OPERATING INSTRUCTIONS

EN

Original

PNEUMATIC GATE VALVE

PFEIFFER VACUUM

Dear customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new Pfeiffer Vacuum valves should support you in your individual application with full performance and without malfunctions. The name Pfeiffer Vacuum stands for high-quality vacuum technology, a comprehensive and complete range of top-quality products and first-class service. With this expertise, we have acquired a multitude of skills contributing to an efficient and secure implementation of our product.

Knowing that our product must not interfere with your actual work, we are convinced that our product offers you the solution that supports you in the effective and trouble-free execution 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.

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.

Copyright

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1 About this manual

IMPORTANT

Read carefully before use.

Keep the manual for future consultation.

1.1 Validity

These operating instructions are 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 these 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.

1.2 Applicable documents

Document	
Product Datasheet for the respective valve	Current document is available via Pfeiffer Vacuum Download Center.

1.3 Products concerned

This document applies to products with the following part numbers:

Part number	Description
GVP-Sxxxxxxx	Models for high vacuum applications
GVMP-Sxxxxxx	Models for ultra high vacuum applications

1.4 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.

1.5 Conventions

1.5.1 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. ...

1.5.2 Pictographs

Pictographs used in the document indicate useful information.

Note

Tip

1.5.3 Abbreviations

Abbreviation	Meaning in this document
CDA	Clean dry air
CF	Flange: Metal-sealed flange connection in accordance with ISO 3669
CF-F	Flange: Metal-sealed flange connection in accordance with ISO 3669
DN	Nominal diameter as size description
FKM	Fluoropolymer rubber
GVP	Pneumatic gate valve, high vacuum
GVMP	Pneumatic gate valve, ultra-high vacuum
GV	Manual gate valve, high vacuum
GVM	Manual gate valve, ultra-high vacuum
IPA	Isopropyl alcohol
ISO	Flange: Connection in accordance with ISO 1609 and ISO 2861
OFHC	Oxygen free copper

Tbl. 1: Abbreviations used in this document

1.6 Trademark proof

- Apiezon® is a trademark of M&I Materials Ltd.
- Allen® is a trademark of Apex Brands, Inc
- Loctite® is a trademark of Henkel IP & Holding GmbH, Germany.

2 Safety

2.1 General safety information

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

⚠ DANGER

Immediately pending danger

Indicates an immediately pending danger that will result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ WARNING

Potential pending danger

Indicates a pending danger that could result in death or serious injury if not observed.

► Instructions to avoid the danger situation

⚠ CAUTION

Potential pending danger

Indicates a pending danger that could result in minor injuries if not observed.

► Instructions to avoid the danger situation

NOTICE

Danger of damage to property

Is used to highlight actions that are not associated with personal injury.

► Instructions to avoid damage to property

Notes, tips or examples indicate important information about the product or about this document.

2.2 Safety instructions

Risks during transport

⚠ 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.

Risks during installation

⚠ WARNING

Risk of injury due to incorrect installation

Dangerous situations may arise from unsafe or incorrect handling

► Do not put hands or any other body part or objects in the valve.

Risks during maintenance, decommissioning 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.

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 when handling the product

- ► Observe all applicable safety and accident prevention regulations.
- ► Check that all safety measures are observed at regular intervals.
- ► Never put hands or any other object in the valve.

2.4 Limits of use of the product

Parameter	Limit value
Installation orientation	Regardless of the flow direction, there are several installation orientations (see chapter “Direction and orientation”, page 19).
Allowable ambient humidity	0 - 95 % non-condensing
Process temperature range	-18 °C - 200 °C Process temperatures above 150 °C may require use of seal materials other than FKM
Heating capabilities	Body can be heated up to 150 °C Actuator can be heated up to 60 °C
Pressure max. (absolute)	1000 hPa
Maximum differential pressure before opening	30 mbar
Reliability	100,000 cycles until service in a clean environment
Overpressure limits (relative pressure) for pressure supply	Valves are designed to run at maximum 5500 hPa. Do not operate valves above 5500 hPa.

Tbl. 2: Limits of use for pneumatic gate valves

2.5 Manufacturer set cycle time

Size (ID)	Open (sec.)	Close (sec.)
1.5" - 3"	1.5 - 2	1.5 - 2
4" - 8"	2.5 - 3	2.5 - 3
10" - 14"	4.5 - 5	4.5 - 5
16" - 21"	6.5 - 9	6.5 - 9

Tbl. 3: Manufactuer set cycle time

2.6 Proper use

- ► Use the valve to isolate vacuum.
- ► Use the valve only in closed indoor areas.
- ► Use the valve only for the evacuation of dry and inert gases.

2.7 Foreseeable misuse

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 misuse, in particular:

- Use outside the mechanical and electrical application limits in accordance with the technical data
- Use with corrosive or explosive media, if this is not explicitly permitted
- Use outdoors
- Use with bare hands or with powder gloves
- Use after unauthorized technical changes (on the inside or the outside of the product)
- Use with replacement or accessory parts that are unsuitable or are not approved

2.8 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.

2.8.1 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.

2.8.2 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

2.8.3 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

Pneumatically actuated gate valves are opened or closed by the movement of a piston in the actuator housing, whereby one side is pressurized with air and the other side is vented. This moves the gate/slide assembly into the respective position via internal connecting links. The gate valve opens when pressure is applied to the Air-to-open fitting (lower fitting closest to the valve cover). It closes when the Air-to-close fitting (upper fitting) is pressurized. In both cases, the opposite side is simultaneously vented through the exhaust port. Damage to the gate valve due to uncontrolled air flow is prevented using speed controls on pneumatic gate valves. These regulate the air flow in and out of the air cylinder. The cycle speeds are preset for optimal function and speed at the factory and should not be changed (see chapter “Manufacturer set cycle time”, page 11). A vacuum-tight seal of the gate valve is achieved when the gate plate seals against the valve body after reaching the mechanical stop.

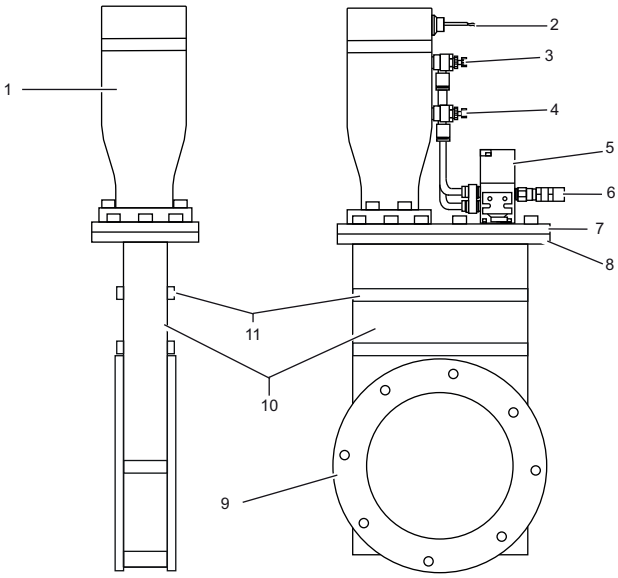


Fig. 1: Pneumatic gate valve overview

1 Pneumatic actuator: air cylinder with piston
2 Position Indicator with flying leads
3 Air-to-close Fitting / Speed controller
4 Air-to-open fitting / Speed controller
5 Humphrey 410-70 solenoid
6 Main air supply to solenoid (non-return valve depends on size)
7 Bonnet plate
8 Body flange
9 Port flange
10 Case / Body
11 Structural support

If the pneumatic actuator is on the left side of the valve, you are viewing the sealing side (front). Otherwise, you are looking at the rear side, which shows the valve mechanism without the sealing ring. The pneumatic gate valves DN 16 to DN 160 feature a lock-over-center mechanism. These valves should arrive in a fully closed and locked position. Pneumatic gate valves and nominal diameters of DN200 and above use non-return valves to lock the gate valve for a short duration instead of utilizing the center locking mechanism.

3.2 Scope of delivery

- Valve
- Hose (for connection of control valve)
- Control valve set (The Humphrey 410-70 is shipped with every valve in standard)
- Non-return valve (for gate valves from DN 200)

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 model number and serial number on hand.

3.3.1 Product types

The product designation of Pfeiffer Vacuum gate valves from the GVP (high vacuum) and GVMP (ultra-high vacuum) series is composed of the family name, the size and, if required, an additional feature description.

Family	Size/model
GVP	DN 16 to 320
GVMP	DN 16 to 320

Tbl. 4: Product designation of Pfeiffer Vacuum pneumatic gate valves

3.3.2 Product features

Feature	Description	Valve version
Valve body material	304 stainless steel	GVP and GVMP
Welded bellows shaft seal	AM-350	GVP and GVMP
Bonnet / gate seals	FKM elastomer / FKM elastomer	GVP
	OFHC copper / FKM elastomer	GVMP

Tbl. 5: Pneumatic gate valve features

4 Transportation and Storage

4.1 Transport

⚠ 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.

We recommend

Pfeiffer Vacuum recommends keeping the transport packaging and original protective cover.

Requirements

- Electric hoist to lift the valve in its packaging.
- Flat substrate ensured.
- Protective equipment, e.g. safety shoes.
- Eye bolts

Transport the valve safely

- ► Note the center of gravity of the load.
- ► Observe safe handling of manually operated transport devices.
- ► Transport the valve only within the permissible temperature limits.
- ► Ensure harmonious movements and moderate speed.
- ► Where possible, always transport or ship the valve in its original packaging.
- ► Always carry the valve with both hands or use adequate equipment to transport the valve.
- ► Remove the protective cover only immediately prior to installation.
- ► Transport the valve in the closed position.

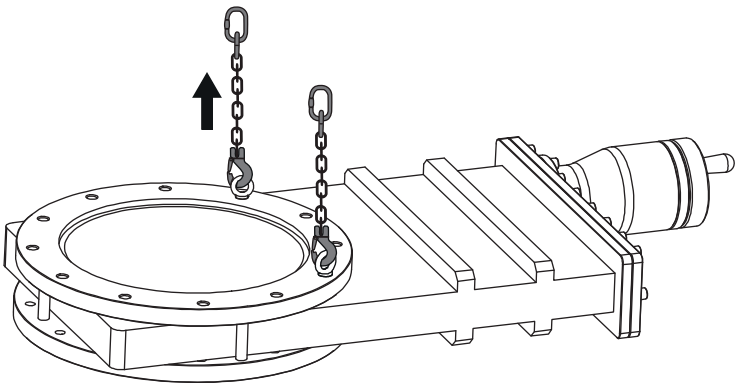


Fig. 2: Lift the valve out of the box

Lift the valve with its packaging

1. Attach eye bolts.
2. Attach suitable lifting tools to the eye bolts.
3. Pay attention to the correct use and fastening of the lifting equipment.
4. Lift the valve vertically.
5. Remove the eye bolts following transport and installation as required.
6. Keep the eye bolts for future use.

4.2 Storage

We recommend

Pfeiffer Vacuum recommends storing the products in their original transport packaging.

Storing the valve

1. Store the valve with all connections protected with the original protective caps.
2. Store the valve only indoors within the permissible temperature limits (see chapter “Limits of use of the product”, page 10).
3. Store the valve only indoors within the permissible humidity limits (see chapter “Limits of use of the product”, page 10).
4. Make sure to store the valve lying flat.

Store the valve depressurized

1. Close the valve.
2. Vent the pressure supply line.
3. Remove the pressure supply line.
4. Vent the valve actuator by loosening the non-return valve, in case a non-return valve is installed.

5 Installation

5.1 Preparatory work

Bench Test

Before installing in the final system, perform a bench test (see chapter “Bench test”, page 24).

Connect attachments properly

Note the mounting instruction of Position Indicator and Humphrey 410-70 Solenoid.

⚠ WARNING

Risk of injury due to incorrect installation

Dangerous situations may arise from unsafe or incorrect handling

- ► Do not put hands or any other body part or objects in the valve.

General notes for the installation of vacuum components

- ► Choose an installation location that permits access to the product and to supply lines at all times.
- ► Observe the ambient conditions given for the limits of use.
- ► Provide the highest possible level of cleanliness during assembly.
- ► Ensure that flange components during installation are grease-free, dust-free and dry.

Required tools and materials

- Lint-free, dry wipe
- Powder-free latex gloves
- Vacuum grease

Pre-installation

1. Observe the instructions for transport to the installation location.
2. Determine that the valve and adjacent plumbing in the vacuum system will be adequately supported when installed.
3. Make sure the mating flanges are in line, flat, parallel, and the correct distance aparty to minimize straining of the valve body.
4. Remove the flange cover and wipe the flange and gaskets with a lint-free, dry wipe.
5. If installing an o-ring seal flange, apply a light film of vacuum grease to the o-ring and install in the flange groove.

5.2 Mounting instructions

- ► Make sure no foreign particles enter the valve.
- ► For continued trouble-free operation, it is recommended that an air filter/lubricator be used in the air line system.
- ► Refer to the solenoid name plate for the correct voltage when connecting to the electrical service.
- ► Connect the compressed air supply to the valve using PTFE tape on the threads to ensure leak-proof joints.
- ► Position indicator switches are preset. Wires are marked for OPEN/CLOSE indicators.
- ► When installing the valve, it is imperative that proper length bolts be used.
  - – Bolts longer than the thickness of both mating flanges will damage the body panels and destroy the seal surface area for the gate O-ring.
  - – All valves have standard ISO flanges or CF flanges.
- ► Lightly grease the flange bolts with high temperature, non-galling type grease such as Loctite® Heavy Duty Anti-Seize or equivalent.
- ► Carefully tighten the bolts around the flange using the proper torque sequence until flanges are metal to metal and bolts are at proper torque.

5.2.1 Proper torque sequence

Prerequisites

- 180° bolt sequence.
- Always follow the proper bolt sequence for each of the following steps of tightening.

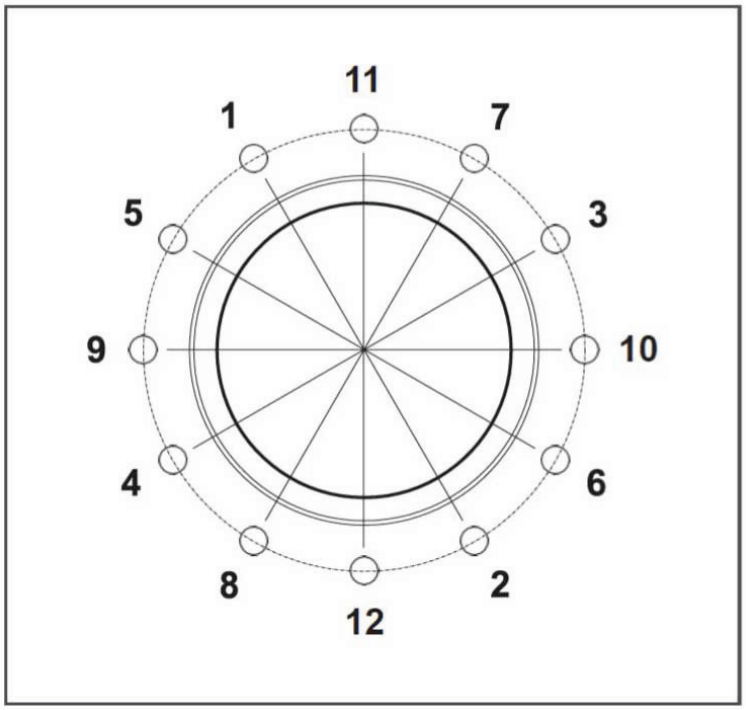


Fig. 3: Torque sequence example

Number of bolt holes will vary depending on flange type and size.

Proper tightening

1. Finger tighten bolts first.
2. Tighten supply with wrench to 1/2 the required torque.
3. Tighten to recommended torque range.

5.2.2 Torque values

Valve size (mm)	Torque (Nm)
16	10.9 - 13.6
40	20.4 - 24.5
50 and larger	34 - 40.8

Tbl. 6: Torque values for copper gaskets for CF-F flanges

Valve size (mm)	Torque (Nm)
16	6.8 - 10.9
40	10.9 - 13.6
50 and larger	20.4 - 27.2

Tbl. 7: Torque values for FKM O-rings for ISO flanges

5.3 Direction and orientation

Product may be installed in any direction. Common installation direction is gate seal side facing away from the vacuum pump, so the valve body remains under vacuum at all times and the pump down of the valve body is eliminated.

- Valves are adjusted for horizontal or vertical orientation.
- Cycle times and clamping pressures are set to this standard.
- Valves that are mounted with different orientation may require adjustment on the speedcontrollers to compensate for the weight of the gate-carriage assembly.
- For sizes 16 mm – 100 mm, valve can be mounted in any orientation
- For sizes 160 mm – 320 mm and greater, contact Pfeiffer Vacuum Service for the suggested valve orientation. Pfeiffer Vacuum Service must be informed if the valve will not be installed and used in a horizontal position, as this adjustment should be made by Pfeiffer Vacuum.

5.4 Solenoid valve

The pneumatic gate valve is controlled electro-pneumatically via a solenoid valve. The solenoid is an electronic switch that is connected directly to the gate valve or installed separately by the customer. The solenoid valve is activated or deactivated electrically. The mode of operation in the activated/deactivated state depends on the pneumatic connection, i.e., whether it should open or close in the event of a power failure.

5.4.1 Technical information of the solenoid valve

The 24 VDC version is included as standard for gate valves with solenoid. Refer to the information on the control valve's name plate.

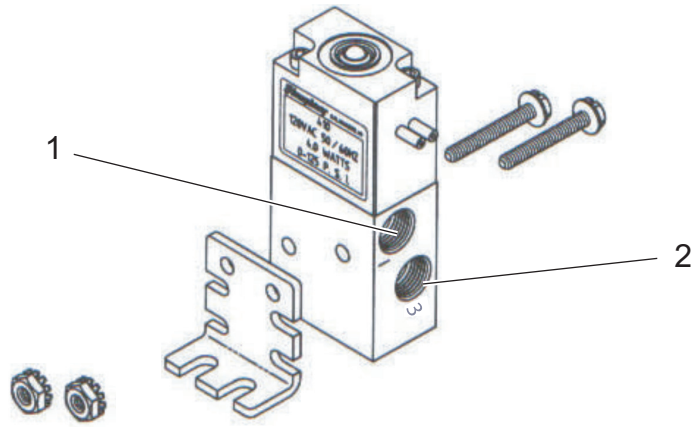


Fig. 4: Humphrey 410-70

1
Port 1: pressure supply port (main air line)
2
Port 3: exhaust port (vent to atmosphere)

- 1/8-inch NPT ported
- 4-way
- 2-position/spring return
- direct acting
- can be mounted in any position
- non-latching type

Media	Air | Inert Gases
Pressure Range	0-125 psig (0-8.5 barr) 0-28" Hg vacuum (prefix "v" 3-way and all 4-way models)
Ambient temperature range	32 - 125° F (0 - 50°C)
Coil temperature rise	81° F (45° C)
Power consumption (AC/DC)	4.5 W

Response time (on/off)	0.012/0.010 (DC), 0.012/0.020 (AC) sec.
Voltage tolerance	+ 10%, - 15% of rated voltage
Coil voltages	12V DC, 24V DC, 24V AC, 100V AC, 120V AC, 200V AC, 240V AC
SCFM at 100 psig (7 barr)	>10
C_v	0.144
Fill/exhaust time at 100 psig (7 barr)	1 cubic inch 0.020/0.032 sec.
	10 cubic inches 0.20/0.32 sec
	100 cubic inches 2.00/3.20 sec.
Leak rate (max. allowed)	4cc/minute at 100 psig
Type of operation	Direct Solenoid
Effective area	0.0064-inch^2
Stroke	0.015-inch'
Maximum cycle rate (cycles/ min.)	2700 (DC), 1875 (AC)
Lubrication	None required, factory pre-lubed
Filtration	40 Micron recommended
Materials	Brass, Buna N, aluminum, stainless steel, acetal

Tbl. 8: Technical Data: Humphrey 410-70

5.4.2 Pneumatic connection of the solenoid valve

⚠ WARNING

Danger of serious injury due to incorrect usage of compressed air.

Dangerous situations may arise from unsafe or incorrect handling.

► Disconnect the supply air before remove a component.

Using a sealant

When using a sealant, make sure that none of that enters the solenoid valve.

Using speed controls

Damage to the gate valve caused by uncontrolled air flow is prevented by using speed controls on pneumatic gate valves. These regulate the air flow into and out of the air cylinder. The cycle speeds are preset at the factory and should not be changed.

Prerequisites

- Make sure all protective plugs are removed from threads and connections.

Solenoid valve ports

- Port 1 “IN” = pressure supply port (main air line)
- Port 3 “EXH” = exhaust port for venting to atmosphere - should not be capped
- Port 2 = Upper port – supplies speed controls of the valve with air as set
- Port 4 = Lower port – supplies speed controls of the valve with air as set

Connect the compressed air lines by pressing on the air connection ring and plugging in the compressed air line. Release the air connection ring to fix and secure the compressed air line. Connect the compressed air supply to the valve by applying Teflon® tape or an equivalent product to the threads to ensure tight connections.

The speed controllers have 4 mm quick couplings. They are connected to the 4 mm quick couplings of the control valve via 4 mm hoses. The supply connection (port 1) of the control valve is 1/8“ FNPT. Use a hose with a 1/8” MNPT connector for the connection. For larger valves, the non-return valve also has a 1/8" FNPT inlet.

5.4.3 Fail-to-close

Fail-to-close is the default setting. In the event of a power failure, the solenoid valve moves the gate valve to the closed position and “holds” or “locks” the gate valve in the closed position until the main power supply is reactivated. Make sure all connections are tight for the solenoid valve to function properly.

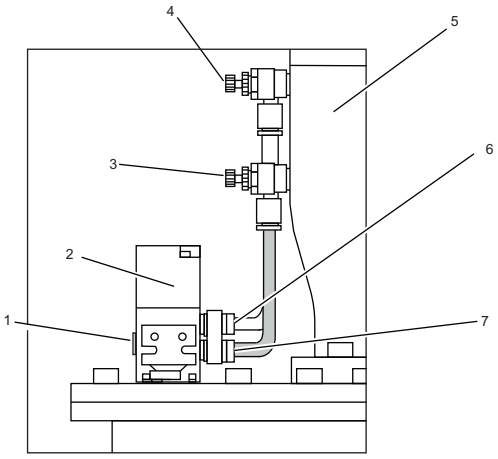


Fig. 5: Pneumatic connection (default setting): fail-to-close

1
Port 1
2
Humphrey solenoid
3
Air-to-open fitting
4
Air-to-close fitting
5
Actuator
6
Port 2
7
Port 4

Connect the valve

1. Connect the main compressed air line to the main compressed air supply of the solenoid valve (port 1).
2. Connect the upper speed controller (Air-to-close fitting) to the upper connection of the solenoid valve (port 2).
3. Connect the lower speed controller (Air-to-open fitting) to the lower connection of the solenoid valve (port 4).

5.4.4 Fail-to-open

Fail-to-open is an option. If the valve is to open in the event of a power failure (“fail-to-open”), change the hose connection at the solenoid valve connections.

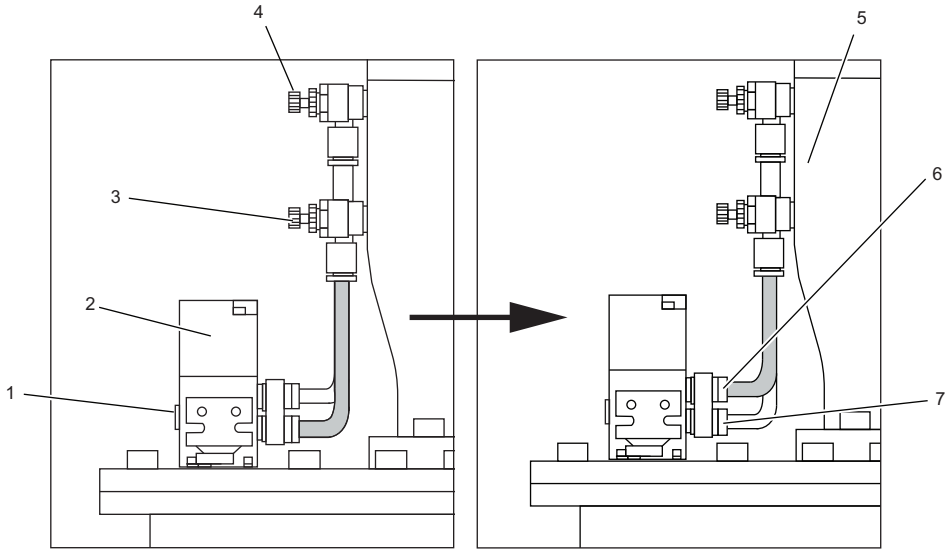


Fig. 6: Pneumatic connection (modification): fail-to-open

1
Port 1
2
Humphrey solenoid
3
Air-to-open fitting
4
Air-to-close fitting
5
Actuator
6
Port 2
7
Port 4

Swap the hose connection

1. Connect the main compressed air line to the main compressed air supply of the solenoid valve (port 1).
2. Connect the upper speed controller (Air-to-close fitting) to the lower connection of the solenoid valve (port 4).
3. Connect the lower speed controller (Air-to-open fitting) to the upper connection of the solenoid valve (port 2).

5.4.5 Electrical connection of the solenoid valve

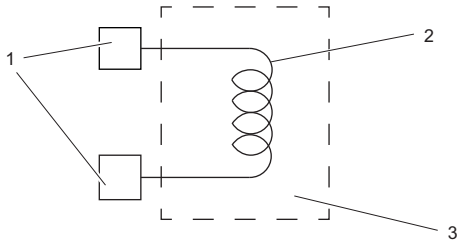


Fig. 7: DC coil circuit of solenoid valve H umphrey 410-70

1
Black wire
2
Solenoid
3
Solenoid valve

The voltage needed to power the control valve is written on the name plate of the solenoid valve. The solenoid valve is electrically activated or deactivated.

Connect the solenoid

1. Connect the solenoid salve by connecting the two loose cable wires to a power supply.

5.5 Reed switch position indicator

Fig. 8: Position indicator | Reed switch

The position indicator provides information on whether the valve is open or closed. Reed switches or position indicators are open switches that close when a magnet is brought close to them via the air cylinder. The wires are labeled to indicate open/closed. By default, the cables are color-coded:

- Yellow Wire = Close sensor
- Blue Wire = Open sensor

5.5.1 Technical data of the position indicator/reed switch

- Sensor type: Two wire magnetic sensing normally open switch

Parameter	Limit value
Contact Rating	3 watts max.
Current Switching	0.25 A max.
Carry	0.5 A max.
Resistance Contact	0.15 Ohms-max.
Voltage Switching	100 V DC max.
Breakdown	170 V DC max.
Shock Resistance	11ms ½ sine wave
Vibration Resistance	150 G max.
Environment	30G 50-2000 htz
Protection	IP66 (IEC standard)
Lead Wire	PVC isolated 2 X 24 AWG
Cycle Life	5 Million min.
Temperature Range	-40º TO 212ºF (-40º TO +100ºC)
Storage Temperature	-85º TO 257ºF (-65º TO +125ºC)

Tbl. 9: Limits of use for position indicator/reed switch

Parameter	Limit value (max.)
Operate time	0.35 ms
Release time	0.1 ms

Tbl. 10: Operational characteristics for position indicator

5.5.2 Wiring diagram of the position indicator

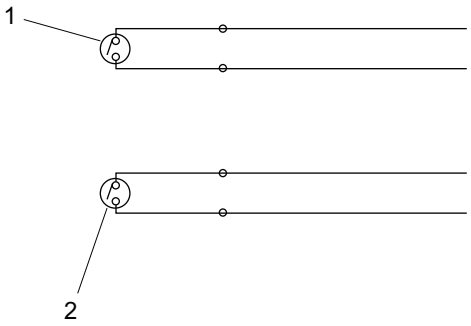


Fig. 9: Wiring diagram: Position indicator reed swich
1
Open Position
Tagged: Open (Blue)
2
Closed Position
Tagged: Closed (Yellow)

5.6 Bench test

A capacitance manometer is not necessary for test purposes. If possible, test the unit when it is under vacuum.

Prerequisites

- Before installing the valve into a system, run a bench test to verify the gate functions are operational.

Bench test procedure (the bench test has to be performed in the Fail-to-close configuration)

1. Connect air lines by pressing on the air fitting ring and inserting the air line.
2. Release the air fitting ring to grip and secure the air line.
   - Smaller valves have the solenoid remotely mounted.
   - The fitting closest to the bonnet will open the valve, and the other fitting will close the valve.
   - In all cases, air is exhausted through the solenoid.
3. Connect the valve electrically.
4. Supply the valve with 0.35 barr.
   - This ensures that the actuator is pressurized with air and ready for operation.
   - Higher pressure may damage the valve. Do not proceed if the valve is in the open position.
5. Confirm that the valve actuates properly by carefully checking the operation of the valve using the minimum air pressure required to achieve full closure.
6. First, make sure the gate is actuated into the open position without problems.
7. Slowly close the valve using the minimum amount of air required until you visually see the gate O-ring make contact with the sealing surface of the housing.
8. Increase pressure by 5 psi (350 hPa) increments, as necessary to achieve a seal. Note the label on the valve.
   - Do not increase the maximum permissible pressure of the valve (90 psig (6 barr)).
   - The valves are designed for operation at approximately 80 psig (5.5 barr).
9. Once the gate plate has engaged in the closed position, its sealing cannot be further improved by increasing pressure.
   - Do not increase pressure if the valve cannot be opened/closed smoothly.
10. If the valve opens and closes properly, it is calibrated and ready for operation.
    - In case the valve is not opening and closing as the manufacturer set cycle time (see chapter “Manufacturer set cycle time”, page 11), contact the maufacturer.
11. Check the errors “Event of power loss” and “Event of pressure loss”. If the power supply is interrupted, the valve should react as described (see chapter “Fail-to-close”, page 21). In the case of the compressed air supply, the locked gate valve should not open.

Recommendation
It is recommendet to use an air filter/lubricator in the air line system.

Gate valves with Kalrez®-Sealing

Kalrez®-sealed gate valves supplied without solenoid valves are delivered in a semi-closed position. The speed regulators are closed and must be adjusted to operate the valve.

6 Operation

- For continued trouble-free operation, keep the valve clean and free of contaminants.
- Use powder-free latex gloves to avoid contaminating the valve with finger oils.
- Work in a clean environment to avoid other contamination.

7 Maintenance

7.1 General maintenance information

⚠ 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.

General notes

- For continued trouble-free operation, keep the valve clean and free of contaminants.
- Use powder-free latex gloves to avoid contaminating the valve with finger oils.
- Work in a clean environment to avoid other contamination.
- Open/close the gate valve with control valve.
  - – If necessary use the manual override function

Required spare parts

1. To order replacement parts or repair kits, contact Pfeiffer Vacuum service.
2. Please provide the model number and serial number when ordering replacement parts.

Serviceable parts

- ► Contact Pfeiffer Vacuum service for repair of non-user-serviceable parts

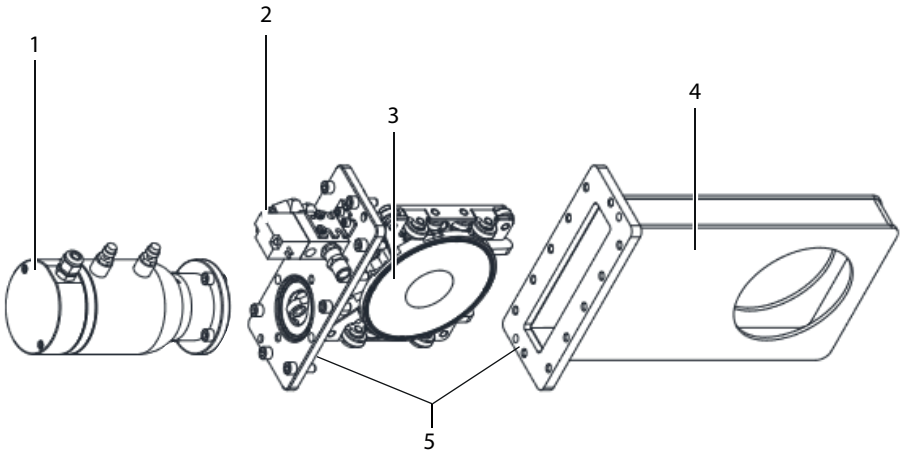


Fig. 10: Pneumatic gate valve | serviceability

1 Gate actuator
2 Solenoid
3 Gate/Strongback
4 Valve Body
5 Bonnet O-ring or gasket

7.2 Removing carriage assembly

- Always wear powder-free latex gloves when servicing the valve
- Be careful not to scratch O-ring groove
- Avoid twisting, stretching, or deforming the O-ring
- Avoid damaging the materials
- Heat gun may be required to melt any Loctite on jam nut threads

All servicing of O-rings and bellows requires removal of the carriage assembly from the valve body.

Required tools and materials

- Allen wrench set: sizes 0.028" - 3/8"
- 1/2" ring wrench
- 1/4" 12pt. wrench
- 5/16" 12pt. wrench
- Powder-free latex gloves
- Appropriate replacement O-rings or metal gasket (see chapter “Spare parts”, page 34).

Prerequisites

- Vacuum system vented to atmospheric pressure
- Electrical supply disconnected
- Pneumatic supply disconnected
- Valve actuated to GATE OPEN position

Procedure

1. Remove the bolts that hold the carriage assembly to the body.
2. Pull out the carriage assembly, taking care not to move the adjustement of the linkage.
3. Support the carriage with a block to minimize stress on linkage.
   – Make sure the disk gasket faces the same direction after service as it did before service.

7.3 Maintaining gate and bonnet seals

- Always wear powder-free latex gloves when servicing the valve
- Be careful not to scratch O-ring groove
- Avoid twisting, stretching, or deforming the O-ring
- Avoid damaging the materials
- Heat gun may be required to melt any Loctite on jam nut threads

For standard and metal seal gates and bonnets

Required tools and materials

- Allen wrench set: sizes 0.028" - 3/8"
- 1/2" box wrench
- O-ring pick, plastic
- Powder-free latex gloves
- Grease for O-rings: Apiezon L
- IPA
- Appropriate replacement O-rings or metal gasket

Prerequisites

- Carriage assembly removed

Remove gate and bonnet O-rings

1. Remove bonnet O-ring or metal gasket with a plastic pick to avoid scratching the O-ring groove.
2. Remove gate O-ring with the plastic pick to avoid scratching the O-ring groove.
3. Discard the O-rings or metal gaskets.
4. Clean the O-ring groove with IPA and dry out with nitrogen or CDA.

Insert gate and bonnet O-rings

1. Apply a light coat of Apiezon-L grease to the new FKM O-ring. Install the copper gasket dry.
2. Install new O-ring gate and bonnet.
   – Set new O-ring into the gate and bonnet
   – Press O-ring in at 6 and 12 o'clock
   – Press at 3 and 9 o'clock
   – Continue pressing O-ring into groove at 180° apart intervals
   – Smooth out the O-ring all the way around the groove
3. After all new O-rings are assembled, replace carriage assembly into the body.
4. Install bolts and tighten.
   – For metal seal/copper gasket type, tighten each bolt of the bonnet 1/8th turn at a time until bonnet plate and body are metal to metal.

8 Decommissioning

8.1 Shutting down for longer periods

⚠ 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.

We recommend

Pfeiffer Vacuum recommends storing the products in their original transport packaging.

Procedure for a longer downtime of the Valve (> 1 year)

1. Before shutting down the system vent with CDA or inert gas.
2. Close the valve
3. Decontaminate valve, if necessary.
4. Store the valve at temperatures between -20 °C and 60 °C.
   - – Make sure the valve ist stored at relative humidity between 0 and 95 %. Non-condensing
   - – Make sure to protect the device against contamination and moisture.
   - – Make sure to store the valve lying flat
5. Seal all flange openings with the original protective caps.
6. Seal all other connections (e.g. venting connection) with the corresponding original parts.

8.2 Dismounting the valve

1. Vent system to atmospheric pressure
2. Close the valve
3. Carefully loosen the bolts around the flange
4. Dismount the valve from the system

8.3 Recommission

1. Non-return valve for contamination, oxidation and moisture
2. Cean valve externally with a lint-free cloth and little IPA
3. Replace the seals
4. If necessary replace the bonnet seals
5. If necessary, have Pfeiffer Vacuum Service maintain the valve

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.

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

10 Troubleshooting

Problem	Possible causes	Remedy
Leak at gate	Dirty or damaged gate seal	• Replace the gate seal • Contact Pfeiffer Vacuum Service
Leak at body	Dirty or damaged bonnet gasket	• Check for a leak using a leak detector on the actuator • Replace the bonnet seal • Contact Pfeiffer Vacuum Service
Valve does not open / close	Air pressure issue	Check compressed air connection
	Operating pressure issue	Check and adjust operating pressure
	Electrical connection faultry	Connect the voltage, if applicable
Gate open/ close is stuck	• Wheels and bearings in the gate/ carriage assembly have seized • Flanges have been over-tightened and are compressing the body causing the gate to seize • Bolts used in the flanges are are too long and have dented the inside of the body	• Contact Pfeiffer Vacuum Service

Tbl. 11: Troubleshooting the valve

Manual Override

Pressing the red button on top the coil shifts armature, which actuates the valve stem. Releasing the manual control returns the valve to its normal position via the valve spring.

The solenoid valve does not work despite the power supply

- Check the valve function using the “Manual Override” function.
- If the valve operates on manual override, check the line voltage to determine if it matches the electrical ratings of the valve.
- Check the valve for an inoperative (open) coil by measuring the milliamps according to the electrical specification table.
- Check that air is being supplied in sufficient quantity and pressure for the appliance to function properly.
- Ensure that there are no blockages due to contamination in the air line or defective/clogged connections.

If the valve still does not work, contact the manufacturer.

11 Service solutions by Pfeiffer Vacuum

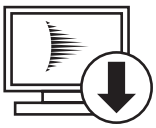
We offer first-class service
High vacuum component service life, in combination with low downtime, are clear expectations that you place on us. We meet your needs with efficient products and outstanding service.

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 section.

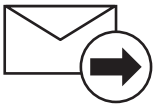
You can obtain advice on the optimal solution for you, from your Pfeiffer Vacuum representative.
For fast and smooth service process handling, we recommend the following:



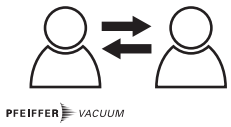
1. Download the up-to-date form templates.
   - Explanations of service requests
   - Service requests
   - Contamination declaration

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.

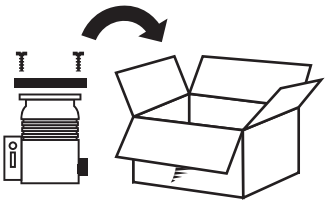


3. Send the forms by email, fax, or post to your local Service Center.

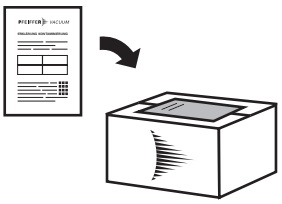


4. You will receive an acknowledgment from Pfeiffer Vacuum.

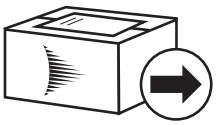
Submission of contaminated products
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree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



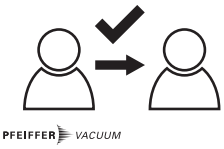
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
a) Neutralize the product with nitrogen or dry air.
b) Seal all openings with blind flanges, so that they are airtight.
c) Shrink-wrap the product in suitable protective foil.
d) Package the product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

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

12 Spare parts

For size not shown on the below tables, please contact Pfeiffer Vacuum for more information on the recommended spare parts.

Size	Elastomer or metal sealed gate valve	Part number	Order number
DN 16	Elastomer (GV or GVP)	KSB06S	2000151344
DN 40	Elastomer (GV or GVP)	KSB15S	2000099880
DN 50	Elastomer (GV or GVP)	KSB20S	2000138522
DN 63	Elastomer (GV or GVP)	KSB25S	2000071291
DN 80	Elastomer (GV or GVP)	KSB30S	2000138717
DN 100	Elastomer (GV or GVP)	KSB40S	2000071292
DN 160	Elastomer (GV or GVP)	KSB60S	2000071293
DN 200	Elastomer (GV or GVP)	KSB80S	2000099883
DN 250	Elastomer (GV or GVP)	KSB100S	2000151348
DN 320	Elastomer (GV or GVP)	KSB120S	2000099879
DN 400	Elastomer (GV or GVP)	KSB160S	2000137372
DN 16	Metal seal (GVM or GVMP)	KSB06M	2000138051
DN 40	Metal seal (GVM or GVMP)	KSB15M	2000138041
DN 50	Metal seal (GVM or GVMP)	KSB20M	2000138729
DN 63	Metal seal (GVM or GVMP)	KSB25M	2000099881
DN 80	Metal seal (GVM or GVMP)	KSB30M	2000138874
DN 100	Metal seal (GVM or GVMP)	KSB40M	2000193303
DN 160	Metal seal (GVM or GVMP)	KSB60M	2000085700
DN 200	Metal seal (GVM or GVMP)	KSB80M	2000137219
DN 250	Metal seal (GVM or GVMP)	KSB100M	2000137455
DN 320	Metal seal (GVM or GVMP)	KSB120M	2000193309

Tbl. 12: Overview of the seal kits available for the gate valves

Valve kit	Part number	Order number
Control valve for valve GVP/GVMP, 24 V DC	GVP-S22	2000032959

Tbl. 13: Available valve kit

13 Technical data and dimensions

13.1 General

	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^2						

Tbl. 14: Conversion table: Pressure units

	mbar l/s	Pa m^3/s	sccm	Torr l/s	atm cm^3/s
mbar l/s	1	0.1	59.2	0.75	0.987
Pa m^3/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^3/s	1.01	0.101	59.8	0.76	1

Tbl. 15: Conversion table: Units for gas throughput

13.2 Technical data and product dimensions

- Please refer to the Pfeiffer Vacuum website for specific valve size and configuration data sheets and dimensions.
- If your valve is not listed on the Pfeiffer Vacuum website, please contact Pfeiffer Vacuum Service for more information.

VACUUM SOLUTIONS FROM A SINGLE SOURCE

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.

COMPLETE RANGE OF PRODUCTS

From a single component to complex systems:
We are the only supplier of vacuum technology that provides a complete product portfolio.

COMPETENCE IN THEORY AND PRACTICE

Benefit from our know-how and our portfolio of training opportunities!
We support you with your plant layout and provide first-class on-site service worldwide.

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Are you looking for a perfect vacuum solution? Please contact us

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T +49 6441 802-0
info@pfeiffer-vacuum.de

www.pfeiffer-vacuum.com

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