



OPERATING INSTRUCTIONS

EN

Translation of the Original

OKTA 8000 G

Roots Pump

PFEIFFER  **VACUUM**

Dear Customer,

Thank you for choosing a Pfeiffer Vacuum product. Your new roots pump 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. 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.

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

This document is the intellectual property of Pfeiffer Vacuum and all contents of this document are protected by copyright. They may not be copied, altered, reproduced or published without the prior written permission of Pfeiffer Vacuum.

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

Table of contents

1	About this manual	7
1.1	Validity	7
	1.1.1 Applicable documents	7
	1.1.2 Variants	7
1.2	Target group	7
1.3	Conventions	7
	1.3.1 Instructions in the text	7
	1.3.2 Pictographs	8
	1.3.3 Stickers on product	8
	1.3.4 Abbreviations	9
2	Safety	10
2.1	General safety information	10
2.2	Safety instructions	10
2.3	Safety precautions	13
2.4	Product usage limits	14
2.5	Proper use	14
2.6	Foreseeable improper use	14
3	Product description	16
3.1	Function	16
3.2	Identifying product	17
3.3	Product features	17
3.4	Shipment	17
4	Transportation and Storage	18
4.1	Transporting vacuum pump	18
4.2	Storing vacuum pump	19
5	Installation	20
5.1	Setting up vacuum pump	20
5.2	Filling with lubricant	20
5.3	Filling with sealing oil	21
5.4	Fill the sealing medium for the axial face seal	22
5.5	Connecting the vacuum side	23
5.6	Connecting the fore-vacuum side	24
5.7	Connecting the gas cooler	24
5.8	Connecting cooling water supply	25
5.9	Connect to mains power supply	27
	5.9.1 Connecting three-phase motor with 6-pin terminal board	28
	5.9.2 Checking the direction of rotation	29
	5.9.3 Connecting the PTC thermistor tripping unit	29
5.10	Connecting accessories	30
	5.10.1 Connecting sealing gas	30
	5.10.2 Installing temperature monitoring	31
	5.10.3 Inserting splinter shield	32
6	Operation	33
6.1	Putting the vacuum pump into operation	33
6.2	Switching on the vacuum pump	33
6.3	Adjusting the sealing gas amount	34
6.4	Flushing the suction chamber	35
6.5	Switching off and venting	35
6.6	Restarting	36
7	Maintenance	37
7.1	Maintenance information	37

7.2	Checklist for inspection and maintenance	37
7.3	Changing the lubricant	38
7.4	Changing sealing oil	40
7.5	Checking and changing the sealing medium of the axial face seal	41
7.6	Cleaning the suction chamber	41
7.7	Installing coupling	42
8	Decommissioning	43
8.1	Shutting down for longer periods	43
8.2	Recommissioning	43
9	Recycling and disposal	44
9.1	General disposal information	44
9.2	Dispose of Okta roots pumps	44
10	Malfunctions	45
11	Service solutions by Pfeiffer Vacuum	47
12	Spare parts	49
12.1	Set of seals for version with RSSR	49
12.2	Set of seals for version with axial face seal	49
12.3	Axial face seal, complete	49
12.4	Maintenance kit for version with RSSR	49
12.5	Overhaul kit for versions with RSSR	49
12.6	Overhaul kit for versions with axial face seal	49
12.7	Set of gear wheels	49
13	Accessories	50
13.1	Accessory information	50
13.2	Ordering accessories	50
14	Technical data and dimensions	52
14.1	General	52
14.2	Technical data	52
14.3	Dimensions	53
	Declaration of conformity	55
	UK Declaration of Conformity	56

List of tables

Tbl. 1:	Stickers on product	8
Tbl. 2:	Abbreviations used	9
Tbl. 3:	Permissible ambient conditions	14
Tbl. 4:	Features of the roots pumps	17
Tbl. 5:	Permissible sealing media	22
Tbl. 6:	Requirements on the cooling water composition	26
Tbl. 7:	Max. permissible flushing quantity	35
Tbl. 8:	Maintenance intervals	38
Tbl. 9:	Troubleshooting	46
Tbl. 10:	Accessories for Okta 8000 G	50
Tbl. 11:	Consumables	51
Tbl. 12:	Conversion table: Pressure units	52
Tbl. 13:	Conversion table: Units for gas throughput	52
Tbl. 14:	Technical data for Okta 8000 G	53

List of figures

Fig. 1:	Position of the stickers on the product	9
Fig. 2:	Design, Okta 8000 G	16
Fig. 3:	Functional diagram Okta G	17
Fig. 4:	Transporting the vacuum pump	19
Fig. 5:	Filling with lubricant	21
Fig. 6:	Filling sealing oil for radial shaft seal rings	22
Fig. 7:	Sealing agent container for axial face seal	23
Fig. 8:	Roots pump with tubular gas cooler	25
Fig. 9:	Cooling water connection at the gas cooler	26
Fig. 10:	Delta connection for low voltage	28
Fig. 11:	Star circuit for high voltage	28
Fig. 12:	Check of direction of rotation	29
Fig. 13:	Connection example with PTC thermistor tripping unit	30
Fig. 14:	Sealing gas connection	31
Fig. 15:	Temperature monitoring	32
Fig. 16:	Changing the lubricant	39
Fig. 17:	Replacing sealing oil for radial shaft seal rings	40
Fig. 18:	Elastic bolt coupling	42
Fig. 19:	Okta 8000 G	54

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.

1.1.1 Applicable documents

Designation	Document
Declaration of conformity	A component of these operating instructions

1.1.2 Variants

These instructions apply for roots pumps of the following versions:

Pump type	Pump designs
Standard version	Standard version: <ul style="list-style-type: none"> • Standard motor • Housing and all parts forming the suction chamber are made of GGG • Connection flanges are designed as ISO, DIN or ANSI flanges • Connections for sealing gas inlet • Shaft sealed with radial shaft seal ring (RSSR) • Version with magnetic coupling (M series only)
Special versions	Changes to the standard design: <ul style="list-style-type: none"> • Shaft sealed with an axial face seal • Version with gas cooler • Special seal materials which are resistant to aggressive media • Special housing and piston materials (e.g. stainless steel) • Pressure test carried out on the pump housing

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 product

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

<p>PFEIFFER VACUUM D-35641 Asslar</p> <p>Mod.: Okta 8000 G Mod.-No.: PP G80 xxx Ser. -No.: 12xxxxxxxxx</p> <p>n: max. 2200 1/min Oil: P3 21,0 l S(N): max. 12000 m³/h Weight: 1500 kg</p> <p>Made in Germany 09/2018 CE</p>	<p>Rating plate (example) The rating plate is located on the front side above the sight glass</p>
	<p>Warning hot surface This sticker warns of injuries caused by high temperatures as a result of contact without protection during operation.</p>
<p>Vor Inbetriebnahme Pumpe mit Öl füllen Fill the pump with oil before putting into operation Remplir la pompe d'huile avant la mise en route</p>	<p>Sticker (red) Before commissioning, fill the gear and bearing chambers with lubricant</p>
<p>Achtung! nur mit D2 befüllen Attention! only D2 to be used</p>	<p>Sticker (blue) – special lubricant only Caution: fill with D2 only</p>

Tbl. 1: Stickers on product

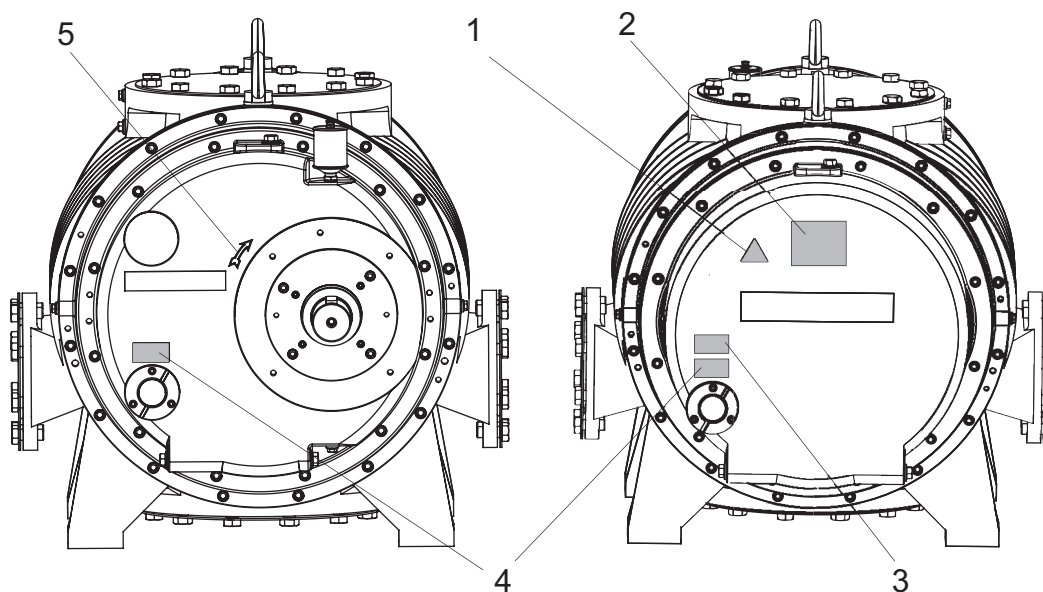


Fig. 1: Position of the stickers on the product

- | | | | |
|---|--------------------------|---|--|
| 1 | Hot surface warning sign | 4 | Note on filling up lubricant |
| 2 | Rating plate | 5 | Direction of rotation arrow (cast in pump housing) |
| 3 | D2 lubricant notice | | |

1.3.4 Abbreviations


Abbreviation	Explanation
Okta "G"	Gas circulation cooled roots pump
WAF	Width Across Flats
E	Clearance between both coupling halves
RSSR	Radial shaft seal ring
AFS	Axial face seal
GGG	Spheroidal graphite cast iron
FPM	Fluoropolymer rubber
PE	Protective earth (earthed conductor)
PN	Nominal pressure stage (pressure nominal)
ANSI	American National Standards Institute
ISO	International Organization for Standardization
DIN	German Institute for Standardization (Deutsches Institut für Normung)
f	Rotation speed value of a vacuum pump (frequency, in rpm or Hz)
BA	Operating instructions
SI	Service instructions

Tbl. 2: Abbreviations used

2 Safety

2.1 General safety information

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

⚠ DANGER	
<p>Immediately pending danger Indicates an immediately pending danger that will result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation 	
⚠ WARNING	
<p>Potential pending danger Indicates a pending danger that could result in death or serious injury if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation 	
⚠ CAUTION	
<p>Potential pending danger Indicates a pending danger that could result in minor injuries if not observed.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid the danger situation 	
NOTICE	
<p>Danger of damage to property Is used to highlight actions that are not associated with personal injury.</p> <ul style="list-style-type: none"> ▶ Instructions to avoid damage to property 	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">  </div>	Notes, tips or examples indicate important information about the product or about this document.

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. Where applicable, all life cycle phases of the product were taken into account.

Risks during transport

⚠ WARNING
<p>Risk of serious injury from swinging, toppling or falling objects During transport, there is a risk of crushing and impact on swinging, toppling or falling objects. There is a risk of injuries to limbs, up to and including bone fractures and head injuries.</p> <ul style="list-style-type: none"> ▶ Secure the danger zone if necessary. ▶ Pay attention to the center of gravity of the load during transport. ▶ Ensure even movements and moderate speeds. ▶ Observe safe handling of the transport devices. ▶ Avoid sloping attachment aids. ▶ Never stack products. ▶ Wear protective equipment, e.g. safety shoes.

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.

⚠ WARNING**Risk of crushing from rotating parts**

Fingers and hands may be caught by rotating pistons within the connection flange. This results in severe injuries.

- ▶ Keep limbs out of the reach of the roots pump.

⚠ WARNING**Risk of scalding from suddenly escaping hot cooling water**

The cooling water connections are open to both sides. When connecting the cooling water supply, there is a risk of scalding from the sudden escape of overpressurized hot water.

- ▶ Prior to installation, ensure that pressure is discharged from the cooling water system, and that it is cooled down.
- ▶ Wear protective equipment, e.g., safety goggles and gloves.

⚠ 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.

⚠ CAUTION**Risk of injury from loss of stability**

During setup, there is a risk of injury from tipping, if the vacuum pump is not anchored on the standing surface.

- ▶ Secure the vacuum pump using suitable lifting gear.
- ▶ Wear personal 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.

Risks during 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.

⚠ WARNING

Risk of injury from reactive, potentially explosive or other hazardous gas/air mixtures

Uncontrolled gas inlet of air or gases containing oxygen provides ideal conditions for the formation of unexpected explosive gas/air mixtures in the vacuum system. This results in severe injuries.

- ▶ Use only inert gases for supplying the sealing gas supply in order to avoid a potential ignition.

⚠ WARNING

Risk of crushing on rotating parts when reaching into the open flange

The pistons continue to run in the vacuum after switching off the motor, and can trap fingers and hands within their reach.

- ▶ Wait until the vacuum pump comes to a complete standstill.
- ▶ Secure the vacuum pump against re-start.

⚠ 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.

⚠ CAUTION

Health hazard from increased noise emission

Remaining in the close proximity of the vacuum pump for a sustained period of time may cause hearing damage.

- ▶ Ensure adequate sound insulation.
- ▶ Wear hearing protection.

Risks during maintenance, decommissioning and malfunctions

⚠ 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**Risk of crushing from rotating parts**

Fingers and hands may be caught by rotating pistons within the connection flange. This results in severe injuries.

- ▶ Keep limbs out of the reach of the roots pump.

⚠ WARNING**Health hazard and environmental damage from toxic contaminated lubricant**

Toxic process media can cause lubricant contamination. When changing the lubricant, there is a health hazard due to contact with poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Wear suitable personal protective equipment when handling these media.
- ▶ Dispose of the lubricant according to locally applicable regulations.

⚠ WARNING**Danger of injury due to exposed rotating parts**

In the operating range of the motor coupling, there is a danger of clothing being caught and wound up.

- ▶ When assembling the motor and coupling, make sure that the coupling protection is seated correctly.
- ▶ Wear correct clothing.

⚠ CAUTION**Scalding from hot lubricant**

Danger of scalding when draining lubricant if it comes into contact with the skin.

- ▶ Wear protective equipment.
- ▶ Use a suitable collection receptacle.

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

- ▶ Do not expose body parts to the vacuum.
- ▶ Check all safety measures at regular intervals.
- ▶ Observe the safety and accident prevention regulations, if necessary wear personal protective equipment.
- ▶ Always ensure a secure connection to the earthed conductor (PE), protection class I.
- ▶ Never operate the vacuum pump with open vacuum flange.
- ▶ Provide suitable touch protection, if the surface temperature exceeds 70°C.
- ▶ Provide suitable noise protection measures as necessary.

- ▶ Before working on the vacuum connection, wait until the rotor is at a complete standstill (rotation speed $f = 0$ Hz).
- ▶ Never make your own conversions or modifications to the vacuum pump.
- ▶ Before returning the vacuum pump, observe the notes in the chapter Service.

2.4 Product usage limits

Parameter	Okta G
Installation location	<ul style="list-style-type: none"> • Indoors, protected against: <ul style="list-style-type: none"> – dust deposits – falling objects – fire-fighting water • Outdoors, protected against: <ul style="list-style-type: none"> – falling objects – direct influence of weather such as rain, splash water, strong drafts and sunlight – fire-fighting water – lightning strike
Installation altitude	max. 2,000 m above sea level, at installation altitudes > 1,000m above m.s.l. and an ambient temperature of 40 °C the rated power of the motor reduces by around 10 %
Ambient temperature	+5 °C to +40 °C
Relative air humidity	max. 85 % (depending on the motor version)
Gas temperature, pressure side, max.	+140 °C
Intake pressure, max.	< 1,100 hPa (abs.)
Orientation	Horizontal

Tbl. 3: Permissible ambient conditions

2.5 Proper use

- ▶ Use the vacuum pump for vacuum generation only.
- ▶ When pumping media with an oxygen concentration level of > 21 %, only use perfluorinated, synthetic oils (F5) as lubricant.
- ▶ Use sealing gas as appropriate for the process.
- ▶ Operate the vacuum pump within the application limits of the product and in compliance with the technical data.
- ▶ Adhere to the installation, commissioning, operating, and maintenance instructions.
- ▶ Use only accessory parts 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:

- Transporting, installing, or operating the vacuum pump in an impermissible spatial position
- Pumping media which are corrosive to materials of the vacuum pump
- Pumping explosive media
- Pumping radioactive media
- Pumping media prone to exothermic reactions
- Pumping media that introduce an ignition source to the suction chamber
- Pumping media that form adhesive deposits inside the suction chamber and cause the pistons to touch or jam
- Pumping fluids - flushing media for cleaning are permissible
- 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 potentially explosive atmospheres
- Using the vacuum pump in areas with strong electrical, magnetic or electromagnetic fields

- Use of the vacuum pump with open vacuum and/or fore-vacuum flange open to the atmosphere
- Using lubricants not specified by Pfeiffer Vacuum
- Lifting the vacuum pump without the prescribed eye bolts, for example on piping.
- Use of accessories or spare parts not listed in these instructions
- Using the vacuum pump as a climbing aid

3 Product description

3.1 Function

The **gas circulation cooled** roots pumps of the OktaLine "G" series work according to the Roots principle, and are operated without backing pump. 2 rolling pistons, which are coupled by a pair of gears, counter-rotate and roll in the housing in opposite directions without making contact. When used as a single pump, they can reach a pressure range of 130 to 1013 Pa. A series connection of two vacuum pumps reduces the ultimate pressure to 20 to 30 hPa. When combined with other Roots pumps, the final pressure can be lowered down to the medium vacuum range. The direction of flow of the vacuum pumps is vertical from top to bottom, so that any accumulating fluids cannot become deposited in the pump housing.

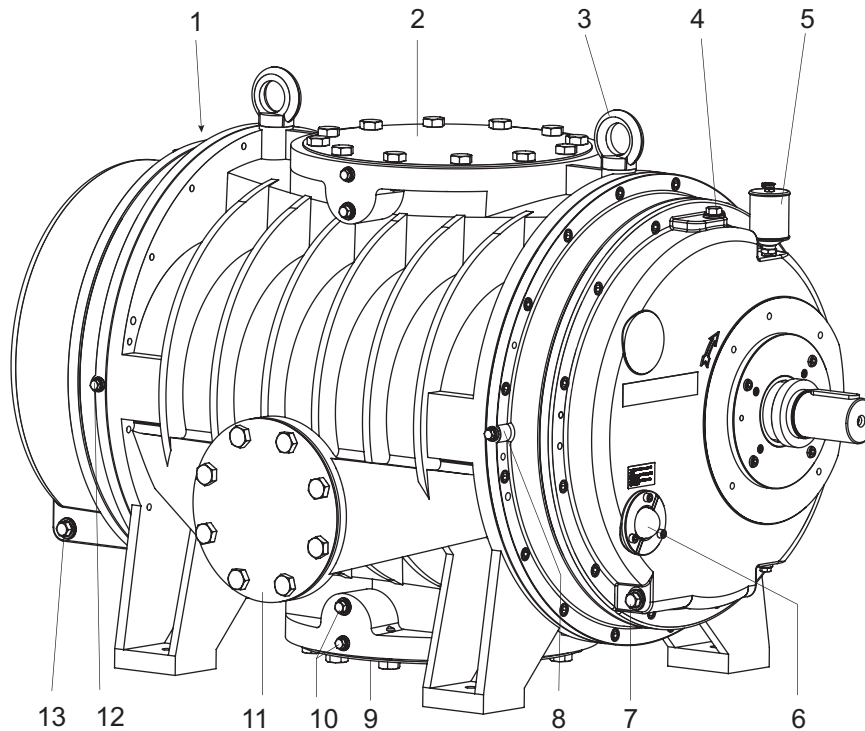


Fig. 2: Design, Okta 8000 G

- | | |
|-------------------------------|---|
| 1 Lubricant filling plug | 8 Sealing gas connection (2×) |
| 2 Vacuum flange | 9 Fore-vacuum flange |
| 3 Eye bolts | 10 Measurement connection, fore-vacuum flange |
| 4 Lubricant filling plug | 11 Cooling gas connection |
| 5 Oiler for version with RSSR | 12 Sealing gas connection (2×) |
| 6 Sight glass | 13 Lubricant drain plug |
| 7 Lubricant drain plug | |

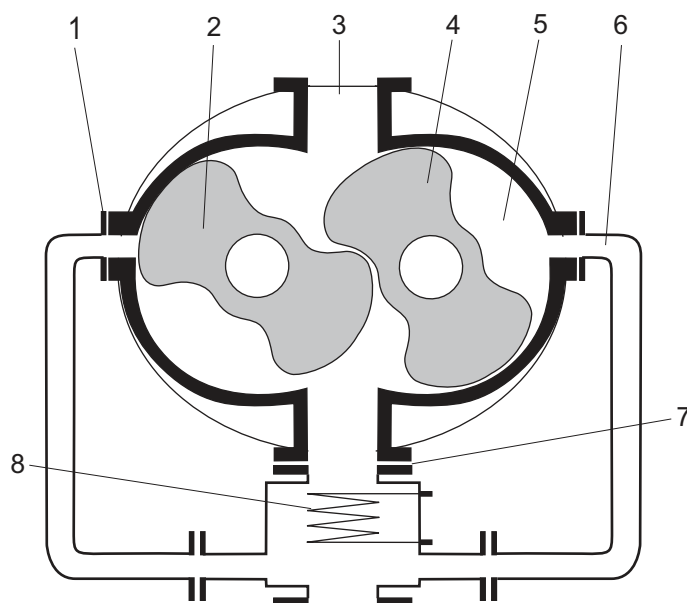


Fig. 3: Functional diagram Okta G

- | | |
|----------------------------|---|
| 1 Cooling gas connection I | 5 Suction chamber |
| 2 Secondary rotor | 6 Cooling gas connection II |
| 3 Vacuum connection | 7 Fore-vacuum connection (fore-vacuum flange) |
| 4 Main rotor | 8 Gas cooler |

3.2 Identifying product

To ensure unambiguous identification of the product when communicating with Pfeiffer Vacuum, always keep all of the information on the rating plate at hand.

The following information is shown on the rating plates:

- Pump model
- Model number
- Type and quantity of the lubricant
- Max. allowable pump rotation speed
- Date of manufacture
- Input voltage range (motor rating plate)

3.3 Product features

Flange types	Vacuum connection/ Fore-vacuum con- nection	Cooling gas con- nection	Measurement connections	Barrier gas connections
ANSI (150 lbs)	12"	6"	1 × G 3/8"	4 × G 3/8"
DIN	DN 300 PN 10	DN 150 PN 10	1 × G 1/2"	
DIN ISO	NW 320 ISO-F	NW 160 ISO-F		

Tbl. 4: Features of the roots pumps

3.4 Shipment

- Okta G without motor
- Connection flange
- Seal for the connection flange
- Protective cover for the connection flange
- Screw kit for the connection flange
- 2 eye bolts
- Lubricant P3 (for standard pump)
- Operating instructions

4 Transportation and Storage

4.1 Transporting vacuum pump

WARNING

Risk of serious injury from swinging, toppling or falling objects

During transport, there is a risk of crushing and impact on swinging, toppling or falling objects. There is a risk of injuries to limbs, up to and including bone fractures and head injuries.

- ▶ Secure the danger zone if necessary.
- ▶ Pay attention to the center of gravity of the load during transport.
- ▶ Ensure even movements and moderate speeds.
- ▶ Observe safe handling of the transport devices.
- ▶ Avoid sloping attachment aids.
- ▶ Never stack products.
- ▶ Wear protective equipment, e.g. safety shoes.



Instructions for safe transport

- Only remove the protective cover for the connection flange once the pipes have been mounted.
- Fill the gear and bearing chambers with lubricant only once the final installation position is reached.



Preparations for transport

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

Safe transport of the product

1. Observe weight specified on the rating plate.
2. Where possible, always transport or ship the roots pump in its original packaging.
3. Remove the protective cap only immediately prior to installation.

Transporting the vacuum pump in its packaging

1. Use a pallet truck to transport the vacuum pump in its packaging.
2. Note the center of gravity of the load.
3. Observe safe handling of manually operated transport devices.
4. Ensure harmonious movements and moderate speeds.
5. Ensure a flat substrate.
6. Wear protective equipment, e.g. safety shoes.

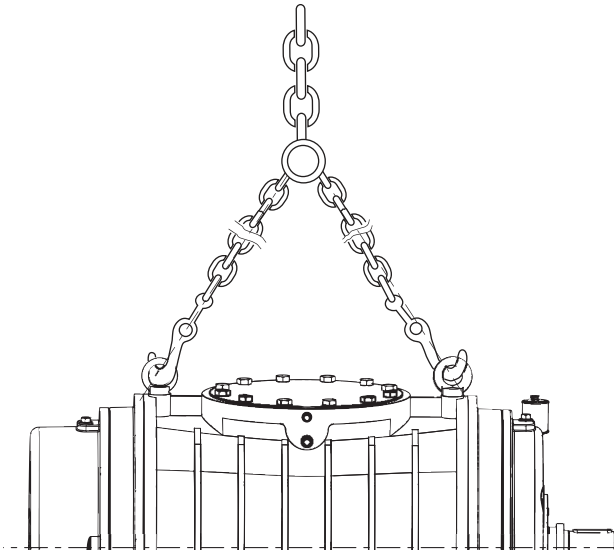


Fig. 4: Transporting the vacuum pump

Transporting vacuum pump without packaging

2 eye bolts are included in the shipment, which are firmly bolted to the vacuum pump ex-factory.

1. Unpack the vacuum pump.
2. Attach suitable lifting tools to both eye bolts.
3. Pay attention to the correct use and fastening of the lifting equipment.
4. If a motor is installed, use an additional strap at a suitable location.
5. Lift the vacuum pump out of the transport packaging vertically.
6. If necessary, remove the eye bolts after transport and installation.
 - Keep the eye bolts for future use.

4.2 Storing vacuum pump

Neither the suction chamber nor the pistons in the roots pump in the roots pump interior are provided with **corrosion protection**.



Storage

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

Procedure

1. Vacuum-seal both connection flanges.
2. Store the roots pump only in dry, dust-free rooms, within the specified ambient conditions.
3. Evacuate and then fill the suction chamber with nitrogen to achieve the best corrosion protection for the roots pump.
4. In rooms with humid or aggressive atmospheres, seal the roots pump airtight in a plastic bag, together with a drying agent.
5. Change the lubricant after a storage period of more than 2 years.
6. If you intend to store the roots pump for longer periods, we recommend that you use a special corrosion protection agreed with Pfeiffer Vacuum.

5 Installation

5.1 Setting up vacuum pump

⚠ CAUTION

Risk of injury from loss of stability

During setup, there is a risk of injury from tipping, if the vacuum pump is not anchored on the standing surface.

- ▶ Secure the vacuum pump using suitable lifting gear.
- ▶ Wear personal protective equipment.

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.

Procedure

1. Check the carrying capacity of the floor at the installation location.
2. Place the vacuum pump on a flat, horizontal and fixed surface, to safeguard the lubricant supply.
 - Reference surface is the vacuum flange.
3. Evenly screw the 4 feet of the vacuum pump onto the base without distorting the pump housing.
4. Use adjustment elements from the Pfeiffer Vacuum [range of accessories for roots pumps](#) to mount the feet horizontally.
5. When installing the pump in a closed housing, ensure adequate air circulation.
6. Keep both sight glasses freely accessible for checks and maintenance.
7. Keep the filling/drain holes freely accessible.
8. Ensure that the motor rating plate remains accessible at all times for a clear view of the voltage and frequency specifications.
9. Maintain the minimum distances to bordering surfaces to guarantee sufficient air circulation.
10. Fill with lubricant prior to first commissioning.

5.2 Filling with lubricant

NOTICE

Property damage from using non-approved lubricant

Attainment of product-specific performance data is not ensured. If non-approved lubricants are used, all liability and warranty claims against Pfeiffer Vacuum are excluded.

- ▶ Use only lubricants approved by Pfeiffer Vacuum.
- ▶ Use alternative, application-specific lubricants only following consultation with Pfeiffer Vacuum.

Permissible lubricants

- P3 (standard design)
- D2 for special applications (such as higher operating temperatures)
- Other lubricants on request

The lubricant type is specified on the rating plate

- ▶ Please refer to rating plate of the vacuum pump for type and quantity of intended lubricant.
 - Only the lubricant used during initial installation is permissible.
 - D2 is permitted as a replacement for D1.
- ▶ Contact Pfeiffer Vacuum if you want to use another type of lubricant.

Consumables

- Lubricant

Required tools

- Open-end wrench, 24 mm WAF
- Calibrated torque wrench (tightening factor ≤ 2.5)

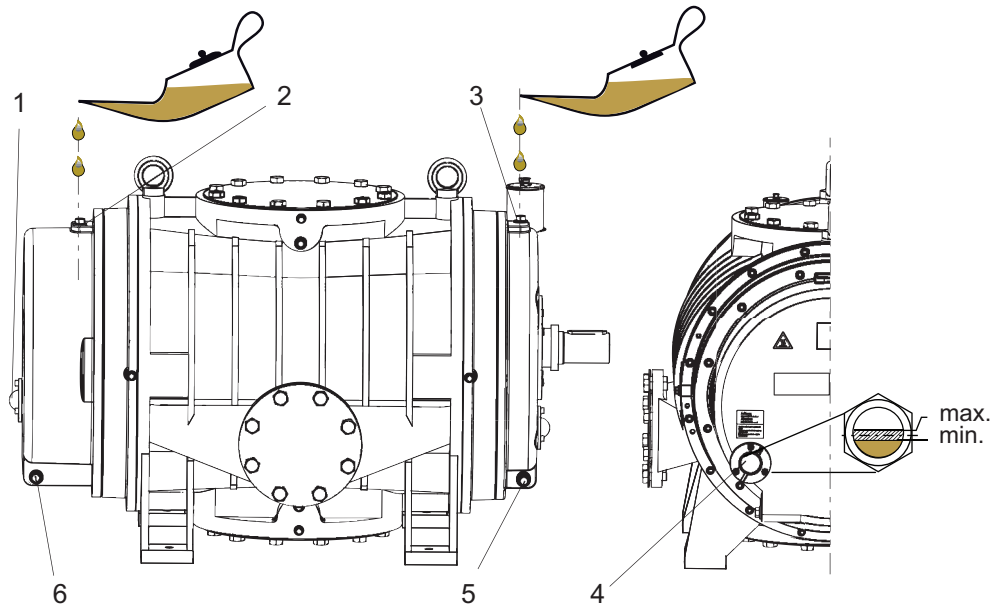


Fig. 5: Filling with lubricant

- | | |
|--------------------------------|--------------------------|
| 1 Sight glass, bearing chamber | 4 Sight glass, gear side |
| 2 Lubricant filling plug | 5 Lubricant drain plug |
| 3 Lubricant filling plug | 6 Lubricant drain plug |

Procedure

1. Unscrew both lubricant filler screws.
2. Fill the lubricant on both sides according to the sight glass.
 - Filling levels with the first filling: approx. 5 mm above the sight glass middle.
3. Seal the filler screws.
 - Tightening torque: **50 Nm**
4. Check the fill level during operation in the final vacuum.
 - Fill level during operation: within the marking on the sight glass

Refilling the lubricant is carried out with the roots pump switched off and vented.

5.3 Filling with sealing oil



Overfilling the oiler

The lubricant expands when the roots pump heats up, which could cause lubricant to leak if overfilled.

Oiler fill level with roots pump in cold state: to max. halfway.

The shaft feedthrough of the drive shaft is sealed with sealing oil-covered radial shaft seals. The corresponding oiler on the seal casing cools and lubricates the radial shaft seal rings. The sealing oil type is the same as the lubricant.

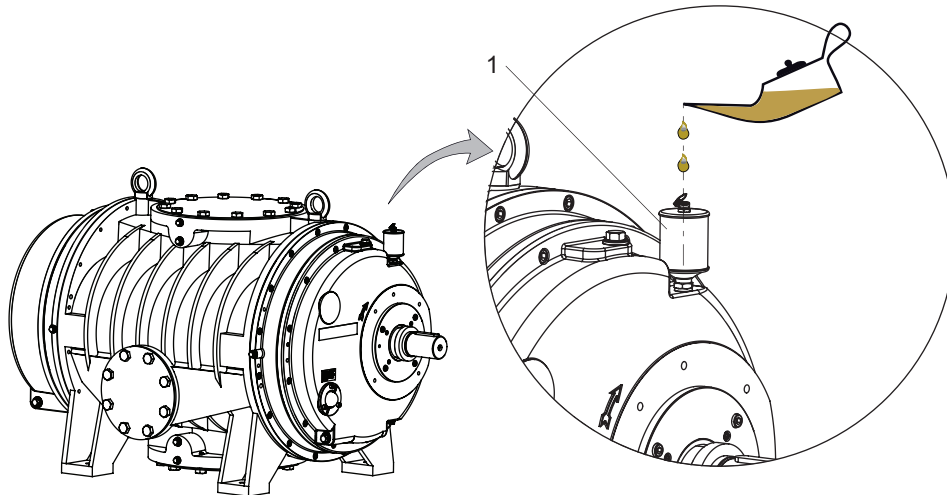


Fig. 6: Filling sealing oil for radial shaft seal rings

1 Oiler

Consumable

- Sealing oil (lubricant)

Procedure

1. Open the filler flap on the oiler.
2. Fill the oiler with lubricant to max. halfway.
3. Close the filler flap.

5.4 Fill the sealing medium for the axial face seal

NOTICE

Damage to the axial face seal due to aging of the sealing medium

Sustained exceeding of the max. permissible sealing oil temperature damages the axial face seal.

- ▶ Observe the maximum permissible sealing oil temperature of 70°C at the outlet of the axial face seal.
- ▶ If necessary, provide temperature monitoring for the event that the temperature exceeds the permissible value.
- ▶ Also use water cooling at the sealing medium container, for the event that the cooling is insufficient due to the thermal radiation at the sealing medium container.

When using an axial face seal, the sealing surfaces must be cooled using a sealing medium. The piping and the sealing medium container are not included in the scope of delivery for the vacuum pump.

Sealing medium	Viscosity [mm ² /s]	Pump lubricant
Shell Morlina S2 B 32	32 at T = 40°C	P3
Anderol 495	28 at T = 40°C	D2

Tbl. 5: Permissible sealing media

Required consumables

- Sealing medium container including fittings
- Sealing medium

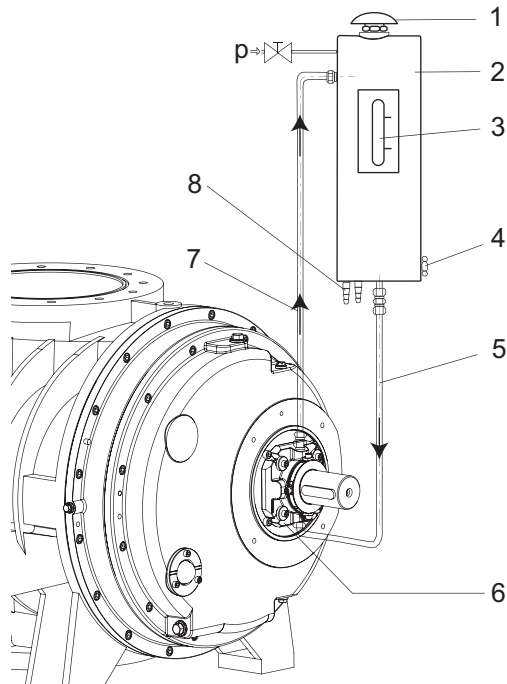


Fig. 7: Sealing agent container for axial face seal

- | | |
|---------------|-----------------------------|
| 1 Filler neck | 6 Sealing ring housing |
| 2 Container | 7 Return line |
| 3 Sight glass | 8 Cooling water connection |
| 4 Drainage | p Compressed air connection |
| 5 Feed line | |

Procedure

1. Fasten the container for the sealing medium onto the base frame above the shaft feedthrough, or as the respective conditions allow.
2. Observe the installation instructions of the manufacturer when mounting the container.
3. Mount the container at a height between 500 mm and max. 800 mm above the axial face seal.
4. Use approved sealing media only.

The axial face seal may bridge a certain pipe resistance through its own pumping effect. If the supply with sealing medium is no longer ensured, an additional circulation is necessary.

5.5 Connecting the vacuum side

⚠ WARNING

Risk of crushing from rotating parts

Fingers and hands may be caught by rotating pistons within the connection flange. This results in severe injuries.

- ▶ Keep limbs out of the reach of the roots pump.

NOTICE

Property damage from intake of solid particles

During commissioning, there is a risk of damage to the suction chamber from dirt from the system or the pipes.

- ▶ Use a suitable protective strainer ("start-up strainer") in the intake flange.
- ▶ Ensure that this strainer is only removed when the risk of solid particles entering the vacuum pump can be excluded.
 - Observe any pumping speed decrease.

Procedure

1. Degrease the connection flange.
2. Clear welded lines of any tinder, loose parts or similar before installation.
3. Establish the shortest possible connection between the roots pump and vacuum chamber; equivalent to the nominal flange diameter as a minimum.
4. Select a larger nominal diameter for pipe lengths > 5 m.
5. Support or suspend the piping so that no forces from the piping system act on the roots pump.
6. Always use **all** prescribed bolts for fastening the flanges and consider the prescribed pressure stage for PN 10.

5.6 Connecting the fore-vacuum side

⚠ WARNING

Risk of crushing from rotating parts

Fingers and hands may be caught by rotating pistons within the connection flange. This results in severe injuries.

- ▶ Keep limbs out of the reach of the roots pump.

⚠ 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.

Procedure

1. Choose a minimum pipe cross section equal to the nominal diameter of the pressure flange.
2. Clear welded lines of any tinder, loose parts or similar before installation.
3. Route the pipes so that no mechanical tension can act on the roots pump or the backing pump.
4. Install a bellows in the piping if necessary.
5. Ensure that mating flanges are in a parallel position.
6. Install the pipes downward from the roots pump, so that condensate does not flow back into the roots pump.
7. Install a condensate separator if necessary.
8. If an air trap is created in the system, then install a condensate drain facility at the lowest point.

5.7 Connecting the gas cooler

Depending on the area of application and requirements of the process, Pfeiffer Vacuum recommends the use of a gas cooler (optional).

The dimensioning of the gas cooler and the cold gas circulation pipe is the responsibility of the operating company. As an alternative, Pfeiffer Vacuum can assist you with the authorization of the dimensioning.

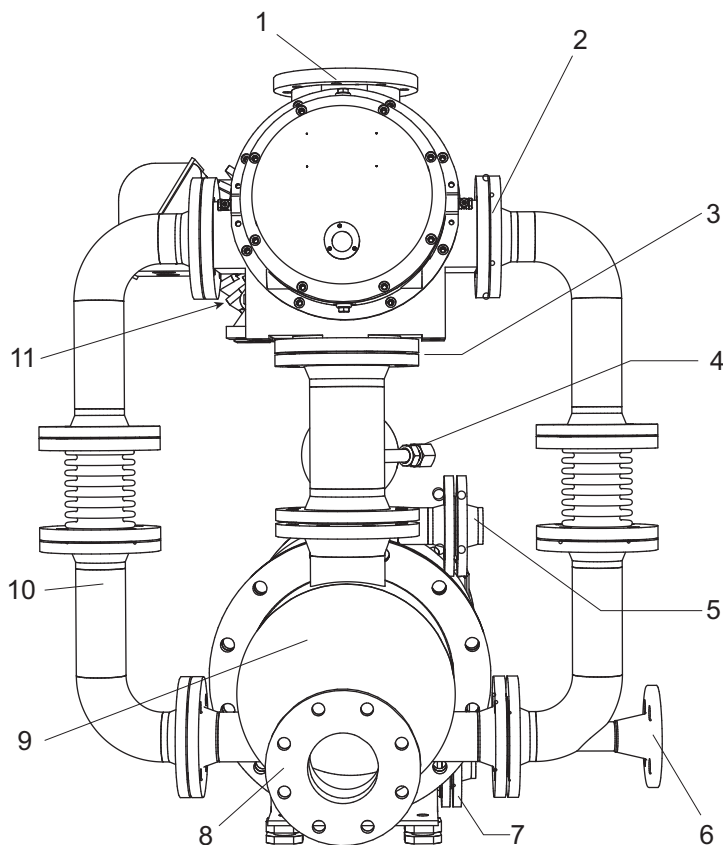


Fig. 8: Roots pump with tubular gas cooler

- | | |
|------------------------------------|------------------------------------|
| 1 Vacuum flange | 7 Cooling water connection, inlet |
| 2 Cooling gas connection | 8 Fore-vacuum connection |
| 3 Fore-vacuum flange | 9 Gas cooler |
| 4 Measurement connection | 10 Cold gas circulation pipe |
| 5 Cooling water connection, outlet | 11 Temperature monitoring (option) |
| 6 Measurement connection | |

Procedure

1. Design the gas cooler in mild steel or stainless steel, according to the media being conveyed.
2. Establish the pipe connections according to the respective design drawing.
3. Choose a minimum fore-vacuum line cross section equal to the size of the connection nominal diameter of the fore-vacuum flange.
4. When connecting the flanges, observe the correct position of the seals.
5. Maintain a tension-free connection.

5.8 Connecting cooling water supply

⚠ WARNING

Risk of scalding from suddenly escaping hot cooling water

The cooling water connections are open to both sides. When connecting the cooling water supply, there is a risk of scalding from the sudden escape of overpressurized hot water.

- ▶ Prior to installation, ensure that pressure is discharged from the cooling water system, and that it is cooled down.
- ▶ Wear protective equipment, e.g., safety goggles and gloves.

Using a cooling water control valve

- ▶ Install a cooling water control valve at the cooling water inlet of the gas cooler.
 - Using this regulator will reduce the consumption of cooling water, and keep the roots pump at the required operating temperature.

Additional monitoring devices to be provided on site:

- Cooling water control valve
- Flow indicator, optional
- Cooling water pressure monitor, optional

Parameter	Cooling water
Appearance	<ul style="list-style-type: none"> • filtered • mechanically clear • visually clear • no turbidity • no sediment • free from grease and oil
pH value	7 to 9
Carbonate hardness, max.	10 °dH 12.53 °e 17.8 °fH 178 ppm CaCO ₃
Chloride content, max.	100 mg/l
Sulfate content, max.	240 mg/l
Carbonic acid content, max.	not detectable
Ammonia content, max.	not detectable
Electrical conductivity, max.	500 µS/cm
Particle size, max.	150 µm

Tbl. 6: Requirements on the cooling water composition

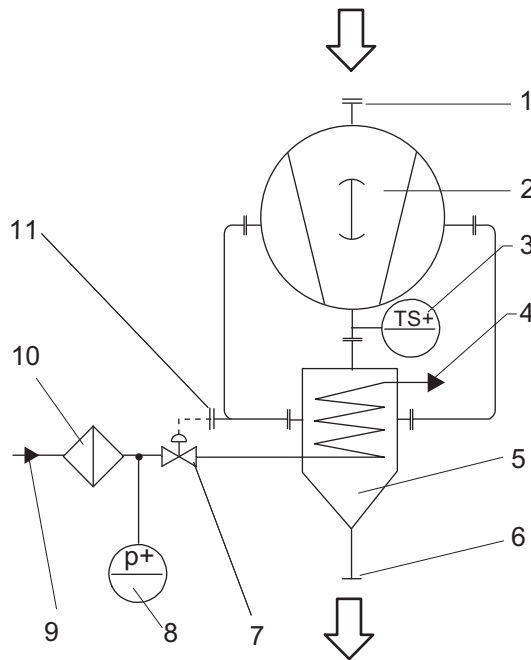


Fig. 9: Cooling water connection at the gas cooler

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Vacuum flange 2 Roots pump Okta G 3 Measurement connection, temperature 4 Cooling water connection, outlet 5 Gas cooler 6 Fore-vacuum connection | <ul style="list-style-type: none"> 7 Cooling water control valve 8 Pressure monitor 9 Cooling water connection, inlet 10 Dirt trap 11 Cooling water control valve temperature sensor (measurement connection) |
|---|--|

Connecting cooling water supply

1. Make sure that the outlet is unpressurized and that a visual check can be made of the flow rate.
 - The best method is the free outflow of cooling water via a funnel.
2. Alternatively, use a flow indicator in the cooling water line directly at the pump connection.

3. Connect the cooling water lines according to the connection diagram.
4. Open the supply provided on site.
5. Open the bypass valve and at the same time fill the cooling system until cooling water is emitted at the outlet.
6. Close the bypass valve.

Installing a pressure monitor

The installation of a cooling water pressure monitor protects the roots pump effectively against cooling water failure. Depending on the pump identification, approved flow rate monitors or flow indicators are required.

1. If necessary, close the pressure monitor and solenoid valve for monitoring and control of the cooling water flow according to the installation instructions of the manufacturer.
2. Set the required switching pressures:
 - minimum: 300 hPa
 - maximum: 10000 hPa

5.9 Connect to 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.

WARNING

Risk of fatal injury due to electric shock on account of incorrect installation

The device's power supply uses life-threatening voltages. Unsafe or improper installation can lead to life-threatening situations from electric shocks obtained from working with or on the unit.

- ▶ Ensure safe integration into an emergency off safety circuit.
- ▶ Do not carry out your own conversions or modifications on the unit.

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

Risk of 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.
 - Pfeiffer Vacuum recommends the circuit breaker type "K" with slow tripping characteristic.

NOTICE

Motor damage from overheating

Limited motor fan cooling capacity, caused by low speeds, causes the motor to overheat.

- ▶ During operation with a frequency converter, observe the rotational speed range specified in the technical data.

The vacuum pumps are equipped with three-phase motors for different voltages and frequencies. The applicable motor type is shown on the motor rating plate.

Standard versions

- Three phase motor with PTC, without switch and mains cable

5.9.1 Connecting three-phase motor with 6-pin terminal board

NOTICE
<p>Property damage from high starting torque</p> <p>The specific load behavior of the vacuum pump requires direct on-line starting at full motor power. Engine damage occurs if a different starting circuit is used.</p> <ul style="list-style-type: none"> ▶ Always start the motor directly. ▶ Never use a star-delta start-up circuit.

Connectors U1 – L2, V1 – L1 and W1 – L3 rotate the motor shaft clockwise when looking at the motor fan.

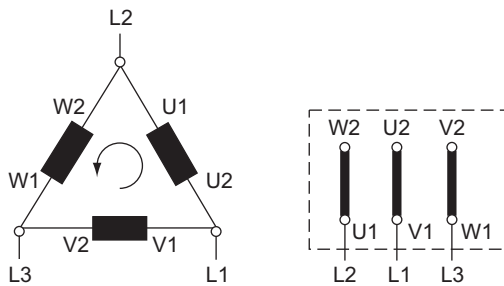


Fig. 10: Delta connection for low voltage

The 3 phases are connected in series, and their connection points connected to the mains. The voltage per phase is equal to the mains voltage, while the mains current is $\sqrt{3}$ times the phase current. The delta connection is marked with the Δ symbol. The voltage between the incoming mains supply lines is called mains voltage. The mains current is the current flowing in the incoming supply lines.

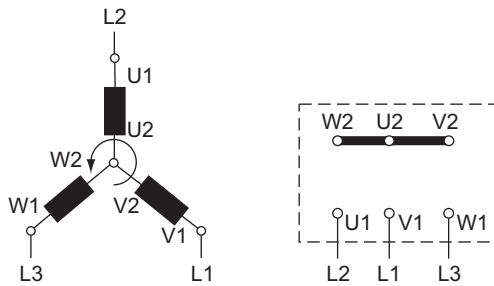


Fig. 11: Star circuit for high voltage

The ends of the 3 phases are connected in the star point. The terminal voltage is $\sqrt{3}$ times the phase voltage, the mains current is equal to the phase current. The star circuit is marked with the Y symbol.

5.9.2 Checking the direction of rotation

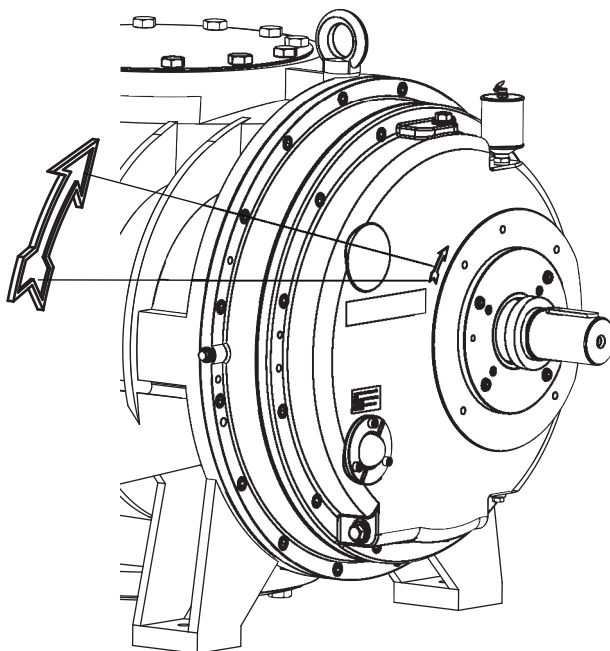


Fig. 12: Check of direction of rotation

Procedure

1. When switching on for the first time, check the roots pump direction of rotation.
2. Switch the vacuum pump on briefly (2 to 3 seconds)
 - The motor and coupling must rotate clockwise (see directional arrow on housing cover).
3. If the direction of rotation is incorrect, swap the 2 phases of the connection cable in the terminal box.

5.9.3 Connecting the PTC thermistor tripping unit



Tripping units store the shut-down

Pfeiffer Vacuum recommends connecting motors with PTC in the stator winding to a PTC resistor tripping device for protection against overload.

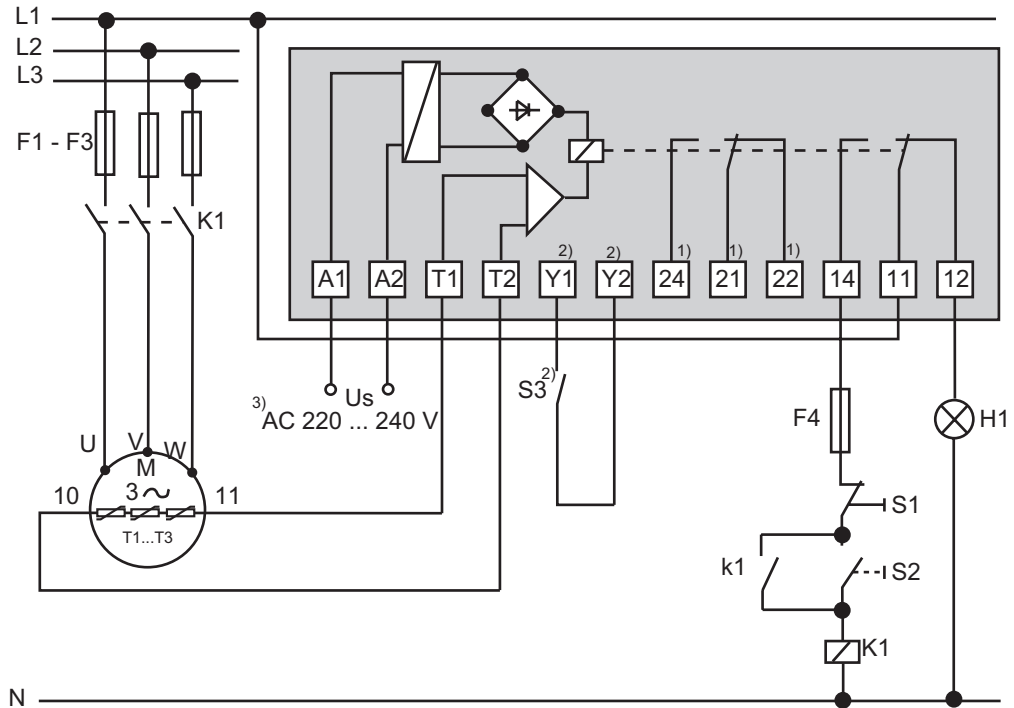


Fig. 13: Connection example with PTC thermistor tripping unit

U _s	Control voltage	T1 – T3	PTC resistor sensor
S ₁	OFF button	H1	Tripping indicator
S ₂	ON button	M	Motor, 3-phase
S ₃	RESET button	1)	For devices with two relay outputs only
K1	Contactor	2)	For MSR type (model) only
F1 – F4	Fuses	3)	Only for order no.: P 4768 052 FQ and P 4768 052 FE

Procedure

- ▶ After shut-down, switch the tripping unit back on manually via the installed RESET button or via the external RESET S3.
 - Switching on mains detected as automatic RESET.

5.10 Connecting accessories



Installation and operation of accessories

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

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

5.10.1 Connecting sealing gas

⚠ WARNING

Risk of injury from reactive, potentially explosive or other hazardous gas/air mixtures

Uncontrolled gas inlet of air or gases containing oxygen provides ideal conditions for the formation of unexpected explosive gas/air mixtures in the vacuum system. This results in severe injuries.

- ▶ Use only inert gases for supplying the sealing gas supply in order to avoid a potential ignition.

Sealing gas in the area of the shaft feedthrough prevents contamination of the lubricant when conveying solvents or reactive gases.

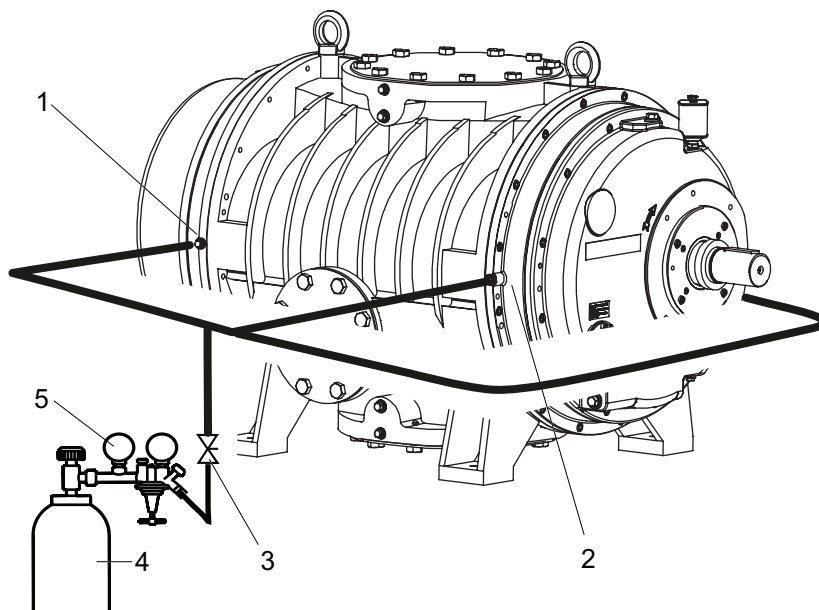


Fig. 14: Sealing gas connection

- | | |
|---|----------------------------------|
| 1 Sealing gas connection on the bearing shield (motor side) | 4 Gas cylinder (N ₂) |
| 2 Sealing gas connection on the bearing shield (gear side) | 5 Pressure reducer |
| 3 Flow meter with dosing valve | |

Required tools

- Open-end wrench, WAF 17
- Calibrated torque wrench (tightening factor ≤ 2.5)

Connecting sealing gas

1. Preferably use nitrogen (N₂) or another inert gas as sealing gas.
2. Connect the sealing gas pipe to both connections per bearing shield (4 × G 3/8").
3. Use the gas cylinder with pressure reducer and flow meter.
4. Set the quantity of sealing gas.

5.10.2 Installing temperature monitoring

To protect the roots pump against thermal overload, a G 3/8" thread for connection of a thermometer (optional) is provided at the fore-vacuum flange of the roots pump. Pfeiffer Vacuum recommends the use of a head-mounted transmitter with 2 input channels.



Temperature monitoring

The max. permissible gas temperature in the discharge channel of the fore-vacuum flange is 140°C.

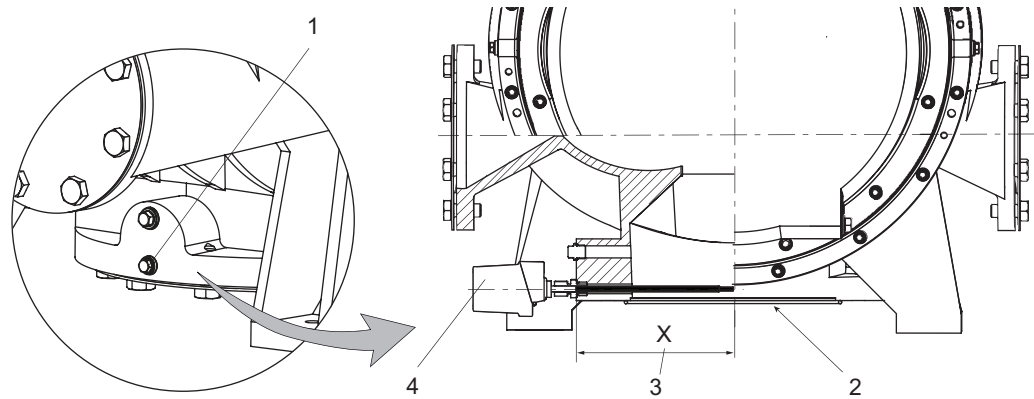


Fig. 15: Temperature monitoring

- | | |
|---|----------------------------|
| 1 Locking screw of the measurement connection | 3 Installation dimension X |
| 2 Fore-vacuum flange | 4 Thermometer |

Required tools

- Open-end wrench, WAF 17



Faulty temperature measurement

The measurement is faulty if the installation dimension is not observed. No maximum values will be measured.

Procedure

1. Unscrew the locking screw of the measurement connection hole at the discharge channel.
2. Mount the clamping screw fitting for the thermometer.
3. Mount the filling pipe in the clamping screw fitting.
4. Set the installation dimension **X = 241,3 mm** and tighten the clamping screw fitting tight.

5.10.3 Inserting splinter shield

Procedure

1. Install an appropriate protective splinter shield at the vacuum connection in case there is a risk of solid matter being sucked along.
2. Clean the splinter shield at regular intervals.

6 Operation

6.1 Putting the vacuum pump into operation

Before switching on

1. Check the lubricant levels on both sight glasses.
2. Compare the voltage and frequency specifications on the motor rating plate with the available mains voltage and frequency.
3. Make sure that the suction chamber is free from all foreign matters.
4. Check the vacuum pump for visible damage and put the vacuum pump into operation only in a correct state.
5. Protect the vacuum pump from sucking in contamination using suitable measures (e.g. dust filter).
6. Make sure that the shut-off units on the pressure side open before starting the pump.
7. Open the cooling water flow and ensure the flow rate.
8. If necessary, vent the cooling chambers.

6.2 Switching on the vacuum pump

⚠ 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.

⚠ CAUTION

Health hazard from increased noise emission

Remaining in the close proximity of the vacuum pump for a sustained period of time may cause hearing damage.

- ▶ Ensure adequate sound insulation.
- ▶ Wear hearing protection.

NOTICE

Property damage from impermissibly high pressure in the vacuum system

Excessive pressure following the failure of the backing pump may damage the motor, pump seals, and cooling system.

- ▶ Where possible, switch off the roots pump immediately if the backing pump fails.

Depending on the application, the roots pump can discharge directly to the atmosphere as single pump or be operated together with a backing pump in a roots pumping station.

Procedure with independent operation of the roots pump

You can switch on the vacuum pump in every pressure range, between atmospheric pressure and ultimate pressure.

1. Switch the vacuum pump on the on-site side via respective start-up switching (e.g. contactor circuit).
2. Allow the vacuum pump to warm up prior to process start, with the vacuum flange closed, for approx. 30 minutes.

Procedure when operating the roots pump in a roots pumping station

The roots pump compresses against one or more backing pumps (e.g. liquid ring pumps).

1. Switch the backing pump on at the mains switch, or on-site, via a contactor circuit.
2. Only switch the roots pump on when the fore-vacuum pressure allows the backing pump to accommodate the amount of gas required.

6.3 Adjusting the sealing gas amount

⚠ WARNING

Risk of injury from reactive, potentially explosive or other hazardous gas/air mixtures

Uncontrolled gas inlet of air or gases containing oxygen provides ideal conditions for the formation of unexpected explosive gas/air mixtures in the vacuum system. This results in severe injuries.

- ▶ Use only inert gases for supplying the sealing gas supply in order to avoid a potential ignition.

NOTICE

Property damage from impermissibly high sealing gas pressure

Excessive sealing gas pressure leads to damage to the seals after switching on the vacuum pump.

- ▶ Make sure that the sealing gas pressure inside the pump does not exceed 1200 hPa.
- ▶ Stop the sealing gas supply immediately after switching off the vacuum pump.

Equation for calculating the sealing gas flow:

$$Q_S = (S_{th} \times p \times A_S) / p_0$$

- Q_S = Sealing gas flow under standard conditions [Nm³/h]
- p = Intake pressure [hPa]
- p_0 = Ambient pressure under standard conditions [hPa]
- Δp = Differential pressure max. [hPa]
- p_v = Fore-vacuum pressure [hPa]
- A_S = Sealing gas content at the operating gas flow ($0.01 \leq A_S \leq 0.08$)
- S_{th} = Rated volume flow rate of the roots pump [m³/h]

Procedure

Depending on the operating pressure, the empirical value for the supplied sealing gas amount is between 1 % (for a high operating pressure) and 8 % (for a lower operating pressure) of the effective suction capacity. The set quantity of sealing gas influences effective pumping speed and achievable ultimate pressure.

1. Open the sealing gas supply on the gas cylinder.
2. Set a max. pressure of 2500 hPa on the pressure reducer.
3. Set the desired quantity of sealing gas on the dosing valve of the inferential meter.

Example for Okta 8000 G with e.g. 50 hPa intake pressure and 8 % sealing gas content

$$Q_S = (8000 \times 50 \times 0.08) / 1013 =$$

$$Q_S = 31.6 \text{ Nm}^3/\text{h}$$

At discharge pressures > 100 mbar:

$$Q_S = (S_{th} \times (p_v - \Delta p) \times A_S) / p_0$$

6.4 Flushing the suction chamber

NOTICE

Property damage from impermissibly high pressure build-up in the suction chamber

Exceeding the specified flushing quantities damages the vacuum pump.

- ▶ Observe the maximum permissible flushing quantities at max. 3000 hPa.
- ▶ Fully purge all supplied fluid.
- ▶ Observe the vapor compatibility of the downstream vacuum pumps.

If the extracted medium polymerizes or becomes deposited in the suction chamber, a continuous or discontinuous flushing of the suction chamber can be performed during operation.

Procedure

1. Consider the components in contact with a medium when selecting a solvent compatible with the process medium.
 - Components contained in the suction chamber are cast iron and steel. Seals are FPM.
2. Select the max. permissible flushing quantity according to the below table.
 - For pumping stations without intermediate condenser or collection receptacles, the smallest vacuum pump in the pumping station determines the fluid quantity.
3. Set the desired flushing quantity at the inferential meter.
4. After flushing, sufficiently dry the vacuum pump on the inside.

Pump type	max. flushing quantity
Okta 500 G	0.5 l/min
Okta 1000/1500G	1.0 l/min
Okta 3000/4000 G	1.5 l/min
Okta 8000 G	2.0 l/min

Tbl. 7: Max. permissible flushing quantity

6.5 Switching off and venting

⚠ WARNING

Risk of crushing on rotating parts when reaching into the open flange

The pistons continue to run in the vacuum after switching off the motor, and can trap fingers and hands within their reach.

- ▶ Wait until the vacuum pump comes to a complete standstill.
- ▶ Secure the vacuum pump against re-start.

NOTICE

Property damage from impermissibly high sealing gas pressure

Excessive sealing gas pressure leads to damage to the seals after switching on the vacuum pump.

- ▶ Make sure that the sealing gas pressure inside the pump does not exceed 1200 hPa.
- ▶ Stop the sealing gas supply immediately after switching off the vacuum pump.

Procedure with clean processes

You can switch off the vacuum pump in every pressure range, between atmospheric pressure and ultimate pressure directly after the process end.

1. Close the shut-off valve in the vacuum line and disconnect the vacuum pump from the process.
2. Switch off the vacuum pump.
3. Vent the vacuum pump via the intake side.
4. Make sure that you do not vent the vacuum chambers through the vacuum pump.
5. Switch off the process- and pump-specific media supply (e.g. the sealing gas supply).

Procedure with contaminated medium

With media that heavily contaminate the suction chamber, flush the suction chamber with air, nitrogen or any other suitable flushing medium at the end of the process.

1. Close the shut-off valve in the vacuum line and disconnect the vacuum pump from the process.
2. At the end of the process, continue to operate the vacuum pump with flushing gas supply at the vacuum flange for another approx. 20 to 40 minutes.
3. Then stop the flushing gas supply.
4. Switch off the vacuum pump.
5. Vent the vacuum pump via the intake side.
6. Make sure that you do not vent the vacuum chambers through the vacuum pump.
7. Switch off the process- and pump-specific media supply (e.g. the sealing gas supply).

6.6 Restarting

NOTICE

Damage to the roots pump from significant temperature fluctuation

If the housing cools down too quickly due to external influences, there is a risk of contact being made between the rotor at warm operating temperature, and the colder pump housing. This will result in irreversible pump damage.

- ▶ Avoid uneven cooling, if you are going to switch the roots pump back on after a short period.
- ▶ Vent the roots pump in order to achieve a temperature compensation between the housing and rotor as quickly as possible.

7 Maintenance

7.1 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.

WARNING

Risk of crushing from rotating parts

Fingers and hands may be caught by rotating pistons within the connection flange. This results in severe injuries.

- ▶ Keep limbs out of the reach of the roots pump.

Maintenance instructions

1. Shut down the vacuum pump and allow it to cool if necessary.
2. Vent the vacuum pump to atmospheric pressure via the vacuum side.
3. Safely disconnect the drive motor from the mains.
4. Secure the motor against unintentional reactivation.
5. Remove the vacuum pump from the system if necessary.
6. Dispose of used lubricant according to applicable regulations in each case.
7. For maintenance work, only dismantle the vacuum pump to the extent needed.
8. Only clean the pump parts using industrial alcohol, isopropanol or similar media.
9. Avoid residues of cleaning agent inside the vacuum pump.

7.2 Checklist for inspection and maintenance

You can carry out maintenance work of **Maintenance Level 1** by yourself.

We recommend Pfeiffer Vacuum Service for carrying out maintenance work of **Maintenance Level 2** and **Maintenance Level 3** (revision). If the required intervals listed below 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 if original spare parts are not used.



Maintenance frequency and service lives

Maintenance frequency and service lives are process-dependent. Chemical and thermic loads or contamination reduce the recommended reference values.

- Determine the specific service lives during the first operating interval.
- Consult with Pfeiffer Vacuum Service if you wish to reduce the maintenance frequency.

Action	Inspection	Maintenance level 1	Maintenance level 2	Maintenance level 3	Required material
described in document	OI	OI	SI	SI	
Interval	daily	≤ 1 year	≤ 1.5 years	≤ 3 years	
Inspection					
Visual and acoustic pump check <ul style="list-style-type: none"> Check the lubricant level and color of the lubricant Check the lubricant level of the sealing oil 	■				
<ul style="list-style-type: none"> Check the roots pump for leaks Check the roots pump for running noises 	■				
Maintenance level 1					
Clean the roots pump <ul style="list-style-type: none"> Pump housing from outside Flush the suction chamber 		■ as required			Lubricant Suitable cleaning agent, compatible with the process
<ul style="list-style-type: none"> Change the lubricant and sealing oil 		■			
<ul style="list-style-type: none"> Check the temperature sensor (if installed) 		■			
Maintenance level 2					
<ul style="list-style-type: none"> Check the coupling for damage, replace the toothed ring if necessary Change the radial shaft seal rings and protective sleeves Clean the gear chambers and replace the seals 			■		Maintenance kit with wearing parts of the coupling and the radial shaft seal rings
Maintenance level 3					
Remove and clean roots pump <ul style="list-style-type: none"> Replace the seals and all wearing parts 				■	Overhaul kit Lubricant Option <ul style="list-style-type: none"> Set of seals Set of gear wheels
Check critical components and replace if necessary: <ul style="list-style-type: none"> temperature sensor (calibrate the sensor with the reference temperature) gear wheels (check the teeth for breaks) 				■	

Tbl. 8: Maintenance intervals

7.3 Changing the lubricant

⚠ WARNING

Health hazard and environmental damage from toxic contaminated lubricant

Toxic process media can cause lubricant contamination. When changing the lubricant, there is a health hazard due to contact with poisonous substances. Illegal disposal of toxic substances causes environmental damage.

- ▶ Wear suitable personal protective equipment when handling these media.
- ▶ Dispose of the lubricant according to locally applicable regulations.

⚠ CAUTION**Scalding from hot lubricant**

Danger of scalding when draining lubricant if it comes into contact with the skin.

- ▶ Wear protective equipment.
- ▶ Use a suitable collection receptacle.

**Pfeiffer Vacuum recommends determining the precise service life of the lubricant in the first operating year.**

The usable life may deviate from the reference value specified depending on thermic and chemical loads, or due to penetrating process media in gear and bearing chambers.

**Safety data sheets**

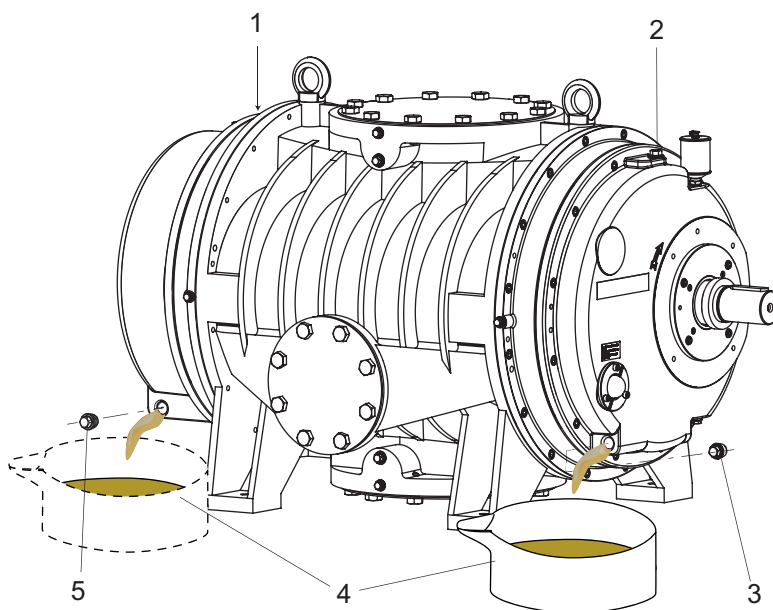
You can obtain the safety data sheets for lubricants from Pfeiffer Vacuum on request, or from the [Pfeiffer Vacuum Download Center](#).

Consumable

- Lubricant

Required tool

- Ring spanner, WAF 24 mm
- Calibrated torque wrench (tightening factor ≤ 2.5)

**Fig. 16: Changing the lubricant**

- | | |
|--------------------------|-------------------------|
| 1 Lubricant filling plug | 4 Collection receptacle |
| 2 Lubricant filling plug | 5 Lubricant drain plug |
| 3 Lubricant drain plug | |

Drain the lubricant

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

1. Shut down the vacuum pump and allow it to cool if necessary.
2. Vent the vacuum pump to atmospheric pressure via the intake side.
3. Unscrew the lubricant filler screws.
4. Place the collection receptacle underneath.
5. Unscrew both lubricant filler screws.
6. Fully drain the lubricant.
7. Screw the drain screws back in.
 - Tightening torque: **max. 50 Nm**

Filling with lubricant

1. Fill new lubricant on both sides until the max. fill level is reached (see chapter "Filling with lubricant", page 20).
2. Screw in the lubricant filler screws.
 - Tightening torque: **max. 50 Nm**

7.4 Changing sealing oil**NOTICE****Damage to the vacuum pump due to incorrect procedure when filling sealing oil**

Disassembly of the lubricator causes leakage in the system. The lubricant expands when the roots pump heats up, which could cause lubricant to leak if overfilled.

- ▶ Use only the lubricator's filler flap to fill up.
- ▶ While the roots pump is cold, fill the lubricator **no more than halfway**.

Consumables

- Lubricant

Required tools

- Open-end wrench, WAF 24
- Calibrated torque wrench (tightening factor ≤ 2.5)

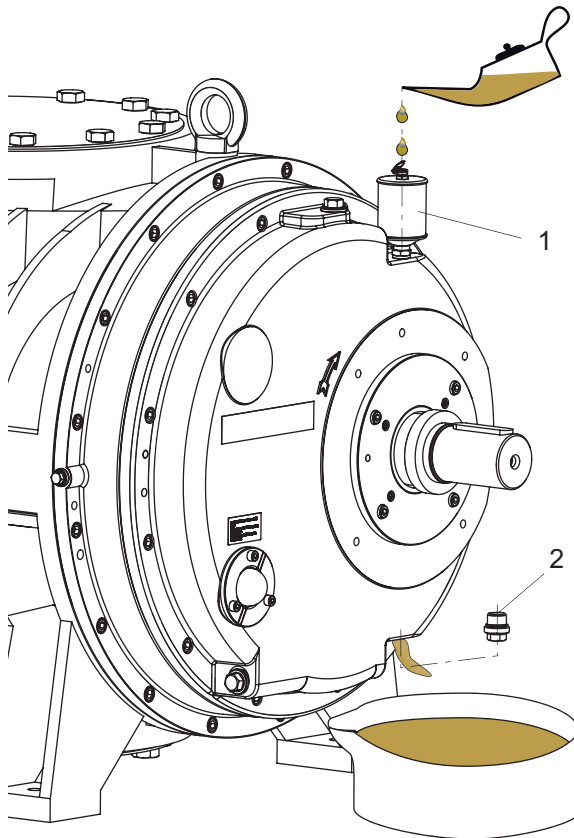


Fig. 17: Replacing sealing oil for radial shaft seal rings

- 1 Oiler 2 Sealing oil drain screw

Procedure in the event of minor oil loss

A decreasing oil level in the oiler and an oil leak below the lantern indicate a defective **external** radial shaft seal ring.

- ▶ Check the level at shorter intervals and top up regularly as required.
 - With this type of damage, the roots pump can continue to be operated for a time.

Procedure in the event of significant oil loss

A decreasing oil level, with no leaked oil visible below the roots pump, is due to a worn **inner** radial shaft seal ring.

- ▶ Should this occur, arrange for maintenance to be carried out by Pfeiffer Vacuum Service, during which all 3 radial shaft seal rings and the protective sleeve are replaced.
 - This damage leads to an inadmissibly high oil level in the bearing chamber.

Changing sealing oil

1. In general, carry out a sealing oil change once a year.
2. Open the filler flap on the oiler.
3. Place the collection receptacle underneath.
4. Unscrew the sealing oil drain screw.
5. Fully drain the lubricant.
6. Screw the drain screw back in.
 - Tightening torque: **50 Nm**
7. Fill the oiler with lubricant to max. halfway.
8. Close the filler flap.

7.5 Checking and changing the sealing medium of the axial face seal

The change intervals for the sealing medium depend on the design of the axial face seal, and the respective operating conditions of the roots pump.

Procedure

- ▶ Carry out maintenance work on the axial face seal and on the sealing agent container according to manufacturer specifications.

7.6 Cleaning the suction chamber

⚠ WARNING**Risk of crushing from rotating parts**

Fingers and hands may be caught by rotating pistons within the connection flange. This results in severe injuries.

- ▶ Keep limbs out of the reach of the roots pump.

NOTICE**Property damage from incorrect cleaning procedure**

Flushing fluid and process media that enters the bearing and oil chambers will stick.

- ▶ During the cleaning processes, always protect all bearings with sealing gas in order to prevent a contamination of the lubricant and bearing chambers.

The clearance between pistons and housing are within a tenth of a centimeter range. Sustained, accumulating contamination has the following effect:

- the friction heat inside the roots pump increases
- the power consumption of the roots pump increases
- the pistons jam

Procedure

1. Dismantle the pipes from the vacuum and fore-vacuum connections.
2. Clean the suction chamber using suitable brushes and cleaning agents.
3. After cleaning, completely remove remaining fluids using absorbent materials, and dry the suction chamber.
4. After cleaning, mount all pipes.
5. Screw in the drain screws.

7.7 Installing coupling

⚠ WARNING

Danger of injury due to exposed rotating parts

In the operating range of the motor coupling, there is a danger of clothing being caught and wound up.

- ▶ When assembling the motor and coupling, make sure that the coupling protection is seated correctly.
- ▶ Wear correct clothing.



Coupling assembly

Observe the manufacturer's installation instructions during installation work on the coupling.

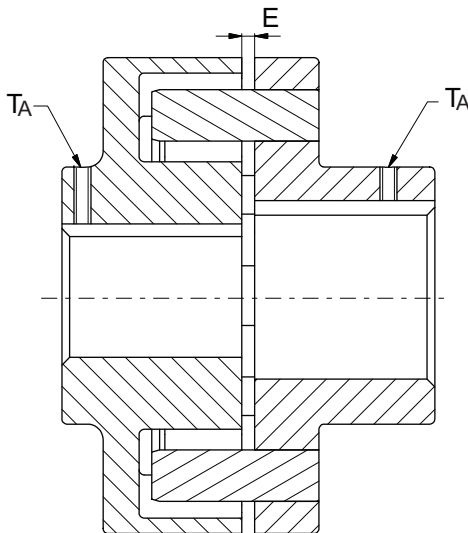


Fig. 18: Elastic bolt coupling

E Clearance T_A Tightening torque

Procedure

1. Precisely adhere to the prescribed installation dimensions.
 - Angular and radial displacement of the shafts.
 - Clearance E.
2. Tighten the bolts in the coupling halves to the prescribed torques (T_A).

8 Decommissioning

8.1 Shutting down for longer periods

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 a longer downtime of the vacuum pump (> 1 year)

1. Allow the vacuum pump to cool down.
2. Clean suction chamber.
3. Change the lubricant.
4. Seal the vacuum flange and fore-vacuum flange and any other openings with screw caps.
5. Evacuate the pump interior via the measurement connection on the vacuum side, to $p < 1$ hPa.
6. Vent the suction chamber of the vacuum pump through the measurement connection using dry air or nitrogen.
7. Store the vacuum pump in dry, dust-free rooms, within the specified ambient conditions.
8. In rooms with humid or aggressive atmospheres: Hermetically seal the vacuum pump together with a drying agent in a plastic bag.
9. For storage durations of more than 2 years, we recommend you carry out maintenance and a lubricant change prior to recommissioning.
10. Please note, the vacuum pump may not be stored in the vicinity of machines, traffic routes, etc., as strong vibrations may damage the bearing.

8.2 Recommissioning

NOTICE

Damage to the roots pump due to aging of the lubricant

The useful life of the lubricant is limited (max. 2 years). Prior to recommissioning, carry out the following operations following inactivity of **2 years or more**:

- ▶ Observe the maintenance instructions – consult Pfeiffer Vacuum where necessary.
- ▶ Change the lubricant.
- ▶ Check the bearings and replace any aged elastomer parts.

Procedure when recommissioning the vacuum pump

1. Check the roots pump for visible damage and operate the roots pump only in an appropriate operating status.
2. Check the interior of the pump for contaminants.
3. Remove any drying pearls from the suction chamber.
4. Do not operate the vacuum pump if there is evidence of rust on the parts which form the housing. Contact [Pfeiffer Vacuum Service](#).
5. Perform a leak test prior to recommissioning the vacuum pump as required.

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

9.2 Dispose of Okta roots pumps

Pfeiffer Vacuum roots pumps from the Okta series contain materials that you must recycle.

1. Fully drain the lubricant.
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

⚠ WARNING

Danger to life from electric shock in the event of a fault

In the event of a fault, devices connected to the mains may be live. There is a danger to life from electric shock when making contact with live components.

- ▶ Always keep the mains connection freely accessible so you can disconnect it at any time.

⚠ 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.

Problem	Possible causes	Remedy
Vacuum pump will not start up	<ul style="list-style-type: none"> • Mains voltage is missing or the incorrect operating voltage is present 	<ul style="list-style-type: none"> • Check the mains voltage. • Check the mains fuse. • Check the motor switch.
	<ul style="list-style-type: none"> • Thermal protection switch has triggered 	<ul style="list-style-type: none"> • Determine the cause and eliminate the fault. • Allow the vacuum pump to cool if needed.
	<ul style="list-style-type: none"> • Suction chamber contaminated 	<ul style="list-style-type: none"> • Clean suction chamber. • If necessary, contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> • Gear (gear wheels) damaged 	<ul style="list-style-type: none"> • Switch off the vacuum pump immediately. • If necessary, contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> • Bearing damage present 	<ul style="list-style-type: none"> • Have the bearing changed. • Contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> • Motor faulty 	<ul style="list-style-type: none"> • Change the motor.
Vacuum pump switches off after a while after being started	<ul style="list-style-type: none"> • Thermal protection switch of the motor has triggered 	<ul style="list-style-type: none"> • Determine the cause of the overheating and eliminate the fault. • Allow the motor to cool if necessary
Vacuum pump/pumping station does not reach ultimate pressure	<ul style="list-style-type: none"> • Suction chamber dirty 	<ul style="list-style-type: none"> • Clean suction chamber
	<ul style="list-style-type: none"> • Lubricant soiled 	<ul style="list-style-type: none"> • Change the lubricant
	<ul style="list-style-type: none"> • Backing pump operates incorrectly 	<ul style="list-style-type: none"> • Check the backing pump
	<ul style="list-style-type: none"> • Leak in system 	<ul style="list-style-type: none"> • Examine the system for leaks and, if necessary, carry out a leak test. • Eliminate leaks.
	<ul style="list-style-type: none"> • Escaping lubricant at the radial shaft seal rings or on the axial face seal 	<ul style="list-style-type: none"> • Check the radial shaft seal rings or the axial face seal. • Have the seals affected replaced, if necessary. • If necessary, contact Pfeiffer Vacuum Service.

Problem	Possible causes	Remedy
Unusual noises during operation	<ul style="list-style-type: none"> ● Suction chamber dirty 	<ul style="list-style-type: none"> ● Switch off the vacuum pump immediately. ● Clean suction chamber.
	<ul style="list-style-type: none"> ● Damage to the bearing or gear wheels 	<ul style="list-style-type: none"> ● Switch off the vacuum pump immediately. ● Contact Pfeiffer Vacuum Service.
	<ul style="list-style-type: none"> ● Damage to motor bearing 	<ul style="list-style-type: none"> ● Switch off the vacuum pump immediately. ● Change the motor. ● If necessary, contact Pfeiffer Vacuum Service.

Tbl. 9: Troubleshooting

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](#).

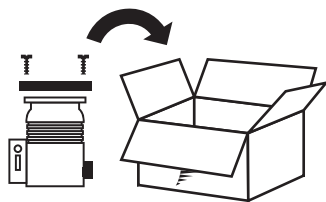


4. You will receive an acknowledgment from Pfeiffer Vacuum.

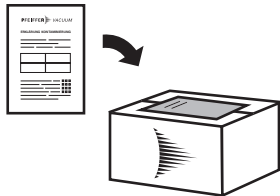
PFEIFFER VACUUM

Submission of contaminated products

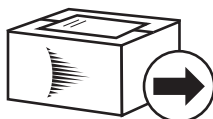
No microbiological, explosive, or radiologically contaminated products will be accepted. Where products are contaminated, or the contamination declaration is missing, Pfeiffer Vacuum will contact you before starting service work. Depending on the product and degree of pollution, **additional decontamination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



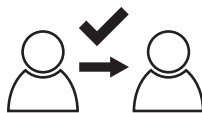
5. Prepare the product for transport in accordance with the provisions in the contamination declaration.
 - a) Neutralize the product with nitrogen or dry air.
 - b) Seal all openings with blind flanges, so that they are airtight.
 - c) Shrink-wrap the product in suitable protective foil.
 - d) Package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

- ▶ Have the vacuum pump part number, and any other necessary details from the rating plate, to hand when ordering spare parts.
- ▶ Install original spare parts only.

12.1 Set of seals for version with RSSR

The set of seals contains:

- all sealing parts such as O-rings, radial shaft seal rings and supporting rings
- flat seals, square washers and annular profile seals

The protective sleeve and centering rings for connecting the roots pump to the suction and pressure sides are not included.

12.2 Set of seals for version with axial face seal

The set of seals contains:

- all sealing parts such as O-rings, flat seals, square washers

Not included are the axial face seal and the centering rings for connecting the pumps for the suction and pressure side.

12.3 Axial face seal, complete

The set of seals contains:

- all seal components, including corresponding O-rings

12.4 Maintenance kit for version with RSSR

The maintenance kit contains:

- all sealing parts in the area of the radial shaft seal ring including the protective sleeve
- all sealing rings of the filling and drain screws and both O-rings for the device cover and cap
- the coupling buffer (toothed ring)

12.5 Overhaul kit for versions with RSSR

The overhaul kit contains:

- the set of seals
- the ball bearing, the roller bearing and the protective sleeve
- the circlips, the groove nuts, the sight glasses and the oiler
- the coupling buffer (toothed ring).

12.6 Overhaul kit for versions with axial face seal

The overhaul kit contains:

- the set of seals
- the ball bearing, the roller bearing
- the locking plates, the groove nut and the sight glasses.

12.7 Set of gear wheels

The gear wheel kit includes:

- Main and auxiliary wheel

13 Accessories



View the line of accessories for Pfeiffer Vacuum roots pumps online at pfeiffer-vacuum.de.

13.1 Accessory information

Sealing gas device

The use of sealing gas at the bearing points protects the lubricant from contamination by the ingress of process media and flushing fluid into the bearing and oil chambers.

Flushing device

The flushing device is used to clean the materials in contact with the medium if the extracted medium polymerizes or deposits in the suction chamber.

Gear space extraction

The gear chamber extractor serves to evacuate the gear and bearing chambers in order to shorten pump-down time.

Protective strainer

The protective strainer on the vacuum connection prevents solids from penetrating into the suction chamber of the vacuum pump.

13.2 Ordering accessories

Description	Order number
Sprayer DN PN16/PN10	PP 001 827 -T
Blank flange set for Okta 8000 G, DN PN10 (stainless steel)	PP 001 828 -T
Seal Kit (FKM) for Okta 8000 G, DN PN10	PP 001 829 -T
Sealing gas kit	PP 027 401 -T
Spray lance G1/2"	PP 046 146 -U
Finned tube cooler	PP 047 289 -T
Setting elements for foot mounting	PP 047 451 -T
Temperature sensor for Okta 8000 18000 Okta 8000 G, G 3/8	PP 048 156 -T
Splinter shield	PP 070 315 -U
OmniControl 200 with TPR 270	PT 440 950 -T
OmniControl 200, table unit with integrated power supply pack	PE E52 100 0
Mains cable 230 V AC, CEE 7/7 to C13, 3 m	P 4564 309 ZA
Mains cable 115 V AC, NEMA 5-15 to C13, 3 m	P 4564 309 ZE
Mains cable 208 V AC, NEMA 6-15 to C13, 3 m	P 4564 309 ZF
Y-connector M12 for RS-485	P 4723 010
Measurement cable DigiLine xPT 200 AR/CCT 3xx AR to TPG 3xx, 3 m	PT 348 250 -T
Measurement cable, 3 m	PT 448 250 -T
TPR 270, DN 16 ISO-KF	PT R26 770
Mating connector, 6 pole	B4707283MA
Centering ring with sintered metal filter, 0,02 mm pore size	PF 117 216 -T
Centering ring with fine filter, 0,004 mm pore size	PT 120 132 -T

Tbl. 10: Accessories for Okta 8000 G

Description	Order number
P3, mineral oil, 1 l	PK 001 106 -T
P3, mineral oil, 5 l	PK 001 107 -T
P3, mineral oil, 20 l	PK 001 108 -T

Description	Order number
D2, synthetic diester based oil, 1 l	PK 005 875 AT
D2, synthetic diester based oil, 5 l	PK 005 876 AT
D2, synthetic diester based oil, 20 l	PK 005 877 AT

Tbl. 11: Consumables

14 Technical data and dimensions

14.1 General

Basis for the technical data of Pfeiffer Vacuum roots pumps

- Specifications according to PNEUROP committee PN5
- ISO 21360-1; 2012: "Vacuum technology - Standard methods for measuring vacuum-pump performance - Part 1: General description"
- Leakage rate: Determination according to measurement of pressure rise method
- Sound pressure level: distance to vacuum pump 1 m

	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

$$1 \text{ Pa} = 1 \text{ N/m}^2$$

Tbl. 12: 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. 13: Conversion table: Units for gas throughput

14.2 Technical data

Type designation	Okta 8000 G
Part number	PP G80 001
Connection flange (in)	DN 300 PN 10
Connection flange (out)	DN 300 PN 10
Cooling gas connection	DN 150 PN 10
Nominal pumping speed	4 000 – 12 000 m ³ /h
Nominal pumping speed at 50 Hz	8000 m ³ /h
Nominal pumping speed at 60 Hz	9600 m ³ /h
Nominal pumping speed min.	4000 m ³ /h
Nominal pumping speed max.	12000 m ³ /h
Final pressure	$1.3 \cdot 10^2$ hPa
Nominal rotation speed at 50 Hz	1500 rpm
Nominal rotation speed at 60 Hz	1800 rpm
Rotation speed min.	750 rpm
Rotation speed max.	2250 rpm
Rotation speed	750 – 2 250 rpm
Motor rating	max. 200 kW
Integral leak rate	$1 \cdot 10^{-3}$ Pa m ³ /s

Type designation	Okta 8000 G
Sound pressure level with connected exhaust line	75 – 105 dB(A)
Protection degree	IP55
Cooling method	Gas
Sealing gas	Yes
Ambient temperature	5 – 40 °C
Shipping and storage temperature	-10 – 40 °C
Operating fluid	P3
Operating fluid amount	21 l
Weight: without motor	1500 kg

Tbl. 14: Technical data for Okta 8000 G

14.3 Dimensions

Dimensions in mm

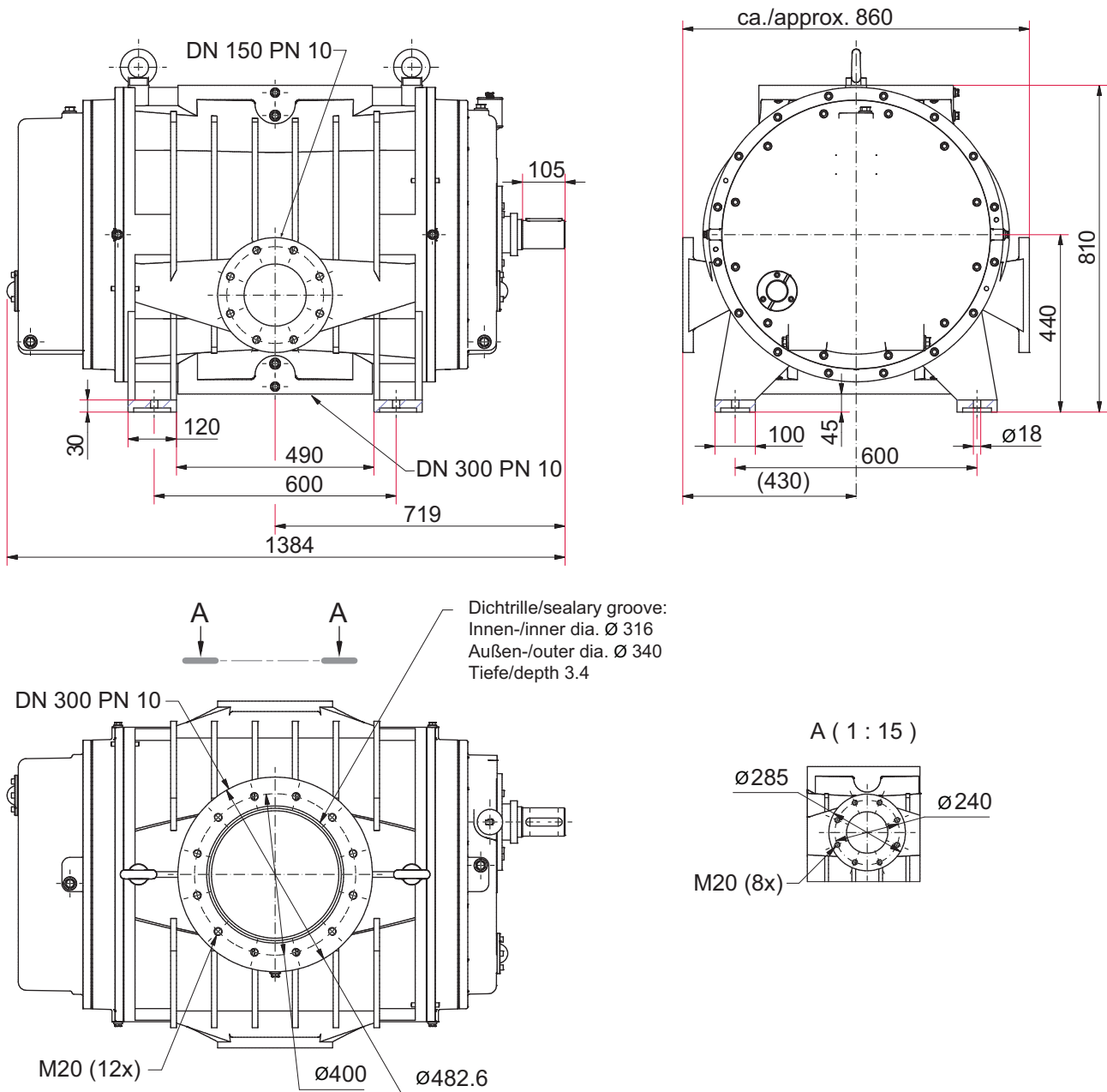


Fig. 19: Okta 8000 G

Declaration of conformity

We hereby declare that the product cited below satisfies all relevant provisions of the following EC 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**

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

Roots pump
Okta 8000 G

Harmonized standards and applied national standards and specifications:

DIN EN ISO 12100: 2011

DIN EN ISO 2151: 2009

DIN EN 1012-2: 2011

DIN EN IEC 61000-6-2: 2019

DIN EN ISO 13857: 2020

DIN EN IEC 61000-6-4: 2020

DIN ISO 21360-1: 2020

ISO 21360-2: 2020

Signature:



Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(Dr. Ulrich von Hülsen)
President

Asslar, Germany,
2018-11-01



UK Declaration of Conformity

This declaration of conformity has been issued under the sole responsibility of the manufacturer.

Declaration for product(s) of the type:

Roots pump

Okta 8000 G

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

Supply of Machinery (Safety) Regulations 2008

Electrical Equipment (Safety) Regulations 2016

Electromagnetic Compatibility Regulations 2016

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Harmonized standards and applied national standards and specifications:

ISO 12100: 2010

EN ISO 2151: 2008

EN 1012-2+A1: 1996

EN IEC 61000-6-2: 2019

ISO 13857: 2019

EN IEC 61000-6-4: 2019

ISO 21360-1: 2020

ISO 21360-2: 2020

The manufacturer's authorized representative in the United Kingdom and the authorized agent for compiling the technical documentation is Pfeiffer Vacuum Ltd, 16 Plover Close, Interchange Park, MK169PS Newport Pagnell.

Signature:



(Daniel Sälzer)
Managing Director

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

Asslar, 2023-05-03

**UK
CA**



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.

ed. H - Date 2311 - P/N:PW0263BEN



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

Pfeiffer Vacuum GmbH
Headquarters • Germany
T +49 6441 802-0
info@pfeiffer-vacuum.de

www.pfeiffer-vacuum.com

PFEIFFER  **VACUUM**