Betriebsanleitung • Operating Instructions

UnoLine™
Oil Sealed Rotary Vane Pump

UNO 6

PD 0022 BE/B (0606)

PFEIFFER VACUUM

Index

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

1. Safety Instructions

☞ Read and follow all instructions in this manual
☞ Inform yourself regarding:
  – Hazards with respect to the pump.
  – Hazards with respect to your system.
  – Hazards with respect to the media being pumped.
☞ Avoid exposing any part of your body to vacuum.
☞ Follow the safety and accident prevention regulations.
☞ Regularly check continuing compliance with all safety instructions.
☞ Do not carry out any unauthorized modifications on the pump.
☞ Please take account of the shipping instructions in Section 7 when returning pumps to us.

1.1. For Your Orientation

Instructions in the text
➡ Operating instruction: here you have to do something.

Symbols used
The following symbols are used throughout in all illustrations in this manual:

Ⓥ Vacuum flange

Ⓐ Exhaust connection

Ⓖ Gas ballast

Electrical connection

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

1.2. Pictogram Definition

Danger of burns from touching hot parts

Danger of an electric shock

Danger of physical injury

Danger of damage to the pump or the system

Important note.

Modifications reserved.

2. Understanding The Pump

2.1. Main Features

Rotary Vane Pump UNO 6

1 Vacuum flange
2 Exhaust connection
6 Pump casing
76 Cover
80 Sight glass
90 Operating fluid return unit
140 Operating fluid filler screw
142 Operating fluid drain screw
250 Motor,

The UNO 6 is a oil-sealed, single stage operating rotary vane vacuum pump with air cooling and circulatory lubrication. A safety valve in the intake flange closes the intake line automatically and prevents operating fluid back-streaming when the pump is switched off. The outlet is via an operating fluid separator (ONF) with integrated oil mist filter. The pump is appropriate for operations in process technology in the food processing, and packing industries and the metallurgical field.
The pump have been designed for non-stop or intermittent operations in the vacuum range from 400 to 2 mbar.

Proper use

- Rotary vane vacuum pumps may only be used for the purpose of generating vacuum.
- The pumps are only suitable for the pumping of air and inert gases.
- The pumps should not be used as compressors.
- Corrosive or explosive gases must not be pumped.
- The pumps should not be located in areas where there is a danger of explosions.
- Accessories other than those named in this manual may only be used with the agreement of Pfeiffer Vacuum.

Improper Use

- Uses not covered above, and, in particular:
  - The pumping of gases which are contaminated with particles, dust and condensate.
  - Connection to pumps and units which is not permitted according to their operating instructions.
  - Connection to units which contain touchable and voltage carrying parts.

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

2.2. Delivery

Product	Order no.:
Pump with single phase motor and prepared for operating fluid **D1** (D1 included in the delivery) 230V/50 Hz (± 10%)	PK D01 151

3. Installation

3.1. Preparations For Installation

WARNING

Do not carry out any unauthorized conversions or modifications to the rotary vane vacuum pump.

CAUTION

Fill up with operating fluid before operating the pump for the first time (included with the delivery consignment). Do not tilt pumps filled with operating fluid otherwise the operating fluid can escape from the exhaust outlet.

3.2. Pump Set-Up And Location

- ➡ Set up the pump on an even and horizontal surface; the pump does not need to be secured to the standing surface.
- ➡ Where stationary installation in a system is involved, the pump must be anchored.
- ➡ The maximum set-up level is 2000 m N.N.
- ➡ The maximum relative humidity is 85%.
- ➡ Sight glass 80 must be visible from the front side and easily accessible.
- ➡ Adequate air circulation must be ensured where the pump is installed in a closed casing; the permissible ambient temperature is +12°C.....+35°C for operating fluid D1.

3.3. Connecting The Vacuum Side

- ➡ Keep the connection between the pump and vacuum chamber as short as possible.
- ➡ Remove scaling and the like from welded lines before fitting.
- – To protect the pump, separators, filters, cooling traps etc. can be fitted upstream (please refer to Section 9, "Acessories"). Please note however that the volume flow rate is reduced by the conductance value of accessory.
- – Intake lines can be of metal hose or PVC hoses with ISO-KF, ISO-K flanges.

3.4. Connecting The Exhaust Side

CAUTION

Dangerous levels of pressure can build up in the exhaust line. Therefore:
Lay exhaust lines without shut-off elements.
The exhaust line, which should correspond to the exhaust diameter DN2 of the pump, should be laid descending from the pump so that no condensate can flow back into the pump. Otherwise fit a condensate separator. The exhaust pressure may not exceed 1.5 bar. Use an exhaust adapter in accordance with the accessories in Section 9 for the connection of the exhaust line.

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CAUTION

Expelled gases and vapours can represent a health hazard and/or be damaging to the environment. The local safety regulations must be observed.

3.5. Connecting To Mains Power

CAUTION

The electrical connections must be carried out in accordance with the local regulations. Voltage and frequency data contained on the rating plate must comply with mains power values. When mains power has been connected, the protective earth lead should be checked.

WARNING

Disconnect voltage to the pump before opening the terminal box:

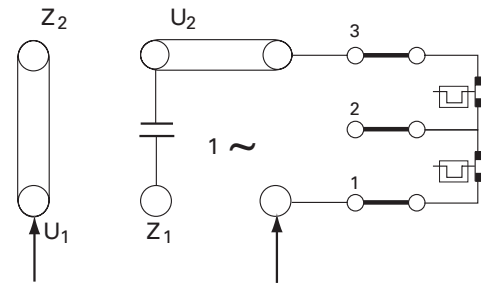
Single phase motor

The UNO 6 is fitted with a single phase motor with integrated thermal protection switch and a power supply cable (2 m) as standard.

CAUTION

To protect the motor in case of malfunction, mains fuse protection must be implemented by the customer.

Connecting diagram with integrated thermal protection switch



4. Operations

4.1. Filling In And Checking The Operating Fluid

CAUTION

The standard version pumps have been tested using operating fluid D1. Only the use of this operating fluid guarantees attained final pressure levels and the unproblematic function of the pump. Where ambient temperatures of less than 12°C and in excess of 35°C are involved, other operating fluids, agreed with Pfeiffer Service, should be used.

One filling of operating fluid is included with the delivery consignment.
Operating fluid should be disposed of in accordance with the respective local regulations.

CAUTION

Filling and topping up operating fluid should only be carried out when the pump has been switched off.

- ➡ Unscrew operating fluid filler screw 140.
- ➡ Fill in the operating fluid included with the delivery consignment; refer to the rating plate or "Technical Data" for the filling amounts of operating fluid.
- ➡ Screw in operating fluid filler screw 140; take care with O-ring 234!
- ➡ Check the level of operating fluid only when the pump is at rest. The level should be between the middle and the upper part on the sight glass scale.
  - When the pump is in operation, the operating fluid level should be in the middle part of the sight glass scale.
- ➡ Where non-stop operations are involved, the operating fluid level should be checked daily, otherwise each time the pump is switched on.

Please note:
Where unusually high levels of operating fluid are being lost it is necessary to carry out a check of the radial shaft seals.
If operating fluid leaks out from under the pump between the pump casing and the motor or fan, the radial shaft seals should be replaced. In this case please get in touch with your local Pfeiffer Vacuum Service (please refer to Section 7).

4.2. Switching The Pump ON And OFF

WARNING

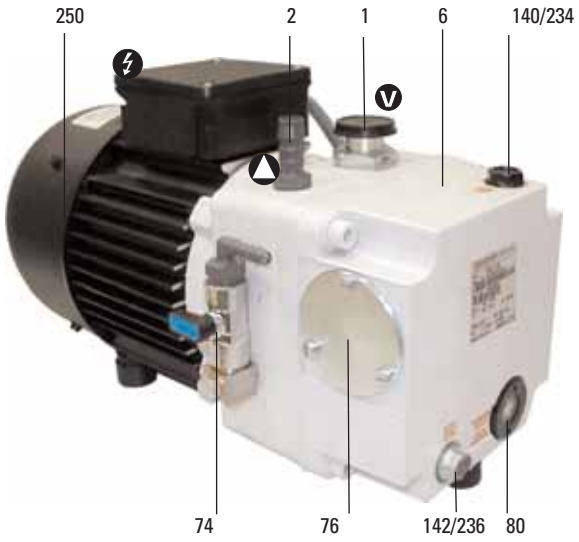
The pump gets hot when in operation.

The pump can be switched on and off in all pressure ranges. The minimum temperature on starting is +12°C in accordance with DIN 28426. Switch on the pump with the inlet closed and allow to warm up for 15 minutes. Having warmed up, the pump can be switched on and off in any pressure range.

On switching off (intake pressure <750 mbar), the integrated safety valve to the vacuum apparatus closes automatically.and ventilates the pump.

Rotary vane vacuum pump UNO 6

1 Vacuum flange
2 Exhaust connection
74 Gas ballast
76 Cover
80 Sight glass
140 Operating fluid filler screw
142 Operating fluid drain screw
234 O-ring
236 O-ring
250 Motor;



PLEASE NOTE

To make shure that the high vacuum safety valve works proper at any intake pressure, there should be at least a pressure difference of 250 mbar between the intake and the exhaust side.

CAUTION

Protect pump by means of suitable measures (e.g. dust separator) when the pumped gases are contaminated with particles or dust. If necessary check operating fluid regular or change operating fluid more frequent.

4.2.1. Permissible Operating Duration

	Operation mode	
	continuous[1]	**intervall**[2] (max. 1h)
Intake Pressure (mbar)	400 ... final pressure	1000 ... 400 mbar

1) **Continuous operation:** continuous pumping at a certain pressure (400 ... 2 mbar) without time limitation.

2) **Switch off pump for at least 30 sec**, so that the operating fluid, separated by the operating fluid separator, can return to the operating fluid sump.

4.3. Using The Gas Ballast Valve

No special measures are necessary providing the correct pump version is being operated (selection of operating fluid, materials etc.).

CAUTION

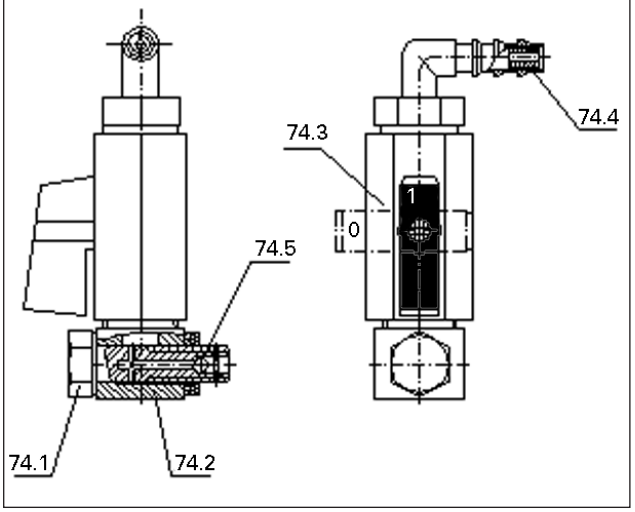
To avoid condensation in the pump, vapours should only be pumped off when the pump is warm and with gas ballast valve G open. Note pump water vapour compatibility levels under Section 8. Technical Data. When the process has been completed, allow the pump to continue running for about 30 minutes with open gas ballast valve for operating fluid regeneration purposes.

Gas Ballast Valve

Air is periodically fed into the working chamber at the beginning of the compression phase via the gas ballast valve. The gas ballast valve is shut when turning to position 0 and open when turning to position 1. Intermediate settings are not possible.

Gas ballast valve 74

74.1 Operating fluid return line
74.2 Gas ballast casing
74.3 Kugelventil
74.4 Gas ballast filter
74.5 Gummikugel



5. What To Do In Case Of Breakdowns ?

Problem	Possible Causes	Elimination
Pump does not attain final pressure	The pump is dirty	Operate the pump for a longer period with open gas The operating fluid is dirty ballast valve or change the operating fluid.
	Insufficient operating fluid	Top up operating fluid.
	Leak in the system	Repair leak.
Unusual operating noises	Damage to the pump system	Request repair by Pfeiffer Vacuum Service.
	Damage to the coupling part	Request repair by Pfeiffer Vacuum Service.
Operating fluid is leaking out from under the pump	Defective radial shaft seals	Request repair by Pfeiffer Vacuum Service.
Gas ballast function is not functioning	Nozzle inside the gas ballast valve is dirty	Unscrew nozzle and clean.
The pump does not start	The ambient temperature is <12°C	Warm up pump.
	Dirty pump system	Request cleaning by Pfeiffer Vacuum Service.

6. Maintenance

Maintenance work precautions

Secure the pump against unintentional switching on when carrying out any work on the pump.
If necessary, remove the pump from the system for inspection.

- ➡ The pump should only dismantled as far as is necessary in order to eliminate defects.
- ➡ Account must be taken of the user instructions when working with synthetic operating fluids and with toxic or substances enriched with corrosive gases.
- ➡ Clean the pump parts only with benzin or the similar. Do not use soluble washing agents.

6.1. Changing The Operating Fluid

The ageing process of operating fluid is dependent on the pump applications.

Please note:
The disposal of used operating fluid must be carried in accordance with the respective local regulations.
Please request safety instruction data sheets for operating fluids from Pfeiffer Vacuum or download from the INTRANET/ INTERNET.

- ➡ Depending on the process, change the operating fluid every 500-2000 operating hours, but at least once every 6 months. The condition of the operating fluid can be assessed by its colour. Fresh operating fluid D1 is golden yellow. Used operating fluid is dark brown down to black and of milky consistencies depending on the typ of process.
- ➡ Switch off the pump.
- ➡ Unscrew operating fluid drain screw 142 and operating fluid filler screw 140 and drain off operating fluid.

The temperature of the operating fluid can be as high as 100°C. When carrying out maintenance and repair work and depending on the application, toxic gases and vapours can escape from the operating fluid which can also be enriched with substances harmful to health (radioactive, chemical etc.).

- ➡ Screw in operating fluid drain screw 142; take care with the O-ring!
- ➡ Fill in new operating fluid and check the filling level in accordance with Section 4.1.
- ➡ Where the operating fluid is extremely dirty, several changes may be necessary (flushing).
- ➡ Screw in operating fluid filler screw 140.
- ➡ When new operating fluid has been filled in, operate the pump for approximately 30 minutes and then switch off again.
- ➡ Drain off operating fluid at drain screw 142.
- ➡ Continue to flush the pump until the operating fluid remains clean.

6.2. Changing The Exhaust Filter

Exhaust filter 120 in operating fluid separator 75 should be replaced, depending on the application and level of contamination, every 500 to 5000 operating hours. It is recommended to also replace the respective o-rings 121 and 122.

Indications for a filter replacement

– Increased expulsion of operating fluid mist from the exhaust flange.
– Increased power consumption.

WARNING

Depending on the process, toxic gases and vapours can be present when replacing the exhaust filter. Maintenance and repair work may only be carried out by qualified personnel and in compliance with the respective regulations.

➡ Unscrew screws 119 from cover 76; take care with the O-ring 122.
➡ Remove cover 76.
➡ Remove used exhaust filter 120; take care with the O-ring 121.
➡ Fit new exhaust filter 120; regard to the position of O-ring 121 und 122.
➡ Re-assemble in reverse order.

6.3. Changing The Intake Filter

The intake filter, located in the upper part of the intake flange must be cleaned when the intake capacity reduces.

CAUTION

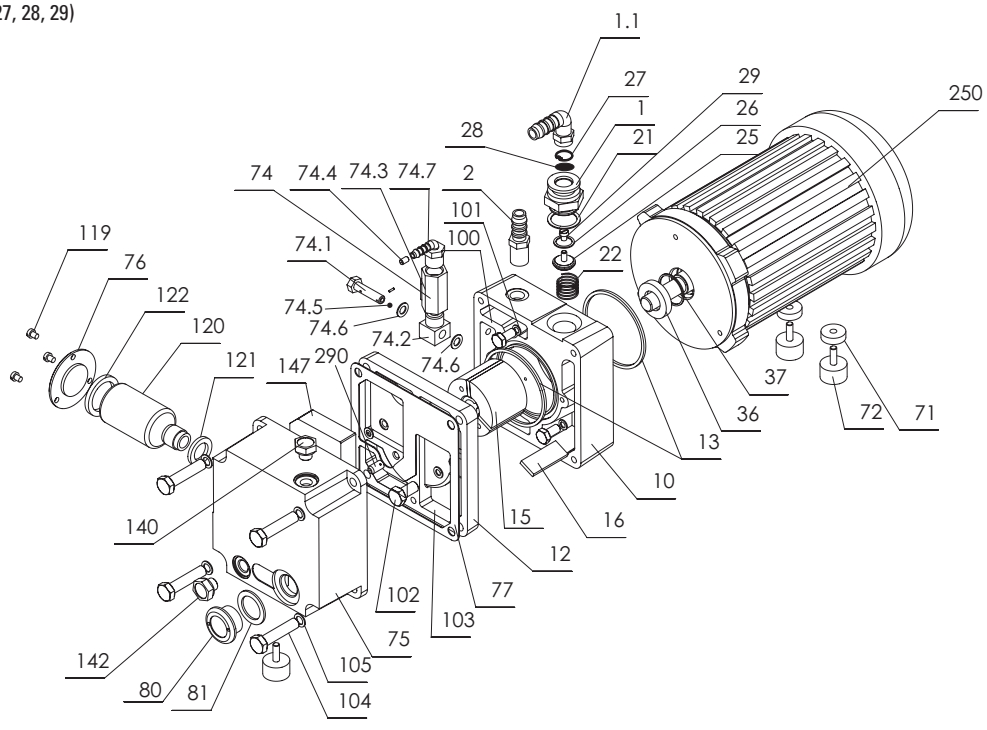
When cleaning the intake filter it is recommended to clean the vacuum safety valve at the same time and check it for wear and tear.

PLEASE NOTE

When replacing the intake filter 28, care must be taken that no dirt or the like gets into the intake flange.

Changing the exhaust filter and the intake filter

1 Vacuum flange (V)
Vacuum safety valve; complete (consisting of pos.: 1, 21, 22, 25, 26, 27, 28, 29)
28 Intake filter
76 Cover
119 Screws
120 Exhaust filter
121 O-ring
122 O-ring



7. Service

Do Make Use Of Our Service Facilities

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

– Have the pump repaired on the spot by our Pfeiffer Vacuum Service Engineers;
– Return the individual components to the manufacturer for repairs;
– Replace individual components with a new value exchange units.

Local Pfeiffer Vacuum representatives can provide full details.

Before Returning:

➡ When returning the pump please use original factory packing.
➡ Dismantle all accessories.
➡ Drain operating fluid.
➡ If the pump free of harmful substances, please attach a clearly visible notice: “Free of contamination” (to the unit being returned, the delivery note and accompanying paperwork).

Harmful substances" are substances and preparations as defined in current legislation. Pfeiffer Vacuum will carry out the decontamination and invoice this work to you if you have not attached this note. This also applies where the operator does not have the facilities to carry out the decontamination work. Units which are contaminated microbiologically, explosively or radioactively cannot be accepted as a matter of principle.

Fill Out The Contamination Declaration

➡ In every case the "Contamination Declaration" must be completed diligently and truthfully.
➡ A copy of the completed declaration must accompany the unit; any additional copies must be sent to your local Pfeiffer Vacuum Service Center.

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

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

Returning Contaminated Units

If contaminated units have to be returned for maintenance/repair, the following instructions concerning shipping must be followed without fail:

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

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

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

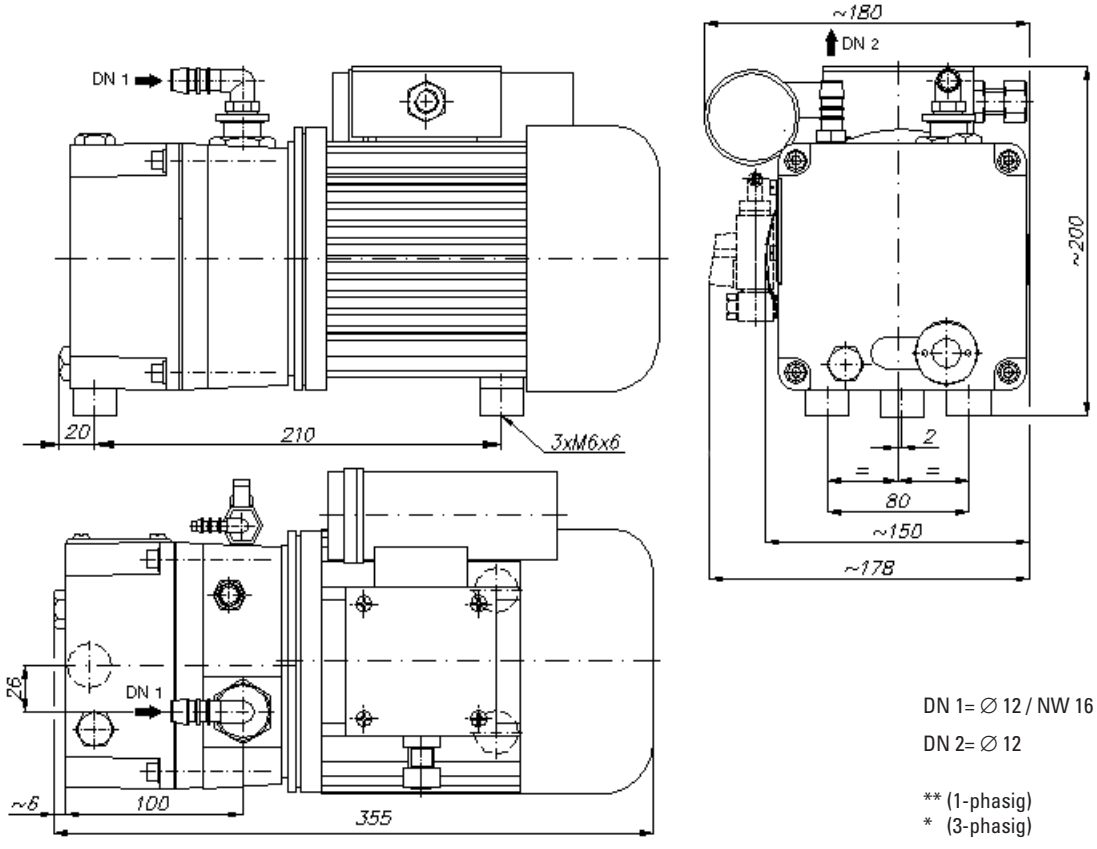
8. Technical Data

Feature	Unit	Pump UNO 6
Connection nominal diameter		
Input	DN 1	DN 16 ISO-KF mit G 3/8" inner thread
Output	DN 2	G 3/8" hose coupling ø 12
Flow rate at		
50 Hz	m^3/h	6
Final pressure		
Total without gas ballast	mbar	< 2
Total with gas ballast	mbar	< 3
Water vapour compatibility	g/h	102
Water vapour acceptable capacity	mbar	23
Gas ballast valve		ja
Noise level		
without gas ballast	dB(A)	65
Operating fluid	l	0,2
Max. permissible operating fluid temperature [1]	°C	< 100
Exhaust filter; degree of separation	%	99,9
Rotation speed		
at 50 Hz	1/min	1400
Rated power at		
230 V/50 Hz (1-phase)	kW	0,55
Weight, approx..	kg	17

[1] at 25 °C ambient temperature and operating fluid D1

8.1. Dimension

UNO 6



DN 1= ∅ 12 / NW 16

DN 2= ∅ 12

** (1-phasig)
* (3-phasig)

9. Accessories

Description	Type	Size	Order No.	Comments
Operating fluid D1 1L			PK005 875-T	
Operating fluid D1 5L			PK005 876-T	
Operating fluid D1 20L			PK005 877-T	standard
Adapter for the exhaust connection G $^3/_8$ auf DN 16 ISO-KF			PK 101 002	
Dust separator	SAS 20	Rp 1/2" inner thread	PK Z60 502	
Ball valve	VKP 20	G 1/2" inner thread	PK Z50 002	
Adaption via DN 16 ISO-KF / R $^1/_2$ kegelig			PK 101 056	for SAS 20 and VKP 20
Vacuum Gauge (Measuring range: 1000 ... 10 mbar)		G $^1/_2$ outer thread	P 6006 102 ZC	
Vacuum Gauge (Measuring range: 1000 ... 10 mbar)		DN 10 ISO-KF	PK M10 001 A	

10. Spare Parts

Spare parts packages for UNO 6

Set of seals UNO 6, PK E50 002 -T

Pos.	Description	Size	Required pieces/pump	Comments
13	O-ring	73 x 3	2	
21	O-ring	24,5 x 3	1	
26	O-ring	15 x 2	1	
101	Copper seal	6 x 10 x 1	3	
121	O-ring	18 x 5	1	
122	O-ring	30 x 5	1	

Maintenance kit UNO 6, PK E51 002 -T

Pos.	Description	Size	Required pieces/pump	Comments
77	Gasket		1	
120	Exhaust filter	FPS 40 x 63	1	
121	O-ring	18 x 5	1	
122	O-ring	30 x 5	1	
140	Operating fluid filler screw		1	
142	Operating fluid drain screw		1	

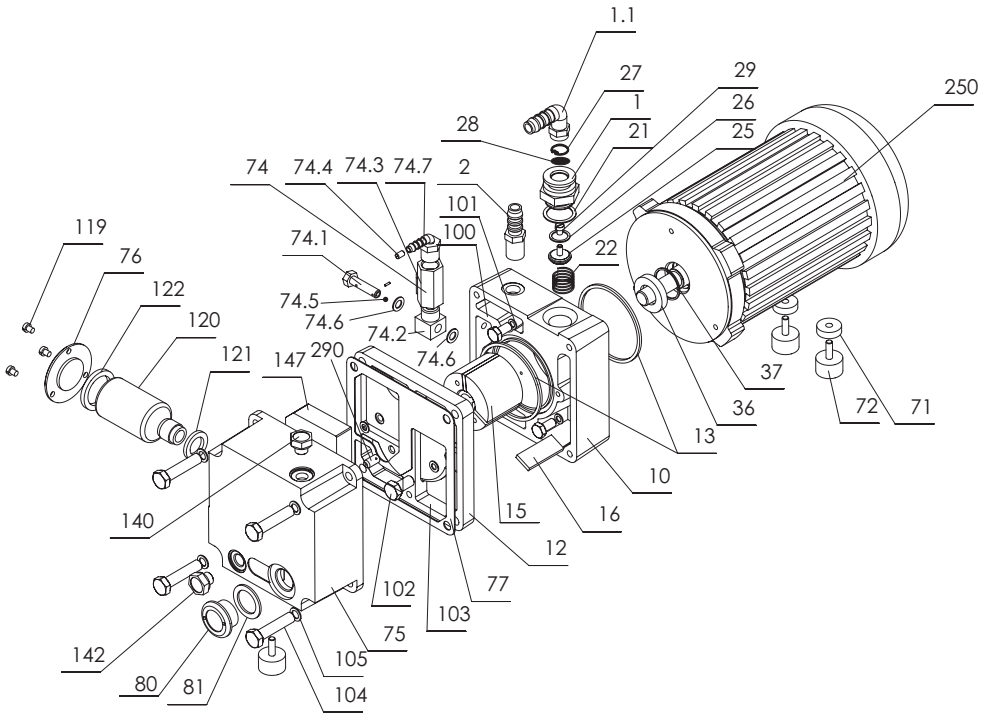
Overhaul kit UNO 6, PK E52 002 -T

Pos.	Description	Size	Required pieces/pump	Comments
	Set of seals		1	
16	Vanes		3	
25	Valve plate		1	
28	Intake strainer		1	
36	Radial shaft seal ring	20 x 30 x 7	1	Typ E
80	Sight glass		1	
120	Exhaust filter	FPS 40 x 63	1	
140	Operating fluid filler screw		1	
142	Operating fluid drain screw		1	

Vacuum safety valve kit UNO 6, PK E54 002 -T

Pos.	Description	Size	Required pieces/pump	Comments
21	O-ring	24,5 x 3	1	
22	Compression spring		1	
25	Valve plate		1	
26	O-Ring	15 x 2	1	
28	Intake strainer		1	
29	Screw	M 4 x 6	1	

Exploded drawing



PLEASE NOTE

The use of other accessories than mentioned in this instruction requires prior authorisation from Pfeiffer Vacuum.

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).

Only authorized, experienced and trained personnel are permitted to make changes or perform maintenance or repairs. Unapproved changes by the customer void all warranty and liability claims against Pfeiffer Vacuum.

PLEASE NOTE

Please use our Service Training offers (information is also available via www.pfeiffer-vacuum.net).

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

Konformitätserklärung
Declaration of Conformity

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

- **Maschinen/*Machinery* 98/37/EG (Anhang/*Annex* IIA)**
- **Elektromagnetische Verträglichkeit/*Electromagnetic Compatibility* 89/336/EWG**
- **Niederspannung/*Low Voltage* 2006/95/EG**

Hiermit erklären wir, daß das unten aufgeführte Produkt den Bestimmungen der **EU-Maschinenrichtlinie 98/37/EG**, der **EU-Richtlinie über Elektromagnetische Verträglichkeit 89/336/EWG** und der **EU-Niederspannungsrichtlinie 2006/95/EG** entspricht.

*We hereby certify, that the product specified below is in accordance with the provision of **EU Machinery Directive 98/37/EEC, EU Electromagentic Compatibility Directive 89/336/EEC** and **EU Low Voltage Directive 2006/95/EC**.*

Produkt/*Product:*
UNO 6

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:

EN ISO 12100-1
EN ISO 12100-2
EN 294
EN 50 081-1
EN 50 082-2
EN 60335-1, -41
EN 61 010
EN 1012-2

Unterschriften/*Signatures:*

Pfeiffer Vacuum GmbH
Berliner Str. 43
35614 Asslar
Germany

(M. Bender)
Geschäftsführer
Managing Director

(Dr. M. Wiemer)
Geschäftsführer
Managing Director

Konf.I/2007

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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