

# OPERATING INSTRUCTIONS

EN

Translation of the Original

## MVP 040-2 | MVP 070-3 | MVP 070-3 C

Diaphragm pump

**PFEIFFER**  **VACUUM**



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## Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new diaphragm pump is designed to support you with its performance, perfect operation and without impacting your individual application. The name Pfeiffer Vacuum stands for high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. From this extensive, practical experience we have gained a large volume of information that can contribute to efficient deployment and to your personal safety.

In the knowledge that our product must avoid consuming work output, we trust that our product can offer you a solution that supports you in the effective and trouble-free implementation of your individual application.

Please read these operating instructions before putting your product into operation for the first time. If you have any questions or suggestions, please feel free to contact [info@pfeiffer-vacuum.de](mailto:info@pfeiffer-vacuum.de).

Further operating instructions from Pfeiffer Vacuum can be found in the [Download Center](#) on our website.

## Disclaimer of liability

These operating instructions describe all models and variants of your product. Note that your product may not be equipped with all features described in this document. Pfeiffer Vacuum constantly adapts its products to the latest state of the art without prior notice. Please take into account that online operating instructions can deviate from the printed operating instructions supplied with your product.

Furthermore, Pfeiffer Vacuum assumes no responsibility or liability for damage resulting from the use of the product that contradicts its proper use or is explicitly defined as foreseeable misuse.

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We reserve the right to make changes to the technical data and information in this document.



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# 1 About this manual



## IMPORTANT

Read carefully before use.  
Keep the manual for future consultation.

## 1.1 Validity

This operating instructions is a customer document of Pfeiffer Vacuum. The operating instructions describe the functions of the named product and provide the most important information for the safe use of the device. The description is written in accordance with the valid directives. The information in this operating instructions refers to the product's current development status. The document shall remain valid provided that the customer does not make any changes to the product.

### 1.1.1 Applicable documents

Designation	Document
Declaration of conformity	A component of these operating instructions

### 1.1.2 Variants

These instructions apply to diaphragm pumps of the AC series:

- MVP 040-2 as standard version
- MVP 070-3 as standard version
- MVP 070-3 C as corrosive gas version

## 1.2 Target group

These operating instructions are aimed at all persons performing the following activities on the product:

- Transportation
- Setup (Installation)
- Usage and operation
- Decommissioning
- Maintenance and cleaning
- Storage or disposal

The work described in this document is only permitted to be performed by persons with the appropriate technical qualifications (expert personnel) or who have received the relevant training from Pfeiffer Vacuum.

## 1.3 Conventions

### 1.3.1 Instructions in the text

Usage instructions in the document follow a general structure that is complete in itself. The required action is indicated by an individual step or multi-part action steps.

#### Individual action step

A horizontal, solid triangle indicates the only step in an action.

- ▶ This is an individual action step.

#### Sequence of multi-part action steps

The numerical list indicates an action with multiple necessary steps.

1. Step 1
2. Step 2
3. ...

### 1.3.2 Pictographs

Pictographs used in the document indicate useful information.



Note



Tip

### 1.3.3 Stickers on the product

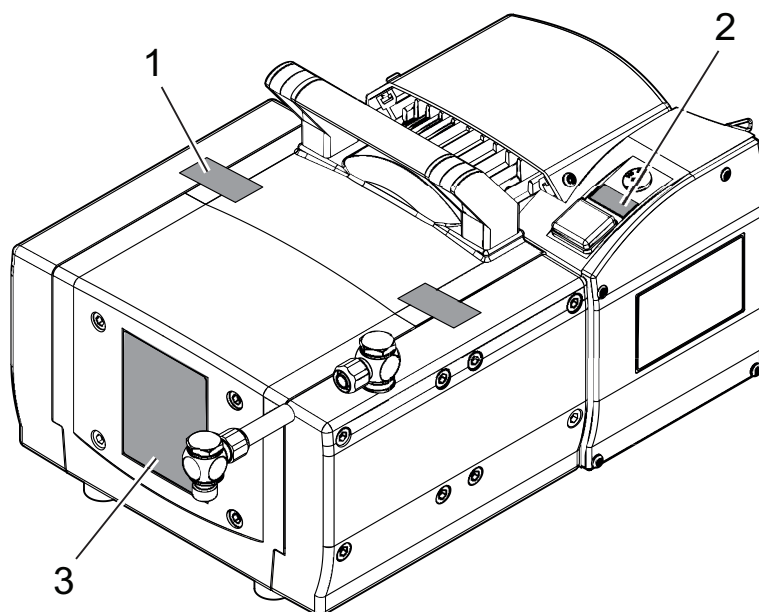
This section describes all the stickers on the product along with their meanings.

<p><b>PFEIFFER VACUUM</b></p> <p>Mod. MVP 040-2    2020/08    CE</p> <p>P/N    PK T01 210</p> <p>S (N<sub>2</sub>)max. 2.3/2.5 m<sup>3</sup>/h</p> <p>Pw    180 W</p> <p>100–115 V / 50/60 Hz, 120 V / 60 Hz; 3.4 A</p> <p>200–230 V / 50/60 Hz; 1.8 A</p> <p>Mass 11.4 kg</p> <p>Ser.-Nr.: xxxxxxxxxxxx</p> <p>Pfeiffer Vacuum D - 35614 Aslar Germany</p>	<p><b>Rating plate</b> Rating plate for diaphragm pump MVP 040-2</p>
<p><b>PFEIFFER VACUUM</b></p> <p>Mod. MVP 070-3    2020/08    CE</p> <p>P/N    PK T01 310</p> <p>S (N<sub>2</sub>)max. 3.8/4.3 m<sup>3</sup>/h</p> <p>Pw    250W</p> <p>100–115 V / 50/60 Hz, 120 V / 60 Hz; 5.7 A</p> <p>200–230 V / 50/60 Hz; 3.0 A</p> <p>Mass 16.4 kg</p> <p>Ser.-Nr.: xxxxxxxxxxxx</p> <p>Pfeiffer Vacuum D - 35614 Aslar Germany</p>	<p><b>Rating plate</b> Rating plate for diaphragm pump MVP 070-3 and MVP 070-3 C</p>
	<p><b>Warning of hot surfaces</b> The sticker warns of hot surfaces during operation or immediately after switching off the vacuum pump.</p>
	<p><b>General warning signs</b> The sticker provides a general warning of possible dangers.</p>
	<p><b>Warranty seal</b> The diaphragm heads are sealed at the factory. Damaging or removing a warranty seal results in loss of the warranty.</p>
	<p><b>Warning against voltage range being set incorrectly</b> This sticker warns against damage to the motor due to incorrectly set voltage range.</p>

Tbl. 1: Stickers on the product







**Fig. 1: Position of the stickers on the product**

- |                              |   |
|------------------------------|---|
| 1 Warranty seal (2×)         | 3 Rating plate of the diaphragm pump<br>Incl. the 2 warning signs |
| 2 Voltage range warning sign |   |

### 1.3.4 Abbreviations

Abbreviation	Meaning in this document
AC	Alternating current
C	Corrosive gas version
DN	Nominal diameter (diamètre nominal)
ECTFE	Ethylene chlortrifluoroethylene
ETFE	Ethylene tetrafluoroethylene copolymer
FFKM	Perfluoroelastomer
FPM	Fluoropolymer rubber
MVP	Diaphragm vacuum pump
MSL	Mean sea level
PA	Polyamide
PE	Polyethylene
	Protective earth (earthed conductor)
PTFE	Polytetrafluoroethylene
PVC	Polyvinyl chloride (PVC)
WAF	Wrench size

**Tbl. 2: Abbreviations used in this document**

## 1.4 Trademark proof

- LOCTITE® is a brand of Henkel AG & Co. KGaA.
- Torx® is a brand of Acument Intellectual Properties, LLC.

## 2 Safety

### 2.1 General safety information

The following 4 risk levels and 1 information level are taken into account in this document.

<b>⚠ DANGER</b>
<p><b>Immediately pending danger</b></p> <p>Indicates an immediately pending danger that will result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> <li>▶ Instructions to avoid the danger situation</li> </ul>

<b>⚠ WARNING</b>
<p><b>Potential pending danger</b></p> <p>Indicates a pending danger that could result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> <li>▶ Instructions to avoid the danger situation</li> </ul>

<b>⚠ CAUTION</b>
<p><b>Potential pending danger</b></p> <p>Indicates a pending danger that could result in minor injuries if not observed.</p> <ul style="list-style-type: none"> <li>▶ Instructions to avoid the danger situation</li> </ul>

<b>NOTICE</b>
<p><b>Danger of damage to property</b></p> <p>Is used to highlight actions that are not associated with personal injury.</p> <ul style="list-style-type: none"> <li>▶ Instructions to avoid damage to property</li> </ul>

<b>i</b>	<p>Notes, tips or examples indicate important information about the product or about this document.</p>
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### 2.2 Safety instructions

All safety instructions in this document are based on the results of the risk assessment carried out in accordance with Machinery Directive 2006/42/EC Annex I and EN ISO 12100 Section 5. As far as applicable, all unit life cycle phases have been considered.

#### Risks during transport

<b>⚠ WARNING</b>
<p><b>Danger of serious injury due to falling objects</b></p> <p>Due to falling objects there is a risk of injuries to limbs through to broken bones.</p> <ul style="list-style-type: none"> <li>▶ Take particular care and pay special attention when transporting products manually.</li> <li>▶ Do not stack the products.</li> <li>▶ Wear protective equipment, e.g. safety shoes.</li> </ul>



## Risks during installation

**⚠ DANGER****Danger to life from electric shock**

Touching exposed and voltage-bearing elements causes an electric shock. Improper connection of the mains supply leads to the risk of touchable live housing parts. There is a risk to life.

- ▶ Before the installation, check that the connection leads are voltage-free.
- ▶ Make sure that electrical installations are only carried out by qualified electricians.
- ▶ Provide adequate grounding for the device.
- ▶ After connection work, carry out an earthed conductor check.

**⚠ CAUTION****Danger of injury from bursting as a result of high pressure in the exhaust line**

Faulty or inadequate exhaust pipes lead to dangerous situations, e.g. increased exhaust pressure. There is a danger of bursting. Injuries caused by flying fragments, the escaping of high pressure, and damage to the unit cannot be excluded.

- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.

## Risks during operation

**⚠ WARNING****Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ▶ Decontaminate affected parts before carrying out maintenance work.
- ▶ Wear protective equipment.

**⚠ WARNING****Danger of poisoning due to toxic process media escaping from the exhaust pipe**

During operation with no exhaust line, the vacuum pump allows exhaust gases and vapors to escape freely into the air. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ▶ Observe the pertinent regulations for handling toxic process media.
- ▶ Safely purge toxic process media via an exhaust line.
- ▶ Use appropriate filter equipment to separate toxic process media.

**⚠ WARNING****Explosion hazard from reactive, potentially explosive or other hazardous gas/air mixtures**

Uncontrolled inlet of gas at the gas ballast valve leads to sparks generated mechanically following diaphragm rupture, hot surfaces or to potentially explosive gas/air mixtures in the vacuum system caused by static electricity.

- ▶ If necessary, use inert gas for supplying the flushing gas in order to avoid a potential ignition.

**⚠ WARNING****Risk of poisoning due to toxic process gases escaping**

For intake pressures > 500 hPa, process gas may escape from the open gas ballast valve. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ▶ If necessary, use inert gas to avoid potential contamination.
- ▶ If necessary, use an extraction line.



**⚠ CAUTION**

**Danger of injury from moving parts**

After a power failure or a standstill as a result of overheating, the motor restarts automatically. There is a risk of injury to fingers and hands if they enter the operating range of rotating parts.

- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against reactivation.
- ▶ Dismantle the vacuum pump for inspection, away from the system if necessary.

**⚠ CAUTION**

**Danger of burns on hot surfaces**

In the event of a fault, the surface temperature of the vacuum pump can increase to above 105 °C.

- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Wear personal protective equipment if necessary.

**⚠ CAUTION**

**Danger of burns on hot surfaces**

Depending on the operating and ambient conditions, the surface temperature of the vacuum pump can increase to above 70 °C.

- ▶ Provide suitable touch protection.

**Risks during maintenance, decommissioning and in the event of malfunctions**

**⚠ WARNING**

**Danger to life from electric shock during maintenance and service work**

The vacuum pump is only completely de-energized when the mains plug has been disconnected. There is a danger to life from electric shock when making contact with live components.

- ▶ Before performing all work, switch off the mains switch.
- ▶ Disconnect mains cable from mains plug.
- ▶ Wait 2 minutes until the capacitors have discharged.
- ▶ Secure the vacuum pump against unintentional re-start.

**⚠ WARNING**

**Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ▶ Decontaminate affected parts before carrying out maintenance work.
- ▶ Wear protective equipment.

**⚠ CAUTION**

**Danger of burns on hot surfaces**

In the event of a fault, the surface temperature of the vacuum pump can increase to above 105 °C.

- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Wear personal protective equipment if necessary.



## Risks during disposal

**⚠ WARNING****Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ▶ Decontaminate affected parts before carrying out maintenance work.
- ▶ Wear protective equipment.

## 2.3 Safety precautions

**Duty to provide information on potential dangers**

The product holder or user is obliged to make all operating personnel aware of dangers posed by this product.

Every person who is involved in the installation, operation or maintenance of the product must read, understand and adhere to the safety-related parts of this document.

**Infringement of conformity due to modifications to the product**

The Declaration of Conformity from the manufacturer is no longer valid if the operator changes the original product or installs additional equipment.

- Following the installation into a system, the operator is required to check and re-evaluate the conformity of the overall system in the context of the relevant European Directives, before commissioning that system.

**General safety precautions**

- ▶ Prevent process gases and their reaction and ancillary products that are harmful to health and the environmental from escaping, or dispose of these according to the applicable regulations.
- ▶ Avoid contact with process gases that are harmful to health and if required, wear personal protective clothing.
- ▶ Check the media compatibility of parts carrying media.
- ▶ Observe all applicable safety and accident prevention regulations.
- ▶ Check that all safety measures are observed at regular intervals.
- ▶ Do not expose body parts to the vacuum.
- ▶ Never disconnect plug connections during operation.
- ▶ Never fill or operate the unit with cleaning agents or cleaning agent residues.
- ▶ Do not carry out your own conversions or modifications on the unit.
- ▶ Observe the unit protection degree prior to installation or operation in other environments.
- ▶ Provide suitable touch protection, if the surface temperature exceeds 70°C.
- ▶ Keep lines and cables away from hot surfaces.
- ▶ Before returning the vacuum pump, observe the notes in the chapter Service solutions.

## 2.4 Limits of use of the product

Installation location	Interiors, protected against the accumulation of dust and weather influences, in a non-explosive, dry environment
Protection degree IEC 60529	IP 40
Protection degree UL 50E	NEMA type 1
Installation altitude	max. 2000 m above sea level <sup>1)</sup>
Ambient temperature	+10 °C to +40 °C

1) at an installation location higher than 1000 meters above sea level, there is a risk of insufficient cooling. If necessary, take measures according to Directive DIN EN 61010.



Relative humidity of air	85% at T ≤ 31 °C, to max. 50% at T ≤ 40 °C
Degree of pollution	2
Overvoltage category	II

**Tbl. 3: Limits of use of the product**

## 2.5 Proper use

- ▶ Use the vacuum pump for vacuum generation only.
- ▶ Adhere to the installation, commissioning, operating, and maintenance instructions.
- ▶ Do not use any accessory parts other than those recommended by Pfeiffer Vacuum.

## 2.6 Foreseeable improper use

Improper use of the product invalidates all warranty and liability claims. Any use that is counter to the purpose of the product, whether intentional or unintentional, is regarded as improper use; in particular:

- Pumping of corrosive media with vacuum pumps in standard version
- Pumping of explosive media
- Pumping radioactive or volatile media
- Pumping of gases that contain impurities such as particles, dust, or condensate
- Pumping of fluids
- Pumping FPM-solubilizing media
- Pumping vapors from combustible liquids
- Pumping pressurized media (> atmospheric pressure)
- Pumping media that can condense or cause adhering deposits to form in the suction chamber
- Use of the vacuum pump outside the specified area of application
- Using the vacuum pump below ground
- Using the vacuum pump to generate pressure
- Using the vacuum pump in systems in which sporadic loads and vibrations or periodic forces act on the unit
- Using the vacuum pump in strong electrical, magnetic, or electromagnetic fields
- Connection to vacuum pumps or equipment which are not suitable for this purpose according to their operating instructions
- Connection to devices with exposed live parts
- Connecting to sockets without earthing contact
- Using pipes to lift the vacuum pump
- Use of accessories or spare parts that are not listed in these instructions
- Using the vacuum pump as a climbing aid
- Using the connection lines between the diaphragm heads as carrying handles
- Using the pump in ambient conditions that do not meet the specified IP protection degree limits

## 2.7 Personnel qualification

The work described in this document may only be carried out by persons who have appropriate professional qualifications and the necessary experience or who have completed the necessary training as provided by Pfeiffer Vacuum.

### Training people

1. Train the technical personnel on the product.
2. Only let personnel to be trained work with and on the product when under the supervision of trained personnel.
3. Only allow trained technical personnel to work with the product.
4. Before starting work, make sure that the commissioned personnel have read and understood these operating instructions and all applicable documents, in particular the safety, maintenance and repair information.



## 2.7.1 Ensuring personnel qualification

### Specialist for mechanical work

Only a trained specialist may carry out mechanical work. Within the meaning of this document, specialists are people responsible for construction, mechanical installation, troubleshooting and maintenance of the product, and who have the following qualifications:

- Qualification in the mechanical field in accordance with nationally applicable regulations
- Knowledge of this documentation

### Specialist for electrotechnical work

Only a trained electrician may carry out electrical engineering work. Within the meaning of this document, electricians are people responsible for electrical installation, commissioning, troubleshooting, and maintenance of the product, and who have the following qualifications:

- Qualification in the electrical engineering field in accordance with nationally applicable regulations
- Knowledge of this documentation

In addition, these individuals must be familiar with applicable safety regulations and laws, as well as the other standards, guidelines, and laws referred to in this documentation. The above individuals must have an explicitly granted operational authorization to commission, program, configure, mark, and earth devices, systems, and circuits in accordance with safety technology standards.

### Trained individuals

Only adequately trained individuals may carry out all works in other transport, storage, operation and disposal fields. Such training must ensure that individuals are capable of carrying out the required activities and work steps safely and properly.

## 2.7.2 Personnel qualification for maintenance and repair



### Advanced training courses

Pfeiffer Vacuum offers advanced training courses to maintenance levels 2 and 3.

Adequately trained individuals are:

- **Maintenance level 1**
  - Customer (trained specialist)
- **Maintenance level 2**
  - Customer with technical education
  - Pfeiffer Vacuum service technician
- **Maintenance level 3**
  - Customer with Pfeiffer Vacuum service training
  - Pfeiffer Vacuum service technician

## 2.7.3 Advanced training with Pfeiffer Vacuum

For optimal and trouble-free use of this product, Pfeiffer Vacuum offers a comprehensive range of courses and technical trainings.

For more information, please contact [Pfeiffer Vacuum technical training](#).

## 3 Product description

### 3.1 Function

Diaphragm pumps are dry compressing displacement pumps. The movement of diaphragms generates a periodic change of the suction chamber volume. The gas flow causes the valves to open and close automatically. The pump unit is directly connected to the drive motor.

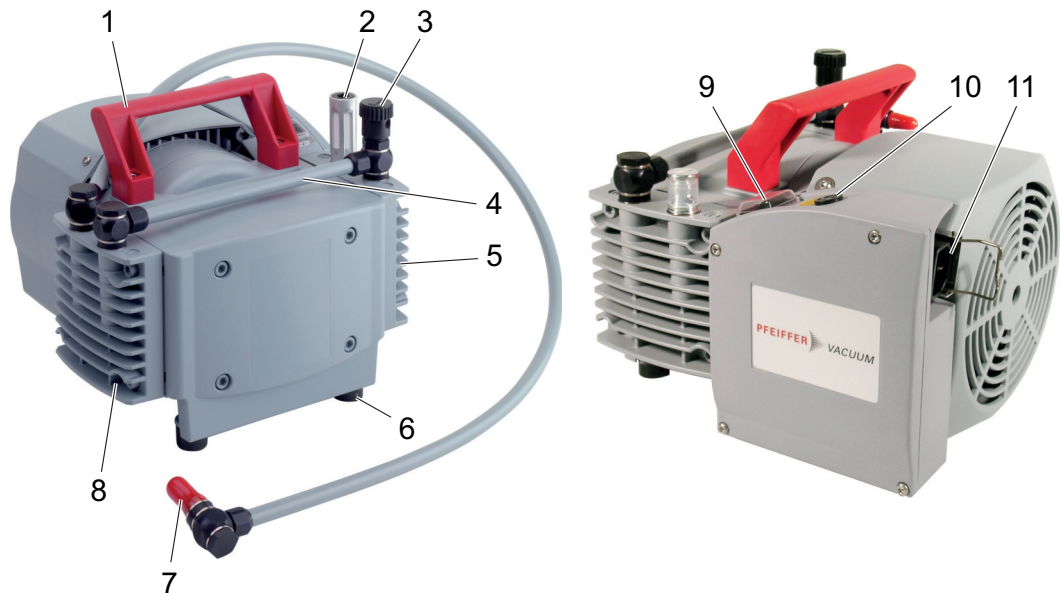


Fig. 2: Design of vacuum pump MVP 040-2

- |                         |   |
|-------------------------|---|
| 1 Handle                | 7 Vacuum connection                     |
| 2 Exhaust with silencer | 8 Diaphragm head 1                      |
| 3 Gas ballast valve     | 9 Mains switch                          |
| 4 Interhead connection  | 10 Voltage selector switch              |
| 5 Diaphragm head 2      | 11 Cold-device socket with locking clip |
| 6 Rubber feet           |   |

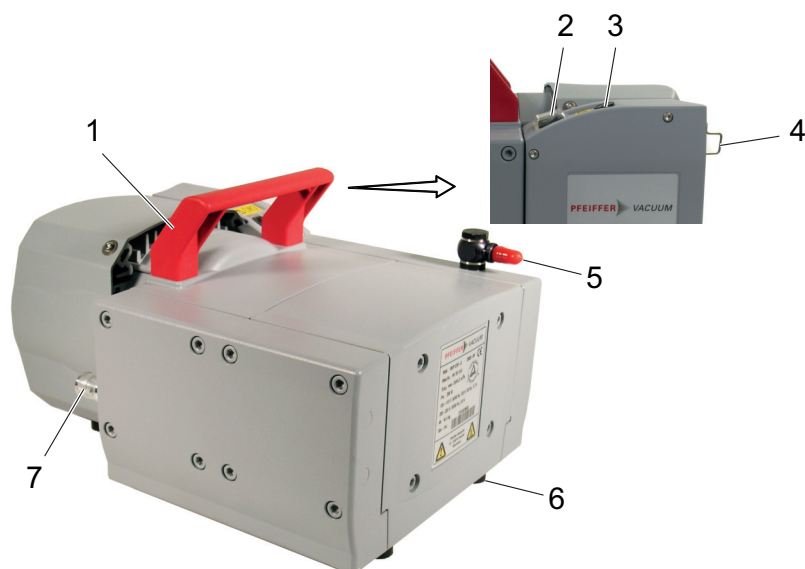
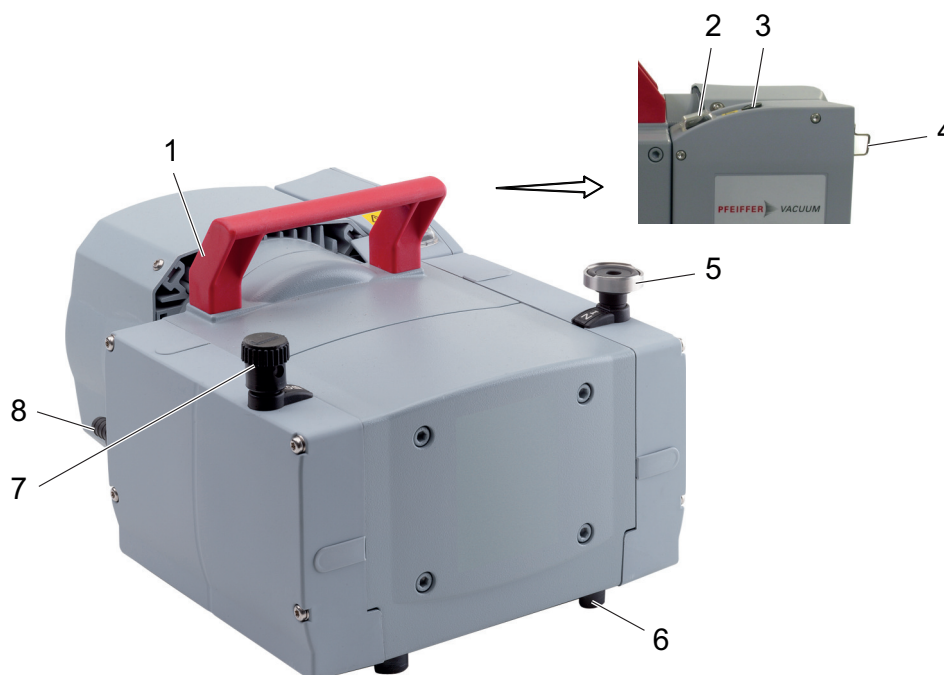


Fig. 3: Design of vacuum pump MVP 070-3

- |  |                         |
|--|-------------------------|
| 1 Handle                               | 5 Vacuum connection     |
| 2 Mains switch                         | 6 Rubber feet           |
| 3 Voltage selector switch              | 7 Exhaust with silencer |
| 4 Cold-device socket with locking clip |                         |







**Fig. 4: Design of vacuum pump MVP 070-3 C**

- |  |                     |
|--|---------------------|
| 1 Handle                               | 5 Vacuum connection |
| 2 Mains switch                         | 6 Rubber feet       |
| 3 Voltage selector switch              | 7 Gas ballast valve |
| 4 Cold-device socket with locking clip | 8 Exhaust           |

### 3.1.1 Drive

The drive motor is an alternating current motor with

- reversible voltage range on the voltage selector switch,
- thermal protection switch,
- mains switch and
- rubber connector

In event of excess temperature ( $> 95\text{ }^{\circ}\text{C}$ ), the thermic protection switch interrupts the motor current, but does not offer a permanent shut-down of the motor. Once the motor has cooled down, the vacuum pump restarts automatically.

### 3.1.2 Pumping system

Diaphragm pump MVP 040-2 has 2 pumping stages.

Diaphragm pump MVP 070-3 (C) has 4 pumping stages.

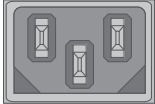
### 3.1.3 Cooling

The diaphragm pump is convection-cooled. The drive motor has its own fan.

### 3.1.4 Gas ballast

An integrated gas ballast system serves the controlled supply of ambient air or inert gas into the suction chamber. Gas ballast supports the reduction of condensate accumulating in the pumping system.

### 3.2 Connections

Connection	Description
	<p><b>Mains connection</b> Power socket and mains switch for voltage supply</p>

Tbl. 4: Connection description of the diaphragm pump

### 3.3 Identifying the product

- ▶ To ensure clear identification of the product when communicating with Pfeiffer Vacuum, always keep all of the information on the rating plate to hand.
- ▶ Learn about certifications through test seals on the product or at [www.certipedia.com](http://www.certipedia.com) with company ID no. [000021320](https://www.certipedia.com/entry/000021320).

### 3.4 Scope of delivery

- Vacuum pump with drive
- Silencer (MVP 040-2 and MVP 070-3 only)
- Operating instructions
- Blind plug on the vacuum connection



## 4 Transportation and Storage

### 4.1 Transporting the vacuum pump

#### **WARNING**

##### **Danger of serious injury due to falling objects**

Due to falling objects there is a risk of injuries to limbs through to broken bones.

- ▶ Take particular care and pay special attention when transporting products manually.
- ▶ Do not stack the products.
- ▶ Wear protective equipment, e.g. safety shoes.



#### **Packing**

We recommend keeping the transport packaging and original protective cover.

#### **General information regarding safe transport**

1. Observe the weight specified on packaging.
2. Use a transport aid if necessary (trolley, lift truck).
3. Transport the product in its original packaging.
4. Always place the product on an adequately sized, level surface.

#### **Transporting the vacuum pump without its packaging**

1. Unpack the vacuum pump.
2. To protect the inside of the pump, leave both protective caps on the connections during transport.
3. For lifting, use the handle provided for this purpose, located on the top of the pump.
4. Lift the vacuum pump out of the transport packaging.
5. Make sure that no forces are acting on the piping system.
6. Always place the vacuum pump on an adequately sized, level surface.

### 4.2 Storing the vacuum pump



#### **Packing**

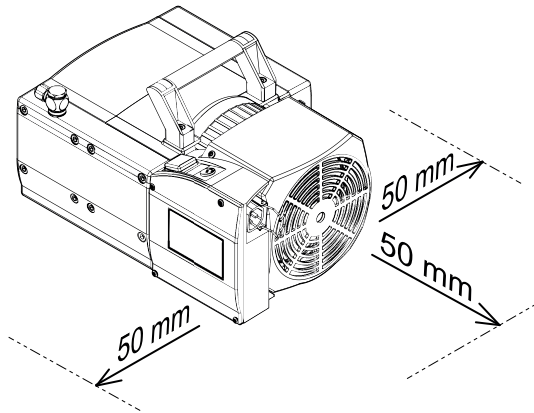
We recommend storing the product in its original packaging.

#### **Procedure**

1. Seal the vacuum connection with the blind plug.
2. Store the vacuum pump only in dry, dust-free rooms, within the specified ambient conditions.
3. In rooms with humid or aggressive atmospheres: Hermetically seal the vacuum pump together with a drying agent in a plastic bag.

## 5 Installation

### 5.1 Setting up the vacuum pump



**Fig. 5: Minimum distances**

**Procedure**

1. Ensure easy access to mains plug at all times so that the vacuum pump can be disconnected from the supply voltage.
2. Place the vacuum pump on a flat, horizontal surface.
3. When installing the pump in a closed housing, ensure adequate air circulation.
4. Make sure that minimum distances to adjacent components, e.g., walls, housings, etc., are observed.
5. Keep the specifications on the motor rating plate visible and freely accessible.

### 5.2 Connecting the vacuum side

**NOTICE**

**Property damage from contaminated gases**

Pumping gases that contain contamination damages the vacuum pump.

- ▶ Use suitable filters or separators from the Pfeiffer Vacuum range of accessories, to protect the vacuum pump.



**Installation and operation of accessories**

Pfeiffer Vacuum offers a series of special, compatible accessories for its diaphragm pumps.

- Information and ordering options for approved [accessories](#) can be found online.
- Described accessories are not included in the shipment.



**Preventing throttling losses**

Using the shortest possible vacuum connection lines with large nominal diameter prevents pressure losses.



**Condensate separator**

Pfeiffer Vacuum recommends the installation of a condensate separator in case vapors are formed from moisture during evacuation.

**Procedure**

1. Remove the blind plug from the vacuum connection.
2. Establish the shortest possible connection between vacuum pump and vacuum chamber.
3. Choose a minimum vacuum line diameter equal to the nominal diameter of the vacuum connection.



4. Depending on the pump type, use PVC or metallic hoses with flange connections from the [Pfeiffer Vacuum component shop](#).
5. Connect the vacuum pump to the vacuum system using the vacuum connection.

### 5.3 Connecting the exhaust side

#### WARNING

##### **Danger to life from poisoning where toxic process gases leak with no exhaust line**

During normal operation, the vacuum pump expels exhaust gases and vapors freely into the air. In processes involving toxic media, there is a risk of injury and danger to life due to poisoning.

- ▶ Observe the relevant regulations for handling toxic substances.
- ▶ Safely purge toxic process gases via an exhaust line.

#### CAUTION

##### **Danger of injury from bursting as a result of high pressure in the exhaust line**

Faulty or inadequate exhaust pipes lead to dangerous situations, e.g. increased exhaust pressure. There is a danger of bursting. Injuries caused by flying fragments, the escaping of high pressure, and damage to the unit cannot be excluded.

- ▶ Route the exhaust line without shut-off units.
- ▶ Observe the permissible pressures and pressure differentials for the product.
- ▶ Check the function of the exhaust line on a regular basis.



#### **Condensate separator**

Pfeiffer Vacuum recommends installing a condensate separator, with condensate drain at the lowest point of the exhaust line.

#### **Procedure**

1. Check the installed silencer for free passage.
2. Choose a minimum exhaust line diameter equal to the nominal diameter of the connection flange.
3. Depending on the pump type, use PVC or metallic hoses with flange connections from the [Pfeiffer Vacuum component shop](#).
4. Option: In case of higher gas throughputs, mount an exhaust line.
5. Route the piping downwards from the vacuum pump, to prevent condensate return.
6. Support or suspend the piping to the vacuum pump so that no piping system forces act on the vacuum pump.

### 5.4 Connecting to the mains power supply

#### DANGER

##### **Danger to life from electric shock**

Touching exposed and voltage-bearing elements causes an electric shock. Improper connection of the mains supply leads to the risk of touchable live housing parts. There is a risk to life.

- ▶ Before the installation, check that the connection leads are voltage-free.
- ▶ Make sure that electrical installations are only carried out by qualified electricians.
- ▶ Provide adequate grounding for the device.
- ▶ After connection work, carry out an earthed conductor check.

#### **NOTICE**

##### **Risk of property damage from excess voltage**

Incorrect or excessive mains voltage will destroy the motor.

- ▶ Always observe the motor rating plate specifications.
- ▶ Route the mains connection in accordance with locally applicable provisions.
- ▶ Always provide a suitable mains fuse to protect the motor and supply cable in the event of a fault.

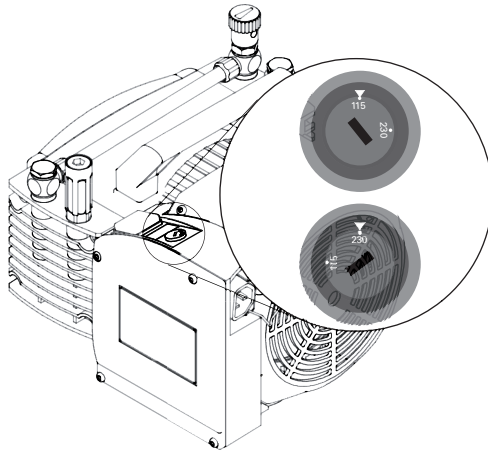


**NOTICE**

**Property damage from the voltage range being set incorrectly**

Recommissioning after longer downtimes of the vacuum pump or after changing the oil requires the current settings to be checked.

- ▶ Before switching the vacuum pump on each time, check the currently set voltage range.
- ▶ Make changes to the voltage range only after the vacuum pump has been disconnected from the mains.



**Fig. 6: Voltage selector switch**

Switch position:	"115"	"230"
Voltage range	100 – 115 V, 50/60 Hz 120 V, 60 Hz	200 – 230 V, 50/60 Hz

**Tbl. 5: Permissible voltage ranges for reversible single phase motor**

**Required tool**

- Slot screwdriver

**Accessories required**

- Mains cable

**Changing the voltage range**

1. The mains voltage must be determined on-site each time before the vacuum pump is installed or moved to a different location.
2. Disconnect the vacuum pump from the mains.
3. Set the required voltage range on the voltage selector switch using a suitable screwdriver.

**Establish the mains supply**

1. Always ensure a secure connection to the earthed conductor (PE).
2. Plug mains cable into power socket of vacuum pump.



## 6 Operation

### 6.1 Putting the vacuum pump into operation

#### **⚠ WARNING**

##### **Danger of poisoning due to toxic process media escaping from the exhaust pipe**

During operation with no exhaust line, the vacuum pump allows exhaust gases and vapors to escape freely into the air. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ▶ Observe the pertinent regulations for handling toxic process media.
- ▶ Safely purge toxic process media via an exhaust line.
- ▶ Use appropriate filter equipment to separate toxic process media.

#### **⚠ CAUTION**

##### **Danger of burns on hot surfaces**

Depending on the operating and ambient conditions, the surface temperature of the vacuum pump can increase to above 70 °C.

- ▶ Provide suitable touch protection.

#### **NOTICE**

##### **Vacuum pump damage caused by overpressure**

Mixing up the connections causes overpressure overload. The vacuum pump can be started only against max. 1 bar differential pressure between inlet and outlet; otherwise the motor jams and sustains damage.

- ▶ Make sure that the distributor is installed correctly on the diaphragm heads, before connecting the vacuum pump to the vacuum equipment.
- ▶ Before commissioning, make completely sure that the pressure side pressure is below the permissible limit.

#### **Procedure**

1. Compare the frequency specifications on the rating plate with the available supply voltage.
2. Check the exhaust connection for free passage (max. permissible pressure: 1100 hPa absolute).
3. Actuate the shut-off units so that the shut-off units open before or at the same time as the vacuum pump starts up.

### 6.2 Switching on the vacuum pump

When pumping down dry gases, no special precautions are required.

#### **⚠ CAUTION**

##### **Danger of burns on hot surfaces**

Depending on the operating and ambient conditions, the surface temperature of the vacuum pump can increase to above 70 °C.

- ▶ Provide suitable touch protection.



#### **Warm-up time of the vacuum pump**

The warm-up time depends on the ambient temperature and takes at least 30 minutes.

#### **Prerequisite**

- Required mains connection established

#### **Switching on the vacuum pump**

1. If required, switch the vacuum pump on in each pressure range at the mains switch.
2. Allow the vacuum pump to warm up prior to process start, with the vacuum connection closed.



The vacuum pump achieves the specified throughput and final pressure values once the operating temperature has been reached.

### 6.3 Operating the vacuum pump with gas ballast

**⚠ WARNING**

**Explosion hazard from reactive, potentially explosive or other hazardous gas/air mixtures**

Uncontrolled inlet of gas at the gas ballast valve leads to sparks generated mechanically following diaphragm rupture, hot surfaces or to potentially explosive gas/air mixtures in the vacuum system caused by static electricity.

- ▶ If necessary, use inert gas for supplying the flushing gas in order to avoid a potential ignition.

**⚠ WARNING**

**Risk of poisoning due to toxic process gases escaping**

For intake pressures > 500 hPa, process gas may escape from the open gas ballast valve. There is a risk of injury and fatality due to poisoning in processes with toxic process media.

- ▶ If necessary, use inert gas to avoid potential contamination.
- ▶ If necessary, use an extraction line.

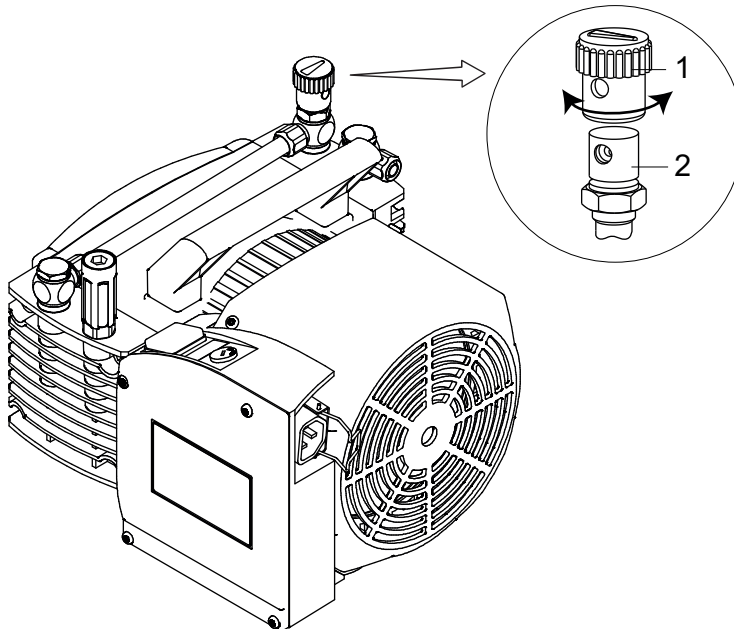
**NOTICE**

**Risk of damage from condensation in vacuum pump**

During operation without gas ballast, condensation may form as a result of the vapor compatibility of the vacuum pump being exceeded.

- ▶ Pump condensable vapors only when the vacuum pump is warm and the gas ballast valve open.
- ▶ Allow the vacuum pump to run on after process end for another 30 minutes with the gas ballast valve open.
  - This protects the vacuum pump against corrosion.

Vapors or moisture from pumped media impair the throughput after condensation in the vacuum pump.



**Fig. 7: Gas ballast valve**

- 1 Cap of gas ballast valve
- 2 Gas ballast valve

**Behavior with process gases with condensable vapors**

- ▶ Operate the vacuum pump with gas ballast, i.e. with the gas ballast valve open.





**Open gas ballast valve**

- ▶ Rotate the cap to align both boreholes.

## 6.4 Pumping condensable vapors

Vapors or moisture from pumped media impair the throughput after condensation in the vacuum pump.

**⚠ WARNING****Risk of explosion from reactive, explosive or other hazardous gas / air mixtures.**

Uncontrolled inlet of gas at the flushing gas nozzle leads to sparks generated mechanically following diaphragm rupture, hot surfaces or to explosive gas / air mixtures in the vacuum system caused by static electricity.

- ▶ If necessary, use inert gas for supplying the flushing gas in order to avoid a potential ignition.

**⚠ CAUTION****Risk of poisoning due to toxic process gases escaping**

For intake pressures > 500 hPa, process gas may escape from the flushing gas nozzle.

- ▶ If necessary, use an extraction line.

**Maximum inlet pressure**

The maximum permissible inlet pressure at the flushing gas connection is 1,200 hPa absolute.

**Accessories required**

- Flushing gas connection **PK 050 299**
- DN 6 or DN 10 hose

**Installing the flushing gas connection**

Use of the optional flushing gas connection improves expulsion of condensate, and the pump attains the specified final vacuum again more quickly.

1. Remove cap from gas ballast valve.
2. Push flushing gas connection over gas ballast valve.
3. Connect DN 6 or DN 10 hose to flushing gas connection.
4. Bring the vacuum pump to operating temperature before starting the process.
5. Continue to operate the vacuum pump approx. 30 minutes after finishing the process before switching it off.

## 6.5 Switching off the vacuum pump

**Procedure**

1. Allow the vacuum pump to run on for 5 to 10 minutes with the vacuum connection open to allow any condensate that may be present to be removed from the vacuum pump.
2. If required, switch the vacuum pump off in each pressure range at the mains switch.

# 7 Maintenance

## 7.1 Maintenance instructions

**⚠ WARNING**

**Health hazard through poisoning from toxic contaminated components or devices**

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ▶ Decontaminate affected parts before carrying out maintenance work.
- ▶ Wear protective equipment.

**⚠ CAUTION**

**Danger of injury from moving parts**

After a power failure or a standstill as a result of overheating, the motor restarts automatically. There is a risk of injury to fingers and hands if they enter the operating range of rotating parts.

- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against reactivation.
- ▶ Dismantle the vacuum pump for inspection, away from the system if necessary.

**NOTICE**

**Damage caused by unsuitable cleaning agents**

Unsuitable cleaning agents damage pump parts.

- ▶ Use only approved cleaning agents to clean pump parts.
- ▶ Use only a clean dry cloth to clean the diaphragms and valves.
- ▶ Do not use any alcohol or other cleaning agents to clean the diaphragms and valves.

**NOTICE**

**Danger of property damage from improper maintenance**

Unprofessional work on the vacuum pump will lead to damage for which Pfeiffer Vacuum accepts no liability.

- ▶ We recommend taking advantage of our service training offering.
- ▶ When ordering spare parts, specify the information on the nameplate.

The following section describes the tasks for cleaning and maintaining the vacuum pump. Valves and diaphragms are wear parts.

Component	Operating hours
Diaphragms	15 000
Valves	15 000
Motor bearing	40 000

**Tbl. 6: Typical service life with normal use**

**Prerequisites**

- Vacuum pump switched off
- Vacuum pump vented from atmospheric pressure
- Vacuum pump cooled

**Required materials**

- Cloth (clean, lint-free)
- Water or mild soap solution



### Servicing the vacuum pump

1. Disconnect the vacuum pump from the voltage supply.
2. Secure the motor against reactivation.
3. Remove any external contamination on the vacuum pump with cloth slightly moistened with water or a mild soap solution.
4. Allow all cleaned parts to dry well.
5. For maintenance work, only dismantle the vacuum pump to the extend needed.
6. Clean the suction chamber, diaphragms, and valves with a dry cloth.
7. Examine the diaphragms and valves for cracks at the latest when the pressure values achieved decrease.

## 7.2 Checklist for inspection and maintenance



### Notes on maintenance intervals

Depending on the process, the required maintenance intervals may be shorter than the reference values specified in the table.

- Consult with Pfeiffer Vacuum Service about shorter maintenance intervals for extreme loads or for specific processes.



### Maintenance level 2

We recommend that Pfeiffer Vacuum Service carry out maintenance work at level 2. If the specified intervals are exceeded, or if maintenance work is carried out improperly, no warranty or liability claims are accepted on the part of Pfeiffer Vacuum. This also applies wherever parts other than original spare parts are used.

Action	Inspection	Maintenance level 1	Maintenance level 3	Required material
<b>Interval</b>	<b>as required; at least once every six months</b>	<b>as required; at least every 2 years</b>	<b>as required; at least every 4 years</b>	
Check silencer for contamination <sup>2)</sup>	■			
Test vacuum pump optically and acoustically	■			
Read out and analyze pump data		■		
Clean the vacuum pump		■		
Change the diaphragms and valves		■		Overhaul kit
Change silencer <sup>3)</sup>		■		Silencer
Perform a functional test		■		
Incoming inspection with vibration measurement			■	
Disassemble vacuum pump completely			■	
Clean vacuum pump completely			■	
Change gas ballast filter <sup>4)</sup>			■	Filter
Replace all wear parts			■	Diaphragms, valves, sealing rings, silencers

Tbl. 7: Maintenance intervals

2) if present

3) if present

4) if present



## 7.3 Replacing device fuses

### **⚠ WARNING**

#### **Danger to life from electric shock during maintenance and service work**

The vacuum pump is only completely de-energized when the mains plug has been disconnected. There is a danger to life from electric shock when making contact with live components.

- ▶ Before performing all work, switch off the mains switch.
- ▶ Disconnect mains cable from mains plug.
- ▶ Wait 2 minutes until the capacitors have discharged.
- ▶ Secure the vacuum pump against unintentional re-start.

The device fuses are located in the terminal box and are integrated in a cable.

#### **Prerequisites**

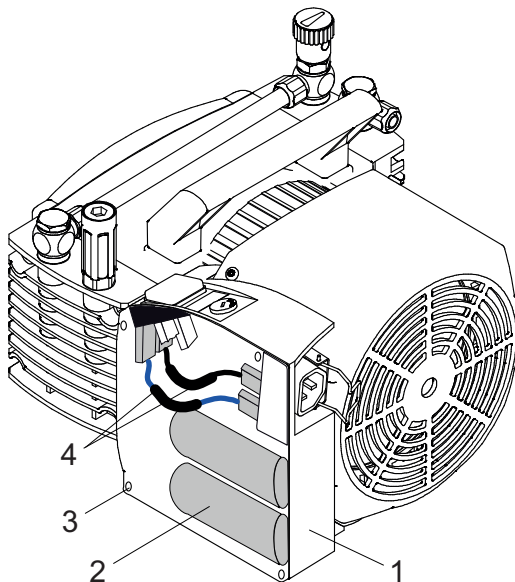
- Supply voltage switched off
- Drive motor disconnected from mains and secured against activation

#### **Required tool**

- Screwdriver

#### **Spare parts required**

- Fuse kit



**Fig. 8: Device fuses in terminal box**

- |                |                         |
|----------------|-------------------------|
| 1 Terminal box | 3 Cylinder screw (4×)   |
| 2 Capacitors   | 4 Device fuses in cable |

#### **Replacing defective device fuses**

1. Loosen cylinder screws.
2. Remove the cover from the terminal box.
3. Unplug complete cable with integrated fuses at flat pin bushings.
4. Replace complete cable.
5. Place the terminal box cover on the vacuum pump.
6. Fasten cylinder screws.



## 7.4 Replacing diaphragms and valves of MVP 040-2

### NOTICE

#### Property damage from incorrect installation

Change in dead volume due to incorrect installation of the original spacer disks impairs the final vacuum or leads to bearing damage.

- ▶ During disassembly, keep the existing spacer disks separate per installation location.
- ▶ Reinstall the same number of original spacer disks per diaphragm head.



#### Avoid interchanging components

Always dismantle and mount only the pump head on one pump side in order to avoid interchanging the components.

The procedures are identical for both pump heads.



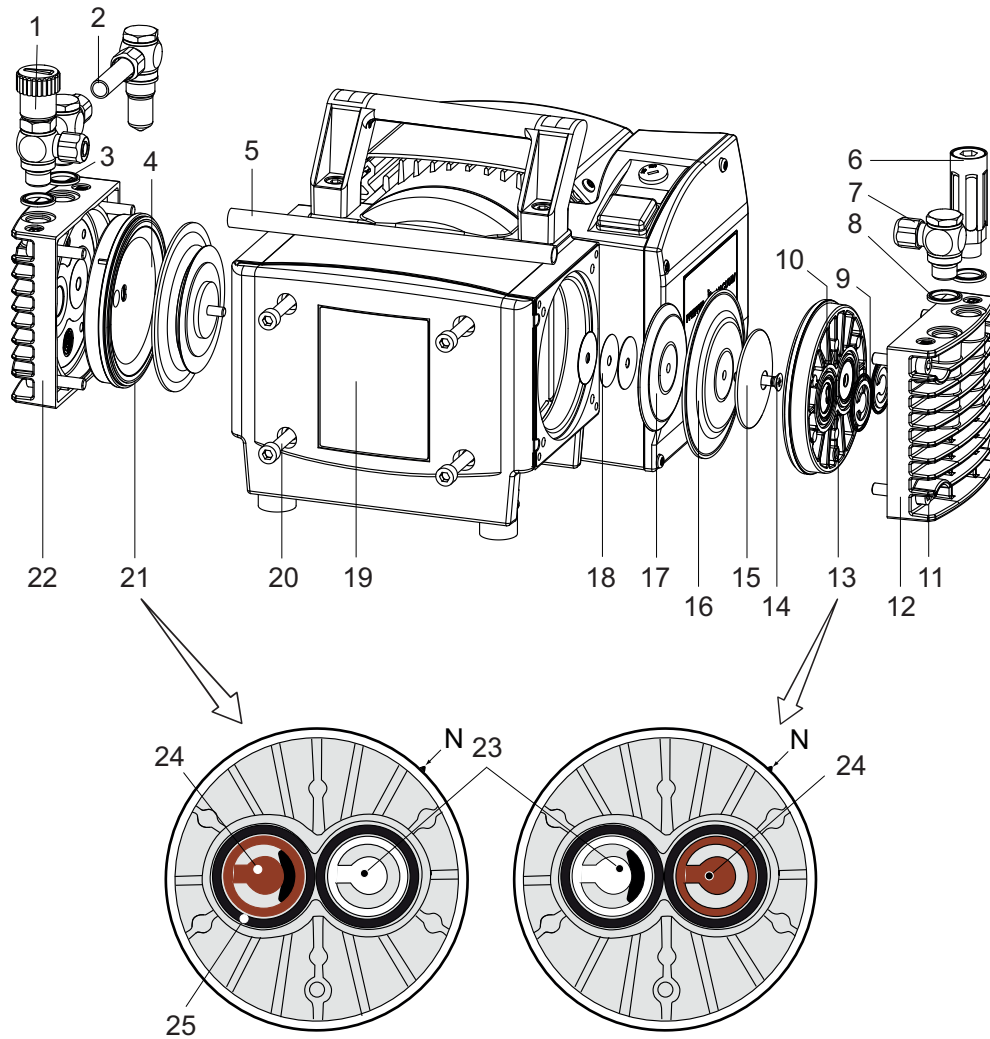


Fig. 9: Individual parts MVP 040-2

- |    |  |    |                               |
|----|--|----|-------------------------------|
| N  | Nose on head cover                         | 13 | Head cover, outlet side       |
| 1  | Gas ballast valve                          | 14 | Countersink screw             |
| 2  | Vacuum connection with 1/4" thread fitting | 15 | Diaphragm clamping disk       |
| 3  | Sealing rings                              | 16 | Diaphragm pair                |
| 4  | Head cover, inlet side                     | 17 | Diaphragm support disk        |
| 5  | Hose connection                            | 18 | Spacer disks                  |
| 6  | Silencer                                   | 19 | Housing panel                 |
| 7  | Compression coupling                       | 20 | Countersunk screws            |
| 8  | Sealing rings                              | 21 | Head cover, inlet side        |
| 9  | Valves (inlet and outlet)                  | 22 | Housing cover, inlet side     |
| 10 | O-rings                                    | 23 | Valves made from PTFE (white) |
| 11 | Cylinder screws                            | 24 | Valves made from FPM (brown)  |
| 12 | Housing cover, outlet side                 | 25 | O-rings                       |

### 7.4.1 Dismantling vacuum pump MVP 040-2

#### Prerequisites

- Vacuum pump vented to atmospheric pressure
- Supply voltage switched off
- Drive motor disconnected from mains and secured against activation
- Vacuum pump cooled

#### Required tool

- Open-end wrench, **WAF 17**
- Open-end wrench, **WAF 20**
- Allen key, **WAF 5**



**Procedure**

1. Prevent the hose fitting from turning using open-end wrench WAF 20.
2. Loosen fitting with open-end wrench WAF 17.
3. Dismantle the hose connection.
4. Unscrew the cylinder screws on the housing cover.
5. Remove housing cover with head cover ensuring that the head cover does not fall out of the housing cover.
6. Remove head cover with valves.
7. Remove valves from head cover.
8. If the valves are sticking to the housing cover, carefully detach the valves.
9. Inspect valves for damage.

**7.4.2 Removing diaphragms from MVP 040-2****Prerequisite**

- Head cover and valves dismantled

**Required consumables**

- Alcohol or cleaning solvent, if necessary

**Procedure**

1. Unscrew countersunk screw from vacuum pump connection rod.
  - Countersunk screw fixed with low-strength adhesive.
2. Remove diaphragm clamping disk, diaphragm pair and diaphragm support disk.
3. Apply alcohol or cleaning solvent to release diaphragm pair from supporting washer if it has become stuck.
4. Pay attention to spacer disks under diaphragm support disk.
  - Use original spacer disks for each installation location when mounting.
5. Inspect diaphragm pair for damage.

**7.4.3 Installing diaphragms for MVP 040-2****Spare parts required**

- Overhaul kit

**Required consumables**

- Clean, dry cloth
- Adhesive, low-strength (e.g. Loctite 243)

**Procedure**

1. Clean all parts with a dry, clean cloth.
2. Replace wear parts (diaphragms) according to spare part package.
3. Place original spacer disks under diaphragm support disk.
4. Place 2 individual diaphragms on top of one another with the rough sides together.
  - The labeled sides of both diaphragms must be legible.
5. Fit diaphragm clamping disk, diaphragm pair and diaphragm support disk onto countersunk screw.
6. Apply a little adhesive to thread of countersunk screw.
7. Tighten countersunk screw together with diaphragm clamping disk, diaphragm pair and diaphragm support disk on vacuum pump connection rod.

**7.4.4 Installing vacuum pump MVP 040-2****NOTICE****Damage to valves during the exchange process**

Incorrect installation of valves can cause damage to the valves as a result of sticking to the head cover.

- ▶ Make sure that the valves have the correct mounting orientation.
- ▶ Ensure that valve flaps do not cover grooves in head cover or housing cover.

**Prerequisite**

- Diaphragms installed



**Required tools**

- Open-end wrench, **WAF 17**
- Allen key, **WAF 5**
- Calibrated torque wrench (tightening factor  $\leq 1.6$ )

**Procedure**

1. Replace wear parts (valves) according to spare part package.
2. Insert valves into head cover.
  - Ensure correct mounting orientation and materials of valves.
3. Insert head cover with valves into housing cover.
4. Mount housing cover onto vacuum pump.
5. First, screw on the cylinder screws of the housing cover loosely by hand, alternating screws in a diagonal pattern.
6. Then tighten the cylinder screws of the housing cover, alternating screws in a diagonal pattern.
  - Tightening torque: **12.0 Nm**
7. Mount the hose connection.
8. Prevent the hose fitting from turning using open-end wrench WAF 20.
9. Fit fitting with open-end wrench WAF 17.

## 7.5 Replacing diaphragms and valves of MVP 070-3

**NOTICE**

**Property damage from incorrect installation**

Change in dead volume due to incorrect installation of the original spacer disks impairs the final vacuum or leads to bearing damage.

- ▶ During disassembly, keep the existing spacer disks separate per installation location.
- ▶ Reinstall the same number of original spacer disks per diaphragm head.



**Avoid interchanging components**

Always dismantle and mount only the pump head on one pump side in order to avoid interchanging the components.

The procedures are identical for both pump heads.





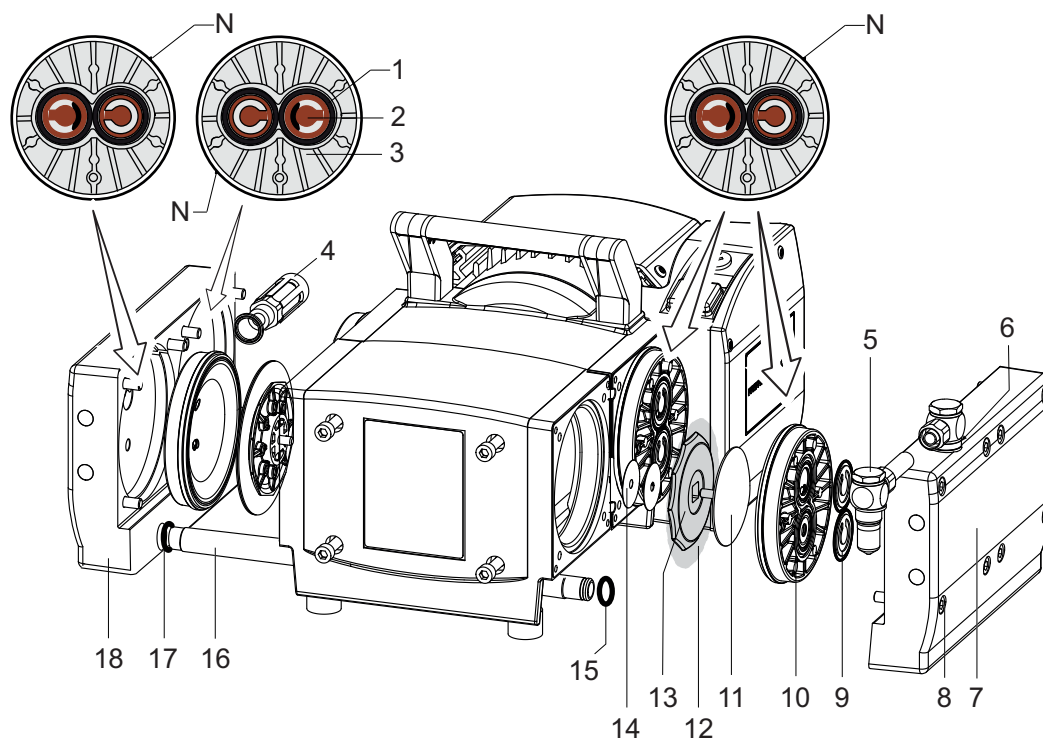


Fig. 10: Individual parts MVP 070-3

N	Nose on head cover	10	Head cover diaphragm head 1
1	O-rings	11	Diaphragm clamping disk
2	Valves made from FPM (brown)	12	Diaphragm pair
3	Head cover diaphragm head 4	13	Diaphragm support disk
4	Silencer	14	Spacer disks
5	Vacuum connection with 1/4" thread fitting	15	O-ring
6	Sealing rings	16	Connection pipe
7	Housing cover 1	17	O-ring
8	Cylinder screws	18	Housing cover 2
9	Valves made from FPM (brown)		

### 7.5.1 Dismantling vacuum pump MVP 070-3

#### Prerequisites

- Vacuum pump vented to atmospheric pressure
- Supply voltage switched off
- Drive motor disconnected from mains and secured against activation
- Vacuum pump cooled
- Vacuum pump positioned on its side and supported as necessary

#### Required tool

- Allen key, **WAF 5**



#### Connection pipe

The connection pipe is located between both housing covers below the vacuum pump. This connection pipe is attached and sealed on both sides with O-rings. Removing the housing cover may also detach the connection pipe.

#### Procedure

1. Unscrew the cylinder screws on the housing cover.
2. Remove housing cover with head cover ensuring that the head cover does not fall out of the housing cover.
3. Remove head cover with valves.
4. Remove valves from head cover.
5. If the valves are sticking to the housing cover, carefully detach the valves.
6. Inspect valves for damage.



## 7.5.2 Removing diaphragms from MVP 070-3

### NOTICE

#### Damage to diaphragms due to incorrect handling

Incorrect handling or using the wrong tools when changing diaphragms can cause damage to diaphragms of the vacuum pump.

- ▶ Do not use pointed or sharp-edged tools.
- ▶ Do not excessively bend diaphragms.

#### Prerequisite

- Head cover and valves dismantled

#### Required tool

- Diaphragm key **WAF 66**

#### Required consumables

- Alcohol or cleaning solvent, if necessary

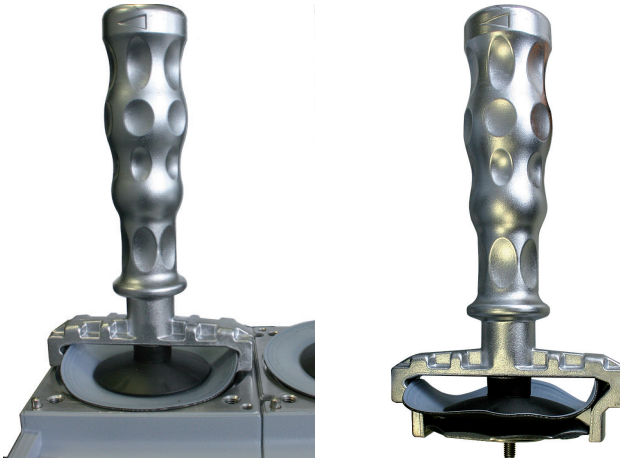


Fig. 11: Function of diaphragm key

#### Procedure

1. Carefully bend up side of diaphragm.
2. Attach diaphragm key to diaphragm support disk.
3. Unscrew diaphragm clamping disk, diaphragm pair and diaphragm support disk.
4. Apply alcohol or cleaning solvent to release diaphragm pair from supporting washer if it has become stuck.
5. Remove diaphragm pair and diaphragm support disk from square of diaphragm clamping disk.
6. Pay attention to spacer disks under diaphragm support disk.
  - Use original spacer disks for each installation location when mounting.
7. Inspect diaphragm pair for damage.

## 7.5.3 Installing diaphragms for MVP 070-3

#### Required tools

- Diaphragm key **WAF 66**
- Calibrated torque wrench (tightening factor  $\leq 1.6$ ) for hexagonal, size 6

#### Spare parts required

- Overhaul kit

#### Required consumables

- Clean, dry cloth

#### Procedure

1. Clean all parts with a dry, clean cloth.
2. Replace wear parts (diaphragms) according to spare part package.



3. Place 2 individual diaphragms on top of one another with the rough sides together.
  - The labeled sides of both diaphragms must be legible.
4. Place diaphragm pair and diaphragm support disk on the square of the diaphragm clamping disk.
5. Ensure correct seating of square in diaphragm support disk guide.
6. Place original spacer disks under diaphragm support disk.
7. Lift diaphragm pair at the side.
8. Using the diaphragm key, carefully reach through and grasp the diaphragm support disk.
9. Tighten diaphragm support disk with diaphragm key on vacuum pump connection rod.
10. Fit torque wrench onto diaphragm key (hexagonal, size 6).
11. Tighten diaphragm support disk.
  - Tightening torque: **6 Nm**

## 7.5.4 Installing vacuum pump MVP 070-3

### NOTICE

#### Damage to valves during the exchange process

Incorrect installation of valves can cause damage to the valves as a result of sticking to the head cover.

- ▶ Make sure that the valves have the correct mounting orientation.
- ▶ Ensure that valve flaps do not cover grooves in head cover or housing cover.

#### Prerequisites

- Diaphragms installed
- Vacuum pump positioned on its side and supported as necessary

#### Required tools

- Allen key, **WAF 5**
- Calibrated torque wrench (tightening factor  $\leq 1.6$ )

#### Procedure

1. Replace wear parts (valves) according to spare part package.
2. Position diaphragms to sit centrally and flush on the supporting surface of the housing opening.
3. Fit head cover on housing opening.
4. Align nose on head cover with notch in housing cover.
5. Insert valves and O-rings into head cover.
6. Make sure that the valves have the correct mounting orientation.
7. Mount housing cover onto vacuum pump.
8. Insert connecting pipe into opposite housing cover.
9. Ensure correct mounting orientation of O-rings in connection pipe grooves.
10. First, screw on the cylinder screws of the housing cover loosely by hand, alternating screws in a diagonal pattern.
11. Then tighten the cylinder screws of the housing cover, alternating screws in a diagonal pattern.
  - Tightening torque: **12.0 Nm**

## 7.6 Replacing diaphragms and valves of MVP 070-3 C

### NOTICE

#### Property damage from incorrect installation

Change in dead volume due to incorrect installation of the original spacer disks impairs the final vacuum or leads to bearing damage.

- ▶ During disassembly, keep the existing spacer disks separate per installation location.
- ▶ Reinstall the same number of original spacer disks per diaphragm head.



#### Avoid interchanging components

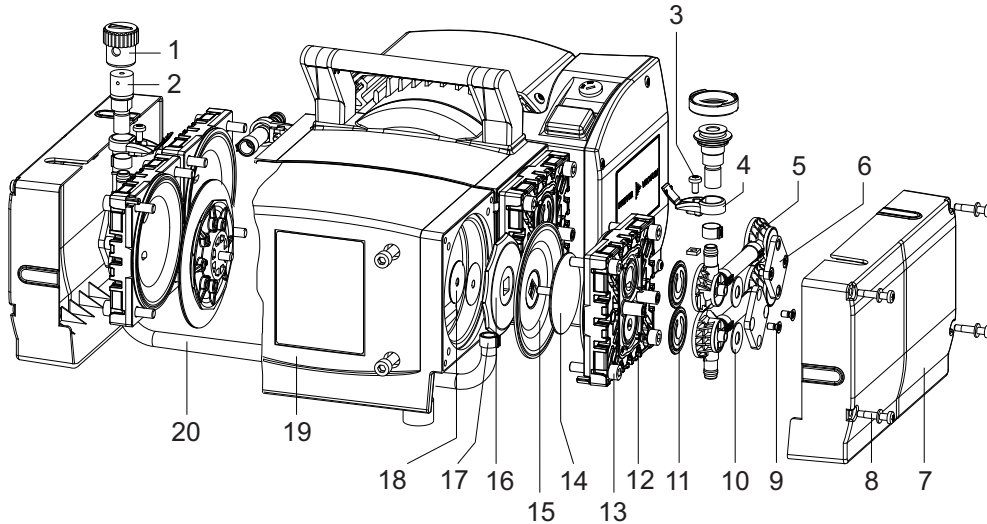
Always dismantle and mount only the pump head on one pump side in order to avoid interchanging the components.

The procedures are identical for both pump heads.



**General information regarding replacement of diaphragms and valves**

- Diaphragms and valves can be replaced completely independently of one another.
- Head cover can be removed complete with valve clusters and interconnections.
- Complete head cover can be removed from one side of pump when replacing valves only.
- Valve clusters and interconnection components do not need to be removed for replacement of diaphragms.



**Fig. 12: Individual parts MVP 070-3 C**

- |  |                                   |
|--|-----------------------------------|
| 1 Cap of gas ballast valve                             | 11 Valves and O-rings             |
| 2 Gas ballast valve                                    | 12 Head cover                     |
| 3 Oval-head screw for connection holder                | 13 Allen head screws              |
| 4 Connection holder with integral hinge and square nut | 14 Diaphragm clamping disk        |
| 5 Valve cluster  | 15 Individual diaphragm           |
| 6 Clamping claw  | 16 Diaphragm support disk         |
| 7 Head cover hood                                      | 17 Hose clamp for connection hose |
| 8 Oval-head screws with clamping washers               | 18 Spacer disks                   |
| 9 Countersunk head screws                              | 19 Housing panel                  |
| 10 Cup springs   | 20 Connection hose                |

**7.6.1 Dismantling vacuum pump MVP 070-3 C**

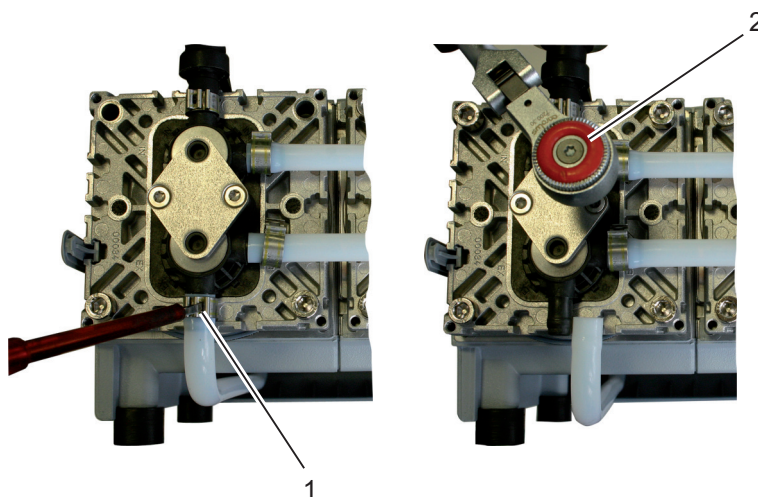
**Prerequisites**

- Vacuum pump vented to atmospheric pressure
- Supply voltage switched off
- Drive motor disconnected from mains and secured against activation
- Vacuum pump cooled

**Required tools**

- Torx screwdriver, **TX 20**
- Screwdriver with flat blade, **2.5 mm**





**Fig. 13: Hose clamps and clamping claws**

- 1 Hose clamp                      2 Clamping claw on valve cluster

#### Procedure

1. Open integral hinge on connection holder.
2. Loosen oval-head screw on connection holder by no more than one full rotation ensuring that it does not unscrew completely from the hexagon nut.
3. Unscrew oval-head screws and clamping washers on head cover hood.
4. Remove head cover hood to the front.
5. Lay the vacuum pump carefully down onto its side so that the pump heads being serviced are facing upward.
6. Support vacuum pump beneath motor.
7. Pry the hose clamp on the connection hose over to the opposite side.
8. Remove hose of hose connection.
9. Unscrew countersunk screws on clamping claws.
10. Remove clamping claws.
  - Head covers remain mounted.
11. Completely remove valve clusters together with cup springs, including connecting hose, hose clips and connection holders as necessary.
12. Ensure correct mounting orientation of valves.
13. Inspect valves and O-rings for damage.

## 7.6.2 Removing diaphragms from MVP 070-3 C

### NOTICE

#### Damage to diaphragms due to incorrect handling

Incorrect handling or using the wrong tools when changing diaphragms can cause damage to diaphragms of the vacuum pump.

- ▶ Do not use pointed or sharp-edged tools.
- ▶ Do not excessively bend diaphragms.

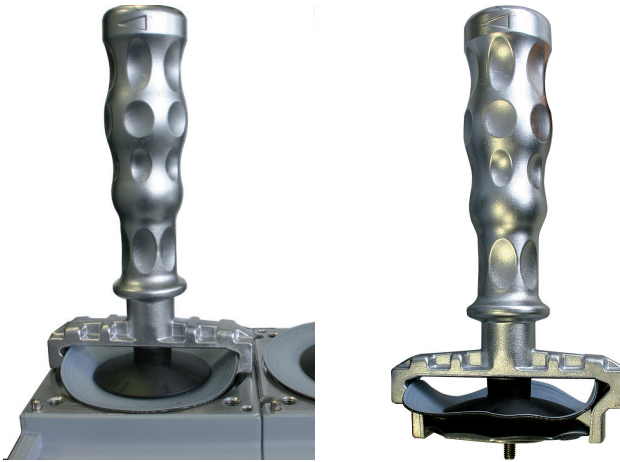
#### Required tools

- Allen key, **WAF 5**
- Diaphragm key **WAF 66**

#### Required consumables

- Alcohol or cleaning solvent, if necessary





**Fig. 14: Function of diaphragm key**

**Procedure**

1. Unscrew interior hexagon socket screws from head cover.
2. Remove head cover together with valve clusters and connections.
3. Carefully bend up side of diaphragm.
4. Attach diaphragm key to diaphragm support disk.
5. Unscrew diaphragm clamping disk, diaphragm and diaphragm support disk.
6. Apply alcohol or cleaning solvent to release diaphragm from supporting washer if it has become stuck.
7. Remove diaphragm and diaphragm support disk from square of diaphragm clamping disk.
8. Pay attention to spacer disks under diaphragm support disk.
  - Use original spacer disks for each installation location when mounting.
9. Inspect diaphragm for damage.

### 7.6.3 Installing diaphragms for MVP 070-3 C

**Required tools**

- Allen key, **WAF 5**
- Diaphragm key **WAF 66**
- Calibrated torque wrench (tightening factor  $\leq 1.6$ ) for hexagonal, size 6

**Spare parts required**

- Overhaul kit

**Required consumables**

- Clean, dry cloth

**Procedure**

1. Clean all parts with a dry, clean cloth.
2. Replace wear parts (diaphragms) according to spare part package.
3. Fit diaphragm with light side facing outward and diaphragm support disk on square of diaphragm clamping disk.
4. Ensure correct seating of square in diaphragm support disk guide.
5. Place original spacer disks under diaphragm support disk.
6. Carefully lift side of diaphragm.
7. Using the diaphragm key, carefully reach through and grasp the diaphragm support disk.
8. Tighten diaphragm support disk with diaphragm key on vacuum pump connection rod.
9. Fit torque wrench onto diaphragm key (hexagonal, size 6).
10. Tighten diaphragm support disk.
  - Tightening torque: **6 Nm**
11. Fit head cover together with valve clusters and connections.
12. Ensure that cylinder pin on pump housing is seated in corresponding recess in head cover.
13. Screw in interior hexagon socket screws of head cover loosely, alternating screws in a diagonal pattern.
14. Tighten interior hexagon socket screws of head cover, alternating screws in a diagonal pattern.
  - Tightening torque: **12.0 Nm**



## 7.6.4 Installing vacuum pump MVP 070-3 C

### NOTICE

#### Damage to valves during the exchange process

Incorrect installation of valves can cause damage to the valves as a result of sticking to the head cover.

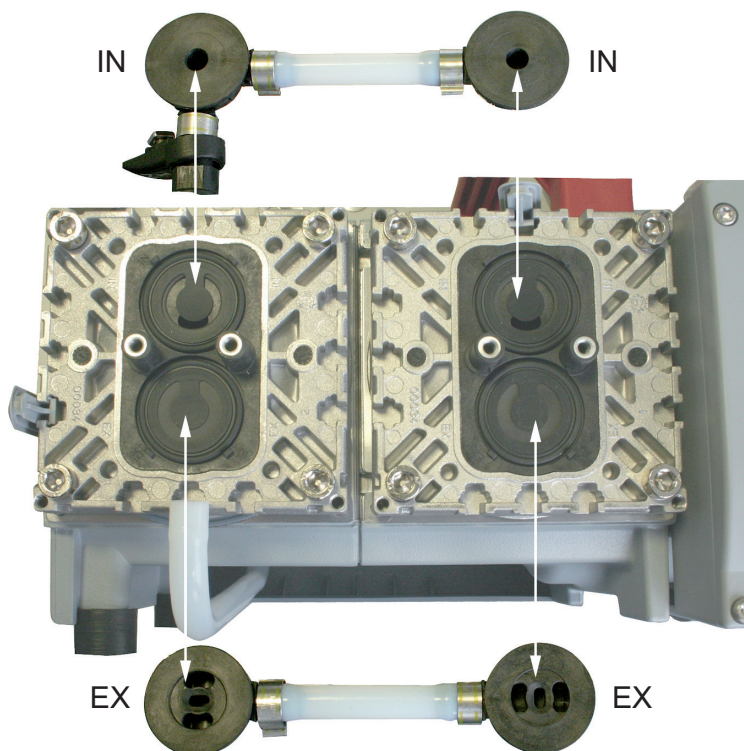
- ▶ Make sure that the valves have the correct mounting orientation.
- ▶ Ensure that valve flaps do not cover grooves in head cover or housing cover.

#### Prerequisites

- Diaphragms installed
- Vacuum pump positioned on its side and supported as necessary

#### Required tools

- Torx screwdriver, TX 20
- Screwdriver with flat blade, 2.5 mm
- Flat pliers



**Fig. 15: Valve orientation**

**IN** Inlet side: The valve flap is pointing towards the pocket in the valve seat.

**EX** Outlet side: The valve has the same orientation as the inlet valve.

#### Procedure

1. Replace wear parts (valves) according to spare part package.
2. Insert valves and O-rings.
3. Make sure that the valves have the correct mounting orientation.
4. Fit valve cluster together with cup springs (bulge facing upward), including connection hose, hose clips and connection holders as required.
5. Center valve cluster on valve seat.
6. Ensure that the valve cluster is positioned flush within the noses of the valve seat.
7. Align the square nut of the connection holder with the groove on the head cover.
8. Lightly tighten oval-head screw on connection holder.
9. Fit clamping claws.
10. Lightly tighten countersunk screws on clamping claws.
11. Adjust alignment of valve clusters as necessary.



12. Tighten countersunk screws on clamping claws.
  - Tightening torque: **3 Nm**
13. Fit hose for hose connection.
14. Fit hose clamp on connection hose.
15. Tighten hose clamp on connection hose with flat pliers.
16. Fit head cover hood.
17. Screw in oval-head screws and clamping washers on head cover hood.
18. Tighten oval-head screws on connection holder.
19. Close integral hinge on connection holder.

## 7.7 Checking the final pressure

The leakage rate of the vacuum pump ensures that the specified final pressure is reached and prevents the formation of potentially explosive mixtures in the interior of the vacuum pump

After the diaphragm or valve is replaced, the vacuum pump reaches the specified final pressure value only after a run-in period of several hours.



### Test values

Observe the separate test specification.

- with gas ballast: < 3 hPa
- without gas ballast: < 2.0 hPa

### Procedure

1. Measure the final pressure of the vacuum pump.
  - after work on the system, e.g., maintenance
  - before the vacuum pump is reinserted
2. Compare the measured final pressure with the test values and the specifications in the technical data.

### Prerequisites

- Vacuum pump mounted
- Vacuum pump correctly installed electrically

### Required aids

- Vacuum chamber (3 liter)
- Pressure gauge
- Flushing gas nozzle (optional)

### Measure the final pressure

1. Connect a vacuum chamber (volume approx. 3 l) to a vacuum connection.
2. Also connect a pressure gauge (e.g. Pirani gauge) to the vacuum chamber on the vacuum side.
3. Operate the vacuum pump with open flushing gas nozzle (if available) for at least 2 hours.
4. If unusual noises develop, immediately switch off the vacuum pump and check the position of the clamping washers.
5. Measure the final pressure.

### Comparing the ultimate pressure with the test value

1. Compare the measured ultimate pressure with the test value.
2. If the values differ significantly from the specified values after replacing the diaphragm and valve, and if there are no changes after a run-in period, perform the following steps:
  - Check the compression couplings of the connection hoses to the pump heads.
  - Check the valve seats and the suction chambers.
  - Repeat the ultimate pressure measurement.





## 8 Decommissioning

Before shutting down the vacuum pump, observe the following instructions to adequately protect the interior of the vacuum pump (suction chamber) from corrosion:

### Procedure for temporary vacuum pump shutdowns

1. Allow the vacuum pump to run on for 5 to 10 minutes with the vacuum connection open to allow any condensate that may be present to be removed from the vacuum pump.
2. If media has entered the vacuum pump that may attack the pump materials or lead to deposits, clean the inside of the pump heads.

### Procedure for longer vacuum pump shutdowns

1. Disconnect the vacuum pump from the vacuum system.
2. Remove the vacuum pump from the vacuum system if necessary.
3. Seal the vacuum connection with the original sealing plugs.
4. Store the vacuum pump in dry, dust-free rooms, within the specified ambient conditions.
5. Pack the vacuum pump together with a drying agent in a plastic bag, and seal the vacuum pump airtight if it is to be stored in rooms with damp or aggressive atmospheres.



## 9 Recycling and disposal

### WARNING

#### Health hazard through poisoning from toxic contaminated components or devices

Toxic process media result in contamination of devices or parts of them. During maintenance work, there is a risk to health from contact with these poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Take suitable safety precautions and prevent health hazards or environmental pollution by toxic process media.
- ▶ Decontaminate affected parts before carrying out maintenance work.
- ▶ Wear protective equipment.



#### Environmental protection

You **must** dispose of the product and its components in accordance with all applicable regulations for protecting people, the environment and nature.

- Help to reduce the wastage of natural resources.
- Prevent contamination.



#### Environmental protection

The product and its components **must be disposed of in accordance with the applicable regulations relating to environmental protection and human health**, with a view to reducing natural resource wastage and preventing pollution.

### 9.1 General disposal information

Pfeiffer Vacuum products contain materials that you must recycle.

- ▶ Dispose of our products according to the following:
  - Iron
  - Aluminium
  - Copper
  - Synthetic
  - Electronic components
  - Oil and fat, solvent-free
- ▶ Observe the special precautionary measures when disposing of:
  - Fluoroelastomers (FKM)
  - Potentially contaminated components that come into contact with media

### 9.2 Dispose of diaphragm pumps

Pfeiffer Vacuum diaphragm pumps contain materials that you must recycle.

1. Disconnect the electronic drive unit.
2. Dismantle the motor.
3. Decontaminate the components that come into contact with process gases.
4. Separate the components into recyclable materials.
5. Recycle the non-contaminated components.
6. Dispose of the product or components in a safe manner according to locally applicable regulations.



## 10 Malfunctions

### ⚠ CAUTION

#### Danger of injury from moving parts

After a power failure or a standstill as a result of overheating, the motor restarts automatically. There is a risk of injury to fingers and hands if they enter the operating range of rotating parts.

- ▶ Safely disconnect motor from the mains.
- ▶ Secure the motor against reactivation.
- ▶ Dismantle the vacuum pump for inspection, away from the system if necessary.

### ⚠ CAUTION

#### Danger of burns on hot surfaces

In the event of a fault, the surface temperature of the vacuum pump can increase to above 105 °C.

- ▶ Allow the vacuum pump to cool down before carrying out any work.
- ▶ Wear personal protective equipment if necessary.

### NOTICE

#### Danger of property damage from improper maintenance

Unprofessional work on the vacuum pump will lead to damage for which Pfeiffer Vacuum accepts no liability.

- ▶ We recommend taking advantage of our service training offering.
- ▶ When ordering spare parts, specify the information on the nameplate.

Should malfunctions occur, you can find information about potential causes and how to fix them here:

Problem	Possible causes	Remedy
Vacuum pump will not start up	<ul style="list-style-type: none"> <li>• No supply voltage or voltage does not correspond to the motor data</li> </ul>	<ul style="list-style-type: none"> <li>• Check the supply voltage.</li> </ul>
	<ul style="list-style-type: none"> <li>• Pump temperature too low</li> </ul>	<ul style="list-style-type: none"> <li>• Heat the vacuum pump to a temperature of &gt; 10 °C.</li> </ul>
	<ul style="list-style-type: none"> <li>• Thermal protection of the motor has triggered</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and eliminate the cause and allow vacuum pump to cool if necessary.</li> </ul>
	<ul style="list-style-type: none"> <li>• Phase failure</li> </ul>	<ul style="list-style-type: none"> <li>• Check the mains fuse.</li> <li>• Replace defective mains fuse.</li> </ul>
	<ul style="list-style-type: none"> <li>• Diaphragms or valves dirty</li> </ul>	<ul style="list-style-type: none"> <li>• Clean the vacuum pump.</li> </ul>
	<ul style="list-style-type: none"> <li>• Overpressure in the exhaust line</li> </ul>	<ul style="list-style-type: none"> <li>• Check and clean exhaust line as required.</li> </ul>
	<ul style="list-style-type: none"> <li>• Fuse failure</li> </ul>	<ul style="list-style-type: none"> <li>• Check the mains fuse.</li> <li>• Replace defective mains fuse.</li> </ul>
Vacuum pump switches off after a while after being started	<ul style="list-style-type: none"> <li>• Thermal protection of the motor has triggered</li> </ul>	<ul style="list-style-type: none"> <li>• Identify and eliminate the cause and allow vacuum pump to cool if necessary.</li> </ul>
	<ul style="list-style-type: none"> <li>• Mains fuse protection triggered due to overload (e.g. cold start)</li> </ul>	<ul style="list-style-type: none"> <li>• Heat up the vacuum pump.</li> </ul>
	<ul style="list-style-type: none"> <li>• Exhaust pressure too high</li> </ul>	<ul style="list-style-type: none"> <li>• Check exhaust line outlet opening and exhaust side accessories.</li> </ul>



Problem	Possible causes	Remedy
Vacuum pump does not reach the specified final pressure	<ul style="list-style-type: none"> <li>• Condensate in the vacuum pump</li> </ul>	<ul style="list-style-type: none"> <li>• Operate the vacuum pump at atmospheric pressure for a longer period.</li> </ul>
	<ul style="list-style-type: none"> <li>• Gas ballast valve open</li> </ul>	Close the gas ballast valve.
	<ul style="list-style-type: none"> <li>• Soiled valves or diaphragms</li> </ul>	<ul style="list-style-type: none"> <li>• If necessary, clean or replace the valves and diaphragms.</li> </ul>
	<ul style="list-style-type: none"> <li>• Leak in system</li> </ul>	<ul style="list-style-type: none"> <li>• Locate and eliminate the leak.</li> </ul>
Pumping speed of vacuum pump too low	<ul style="list-style-type: none"> <li>• Intake line not well-dimensioned</li> </ul>	<ul style="list-style-type: none"> <li>• Make sure that connections are short and cross sections adequately dimensioned.</li> </ul>
	<ul style="list-style-type: none"> <li>• Exhaust pressure too high</li> </ul>	<ul style="list-style-type: none"> <li>• Check exhaust line outlet opening and exhaust side accessories.</li> </ul>
Unusual noises during operation	<ul style="list-style-type: none"> <li>• Defective valves or diaphragms</li> </ul>	<ul style="list-style-type: none"> <li>• If necessary, clean or replace the valves and diaphragms.</li> </ul>
	<ul style="list-style-type: none"> <li>• Suction chamber dirty</li> </ul>	<ul style="list-style-type: none"> <li>• Clean suction chamber.</li> </ul>
	<ul style="list-style-type: none"> <li>• Silencer loose or missing</li> </ul>	<ul style="list-style-type: none"> <li>• If necessary, check or replace the silencer.</li> </ul>
	<ul style="list-style-type: none"> <li>• Valves dirty or defective</li> </ul>	<ul style="list-style-type: none"> <li>• If necessary, clean or replace the valves and diaphragms.</li> </ul>
	<ul style="list-style-type: none"> <li>• Motor fan defective</li> </ul>	<ul style="list-style-type: none"> <li>• Contact Pfeiffer Vacuum Service.</li> </ul>
	<ul style="list-style-type: none"> <li>• Connection rod or motor bearing defective</li> </ul>	<ul style="list-style-type: none"> <li>• Contact Pfeiffer Vacuum Service.</li> </ul>

Tbl. 8: Troubleshooting on diaphragm pumps



# 11 Service solutions by Pfeiffer Vacuum

## We offer first-class service

High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

We are always focused on perfecting our core competence – servicing of vacuum components. Once you have purchased a product from Pfeiffer Vacuum, our service is far from over. This is often exactly where service begins. Obviously, in proven Pfeiffer Vacuum quality.

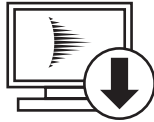
Our professional sales and service employees are available to provide you with reliable assistance, worldwide. Pfeiffer Vacuum offers an entire range of services, from [original replacement parts](#) to [service contracts](#).

## Make use of Pfeiffer Vacuum service

Whether preventive, on-site service carried out by our field service, fast replacement with mint condition replacement products, or repair carried out in a [Service Center](#) near you – you have various options for maintaining your equipment availability. You can find more detailed information and addresses on our homepage, in the [Pfeiffer Vacuum Service](#) section.

**You can obtain advice on the optimal solution for you, from your [Pfeiffer Vacuum representative](#).**

**For fast and smooth service process handling, we recommend the following:**



1. Download the up-to-date form templates.
  - [Explanations of service requests](#)
  - [Service requests](#)
  - [Contamination declaration](#)



- a) Remove and store all accessories (all external parts, such as valves, protective screens, etc.).
  - b) If necessary, drain operating fluid/lubricant.
  - c) If necessary, drain coolant.
2. Complete the service request and contamination declaration.



3. Send the forms by email, fax, or post to your local [Service Center](#).



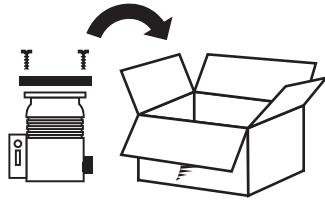
4. You will receive an acknowledgment from Pfeiffer Vacuum.

PFEIFFER VACUUM

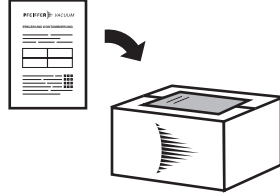
## Submission of contaminated products

No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination costs** may be incurred.

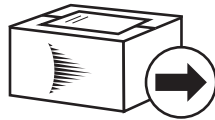




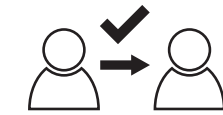
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
  - a) Neutralize the product with nitrogen or dry air.
  - b) Seal all openings with blind flanges, so that they are airtight.
  - c) Shrink-wrap the product in suitable protective foil.
  - d) Package the product in suitable, stable transport containers only.
  - e) Maintain applicable transport conditions.



6. Attach the contamination declaration to the **outside** of the packaging.



7. Now send your product to your local Service Center.



8. You will receive an acknowledgment/quotation, from Pfeiffer Vacuum.

PFEIFFER VACUUM

Our sales and delivery conditions and repair and maintenance conditions for vacuum devices and components apply to all service orders.



## 12 Spare parts packages

### Ordering spare part packages

- ▶ Have the vacuum pump part number to hand, along with other details from the rating plate if necessary.
- ▶ Install original spare parts only.
- ▶ When ordering the inspection set, observe the respective part number of the diaphragm pump.

Spare parts package	Part number			Remark
	MVP 040-2	MVP 070-3	MVP 070-3 C	
Overhaul kit	PU E22 013 -T	PU E22 014 -T	PU E22 015 -T	Diaphragms, valves, O-rings
Silencer	P 0920 412 E	P 0920 412 E	-	-
Usit sealing ring	P 3529 143-C	-	-	Sealing ring (1 of 13)
Hose connection, complete	P 0920 542 E	-	-	Hose, fittings
Hose	P 0988 088	P 0988 088	-	PE hose, 10 × 8 mm, 1 m length
Gas ballast valve	P 0920 634 E	-	-	-
Fuse kit	PU E22 016 -T	PU E22 016 -T	PU E22 016 -T	2 safety fuses, 6.3 AT
Diaphragm key	-	PK 050 186	PK 050 186	WAF 66

**Tbl. 9: Spare parts packages**

## 13 Accessories

### 13.1 Accessory information

#### Relay boxes

Relay boxes are used to control backing pumps in conjunction with the electronic drive unit TC of the turbopump.

#### Mains cable

Mains cables provide a secure and suitable connection.

#### Screw-in flange

Screw-in flange, including seal for the intake side of the vacuum pump

#### Flushing gas connection

Avoids moisture accumulating in the vacuum pump

### 13.2 Ordering accessories

Selection field	Part number
Relay box, shielded, for backing pumps, 1-phase 7A for TC 110/120 and TCP 350, plug M8	PM 071 282 -X
Mains cable 230 V with safety plug, right angle IEC 320/C13 socket, 2 m	PK 050 109
Mains cable, 115 V, with NEMA plug to Euro C13 socket (angled), 2 m	PK 050 110
Mains cable 115/230 V without plug, rubber connector (right angle), 3 m	PK 050 111
Screw-in flange DN 16 ISO-KF / G1/4" incl. seal (for MVP 040-2, MVP 070-3 inlet/outlet)	PK 050 114 -T
Flushing gas connection DN 6 / DN 10 (for MVP 040-2 / MVP 070-3 C)	PK 050 299

**Tbl. 10: Accessories MVP 040-2**

Selection field	Part number
Relay box, shielded, for backing pumps, 1-phase 7A for TC 110/120 and TCP 350, plug M8	PM 071 282 -X
Relay box, shielded, for backing pumps, 1-phase 7 A for TC 400/1200, TM 700 and TCP 350, M12	PM 071 284 -X
Mains cable 230 V with safety plug, right angle IEC 320/C13 socket, 2 m	PK 050 109
Mains cable, 115 V, with NEMA plug to Euro C13 socket (angled), 2 m	PK 050 110
Mains cable 115/230 V without plug, rubber connector (right angle), 3 m	PK 050 111
Screw-in flange DN 16 ISO-KF / G1/4" incl. seal (for MVP 040-2, MVP 070-3 inlet/outlet)	PK 050 114 -T

**Tbl. 11: Accessories MVP 070-3**

Selection field	Part number
Relay box, shielded, for backing pumps, 1-phase 7A for TC 110/120 and TCP 350, plug M8	PM 071 282 -X
Relay box, shielded, for backing pumps, 1-phase 7 A for TC 400/1200, TM 700 and TCP 350, M12	PM 071 284 -X
Mains cable 230 V with safety plug, right angle IEC 320/C13 socket, 2 m	PK 050 109
Mains cable, 115 V, with NEMA plug to Euro C13 socket (angled), 2 m	PK 050 110
Mains cable 115/230 V without plug, rubber connector (right angle), 3 m	PK 050 111
Flushing gas connection DN 6 / DN 10 (for MVP 040-2 / MVP 070-3 C)	PK 050 299

**Tbl. 12: Accessories MVP 070-3 C**





## 14 Technical data and dimensions

### 14.1 General

Basis for the technical data of Pfeiffer Vacuum diaphragm pumps:

- Specifications according to PNEUROP committee PN5
- ISO 21360:2012: "Vacuum technology - Standard methods for measuring vacuum-pump performance - General description"

The following harmonized standards are fulfilled:

- IEC 61010-1
- UL 61010-1
- CSA 61010-1

	mbar	bar	Pa	hPa	kPa	Torr   mm Hg
mbar	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
bar	1000	1	$1 \cdot 10^5$	1000	100	750
Pa	0.01	$1 \cdot 10^{-5}$	1	0.01	$1 \cdot 10^{-3}$	$7.5 \cdot 10^{-3}$
hPa	1	$1 \cdot 10^{-3}$	100	1	0.1	0.75
kPa	10	0.01	1000	10	1	7.5
Torr   mm Hg	1.33	$1.33 \cdot 10^{-3}$	133.32	1.33	0.133	1

1 Pa = 1 N/m<sup>2</sup>

**Tbl. 13: Conversion table: Pressure units**

	mbar l/s	Pa m <sup>3</sup> /s	sccm	Torr l/s	atm cm <sup>3</sup> /s
mbar l/s	1	0.1	59.2	0.75	0.987
Pa m <sup>3</sup> /s	10	1	592	7.5	9.87
sccm	$1.69 \cdot 10^{-2}$	$1.69 \cdot 10^{-3}$	1	$1.27 \cdot 10^{-2}$	$1.67 \cdot 10^{-2}$
Torr l/s	1.33	0.133	78.9	1	1.32
atm cm <sup>3</sup> /s	1.01	0.101	59.8	0.76	1

**Tbl. 14: Conversion table: Units for gas throughput**

### 14.2 Technical data

Type designation	MVP 040-2	MVP 040-2
Part number	PK T01 210	PK T01 211
Number of pumping stages	2	2
Connection flange (in)	G 1/4"	G 1/4"
Connection flange (out)	1/4" thread with silencer	1/4" thread with silencer
Pumping speed at 50 Hz	2.3 m <sup>3</sup> /h	2.3 m <sup>3</sup> /h
Pumping speed at 60 Hz	2.5 m <sup>3</sup> /h	2.5 m <sup>3</sup> /h
Gas ballast	Yes	Yes
Final pressure without gas ballast	4 hPa	4 hPa
Final pressure with gas ballast	5 hPa	5 hPa
Intake pressure max.	1100 hPa	1100 hPa
Exhaust pressure, max.	1100 hPa	1100 hPa
Integral leakage rate	$2 \cdot 10^{-3}$ Pa m <sup>3</sup> /s	$2 \cdot 10^{-3}$ Pa m <sup>3</sup> /s
Input voltage(s)	100 – 115 / 200 – 230 V AC, 50 Hz // 100 – 115 / 120 / 200 – 230 V AC (±10 %), 60 Hz	100 – 115 / 200 – 230 V AC, 50 Hz // 100 – 115 / 120 / 200 – 230 V AC (±10 %), 60 Hz
Input voltage: tolerance	±10 %	±10 %



Type designation	MVP 040-2	MVP 040-2
Part number	PK T01 210	PK T01 211
Rated current consumption	3.4 A	3.4 A
Rotation speed at 50 Hz	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm
Sound pressure level	53 dB(A)	53 dB(A)
Switch included	Yes	Yes
Motor type	1-ph motor	1-ph motor
Cooling method	Air	Air
Operating altitude, max.	2000 m	2000 m
Protection degree	IP40	IP40
Ambient temperature	10 – 40 °C	10 – 40 °C
Temperature: Storage	-10 – 60 °C	-10 – 60 °C
Degree of pollution	–	–
Weight	11.4 kg	11.4 kg

Tbl. 15: Technical data, MVP 040-2

Type designation	MVP 070-3	MVP 070-3	MVP 070-3	MVP 070-3 C
Part number	PK T01 310	PK T01 313	PK T01 315	PK T01 360
Number of pumping stages	4	4	4	4
Connection flange (in)	G 1/4"	G 1/4"	G 1/4"	DN 16 ISO-KF
Connection flange (out)	1/4" thread with silencer	1/4" thread with silencer	1/4" thread	Hose clamp 10 mm
Pumping speed at 50 Hz	3.8 m³/h	3.8 m³/h	3.8 m³/h	3.4 m³/h
Pumping speed at 60 Hz	4.3 m³/h	4.3 m³/h	4.3 m³/h	3.8 m³/h
Gas ballast	No	No	No	Yes
Final pressure without gas ballast	1 hPa	1 hPa	1 hPa	1.5 hPa
Final pressure with gas ballast	–	–	–	3 hPa
Intake pressure max.	1100 hPa	1100 hPa	1100 hPa	1100 hPa
Exhaust pressure, max.	1100 hPa	1100 hPa	1100 hPa	1100 hPa
Integral leakage rate	$\leq 2 \cdot 10^{-3}$ Pa m³/s	$2 \cdot 10^{-3}$ Pa m³/s	$2 \cdot 10^{-3}$ Pa m³/s	$\leq 2 \cdot 10^{-3}$ Pa m³/s
Input voltage(s)	100 – 115 / 200 – 230 V AC, 50 Hz // 100 – 115 / 120 / 200 – 230 V AC ( $\pm 10$ %), 60 Hz	100 – 115 / 200 – 230 V AC, 50 Hz // 100 – 115 / 120 / 200 – 230 V AC ( $\pm 10$ %), 60 Hz	100 – 115 / 200 – 230 V AC, 50 Hz // 100 – 115 / 120 / 200 – 230 V AC ( $\pm 10$ %), 60 Hz	100 – 115 / 200 – 230 V AC, 50 Hz // 100 – 115 / 120 / 200 – 230 V AC ( $\pm 10$ %), 60 Hz
Input voltage: tolerance	$\pm 10$ %	$\pm 10$ %	$\pm 10$ %	$\pm 10$ %
Rated current consumption	5.7 A	5.7 A	5.7 A	5.7 A
Rotation speed at 50 Hz	1500 rpm	1500 rpm	1500 rpm	1500 rpm
Rotation speed at 60 Hz	1800 rpm	1800 rpm	1800 rpm	1800 rpm
Sound pressure level	55 dB(A)	55 dB(A)	55 dB(A)	50 dB(A)
Switch included	Yes	Yes	Yes	Yes
Motor type	1-ph motor	1-ph motor	1-ph motor	1-ph motor



Type designation	MVP 070-3	MVP 070-3	MVP 070-3	MVP 070-3 C
Part number	PK T01 310	PK T01 313	PK T01 315	PK T01 360
Cooling method	Air	Air	Air	Air
Operating altitude, max.	2000 m	2000 m	2000 m	2000 m
Protection degree	IP40	IP40	IP40	IP40
Ambient temperature	10 – 40 °C	10 – 40 °C	10 – 40 °C	10 – 40 °C
Temperature: Storage	-10 – 60 °C	-10 – 60 °C	-10 – 60 °C	-10 – 60 °C
Degree of pollution	–	–	–	–
Weight	16.4 kg	16.4 kg	16.4 kg	14.3 kg

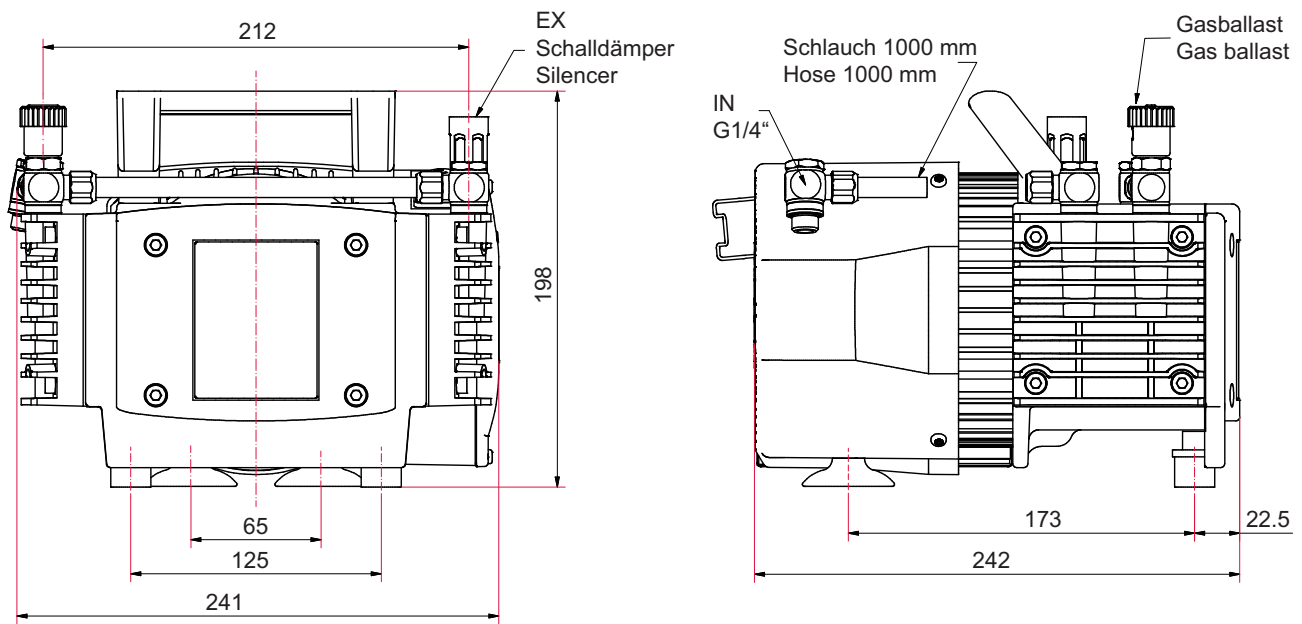
Tbl. 16: Technical data MVP 070-3 | MVP 070-3 C

### 14.3 Substances in contact with the media

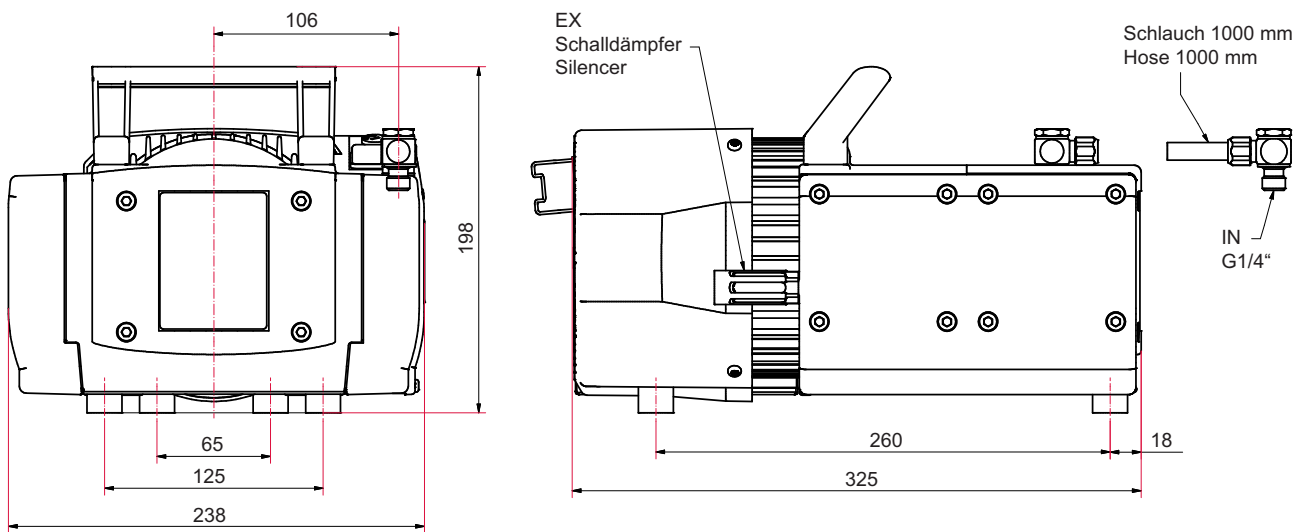
Pump parts	MVP 040-2	MVP 070-3	MVP 070-3 C
Housing cover	Aluminum alloy (AlMg-Si)	Aluminum alloy (AlMg-Si)	-
Head cover	Aluminum alloy (AlMg-Si)	Aluminum alloy (AlMg-Si)	ETFE, strengthened with carbon fibers
Diaphragm clamping disk	Aluminum alloy (AlMg-Si)	Aluminum alloy (AlMg-Si)	ETFE, strengthened with carbon fibers
Diaphragm	FPM	FPM	PTFE
Valves	FPM	FPM	FFKM
Valve cluster	-	-	ECTFE, strengthened with carbon fibers
O-rings	FPM	FPM	FPM
Gas ballast pipe	-	-	PTFE, carbon fiber reinforced
Inlet	Stainless steel (small flange)	Stainless steel (small flange)	PTFE, strengthened with carbon (hose nozzle)
Outlet	-	-	PTFE, carbon fiber reinforced
Silencer	PA, PE, aluminum	PA, PE, aluminum	-
Threaded hose couplings	Anodized aluminum	Anodized aluminum	ETFE/ECTFE
Hose	Polyethylene (PE)	Polyethylene (PE)	PTFE

Tbl. 17: Materials that make contact with the process media

## 14.4 Dimensions

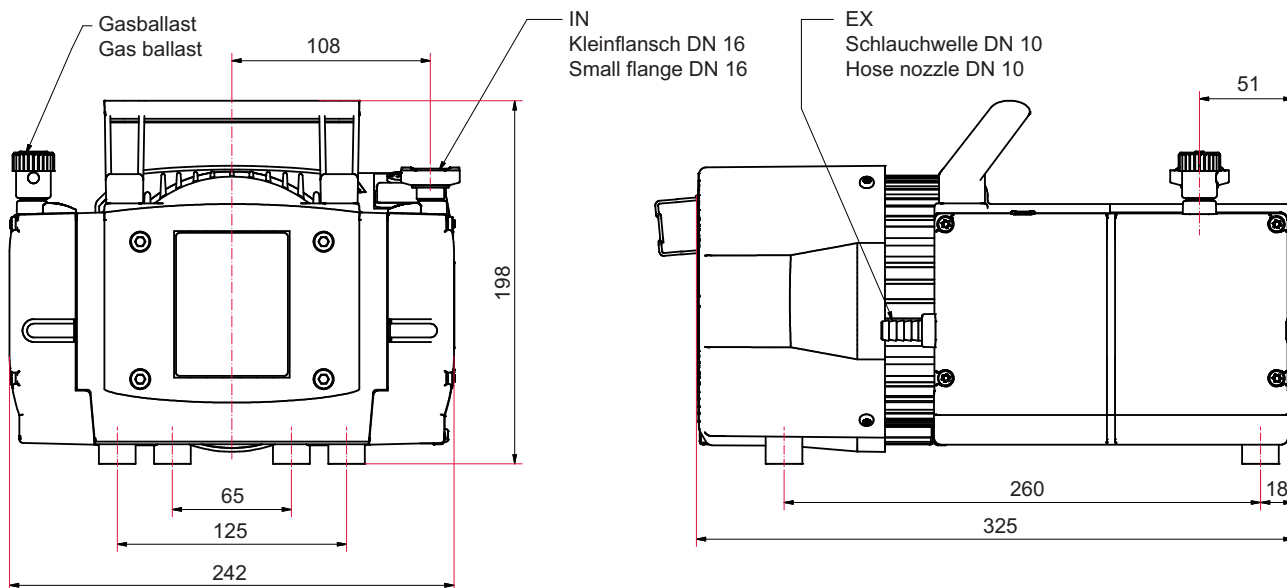


**Fig. 16: Dimensions MVP 040-2**  
Dimensions in mm



**Fig. 17: Dimensions MVP 070-3**  
Dimensions in mm





**Fig. 18: Dimensions MVP 070-3 C**  
**Dimensions in mm**



# Declaration of conformity

Declaration for product(s) of the type:

**Diaphragm pump**

MVP 040-2  
MVP 070-3  
MVP 070-3 C

We hereby declare that the listed product satisfies all relevant provisions of the following **European Directives**.

**Machinery 2006/42/EC (Annex II, no. 1 A)**

**Electromagnetic compatibility 2014/30/EU**

**Restriction of the use of certain hazardous substances 2011/65/EU**

**Restriction of the use of certain hazardous substances, delegated directive 2015/863/EU**

**Harmonized standards and applied national standards and specifications:**

DIN EN ISO 12100:2011	DIN EN IEC 63000:2019
DIN EN 1012-2:2011	DIN EN 61010-1:2011
DIN EN 61326-1:2013	IEC 61010-1:2010 (Ed. 3)

The authorized representative for the compilation of technical documents is Mr. Wolfgang Bremer, Pfeiffer Vacuum GmbH, Berliner Straße 43, 35614 Asslar, Germany.

Signature:



(Daniel Sälzer)  
Managing Director

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Asslar, 2020-07-24





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