

Operating Instructions

TSD 022
TSH 064 D / TSU 064 D
TSH 065 D / TSU 065 D

Turbomolecular Drag Pumping Stations



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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 pumping station;
 - 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 carry out any unauthorised conversions or modifications on the pumping station.
- ☞ When returning pumping components to us please note the shipping instructions (please see operating instructions for the pumping station components).

Modifications reserved.

Pictogram-Definitions:



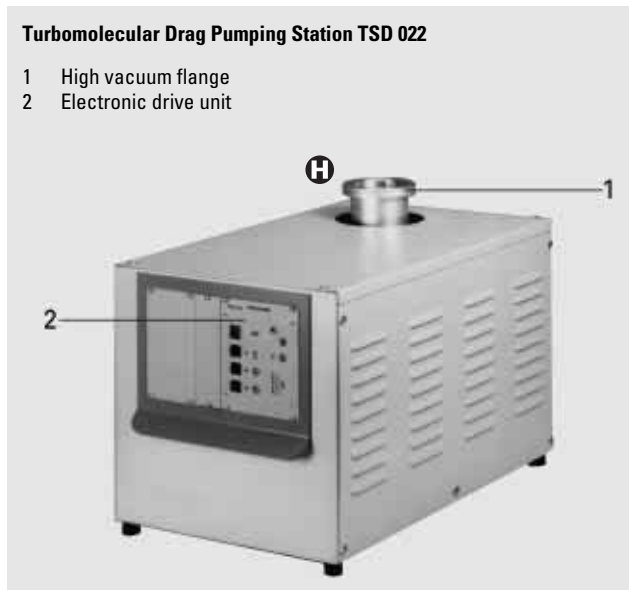
Danger of personal injury.



Danger of damage to the pumping station or system.

2. Understanding The Pumping Station

2.1. Main Features



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

The integrated pumping station control unit (TCS) controls and monitors the process and operates in conjunction with the electronic drive unit (TCP).

Cooling

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

Alternative: Water cooling (on request)

Proper Use

- Turbomolecular Pumping Stations may only be used for the purpose of generating vacuum.
- Turbomolecular Pumping Stations may only be operated in the prescribed configuration.

Improper Use

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

- Pumping corrosive or explosive gases.
- Operating the pumping station where explosive processes are involved.
- Using accessories not named in this manual and/or not authorised by the manufacturer.

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

2.2. Pumping Station Control

Pumping Station	Pumping Station Control
TSD 022	TCS 015
TSH 064 D	
TSU 064 D	
TSH 065 D	
TSU 065 D	

Accessory connection on the TCP 015:

- Air cooling
- Venting Valve TSF 012
- Turbopump heating

Connection on the TCS 015:

- Diaphragm Vacuum Pump MZ 2T
- Fore-Vacuum Safety Valve TVV 001

2.3. Pumping Station Components

Pumping Station	TSD 022	TSH 064 D	TSH 064 D TSU 064 D	TSH 065 D	TSH 065 D TSU 065 D	Operating Instructions
Pumping Station Components						
Turbomolecular Drag Pump	TPD 022	TMH 064	TMH 064 TMU 064	TMH 065	TMH 065 TMU 065	PM 800 412 BN PM 800 308 BN with supplementary sheet PM 800 321 BN PM 800 308 BN
Diaphragm Pump Electronic Drive Unit Pumping Station Control Venting Valve	MZ 2T TCP 015 TCS 015 —	MZ 2T TCP 015 TCS 015 TSF 012	MZ 2T TCP 015 TCS 015 TSF 012	MZ 2T TCP 015 TCS 015 TSF 012	MZ 2T TCP 015 TCS 015 TSF 012	PK 800 173 BN PM 800 230 BN PM 800 248 BN PM 800 168 BN

2.4. For Your Orientation

Instruction 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
- Ⓧ Venting connection
- Ⓝ Cooling water connection
- ⚡ Electrical connection
- Ⓜ Gas inlet
- Ⓜ Exhaust
- Ⓡ Air cooling

Position numbers

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

3. Installation

3.1. Preparations For Installation



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

- Only remove blank flanges on the high and fore-vacuum side just before connecting.
- The turbo pumps are supplied with their lubricant reservoirs fitted and filled.
- Permissible magnetic field ≤ 7.0 mT.
- Place the pumping station on a horizontal surface.

3.2. Laying The Exhaust Line



When laying the exhaust line the instructions in the backing pump operating instructions must be followed.

Exhaust gases and vapours can be hazardous to health and environmentally pollutive.

3.3. Venting Units

TPD 022

The Turbomolecular Drag Pump TPD 022 has to be vented on the HV side because it has no separate venting connection. On blank flanged pumps the venting time must not be less than 30 seconds.

TMH/U 064 and TMH/U 065

Turbomolecular Drag Pumps TMH/U 064 and TMH/U 065 are vented automatically because the pumping stations are fitted with Venting Valve TSF 012 as standard.

Venting Valve TSF 012

Venting Valve TSF 012 is used, in conjunction with the TCP 015, to vent the TPD 022 (venting valve connected on the vacuum chamber), the TMH/U 064 and the TMH/U 065. Delay in venting is a common function of the TCP and the TSF 012. On switching on, Venting Valve TSF 012 closes immediately. After switching off or a power failure, the TSF 012 is supplied with power by the drive motor of the turbo drag pump.

Venting begins: at approx. 30% to 35% of the rated rotation speed

Venting valve: remains open.

Drier TTV 001 (accessory)

The drier keeps moisture away from the equipment when venting with atmospheric air.

- ➔ Fix Drier TTV 001 to the rear side of the pumping station casing (insert nuts), using the knurled screws and two holders (accessory) provided.
- ➔ Make connection to the venting valve with a PVC hose (accessory).

3.4. Electrical Connections



Electrical connections must be carried out in compliance with local regulations. Voltages specified on the rating plate and mains voltages must concur.

Alternating current is necessary to operate the pumping station. A mains power cable (2.5 m long) is provided on the pumping station.

- ➔ Connect mains plug (now the pumping station can be operated).

Accessory Connections:

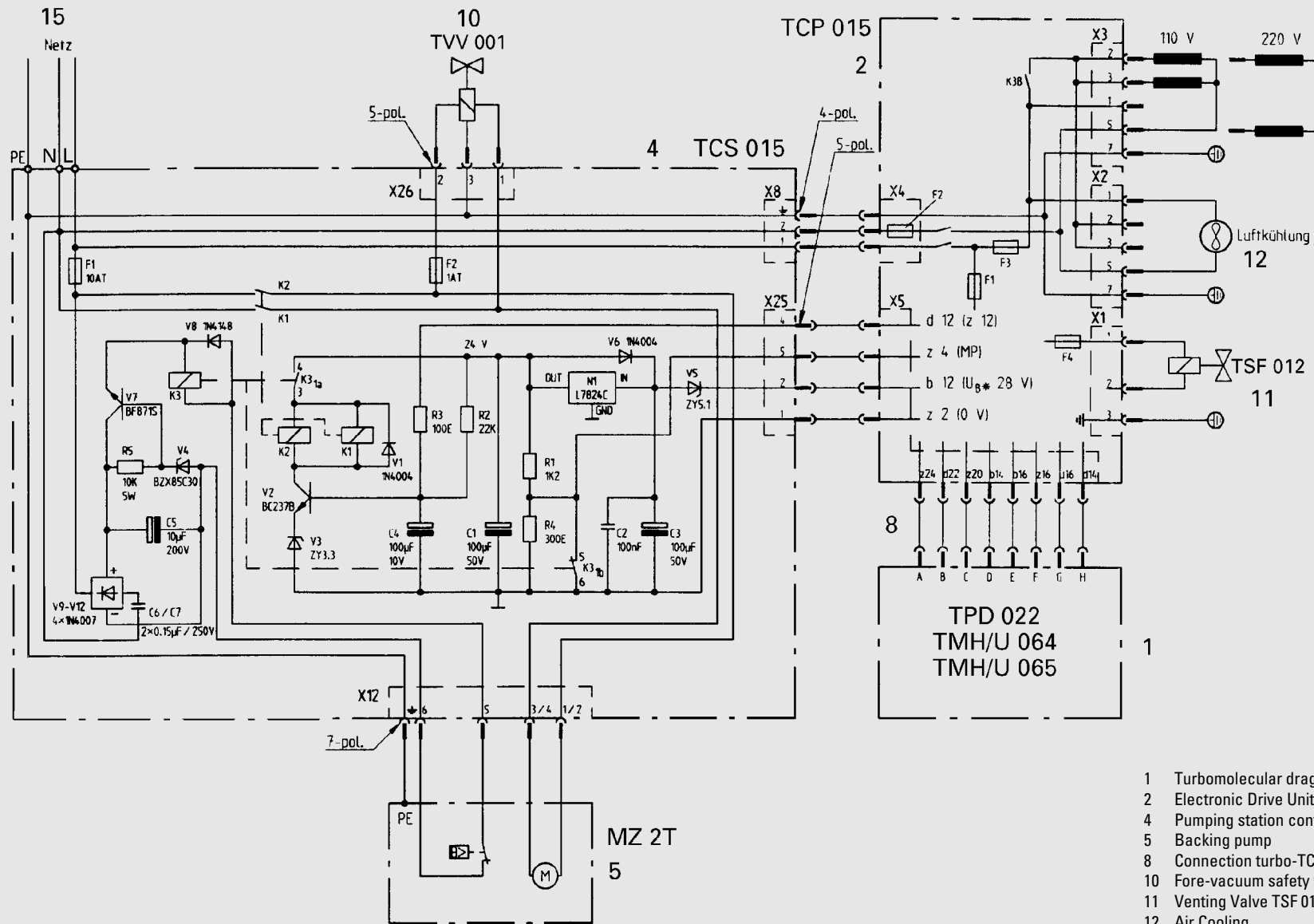
Electrical connection of the accessory:

When operating a TCP 015 as per Wiring Diagram PM 041 532 -S.

Earthing

When separating the turbopump from the pumping station to operate with a longer cable, an additional cable can be connected to the earthing point on the boring M4 (marked with the earth symbol).

Wiring Diagram PM 041 532 -S



- 1 Turbomolecular drag pump
- 2 Electronic Drive Unit TCP
- 4 Pumping station control unit
- 5 Backing pump
- 8 Connection turbo-TCP
- 10 Fore-vacuum safety valve
- 11 Venting Valve TSF 012
- 12 Air Cooling
- 15 Mains connection

3.5. Connecting The Vacuum Equipment



The weight of a vacuum chamber freely flanged onto the vacuum flange must not exceed 200 N (corresponds to 20 kg).

Important

Observe strict cleanliness when fitting all HV parts. Unclean parts prolong the pumping time.

- ➔ Only remove blank cover on the high vacuum flange when the equipment is ready for connecting so that no moisture, which would prolong the pumping time to final vacuum, is deposited in the pump.
- ➔ Fit the splinter shield in the high vacuum flange to protect against foreign particles (see turbopump accessories).

Flanging The Pumping Station Via The Bellows

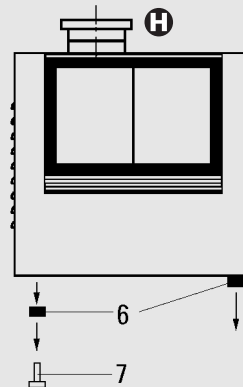
Advantage: Reduced vibration transmission.

The pumping station must be mechanically anchored.

- ➔ Unscrew the rubber feet from the underside (of the base).
Fix the pumping station onto a holder with M6 screws.

Anchoring Points On The Underside Of The Pumping Station

- 6 Rubber feet (4x)
- 7 M6 screws (4x)



Piping must be connected free of tension. To compensate against tension arising, the bellows must be fitted into the piping.

3.6. Cooling

The pumping station is fitted with air cooling which can be used for ambient temperatures up to 35 °C as standard. Conversion to water cooling is possible if required (water cooling on request).

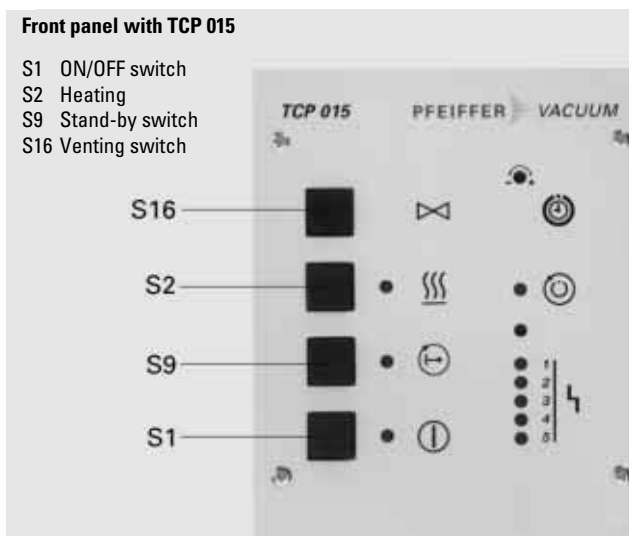
4. Operations

4.1. Lubricant Filling

- On delivery, the bearing of the turbomolecular drag pump has already been provided with the required amount of lubricant. Replacing the lubricant reservoir should be carried out in accordance with the relevant operating instructions.
- Diaphragm pumps have life-long lubrication.

4.2. Starting

- ➔ Switch on with S1 on the front panel of the pumping station.



- If the vacuum pump does not start after switching on please refer to the Section "What To Do In The Case Of Breakdowns" in the relevant operating instructions.
- The turbomolecular drag pump runs up automatically. The run-up phase to attainment of the rotation speed switch point is dependent on the size of the vacuum chamber. For the run-up times of the pumps please refer to Section "Technical Data" of the relevant operating instructions.

4.3. Switching Off

- ➔ The complete pumping station is switched off with S1.
- The Diaphragm Pump MZ 2T does not shut tight to atmosphere so the turbopump and the vacuum equipment are vented via the fore-vacuum connection. To avoid this, it is recommended to fit a Vacuum Safety Valve TVV 001 between the turbopump and the backing pump (see accessories).
- Both pump and vacuum chamber can be vented directly after switching off (see Section 3.3).
- Where Venting Valve TSF 012 is fitted, venting occurs at approx. 30% to 35% of the rated rotation speed.

5. What To Do In The Case Of Breakdowns?

Please refer to the operating instructions for the individual components.

6. Maintenance

Please note:

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

6.1. Lubrication

- Diaphragm pump bearings have life-long lubrication.
- The lubricant reservoir of the turbopump should be changed at least once a year, but under extreme conditions or where unclean processes are involved, more frequently.

Lubricant reservoir	Order Nr.
TPD 022	PM 033 759-T
TMH / TMU 064	PM 033 759-T
TMH / TMU 065	PM 033 759-T

7. 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:

- On the spot repairs by our Service Engineers,
- Return the individual components to the manufacturer for repairs,
- Replacement with new value 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 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 radioactively, microbiologically or biologically 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 (see operating instructions for the individual components).
- ➔ 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 radioactively, microbiologically or biologically contaminated.

Returning Contaminated Units

If contaminated units 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 Service Hotline

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

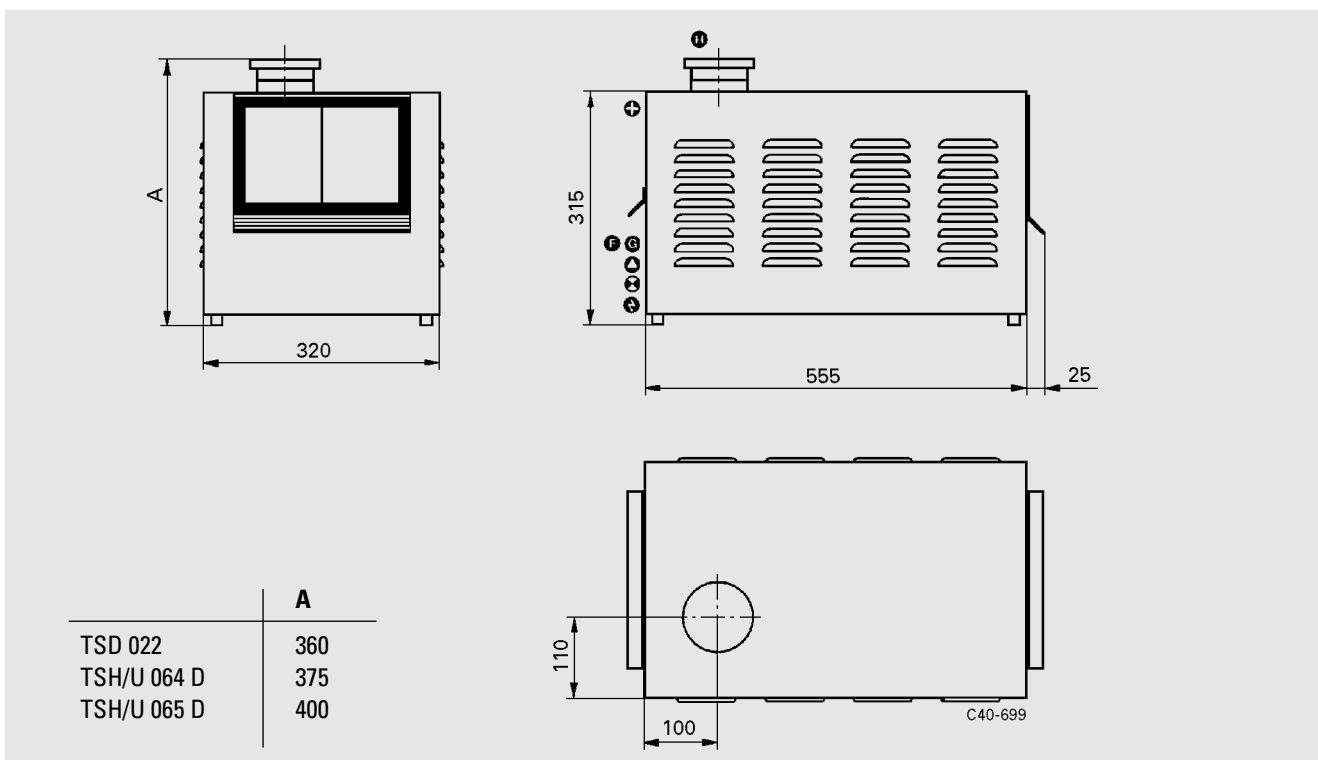
8. Technical Data

Pumping Station	Unit	TSD 022	TSH 064 D	TSH 064 D TSU 064 D	TSH 065 D	TSH 065 D TSU 065 D
Connection nominal diameter		DN 63 ISO-K	DN 40 ISO-KF	DN 63 ISO-K DN 63 CF-F	DN 40 ISO-KF	DN 63 ISO-K DN 63 CF-F
Volume flow rate for Nitrogen N ₂	l/s	18 (15) ¹⁾	30	53	30	56
Helium He	l/s	12 (10) ¹⁾	40	42	40	48
Hydrogen H ₂	l/s	9 (7) ¹⁾	20	31	34	36
Working range from	mbar	1000	1000	1000	1000	1000
to	mbar	$2 \cdot 10^{-7}$	$< 1 \cdot 10^{-8}$	$< 1 \cdot 10^{-9}$	$< 1 \cdot 10^{-8}$	$< 1 \cdot 10^{-9}$
Backing pump volume flow rate	m ³ /h	2	2	2	2	2
Electrical connection load	kW	0,3	0,3	0,3	0,3	0,3/0,35
Weight	kg	24,5	25	25/25,2	26	26/26,4
Pumping station components						
Turbomolecular Drag Pump		TPD 022	TMH 064	TMH 064 TMU 064	TMH 065	TMH 065 TMU 065
Diaphragm Pump		MZ 2T	MZ 2T	MZ 2T	MZ 2T	MZ 2T
Electronic Drive Unit		TCP 015	TCP 015	TCP 015	TCP 015	TCP 015
Pumping Station Control Unit		TCS 015	TCS 015	TCS 015	TCS 015	TCS 015
Venting Valve		—	TSF 012 ²⁾	TSF 012 ²⁾	TSF 012 ²⁾	TSF 012 ²⁾

1) Values in brackets for reduction to DN 40 ISO-KF.

2) Included in the delivery.

8.1. Dimensions



9. Accessories

Description	Size	Number	Comments/ relevant operating instructions	Ord. Quantity
Fore-Vacuum Safety Valve TVV 001	230 V 115 V	PM Z01 205 PM Z01 206	With delayed switching on PM 800 263 BN	
Drier TTV 001		PM Z00 121	Filled with zeolite PM 800 022 BN	
1 filling for TTV 001	approx. 260 cm ³	PM 006 786 -T		
Mounting device for TTV 001: 1 set of angle holders PVC hose	8/14; 1m	PM 015 245-T N 2358 170 JS		
Set of rollers Adapter set for TSD 022		PM 015 083 -T PM 053 127-T	For mobile pumping stations For reduction to DN 40 ISO-KF	
Heating jacket, turbopump TPD 022	115 V/230 V	PM 043 443-T		
TMH/U 064	115 V/230 V	PM 043 443-T		
TMH/U 065	115 V/230 V	PM 043 443-T		

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

10. Spare Parts

The spare parts for the individual components can be found in the relevant operating instructions.

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).

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 siedettävyyss 89/336/ETY
- pienjännite 73/23/ETY

Vahvistamme, täten, että allmainittu tuote vastaa EU-konedirektiivin 89/392/ETY - liite IIA, EU-direktiivin sähkömagneettinen siedettävyyss 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 νόημα των εξής 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, οι εναρμονισμένες προδιαγραφές και οι εφαρμοσθείσες εθνικές προδιαγραφές και τεχνικές προδιαγραφές αναφέρονται κατωτέρω:

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

TSD 022

TSH/TSU 064 D

TSH/TSU 065 D

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

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Geschäftsführer (W. Dondorf)
Managing Director
Gérant d'affaires
Gerente
Directeur
Administrerende Direktor
Verkställande Direktör
Gerente
Διευθύνων Σύμβουλος

Zentrale/Headquarters

Pfeiffer Vacuum GmbH

Emmeliusstrasse 33
D-35614 AsslarTelefon 06441/802-0
Telefax 06441/802-202

Hotline 06441/802-333

Internet:

<http://www.pfeiffer-vacuum.de>**Argentina**ARO S.A., Casilla de Correo 4890,
1000 Buenos Aires, telephone 0054 / 1 331 3918,
telefax 0054 / 1 331 3572**Australia**Balzers Australia Pty. Ltd., Level 1,
3, Northcliff Street, Milsons Point, NSW 2061,
telephone 0061 / 2 9954 1925, telefax 0061 / 2 9954 1939**Austria**Pfeiffer Vacuum Austria GmbH
Diefenbachgasse 35, A-1150 Wien,
telephone 0043 / 1 8941 704, telefax 0043 / 1 8941 707
Service Hotline: 0043 / 1 8941704**Belgium / Luxemburg**Pfeiffer Vacuum Belgium N.V./S.A.
Minervastraat 14, B-1930 Zaventem
telephone 0032 / 2 725 0525, telefax 0032 / 2 725 0873
Service Hotline: 0032 / 2 725 3545**Brazil**Elmi Tec
Assistencia Técnica e Representação S/C Ltda.
Rua Bernadino de Compos, 551
CEP 04620-002 São Paulo, SP - Brasil
telephone 0055 / 11 532 0740
telefax 0055 / 11 535 3598**Chile**BERMAT S.A., Coyuncura 2283, piso 6
Providencia, P.O. Box 9781, Santiago
telephone 0056 / 2 231 8877,
telefax 0056 / 2 231 4294**Colombia**Arotec Colombiana S.A., Carrera 15 No.38-17
P.O. Box 050 862, Santafe de Bogota / D.C.
telephone 0057 / 1 288 7799, telefax 0057 / 1 285 3604**Denmark**Pfeiffer Vacuum Scandinavia AB, Vesterengen 2,
DK-2630 Taastrup, telephone 0045 / 43 52 38 00,
telefax 0045 / 43 52 38 50**France**Pfeiffer Vacuum France SAS
45, rue Senouque, BP 139 F-78531 BUC Cedex
telephone 0033 / (0)1 30 83 04 00,
telefax 0033 / (0)1 30 83 04 04**Germany**Pfeiffer Vacuum Vertriebs GmbH,
Emmeliusstrasse 33, D-35614 Asslar
telephone 0049 / 6441 802 400
telefax 0049 / 6441 802 399
Service Hotline: 0049 / 6441 802 333**Great Britain**Pfeiffer Vacuum Ltd.
Bradbourne Drive, Tilbrook,
Milton Keynes, MK7 8AZ, United Kingdom
telephone 0044 / 1 908 373 333
telefax 0044 / 1 908 377 776**Greece**Analytical Instruments S.A., 1 Mantzarou St.,
GR-15451 Athens,
telephone 0030 / 1 674 8973, telefax 0030 / 1 674 8978**India**Pfeiffer Vacuum India Ltd.
25-E Nicholson Road, Tarbund
Secunderabad 500 009,
telephone 0091 / 40 775 0014, telefax 0091 / 40 775 7774**Israel**Eastronics Ltd., 11 Rozanis Street, P.O. Box 39 300,
Tel Aviv 61392,
telephone 00972 / 3 6458 777,
telefax 00972 / 3 6458 666**Italy**Pfeiffer Vacuum Italia S.p.a.
Via San Martino, 44 I-20017 RHO (Milano)
telephone 0039 / 2 93 99 051, telefax 0039 / 2 93 99 05 33**Japan**Hakuto Co. Ltd., C.P.O. Box 25,
Vacuum & Scientific Instruments Division
Tokyo Central 100-91,
telephone 0081 / 3 32 258 910,
telefax 0081 / 3 32 259 009**Korea**Pfeiffer Vacuum Korea Ltd., 3F Haein Building 453,
Dokok-Dong, Kang Nam-Ku, Seoul, 135-270
telephone 0082 / 2 3461 0671,
telefax 0082 / 2 3461 0676**Netherlands**Pfeiffer Vacuum Nederland BV
Veldzigt 30a, NL-3454 PW De Meern,
telephone 0031 / 30 6666050, telefax 0031 / 30 6662794**Peru**Ing. E. Brammert S.C.R.L., José Pardo 182,
Apartado 173, PE-18 Miraflores,
telephone 0051 / 1 445 8178
telefax 0051 / 1 445-1931**Poland**Softrade Sp.z.o.o., ul. Malwowa 35,
PL-60-175 Poznan, telephone 0048 / 61 8677 168,
telefax 0048 / 61 8677 111**Portugal**Unilaser Lda, Taguspark
Núcleo Central, sala nº 268, Estrada Cacém-
Porto Salvo, P-2780 Oeiras
telephone 00351 / 1 421 7733,
telefax 00351 / 1 421 7744**Singapore**APP Systems Services Pte. Ltd, 2 Corporation Road
06-14 Corporation Place, Singapore 618494,
telephone 0065 / 268 2024, telefax 0065 / 268 6621**Spain**Tecnovac
Tecnologia de Vacío S.L., Ronda de Poniente, 6 Bajo F
Centro Empresarial Euronova
E-28760 Tres Cantos (Madrid)
telephone 0034 / 91 804 11 34,
telefax 0034 / 91 804 30 91**Sweden**Pfeiffer Vacuum Scandinavia AB
Magasinsgatan 35, Box 10412
S-43424 Kungsbacka
telephone 0046 / 300 710 80
telefax 0046 / 300 172 85
Service Hotline: 0046 / 300 710 85**Switzerland**Pfeiffer Vacuum Schweiz S.A.
Förrlibuckstraße 30, CH-8005 Zürich
telephone 0041 / 1 444 2255,
telefax 0041 / 1 444 2266
Service Hotline: 0041 / 1 2730119**South Africa**Labotec Pty Ltd., P.O. Box 6553,
Halfway House
1685 Midrand
telephone 0027 / 11 315 5434,
telefax 0027 / 11 315 5882**Taiwan**Heli-Ocean Engineering and Trading Co., Ltd.
6th Floor, No. 67, Shyr Pin Road,
Hsinchu 300, Taiwan R.O.C.,
telephone 00886 / 3 5725 848, telefax 00886 / 3 5725 849**Thailand**Thai Unique Co. Ltd., 80-82 Prachathipathai Road,
Bangkok 10200,
telephone 00662 / 282 97 49, telefax 00662 / 280 1788**U.S.A.**Pfeiffer Vacuum Technology, Inc.
24 Trafalgar Square
Nashua, NH 03063-1988
USA
telephon 001 / 603 578 6500
telefax 001 / 603 578 6550**Venezuela**Secotec S.A., Apartado 3452, Caracas 1010-A,
telephone 0058 / 2 573 8687
telefax 0058 / 2 573 1932**Other countries**AVI - Applied Vacuum Industries GmbH
Leginglenstrasse 17A; CH-7320 Sargans
Switzerland
telephon 0041 / 81 710 03 80
telefax 0041 81 710 03 81**Scope of represented countries**Armenia, Azerbaijan, Bangladesh, Belarus, Bulgaria,
Cambodia, Estonia, Georgia, Hong Kong, Kazakhstan,
Kingdom of Nepal, Kirghizia, Latvia, Lithuania,
Maldavia, Philippines, P.R. China, Rumania, Russia,
Tajikistan, Turkmenistan, Ukraine, Uzbekistan, Vietnam**A.E.M.S.**Advanced Equipment Materials and Systems
P.O. Box 25
Föhrenweg 18
FL-9496 Balzers
telephon 0041 / 75 380 0550
telefax 0041 / 75 380 0551**Scope of represented countries**Bahrain, Egypt, Iraq, Iran, Jordan, Kuwait, Lebanon,
Lybia, Oman, Pakistan, Saudi-Arabia, Sudan, Syria,
Turkey, United Arab Emirates, Yemen