacing The Lubricant Reservoir And The Operating Fluid

- The **diaphragm pump** bearings are lubricated for the whole of their working life.
- The lubricant reservoir in respect of the **turbopump** should be replaced at least once a year. Where extreme operating conditions or unclean processes are involved, the replacement interval should be shorter.

Procedure:

- ➔ Unscrew the four screws from the cover plate and remove.
- ➔ Unscrew four screws from the turbopump holding plate.
- ➔ Lift out the turbopump with the holding plate from the pumping station.
- ➔ Carry out the change of the lubricant reservoir in accordance with the turbopump operating instructions.



The Lubricant can contain toxic substances from the medium pumped. Lubricant must be disposed of in accordance with the respective regulations. Safety instructions data sheet for the lubricant on request.

- The operating fluid for the **rotary vane vacuum pump** should be changed at least once a year.

Procedure:

- ➔ Unscrew the two screws on the right hand side panel. Slightly lift up the side panel and remove.
- ➔ Unscrew two screws 4 and pull out perforated plate 5 to the right hand side.
- ➔ Exert slight downward pressure on operating fluid duct 6, turn 90° and bring into the forward position.
- ➔ Unscrew operating fluid drain screw 7 and drain operating fluid via operating fluid duct 6 into a suitable container.



The temperature of the operating fluid can be as high as 80 °C.



Toxic gases and vapours can escape from the operating fluid which can be enriched with substances which represent a hazard to health. Disposal must be carried out in accordance with the relevant regulations.

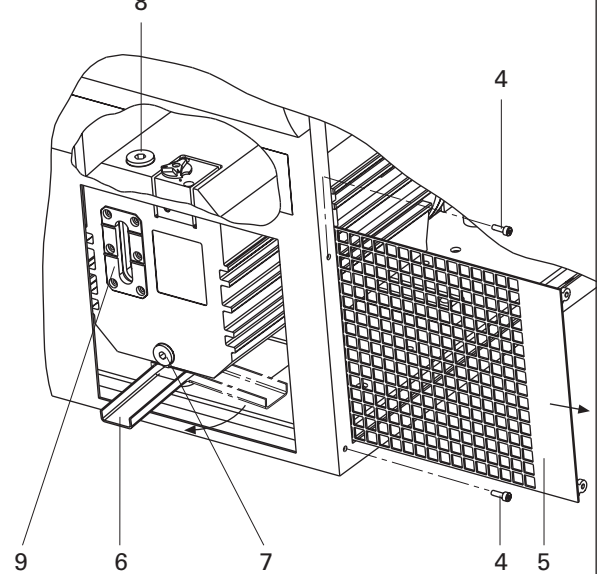
- ➔ Screw back in operating fluid drain screw 7 taking care with the O-ring.
- ➔ Fill in operating fluid as described in Section 4.1. of these operating instructions.
- ➔ Re-fit the perforated plate and the side panel.
- ➔ Check the operating fluid daily where non-stop operations are involved, otherwise each time the pumping station is switched on.



Further information regarding changes of operating fluid can be found in the operating instructions for the respective rotary vane vacuum pump.

Changing the operating fluid on rotary vane vacuum pumps

- 4 Screws (2 pieces)
- 5 Perforated plate
- 6 Operating fluid duct
- 7 Operating fluid drain screw
- 8 Operating fluid filler screw
- 9 Sight glass



Order numbers for the lubricant reservoir on turbopumps and operating fluid on rotary vane vacuum pumps

Lubricant reservoir on turbomolecular pumps		Order number
TMH/U 071		PM 073 073 -T
TMH/U 261		PM 063 265-T
TMH/U 521		PM 063 265 -T
Operating fluid for rotary vane vacuum pumps	Pack size	Order number
P3	1 l	PK 001 106 -T
P3	5 l	PK 001 107 -T
P3	20 l	PK 001 108 -T

7. Service

Do make use of our service facilities

In the event that repairs are necessary on your pumping station 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 Pfeiffer Vacuum Service Engineers,
- Return individual components to the manufacturer for repairs,
- Replace individual components.

Local Pfeiffer Vacuum representatives can provide full details.

Before returning:

- ➔ Dismantle all accessories.
- ➔ Drain lubricant/operating fluid (please see Section 6.1.).
- ➔ If the units are free of harmful substances 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 substances and preparations as defined in the current, local, dangerous substances regulations; 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 declaration of contamination

- ➔ In every case the "Declaration of Contamination" 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 Vacuum Service Center.

Please get in touch with your local Pfeiffer Vacuum 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.



Repair orders are carried out according to our general conditions of sale and supply.

If repairs are necessary, please send the unit together with a short damage description to your nearest Pfeiffer Vacuum Service Center.

Contact addresses and telephone hotline

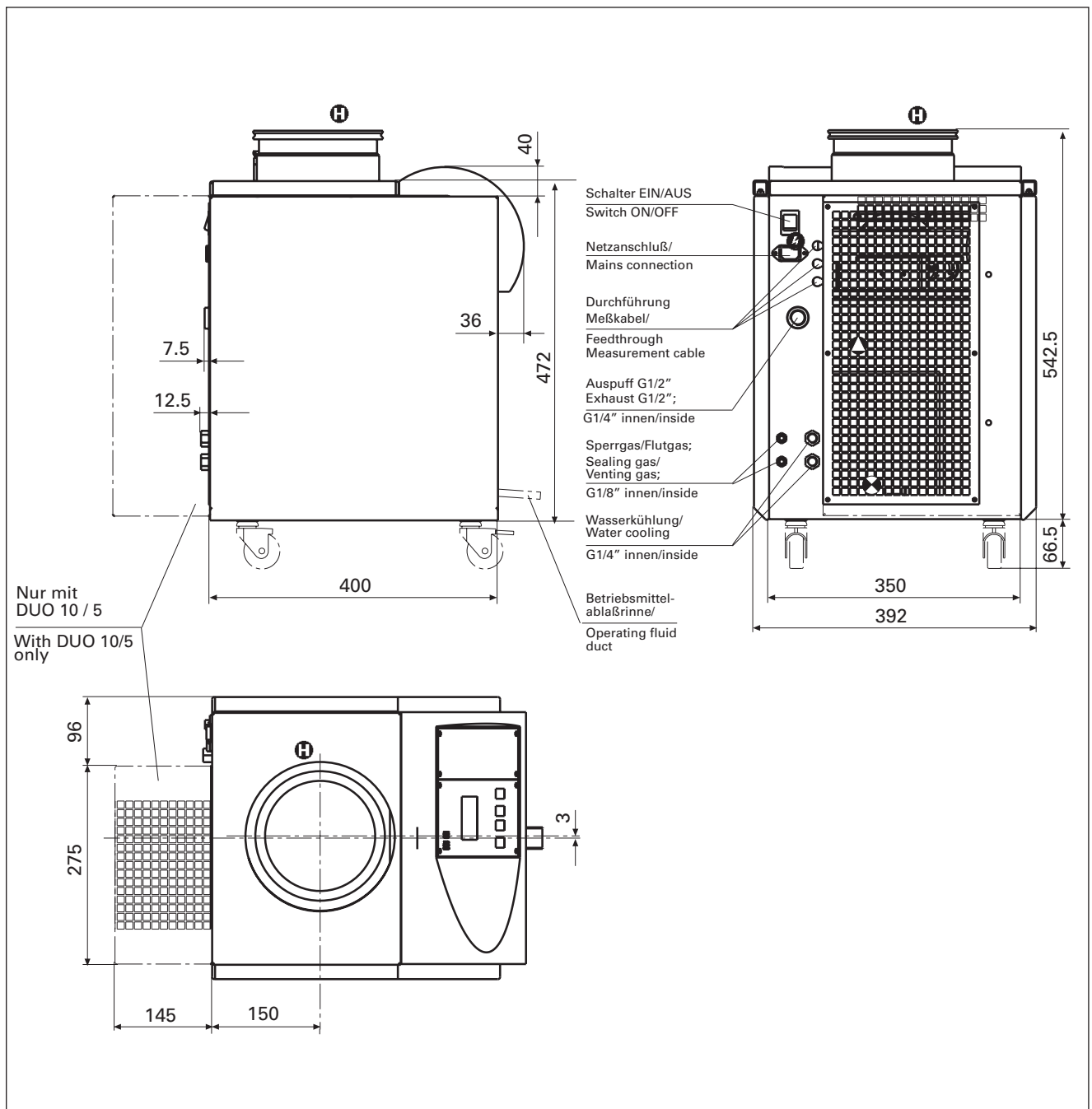
Contact addresses and telephone numbers can be found on the back cover of these operating instructions.

8. Technical Data

Pumping Station	Unit	TSH 071	TSH 071	TSU 071	TSH 261	TSU 261	TSH 521	TSH 521	TSU 521	TSU 521
Connection, nominal diameter		DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F	DN 100 ISO-K	DN 100 CF-F	DN 100 ISO-K	DN 160 ISO-K	DN 100 CF-F	DN 160 CF-F
Pumping speed for Nitrogen N ₂	l/s	33	60	60	210	210	300	510	300	510
Final pressure with rotary vane vacuum pumps	mbar	$< 1 \cdot 10^{-7}$	$< 1 \cdot 10^{-7}$	$< 5 \cdot 10^{-10}$	$< 5 \cdot 10^{-10}$	$< 5 \cdot 10^{-10}$	$< 5 \cdot 10^{-10}$ 1)	$< 5 \cdot 10^{-10}$ 1)	$< 5 \cdot 10^{-10}$	$< 5 \cdot 10^{-10}$
diaphragm pumps	mbar	$< 1 \cdot 10^{-7}$	$< 1 \cdot 10^{-7}$	$< 1 \cdot 10^{-8}$	$< 1 \cdot 10^{-8}$	$< 1 \cdot 10^{-8}$	$< 1 \cdot 10^{-8}$ 1)	$< 1 \cdot 10^{-8}$ 1)	$< 1 \cdot 10^{-8}$	$< 1 \cdot 10^{-8}$
Pumping speed, backing pump at a mains frequency of 50 Hz with										
Diaphragm Pump	m ³ /h	0,9	0,9	0,9	—	—	—	—	—	—
MVP 015-2	m ³ /h	2,1	2,1	2,1	2,1	2,1	—	—	—	—
MVP 035-2	m ³ /h	3,3	3,3	3,3	3,3	3,3	3,3	3,3	3,3	3,3
MVP 055-3	m ³ /h									
Rotary Vane Pump	m ³ /h	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
DUO 2.5	m ³ /h	5	5	5	5	5	5	5	5	5
UNO 5	m ³ /h	5	5	5	5	5	5	5	5	5
DUO 5	m ³ /h	10	10	10	10	10	10	10	10	10
Mains connection- power consumption with										
Diaphragm Pump	VA	140	140	140	—	—	—	—	—	—
MVP 015-2	VA	280	280	280	380	380	—	—	—	—
MVP 035-2	VA	300	300	300	400	400	500	500	500	500
MVP 055-3	VA									
Rotary Vane Pump	VA	230	230	230	330	330	430	430	430	430
DUO 2.5	VA	230	230	230	330	330	430	430	430	430
UNO 5	VA	470	470	470	570	570	670	670	670	670
DUO 5	VA	650	650	650	750	750	850	850	850	850
DUO 10	VA									
Weight with Diaphragm Pump	kg	28	28	28	—	—	—	—	—	—
MVP 015-2	kg	32	32	32	42	42	—	—	—	—
MVP 035-2	kg	37	37	37	47	47	56	56	56	56
MVP 055-3	kg									
Rotary Vane Pump	kg	32	32	32	42	42	51	51	51	51
DUO 2.5	kg	32	32	32	42	42	51	51	51	51
UNO 5	kg	44	44	44	54	54	63	63	63	63
DUO 5	kg									

1) Final pressure only reachable with metal sealing of the high vacuum flange

8.1. Dimensions



9. Accessories

Description	Size	Number	Comments/ relevant operating instructions	Ordering quantity
Drying Unit TTV 001		PM Z00 121	filled with zeolite/ PM 0022 BN	
Zeolite filling for the drying unit	approx. 260 cm ³	PM006 786 -T		
Set of rollers consist of: 2 wheels without brakes 2 wheels with brakes 4 screws 4 spring washers	M10 x 16 10,2 x 2,5	P 0994 830 P 3885 259 EA N 3059 469 8P N 3535 913 SP	for mobile pumping station	
Heating sleeve TMH/TMU 071	230 V; Schuko plug 208 V; UL plug 115 V; UL plug	PM 041 900 -T PM 041 901 -T PM 041 902 -T	PM 0542 BN	
TMH/TMU 261	230 V; Schuko plug 208 V; UL plug 115 V; UL plug	PM 041 903 -T PM 041 904 -T PM 041 905 -T	PM 0542 BN	
TMH/TMU 521	230 V; Schuko plug 208 V; UL plug 115 V; UL plug	PM 051 096 -T PM 051 097 -T PM 051 098 -T	PM 0542 BN	
Water cooling TSH/TSU 071 TSH/TSU 261 TSH/TSU 521		PM 016 102 -T PM 016 101 -T PM 016 101 -T		
Oil Mist Filter ONF 25 ONF 4-20 (for DUO 5 and DUO 10)		PM 015 399 -T PM 015 400 -T	PK 0213 BN PK 0169 BN	
Oil Mist Filter ONF 16 (for DUO 2.5 and DUO 5)		PM 015 401 -T	PK 0213 BN	

Further accessories are listed in the operating instructions for the individual components.

When ordering accessories please be sure to state the full part number. Please use this list as an order form (by taking a copy).

10. Spare Parts

Spare parts are listed in the relevant operating instructions for the individual components

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: _____



Konformitätserklärung *Declaration of Conformity*



im Sinne folgender EU-Richtlinien:
pursuant to the following EU directives:

- **Maschinen/Machinery 98/37/EG (Anhang/Annex IIA)**
- **Elektromagnetische Verträglichkeit/Electromagnetic Compatibility 89/336/EWG**
- **Niederspannung/Low Voltage 73/23/EWG**

Hiermit erklären wir, dass das unten aufgeführte Produkt den Bestimmungen der **EU-Maschinenrichtlinie 98/37/EG**, der **EU-Richtlinie über Elektromagnetische Verträglichkeit 89/336/EWG** und der **EU-Niederspannungsrichtlinie 73/23/EWG** entspricht.

*We hereby certify, that the product specified below is in accordance with the provision of **EU Machinery Directive 98/37/EEC**, **EU Electromagnetic Compatibility Directive 89/336/EEC** and **EU Low Voltage Directive 73/23/EEC**.*

Produkt/Product:

TSH/TSU 071
TSH/TSU 261
TSH/TSU 521

Angewendete Richtlinien, harmonisierte Normen und angewendete nationale Normen:

Guidelines, harmonised standards, national standards which have been applied:

EN 292-1	EN 50 081-1
EN 292-2	EN 50 082-2
EN 294	IEC 801 1-4
EN 61 010	VDE 0843-6
EN 55 011	

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