Betriebsanleitung • Operating Instructions

TurboDrag Pump
with Electronic Drive Unit TC 600

TMH 071
TMU 071

PM 0504 BE/M (0702)

PFEIFFER VACUUM

Index

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 pump;
  – Hazards which can be caused by your system.
  – Hazards which can be caused by the media 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 turbopump with open high vacuum flange.
☞ Do not carry out any unauthorised conversions or alterations to the turbopump with TC 600.
☞ When returning the turbopump observe the shipping instructions.
☞ The turbopump must be anchored in accordance with the installation instructions.
☞ Do not disconnect the plug between the TC 600 and accessory components during operations.
☞ Disconnect the voltage supply to the TC 600 before opening the turbopump.
☞ When working on the turbopump, the high vacuum flange should only be opened once the rotor is at rest.
☞ 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).
☞ Operate the turbopump with TC 600 only in conjunction with the relevant power unit (accessory).
☞ 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. Protection class IP 54 is afforded by retro-fitting a cover plate (Accessory) to the TC 600.
☞ The mains connection must be subject to a safe connection to the PE (protection class 1).
☞ If the turbopump and the TC 600 are operated independently of each other (only permissible with the agreement of the manufacturer) the turbopump must be connected to the PE.
☞ The turbopump and the TC 600 must only be disconnected from each other when the turbopump is completely at rest and the TC 600 has been disconnected from the power supply.
☞ The cause of any operating voltage leakage to earth (red LED flashes) must be eliminated to avoid the danger of an electric shock.

Modifications reserved.

1.1. For Your Orientation

Instruction in the text
➡ Working instruction: here, you have to do something.

Symbols used
The following symbols are used throughout in all illustrations.

Ⓗ High vacuum flange
Ⓥ Fore-vacuum flange
Ⓕ Venting connection
Cooling water connection
Air cooling
Electric connection
Ⓖ Sealing gas connection

Abbreviations used
DCU = Display and control unit
HPU = Handheld programming unit
TC = Electronic drive unit, turbopump
TPS = Power unit

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

1.2. Pictogram Definitions

Warning, danger of burns from touching hot parts.

Warning, danger of personal injury.

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

Warning, danger of injury from rotating parts.

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

2. Understanding The Pumps TMH 071 / TMU 071

2.1. Main Features

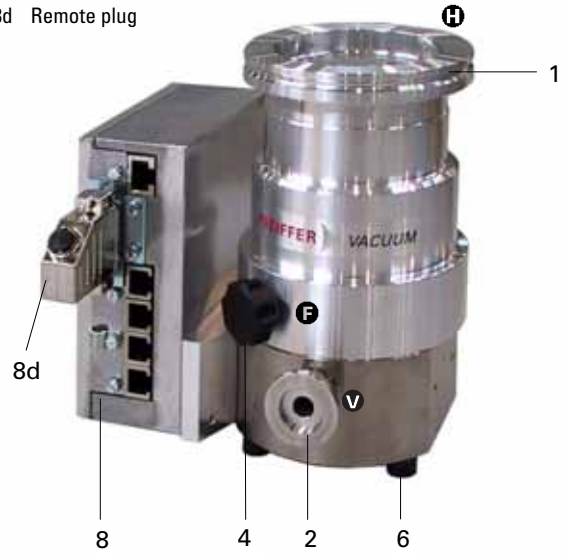
Turbopumps TMH 071 / TMU 071 with the TC 600 form a complete unit. Voltage is supplied by the power unit (see "Accessories").

PLEASE NOTE

On delivery, the pumps have been set up for operations in remote mode.
Remote plug 8d should must be removed if operations with DCU or HPU are required.

Turbomolecular Drag Pump TMH 071 / TMU 071

1 High vacuum flange
2 Fore-vacuum flange
4 Venting valve
6 Rubber feet
8 Electronic drive unit TC 600
8d Remote plug



Cooling
- Enhanced convection cooling with cooling unit (accessory),
- air cooling (accessory) or
- water cooling (accessory).

Integrated protective measures against excess temperatures:
The electronic drive unit TC 600 reduces the rotor rotation speed.

Bearings
High vacuum side: Wear free permanent magnetic bearing.

Fore-vacuum side: Oil circulatory lubricated ball bearing with ceramic balls.

Ambient conditions
The turbomolecular pump needs to be installed in compliance with the following ambient conditions:

Installation location:	protected against the weather (rooms within buildings)
Temperature:	+5 °C to +40 °C
Relative humidity of the air:	max. 80 % at T ≤ 31 °C up to max. 50% at T ≤ 40 °C
Air pressure:	77 kPa - 106 kPa
Installation altitude:	2000 m max.
Pollution degree:	2
Overvoltage category:	II
Connection voltage:	24 VDC ±5%

Proper Use

- The Turbomolecular Pumps TMH 071 / TMU 071 may only be used for the purpose of generating vacuum.
- 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.
- The turbopump must be connected to a backing pump in accordance with Section 3.3.
- Only Pfeiffer Vacuum power units may be used to operate the TC 600. The use of other power units requires the prior agreement of the manufacturer and equalization with the valid specification.
- The pumps may only be operated providing the ambient conditions in compliance with Protection Type IP 30 are observed.
- Sealing gas must be used to ensure rotor cooling, when operate the pump with 50% of the maximum gas load.

Improper Use

The following is regarded, inter alia, as improper:

- The pumping of explosive or corrosive gases,
- Operating the pumps in explosive areas,
- The pumping of gases and vapours which attack the materials of the pumps,
- The pumping of radioactive media,
- The pumping of corrosive gases without sealing gas,
- The pumping of condensating vapours,
  Operation involving impermissibly high levels of gas loads.
- Operation with improper gas modes.
- Operation involving too high levels of heat radiation power (see Section "Technical Data").
- Operation without the use of cooling equipment.
- Operation without cover plate for the TC in environments which require a protection class superior to IP 30.
- Installation in systems where the turbopumps are subjected to impact-like stress and vibrations or the effect of periodically occurring forces.
- The use of other power units or accessories which are not named in this manual or which have not been agreed by the manufacturer.
- The connection to power units with earthing of a direct voltage pole.

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

2.2. Differences Between The Pump Types

Feature	TMH 071	TMU 071
High vacuum flange	ISO-KF / ISO-K	CF-F
High vacuum seal	Elastomer	Metal
Attainable final pressure	$< 1 \cdot 10^{-7}$ mbar (without baking-out)	$< 5 \cdot 10^{-10}$ mbar (with baking-out)

Abbreviations on the rating plate of the turbopump

Suffix **"P"**: Purge gas connection for the prevention of the ingress of aggressive gases into the motor and bearing arena (Sealing gas valve see "Accessories").

Suffix "Y": Installation orientation in all positions possible.

2.3. Scope Of Delivery

Turbomolekular pump with:

- Electronic drive unit TC 600,
- protecting cover for high vacuum flange,
- protecting cover for fore vacuum flange,
- only DN 63 ISO-K: 2 bracket screws.

3. Installation

3.1. Preparations For Installation

Do not carry out any unauthorised conversions or alterations to the turbopump. The operator must ensure that the TC 600 is integrated into an emergency safety circuit. The supply voltage of the TC 600 must be interrupted when releasing the emergency safety condition.
For special requirements please contact Pfeiffer Vacuum.

In case the rotor blocks suddenly, torque levels up to **820 Nm** can occur which need to be absorbed by the system and the high vacuum flange.

- The maximum permissible rotor temperature of the pump is 80 °C. If the vacuum chamber or parts in the vacuum chamber are heated must be fitted if necessary, suitable shielding in the vacuum chamber before the turbopump (constructional suggestions available on request).
- The temperature of the high vacuum flange may not exeed 120 °C.
- Only remove the blank flange from the high and fore-vacuum side immediately before connection.
- On Turbopumps TMH 071 / TMU 071 the lubricant reservoir is already fitted and filled.
- Where magnetic fields of > 3 mT are involved suitable shielding must be provided (available on request).
- If the pump is baked out, the heating sleeve and the body of the pump must be insulated to prevent burns from accidental contact.
- Either air or water cooling is necessary for operating the pump. Where operations with convection cooling are involved, a cooling unit must be used (please see "Accessories").
- Floor mounting of the turbomolecular pump is only admissible after consulting the manufacturer.

The person responsible for commissioning must ensure that the installation is carried out in accordance with the legal regulations and the pertinent industrial standards.

Notes to the accessories named below are located in the section 11 “Accessories”. There are also located the information on the appropriate operating instructions.

3.2. Connecting The High Vacuum Side

The utmost cleanliness must be observed when fitting all high vacuum parts. Unclean components prolong the pumping time!
All mounting materials for the flanges must be dry and free of any grease or dust with the installation.

Only those turbopumps with a "**Y**" behind the type designation (please see rating plate, for example TMH 071 Y P) may be fitted in all positions.

Connecting via a Pfeiffer Vacuum vibration compensator
The high vacuum side can be flanged onto the vacuum chamber either directly or via a Pfeiffer Vacuum vibration compensator (see Section 11. Accessories).

When using a Pfeiffer vacuum vibration compensator, suitable securing needs to be introduced capable of absorbing the energy of the rotor should it suddenly block, since the vibration compensator itself alone cannot absorb the occurring forces. Please consult the manufacturer.

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

Use a Pfeiffer Vacuum splinter shield or protective screen
The use of a Pfeiffer Vacuum splinter shield or protective screen in the high vacuum flange protects the turbopump against foreign bodies coming from the vacuum chamber but does reduce the volume flow rate as followed:

	Reduced volume flow rate in %		
	N_2	He	H_2
Splinter shield DN 63	13	5	3
Protective screen DN 63	3	1	1
Splinter shield DN 40	26	13	8

Installing The High Vacuum Flange

– In case the rotor blocks suddenly, torque levels up to **820 Nm** can occur which need to be absorbed by the system and the high vacuum flange.

If the pumps are secured with the attachment of ISO-K flange to ISO-F or with the attachment of ISO-KF flanges it can come to twisting the flange in case the rotor blocks suddenly.

– For installing the turbomolecular pumps to the high vacuum flange, the components listed in the following **must** be used exclusively. Otherwise the turbomolecular pump may twist or tear off. The clamps, bolts, nuts and centering rings are special designs from Pfeiffer Vacuum
– The minimum strength of 170 N/mm² of the flange material needs to be observed.

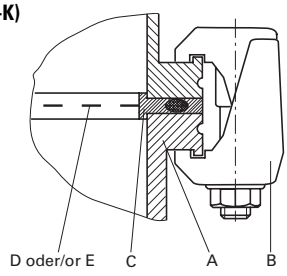
Installation is done as follows:

ISO-K flange with ISO-K flange
For installing the following components are available:

Connection nominal diameter	Designation	Order number
DN 63 ISO-K	Centering ring (coated), incl. 4 bracket screws	PM 016 360 -T
	Centering ring (coated) with splinter shield, incl. 4 bracket screws	PM 016 361 -T
	Centering ring (coated) with protective screen, incl. 4 bracket screws	PM 016 362 -T

Bracket screw (ISO-K with ISO-K)

A ISO-K flange
B Bracket screw
C Centering ring, coated
D Splinter shield
E Protective screen



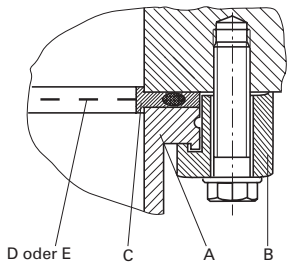
➡ See that the sealing surface is not damaged.
➡ Flange the turbopump according to the drawing and the component parts in your set of mounting material. Use 4 bracket screws.
➡ Tighten the bracket screws crosswise in three steps. Tightening torque: 25 ±2 Nm

ISO-K flange with ISO-F flange
For installing the following components are available:

Connection nominal diameter	Designation	Order number
DN 63 ISO-K	Centering ring (coated)	PM 016 206 -U
	Centering ring (coated) mit splinter shield	PM 016 207 -U
	Centering ring (coated) mit protective screen	PM 016 208 -U
	Claw crip (use **4** pieces)	PF 301 100 -T

Claw grip (ISO-K with ISO-F)

A ISO-K flansch
B Claw grip
C Centering ring, coated
D Splinter shield
E Protective screen

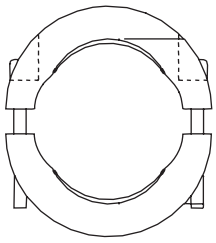


➡ See that the sealing surface is not damaged.
➡ Flange the turbopump according to the drawing and the component parts in your set of mounting material. Use 4 claw grips.
➡ Tighten the claw grips crosswise in three steps. Tightening torque: 16 ±1 Nm.

ISO-KF flange with ISO-KF flange
For installing the following components are available:

Connection nominal diameter	Designation	Order number
DN 40 ISO-KF	Clamping ring for metal seal	PF 105 040 -T
	Centering ring	PF 110 140 -T
	Splitter shield	PM 600 375 -X

Clamping ring for metal seal



➡ The screws on the clamping ring need to be tightened with a tightening torque of 3.7 Nm.

CF-F flange

Applications for installing an CF-F to an CF-F flange are “Stud screw with blind hole” and “Hexagon screw and clearance hole”. The following items are needed: the particular set of mounting material and a copper seal. Using asplinter shield or protective screen is optional.

PLEASE NOTE

Don’t touch the copper seal with bare hands, this may affect the sealings efficiency. See that the sealing lip is not damaged.

The components for installing to an CF-F flange are to be ordered under the following numbers:

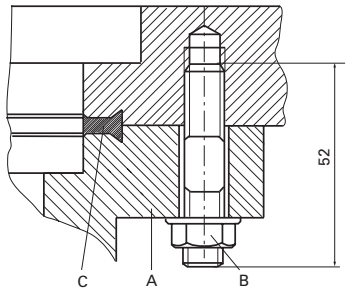
Connection nominal-diameter	Designation	Order-number
DN 63 CF-F	Hexagon screw M8 with washer and nut (25 pieces[1)])	PF 505 002 -T
	Stud screw M8 with washer and nut (18 pieces[1)])	PF 507 002 -T
	Copper seal (10 pieces[1)]) or copper seal silvered (10 pieces[1)])	PF 501 406 -T PF 501 506 -T
	Splinter shield	PM 016 312
	Protective screen	PM 016 333

1) supplied pieces

Stud screw with blind hole

Stud screw with blind hole

A CF-F flange
B Stud screw with washer and nut
C Copper seal

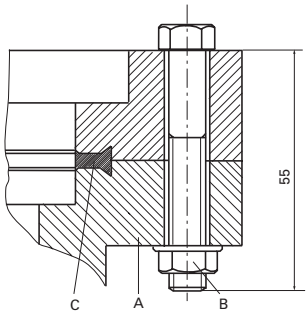


➡ If used: Insert the splinter shield and protective screen in the high vacuum flange with the clamping lugs downward (towards the pump).
➡ Bring the seal centric into the correct position.
➡ Connect the flanges via **8** pieces of stud screws (M8) with washers and nuts. The stud screws need to be tightened revolving with a tightening torque of 22 ±2 Nm. Control the torque afterwards, because of the sealing material’s flowing a retightening of the screws may be required.

Hexagon screw and clearance hole

Hexagon screw and clearance hole

A CF-F-flange
B Hexagon screw with washer and nut
C Copper seal



➡ If used: Insert the splinter shield and protective screen in the high vacuum flange with the clamping lugs downward (towards the pump).
➡ Bring the seal centric into the correct position.
➡ Connect the flanges via **8** pieces of hexagon screws (M8) with washers and nuts. The hexagon screws need to be tightened revolving with a tightening torque of 22 ±2 Nm. Control the torque afterwards, because of the sealing material’s flowing a retightening of the screws may be required.

Directly Flanging The Pump

CAUTION

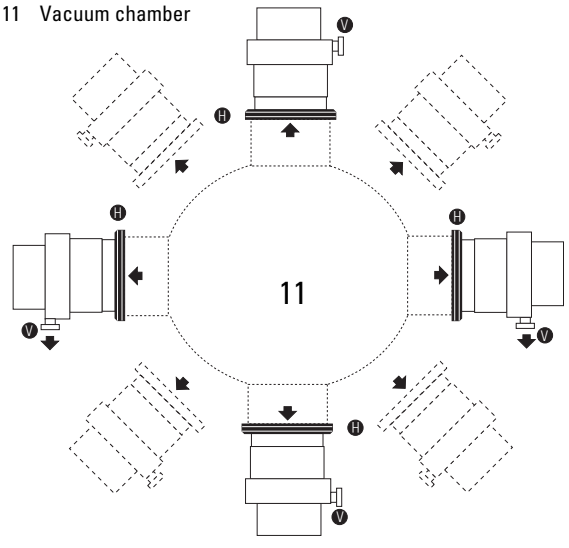
Only those turbopumps with a "Y" behind the type designation (please see rating plate, e.g. TMH 071 Y P) may be fitted in any positions. Turbopumps in standard version (without “Y” on the rating plate) can be flanged onto the vacuum chamber vertically (0°) up to an angle of 90° maximum.

CAUTION

The fore-vacuum flange must always point downwards.

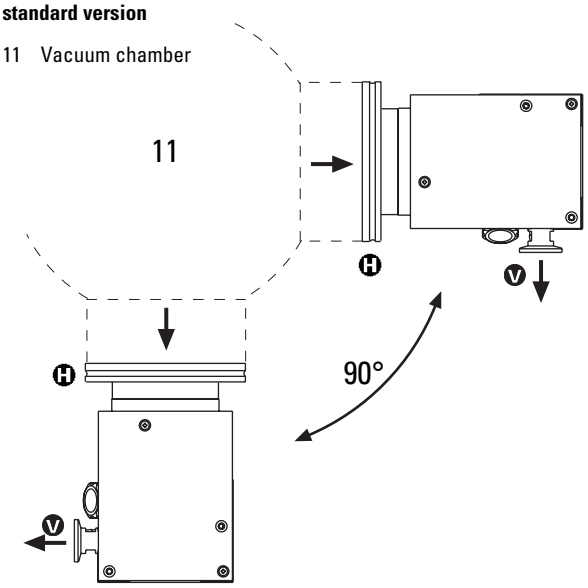
Installation orientations for “Y” version

11 Vacuum chamber



Permissible installation orientation for the turbopump in standard version

11 Vacuum chamber



CAUTION

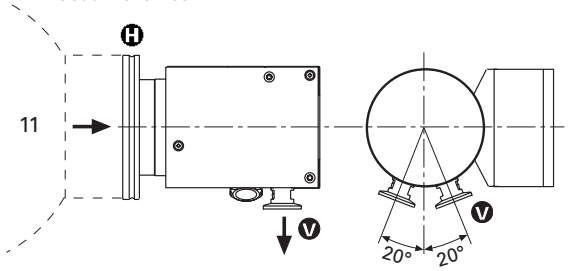
The maximum loading capacity of the high vacuum flange is 200 N (equivalent to 20 kg). Assymetric loading on the high vacuum flange must be avoided.

Horizontal installation

With horizontal pump installation and oil-sealed backing pumps (e.g. rotary vane pumps) the fore-vacuum flange of the turbopump must be aligned vertically downwards (maximum deviation ±20°), otherwise the turbopump could become dirty.

Installation position with oil-sealed backing pump

11 Vacuum chamber



CAUTION

No forces from the piping system must be allowed to act on the pump where turbopumps are anchored. Suspend or support all pipes to the pump.

3.3. Connecting The Fore-Vacuum Side

Backing pump: Vacuum pressure ≤ 10 mbar; with enhanced convection cooling < 0.1 mbar.

Recommendation: Oil-free diaphragm pump or rotary vane vacuum pumps from the Pfeiffer Vacuum range (note installation position, turbopump, see section 3.2.).

Connecting the backing pump

All connections of the fore-vacuum line: with the usual small flange components or hose screw connections.

CAUTION

Be sure to conduct away the exhaust gases from the backing pump. Do not reduce the free cross section of the fore-vacuum flange with following components.

WARNING

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.

➡ With rigid pipe connections: fit a bellows in the connecting line to reduce vibration.

➡The electrical connection of the backing pump is made via a relay box whose control line is connected to "FV PUMP" on the TC 600 (see section "accessories").

3.4. Connecting The Cooling Unit

Turbopumps TMH 071 / TMU 071 can optionally be provided with enhanced convection cooling, air cooling or water cooling. The turbopumps must be operated with air or water cooling where the fore-vacuum pressure is increased (> 0.1 mbar) and/or operations with gas loads. For all processes from 50% of the maximum gas load sealing gas must be used to ensure rotor cooling.

Use and installation:

– Heat sink for convection cooling (installation orientations see section "dimensions").
– Water cooling unit
– Air cooling unit (only valid for ambient temperatures from 5° to 40° C).

➡ Plug control lead into the connection "FAN" of the TC 600 on the turbopump.

3.5. Connecting The Venting Valve

The venting valve TVF 005 (accessory) provides automatic venting in the event of a power failure and switching off.

Fitting the venting valve

➡ Unscrew the venting screw from the venting connection of the turbopump.
➡ Screw in the venting valve (42) with seal ring.

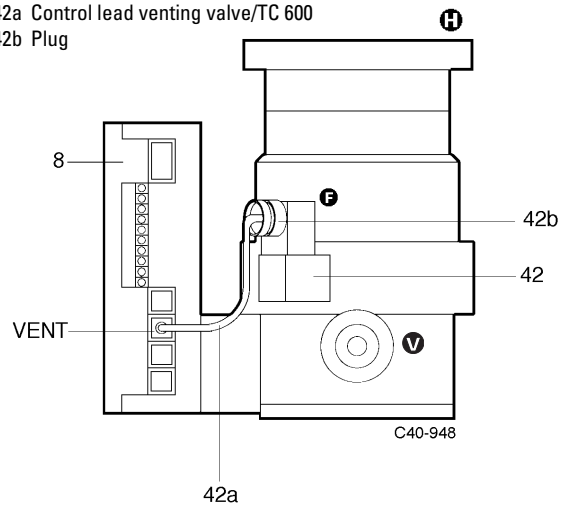
Electrical connection

➡ Plug control lead (42a) into the connection "VENT" of the TC 600 on the turbopump.

The venting mode of the venting valve can be selected via DCU, HPU or PC (via serial interface RS 485).

Connecting the venting valve

8 Electronic Drive Unit TC 600
42 Venting valve TVF 005
42a Control lead venting valve/TC 600
42b Plug



CAUTION

The maximum pressure at the venting valve is 1.5 bar absolute.

3.6. Connecting The Casing Heating Unit

The attainment of final pressures is accelerated when turbopumps and vacuum chambers are baked out. Baking out is only practical on pumps with stainless steel casings (TMU pumps). On account of their aluminium casings, the temperatures attainable on TMH pumps are not high enough. The heating duration is dependent on the degree of dirt and on the required final pressure level. The heating duration should be at least 4 hours.

PLEASE NOTE

Where casing heating is involved the turbopump must be water cooled.

CAUTION

The temperature of the high vacuum flange must not exceed 120 °C.

WARNING

High temperatures are generated when turbopumps are heated. There is a danger of injury from coming into contact with hot parts even after the casing heating has been switched off.
Heating sleeve and the pump casing should be thermally insulated during the installation.
During the heating phase be careful not to come into contact with the heating sleeve or the pump casing.

➡ Plug control lead of the casing heating into the connection "HEAT/TMS" of the TC 600 on the turbopump.

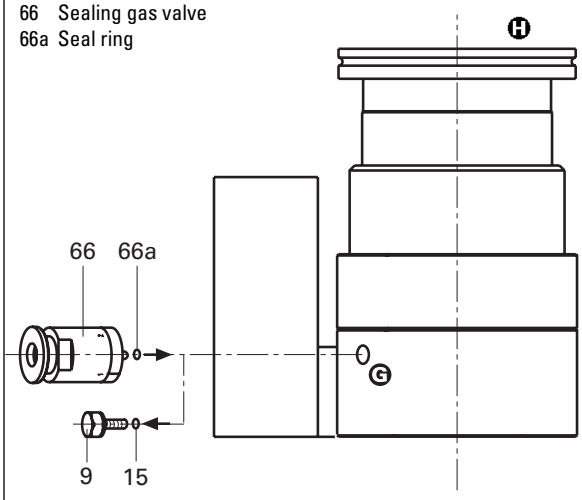
3.7. Connecting The Sealing Gas Valve

To protect the pump, particularly where corrosive or dust producing processes are involved, it is necessary to use sealing gas. For all processes from 50% of the maximum gas load sealing gas must be used to ensure rotor cooling.

➡ Unscrew the locking screw (9) from the sealing gas connection of the turbopump.
➡ Screw in the sealing gas valve (66) with seal ring (66a).
➡ For details on adjusting the sealing gas flow refer to the operating instructions (see "Accessories").

Connecting the sealing gas valve

9 Locking screw sealing gas connection
15 Seal
66 Sealing gas valve
66a Seal ring



3.8. Connecting The Electronic Drive Unit TC 600

PLEASE NOTE

The turbopump and the electronic drive unit TC 600 are connected and together form a single unit. The connecting cable 8a has to be ordered separately (see "Accessories").

PLEASE NOTE

If the turbopump is operated with a display and control unit DCU 001/DCU100 or the HPU 001, the remote plug 8d must be disconnected.

- ➡ Unscrew screw with tooth lock 8c from the TC 600 (above the connection X4).[1)]
- ➡ Plug the plug X4 on connecting cable 8a into the connection X4 on the TC 600 and screw in screw 8b.
- ➡ Secure plug X4 on the TC 600 with a screw and tooth lock 8c.[1)]
- ➡ Connect plug X2 on connecting cable 8a with power supply TPS 200/DCU 200 (Accessories) on connection X2.
- ➡ Using screws and toothlock 8c (included with the cable consigment) secure plug X2 to power supply 105.[1)]

1) Only with cable PM 051 843 -T (see section "Accessories")

CAUTION

Once operating voltage has been supplied, the TC 600 performs a self test on the supply voltage. The supply voltage for turbopumps TMH 071 / TMU 071 is 24 VDC ±5% in accordance with EN 60 742.

3.9. Installing The Power Supply

CAUTION

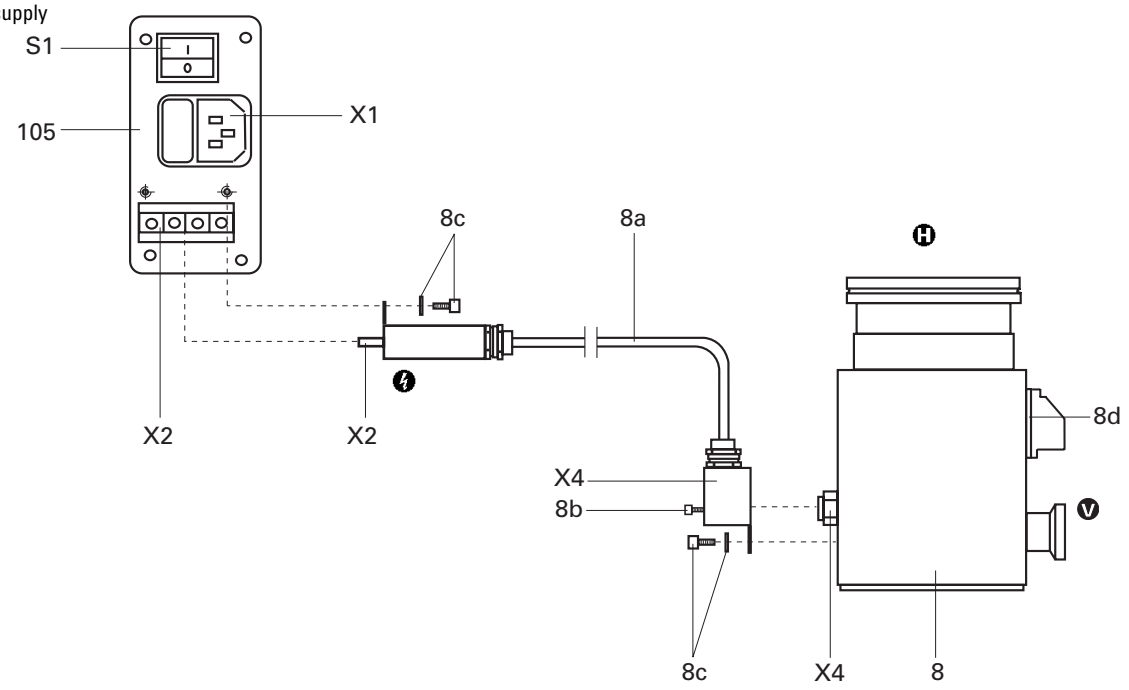
Voltage may only be supplied with the Pfeiffer Vacuum power supplies (accessory). The use of other power supplies requires the prior agreement of Pfeiffer Vacuum and equalization with the valid specification (specifications available on request).

CAUTION

The mains connection must be freely accessible at all times.

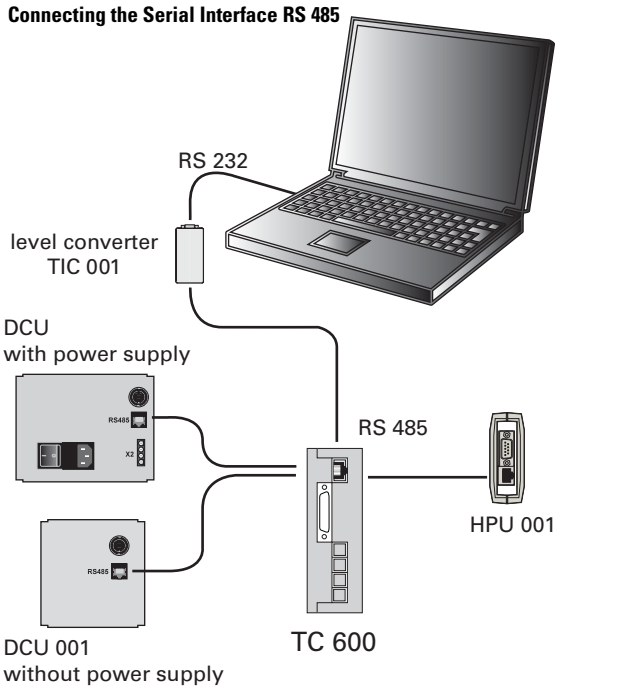
Connecting the TC 600 with power supply TPS 100 or DCU 100, mounting diagram for shielded connection cable

X1 Mains connection
X2 Connection, power supply
X4 Connection TC 600
S1 ON/OFF switch
8 Electronic Drive Unit TC 600
8a Connecting cable, TC 600 – TPS/DCU
8b Screw
8c Screw with tooth lock (3 pieces)
8d Remote plug
105 power supply



3.10. Installation Of Pfeiffer Vacuum Display And Control Units

An external display and control unit (DCU 001, DCU 100, HPU 001) or an external PC can be connected via the connection "RS 485" on the TC 600 with the use of a shielded 8 pole modular connecting cable (contained with the delivery of the DCU/HPU).



The serial interface is galvanically and safely separated from the maximum supply voltage from the TC 600.

Connection

Designation	Value
Serial interface type:	RS 485
Baud rate:	9600 Baud
Data file word length:	8 bit
Parity:	no parity
Start bits:	1
Stop bits:	1..2

The electrical connections in the TC 600 are optically decoupled.

Pin	Occupancy
1	not connected
2	+ 24 V output (loadable with 210 mA)
3	not connected
4	not connected
5	RS 485: D+ (DO / RI)
6	Gnd
7	RS 485: D- ($\overline{DO}$ / $\overline{RI}$)
8	not connected

RS 485

1 ... 8

(View from the plug side of the TC 600)

PLEASE NOTE

It is possible to connect an RS 232 (e.g. PC) via a level converter (please see "Accessories").

3.11. Connecting The RS 485

PLEASE NOTE

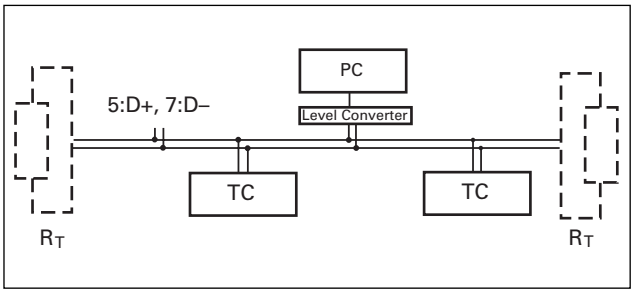
Please refer to the operating instructions PM 0488 BN for detailed operating procedures and electrical data in respect of the serial interface RS 485.

Connection to a fixed bus system

➡ Connect all units with D+ (pin 5 / RS 485) and D- (pin 7 / RS 485) to the bus.

➡ The bus must be closed at both ends.

The connections should be made in accordance with the specification of the Serial Interface RS 485.



All units connected to the bus must have differing serial interface addresses (parameter 797).

The group address of the TC 600 is 960.

WARNING

Only SELV may be connected to the serial interface RS 485.

All switched on remote functions have priority over the serial interface functions.

The Profibus DP Gateway TIC 250 (accessory) is available for connecting an electronic drive unit TC 600 to a Profibus DP.

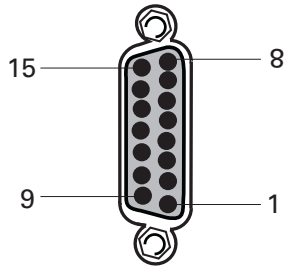
3.12. Connecting The Remote Control Unit

Remote control options for various functions are provided with the connection "REMOTE" on the TC 600 via the 15-pole D-Sub-Connector. Shielded cable must be used. Shielding is on the plug side of the TC 600 connected to the TC casing.

The inputs 2-6 are activated by connecting them to the + 24 V on pin 1 (active high) (please see 3.12. "Connection Diagram").

Pin occupancy and remote plug functions
(please see following table)

Pin occupancy remote plug



CAUTION

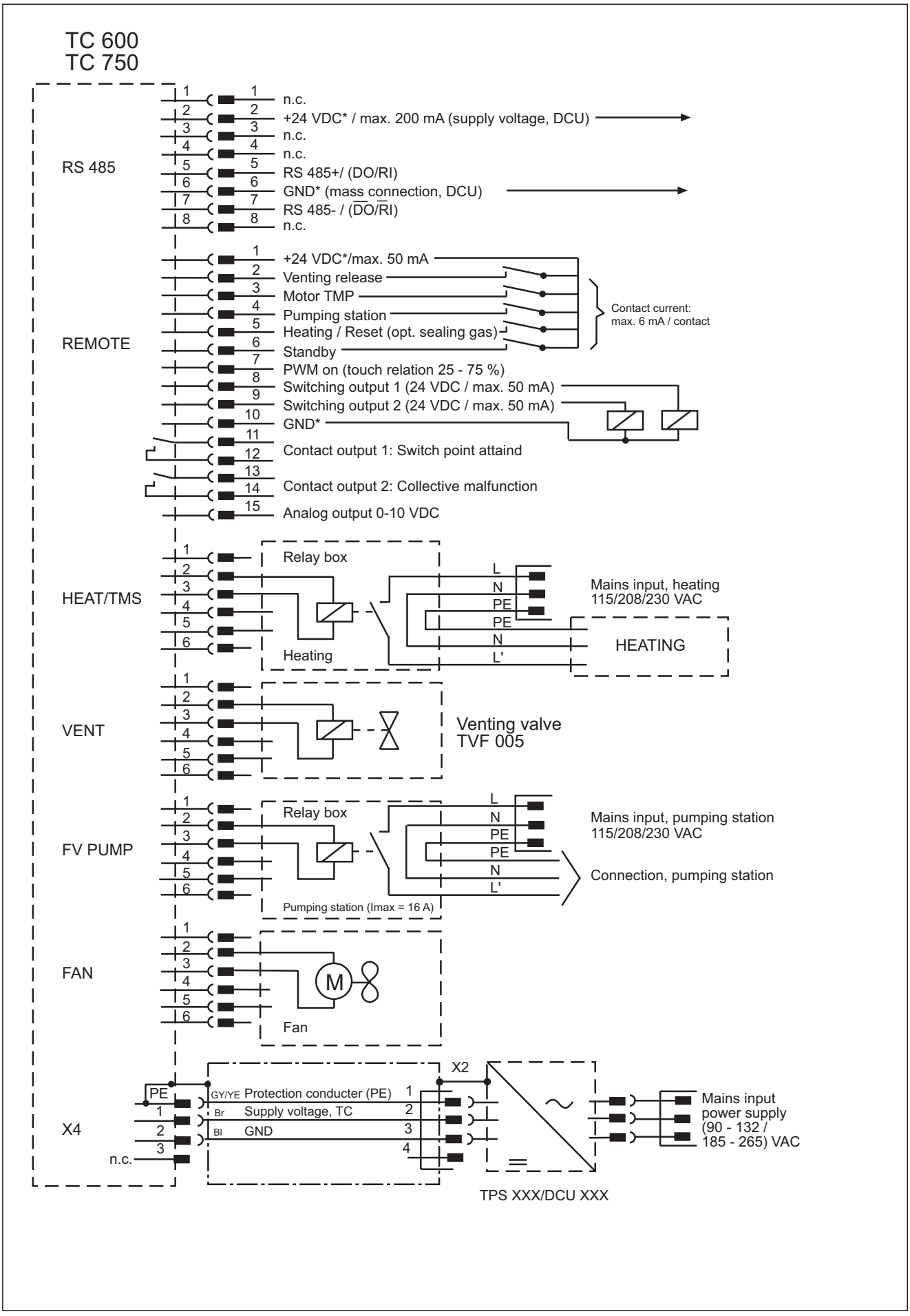
When connecting supply voltage, the turbopump is started.
On delivery:
Pin 1, Pin 2, Pin 3 and Pin 4 are bridged in the mating plug.

Pin arrangement and function of the remote plug functions

Pin no.	Input open (low)	Input closed (high) on + 24V (pin 1)
1	+24 V	
2	venting blocked (see Section 3.5.)	venting released (see Section 3.5.)
3	motor, turbopump off	motor, turbopump on: the turbopump is driven, current flows through the motor coils
4	pumping station off	pumping station on: the turbopump is driven, backing pump is started via the relay box
5	heating off optional: sealing gas valve off[1)]	heating on: the heating is switched on once the rotation speed switchpoint is attained and off when the rotation speed switchpoint is unattained optional: sealing gas valve on[1)]
5		reset: by supplying a pulse (T < 2s) with an amplitude of 24V a malfunction acknowledgement can be processed
6	standby off	standby on: pump is accelerated to 66% of its nominal rotation speed
7	rotation speed setting mode off	the rotation speed can be changed by feeding a PWM signal to this pin or via Serial Interface RS 485 (see Section 4.7. "Rotation Speed Setting Mode")
8	**Output (low)** rotation speed switchpoint not attained	**Output (high)** rotation speed switchpoint attained; output can be loaded with 24 V/50 mA
9	**Output (low)** Collective malfunction message	**Output (high)** malfunction-free operations; output can be loaded with 24 V/50 mA
10	Mass (ground)	_____
11	Contact Output 1: Switchpoint attained	contact [1)] between pin 11 and pin 12 closed if the turbopump is above the switchpoint
12	Contact Output 1: Switchpoint attained	
13	Contact Output 2: Collective malfunction message	contact [1)] between pin 13 and pin 14 is closed on failure-free operation
14	Contact Output 2: Collective malfunction message	
15	Analog output	rotation speed proportional output voltage 0 - 10 VDC = 0 - 100 % * f_{end}/load R ≥ 10 kΩ (optional current/power)

1) The option must be set via the Serial Interface RS 485
(see Operating Instructions PM 0547 BN, Pumping Operating with DCU)
2) The following technical data is applicable for the contacts: U_{max} = 50 VDC
I_{max} = 1 A

3.13. Connections Diagram



4. Operations

4.1. Before Switching On

Sections 4.1. to 4.3. refer only to operating the pump in its delivery status, without display and control unit. The bridges "venting release", "motor, TMP ON" and "pumping station ON" are fitted in the remote control plug.

Turbopump rotors rotate at high speed. When the high vacuum flange is open there is a danger of injury and of damage to the pump caused by objects falling into the pump.
Therefore never operate the pump with open high vacuum flange.

➡ With water cooling: Open cooling water supply and check flow.
➡ Plug connecting cable ("Accessory") into the TC 600 and connect with power supply TPS 100 or DCU 100 on X2 (please see section 3.8.).

Please note:
The following pre-settings have been programmed:

– Running up time	15 min
– Rotation speed switchpoint	80%
– Automatic venting	50%

For further works settings please refer to the parameter overview in the operating instructions "Pumping Operations With the DCU", PM 0547 BN. These settings can only be altered via serial interface RS 485 via DCU / HPU or PC (please refer to the respective operating instructions).

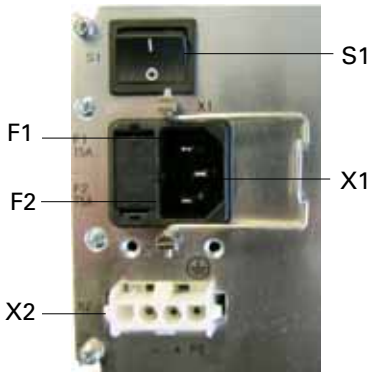
Take care when pumping hazardous gases. Take note of all safety recommendations of the gas manufacturer.

4.2. Switching On

➡ Switch on the turbopump with switch S1 on the power supply.
– When air cooling is fitted the cooling fan is also switched on via the TC 600.
– Once the self test has been successfully completed on the TC 600 (duration approximately 10 seconds), turbopump and backing pump (if connected) begin to operate.

Rear panel, TPS

S1 ON/OFF switch
X1 Mains connection
X2 Connection TC 600
F1 Fuse
F2 Fuse



4.3. Operations With The Remote Control Unit

Remote control operations can be performed via the 15-pole D-Sub connection with the designation "REMOTE" on the TC 600 (refer to section 3.12. and 3.13.).

Inputs 2 - 6 are activated if they are connected with the 24 V on pin 1 (active high; please see section 3.13. "Connections Diagram").

On delivery there is a bridge between Pin 1, Pin 2, Pin 3 and Pin 4 on the TC 600 mating plug.
Once operating voltage has been supplied and on successful completion of the self-test on the TC 600, the turbopump and any possible connected backing pump begin to operate.

Venting Release (Optional)

Automatic venting:

Venting frequency	Switch off the pumping station	Mains power failure 1)
< 750 Hz (corresponds to 50% of the final rotation speed)	venting valve opens for 150 ms at 4 s intervals	venting valve opens for 150 ms at 4 s intervals
< 500 Hz	venting valve opens for 3600 s (works setting)	venting valve opens as long as sufficient energy is generated by the turbopump

1) When mains power is restored the venting procedure is interrupted.

Venting blocked:
Venting does not take place.

Other venting modes:
Other venting modes can be selected via the serial interface RS 485 with DCU / HPU or PC.

Motor, Turbopump

When the pumping station is switched on and once the self test has been successfully completed (duration approx. 10 sec), the turbopump is set in operation. During operations, the turbopump can be switched on and off while the pumping station is switched on. Thereby the turbopump will not be vented.

Pumping Station

Any connected pumping station components are started up (e.g. backing pump, venting valve, air cooling) and with simultaneous activation of the input "motor, turbopump" the turbopump is set in operation once the self test has been successfully completed (duration approx. 10 sec).

Heating/Reset

Heating (optional)
Once the rotation speed switchpoint is attained the heating unit is switched on; when the rotation speed switchpoint is fallen below the heating unit is switched off.

Reset
The heating input has two functions (please see section 3.12., point 5 "Reset").

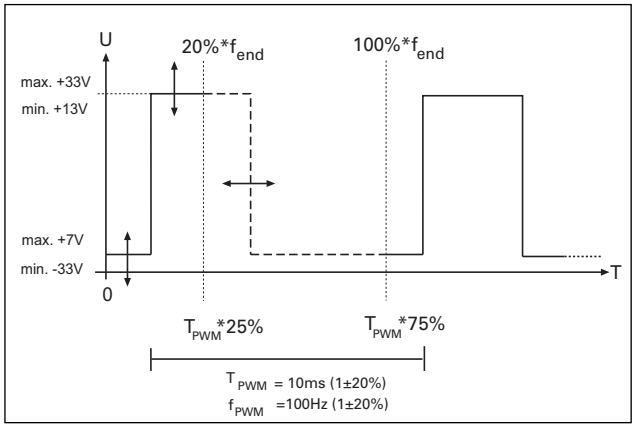
Sealing gas valve (optinal)
Optionally a valve (e.g. TVF 005, accessory) for sealing gas inlet can be contolled via this input. More information on request.

Standby

The pump can be operated optionally at 66% of its nominal rotation speed (standby ON) or at its nominal rotation speed (standby OFF).

Rotation Speed Setting Mode Via Input PWM

The supply of pulse width modulated signals (PWM) with a ground frequency of 100 Hz ±20% with an amplitude of maximum 24 V and a key ratio of 25-75% enables the rotation speed to be set in the range 20-100% of the nominal rotation speed.



If no signal is present the pump accelerates up to its final rotation speed. A PWM adapter box for rotation speed setting operations for the turbopump is available as an option (please see "Accessories").

Switching Outputs

The switching outputs 1 and 2 can be loaded with a maximum 24 V / 50 mA per output. The following functions are assigned to the switching outputs:

Switching output 1: Active high when the rotation speed switchpoint is attained. The switchpoint for the turbopump is set at 80% of the nominal rotation speed. It can be used, for example, for a message "pump ready to operate".

Switching output 2: Active low with a malfunction - collective malfunction message.

The connection of a relay is made between pin 10 (mass) and the respective switching output pin 8 or pin 9 (see section 3.13. "Connections Diagram").

Analog Output

A rotation speed proportional voltage
(0 - 10 VDC correspond to 0 - 100%*f_{end}) can be tapped via the analog output (load ≥ 10 kΩ).

Additional functions (power, current) can be assigned to the analog output via a DCU or Serial Interface RS 485.

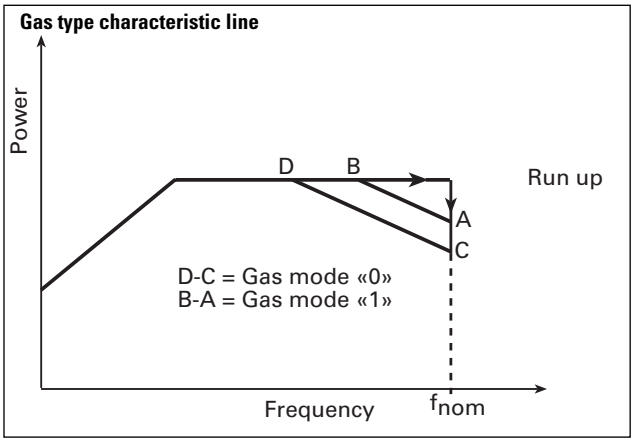
4.4. Gas Type Dependent Operations

Water cooling is required if the pumps are to be operated with gas load.

Where high level gas loads and rotation speeds are involved, the resulting friction subjects the rotor to the effect of great heat. To avoid over-heating, a power rotation speed characteristic line is implemented in the TC 600; this ensures that where maximum gas loads are involved, the pump will operate at any rotation speed without the danger of damage arising. The maximum power is dependent on the type of gas. Two characteristic lines are available for any type of gas in order to fully exploit the power potential of the pump:

➡ Set the applicable gas mode on the TC 600 via the DCU, HPU or PC.
– "Gas-Mode 0" for gases with molecular mass ≥ 40 (e.g. Ar);
– "Gas-Mode 1" for all lighter gases.
– **Factory setting**: "Gas-Mode 0"

Pumping gases with molecular mass ≥ 40 with the incorrect gas mode can cause damage to the pump. Before pumping such gas types please contact the manufacturer.



For the vertex of the power characteristic line please refer to section “Technical Data”. Maximum power is applied when the pump starts in order to limit the time required. Once the set rotation speed is attained, switching to the selected power characteristic line is automatic. If the gas dependent maximum power is exceeded, the rotation speed is reduced until equilibrium between the permissible power and gas friction is attained. The power limitation serves to protect the pump against thermal overloading. In order to avoid rotation speed fluctuations it is recommended to set, in rotation speed setting mode, the equilibrium frequency or a somewhat lower frequency.

4.5. Operations With DCU 001/DCU 100 or HPU 001

Where the turbopump is operated via Pfeiffer Vacuum display and operating units, the remote plug on the TC 600 must be disconnected.

Operations with the DCU or HPU 001 should be carried out in accordance with the relevant operating instructions (see “accessories”).

4.6. Switching Off And Venting

Before coming to rest after switching off, the turbopump must be vented in order to prevent contamination.

➡ Close the fore-vacuum line. Switch off the backing pump or close the fore-vacuum valve (if connected).
➡ Switch off the turbopump with switch S1 on the power supply.
➡ Venting

There are three possibilities to vent turbopump:

– **Manual venting**
  Open the venting screw (on delivery, screwed in) on the venting connection about one turn.

– **Venting with the Venting Valve TVF 005** (accessories)
  Venting release via the remote control (see section 4.7.) or via the serial interface with DCU, HPU or PC (see operating instructions "Pumping Operations With The DCU").

– **Venting in two stages** when the vacuum chamber should be vented as quickly as possible.
  First stage: venting with a pressure increase rate of 15 mbar/s for 20 seconds.
  Second stage: venting with an optionally large venting valve.

The valve cross-section for a venting rate of 15 mbar/s must be compatible with the size of the vacuum chamber. Where small vacuum chambers are involved, the Pfeiffer Vacuum venting valve TVF 005 can be used for first stage venting.

➡ Shut off water supply (if installed).

4.7. Shutting Down For Longer Periods

If aggressive or hazardous gases are pumped there is a danger of personal injury resulting from coming into contact with process gases. Before removing a turbopump from the system, first:

– Vent the turbopump 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 turbopump is to be shut down for more than a year:
➡ Remove turbopump from the system.
➡ Change the lubricant reservoir (see section 7.2.).

Lubricant TL 011 should not be used when there have been no operations for **3 years.**

➡ Close the high vacuum flange and evacuate the turbopump via the fore-vacuum flange.
➡ Vent turbopump via the venting connection with nitrogen or dry air.
➡ Close the fore-vacuum and venting connections by blank flanging.
➡ Place the pump vertically on its rubber feet.
➡ Storage the pump only indoors at a permissible ambient temperature between -25° C and + 55° C.
➡ In rooms with moist or aggressive atmospheres, the turbopump must be air-sealed in a plastic bag together with a bag of dessicant.

If the pump has been shut down for **3 years**, the bearing must be changed (please contact Pfeiffer Vacuum Service).

5. Monitoring Operations

5.1. Operations Display Via LED

Certain operations modes of the turbopump and the TC 600 can be ascertained via the two integrated LEDs located on the front panel of the TC 600.

The following operations modes are displayed:

LED		Cause
green	red	
Glows		– power supply OK – Function "pumping stati on ON" carried out
Flashes short (1/12s active)		– power supply OK – Pumping station OFF
Blinks (1/2s active)		– Mains power supply failure
	Glows	– Collective malfunction (for example, run-up time error, over-temperature, turbopump or TC 600) – Switching output 2 active (low)
	Blinks (1/2s active)	– Warning (e.g. supply voltage short circuit to earth, mains power failure)

Differentiated malfunction and warning signals are only possible with the use of a DCU, HPU or PC.

5.2. Turbopump Temperature Management

Where impermissible motor temperatures are involved or the temperature of the casing is too high, the motor current is reduced.
This can lead to dipping below the set rotation speed switch-point and results in the turbomolecular pump being switched off.
LED on the TC 600 glows red: Collective malfunction.

6. What To Do In Case Of Breakdowns?

Problem	Possible Causes	Remedy
Pump doesn't start; None of the integrated LEDs glow on the TC 600	• Power supply interrupted	• Check fuse in the power pack unit • Check plug contacts on the mains power supply • Check power supply feeder line • Check voltage on the power supply (24 V DC) at connection X2
	• Incorrect operations voltage supplied • No supply of operations voltage • Defect TC 600	• Supply correct operations voltage • Check plug contacts on the power supply • Inform Pfeiffer Vacuum Service of need for repair
Pump doesn't start; green LED on the TC 600 is blinking	• Pins 1-3 and 1-4 on the remote plug not connected • Reduction in the voltage in the cable	• Connect pins 1-3 and 1-4 on the remote plug • Use suitable cable
Pump doesn't attain nominal rotation speed within the set run-up time Pump cuts out during operations	• Fore-vacuum pressure too high • Leak or too much gas	• Check backing pump function • Check seals • Seek leak and repair • Reduce supply of process gas
	• Rotor sluggish caused by defective bearing • TC run-up time too short • Thermal overloading caused by – Water flow insufficient – Insufficient air supply – Fore-vacuum pressure too high – Ambient temperature too high	• Check bearing (noises?): Inform Pfeiffer Vacuum Service • Set longer start-up time with the DCU or PC • Ensure free flow • Ensure adequate air supply • Reduce fore-vacuum pressure • Reduce ambient temperature
Pump doesn't attain final pressure	• Pump dirty	• Bake out pump • If seriously contaminated: Request Pfeiffer Vacuum Service to clean
	• Leak in vacuum chamber, lines or pump	• Seek leak starting with vacuum chamber • Repair leak
Unusual operating noises	• Bearing damaged	• Inform Pfeiffer Vacuum Service of need for repair
	• Rotor damaged	• Inform Pfeiffer Vacuum Service of need for repair
	• Splinter shield (if fitted) not seated firmly	• Check seat of splinter shield (see Section 3.2.)
Red LED on the TC 600 glows	• Collective malfunction	• Reset via mains OFF/ON or remote pin 5 • Different malfunction display with the DCU possible [1)]
Red LED on the TC 600 flashes	• Warning through: – Mains power failure	• Different warning message with the DCU possible [1)] • Check power supply voltage
	– Supply voltage short circuit to earth	• Check power supply mains connection • Check power supply voltage for short circuit to earth
	• Wrong setting for nominal rotation speed (Parameter 777)	• Enter 1500 Hz for parameter 777 (see operating instruction PM 0547 BN "Pumping Operations With DCU"). If there is no DCU/HPU available contact Pfeiffer Vacuum Service .

1) Without a DCU or HPU inform Pfeiffer Vacuum Service to check the cause of trouble.

7. Maintenance / Exchange

PLEASE NOTE

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.

The bearing should be changed every three years (request Pfeiffer Vacuum Service to change). Where extreme operating conditions or unclean processes are involved, the replacement interval should be checked with your Pfeiffer Vacuum Service Center.

You can change the electronic drive unit TC 600 and the lubricant reservoir yourself. Please contact your Pfeiffer Vacuum Service for all other maintenance and service work.

CAUTION

Apply no mechanical stress to the electronic drive unit TC 600.

7.1. Replacing The Electronic Drive Unit

CAUTION

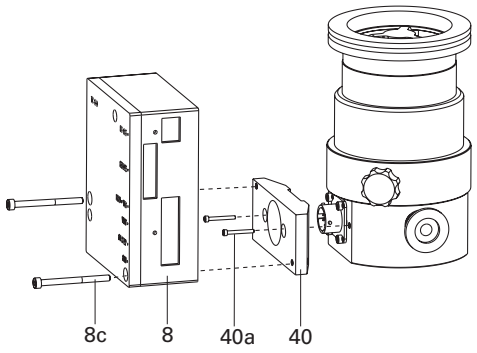
The turbopump and the TC 600 must only be disconnected from each other when the turbopump is completely at rest and the TC 600 has been disconnected from the power supply.

Remove the electronic drive unit TC 600 from the turbopump as follows:

➡ Switch off the turbopump, vent to atmospheric pressure (see section 4.6.) and allow to cool as necessary.
➡ If necessary, remove the turbopump from the system.
➡ Unscrew allen head screws 8c (2 pieces) from the electronic drive unit 8

Assembling / disassembling of the TC 600

8 Electronic drive unit TC 600
8c Hexagon socket screw M4 x 50
40 Adapter TC-TMH/U 071
40a Hexagon socket screw M4 x 16



➡ The adapter 40 must not be released for the replacement of the TC or following works.
➡ Assemble the new electronic drive unit TC 600 (order number please see section"Spare Parts") on the turbopump and connect again.

CAUTION

Please take into account that after replacement the standard operating parameters are always pre-set. If your application requires different parameters, please modify accordingly.

7.2. Replacing The Lubricant Reservoir

The lubricant reservoir should be replaced at least every three years. Where extreme operating conditions or unclean processes are involved, the replacement interval should be checked with Pfeiffer Vacuum Service.

CAUTION

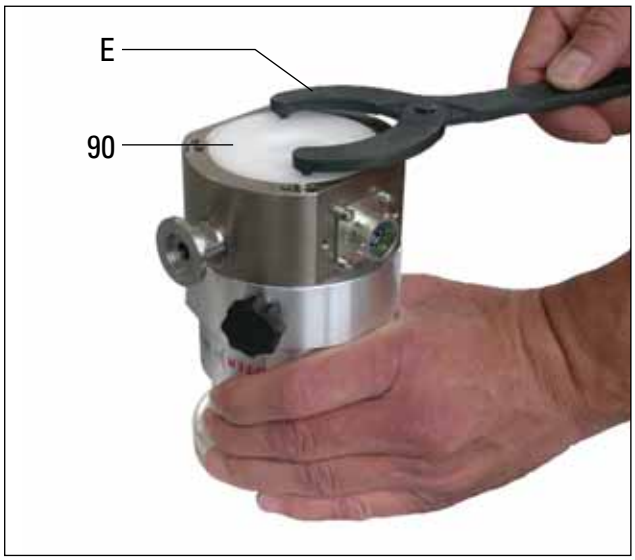
The procedure for the replacement of the lubricant reservoir depends on the turbopump type. Necessarily observe the properties abbreveations on the rating plate.

Standard Version

WARNING

The lubricant reservoir can contain toxic substances from the medium pumped. The lubricant reservoir must be disposed of in accordance with the respective regulations. Safety instructions data sheet on request or via internet under www.pfeiffer-vacuum.net

➡ Switch off the turbopump, vent to atmospheric pressure (see section 4.6.) and allow to cool as necessary.
➡ If necessary, remove the turbopump from the system.
➡ Unscrew rubber feet 6 from the underside of the pump.
➡ Unscrew locking cover 90 on the underside of the pump with installation tool E (order number N 5709 103).

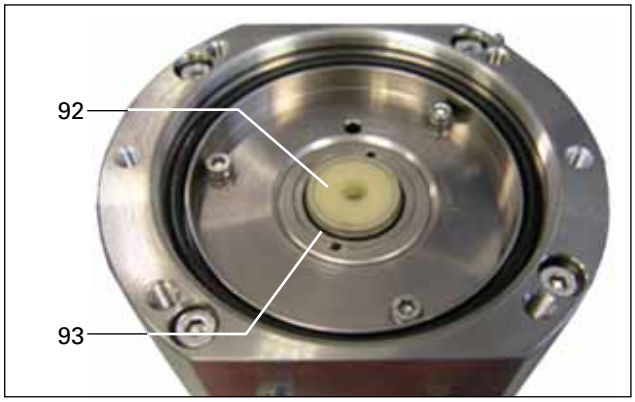


➡ Lever out the lubricant reservoir 92 with the help of two screwdrivers.

➡ Clean off any dirt on the pump and locking cover with a clean, fluff-free cloth.
➡ Insert new lubricant reservoir 92 **up to the O-ring 93** in the pump.

CAUTION

The lubricant reservoir is already filled with Lubricant TL 011; do not add additional lubricant.



➡ Screw in locking cover 90. The lubricant reservoir is brought into the correct axial position with the locking cover.
➡ Screw the rubber feet back in.

"Y"-Version
(Mounting In Any Orientation)

CAUTION

The following instructions are only valid for turbopump types with the properties abbreveation "Y" on the rating plate.

WARNING

Both the lubricant reservoir 92 and the Porex rods 89 can contain toxic substances from the media being pumped. Lubricant reservoirs and Porex rods must be disposed of in accordance with local regulations. Safety instructions data sheet on request or via internet under www.pfeiffer-vacuum.net

➡ Switch off the turbopump, vent to atmospheric pressure (see section 4.6.) and allow to cool as necessary.
➡ If necessary, remove the turbopump from the system.
➡ Unscrew rubber feet 6 from the underside of the pump.
➡ Unscrew locking cover 90 on the underside of the pump with installation tool E (order number N 5709 103).

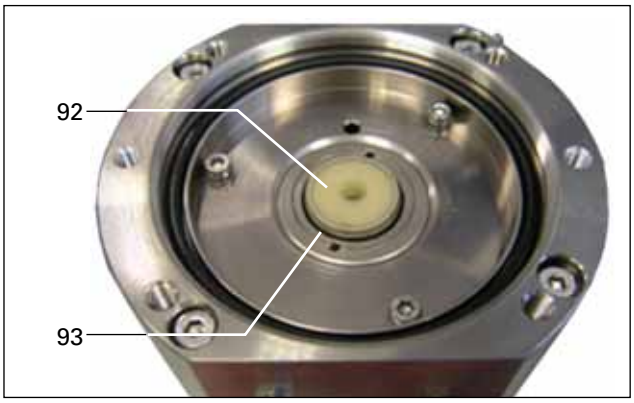
➡ Lever out the lubricant reservoir 92 with the help of two screwdrivers.

➡ Remove the Porex rods 89 (eight pieces) with tweezers.

➡ Clean off any dirt on the pump and locking cover with a clean, fluff-free cloth.
➡ Insert new Porex rods (eight pieces) with tweezers.
➡ Insert new lubricant reservoir 92 **up to the O-ring 93** in the pump.

CAUTION

The lubricant reservoir is already filled with Lubricant TL 011; do not add additional lubricant.



➡ Screw in locking cover 90. The lubricant reservoir is brought into the correct axial position with the locking cover.
➡ Screw the rubber feet back in.

8. Service

Pfeiffer Vacuum offers first-class service!

- Lubricant- and bearing exchange on the spot by Pfeiffer Vacuum field service
- Maintenance/repairs in the nearby service center or service point
- Fast replacement with exchange products in mint condition
- Advice on the most cost-efficient and quickest solution

Detailed information and addresses at: **www.pfeiffer-vacuum.net (Service)**.

Maintenance and repairs in the Pfeiffer Vacuum ServiceCenter
The following steps are necessary to ensure a fast, smooth servicing process:

➡ RMA[1)] form and contamination declaration.
➡ Fill in the RMA form and send it by fax or e-mail to your service address.
➡ Enclose the RMA confirmation of receipt from Pfeiffer Vacuum in the shipment.
➡ Fill in the contamination declaration and enclose it in the shipment (required!).
➡ Dismantle all accessories.
➡ Drain operating fluid/lubricant.
➡ Leave the electronic drive unit on the pump.
➡ Send the pump in its original packaging if at all possible.

Contaminated vacuum pumps
Units which are microbiologically, explosively or radioactively contaminated will not be accepted by Pfeiffer Vacuum as a matter of principle. Hazardous substances are substances and compounds in accordance with the hazardous goods directive (current version). Should pumps be contaminated or the contamination declaration be missing, Pfeiffer Vacuum will decontaminate the pumps at your cost.

Returning contaminated pumps or units
➡ Neutralise the pump by flushing it with nitrogen or dry air.
➡ Close off all openings so that they are air-tight.
➡ Seal the pump or unit in suitable protective film.
➡ Only return the pump/unit in a suitable and sturdy transport container.

Exchange units
For all exchange units the standard operating parameters are always pre-set. If your application requires different parameters, please modify accordingly.

Service orders
All service orders are carried out exclusively according to our repair conditions for vacuum units and components.

[1)] Return Material Authorization downloadable at www.pfeiffer-vacuum.net

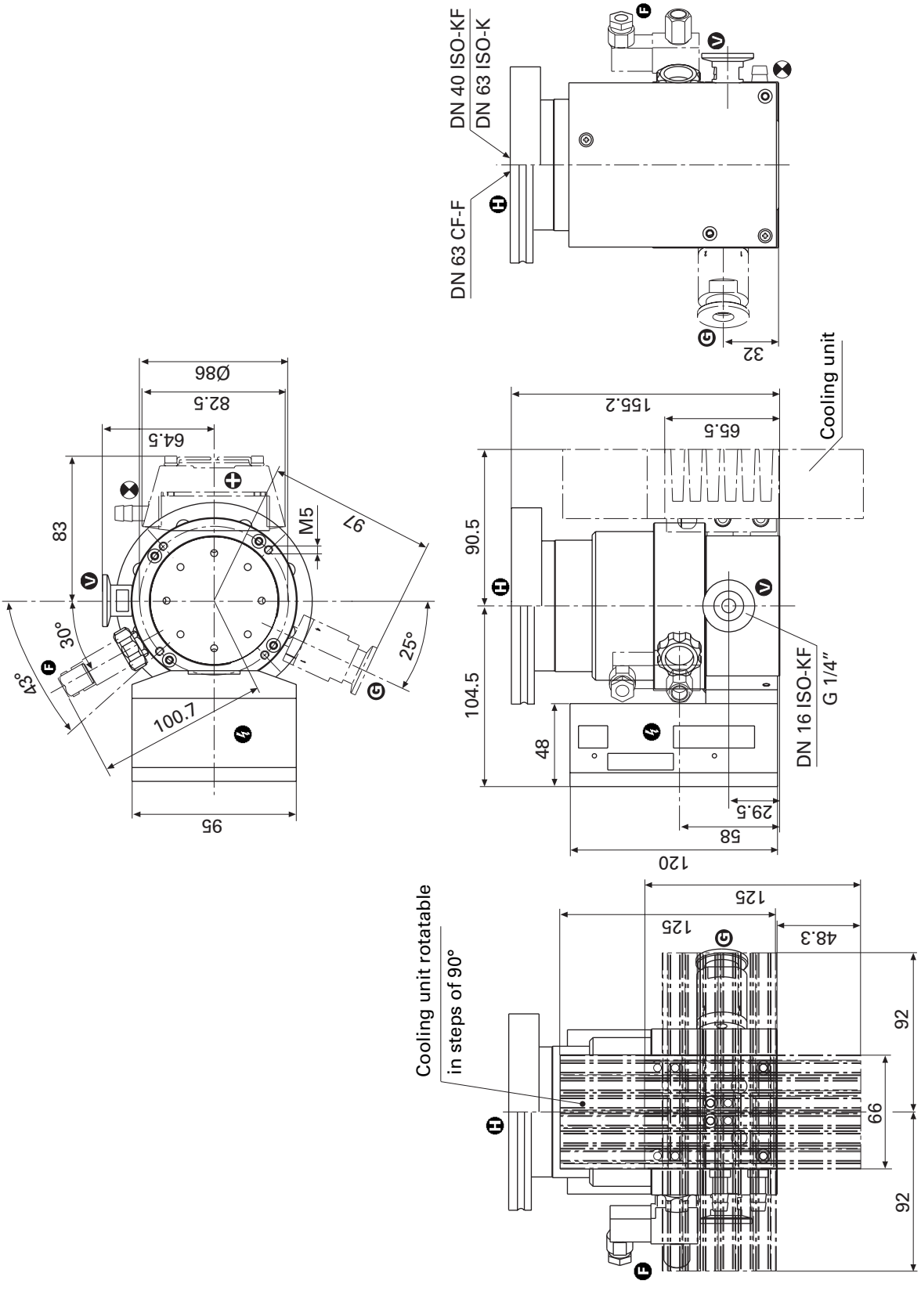
9. Technical Data

Feature	Unit	TMH 071 P TMH 071 Y P	TMH 071 P TMH 071 Y P	TMU 071 P TMU 071 Y P
Connection nominal diameter				
Inlet		DN 40 ISO-KF	DN 63 ISO-K	DN 63 CF-F
Outlet		DN 16 ISO-KF/G 1/4“	DN 16 ISO-KF/G 1/4“	DN 16 ISO-KF/G 1/4“
Venting connection		G 1/8”	G 1/8”	G 1/8”
Nominal rotation speed	Hz (1/min)	1500 (90 000)	1500 (90 000)	1500 (90 000)
Standby rotation speed	Hz (1/min)	1000 (60 000)	1000 (60 000)	1000 (60 000)
Start-up time	min	2.5	2.5	2.5
Noise level	dB (A)	< 45	< 45	< 45
Final pressure, backing pump	mbar	< 10	< 10	< 10
Integral leak rate	mbar l/s	$< 2 \cdot 10^{-8}$	$< 2 \cdot 10^{-8}$	$< 2 \cdot 10^{-8}$
Maximum permissible rotor temperature	°C	80	80	80
Permissible heat radiation power	W	4	4	4
Volume flow rate for				
Nitrogen N_2	l/s	33	59	59
Helium He	l/s	39	50	50
Hydrogen H_2	l/s	32	42	42
Compression ratio for				
Nitrogen N_2		$> 10^{11}$	$> 10^{11}$	$> 10^{11}$
Helium He		$6 \cdot 10^{6}$	$6 \cdot 10^{6}$	$6 \cdot 10^{6}$
Hydrogen H_2		$> 10^{5}$	$> 10^{5}$	$> 10^{5}$
Maximum fore-vacuum pressure for				
Nitrogen N_2	mbar	18	18	18
Helium He	mbar	18	18	18
Hydrogen H_2	mbar	12	12	12
Maximum gas throughput at nominal rotation speed [2]				
With water cooling — Nitrogen N_2	mbar l/s	1.3	1.3	1.3
With water cooling — Helium He	mbar l/s	2.7	2.7	2.7
With air cooling [3] — Nitrogen N_2	mbar l/s	0.58	0.58	0.58
Maximum gas throughput at intake pressure of 0.1 mbar [4]				
With water cooling — Nitrogen N_2	mbar l/s	2	2	2
With water cooling — Helium He	mbar l/s	3	3	3
With water cooling — Hydrogen H_2	mbar l/s	2	2	2
Vertex power characteristics line [5]				
A	W / Hz	80 / 1500	80 / 1500	80 / 1500
B	W / Hz	80 / 1500	80 / 1500	80 / 1500
C	W / Hz	60 / 1500	60 / 1500	60 / 1500
D	W / Hz	80 / 1300	80 / 1300	80 / 1300
Final pressure [6]				
With rotary vane pumps	mbar	$< 1 \cdot 10^{-7}$	$< 1 \cdot 10^{-7}$	$< 5 \cdot 10^{-10}$
With diaphragm pumps	mbar	$< 1 \cdot 10^{-7}$	$< 1 \cdot 10^{-7}$	$< 1 \cdot 10^{-8}$
Lubricant		TL 011	TL 011	TL 011
Maximum cooling water consumption with water at 15 °C [6]	l/h	100	100	100
Cooling water temperature	°C	5 - 25	5 - 25	5 - 25
Permissible ambient temperature with air cooling	°C	0 - 40	0 - 40	0 - 40
Heating power consumption	W	32	32	32
Weight	kg	2.8	3.8	3.8
Permissible magnetic field	mT	3	3	3
Operating voltage	VDC	24 ± 5%	24 ± 5%	24 ± 5%
Duration [7] - / max. current consumption	A	4.1 / 4.6	4.1 / 4.6	4.1 / 4.6
Duration [7] - / max. power	W	100 / 110	100 / 110	100 / 110
Fuse, internal	V	T8A/250	T8A/250	T8A/250
Protection class [8]		IP 30	IP 30	IP 30
Relative humidity	%	5-85 non-condensing	5-85 non-condensing	5-85 non-condensing

1)Measured with 20 % helium concentration and a measurement period of 10s
2) Until frequency fall-off; higher gas throughputs with reduced rotation speed.
3) Until ambient temperature 40 °C.
4) Rotation speed of pump may drop below the nominal rotation speed.
5) For gas characteristic lines please refer to section 4.4.
6) In accordance with German Industrial Standard DIN 28428
7) At maximum gas throughput.
8) Protection class IP 54 is afforded for the TC 600 by retro-fitting a cover plate (Accessory)

9.1. Dimensions Diagram

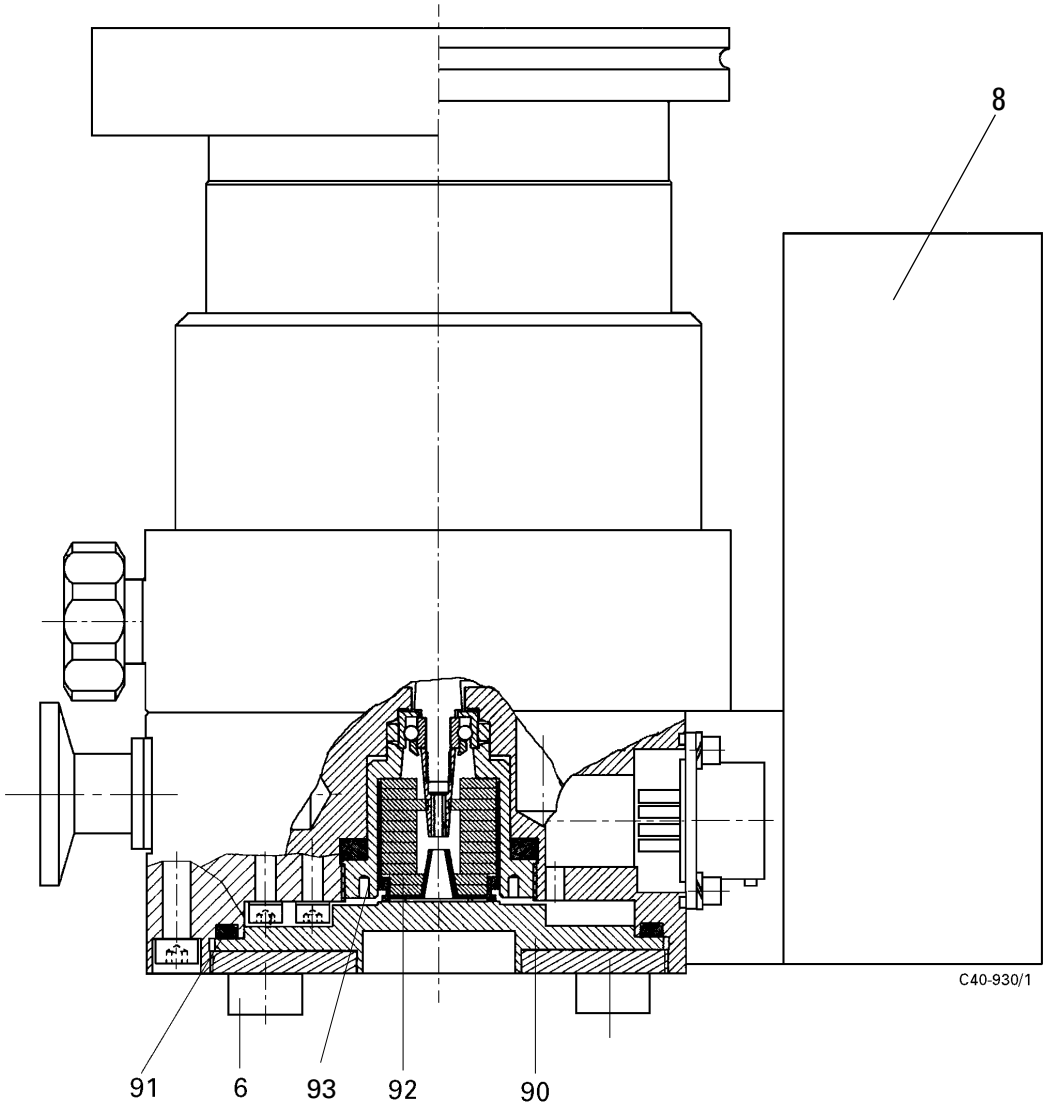
TMH 071 P / TMU 071 P



10. Spare Parts

Pos.	Description	Pieces	Size	Number	Comments	Ordering Quantity
	Spare parts TMH 071 / TMU 071					
6	Rubber foot	4		P 3695 700 ZD		
8	Electronic drive unit TC 600	1		PM C01 720		
90	Locking cover	1		PM 083 021 -X		
91	O-ring	1	68 x 3	P 4070 972 PV		
92	Lubricant reservoir (standard version)	1		PM 073 073 -T	incl. O-ring (93)	
92	Lubricant reservoir ("Y"-Version)	1		PM 103 794 -T	incl. O-ring (93) and 8 x Porex rods (89)	

Spare parts



11. Accessories

Description	Size	Number	Comments/ Operating Instructions	Order Quantity
Components for cooling				
Dirt trap	R 3/8"	P 4161 300 2R		
Recycled Water Cooling Unit TZK 400	230 V, 50 Hz	PM Z01 245	PM 0369 BN	
Air cooling	24 VDC	PM Z01 253	PM 0543 BN	
Water cooling		PM 016 000 -T	PM 0546 BN	
Cooling unit for convection cooling		PM 039 237 -T		
Components for venting				
Venting Valve TVF 005, without current closed	24 VDC	PM Z01 135	PM 0507 BN	
Drying Unit TTV 001 (filled with zeolite)		PM Z00 121	PM 0022 BN	
Venting flange	DN 10 ISO-KF	PM 033 737 -T		
Clip clamping ring for the venting flange	DN 10 - 15 ISO-KF	PF 102 016 -T		
Components for heating				
Casing heating			Water cooling required	
	230 V, Schuko plug	PM 041 900 -T	PM 0542 BN	
	208 V, UL-plug	PM 041 901 -T	PM 0542 BN	
	115 V, UL-plug	PM 041 902 -T	PM 0542 BN	
Other accessories				
Connecting cable TC 600 – TPS/DCU	3 m	PM 051 103 -T	Other lengths on request	
Connecting cable TC 600 – TPS/DCU (shielded)	3 m	PM 051 843 -T	Other lengths on request	
Power supplies				
– TPS 100; for fitting to walls or standard runners		PM 041 827 -T	PM 0521 BN	
– TPS 100; 19" insert unit		PM 041 828 -T	PM 0521 BN	
– DCU 100; 19" insert unit with ....Operating and Display Control Unit		PM C01 694	PM 0477 BN	
Display and control unit DCU 001		PM 041 816 -T	PM 0477 BN	
Handheld programming unit HPU 001		PM 051 510 -T	PT 0101 BN	
Mains cables				
Schuko plug	230 V	P 4564 309 ZA		
UL plug	208 V	P 4564 309 ZF		
UL plug	115 V	P 4564 309 ZE		
Relay box, backing pump				
	90 - 265 V (5 A)	PM 041 937 -T	PT 0030 BN	
	90 - 265 V (20 A)	PM 041 938 -T	PT 0030 BN	
PWM adapter box		PM 051 028 -U	PM 0563 BN	
Level Converter RS 232/485, TIC 001		PM 051 054 -T	PM 0549 BN	
Cover plate for TC 600 (IP 54)		PM 051 327 -U	PT 0024 BN	
Profibus-DP gateway TIC 250		PM 051 257 -T	PM 0599 BN	
Vibration compensator, TMH	DN 63 ISO-K	PM 006 800-X		
TMH	DN 40 ISO-KF	PM 006 799-X		
TMU	DN 63 CF-F	PM 006 801 -X		
Splinter shield	DN 40 ISO-KF	PM 006 375 -X		
	DN 63 ISO-K	PM 006 376 -X		
Protective grill	DN 63 ISO-K	PM 006 597 -R		
Sealing ring, TMH	DN 63 ISO-K	PF 303 106 -T		
Cu seal (10 pieces), TMU	DN 63 CF	PF 501 406 -T		
Set of screws, TMU	DN 63 CF	PF 505 002 -T		
Sealing gas valve		PM Z01 142	PM 0229 BN	
Hose nipple for the sealing gas valve	DN 16 ISO-KF-10	PF 144 020		
Assembly material, Accessories for flange mounting		**see section 3.2.**		

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: _____

PFEIFFER VACUUM

Herstellererklärung
Manufacturer´s Declaration

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

- **Maschinen/*Machinery* 98/37/EWG (Anhang/*Annex* II B)**
- **Elektromagnetische Verträglichkeit/*Electromagnetic Compatibility* 89/336/EWG**
- **Niederspannung/*Low Voltage* 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 98/37/EWG entspricht.

Das unten aufgeführte Produkt entspricht den Anforderungen der EU-Richtlinien **Maschinen 98/37EWG, Elektromagnetische Verträglichkeit 89/336/EWG** und **Niederspannung 73/23/EWG**.

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 98/37/EEC.

*The product specified below is in correspondence to the EU directives **Machinery 98/37/EEC**, **Electromagnetic Compatibility 89/336/EEC** and **EU Low Voltage 73/23/EEC**.*

Produkt/Product:
TMH 071
TMU 071

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:

DIN EN ISO 12100-1 / -2, DIN EN 294, DIN EN 1012-2, DIN EN 61010

Unterschrift/*Signature:*

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

W. Dondorf
Geschäftsführer
Managing Director

Herst.I/2003

Vacuum is nothing, but everything to us!

Turbopumps

Rotary vane pumps

Roots pumps

Dry compressing pumps

Leak detectors

Valves

Components and feedthroughs

Vacuum measurement

Gas analysis

System engineering

Service

PFEIFFER VACUUM

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