



# OPERATING INSTRUCTIONS

EN

Original

## MAGNETICALLY COUPLED ROTARY FEEDTHROUGH, MOTORIZED 420MRM040-m

**PFEIFFER**  *VACUUM*

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# 1 About this manual

## 1.1 Validity

This operating manual is for customers of Pfeiffer Vacuum. It describes the functioning of the designated product and provides the most important information for safe use of the unit. The description follows applicable EU guidelines. All information provided in this operating manual refers to the current state of the product's development. The documentation remains valid as long as the customer does not make any changes to the product.

Up-to-date operating instructions can also be downloaded from [www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com).

This operating manual applies to the following products:

Rotary feedthroughs motorized with the order numbers

**420MRM040-m**

## 1.2 Conventions

### Safety instructions

The safety instructions in Pfeiffer Vacuum operating instructions are the result of risk evaluations and hazard analyses and are oriented on international certification standards as specified by UL, CSA, ANSI Z-535, SEMI S1, ISO 3864 and DIN 4844. In this document, the following hazard levels and information are considered:

<b>DANGER</b>
<p><b>Imminent danger</b> Indicates an imminent hazardous situation that will result in death or serious injury.</p>
<b>WARNING</b>
<p><b>Possibly imminent danger</b> Indicates an imminent hazardous situation that can result in death or serious injury.</p>
<b>CAUTION</b>
<p><b>Possibly imminent danger</b> Indicates an imminent hazardous situation that can result in minor or moderate injury.</p>
<b>NOTICE</b>
<p><b>Command or note</b> Command to perform an action or information about properties, the disregarding of which may result in damage to the product.</p>

## Pictographs



Prohibition of an action to avoid any risk of accidents, the disregarding of which may result in serious accidents



Warning of a displayed source of danger in connection with operation of the unit or equipment



Command to perform an action or task associated with a source of danger, the disregarding of which may result in serious accidents



Important information about the product or this document

## Instructions in the text

→ Work instruction: here you have to do something.

## 2 Safety

### 2.1 Safety precautions



#### Duty to inform

Each person involved in the installation or operation of the unit must read and observe the safety-related parts of these operating instructions.

→ The operator is obligated to make operating personnel aware of dangers originating from the unit or the entire system.



#### CAUTION

#### Entanglement hazard!

Rotating shaft may entangle hair or loose clothing.

→ Operate product only if installed on a vacuum chamber.  
→ Keep hair or loose clothing away from rotating shaft.



#### CAUTION

#### Crushing and entanglement hazard!

Danger of fingers and hands being crushed by moving parts. Danger of hair or loose clothing being entangled by rotating parts.

→ Do not operate product without housing cover.

### 2.2 Protective equipment

In certain situations the handling of the product requires wearing of personal protective equipment. The owner, respectively the employer are obligated to provide adequate equipment to any operating persons.



#### WARNING

#### Danger to health and environment by hazardous substances or mixtures!

Depending on the process the product may be contaminated by hazardous substances or mixtures.

→ Wear adequate protective equipment during maintenance and repairs or in case of deinstallation.  
→ Observe the safety data sheet of the hazardous substance or mixture provided by the respective suppliers.



## 2.3 Proper use



### **Commissioning of the partly completed machinery is prohibited**

This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated, has been declared in conformity with the provisions of the machinery directive 2006/42/EC.

- This product is intended to be attached to a vacuum chamber to become part of a vacuum system.
- Transfer mechanical movement into a vacuum chamber.
- This product is designed to withstand forces which result from an inwards pointing pressure difference (vacuum). Additional or differently pointed forces may damage or destruct the product.
- Linkage of the product with a suitable control system by the user for a targeted function of the product.
- Use within the technical parameters given in chapter „Technical Data“.

## 2.4 Improper use

Improper use will cause all claims for liability and warranties to be forfeited. Improper use is defined as usage for purposes deviating from those mentioned above, especially:

- Operating with overpressure.
- Exceeding the maximum load capacity.
- Usage without installation on a vacuum chamber.

## 2.5 Partly completed machinery

This Product is a partly completed machinery in terms of the Machinery Directive 2006/42/EC.

Partly completed machinery cannot comply fully with the essential health and safety requirements set out in Annex I of the Machinery Directive 2006/42/EC, since certain of the risks may result from the fact that the machinery is not complete or from the interface between the partly completed machinery and the rest of the machinery or assembly of machinery into which the partly completed machinery is to be incorporated. In this case these requirements are met. The user has to incorporate this product into a vacuum system.

## 3 Product description

### 3.1 Product identification

To correctly identify the product when communicating with Pfeiffer Vacuum, always have the information from the rating plate available.



Fig. 1: Example for a rating plate

Pfeiffer Vacuum Components & Solutions GmbH  
Anna-Vandenhoeck-Ring 44  
37081 Göttingen/Germany  
T +49 551 999 63-0  
F +49 551 999 63-3010  
service-cs@pfeiffer-vacuum.de  
www.pfeiffer-vacuum.com

### 3.2 Function

This hermetically sealed, UHV-suitable rotary feedthrough is a device for transferring a rotary movement into a vacuum chamber. The rotary feedthrough is magnetically coupled using highly efficient and bakeable samarium-cobalt magnets.

The rotary feedthrough comes with a stainless steel ball bearing with a UHV-suitable dry lubrication for precise positioning and continuous rotation.

The drive unit is a 2-phase stepper motor.

### 3.3 Documentation

The documentation of this product contains:

- This manual
- Declaration of Incorporation according to Machinery Directive 2006/42/EC, Annex II
- Operating manuals for the individual components

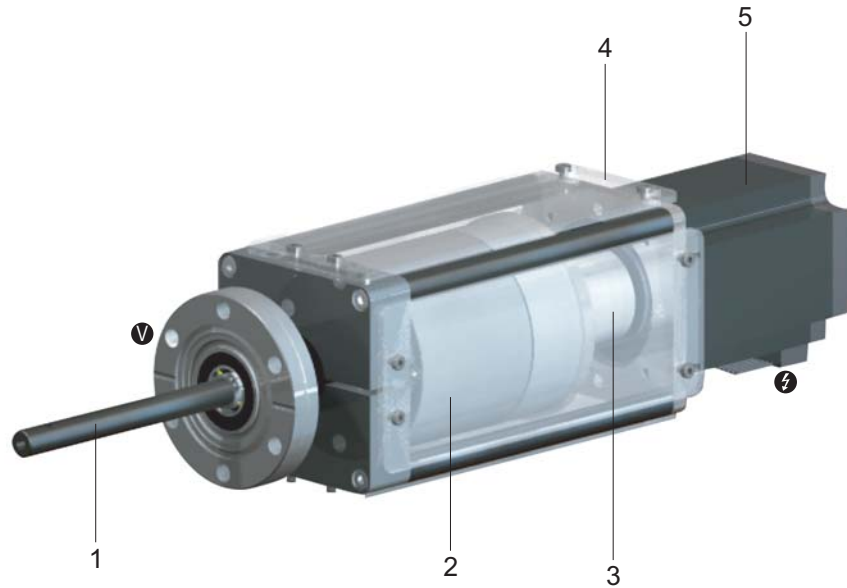
### 3.4 Used terms

#### Used symbols

The following symbols are used consistently throughout in all illustrations:

- ⚡ Electrical connection
- Ⓜ Chamber connection flange

The following terms are used within this documentation.



**Fig. 2: Rotary feedthrough**

- |   |   |   |   |
|---|---|---|---|
| 1 | Rotating shaft                          | 4 | Housing cover (transparent acrylic glass) |
| 2 | Magnetically coupled rotary feedthrough | 5 | 2-phase stepper motor                     |
| 3 | Coupling                                |   |   |



## 4 Transport and storage

### 4.1 Transport



#### WARNING

##### Risk of injury from falling objects!

Falling objects may result in death or serious injury.

- Carry small and mid-size products two-handed or with two persons.
- Secure products located on higher levels from falling down.
- Carry products > 20 kg by using suitable lifting gear.
- Do not step under elevated loads.
- Wear safety shoes with steel toe cap according to EN 347.

#### NOTICE

##### Sensitive parts

The sealing surfaces of the flanges and the diaphragm bellows are sensitive parts and must not be damaged.

- Handle the product with care.
- Use gloves when touching vacuum-related parts.

### 4.2 Storage

- Check that all the openings of the product are securely closed.
- Store the product in a cool, dry and dust-free place; preferably at room temperatures (approx. 20°C).
  - For a longer period of storage, seal the product in a PE bag with drying agents enclosed.

## 5 Installation

### 5.1 Installation location

Observe the following requirements when using the product:

- no outdoor use
- weatherproof place
- not in damp or humid areas
- not in dusty areas

### 5.2 Preparatory work

→ Check sealing surface of the flanges prior to assembly.

### 5.3 Assembly



#### NOTICE

##### Assembly of CF flanges!

Loss of sealing capability due to a lack of cleanliness when handling the sealing and CF flange.

- Assemble the sealing dry and oil-free.
- Always wear gloves when handling the components.
- Do not damage the surfaces and cutting edges.



##### Seals

Please note: Temperature and pressure range are significantly influenced by the seal type.

- Use metal seals for best possible tightness.
- Remove locking cap from the vacuum flange.
- Place copper gasket (not included in the scope of delivery) in the flange of the vacuum chamber.
- Place chamber connection flange slowly on the flange of the vacuum chamber. Make sure the screw holes are placed onto each other.
- Fix chamber connection flange with screws and nuts with an appropriate tool. Use washers.
- Tighten diagonally opposite screws to avoid damage to copper gasket .

## 5.4 Electrical connection



### DANGER

#### Voltage-bearing elements

Danger to life from electric shock.

- The electrical connection can be carried out only by trained and authorised electricians.
- Disconnect the power supply and secure it against being switched back on.
- Ensure the system is adequately earthed.

The motor has to be connected bipolar (serial or parallel) to a stepper motor control system. The maximum current per phase for a bipolar serial connection must not exceed 2.12 A, the maximum current per phase for a bipolar parallel connection must not exceed 4.24 A.

- For a configuration of the motor note the data sheet and the torque graph of the manufacturer.

The bipolar parallel connection with 4.24 A and 48 V is recommended to maintain max. torque even with higher revolutions.

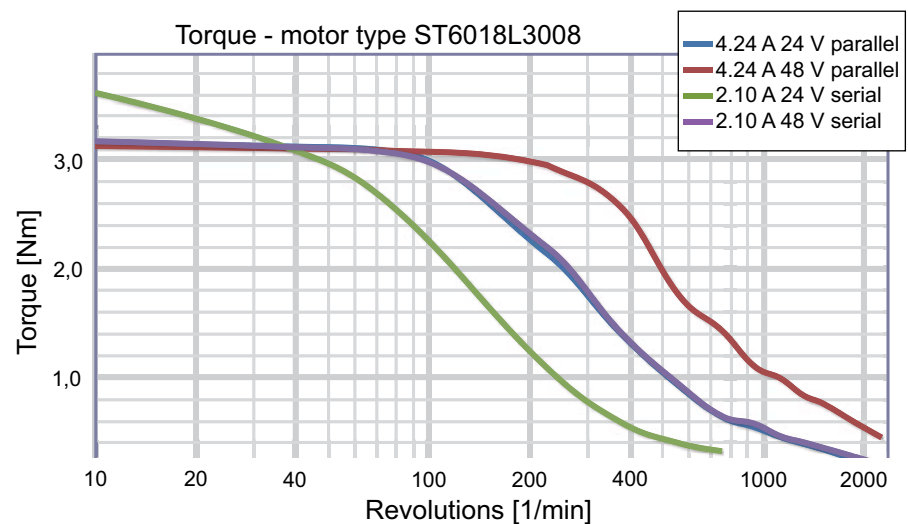


Fig. 3: Motor torque graph

## 6 Operation



### Commissioning of the partly completed machinery is prohibited

This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated, has been declared in conformity with the provisions of the machinery directive 2006/42/EC.



### CAUTION

#### Entanglement hazard!

Rotating shaft may entangle hair or loose clothing.

- Operate product only if installed on a vacuum chamber.
- Keep hair or loose clothing away from rotating shaft.



### CAUTION

#### Crushing and entanglement hazard!

Danger of fingers and hands being crushed by moving parts. Danger of hair or loose clothing being entangled by rotating parts.

- Do not operate product without housing cover.



### CAUTION

#### Burn hazard!

The motor will get hot during operation. Contact with skin may cause burns.

- Do not touch motor during operation.
- Be sure the motor has cooled before touching it.
- If the maximum motor current is used be sure to provide an appropriate heat rejection for keeping the operating temperature within admissible values (see enclosed motor datasheet).

- Do not deviate from the performance data given in the chapter "Technical Data".
- Observe the maintenance instructions given in the chapter "Maintenance / replacement".
- Do not bring the product into service if it shows apparent damage.

## 7 Maintenance / replacement

### 7.1 Precautions



#### NOTICE

##### Disclaimer of liability

Pfeiffer Vacuum accepts no liability for personal injury or material damage, losses or operating malfunctions due to improperly performed maintenance. The liability and warranty entitlement expires.



#### DANGER

##### Voltage-bearing elements!

Danger to life from electric shock.

- Work on electrical installations may be carried out by trained and authorised electricians only.
- Disconnect the power supply and secure it against being switched back on.



#### CAUTION

##### Crushing and entanglement hazard!

Danger of fingers and hands being crushed by rotating and moving parts. Entanglement hazard for hair and loose clothing.

- Disconnect the product from the energy supply before beginning maintenance.
- Vent the vacuum chamber before beginning maintenance.
- Make sure the product does not carry any loads.

### 7.2 Checklist for inspection, maintenance and overhaul

The product is maintenance-free within proper use. Every time the interval given below is reached a visual inspection should be conducted.

Part	Activity	Cycles	at latest
Whole product	Visual inspection for alterations or damaged parts		after 6 months

### 7.3 Accessories

Designation	Order number
Copper gasket, OFHC-copper, DN 40 CF	490DFL040-S10

## 8 Decommissioning

### 8.1 Dismantling

Observe the same measures and rules given in the chapters "Transport and storage" and "Installation" accordingly for a dismantling.

### 8.2 Disposal

Products or parts thereof (mechanical and electrical components, operating fluids, etc.) may cause environmental burden.

→ Safely dispose of the materials according to the locally applicable regulations.

## 9 Service

### Maintenance and repairs

Please direct service requests concerning this product towards:

Pfeiffer Vacuum Components & Solutions GmbH  
Anna-Vandenhoeck-Ring 44  
37081 Göttingen/Germany  
T +49 551 999 63-0  
F +49 551 999 63-3010  
service-cs@pfeiffer-vacuum.de

The following steps are necessary to ensure a fast, smooth servicing process:

- Download the form "Declaration on Contamination".<sup>1)</sup>
- Fill in the contamination declaration and enclose it in the shipment (required!).
- Dismantle all accessories.
- Drain operating fluids/lubricants.
- Send the product in its original packaging if possible.

Depending on the process the product may be contaminated by hazardous substances or mixtures in the meaning of Regulation (EC) 1272/2008, such as toxic, corrosive, flammable or carcinogen.

- No products will be accepted if they are contaminated with micro-biological, explosive or radioactive substances.
- If products are contaminated or the declaration on contamination is missing, we will perform a decontamination at the shipper's expense.

### Sending of contaminated products

- Neutralise the product by flushing it with nitrogen or dry air.
- Close all openings airtight.
- Seal the product or unit in suitable protective film.
- Return the product only in a suitable and sturdy transport container and send it in while following applicable transport conditions.

For further information, addresses and forms please visit

**[www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com)**

<sup>1)</sup> Forms under [www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com)

# 10 Technical data and dimensions

## 10.1 Technical data

Mounting and application		
Mounting location	no outdoor use, weatherproof place, not in damp or humid areas, not in dusty areas	
Application	Rotation angle positioning and continuous rotation (number of revolutions)	
Technical parameter	Einheit	420MRM040-m
Pressure range		$1 \cdot 10^{-10}$ hPa to 500 hPa over pressure
Operating temperature	°C	-10 to 50
Bakeout temperature with electric parts	°C	80
Bakeout temperature without electric parts	°C	200
Tightness	Pa m <sup>3</sup> /s	$1 \cdot 10^{-11}$
Weight	kg	4.8
Lowest angular resolution (at 1/4 motor step)	°	0.45
Nominal diameter		DN 40 CF
Angle of rotation	°	360
Shaft connection		with threaded hole, vented: M5x10
Torque	Nm	max. 3
Rotation speed	min <sup>-1</sup>	500
Motor version		2-phase stepper motor
Current	A	4.2 per phase (bipolar parallel connection)
Materials		1.4301 stainless steel; aluminum blank and anodized

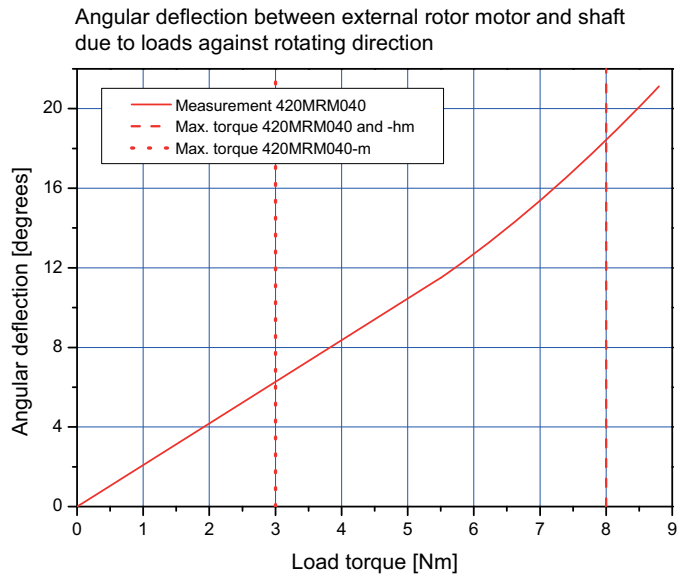
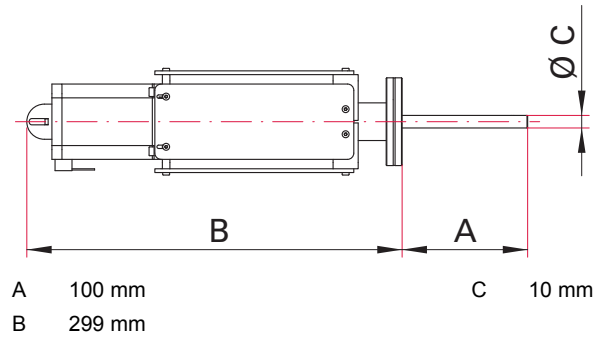


Fig. 4: Torque graph



## 10.2 Dimensions

420MRM040-m



# Einbauerklärung *Declaration of Incorporation*

nach Richtlinie 2006/42/EG, Anhang II, Nr. 1 B  
*according to Directive 2006/42/EC, Annex II, No. 1 B*

Die speziellen technischen Unterlagen gemäß Anhang VII Teil B wurden erstellt.

*The relevant technical documentation is compiled in accordance with part B of Annex VII.*

Hiermit erklären wir, dass das unten aufgeführte Produkt eine unvollständige Maschine nach Artikel 2g ist und ausschließlich zum Einbau in oder zum Zusammenbau mit einer anderen Maschine oder Ausrüstung vorgesehen ist. Diese unvollständige Maschine ist in Übereinstimmung mit den Bestimmungen der folgenden EG-Richtlinien:

*We hereby declare that the product specified below is partly completed machinery according to Article 2g and is exclusively intended for incorporation in or with other machinery or equipment. The partly completed machinery specified below is also in compliance with the provisions of the following EC-directives:*

Bevollmächtigt, die speziellen technischen Unterlagen gemäß Anhang VII B zusammenzustellen ist:

*Authorised to compile the relevant technical documentation according to Annex VII B is:*

Pfeiffer Vacuum Components & Solutions GmbH  
Anna-Vandenhoeck-Ring 44  
37081 Göttingen

Auf begründetes Verlangen werden die speziellen Unterlagen zu der unvollständigen Maschine an die zuständige Behörde elektronisch übermittelt.

*In response to a reasoned request by the national authorities, relevant information on the partly completed machinery will be transmitted electronically.*

## **Beschreibung und Identifizierung der unvollständigen Maschine:**

### ***Description and identification of the partly completed machinery:***

Drehdurchführung, magnetisch gekoppelt, motorisiert, DN 40 CF, zur Einbindung in ein Vakuumsystem  
Rotary feedthrough, magnetically coupled, motorized, DN 40 CF, to be incorporated into a vacuum system  
Bestell-Nr./order no.: 420MRM040-m

Folgende grundlegende Sicherheits- und Gesundheitsschutzanforderungen gemäß Anhang I dieser Richtlinie kommen zur Anwendung und wurden eingehalten:

*The following essential health and safety requirements according to Annex I of this directive are applicable and have been fulfilled:*

1.1.3, 1.1.5, 1.3.2, 1.3.8.1, 1.5.8, 1.7.4, 1.7.4.1

**Diese unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine, in die diese unvollständige Maschine eingebaut werden soll, den Bestimmungen der Maschinenrichtlinie 2006/42/EG entspricht.**

***This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated, has been declared in conformity with the provisions of the machinery directive.***

Göttingen, 25.07.2017



Guido Hamacher  
Geschäftsführer  
Managing Director

Pfeiffer Vacuum Components & Solutions GmbH  
Anna-Vandenhoeck-Ring 44  
37081 Göttingen/Germany  
T +49 551 99963-0  
F +49 551 99963-3010  
info-cs@pfeiffer-vacuum.de  
www.pfeiffer-vacuum.de

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