



SERVICE OF VACUUM PUMP SYSTEMS
2442 Etnick Blvd. Bethlehem, PA 18020
For Service Call (610) 625-1505
www.polvac.com

Diaphragm Vacuum Pump



MVP 030
MVP 015-4

PK 800 202 BN/D (0501)

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Please note:

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

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 the body to vacuum.
- ☞ Observe all safety and accident prevention regulations.
- ☞ Check regularly that all safety requirements are being complied with.
- ☞ Do not carry out any unauthorised conversions or modifications on the pump.
- ☞ When returning the pump to us please note the shipping instructions in Section 7.
- ☞ Do observe strictly the proper use.

Proper use

- The Diaphragm Pump MVP 015-4/030 may only be used for the purpose of generating vacuum.
- Do not pump corrosive or explosive gases.
- Do not pump liquids.
- Do not operate the pump in locations where there is an explosion hazard.
- Accessories other than those named in this manual may not be used without the agreement of Pfeiffer Vacuum.
- Do not use the connecting line between the heads of the pump as a handle.
- Equipment must be connected only to a suitable fused and protected electrical supply and a suitable earth point.
- Ensure that installation is in compliance with limitations from the degree of protection, see section "Technical Data".

Improper Use

The following are regarded as improper:

- The pumping of corrosive gases (except with corrosive gas processes version).
- The pumping of explosive gases.
- Operating the pump in locations where there is an explosion hazard (a special version for this application is available on request).
- The pumping of gases which are contaminated with particles, dust and condensate.
- The Pump may not be used for the purpose of generating pressure.
- The pumping of liquids.
- 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.

1.1. For Your Orientation

Instructions in the text

➔ Operating instructions: Here you have to do something!

Symbols used

The following symbols are used throughout in the illustrations:

Ⓥ Vacuum flange

Ⓛ Exhaust flange

⚡ Power supply connection

Position numbers

Identical components and accessories parts have the same position numbers in all illustrations.

1.2. Pictogram Definitions



Danger of personal injury.



Danger of damage to the pump or system.



Danger of burns from touching hot parts.



Danger of an electric shock.



Attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

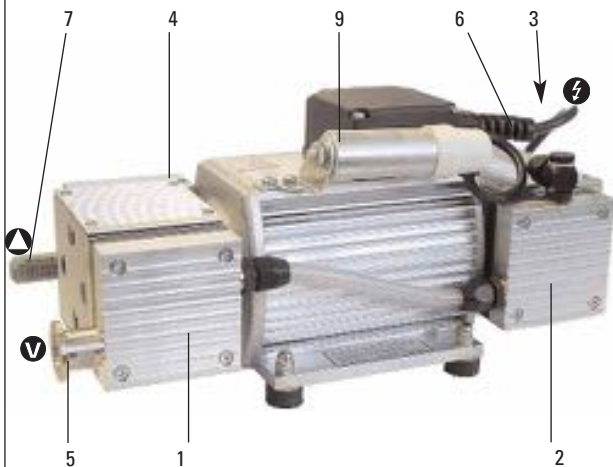
Modifications reserved

2. Understanding The Pump

2.1. Main Features

Diaphragm Vacuum Pump MVP 015-4

- 1 Membrane head 1
- 2 Membrane head 2
- 3 Membrane head 3
- 4 Membrane head 4
- 5 Vacuum flange (direct screw joint)
- 6 Voltage supply
- 7 Exhaust (silencer)
- 9 Capacitor



The diaphragm pump can be applied in all areas where an oil-free, dry vacuum is required.

Particularly the pump is suitable as backing pump for many Pfeiffer Vacuum turbopumps in applications involving light gas loads only.

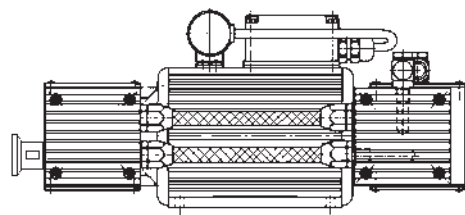
Further applications:

- Pumping stations
- Plants
 - Research
 - Laboratories
 - Analytical
 - Chemistry
 - Leak detection

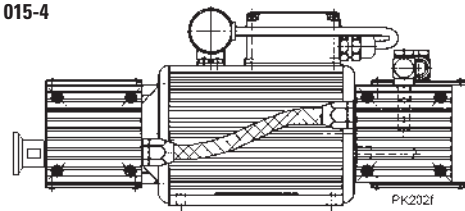
2.2. Differences Between The Pump Types

Features	Unit	MVP 030	MVP 015-4
Volume flow rate at 1000 mbar and 50 Hz	l/min	20	15
Pump stages		three-stage	four-stage
Connection of the membrane heads		1-->2 in parallel 3-->4 in series	1-->2 in series 3-->4 in series
Final pressure at 50 Hz	mbar	< 1.0	< 0.5
Mains connection	Connecting cable hard-wired in terminal box, without mains switch		

MVP 030



MVP 015-4



3. Installation

3.1. Setting Up The Pump And Location

- ➔ Place pump on a smooth, even surface.
- ➔ Anchor the pump if it is to be erected in a stationary position.
- ➔ Avoid mechanical stresses due to rigid connections. Insert elastic hoses or resilient elements as couplings between the pump and rigid pipes.
- ➔ Anchoring is not necessary if the pump is not erected in a stationary position.
- ➔ Maximum ambient temperature +12 ... +40 °C.
- ➔ Where rack installation is involved, ensure adequate ventilation. If pump is installed above 1000 m above mean sea level check compatibility with applicable safety requirements, e. g. DIN VDE 0530 (motor may overheat due to insufficient cooling).

3.2. Connecting The Vacuum Side

- Remove locking cap on intake connection.
- Make connection between the vacuum system and pump as short as possible.
- Connect pump with intake connection to the apparatus.
- If liquid - which would generate vapours - is present in the system to be evacuated, a condensate trap must be fitted upstream of the pump.

3.3. Connecting The Exhaust Side



Pressure can rise to dangerous levels in exhaust lines. Therefore, lay exhaust side lines without shut-off units. Do not connect the exhaust side with a closed system on account of the danger of bursting.

In certain applications, exhaust gases and vapours can be very hot and represent a health and/or environment hazard. Lay lines from the pump sloping downwards so that condensate cannot run back into the pump, otherwise fit a separator.

3.4. Connecting To Mains Power

The pump is driven by AC motors with the following possible variants:

230 V + 5% / -10%, 50 Hz

120 V + 5% / -10%, 60 Hz

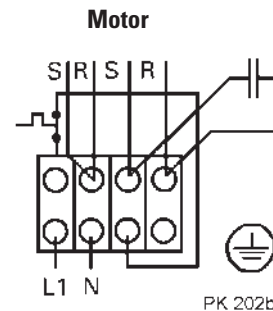


Power connections must comply with local regulations. Voltage and frequency information given on the rating plate must correspond to the mains voltage and frequency values. The pump may only be connected to mains current with earthed conductor.



Pump versions where the thermostatic winding protection protrudes must be appropriately wired to ensure the motor is protected.

Normal version



4. Operations

4.1. Important Information



Before starting, ensure that impermissibly high pressures cannot build up on the pressure side. Interchanging the connections causes dangerous excess pressure levels.

The pumps should only start, when the pressure difference is max. 1 bar between admission and exhaust, because the motor will be blocked and damage.



When the pump is running, surfaces and motor casing become hot.

4.2 Switching ON/OFF The Pump

The pump can be switched on and off at all times.



Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amount over lengthy periods!

If the pump is subjected to condensates it should be allowed to run for a few minutes under atmospheric pressure before switching off.

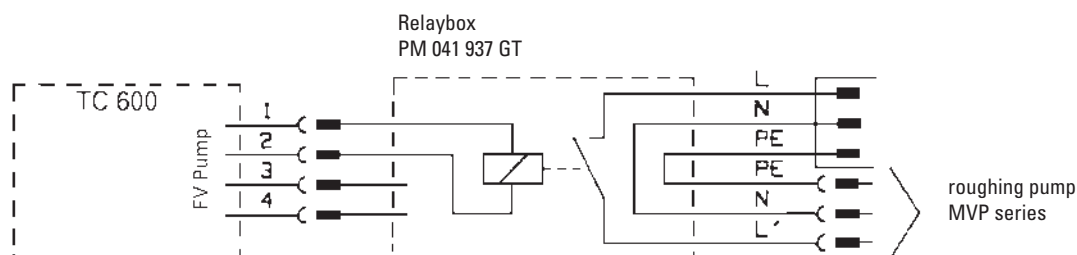
4.3 Intermittent Operations

To prolong the life of diaphragm pumps, intermittent operations can be selected with lesser gas throughputs of < 0.18 mbar l/s. This means that, dependent on the turbo pump power take-up, the backing pump will be switched on and off. Turbo pump power take-up is dependent on the fore-vacuum pressure and gas throughput.

- By comparing the power take-up with an upper and a lower limit value, the relative switch-on duration with lesser gas throughputs can be reduced to approx. 1 to 60%
- To avoid too frequent switching on, the buffer volume in the fore-vacuum line should amount to < 0.5 liter from approx. 0.018 mbar l/s.

Possible intermittent operations variations are shown in the following diagram:

Connection of Diaphragm Vacuum Pump with with relay box on TC 600 for intermittent operations



5. What To Do In The Case Of Breakdowns ? ---

Problem	Possible cause	Remedy
Pump does not attain final pressure	• Condensate in the pump • Valves/diaphragms defective/dirty • Leak in system	• Run pump for a longer period under atmospheric pressure • Clean or replace valves and diaphragms, see section 6. • Repair leak
Unusual operating noises	Valves/diaphragms defective Dirt in the working chamber Silencer loose or missing Valves defective Motor fan defective Con-rod or motor bearing defective	See maintenance in section 6. Clean working chamber. Check silencer; clean or replace. Change valves. Change motor fan. Inform Pfeiffer-Service.
Pump does not start	No mains voltage Phase failure Motor overheating Ambient temperature < 12 °C Dirty valves/diaphragms Over-pressure in the exhaust line	Check power supply. Check fuse. Allow the motor to cool down and depress mains switch off/on. Warm pump. See maintenance in section 6. Open exhaust line (open exhaust valve).
Pump switches off	• Sticking diaphragms • Wrong mains voltage	• Clean pump (see section 6.) • Correct as per rating plate

6. Maintenance

6.1. Precautionary Measures During Maintenance Work



Whenever working on the pump ensure the motor cannot get switched on. If necessary, remove pump from the system for inspection. Before dismantling allow the pump to cool down.

- ➔ Only dismantle the pump as far is necessary to effect repairs.
- ➔ Use only benzine or the like for cleaning. Do not use solvents.

6.2. Cleaning And Replacing Valves And Membranes

Under normal operating conditions, the pump is maintenance free. The valves and the diaphragms are wear parts. If the rated ultimate vacuum is no longer achieved, the pump interior, the diaphragms and the valves must be cleaned and the diaphragms and valves must be checked for cracks or other damage.

Depending on individual cases it may be efficient to check and clean the pump heads on a regular basis. In case of normal wear the **lifetime of the diaphragms and valves is > 10000 operating hours.**



There can be different numbers of washers 17 in each membrane head. Ensure the correct assignment for mounting when dismantling the membrane heads. Don't confuse the washers 17.

6.3. Dismantling The Membrane Head

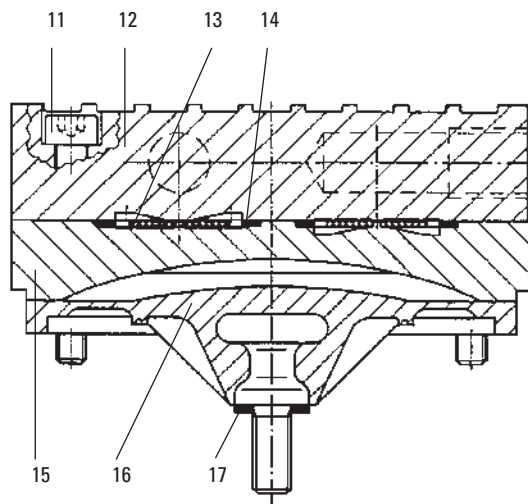
- ➔ Allow the pump to cool down before dismantling.
- ➔ Using an SW 14 key, unscrew direct screw joint (20) of interhead connection (10) on diaphragm head 1 (see marks on the housing).
- ➔ As far as possible place pump on its side so that the head to be dismantled points up.
- ➔ Using an SW 3 key, unscrew the four Allan head screws (11) and remove head cover (12), taking care with the two valve plates (13) and sealing rings (14).
- ➔ Remove intermediate plate (15).
- ➔ Use a small screwdriver to carefully ease out diaphragm (16) and manually unscrew from the connecting rod (right-hand thread). Look out for possible washers (17).
- ➔ Clean all parts with alcohol and examine diaphragms, valves and seals for possible damage and renew as necessary. If a new diaphragm is to be fitted, the washers (17) of the old diaphragm must be used again otherwise the pump will not attain the required pressure.

6.4. Assembling The Membrane Head

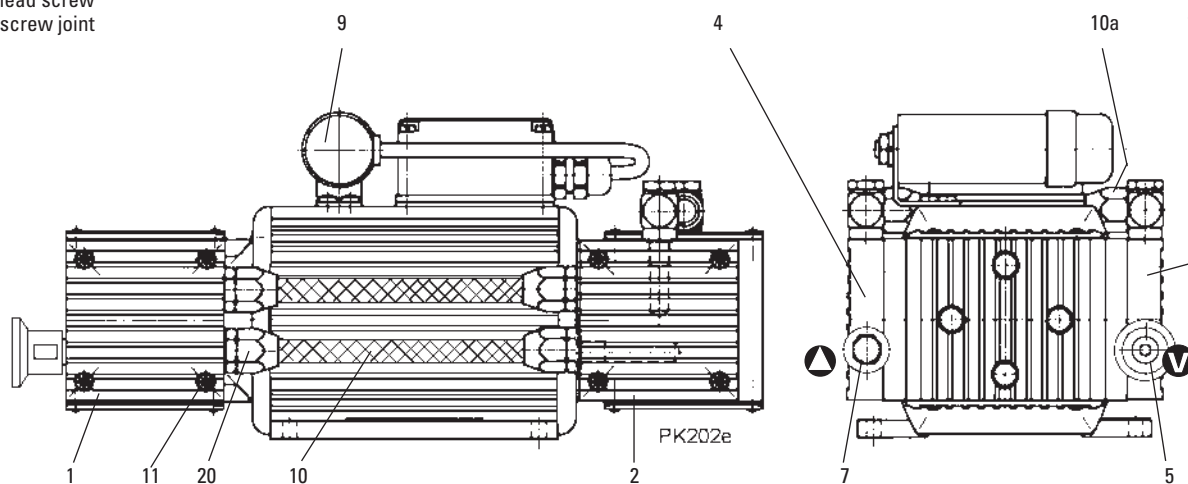
- ➔ Assemble all parts in reverse order. The connecting rod should be positioned in the upper dead point when fitting the diaphragm. Ensure correct positioning of all parts.
- ➔ Check correct sealing ring seating.
- ➔ Re-make hose connection and re-tighten direct screw joint (20).
- ➔ Test pump for function.

Dismantling the membrane head

- | | |
|---------------------|-----------------------|
| 11 Allan head screw | 15 Intermediate plate |
| 12 Head cover | 16 Diaphragm |
| 13 Valve plate | 17 Washer |
| 14 Sealing ring | |



- | |
|--------------------------------------|
| 1 Membrane head 1 |
| 2 Membrane head 2 |
| 4 Membrane head 4 |
| 5 Vacuum flange (direct screw joint) |
| 7 Exhaust (silencer) |
| 9 Capacitor |
| 10 Interhead connection 1-2 |
| 10a Interhead connection 2-3 |
| 11 Allan head screw |
| 20 direct screw joint |



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:

- ➔ Dismantle all accessories.
- ➔ 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.



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.

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.

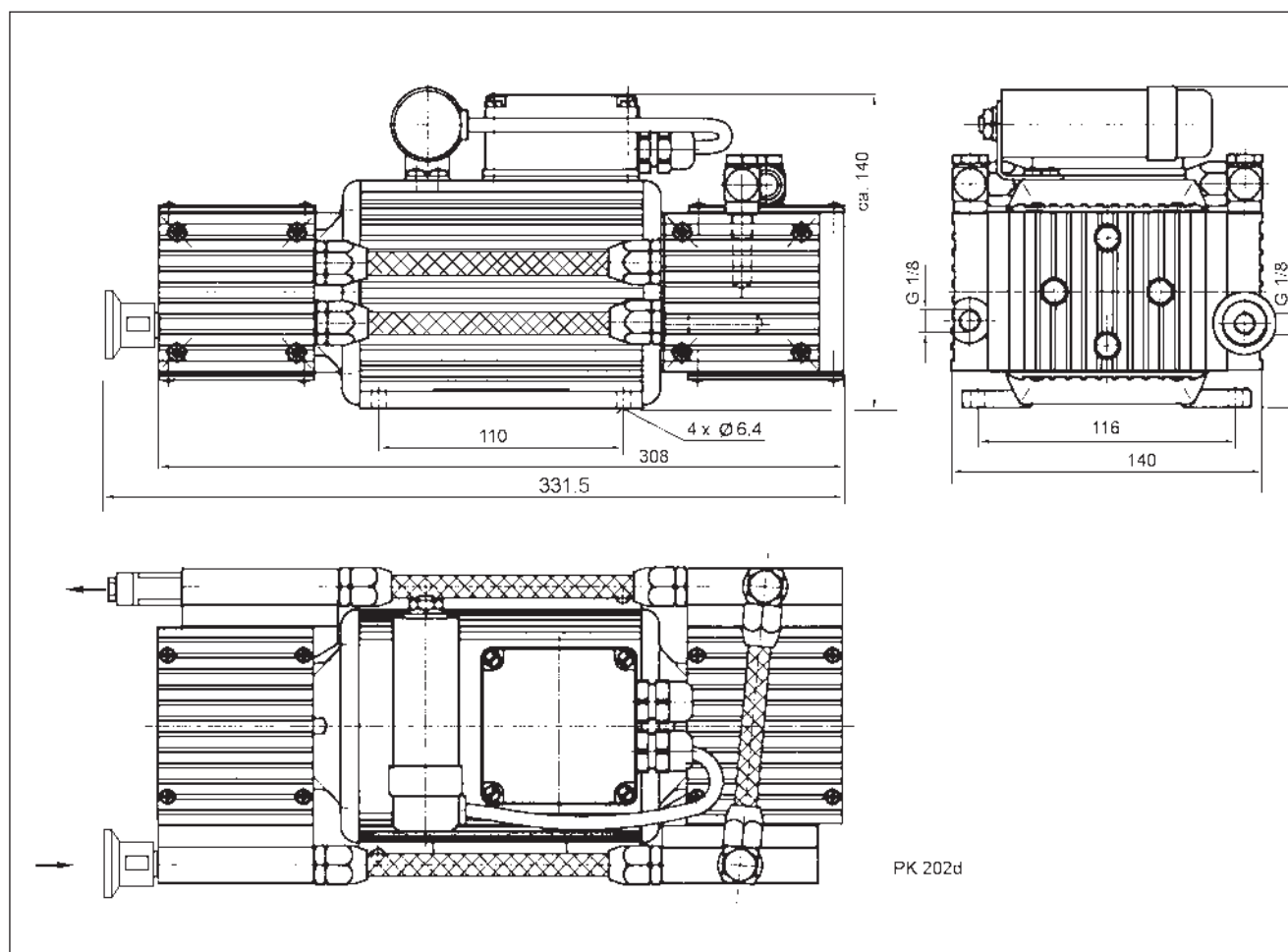
8. Technical Data

Size	Unit	MVP 030	MVP 015-4
Connections	Intake side Pressure side	DN 16 ISO-KF/G 1/8" DN 16 ISO-KF/G 1/8	G 1/8"+silencer G 1/8"+silencer
Nominal volume flow rate at 1000 mbar	50 Hz 60 Hz	l/min 20 l/min 24	15 18
Volume flow rate at 10 mbar	50 Hz 60 Hz	l/min 6 l/min 7	4 4,5
Final pressure	mbar	≤ 1.0	≤ 0.5
Permissible exhaust pressure	mbar	1050	1050
Leakrate to vacuum chamber when pump is switched off	mbar l/sec	≤ 5·10 ⁻³	≤ 5·10 ⁻³
Integral Leakrate	mbar l/sec	≤ 1·10 ⁻³	≤ 1·10 ⁻³
Max. operating altitude (a. s. l.)	m	approx. 2000	approx. 2000
Max. permissible gas- and environment temperature	°C	+12 ... +40	+12 ... +40
Overload protection (coiled temperature switch)	°C	118	118
Noise level	dB(A)	ca. 52	ca. 52
Motor (insulation material class B)		IP 54	IP 54
Power at 230 V 50 Hz	W	80	80
Power at 115 V 60 Hz	W	80	80
Weight, approx.	kg	7.5	7.5

8.1. Substances Which Come Into Contact With The Medium

Pump components	Substances in contact with the media (MVP 030, MVP 015-4)
Diaphragm	EPDM
Valves	EPDM
Pump head	Aluminium
Tupee	PVC
Swivelling screw-fitting	Aluminium
Silencer	Polyamide

8.2. Dimensions



9. Spare Parts

Pos.	Description	Pieces	Size	Number	Comments/relevant	Ord. Quantity
	MVP 030 MVP 015-4 Spare parts pack contains all necessary wear parts:	2		PK 050 094 -AT	not included in the delivery consignment	
7	Silencer	1		PO 920 791 E	not included in the delivery consignment	

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).

10. Accessories

Pos.	Description	Pieces	Size	Number	Comments/relevant	Ord. Quantity
	Relaybox roughing pumps, 1 phas. 5A for connection on TC 600 or TC 100 with TCS 010	1	94 x 65 x 57 (mm)	PM 041 937 GT	not included in the delivery consignment	

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: _____



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 73/23/EWG**

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 73/23/EWG entspricht.

We hereby certify, that the product specified below is in accordance with the provision of EU Machinery Directive 98/37/EEC, EU Electromagnetic Compatibility Directive 89/336/EEC and EU Low Voltage Directive 73/23/EEC.

Produkt/Product:

MVP 030
MVP 015-2

Angewendete Richtlinien, harmonisierte Normen und angewendete nationale Normen:

Guidelines, harmonised standards, national standards which have been applied:

DIN EN ISO 12100-1	DIN EN ISO 12100-2
EN 55 014	EN 50 081-1
EN 294	EN 50 082-1
EN 60 204-1	EN 60 555-2, -3
EN 60 335-1	EN 1012-2

Unterschrift/Signature:



Pfeiffer Vacuum GmbH
Berliner Str. 43
35614 Asslar
Germany

(W. Dondorf)
Geschäftsführer
Managing Director

Konf.I/2003

Your Vacuum Technology Experts in



Turbo Pumps



Rotary Vane Vacuum Pumps



Roots Pumps



Dry Vacuum Pumps



Leak Test Units



Valves



Flanges, Feedthroughs



Vacuum Measurement



Gas Analysis



System Technology



Service



Pfeiffer Vacuum Technology AG · Headquarters/Germany

Tel. +49-(0) 64 41-8 02-0 · Fax +49-(0) 64 41-8 02-2 02 · info@pfeiffer-vacuum.de · www.pfeiffer-vacuum.net