

Diaphragm Vacuum Pump



MVP 015

MVP 015-T

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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.





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 damage to the pump or system.



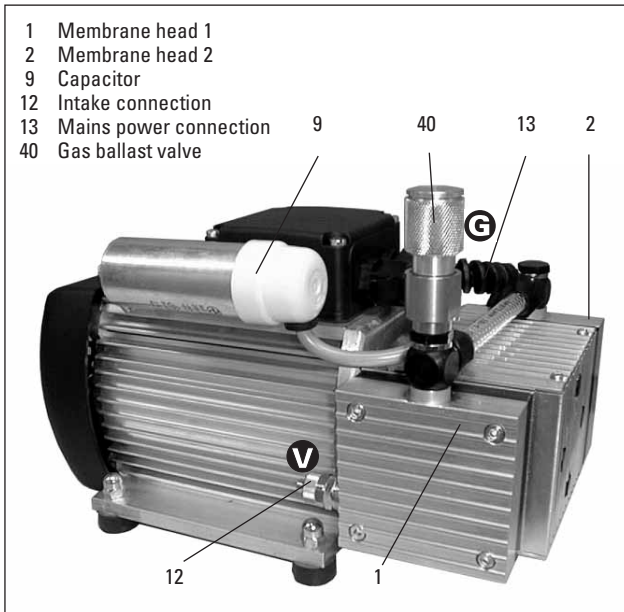
Danger of burns from touching hot parts.



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. Main Features



2.2. Differences Between The Pump Types

Feature	MVP 015	MVP 015-T
Vacuum side	G 1/4" with 1m synthetic hose (DN 10 ISO-KF or (others on request)	G 1/4" with 1m synthetic hose
Exhaust side	Silencer with switch	Silencer without switch
Voltage connection	with mains power cable	with mains power cable with power relais and connecting plug for the exclusively connection to Pfeiffer-turbo pumps with TCP (without TCS)

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.

Proper use

- The Diaphragm Pump MVP pump series 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.
- The Diaphragm Pumps may not be used for the purpose of generating pressure.
- 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:

- Uses not covered above, and, in particular:
 - 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.

- 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 wide voltage AC motors with the following possible variants:

220 V - range 187...265 V, 50/60 Hz

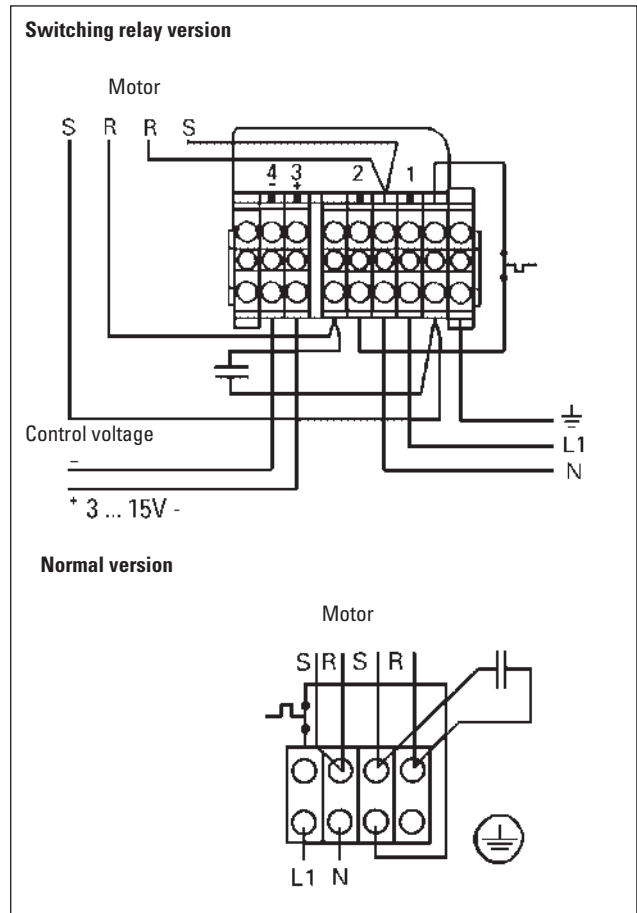
110 V - range 90...127 V, 50/60 Hz



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.



4. Operations

4.1. Important Information



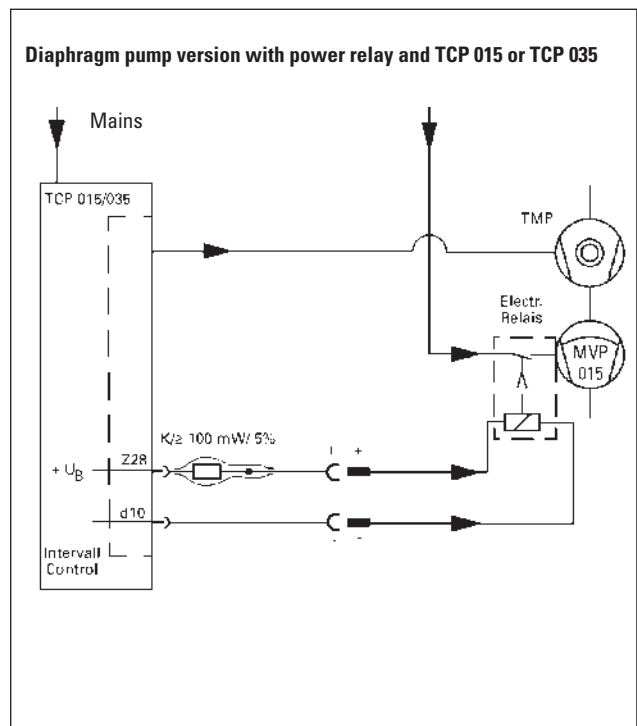
Before starting, ensure that impermissibly high pressures cannot build up on the pressure side. Interchanging the connections causes dangerous excess pressure levels.

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



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

- The pump can be switched on and off at all times.
- The intake connection and the output are marked with ∇ and \triangle respectively.
- If the pump is subjected to condensates it should be allowed to run for a few minutes under atmospheric pressure before switching off.

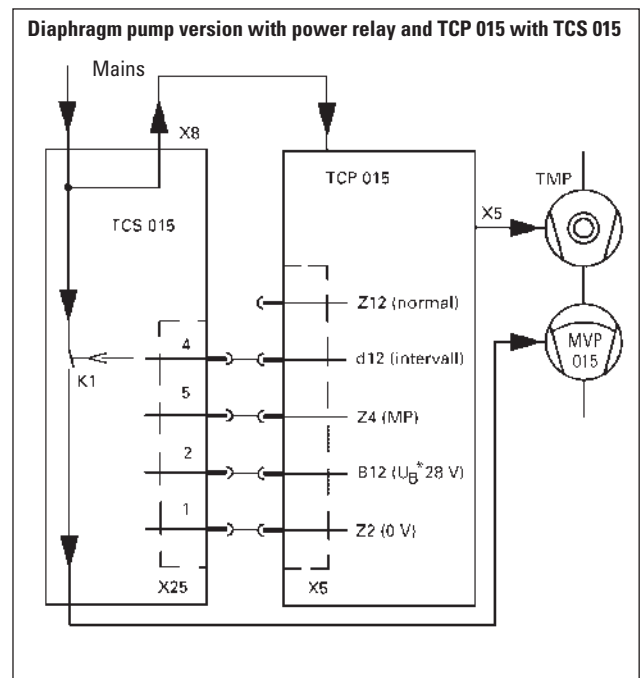


4.2 Intermittent Operations

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.

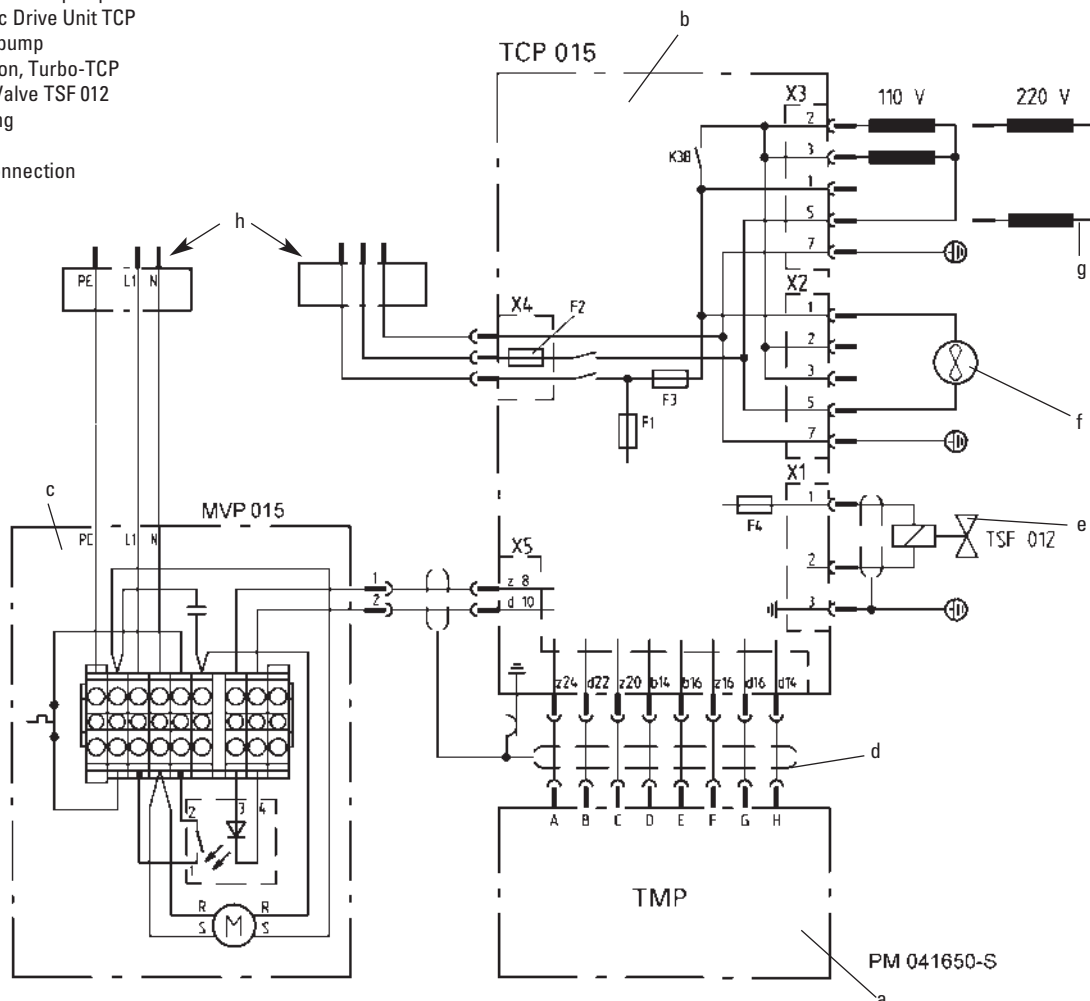
- By comparing the power take-up with an upper and a lower limit value, the relative switch-on duration with lesser gas throughputs can be reduced to approx. 1 to 60%
- To avoid too frequent switching on, the buffer volume in the fore-vacuum line should amount to 0.5 liter from approx. 0.018 mbar l/s.

Possible intermittent operations variations are shown in the following diagram:



MVP 015-T with power relay and with TCP 015

- a Turbomolecular pump
- b Electronic Drive Unit TCP
- c Backing pump
- d Connection, Turbo-TCP
- e Venting Valve TSF 012
- f Air cooling
- g Heating
- h Mains connection



4.3. Operation With Gas Ballast

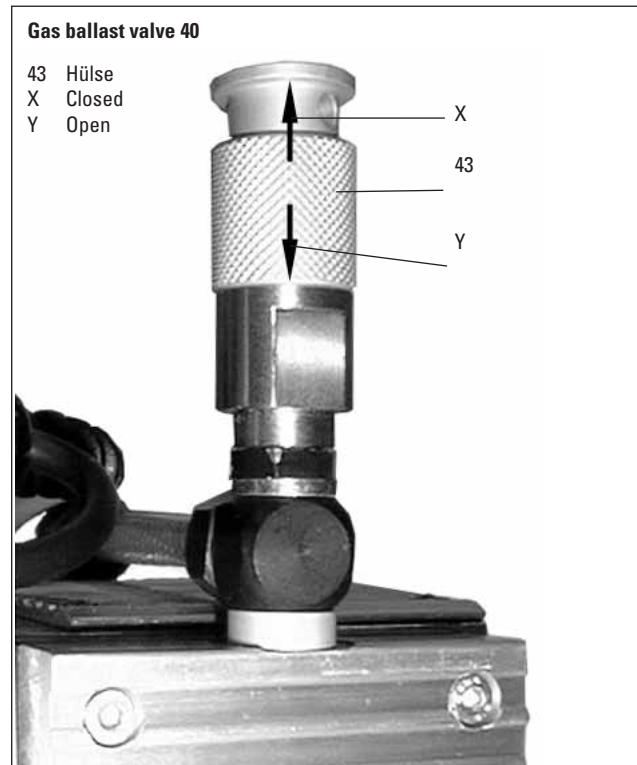
The pumping of air or process gases can cause moisture/vapour to condense in the pump. This has an effect on the attainable final pressure and the volume flow rate levels.

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“.



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
	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.
Pump does not start	Ambient temperature < 12 °C	Warm pump
	Dirty valves/diaphragms	See maintenance in section 6.
	On power relay version control voltage fault or relay defective	Check control voltage (see section 3.4.) Check relay
	Pump switches off	Sticking diaphragms Wrong mains voltage

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.

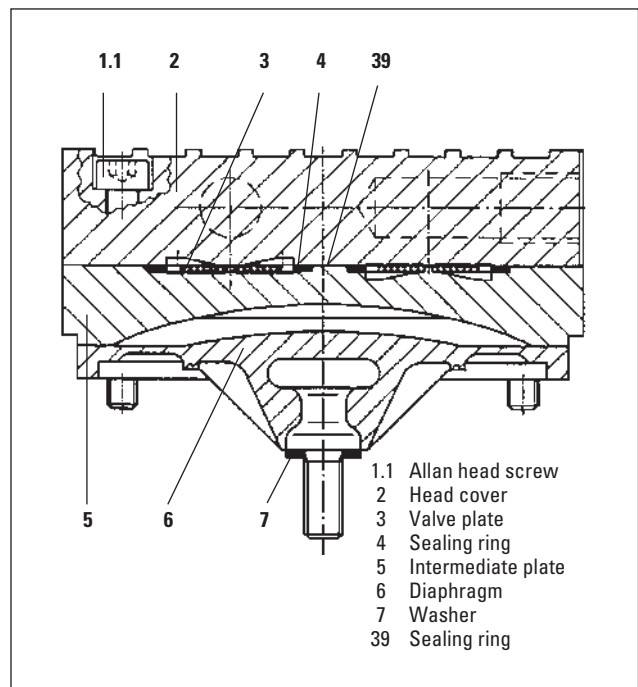
Depending on individual cases it may be efficient to check and clean the pump heads on a regular basis. In case of normal wear the **lifetime of the diaphragms and valves is > 10000 operating hours.**



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 11 with gas ballast valve 40 of interhead connection 1) 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.



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 11 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).

7. Service

Do Make Use Of Our Service Facilities

In the event that repairs are necessary to your pump, 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.

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	MVP 015-T
Connections		
Intake side ¹⁾	G 1/8"	G 1/8"
Pressure side ²⁾	silencer (G 1/8")	silencer (G 1/8")
Nominal volume flow rate at 1000 mbar		
50 Hz	l/min	15
60 Hz	l/min	18
Volume flow rate at 10 mbar		
50 Hz	l/min	≥ 3,8
60 Hz	l/min	≥ 4,4
Final pressure	mbar	≤ 3,5
Final pressure with gas ballast	mbar	≤ 4,5
Permissible exhaust pressure	mbar	1050
Leakrate	mbar l/s	≤ 5·10 ⁻³
Max. operating altitude (a. s. l)	m	2000
Temperature for restarting under vacuum	°C	12...40
Noise level	dB(A)	ca. 52
Motor (insulation material class B)	IP 54	IP 54
Power at		
100 V 50 Hz	W	65
115 V 60 Hz	W	65
208 V 60 Hz	W	40
230 V 50 Hz	W	40
Max. permissible operating temperature	°C	80
Overload protection (coiled temperature switch)	°C	118
Weight, approx.	kg	6

1) included with hose 6-8 with G1/4" connection or DN10 ISO-KF

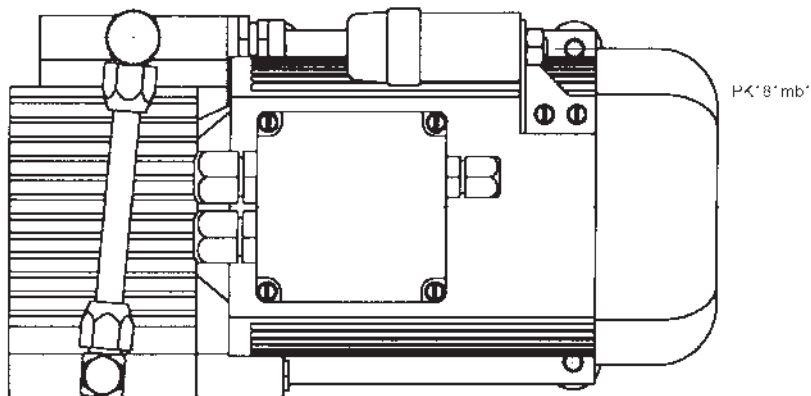
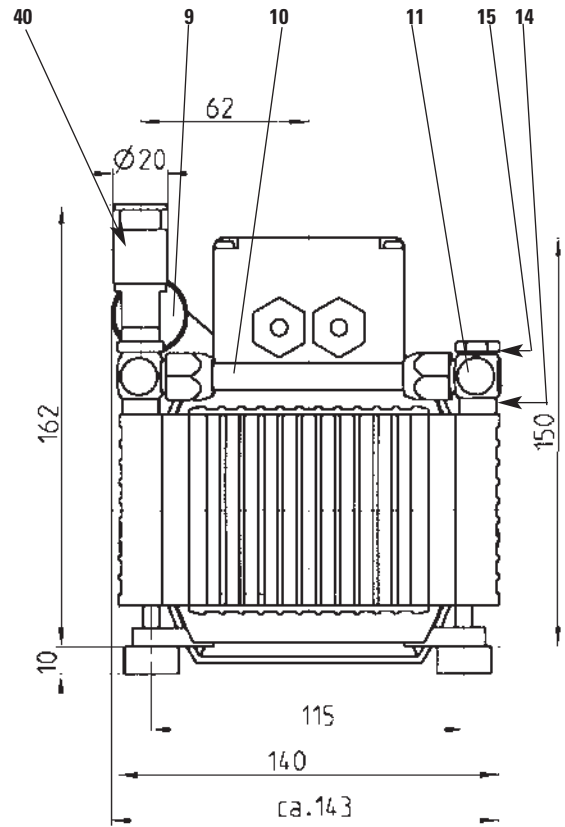
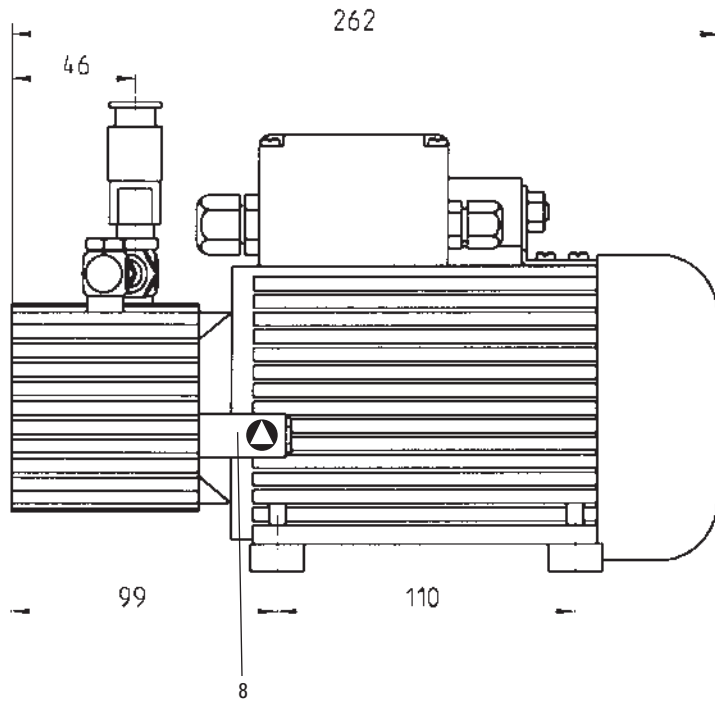
2) Pressure side, closed with silencer (pipe thread DIN ISO 228)

8.1. Substances Which Come Into Contact With The Medium

Pump components	Substances in contact with the media
Diaphragm	EPDM
Valves	EPDM
Pump head	Aluminium
Tupe	Polyurethane elastomer
Swivelling screw-fitting	Aluminium
Silencer	Polyamide

8.2. Dimensions

- 8 Silencer (outlet side)
- 9 Capacitor
- 10 Interhead connection
- 11 Hollow screw
- 14 Sealing ring
- 15 Interhead sealing ring



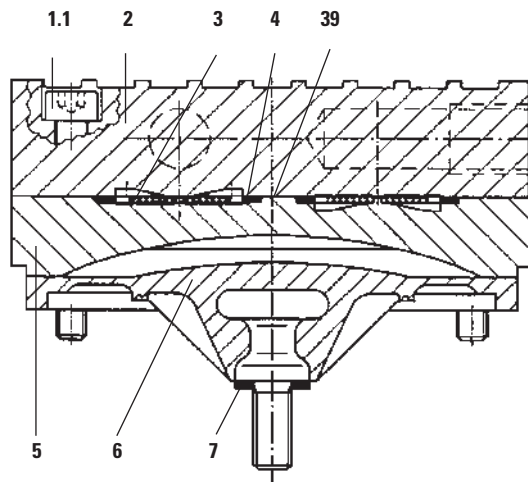
9. Spare Parts

Pos.	Description	Pieces	Size	Number	Comments/relevant	Ord. Quantity
	MVP 015 and MVP 015-T Spare parts pack contains all necessary wear parts:					
3	Valve plate	4		PK 050 013 -T		
4	Sealing ring	4				
6	Diaphragm	2		P 0920 567 E		
8	Silencer	1				
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	
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).

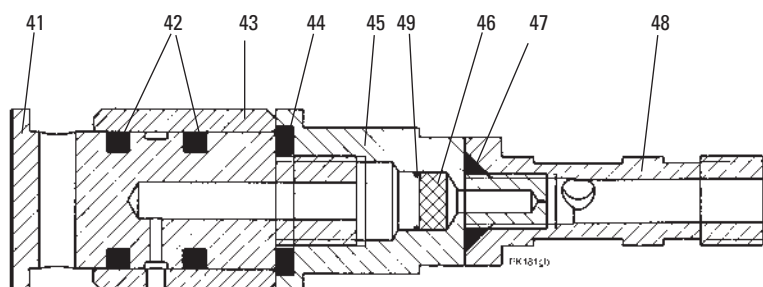
Membrane head

- 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



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 015

MVP 015-T

Angewendete Richtlinien, harmonisierte Normen und angewendete nationale Normen:

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

DIN EN 12100-1	DIN EN 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*:

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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

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