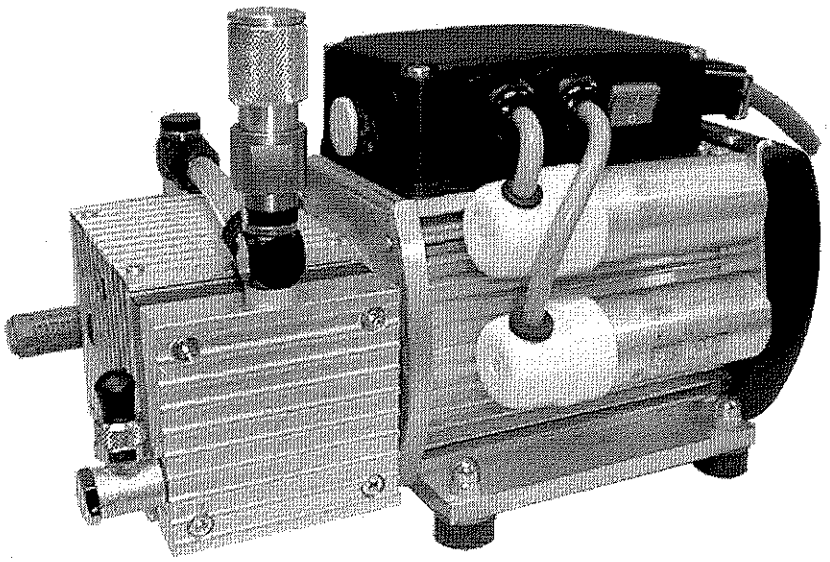
Betriebsanleitung • Operating Instructions

Membranvakuumpumpe mit
umschaltbarem 1-Phasen-Weitspannungsmotor
Diaphragm Vacuum Pump with
switchable Single Phase Wide Range Voltage Motor



MVP 015-2

PU 0012 BN/D (0601)

PFEIFFER VACUUM

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.

Proper use

- The Diaphragm Pump MVP 015-2 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 of the two-headed pump as a handle.
- The Diaphragm Pump MVP 015-2 may not be used for the purpose of generating pressure.

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 connection (intake side)
Ⓐ Exhaust connection (outlet side)
Power supply connection
Ⓖ Gas ballast 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 an explosion.

Danger of an electric shock.

Danger of burns from touching hot parts.

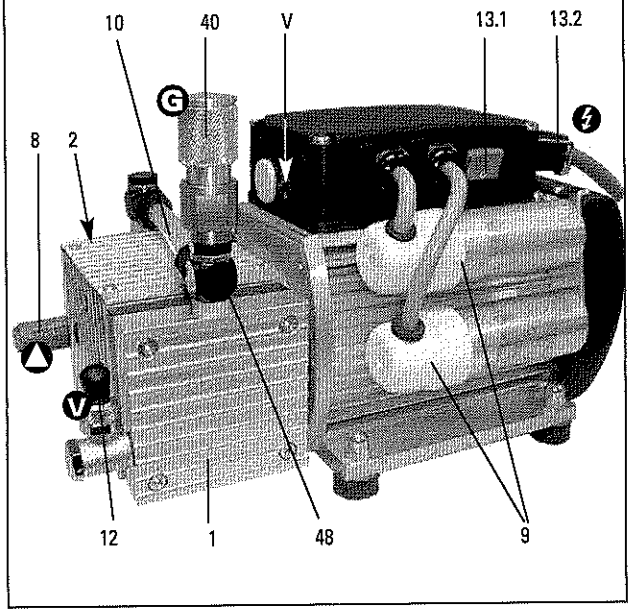
Danger of damage to the pump or system.

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

2. Understanding The Pump

2.1. Different Features

1 Diaphragm head 1
2 Diaphragm head 2
8 Silencer
9 Condensators
10 Interhead connection
12 Vacuum connection
13.1 Mains switch
13.2 Mains plug with cable
40 Gas ballast valve
48 Hollow screw
V Voltage selector switch



- The intake side on the front side of the pump is provided with a swivelling screw fitting (G1/8) and screw (G1/4) for connection to a Pfeiffer Vacuum turbopump.
- A pressure connection (silencer G1/8) on the front side of the pump.
- Mains connection via cold unit socket with safety strap (mains cable not included in the standard version delivery consignment).
- ON/OFF mains switch.

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.
- ➡ Anchoring is not necessary if the pump is not erected in a stationary position.
- ➡ Ambient temperature range + 12 ... +40 °C.
- ➡ Where rack installation is involved, ensure adequate ventilation.

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

CAUTION

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 wide voltage AC motors with the following possible variants:
220 V - range 190 ... 260 V, 50/60 Hz
110 V - range 90 ... 127 V, 50/60 Hz

CAUTION

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.

CAUTION

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

3.4.1. Adjusting Voltage Selector

The respective single phase mains voltage must be checked before each installation or re-location of the diaphragm pump.
Use an appropriate screwdriver on the diaphragm pump voltage selector switch to select the range which corresponds with the mains voltage provided (please see Figure 3.4a).

CAUTION

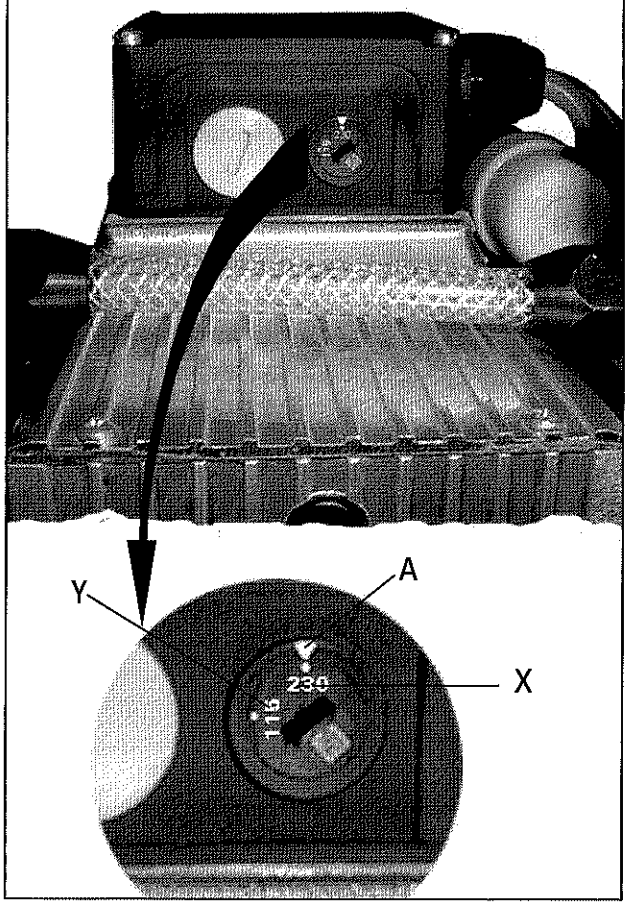
Be sure to disconnect the pump from mains power before changing the voltage range.

CAUTION

Prior to switching on the pump always check the voltage range which has been set in the pump terminal box..

3.4.a Voltage Selector Switch U On The Terminal Box Cover

A Setting range marking
X Position "230", voltage range (190.....260V; 50/60Hz)
Y Position "115", voltage range (90.....127V; 50/60Hz)



4. Operations

4.1. Important Information

WARNING

Before starting, ensure that impermissibly high pressures cannot build up on the pressure side. Interchanging the connections causes dangerous excess pressure levels.
Do not start the pump if pressure difference between inlet and outlet exceeds max. 1 bar.
Attemps to start pump at higher differential pressure may cause the motor to jam and damage may result.

WARNING

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

CAUTION

Use only "C" version pumps where the pumping of corrosive gases is involved.

CAUTION

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!

4.2 Switching ON/OFF The Pump

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

CAUTION

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

Intermittent Operations

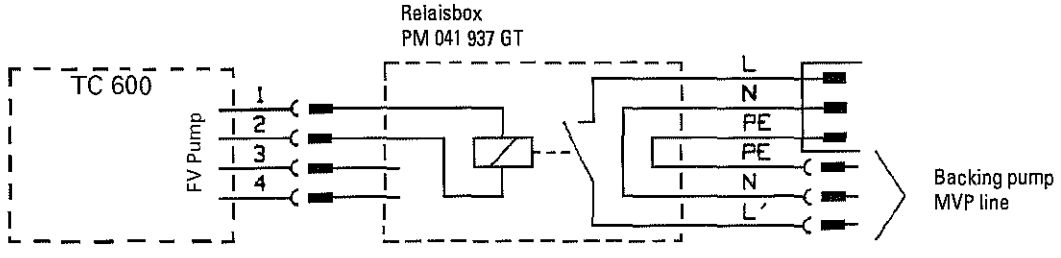
To prolong the life of diaphragm pumps, intermittent operations can be selected with lesser gas throughputs of < 0.18 mbar l/s. This means that, dependent on the TMP power take-up, the backing pump will be switched on and off. TMP power take-up is dependent on the fore-vacuum pressure and gas throughput.

- 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.

PLEASE NOTE

Connect diaphragm pumps in the pumping station according wiring diagram in operating instructions PT 800 030 BN of the Backing Pump Relay Boxes.

Connection with Relaisbox at TC 600 for intermittend operation

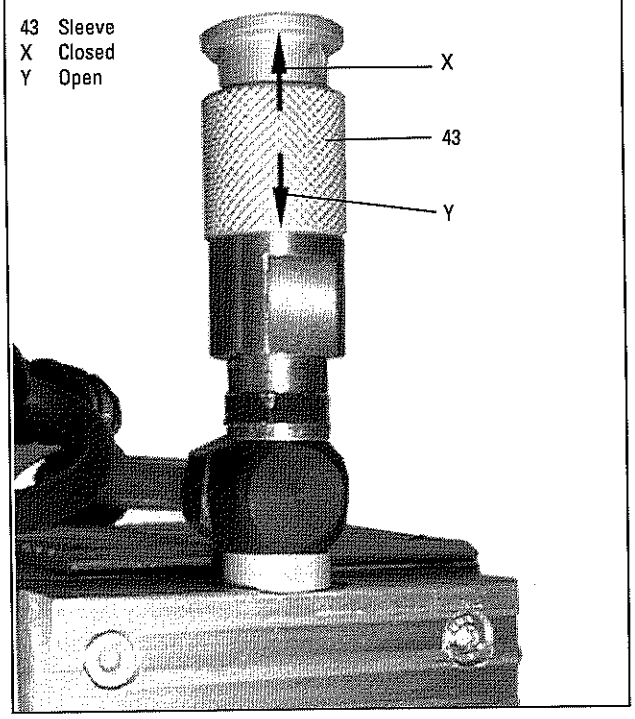


4.3. Operation With Gas Ballast

The pumping of air or process gases can cause moisture/vapour to condense in the pump. This has an effect on the attainable final pressure and the volume flow rate levels.
The rate of expulsion of condensate can be increased by admitting gas ballast air and the pump will attain the specified final pressure within a shorter time. This is achieved by setting the sleeve 43 on gas ballast valve to the position „open" (Y).
When starting the pump or system and when the presence of vapour is to be anticipated it is recommended to open the gas ballast valve in advance. If the intake pressure of the pump increases or is unusually high, the valve can also be opened when the pump is running. Once the final pressure has stabilised the valve can again be closed.
Although the gas ballast equipment has been designed to operate non-stop it should be taken into account that when the valve is open the final vacuum level of the pump is slightly increased.
The lower part of the valve casing has been constructed in such a way to permit the mounting of a magnetic valve with a connection thread of G 1/8".

Gas ballast valve 40

43 Sleeve
X Closed
Y Open



Important notes regarding the use of gas ballast

WARNING

Make sure that air/gas inlet through the gas ballast valve never lead to hazardous, explosive or otherwise dangerous mixtures. If in doubt, use inert gas.

PLEASE NOTE

Do not pump vapour before pump has reached its operating temperature and with gas ballast valve closed.
If the pump is subjected to condensates it should be allowed to run for a few minutes under atmospheric pressure before switching off.

4.4. Shutdown

Short-term after formation of condensate:

- ➡ Allow the pump to continue to run at atmospheric pressure for a few minutes.
- ➡ Check and clean pump heads if the pump has been exposed to media which may damage the pump materials or forms deposits.

Long-term:

- ➡ Take measures as described in section short-term shutdown.
- ➡ Separate pump from the apparatus.
- ➡ Close gas ballast valve.
- ➡ Close inlet and outlet port (e. g. with transport caps).
- ➡ Store the pump in dry conditions.

5. What To Do In The Case Of Breakdowns ?

Problem	Possible cause	Remedy
Pump does not attain final pressure	Condensate in the pump	Run pump for a longer period under atmospheric pressure; open gas ballast valve.
	Open gas ballast valve	Close gas ballast valve.
	Valves/diaphragms defective/dirty	Clean or replace valves and diaphragms, see section 6.
	Leak in system	Repair leak.
Unusual operating noises	Valves/diaphragms defective	See maintenance in section 6.
	Dirt in the working chamber	Clean working chamber.
	Silencer loose or missing	Check silencer; clean or replace.
	Valves defective	Change valves.
	Motor fan defective	Change motor fan.
	Con-rod or motor bearing defective	Inform Pfeiffer-Service.
Pump does not start	No mains voltage	Check power supply.
	Phase failure	Check fuse.
	Motor overheating	Allow the motor to cool down and depress mains switch off/on.
	Ambient temperature < 12 °C	Warm pump.
	Dirty valves/diaphragms	See maintenance in section 6.
	Over-pressure in the exhaust line	Open exhaust line (open exhaust valve).
Pump switches off	Sticking diaphragms	Clean pump (see section 6.).
	Wrong mains voltage	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 alcohol or similar cleaning agents 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 7 in each membrane head. Ensure the correct assignment for mounting when dismantling the membrane heads. Don't confuse the washers 7.

6.3. Dismantling The Membrane Head

➡ Allow the pump to cool down before dismantling.

➡ Using an SW 14 spanner, unscrew hollow screw 48 with gas ballast valve 40 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 allen key, unscrew the four allen head screws 1.1 and remove head cover 2, taking care with the two valve plates 3, the sealing rings and the sealing ring 39 between the head cover 2 and the intermediate plate 5.

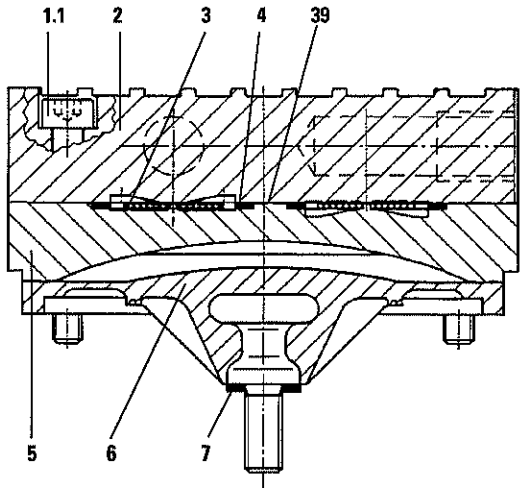
➡ Remove intermediate plate 5.

➡ Use a small screwdriver to carefully release out diaphragm 6 and manually unscrew from the connecting rod (right-hand thread). Look out for possible washers 7.

➡ Check clearance hole in the intermediate plate 5 of the head cover 1; clean carefully if necessary.

➡ 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 7 of the old diaphragm must be used again otherwise the pump will not attain the required pressure.

1.1 Allan head screw
2 Head cover
3 Valve plate
4 Sealing ring
5 Intermediate plate
6 Diaphragm
7 Washer
39 Sealing ring



6.4. Assembling The Membrane Head

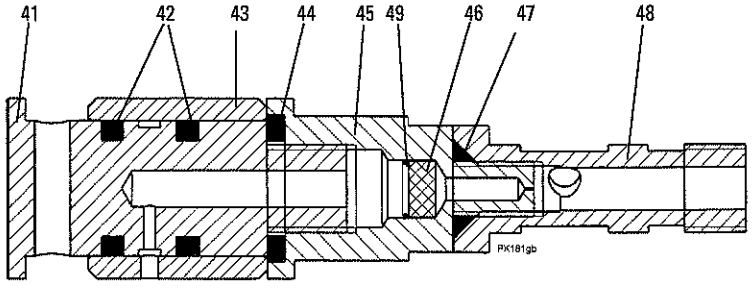
- ➡ Assemble all parts in reverse order. The connecting rod should be positioned in the upper dead point when fitting the diaphragm. Ensure correct positioning of all parts.
- ➡ Check correct sealing ring seating.
- ➡ Re-make hose connection and re-tighten hollow screw 48 complete with gas ballast valve 40.
- ➡ Test pump for function.

6.5. Dismantling The Gas Ballast Valve

- ➡ Unscrew gas ballast valve 40 with SW 17 key from hollow screw 48; taking care with the o-ring 47.
- ➡ Unscrew valve housing 41 and reducing piece 45; use suitable tool (bolt) for the bore
- ➡ Remove sleeve 43 of the valve housing 41.
- ➡ Check the USIT- ring and O-ring 42 for possible damage and renew as necessary.
- ➡ Unlever circular spring 49 with a small screw driver carefully out of the reducing piece 45.
- ➡ Turn reducing piece 45 to the table and dump out filter 46.
- ➡ Clean all parts, check for possible damage and renew as necessary.
- ➡ Assemble all parts in reverse order; taking care with the bore in sleeve 43 (bore pointed to the top).

Gas ballast valve 40

41 Gas ballast valve housing
42 O-ring
43 Sleeve
44 USIT-ring
45 Reducing piece
46 Filter
47 O-ring
48 Hollow screw
49 Circular spring



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.
- ➡ If the pump is 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.

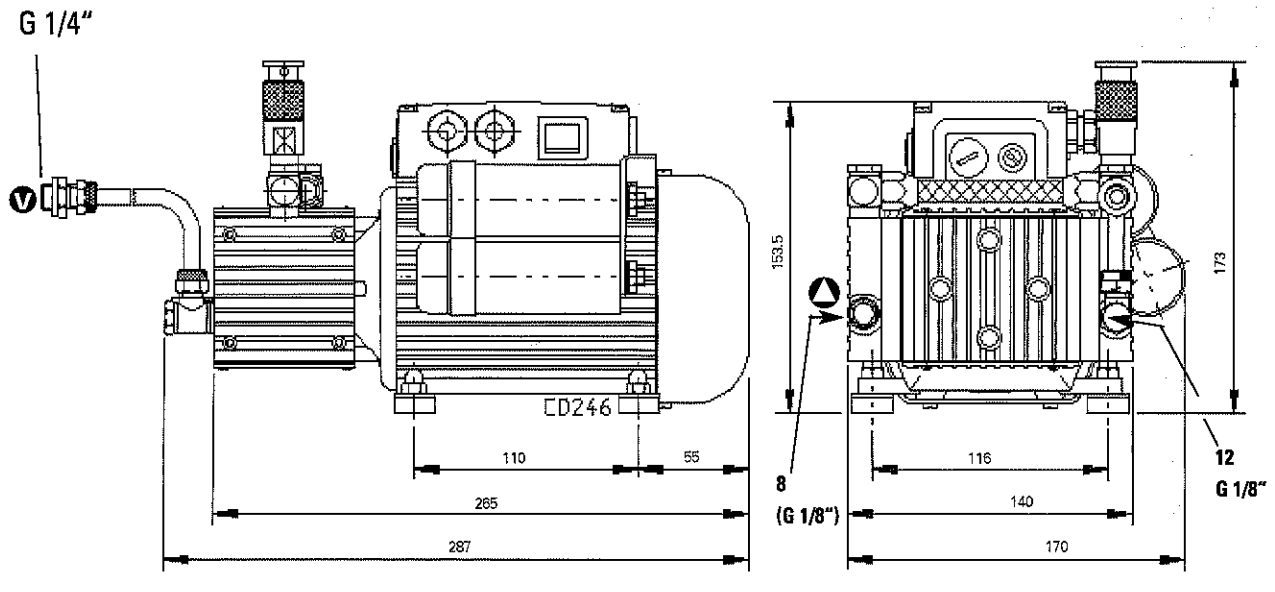
8. Technical Data

Size	Unit	MVP 015-2
Connections		
Intake side [1]		G 1/8"
Pressure side		silencer (G 1/8")
Nominal volume flow rate at 1000 mbar		
50 Hz	m^3/h	0.9
60 Hz	m^3/h	1.1
Final pressure	mbar	≤ 3,5
Final pressure with gas ballast	mbar	≤ 4,5
Permissible exhaust pressure	mbar	1050
Leakrate	mbar l/s	$\leq 5 \cdot 10^{-3}$
Max. operating altitude (a. s. l.)	m	approx. 2000
Permissible gas- and environment temperature range	°C	+ 12...40
Rotation speed		
at 50 Hz	1/min	1500
at 60 Hz	1/min	1800
Noise level	dB(A)	ca. 52
Motor (insulation material class B)		IP 54
Power at		
115 V 50 Hz	W	75
115 V 60 Hz	W	115
230 V 60 Hz	W	110
230 V 50 Hz	W	65
Overload protection (coiled temperature switch)	°C	118
Power take-up at		
115V, 50/60Hz	A	0,65/1,1
230V, 50/60Hz	A	0,35/0,55
Weight, approx.	kg	6,5

[1] included with hose (inside/outside dimension Ø6/Ø8) with G1/8" swivelling screw fitting and G 1/4" straight fitting

8.1. Dimensions

8 Silencer
12 Intake connection



8.2. Substances Which Come Into Contact With The Medium

Pump components	Substances in contact with the media
Diaphragm	EPDM
Valves	EPDM
Pump head	Aluminium
Tupe	PVC
Swivelling screw-fitting	Aluminium
Pipe fitting	CuZn-plated
Tube	Polyethylene
Silencer	Polyamide

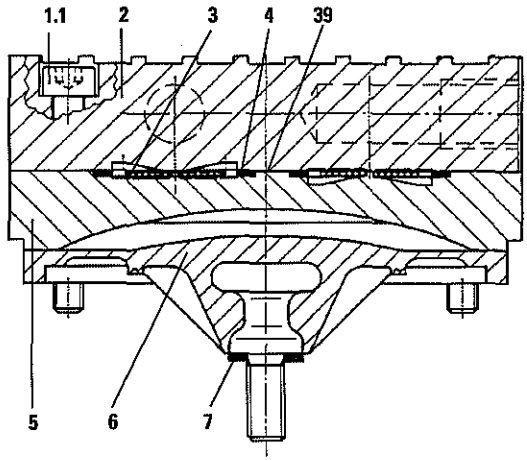
9. Spare Parts

Pos.	Description	Pieces	Size	Number	Comments/relevant	Ord. Quantity
	MVP 015-2 Spare parts pack contains all necessary wear parts:	1		PU E22 001-T	consisting of pos.: 3, 4, 6, 14, 15 and 39	
3	Valve plate	4				
4	Sealing ring	4				
6	Diaphragm	2				
8	Silencer	1		P 0920 567 E		
14	Sealing ring	2	R 1/8			
15	Interhead sealing ring	2	R 1/8			
10	Interhead connection, complete	1		PK 050 002 -T		
12	Intake hose	1	1.0 m, 6 x 1	P 0991 939		
39	Sealing ring for bypass boring	1	D 4,5 x 1,6 x 1	P 0995 947	EPDM 266	
40	Gas ballast valve, complete	1		PK 050 148-U		
41	Gas ballast valve housing	1		PK 050 142		
42	O-ring	2	10 x 2,5	P 4070 166 PV	Elastomer	
43	Sleeve	1		PK 050 141		
44	USIT-ring	1	U10,35/16x2	P 3529 133-A		
45	Reducing piece	1		PK 050 137		
46	Filter	1		B 4161 200 3G		
47	O-ring	1	6 x 2,2	P 4070 088 PV	Elastomer	
48	Hollow screw	1	G 1/8"/M6	PK 050 136		
49	Circular spring	1		BG 510 857		

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).

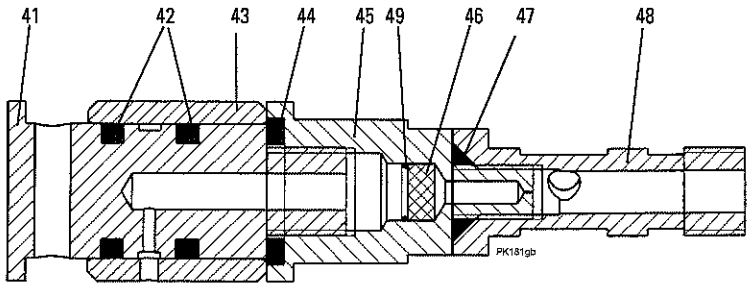
Membrane head

1.1 Allan head screw
2 Head cover
3 Valve plate
4 Sealing ring
5 Intermediate plate
6 Diaphragm
7 Washer
39 Sealing ring



Gas ballast valve 40

41 Gas ballast valve housing
42 O-ring
43 Sleeve
44 USIT-ring
45 Reducing piece
46 Filter
47 O-ring
48 Hollow screw
49 Circular spring



10. Accessories

Pos.	Description	Pieces	Size	Number	Comments	Order Quantity
	Mains cable for wiring (without plug)	1	3.0 m	P 4564 309-ZH		
	Mains cable 230 V with schuko plug, EURO Counter plug CEE 22	1	3.0 m	P 4564 309-ZA		
	Mains cable 115 V, UL EURO Counter plug CEE 22	1	3.0 m	P 4564 309-ZE		
	Small flange for intake or outlet side	1	DN 16 ISO-KF	PK 050 108-T		
	Relay box for TC 600 connection			PM 041 937 GT		
	Screw in flange with female thread		G 1/4" / DN 16 ISO-KF	PM 006 994		
	Hose connection DN 6 x 400 mm for the intake side		G 1/8" and G 1/4"	P0 920 739 E	with straight fitting and sealing rings	

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: _____