

Operating Instructions

TSH 071 E / TSU 071 E

Turbomolecular Drag Pumping Stations



Index

	Page		Page
1. Safety Instructions	2	4. Operations	6
1.1. For Your Orientation.....	2	4.1. Lubricant Filling	6
1.2. Pictogram Definitions.....	2	4.2. Starting	6
2. Understanding The Pumping Station	3	4.3. Switching OFF	6
2.1. Main Features.....	3	5. What To Do In Case Of Breakdowns ?	6
2.2. Pumping Station Control	3	6. Maintenance	6
2.3. Pumping Station Components.....	13	6.1. The Lubricant.....	6
3. Installation	4	7. Service	7
3.1. Preparations For Installation.....	4	8. Technical Data	8
3.2. Laying The Exhaust Line	4	8.1. Dimensions.....	8
3.3. Venting Units.....	4	9. Accessories	9
3.4. Electrical Connections	4	10. Spare Parts	9
3.5. Connecting The Vacuum System	4	Declaration of Contamination	10
3.6. Cooling	4	Declaration Of Conformity	(last page)
3.7. Connections Diagram.....	5		

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.
- ☞ Do not disconnect the plug between the TC 600 and accessory components during operations.
- ☞ 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).
- ☞ 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.
- ☞ When returning individual components please observe the shipping instructions (refer to the operating instructions for the pumping station components).

1.1. For Your Orientation

In the text

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

Symbols used

The following symbols are used throughout in illustrations.

- ⊕ High vacuum flange
- ⊖ Fore-vacuum flange
- ⊕ Air cooling

1.2. Pictogram Definitions



Danger of personal injury.

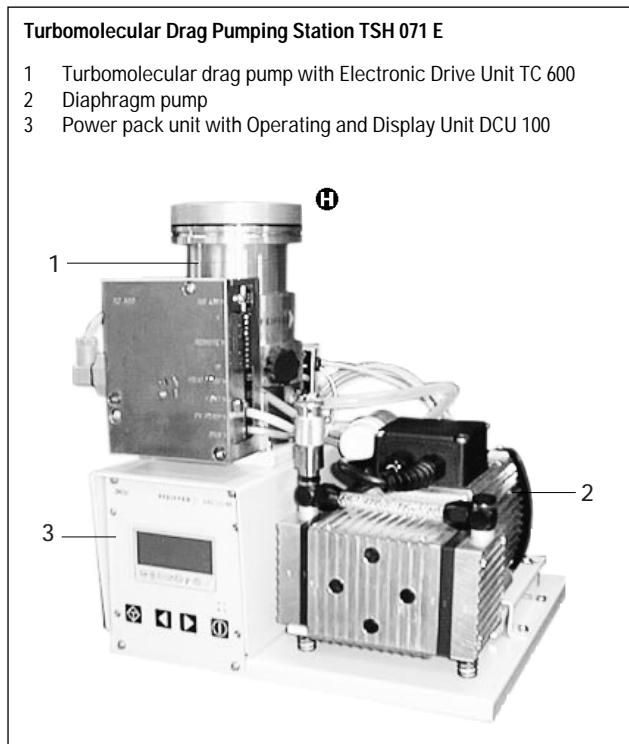


Danger of damage to the pumping station or to the system.

Modifications reserved.

2. Understanding The Pumping Station

2.1. Main Features



The pumping stations are ready for connection and are fully automatic operating pumping units.

The integrated power pack unit with Operating and Display Unit DCU 100 serve to control and monitor and to operate in conjunction with the Electronic Drive Unit TC 600.

Cooling

Standard: Air cooling (up to 35 °C ambient temperature)

Alternative: Water cooling

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.
- Operating in environments which require a protection class superior to IP 30.
- 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
TSH 071 E	TC 600 mit DCU 100
TSU 071 E	TC 600 mit DCU 100

Accessory connections on the

TC 600:

- Air cooling
- Venting Valve TVF 005
- Turbopump heating
- Diaphragm Vacuum Pump MVP 015-T

DCU 100:

- Vacuum gauges

2.3. Pumping Station Components

Pumping Station	TSH 071 E TSU 071 E	Operating Instructions
Pumping Station Components		
Turbomolecular Drag Pump with-Electronic Drive Unit TC 600	TMH 071 P TMU 071 P	PM 800 504 BN PM 800 504 BN
Diaphragm Vacuum Pump	MVP 015-T	PK 800 181 BN
Power pack unit with Operating and Display Unit Air cooling	DCU 100 Yes	PM 800 477 BN PM 800 543 BN

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 and fore-vacuum side immediately before connection.
- The lubricant reservoir is already fitted to turbopumps and filled.
- Permissible magnetic field ≤ 4 mT.
- The pumping station should be erected on a horizontal surface.

3.2. Laying The Exhaust Line



Please observe the backing pump operating instructions when laying the exhaust line.



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.

3.3. Venting Units

Turbomolecular Drag Pumps TMH/TMU 071 P can be vented with the venting screw (condition on delivery). The venting time to atmospheric pressure is minimum 30 seconds.

Venting Valve TVF 005 (accessory)

Venting Valve TVF 005 can be used in conjunction with the TC 600 to vent the TMH/TMU 071 P.

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 100.

3.4. Electrical Connections



The electrical connections must be carried out 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.

- ➔ Connect both (DCU and diaphragm pump) mains plugs (mains connecting cable 2.5 m long).

Accessory connections

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

3.5. Connecting The Vacuum System



The weight of a vacuum chamber freely flanged on the vacuum flange must not exceed 200 N (equivalent to 20 kg). There should be unilateral loading on the high vacuum flange.

Important

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).

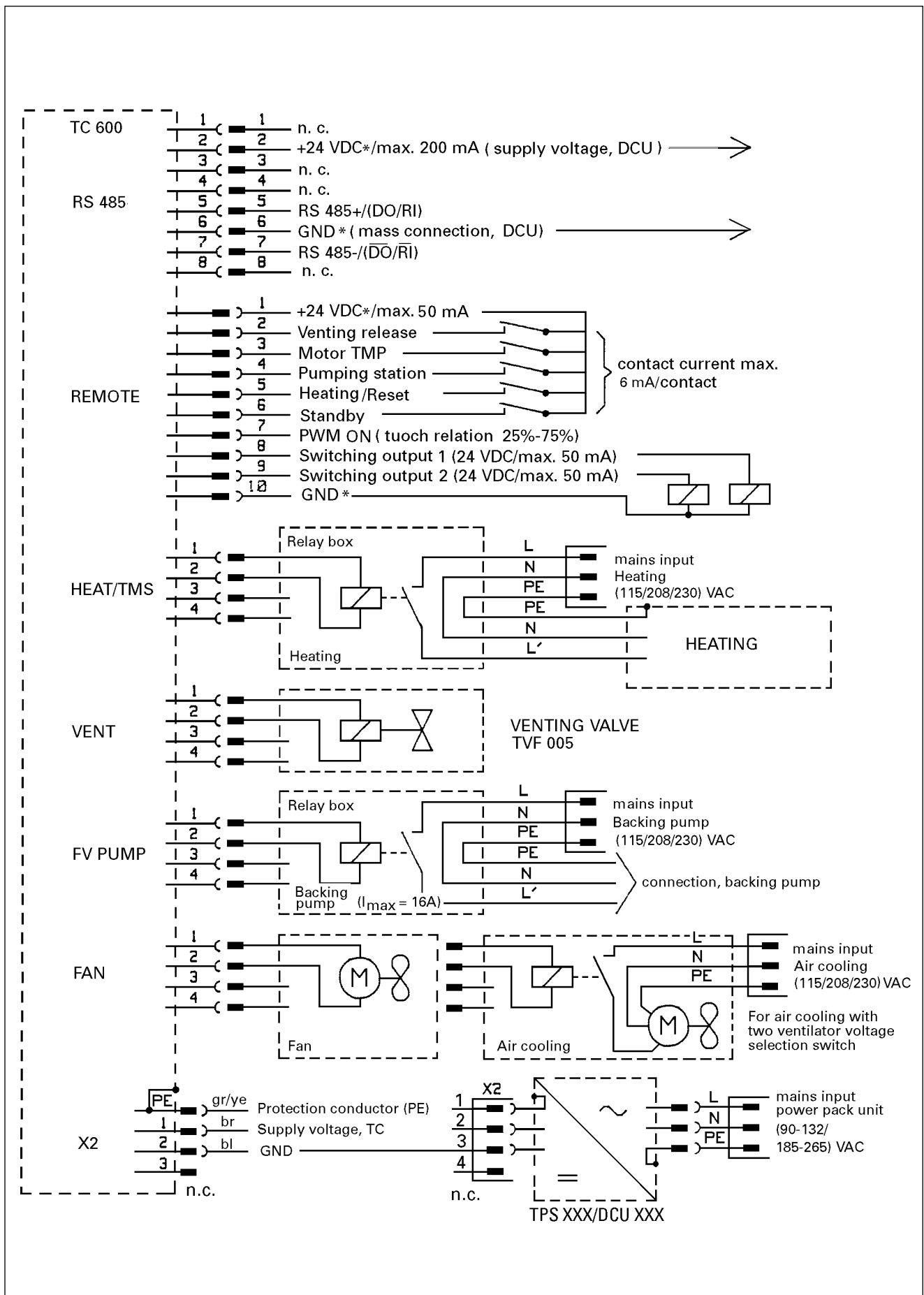
3.6. Cooling

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.



Water cooling is necessary where casing heating units are being used (please see „Accessories“).

3.7. Connections Diagram



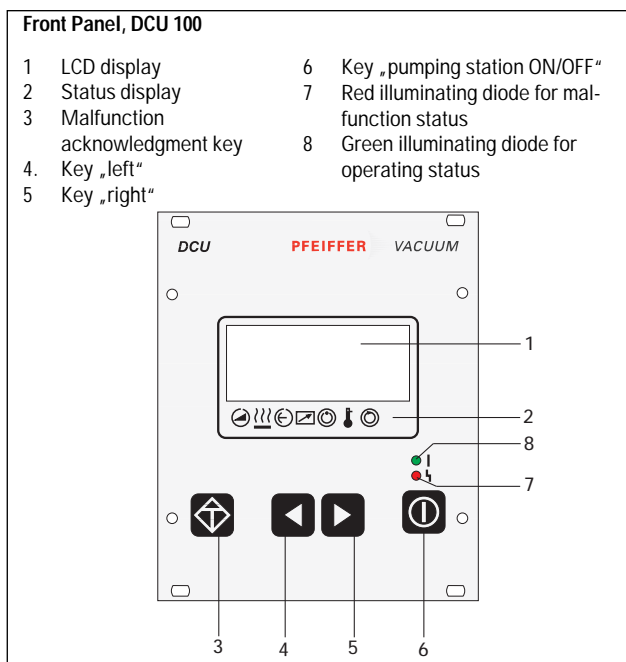
4. Operations

4.1. Lubricant Filling

- The turbomolecular drag pump bearing has been filled with the required amount of lubricant in the works. The lubricant reservoir should be changed in accordance with the respective operating instructions.
- The diaphragm pump is lubricated for the whole of its working life.

4.2. Starting

- ➔ Switch on with the „Pumping Station ON/OFF“ key on the front panel of the DCU 100.



- Once the self test has been successfully completed (duration approximately 10 seconds), the pumping station begins operating.
- 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.
- 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.

Please note:

It is recommended, before starting the pumping station, especially where water vapour presence is to be anticipated, to open the gas ballast valve on the backing pump by hand. If the intake pressure on the pump increases or is unusually high, the valve can be opened, even when the pumping station is running. Once the final pressure has stabilised, the valve can again be closed.

4.3. Switching OFF

- ➔ The complete pumping station is switched off with the key „pumping station ON/OFF“.
- Pump and vacuum chamber can be vented directly after switching off (please see Section 3.3.).
- Where Venting Valve TVF 005 is in use this valve 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 100.

5. What To Do In Case Of Breakdowns?

Please refer to the operating instructions for the individual components for information on what to do in the case of breakdowns.

6. Maintenance

Please note:

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.

Lubricant Reservoir	Order Number
TMH 071 P	PM 073 073 -T
TMU 071 P	PM 073 073 -T

6.1. The Lubricant

- 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.

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 Service Engineers,
- Return individual components to the manufacturer for repairs,
- Replace individual components.

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 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 Service 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 pump to your nearest PFEIFFER Service Center.

Contact addresses and telephone hotline

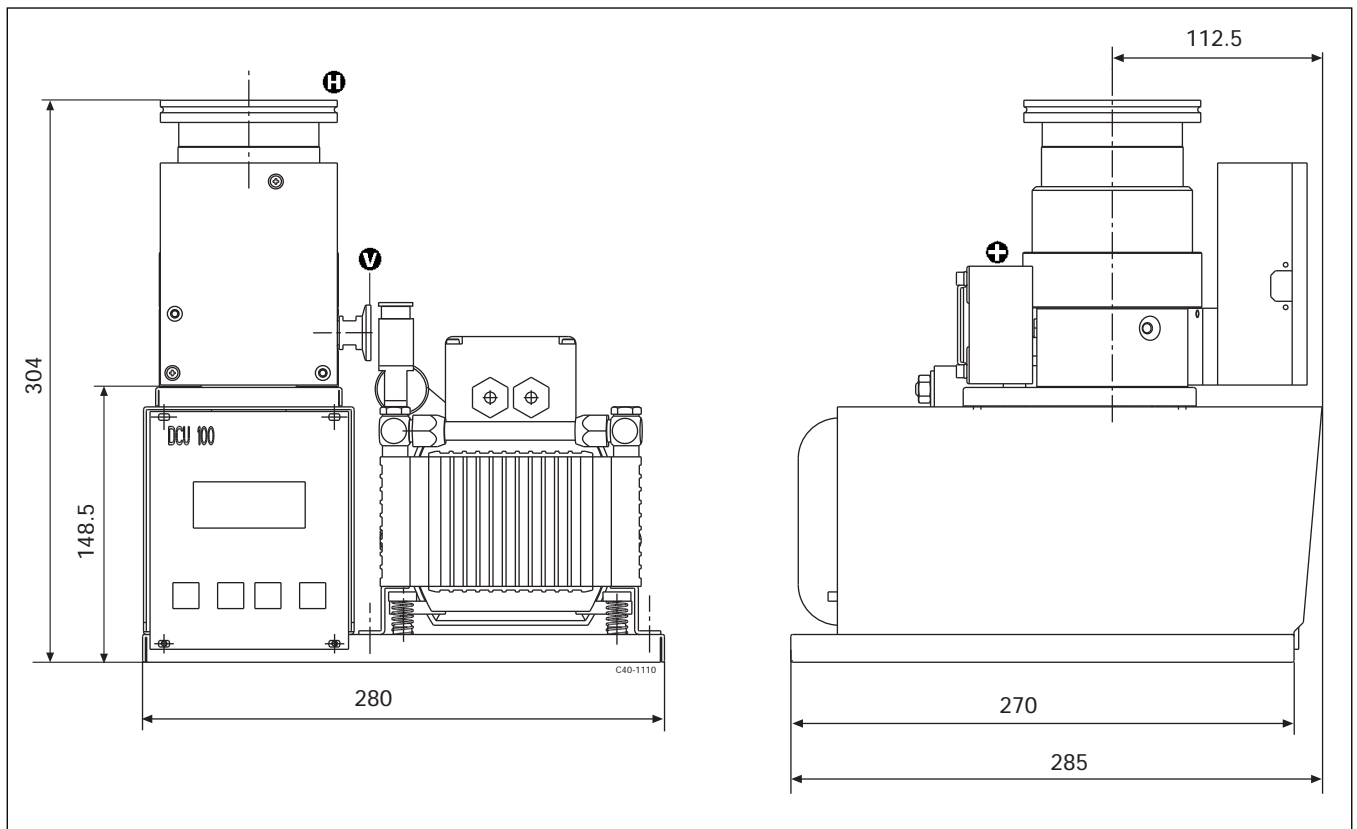
Contact addresses and telephone numbers can be found on the back cover of these operating instructions.

8. Technical Data

Pumping Station	Unit	TSH 071 E	TSH 071 E TSU 071 E
Connection, nominal diameter		DN 40 ISO-KF	DN 63 ISO-K DN 63 CF-F
Volume flow rate for Nitrogen N ₂	l/s	33	60
Helium He	l/s	38	55
Hydrogen H ₂	l/s	37	45
Working range From	mbar	1000	1000
To	mbar	$< 1 \cdot 10^{-8}$	$< 1 \cdot 10^{-9}$
Backing pump volume flow rate At 10 mbar 50 Hz	l/min	≤ 3.8	≤ 3.8
60 Hz	l/min	≤ 4.4	≤ 4.4
Electrical connection value	kW	0.1	0.1
Weight	kg	16	16/17

Please refer to the relevant operating instructions for technical data on the individual components.

8.1. Dimensions



9. Accessories

Description	Size	Number	Comments/ Relevant Operating Instructions	Ordering Quantity
Venting Valve TVF 005, closed in a currentless condition	24 VDC	PM Z01 135	PM 800 507 BN	
Casing heating units	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 800 542 BN PM 800 542 BN PM 800 542 BN	
Water cooling		PM 016 000 -T	PM 800 546 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: _____

⇒ **DE, AT**

Konformitätserklärung 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 den Bestimmungen der EU-Maschinenrichtlinie 89/392/EWG - Anhang IIA, der EU-Richtlinie über elektromagnetische Verträglichkeit 89/336/EWG und der EU-Niederspannungsrichtlinie 73/23/EWG entspricht.

Die angewandten Richtlinien, harmonisierten Normen, nationalen Normen und Spezifikationen sind unten aufgeführt.

⇒ **GB, IE**

Declaration of conformity 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 in accordance with the provision of EU Machinery Directive 89/392/EEC - Annex II A, EU Electromagnetic Compatibility Directive 89/336/EEC and EU Low Voltage Directive 73/23/EEC.

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

⇒ **BE, FR**

Déclaration de conformité 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 répond bien aux dispositions de la directive machine CE 89/392/CEE - appendice II A, 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 di conformità 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 rispetta le disposizioni della direttiva UE sui macchinari 89/392/CEE - Appendice II A - della direttiva UE sulla compatibilità elettromagnetica 89/336/CEE e della 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 de conformidad 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 concuerda con las disposiciones resultantes de la Directiva 89/392/MCE de la UE sobre Maquinarias - Apéndice IIA, 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 inzake de conformiteit 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 produkt voldoet aan de bepalingen van de EU-machinerichtlijn 89/392/EEG - appendix II A, de EU-richtlijn over elektromagnetische compatibiliteit 89/336/EEG en de EU-richtlijn over laagspanning 73/23/EEG.

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

⇒ **DK**

EF-konformitetserklæring 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 i overensstemmelse med bestemmelserne i EU-maskindirektiv 89/392/EWG - tillæg II A, Eu-direktiv vedrørende elektromagnetisk kompatibilitet 89/336/EWG og EU-lavspændingsdirektiv 73/23/EWG.

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

⇒ **SE**

Konformitetsförklaring 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 stämmer överens med EG's maskindirektiv 89/392/EEC - annex II A, 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.



Vaatumusten mukaisuus vakuutus seuraavien EU-direktiivien mukaisesti:

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

Vahvistamme, täten, että allmainittu tuote vastaa EU-konedirektiivin 89/392/ETY - liite IIA, EU-direktiivin sähkömagneettinen siedettävyyks 89/336/ETY ja EU-pienjännitedirektiivin 73/23/ETY vaatimuksia.

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



Declaração de conformidade, 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 está em conformidade com as disposições pertinentes na Directiva CE para máquinas, na redacção 89/392/CEE - Apêndice II A, na Directiva CE sobre compatibilidade electromagnética, na redacção 89/336/CEE, e 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 συμμόρφωσης κατά το κείμενο 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 ανταποκρίνεται στην οδηγία περί μηχανών της Ε.Ε. 89/392/Ε.Ο.Κ.- παράρτημα II Α, στην οδηγία περί ηλεκτρομαγνητικής συμβατότητας της Ε.Ε. 89/336/Ε.Ο.Κ. και στην οδηγία περί χαμηλής τάσης της Ε.Ε. 73/23/Ε.Ο.Κ.

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

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

TSH 071 E
TSU 071 E

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 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 | |

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

01. 04.1996

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