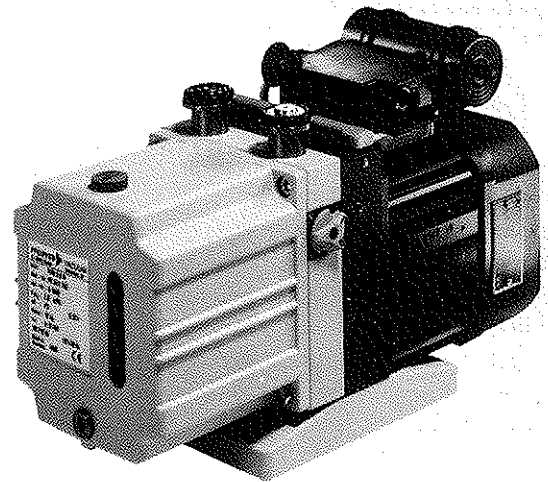


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Mode d'emploiPage 26

UNO 005 A
UNO/DUO 2.5 A
UNO/DUO 2.5 AC

Drehschiebervakuumpumpen
Rotary Vane Vacuum Pumps
Pompes à vide rotatives à palettes



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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 pump;
 - 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.
- ☞ Observe all safety and accident prevention regulations.
- ☞ Check regularly that all safety requirements are being complied with.
- ☞ Do not use the pump for the purpose of generating pressure.
- ☞ Do not carry out any unauthorised conversions or modifications on the pump.
- ☞ When returning the pump to us please note the shipping instructions in the section on 7. service.



Danger of burns from touching hot parts.



Danger of personal injury.



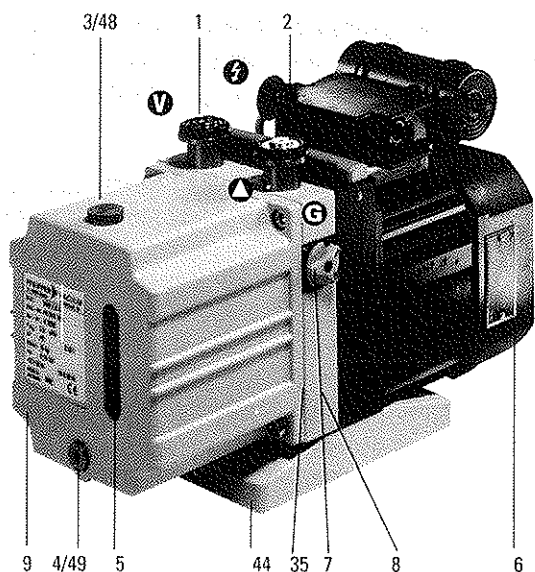
Danger of damage to the pump or system.

2. Understanding The Pump

2.1. Main Features

Rotary Vane Vacuum Pumps

- 1 Vacuum connection
- 2 Exhaust connection
- 3 Operating fluid filler screw
- 4 Operating fluid drain screw
- 5 Sight glass
- 6 Motor
- 7 Gas ballast valve
- 8 Support stand
- 9 Casing
- 35 Casing seal
- 44 Base plate
- 48 O-ring
- 49 O-ring



The Rotary Vane Vacuum Pumps are suitable for the generation of rough and medium vacuum in the laboratory and for all operations where small volume flow rates suffice. They can also be used as backing pumps for small diffusion or turbo molecular pumps.

Proper Use

- Rotary Vane Vacuum Pumps may only be used to generate vacuum.
- Do not pump corrosive or explosive gases (a special version for these operations is available on request).
- Do not operate the pumps where explosive processes are involved. This is only permitted with the "explosive" version of the pump.
- Using accessories not named in this manual is not permitted without authorisation from PFEIFFER.

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

2.2. Design

The single stage UNO 005 A/2.5 A and two stage DUO 2.5 A/AC Rotary Vane Vacuum Pumps are oil-immersed. The pump stages and motor are mounted on a support stand. Bearings and pumping chamber are supplied continuously with pump fluid which both seals and lubricates. Pump fluid, together with dirt and other particles, is expelled via the pump valve and returned to the pump fluid reservoir. Foreign matter and dirt particles are deposited on the floor of the casing so that only clean pump fluid flows into the pump circulation system. Intake ports, exhaust ports and gas ballast valve are located on the support stand. The direct drive, broad range voltage motor drives the pump via a coupling. A built-in, thermal protection switch protects the motor and the pump against overloading.

A hydraulically controlled high vacuum safety valve is located between the vacuum connection and the pumping system. The valve closes off the vacuum equipment without delay when the pump is at a standstill and vents the pump. The Rotary Vane Vacuum Pumps are in two versions available:

Standard versions: UNO 005 A,
UNO/DUO 2.5 A

Version for Corrosive Gas Processes: DUO 2.5 AC

With regard to the Rotary Vane Pump DUO 2.5 AC please note the following divergences compared with the standard version:

- Corrosive gas type pumps are equipped with special materials.
- Corrosive gas type pumps are equipped with a special gas ballast valve (see section 4.5)
- Corrosive gas type pumps are operated with the synthetic pump fluid F5 as standard.

2.3. For Your Orientation

Operating instruction in the text:

- ➔ Here, you have to do something.

Symbols used

The following symbols are used throughout in the illustrations:

- Ⓧ Vacuum flange
- ⓐ Exhaust flange
- ⓐ Gas ballast valve
- Ⓧ Power connection

Position numbers

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

3. Installation

3.1. Preparations For Installation

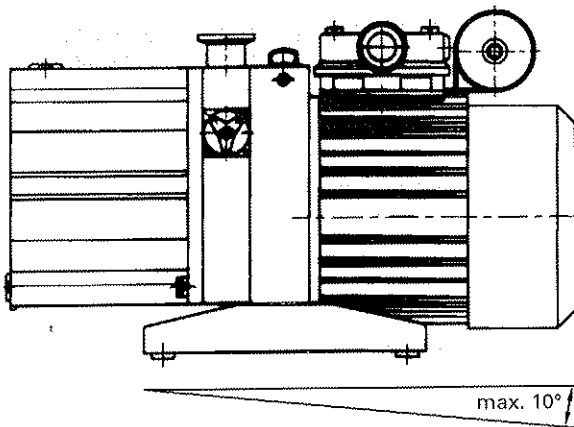


Fill up with operating fluid before operating the first time (included in a separate pack in the delivery consignment).
When transporting, use only the handle provided for the purpose. When filled with operating fluid, do not tilt the pump otherwise operating fluid could escape via the vacuum and exhaust flanges.

3.2. Pump Set-Up And Location

- ➔ Where stationary installation is involved, anchor the pump on site.
- ➔ Sight glass 5 on the front side must be visible and the gas ballast valve readily accessible.
- ➔ When installing the pump in a closed housing, ensure there is sufficient air circulation.

Maximum angle of inclination to each side 10°
Maximum erection height 2000 m N.N.
Maximum and minimum ambient temperature 40 °C and 12 °C respectively
Maximum relative humidity 85%



3.3. Connections, Vacuum Side

- ➔ Keep the connection between the vacuum chamber and pump as short as possible.
- ➔ Remove all scaling and loose particles from welded lines prior to assembly.
- To protect the pump, separators, filters and cooling traps etc. (see Section 9. Accessories) can be fitted upstream of the pump. However, this does mean that owing to the conductance value of the accessory, there is a reduction in volume flow rate.
- For the intake lines, metal or PVC hoses with small flanges are available for laboratory work.

3.4. Connecting The Exhaust Side



Pressure can rise to dangerous levels in exhaust lines. Therefore exhaust lines should not be fitted with shut-off units.
If, for internal works reasons, shut-off devices are fitted, or if there is a risk of a build up of excess pressure in the lines, observe all official accident prevention safety regulations.

- Lay minimum diameter exhaust lines of DN 10.
- If the exhaust gases are being extracted, the pressure of the exhaust must not fall below 200 mbar.
- Lay lines from the pump sloping downward so that no condensate can flow back into the pump. Otherwise fit a separator.
- Forces from the piping system may not be allowed to act on rotary vane pumps which are anchored.
All piping to the pump must be suspended or supported.



Exhaust gases and vapours can be detrimental to health and/or can pollute the environment. For this reason, when working with toxic substances it is essential to ensure compliance with the applicable regulations. Only officially approved filter systems may be used to separate out these substances. This is also applicable to operations involving poisonous, chemically unstable, polymerising or peroxide forming gases (see Section 9 Accessories).

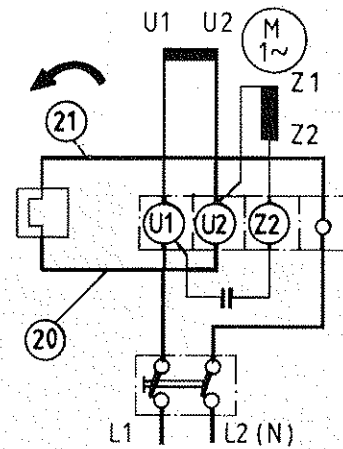
3.5. Connecting To The Mains Power Supply



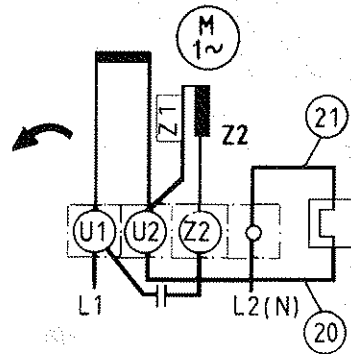
Power connections ⚡ must comply with local regulations. Voltage and frequency information given on the rating plate must correspond to the mains voltage and frequency values.

- Voltage and frequency information given on the rating plate must correspond to the mains voltage and frequency values.
- The single phase drive motors of the UNO 005 A/2.5 A and the DUO 2.5 A/AC are fitted with a built-in thermal protection switch. A cable with connecting plug is fitted to the motor for mains connection purposes.
- Motors can be supplied with or without ON/OFF switch.
- As standard drive motors two single phase motors for the following tensions are suitable:
 - 230 V \pm 15 % 50 Hz, and
 - 208 V \pm 10 % 60Hz or
 - 100 V \pm 10 % 50 Hz, and
 - 110 V \pm 15 % 60 Hz.
- Other drive motors are available on request.

Drive Motor with switch



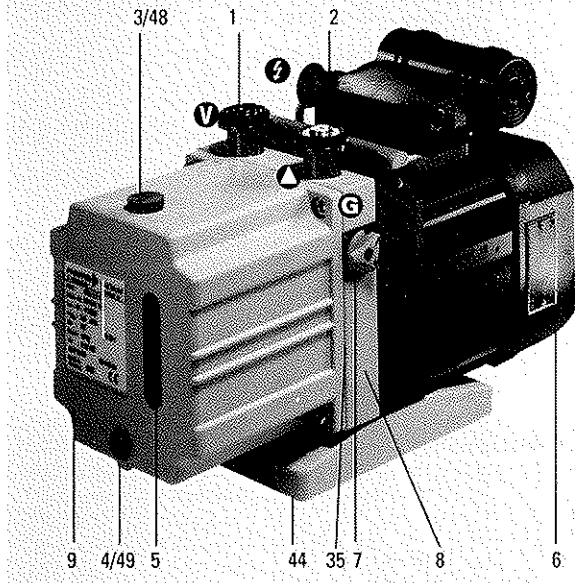
Drive Motor without switch



4. Operations

Rotary Vane Vacuum Pumps UNO 005 A/2.5 A, DUO 2.5 A/AC

1 Vacuum connection	8 Support stand
2 Exhaust connection	9 Casing
3 Operating fluid filler screw	35 Casing seal
4 Operating fluid drain screw	44 Base plate
5 Sight glass	48 O-ring
6 Motor	49 O-ring
7 Gas ballast valve	



4.1. Filling Up And Checking The Operating Fluid



Standard version pumps are tested with operating fluid P3. Guarantees relating to attainment of final pressures and trouble free functioning apply only providing this operating fluid is used.

The delivery consignment contains sufficient operating fluid for one filling.

Pumps for special applications (e.g. for pumping corrosive gases) can be operated with special operating fluids such as F5, C100 and other Pfeiffer operating fluids. The use of such operating fluids requires prior authorisation from the manufacturer.

P3 must be disposed of in accordance with local waste disposal regulations.

- ➔ Remove operating fluid filler screw 3.
- ➔ Fill up with pump fluid included in the consignment; refer to rating plate for correct quantity.
- ➔ Replace operating fluid filler screw 3; be careful with O-ring 48.
- ➔ Check operating fluid level only when the pump is warm and running and vacuum connection 1 and gas ballast valve 7 and operating fluid filler screw are closed.
- The level should be between the two markings on sight glass 5. The minimum level is the lower marking on sight glass 5.

- Topping up pump fluid is possible when the pump is in final vacuum operations.
- In non-stop operations check operating fluid daily, otherwise whenever the pump is switched on.



If there is a noticeable loss of pump fluid, the casing and the radial shaft seals should be checked for leaks (see Service Instructions).

4.2. Switching The Pump ON And OFF

The pump can be switched ON and OFF in any pressure range. Maximum exhaust pressure 1.5 bar (absolute). Lowest start-up temperature, in compliance with German Industrial Standard DIN 28 426: +12°C.

On switching OFF (intake pressure < 750 mbar) the built-in high vacuum safety valve to the vacuum chamber closes automatically and the pump is vented.

The Working Of The High Vacuum Safety Valve

The automatically operating high vacuum safety valve 20 is open when the equipment is vented. When the pump is switched on, air intake is shut off via hydraulic pump 53 integrated in the pumping system and the safety valve remains in the open position owing to the action of the pressure spring.

At intentional or unintentional pump standstills, hydraulic valve 23 opens the air intake owing to absence of hydraulic pressure and presses valve head 24 against the vacuum side by virtue of the air streaming in. The system closes vacuum tight and simultaneously the pump is vented.

When the vacuum pump is switched on again, the intake of air is shut off by hydraulic valve 23 and the inner area of the high vacuum safety valve is evacuated. If the pressure in the valve has fallen far enough that the force of spring 27 is sufficient to press valve head 24 against the pressure prevailing in the system, the valve opens.

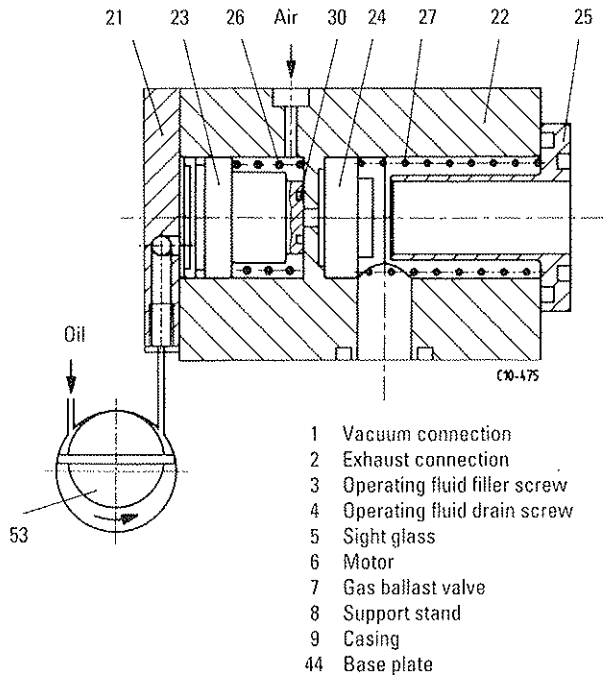
4.3. Pumping Dry Gases And Vapours

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



To avoid condensation in the pump, vapours should only be pumped off when the pump is warm and with gas ballast valve 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.

Working principle of High Vacuum Safety Valve 20



4.4. Gas Ballast Valve (Standard Version)

To avoid the condensation of vapours in the pump, air is periodically fed into the working chamber at the beginning of the compression phase via the gas ballast valve.

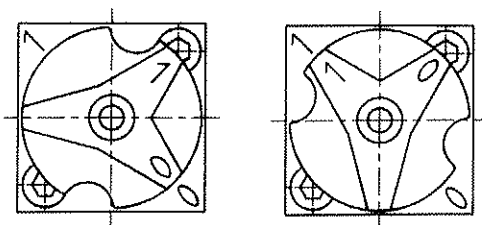
- Gas ballast valve 7 is shut when turning to the right to position 0-0 and open when turning to the left to position 1-1. Intermediate settings are not possible.

If the pumping process requires the connection of flushing gas, an adapter connection G 1/8 can be provided for the gas ballast valve (available on request).

Gas ballast valve 7, Standard version

Position: Closed

Position: Open



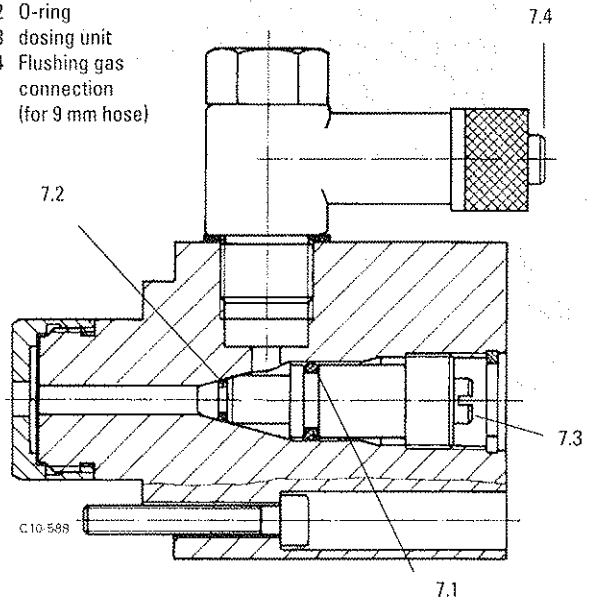
4.5. Gas Ballast Valve (For Corrosive Gas Processes)

Gas ballast valve 7 is equipped with a dosing unit 7.3 and a flushing gas connection 7.4.

The dosing unit is closed when turned fully clockwise and open when turned fully anti-clockwise. The amount of gas can be set at any required rate from maximum to minimum with a flow meter.

Gas ballast valve 7, for Corrosive Gas Processes

- 7.1 O-ring
- 7.2 O-ring
- 7.3 dosing unit
- 7.4 Flushing gas connection (for 9 mm hose)



Please note:

Flushing gas must be connected when operating corrosive gas model pumps. The gas ballast valve must be open. Flushing gas pressure may not exceed 1.5 bar. The type of flushing gas is dependent on the medium being pumped. Our specialists would be pleased to give advice regarding the type and volume of flushing gas required.



When working with synthetic pump fluid, the manufacturer's directions for use must be observed. If F5 is heated to over 250°C, poisonous gases damaging to the respiratory system are produced. F5 must not be allowed to come into contact with tobacco products. When handling chemicals, the relevant manufacturer's instructions must be followed. Pump fluid which have been enriched with toxic or corrosive substances must be specially handled and all pertinent regulations must be observed.

4.6. Silencer

Silencer 40 is a nozzle inside the pump housing and cannot be altered; when dirty it should either be cleaned or replaced (see Service Instructions).

5. What To Do In The Case Of Breakdowns?

Problem	Possible Cause	Remedy
Pump doesn't attain final pressure	<ul style="list-style-type: none"> • Pump dirty • Operating fluid dirty 	<ul style="list-style-type: none"> • Clean the pump • Operate pump for a longer period with open gas ballast valve or change operating fluid
Unusual operating noises	<ul style="list-style-type: none"> • Leak in system • Silencer dirty • Pump system damage 	<ul style="list-style-type: none"> • Repair leak • Clean the silencer (see Service Instructions). • Request repair by PFEIFFER Service
Pump doesn't start	<ul style="list-style-type: none"> • Mains power missing • Ambient temperature <12 °C • Dirty pump stages • Damaged pump system 	<ul style="list-style-type: none"> • Check mains voltage and motor switch • Warm up pump • Request cleaning by PFEIFFER Service • Request repair by PFEIFFER Service

Any other repairs may only be carried out by qualified personnel in conjunction with the service instructions.

6. Maintenance

When carrying out servicing work, take the following precautions:



Always ensure the pump cannot be switched on when carrying out any work on the pump. If necessary, remove the pump from the system to carry out inspection work.

- ➔ Only dismantle the pump as far as is necessary in order to repair defects.
- ➔ Dispose of used operating fluid in compliance with local regulations.
- ➔ When working with synthetic operating media, toxic substances and substances contaminated with corrosive gases, the relevant instructions governing their use must be observed.
- ➔ Only use benzene or similar agents for cleaning pump parts. Do not use soluble cleaning agents.

6.1. Replacing The Operating Fluid

The ageing process of operating fluid P3 is governed by the type of operation for which the pump is being used. For example, in the ultra high vacuum (UHV) range, which is a particularly clean type of operation, the pump is not subjected to the effects of dirt. In such cases, the P3 ageing process can be read off from the following diagram.

Where condensable vapours or other contaminating gases are pumped off during the process, the operating fluid change must be undertaken in accordance with the colour scale.

If the extent of the P3 discolouration reaches the 5 - 6 level, the operating fluid should be changed immediately. At a colour level of 7 - 8 it is possible that the pump has already been damaged.

The colour scale is not applicable for baths and acids in the chemical industry.

➔ Switch off the pump.

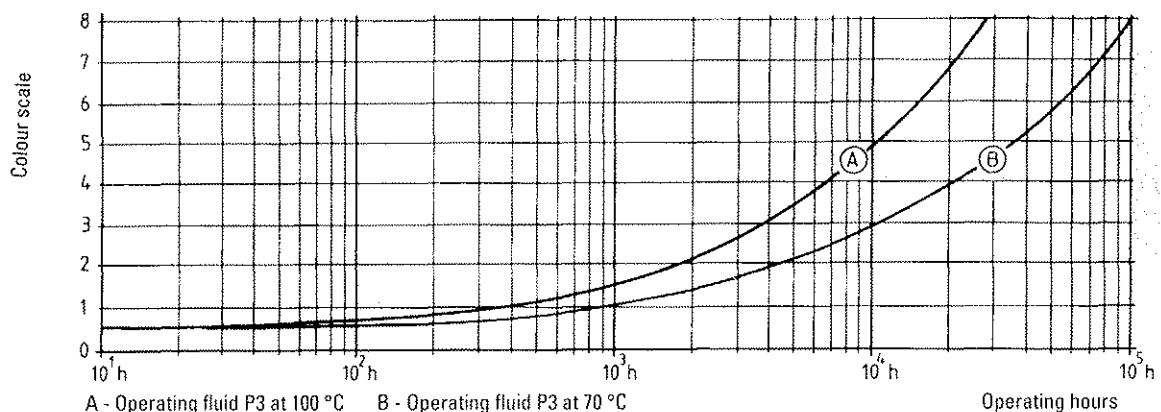
➔ Unscrew operating fluid drain screw 4 and drain operating fluid.



The operating fluid temperature can be as high as 80 °C. During maintenance and repair work, process related toxic gases and vapours can escape from the operating fluid which may become contaminated with harmful substances (radioactive, chemical etc.).

Disposal of used operating fluid is subject to the relevant regulations.

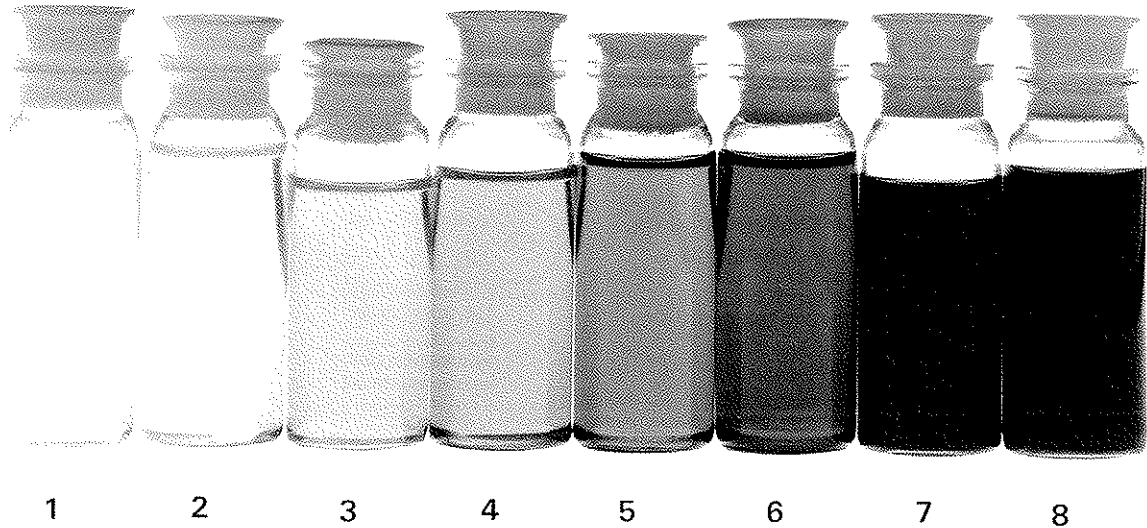
- ➔ Screw in operating fluid drain screw 4.
- ➔ Allow pump to run for about 10 seconds with open vacuum flange.
- ➔ Drain off remaining operating fluid.
- ➔ In the case of serious contamination, the operating fluid will have to be changed several times.
- ➔ Screw in operating fluid drain screw 4 with O-ring 49.
- ➔ Fill in fresh operating fluid and check level as per section 4.1.



A - Operating fluid P3 at 100 °C B - Operating fluid P3 at 70 °C

Operating hours

Colour Scale For Operating Fluid Replacement



6.2. Shutting Down For Longer Periods

Should the pump have to be shut down for a longer period, the complete pumping system must be adequately protected against corrosion.

- ➔ Switch off pump.
- ➔ Unscrew operating fluid drain screw 4 and drain operating fluid as per Section 6.1.
- ➔ Screw in operating fluid drain screw 4; keep an eye on the position of the O-ring 49.
- ➔ Allow pump to run for about 10 seconds with open vacuum flange ①.
- ➔ Drain off remaining operating fluid.

- ➔ Fill up pump with fresh operating fluid: filling level - upper end of sight glass 5.
- If this amount of operating fluid is filled in, the level is extremely high but this is necessary to protect all parts of the pump against corrosion.



Before operating, the operating fluid must be reduced to its normal level.

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:

- Have the pump repaired on the spot by our Service Engineers;
- Return the pump to the manufacturer for repairs;
- Replace with a new value pump.

Local PFEIFFER representatives can provide full details.

Before returning:

- ➔ Please attach a clearly visible notice "Free of harmful substances" (both on the unit and also on the delivery note and any accompanying letters).

"Harmful substances" are substances and preparations as defined in the current harmful substances 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 microbiologically, explosively or radioactively cannot be accepted as a matter of principle.

Fill Out The Declaration Of Contamination

- ➔ In every case the "Declaration Of Contamination" must be completed diligently and truthfully.
- ➔ A copy of the completed declaration must accompany the unit: any additional copies must be sent to your local PFEIFFER Service Center.

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



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

Returning Contaminated Units

If contaminated have to be returned for maintenance/repair, the following instructions concerning shipping must be followed:

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

Please Note:

Repair orders are carried out according to our general conditions of sale and supply. If repairs are necessary, please send the unit to your nearest PFEIFFER Service Center.

Contact Addresses And Service Hotline

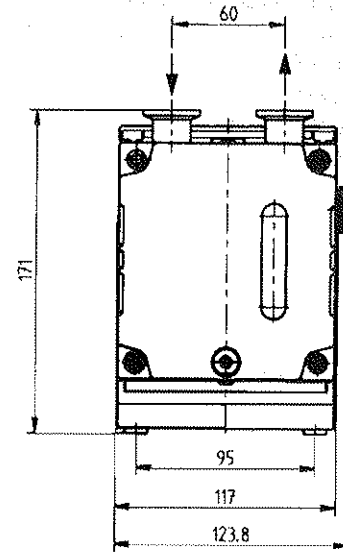
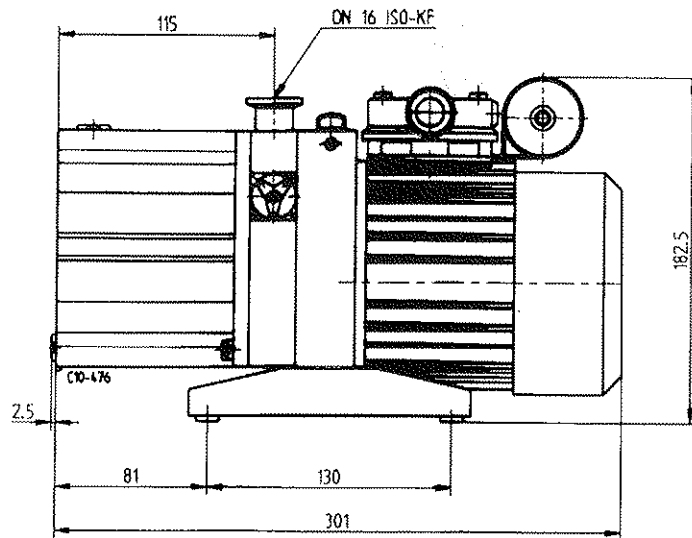
Contact addresses and telephone numbers can be found on the back cover of these operating instructions.

8. Technical Data

Single Stage Two Stage		UNO 005 A	UNO 2.5 A	DUO 2.5 A/AC
Connection nominal diameter				
Input		DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Output		DN 16 ISO-KF	DN 16 ISO-KF	DN 16 ISO-KF
Nominal volume flow rate at				
50 Hz	m ³ /h	5,1	2,8	2,8
60 Hz	m ³ /h	5,8	3,3	3,3
Volume flow rate at				
50 Hz	m ³ /h	4,6	2,5	2,5
60 Hz	m ³ /h	5,1	2,9	2,9
Final pressure				
Total without gas ballast	mbar	$< 5 \cdot 10^{-2}$	$< 5 \cdot 10^{-2}$	$< 5,0 \cdot 10^{-3}$
Total with gas ballast	mbar	< 1	< 1	$< 6,0 \cdot 10^{-3}$
Max. pressure (in continuous operation)		bar	1,5	1,5
Water vapour compatibility	mbar	20	15	15
Water vapour capacity at 50/60 Hz	g/h	70/75	37	37
Noise level				
Without gas ballast	dB(A)	53	53	53
With gas ballast	dB(A)	55	53	53
Operating fluid		l	0,45	0,4
Max. permissible operating temperature ¹⁾		°C	80	80
Rotation speed at 50 Hz	1/min	2800	2800	2800
Rotation speed at 60 Hz	1/min	3350	3350	3350
Rated power, motor	kW	0,13	0,13	0,13
Weight	kg	11	10,2	10,5
¹⁾ at 25°C ambient temperature and operating fluid P3				

8.1. Dimensions

UNO 005 A
 UNO/DUO 2.5 A
 UNO/DUO 2.5 AC



9. Accessories

Oil Mist Separator ONF 010 can be fitted to the exhaust port with the help of a reducing ring of the Rotary Vane Vacuum Pumps to prevent the expelled operating fluid mist polluting the air.

Oil Mist Separator ONF 010 and reducing ring are not included as standard and should therefore be ordered separately.

Pfeiffer's catalogue contains details of a comprehensive accessory programme which can both extend the range of application of the pump and provide protection against wear and tear under extreme operating conditions.

UNO 005 A
 UNO/DUO 2.5 A
 UNO/DUO 2.5 AC

Pos.	Description	Size	Number	Comments/ Operating Instructions	Order Quantity
1	Oil Mist Separator ONF 010		PK Z40 002		
2	Reducing ring	DN 16/10 ISO-KF	BP 213 331-T		
3	Operating fluid check set OPS 001		PK Z90 013		

10. Spare parts

Spare parts UNO 005 A, Standard version
Spare parts UNO/DUO 2.5 A, Standard version

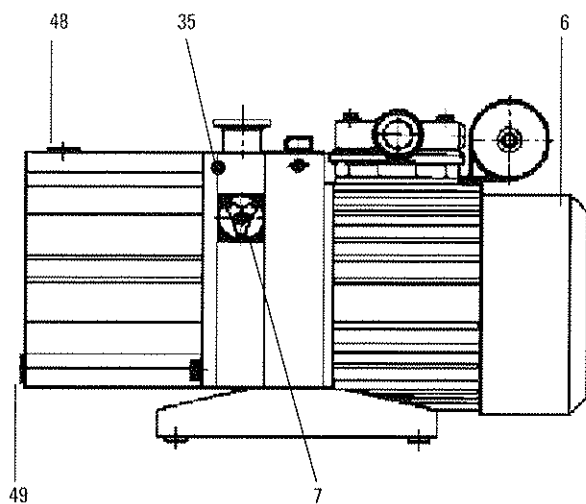
Pos.	Description	Pieces	Size	Number	Comments	Order Quantity
	Set of seals, UNO 005 A	1		PK 194 512-T		
	Set of seals, UNO/DUO 2.5 A	1		PK 194 057-T		
6	Motor 110 V 50/60 Hz with switch	1		PK 194 114		
6	Motor 110 V 50/60 Hz without switch	1		PK 194 115		
6	Motor 230 V 50/60 Hz with switch	1		PK 194 116		
6	Motor 230 V 50/60 Hz without switch	1		PK 194 117		
7	Gas ballast valve	1		PK 194 012-U		
35	Casing seal	1		PK 194 081		
48	O-ring, Vi	1	10x2,5	P 4070 166 PV		
49	O-ring, Vi	1	6x2,2	P 4070 088 PV		

Spare parts list DUO 2.5 AC, Version for Corrosive Gas Processes

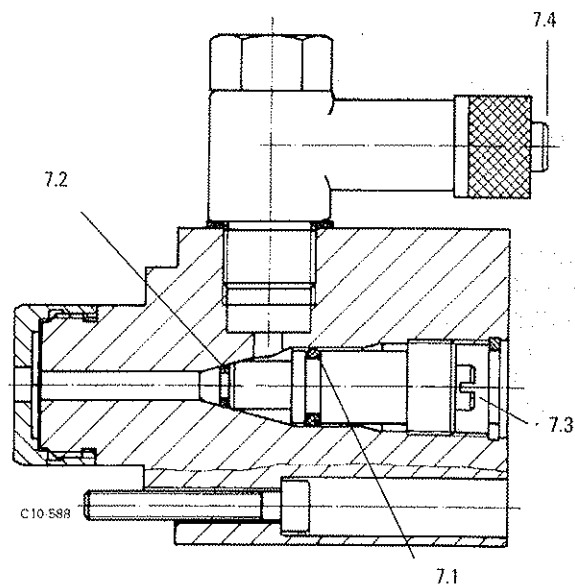
Pos.	Description	Pieces	Size	Number	Comments	Order Quantity
	Set of seals	1		PK 194 146-T		
6	Motor 110 V 50/60 Hz with switch	1		PK 194 114		
6	Motor 110 V 50/60 Hz without switch	1		PK 194 115		
6	Motor 230 V 50/60 Hz with switch	1		PK 194 116		
6	Motor 230 V 50/60 Hz without switch	1		PK 194 117		
7	Gas ballast valve	1		PK 194 144-U		
7.1	O-ring	1	5,0 x 1,5	P 4070 065 PV		
7.2	O-ring	1	2,1 x 1,0	P 4070 015 PV		
35	Casing seal	1		PK 194 154		
48	O-ring	1	10x2,5	P 4070 166 PV		
49	O-ring	1	6x2,2	P 4070 088 PV		

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).

Spare parts



Spare Parts, Gas Ballast Valve 7 (For Corrosive Gas Processes)



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 GmbH

Emmeliusstrasse 33
D-35614 Asslar

Telefon 06441/802-0
Telefax 06441/802-202
Hotline 06441/802-333

Argentina

ARO S.A., Casilla de Correo 4890,
1000 Buenos Aires, telephone 0054 / 1 331 3918,
telefax 0054 / 1 331 3572

Asean

APP Systems Services Pte. Ltd, 2 Corporation Road
06-14 Corporation Place, Singapore 618494,
telephone 0065 / 268 2024, telefax 0065 / 268 6621

Australia

Balzars Australia Pty. Ltd., Level 1,
3, Northcliff Street, Milsons Point, NSW 2061,
telephone 0061 / 2 9954 1925, telefax 0061 / 2 954 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 Campos, 551 - Brooklin
CEP 04620-002 São Paulo
SP - Brasil
telephone 0055 / 11 532 0740
telefax 0055 / 11 535 3598

Chile

Bermat S.A., Lota 2250, Providencia, P.O. Box 9781
Santiago,
telephone 0056 / 2 231 8877,
telefax 0056 / 2 231 4294

Colombia

Arotec Colombiana S.A., P.O. Box 050 862,
Santafe de Bogota / D.C.,
telephone 0057 / 1 288 7799, telefax 0057 / 1 285 3604

Denmark

Balzars-Pfeiffer Scandinavia, Baunegardsvej 7L,
DK-2820 Gentofte, telephone 0045 / 39 / 68 32 61,
telefax 0045 / 39 / 68 22 55

France

Pfeiffer Vacuum France
47, rue d'Arthelon, F-92190 Meudon
telephone 0033 / 1 4623 7070, telefax 0033 / 1 4534 4441

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,
GB-Milton Keynes, MK7 8AZ,
telephone 0044 / 1 908 373 333
telefax 0044 / 1 908 377 776

Greece

Analytical Instruments S.A., 1 Mantzaron St.,
GR-15451 Athens,
telephone 0030 / 1 674 8973, telefax 0030 / 1 674 8978

India

Balzars-Pfeiffer India Ltd.
25-E Nicholson Road, Tarbund
Secunderabad 500 009,
telephone 0091 / 40 775 0014, telefax 0091 / 40 775 7774

Israel

Eastronics Ltd., P.O. Box 39 300,
Tel Aviv 61392,
telephone 00972 / 3 6458 777,
telefax 00972 / 3 6458 666

Italy

Balzars-Pfeiffer Italia
Via G. Favretto 13, I-20146 Milano,
telephone 0039 / 2 422 1341, telefax 0039 / 248 953756
Service Hotline: 0039 / 2 422 2626

Japan

Hakuto Co. Ltd., P.O. Box 25,
Scientific Product Division
Tokyo Central 100-91,
telephone 0081 / 3 32 258 910,
telefax 0081 / 3 32 259 009

Republic of 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

Malaysia

APP Engineering Snd. Bhd., 85-A, 1st Floor,
Jalan 1/12, Old Town,
46000 Petaling Jaya, Selangor West Malaysia
telephone 0060 / 3 793 8334 / 793 8335 / 793 8340,
telefax 0060 / 3 793 8343

Mexico

Maquinaria y Accesorios SA de CV,
Cincinnati 81-402, 03720 Mexico D.F.,
telephone 0052 / 5 563 8188, telefax 0052 / 5 611 0003

Middle East

PRIDG Ltd.
Provac & International Development Group
Al Wathba Building, P. O. Box 43298,
Abu Dhabi / United Arab Emirates
telephone 00971 / 2 221925, telefax 00971 / 2 221926

Netherlands

Pfeiffer Vacuum Nederland
Veldzigt 30a, NL-3454 PW De Meern,
telephone 0031 / 30 6666050, telefax 0031 / 30 6662794

Peru

Ing. E. Brammertz S.C.R.L., José Pardo 182,
Apartado 173, PE-18 Miraflores,
telephone 0051 / 1 445 8178 / 445-0181,
telefax 0051 / 1 444 5155 / 445-1931

Poland

Softtrade Sp.z.o.o, ul. Malwowa 35,
PL-60-175 Poznan, telephone 0048 / 61 677 168,
telefax 0048 / 61 677 111

Portugal

Unilaser, Lda Taguspark
Núcleo Central N° 268, (Estrada Cacém, Porto Salvo)
P-2780 Oeiras
telephone 00351 / 1 421 7733,
telefax 00351 / 1 421 7744

Romania

V. TARUS Ro-Agencies SRL, P.O. Box 42-72
Bd. Unirii 23, bl.13 sc.1, ap.4
R-70401 Bucuresti
telephone 0040 / 1 3124611
telefax 0040 / 1 3122361

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
Box 10412
S-43424 Kungälv
telephone 0046 / 300 710 80
telefax 0046 / 300 172 85
Service Hotline: 0046 / 300 710 85

Switzerland

Pfeiffer Vacuum Schweiz
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 6563,
Halfway House
1685
Republic of South Africa
telephone 0027 / 11 315 5434,
telefax 0027 / 11 315 5882

Taiwan

Heli-Ocean Engineering and Trading Co.,
6th Floor, Nr. 67, Shyr Pin Road,
Hsinchu 300, Taiwan R.O.C.,
telephone 0088 / 635 725 848, telefax 0088 / 635 725 849

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
telephone 001 / 603 578 6500
telefax 001 / 603 578 6550

Venezuela

Secotec S.A., Apartado 3452, Caracas 1010-A,
telephone 0058 / 2 573 8687 / 0270,
telefax 0058 / 2 573 1932