



# OPERATING INSTRUCTIONS



Translation of the original instructions

## DUO 255, DUO 255 M

Rotary Vane Pump



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# 1 About this manual

## 1.1 Validity

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

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

### Applicable documents

DUO 255	Operating instructions
Declaration of Conformity	Part of this document
Operating instructions for accessories (order-specifically)	see section "accessories"

\*also available via [www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com)

## 1.2 Conventions

### Safety instructions

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

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

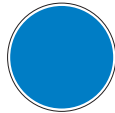
## Pictographs



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



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



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



Important information about the product or this document

## Instructions in the text

→ Work instruction: here you have to do something.

## Symbols used

The following symbols are used consistently throughout in all illustrations:

- Ⓟ Vacuum flange
- Ⓛ Exhaust flange
- Ⓞ Gas ballast valve
- ⚡ Power connection



## 2 Safety

### 2.1 Safety precautions



#### Duty to inform

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

→ The operator is obligated to make operating personnel aware of dangers originating from the vacuum pump, the pumped medium and the entire system.



#### Installation and operation of accessories

Pfeiffer Vacuum pumps can be equipped with a series of adapted accessories. The installation, operation and maintenance of connected devices are described in detail in the operating instructions of the individual components.

→ For information on order numbers of components, see "Accessories".

→ Use original accessory parts only.

- Do not expose any body parts to the vacuum.
- Observe the safety and accident prevention regulations.
- Check regularly that all safety precautions are being complied with.
- Do not carry out any unauthorised modifications or conversions to the pumps.
- Depending on the operating and ambient conditions, the surface temperature of the pumps may rise above 70 °C. Use suitable finger guards if necessary.
- When returning the pumps to us please note the instructions in the Service section.

**The following safety instructions are only valid for the disassembly of the drive system for a vacuum pump with a magnetic coupling:**

- When disassembling the drive system from the pump housing, the strong magnetic field may influence the function and operational reliability of electrical and electronic devices.
- Persons with cardiac pacemakers must keep away from the magnetic coupling.

#### **Danger to life!**

- **Minimum distance: 2 m!**

- Disassembled magnetic couplings must be kept away from computers, data storage media and other electronic components.
- Keep the disassembled components of the magnetic coupling separate at all times. Danger of crushing!
- Do not allow any magnetised parts into the vicinity of the magnetic coupling. Danger of injury!

### 2.2 Protective equipment

Determined situations concerning the handling of vacuum pumps require wearing of personal protective equipment. The owner, respectively the employer are obligated to provide an adequate equipment to any operating persons.



#### **DANGER**

#### **Danger to health by hazardous substances during maintenance or installation**

Depending on the process vacuum pumps, components or operating fluids can be contaminated by toxic, reactive or radioactive substances.

→ Wear adequate protective equipment during maintenance and repairs or in case of reinstallation.



### CAUTION

#### Risk of injury through hot surfaces

Vacuum pumps can become hot during operation.

- Allow the pump to cool before maintenance and repairs.
- If necessary wear protective gloves according to EN 420.

### WARNING

#### Increased noise emission!

Increased noise emission can occur within a limited area surrounding the vacuum pump.

- Provide noise protection or
- wear hearing protection.

## 2.3 Proper use



### NOTICE

#### EC conformity

The manufacturer's declaration of conformity becomes invalid if the operator modifies the original product or installs additional components.

- Following installation into a plant and before commissioning, the operator must check the entire system for compliance with the valid EU directives and reassess it accordingly.

- The vacuum pump may only be used to generate a vacuum.
- Only use the vacuum pump for applications with oxygen concentration  $\leq 21\%$ .
- Installation, operating and maintenance regulations must be complied with.
- Other accessories, than those described in this manual, must not be used without the agreement of Pfeiffer Vacuum.

## 2.4 Improper use

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

- pumping of corrosive gases
- pumping of explosive media
- operation in potentially explosive areas
- pumping of gases containing impurities such as particles, dusts and condensate; note the vapour compatibility levels of the pump
- pumping of substances that tend to sublime
- use of the vacuum pump to generate pressure
- pumping of liquids
- the use of operating fluids not specified by Pfeiffer Vacuum
- connection to pumps or units which are not suitable for this purpose according to their operating instructions
- connection to units which have exposed voltage-carrying parts
- operation of the devices in areas with ionizing radiation



## 3 Transport and storage

### 3.1 Transport

#### Transport instructions

- Remove the locking cap from the vacuum and exhaust flange immediately before connecting!
  - Check the protective stainer, paying attention to the O-ring.
- Use only the crane eye on the top side of the pump to lift the pump.

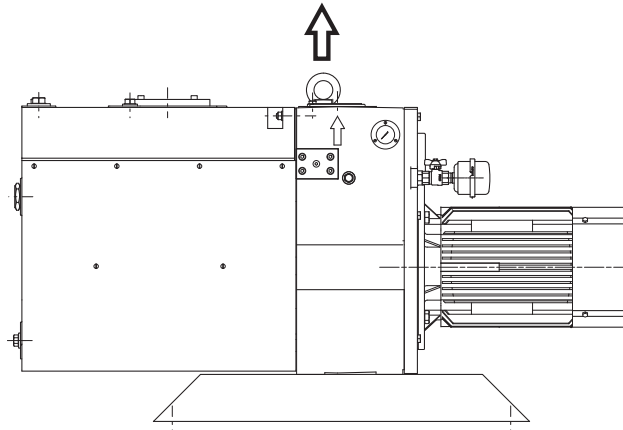


Fig. 1: Transporting the pump

### 3.2 Storage

- Check that all the openings on the pump are securely closed.
- Fill up the pump with new operating fluid to the top edge of the sight glass.
- Store the pump only indoors, preferably at temperatures between  $-10\text{ °C}$  and  $+40\text{ °C}$ .
  - In rooms with moist or aggressive atmospheres, the pump must be airproof shrink-wrapped in a plastic bag together with a bag of desiccant.
  - After storage periods longer than two years, it is recommended to carry out maintenance and change the operating fluid before using the pump.



## 4 Product description

### 4.1 Product identification

To correctly identify the product when communicating with Pfeiffer Vacuum, always have the information from the rating plate available and use it:

- Pump model and model number
- Serial number
- Type and amount of operating fluid
- Date of manufacture

Please find the voltage range and motor-related data on the separately attached motor rating plate.

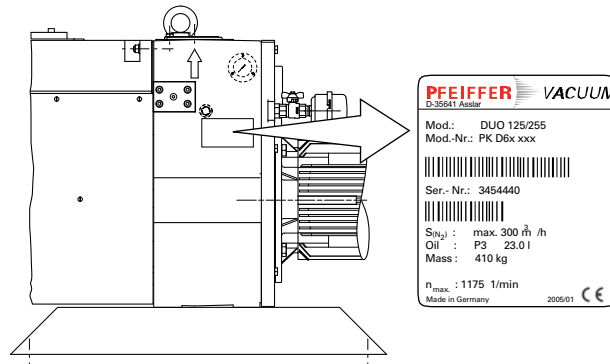


Fig. 2: Product identification on the rating plate

### Scope of delivery

- Pump with motor/without motor
- Operating fluid (except F4 and F5)
- Cone strainer and centering ring with O-ring
- Locking cap for vacuum and exhaust flange
- Operating instructions

### Pump types

Pump type	Pump versions
DUO 255	Standard version of pump
DUO 255 M	Version with magnetic coupling





## 4.2 Function

The vacuum pumps of the DUO-Line are dual stage rotary vane pumps and are used primarily for rough and medium vacuum applications. The pumps are fitted with a hydraulically controlled vacuum safety valve which, when the pump is at a stillstand, closes the vacuum chamber vacuum tight and at the same time vents the pump.

The version with magnetic coupling has as an alternative to conventional shaft feedthrough a static seal towards the outside.

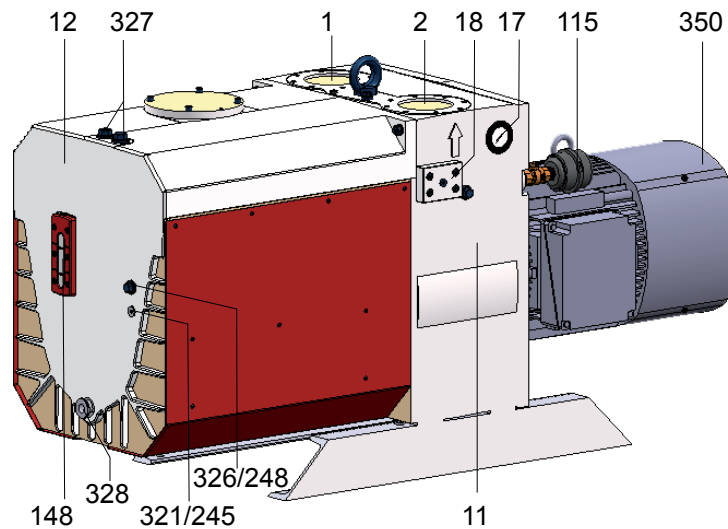


Fig. 3: DUO 255

1	Vacuum flange	148	Sight glass
2	Exhaust flange	321	Connection temperature sensor
11	Support	326	Connection operating fluid level switch
12	Casing	328	Operating fluid drain screw
17	Manometer	327	Operating fluid filler screw
18	Oil passage for connecting accessories (operations monitoring, mechanical oil filter)	245	O-ring
115	Gas ballast valve	248	O-ring
		350	Motor



## 5 Installation

### 5.1 Setting up the pump

#### Installation location

Observe the following requirements when setting up the pump:

- Consider the load-bearing capacity of the installation site.
  - Maximum installation altitude 2000 m (above mean sea level)
  - Permissible ambient temperature: +12 ... 40°C
  - Maximum relative humidity 85%
- Fill up with operating fluid before operating the first time (see p. 14, chap. 5.5).
- Amount and type according to rating plate
- Always place the pump on a firm, even surface.
- The base frame has four holes for anchoring onto the base.
- When installing the pump in a closed housing, ensure there is sufficient air circulation.
- Sight glass and gas ballast valve must be visible and readily accessible.
  - Voltage and frequency information given on the motor rating plate must be visible.

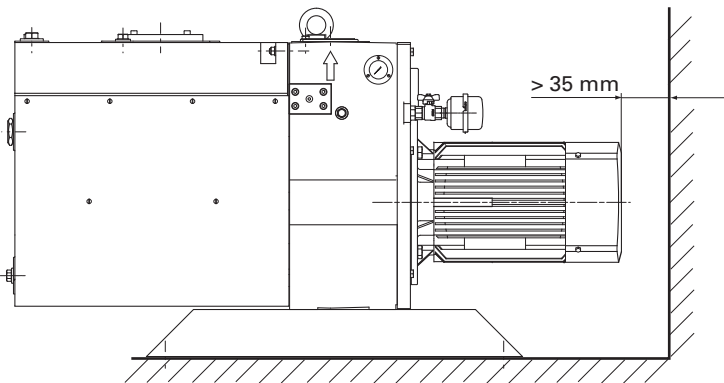


Fig. 4: Setting up the pump

### 5.2 Connecting the vacuum side

- Remove locking cap from the vacuum flange;
- pay attention to the cone strainer and the respective O-ring in the intake port.
- Clear welded lines of any welding scales, loose parts etc. before installation.
- The connection between the pump and the vacuum chamber should be kept as short as possible.
- Depending on the pump type, use metallic hoses or PVC hoses with flange connections.
  - Separators, filters etc. may be installed upstream to protect the pump (see accessories). However, please observe the loss of pumping capacity due to the conductivity of the accessories.



### 5.3 Connecting the exhaust side



#### CAUTION

##### High pressure in the exhaust line!

Danger of damage to the seals and danger of the pump bursting.

- Install the line without shut-off valves on the exhaust side.
- If there is danger of a build-up of excess pressure (> 1500 hPa abs.) in the lines, observe all official accident prevention safety regulations.
- If the exhaust gases are being extracted, the exhaust pressure must be at least 250 hPa greater than the pressure at the intake side.

- Choose the cross-section of the exhaust line to be at least the size of the nominal connection diameter of the vacuum pump's exhaust connection.
- Piping to the pump must be suspended or supported.
  - Physical forces from the piping system must not be allowed to act on vacuum pumps.
- Lay piping from the pump sloping downward so that no condensate can flow back into the pump; otherwise fit a condensate separator.
  - If an air trap is created in the system, then a device for draining condensation water must be provided at the lowest point.



#### WARNING

##### Emission of toxic substances from the exhaust!

Danger of poisoning from emitted gases or vapours, which can be detrimental to health and/or can pollute the environment, depending on the particular application.

- Comply with the applicable regulations when working with toxic substances.
- Only officially approved filter systems may be used to separate and remove these substances.

### 5.4 Connecting to the mains power supply

Depending on the pump type, different motor versions or mains voltages are possible:

- Three phase motor (without switch and mains cable).



#### DANGER

##### Voltage-bearing elements

Danger to life from electric shock.

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



#### NOTICE

##### Excess voltage!

Danger of destroying the motor.

- Power connections must comply with local regulations. Voltage and frequency information given on the motor rating plate must correspond to the mains voltage and frequency values.
- To protect the motor and supply cable in case of malfunction, mains fuse protection must be implemented. Recommended: Type K slow blow circuit breaker.



### Three-phase motor

#### The three-phase current motor circuit

The connections U1 - L2, V1 - L1 and W1 - L3 result in a clockwise rotation of the motor shaft as seen looking towards the motor fan.

#### Delta Connection

The three coils are connected in series with the connection point connected to the mains. The voltage of each coil is the same as the mains voltage whereas the mains current is the cube root of the coil current. Delta connections are denoted by the symbol  $\Delta$ . The voltage between the mains supply lines is called mains voltage. The mains current is the current which flows in the supply lines.

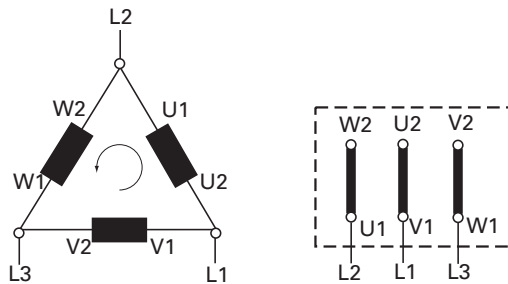


Fig. 5: Motor coil and connecting plate of Delta Connection (for low voltage)

#### Star Connection

The ends of the three coils are connected at the star center. The terminal voltage is the cube root of the coil voltage; the mains and the coil current are the same. Star connections are denoted by the symbol  $Y$ .

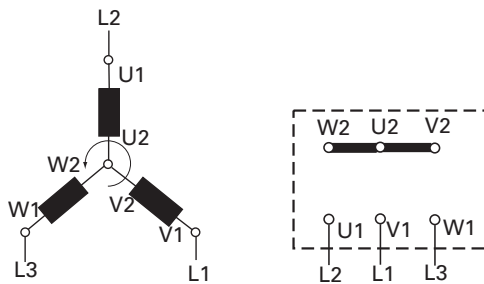


Fig. 6: Motor coil and connecting plate of Star Connection (for high voltage)

#### Inspection of the direction of rotation

For pumps with three-phase motors, it is necessary to check the direction of rotation!



#### CAUTION

##### Operating fluids may leak out!

If the direction of rotation is incorrect, there is a danger that operating fluids may leak at the vacuum flange.

→ Always check the direction of rotation before filling in operating fluid.

- Remove the locking cap from the exhaust flange (if existing).
- Switch the pump on briefly (from 2 to 3 sec.).
  - The motor and motor fan must turn in a clockwise direction (see the arrow on the support stand).
- If the direction of rotation is incorrect: Swap two phase contacts at the connecting cable.
- Fill up the operating fluid.

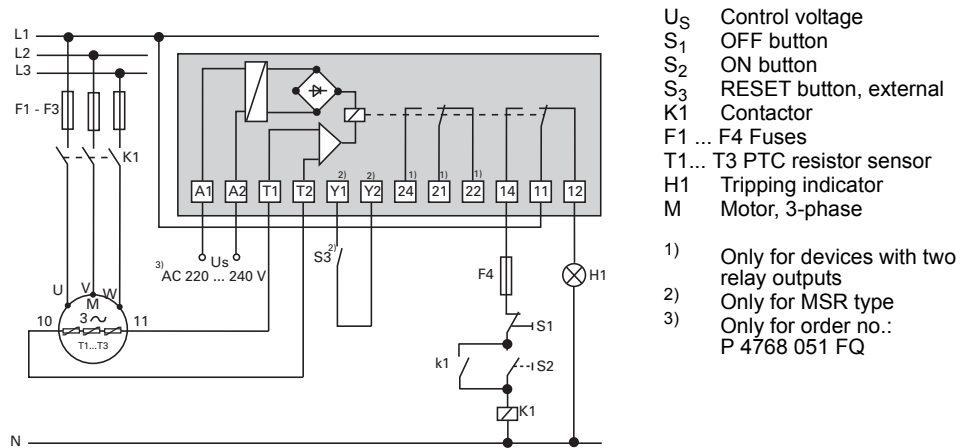


**With PTC temperature sensors (3PTC)**

Pump motors equipped with PTC temperature sensors (3PTC) in the stator windings can be connected to a PTC resistor tripping device for protection against overload. Other approved motor temperature monitoring can be used also by the operator.

Tripping devices store the shutdown event and need to be manually switched back on again via the integrated RESET button or via the external RESET S3. Mains-ON is detected as an automatic RESET.

→ Set up the connections so that the directional rotation indicated on the pump is maintained, regardless of the representations in the current flow diagram.



**Fig. 7: Connection example for a three-phase AC motor with PTC resistor tripping device**



**NOTICE**

**Do not start with star/delta connection.**  
 → Always start motor directly.

## 5.5 Filling up the operating fluid

The type and amount of operating fluid should be visible on the pump's rating plate for every rotary vane pump.

The delivery consignment for the **standard pump** contains sufficient operating fluid for one filling. The use of other operating fluids requires prior authorisation from Pfeiffer Vacuum.

### Permissible operating fluids

- P3 (Standard operating fluid)
- D1 for special applications (e.g. higher operating temperatures)
  - Ultimate pressure measured with gas type dependent gauge:  $< 5 \cdot 10^{-2}$  hPa



### NOTICE

#### Use approved operating fluids only!

The use of operating fluids that have not been approved by Pfeiffer Vacuum shall result in a limited warranty. In such cases, it is not possible to guarantee that product-specific performance data will be achieved.

→ Prior consultation is required before using other application-specific operating fluids.

### Filling up the operating fluid

- Unscrew operating fluid filler screw 327.
- Fill up operating fluid;
  - correct filling level during operations: within the markings at the sight glass frame.

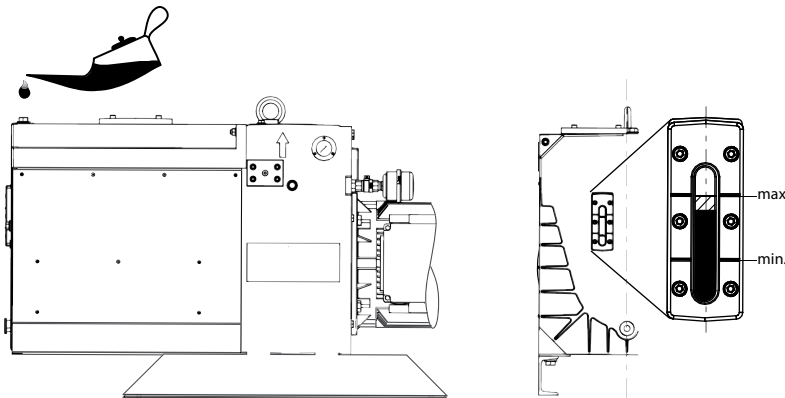


Fig. 8: Filling up the operating fluid

- Screw in operating fluid filler screw 327.
- Check operating fluid level only when the pump is warm and running; therefore
  - close vacuum flange and gas ballast valve,
  - correct filling level during operations: within the markings at the sight glass frame,
  - check operating fluid daily in non-stop operation, otherwise whenever the pump is switched on. Refilling is possible when the pump is in final vacuum operation.



### WARNING

#### Toxic vapours!

Danger of poisoning when igniting and heating synthetic operating fluids (e.g. F4/F5) above 300 °C.

- Observe the application instructions.
- Do not allow operating fluid to make contact with tobacco products; observe safety precautions when handling chemicals.

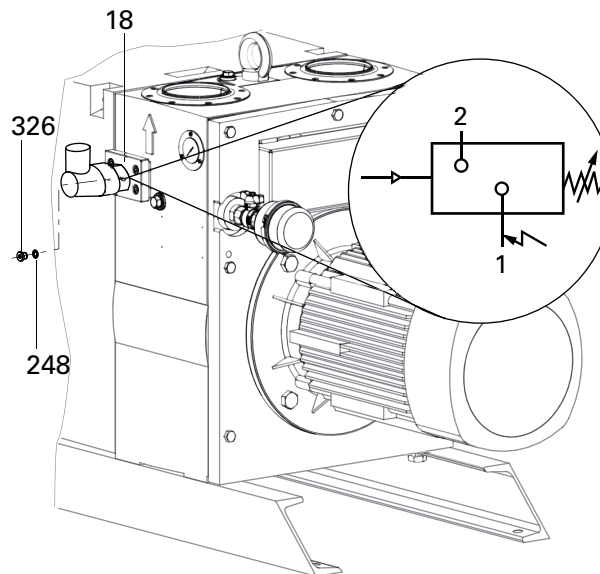


## 5.6 Operations monitoring (Option)

For operations monitoring a pressure switch can be installed on the side of the support. In case of a malfunction, e. g. pressure drop or when the pump is at rest, the contact of the pressure switch opens. The signal can be used to control external valves.

Parameter	Oil pressure switch
Protection category	IP 55
Contact	Closing contact, normally open
Set point	1000 hPa
Switching voltage	250 V
Switching current V AC	2 A

1 + 2 closers = pressureless open



**Fig. 9: Installation location and circuit diagram of pressure switch**

- Switch off the pump.
- Unscrew screw 326 from the oil passage 18.
- Screw pressure switch with O-ring into oil passage 18.
- Remove protective cover and make electrical connections at the pressure switch.
- Reassemble the protective cover.



## 6 Operation

### 6.1 Before switching on the pump

- Check the operating fluid level in the sight glass.
- Compare the voltage and frequency information on the rating plate with the mains voltage and frequency values.
- Check that the exhaust connection allows free flow (max. permissible pressure 150 hPa absolute).
  - Activate the shut-off valves in such a way that they open before or at the same time as the pump is started.
- Protect the pump sufficiently from taking in contaminants by means of suitable precautions (e.g. dust filters); if necessary, check operating fluid regularly or replace at shorter intervals.

### 6.2 Switching on the pump

The pump can be switched on in any pressure range between atmospheric and ultimate pressure.

No special precautions are necessary when pumping dry gases. In order to attain the lowest possible ultimate pressures, the gas ballast valve should be closed.

- Switch on the pump with the vacuum flange closed and allow to warm up for 30 minutes.



#### CAUTION

##### **Hot surface!**

Danger of burns if hot parts are touched. Depending on the operating and ambient conditions, the surface temperature of the pump may rise above 70 °C.

- In this case, use suitable finger guards.

### Monitoring the operating fluid pressure

The pressure values on pressure gauge 17 differ depending on the operating temperature.

Operating fluid	Pump temperature	Operating fluid pressure
P3/D1	Cold start (ca. 12°C)	max. 10000 hPa
	Operating temperature	1500 ... 2500 hPa

- During continuous pump operation, check operating fluid level at sight glass 148 and operating fluid pressure on pressure gauge on a daily basis.





## 6.3 Pumping condensable vapours

Should the process gases contain condensable gases, the rotary vane pump must be operated with gas ballast (i.e. with an open gas ballast valve).



### NOTICE

#### Bad final vacuum and damage to the pump!

Danger of condensation and corrosion due to exceeding the water vapour compatibility during operation without gas ballast or in case of insufficient supply of flushing gas.

- Only pump vapours when the pump is warm and the gas ballast valve is open.
- When the process has been completed, allow the pump to continue running for about 30 minutes with the vacuum flange closed and the gas ballast open for operating fluid regeneration purposes.

### Gas ballast valve, standard version

To avoid condensation in the pump when pumping condensable vapours, air is periodically fed into the working chamber at the beginning of the compression phase via the gas ballast valve 115.

The gas ballast valve is closed when turning to the right to position 0 and open when turning to the left to position 1. Intermediate settings are not possible.

The gas ballast filter is used to keep the air free of particles before entering the suction chamber.

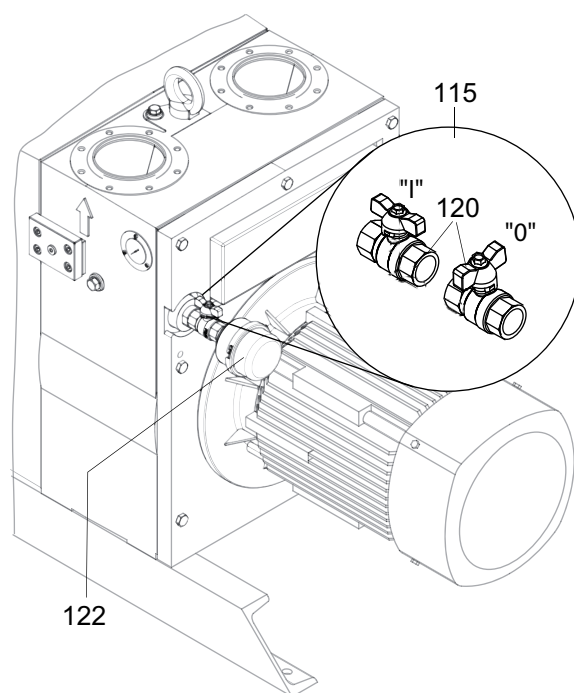


Fig. 10: Standard version of gas ballast valve 115

115 Gas ballast valve (ball valve)

122 Gas ballast filter

### Gas ballast valve with flushing gas connection (option)

If the pumping process requires the use of flushing gas, a supply hose can be connected at the gas ballast valve.

- Unscrew gas ballast filter 122 at ball valve 120.
- On the inside thread G 1/2" of ball valve 120, connect the supply line and seal up thread side.
- Set flushing gas pressure on site; maximum pressure 1500 hPa (absolute).
  - Select the type and amount of flushing gas depending on the process; consult Pfeiffer Vacuum if necessary.
- Dose flushing gas with the knob on the ball valve 120 or with a flow meter on site.





**NOTICE**

**Flushing gas pressure higher than allowed endangers the operational reliability of the pump.**

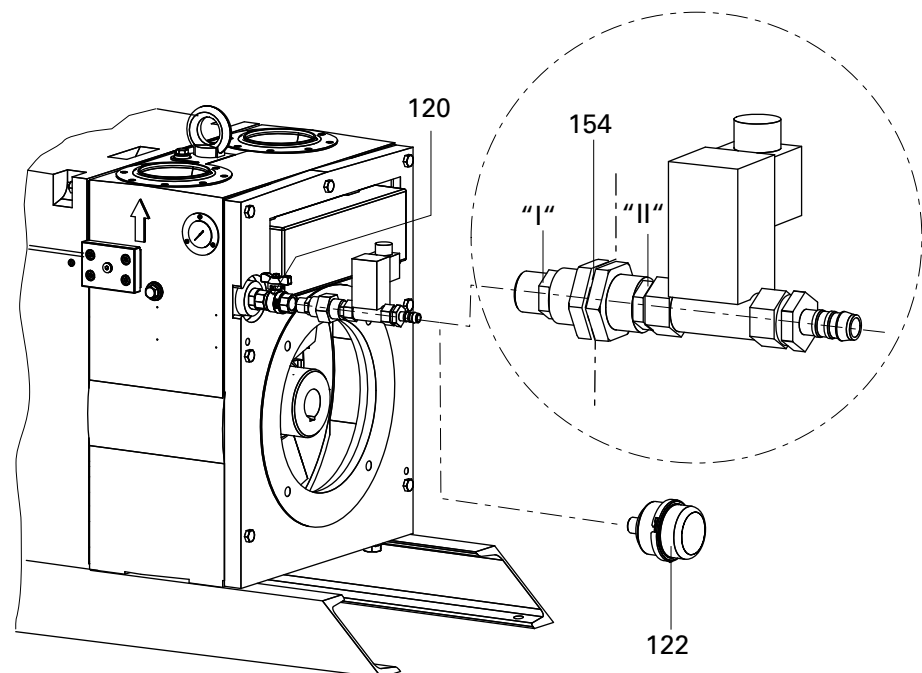
The power input of the pump, the temperature and the ejection of operating fluid will increase.

- Observe the maximum permissible flushing gas pressure.
- Set the amount of flushing gas on site.

**Gas ballast valve with solenoid valve**

The inlet of gas ballast or flushing gas can be controlled by a solenoid valve if a conversion kit is used.

If the process does not require flushing, ambient air can also be admitted via the solenoid valve. For this, remove the hose connection and attach the gas ballast filter 122 to the solenoid valve.



**Fig. 11: Assembling the solenoid valve at the gas ballast inlet**

Supply voltage:	24 V AC/DC
Starting power:	80 W
Stopping power:	6 W
Valve closed without current	

- Remove gas ballast filter 122.
- Unscrew connection 154, take care to ensure the flat gasket is secure.
- Seal the external thread G 1/2" of screw connection part I and attach to ball valve 120.
- Mount the screw connection part II so that the solenoid valve is facing up; take care to ensure the flat gasket is secure.
- Make electrical connections 24 V DC.
- Attach flushing gas to hose connection (NW 12... 14 mm) or after removing the hose nozzle attach to the internal thread G 1/2".
- Set flushing gas pressure; maximum pressure 1500 hPa (absolute).
  - Select the type and amount of flushing gas depending on the process; consult Pfeiffer Vacuum if necessary.
- Dose flushing gas with the knob on the ball valve 120 or with a flow meter on site.



## 6.4 Switching off the pump

The pump can be switched off in any pressure range.

Rotary vane pumps have an integrated safety valve on the intake side. If the differential pressure between the exhaust side and the intake side is  $\geq 250$  hPa, then the valve closes automatically and vents the pump when the pump is switched off.

→ Switch the pump off at the mains switch or disconnect from the mains in a secure manner.

### Venting the vacuum chamber



#### NOTICE

##### **Danger of backflow of operating fluid into the intake line!**

Contamination of the connected vacuum system!

- Vent the vacuum chamber within 30 s, regardless of the chamber size.
- For a longer venting process, use an additional shut-off valve and shut off the intake line after switching off the pump.

### Maintaining the vacuum in the chamber



#### NOTICE

##### **Danger of backflow of operating fluid into the intake line!**

Contamination of the connected vacuum system!

- Because the safety valve of the pump is not suitable for longer-term sealing, install an additional shut-off valve in the intake line.
- Shut off the intake line immediately after switching off the pump.



# 7 Maintenance

## 7.1 Precautions



WARNING
<p><b>Danger of injury from moving parts!</b>                  After power failure or motor shutdown due to overheating, the motor may restart automatically.</p> <ul style="list-style-type: none"> <li>→ Secure the motor so that it cannot be switched on while any work is being performed on the pump.</li> <li>→ If necessary, dismantle the pump from the installation for inspection.</li> </ul>



WARNING
<p><b>Pump parts may be contaminated from pumped media!</b>                  Danger of poisoning due to contact with harmful substances.</p> <ul style="list-style-type: none"> <li>→ Decontaminate the pump before carrying out any maintenance work.</li> <li>→ In the event of contamination, take suitable safety precautions to prevent your health from being harmed by any dangerous substances.</li> </ul>

- Turn off the vacuum pump, vent to atmospheric pressure and allow to cool.
- Disconnect the drive motor from the mains and secure it so that it cannot be switched on.
- Only dismantle the pump as far as necessary to carry out maintenance.
- Dispose of used operating fluid in compliance with local regulations.
- When using synthetic operating fluids or working with toxic substances or substances contaminated with corrosive gases, the relevant instructions governing their use must be observed.
- Use only alcohol or similar agents for cleaning pump parts.

### Magnetic coupling

The following safety instructions are only valid for the **disassembly** of the drive system for vacuum pumps with **magnetic coupling!**



DANGER
<p><b>Strong magnetic field in the vicinity of the drive system!</b>                  Danger to life for persons with cardiac pacemakers when the drive system is disassembled.</p> <ul style="list-style-type: none"> <li>→ Persons with cardiac pacemakers must not enter the area (<math>\leq 2\text{m}</math>) of the magnetic field.</li> <li>→ Rooms in which open couplings are accessible must be identified: "No trespassing for persons with heart pacemaker"!</li> <li>→ Disassembled magnetic couplings must be kept away from computers, data storage media and other electronic components.</li> </ul>



**Checklist for inspection, maintenance and overhaul**

Certain maintenance and overhaul work should only be performed by Pfeiffer Vacuum Service (PV). Pfeiffer Vacuum will be released from all warranty and liability claims if the required, below listed, intervals are exceeded or maintenance or overhaul procedures are not performed properly. This also applies if replacement parts other than Pfeiffer Vacuum OEM replacement parts are used.

Activity	K//W/R <sup>1</sup>	daily	as required; at least annually	as required; at least every 2 years	as required; at least every 4 years
Check operating fluid level	K	X			
Visual inspection (leak-tightness/oil leaks)	K	X			
Check filter insert of external oil mist filter (if existent)	K	X			
Change operating fluid	I		X		
Disassemble casing, sight glass and pumping system and clean casing outside (without cleaning agent)	I		X		
Clean gas ballast valve and silencer	I		X		
Clean the motor fan cap	I		X		
Disassemble the pump, clean and exchange seals and wearing parts: ⇒ Radial shaft seal ring ⇒ Coupling half at motor side ⇒ Hydraulic valve ⇒ Exhaust valve tongue ⇒ Valve flap of the gas ballast valve ⇒ Vane springs	W			X (PV)	
Carry out work in accordance the maintenance and additionally: ⇒ Change vanes ⇒ Change valves, springs and sight glass ⇒ Change silencer nozzle ⇒ Check coupling and exchange if necessary	R				X (PV)

Depending on the process, the required replacement intervals for the operating fluid and the intervals for inspection, maintenance and overhaul may be shorter than the guide values specified in the table. Consult Pfeiffer Vacuum Service, if necessary.

1. K: Checking, I: Inspection, W: Maintenance, R: Overhaul

**7.2 Changing the operating fluid**

The changing interval for the operating fluid depends on the pump applications, but should be carried out once a year.



**Depending on the applications, Pfeiffer Vacuum recommends determining the exact service life of the operating fluid during the first year of operation.**  
The replacement interval may vary from the guide value specified by Pfeiffer Vacuum depending on the thermal and chemical loads, and the accumulation of suspended particles and condensation in the operating fluid.

- The level of deterioration of operating fluid P3 can be determined for clean processes with the colour scale (in accordance with DIN 51578); supplementary sheet PK 0219 BN on request or at [www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com).
- Suck off operating fluid from the pump through the operating fluid filler opening.
- Fill the specimen in a test tube or some similar vessel and test by holding against the light.
- Where discolouration is red brown (equivalent to 5 on the scale) change operating fluid at the latest.
- Switch off the pump.
- Unscrew operating fluid filler screw 327.
- Unscrew operating fluid drain screw 328.

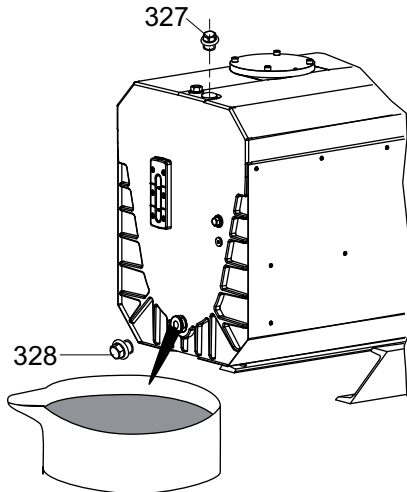


Fig. 12: Draining the operating fluid



**WARNING**

**Hot operating fluid!**

- Danger of burns when draining due to contact with skin.
- Wear suitable protective clothing.
- Use a suitable collecting vessel.



**WARNING**

**Operating fluid may contain toxic substances from the pumped media!**

- Danger of poisoning from the emission of harmful substances from the operating fluid.
- Wear suitable protective clothing and respirators.
- Dispose of operating fluid according to the local regulations
- Screw in operating fluid drain screw 328; pay attention to O-ring.
- Screw in operating fluid filler screw 327.
- Allow pump to run for a maximum of 5 seconds with the vacuum flange open.
- Drain off remaining operating fluid.
  - In case of serious contamination, the operating fluid will have to be changed several times (flushing):
- Fill up with operating fluid and check the filling level (see p. 14, chap. 5.5).

**Flushing and cleaning**

- Fill up with operating fluid to the middle of the sight glass.
- Operate the pump with the gas ballast open until the pump has warmed up.
- Drain the operating fluid again and check for contamination, flush again if necessary.
- Screw the operating fluid drain screw back in.
- Fill up with operating fluid and check the filling level (see p. 14, chap. 5.5).



**Request safety data sheets for operating fluids and lubricants**

- from Pfeiffer Vacuum or download at [www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com).
- Dispose of operating fluid according to the local regulations.



## Checking the oil filter

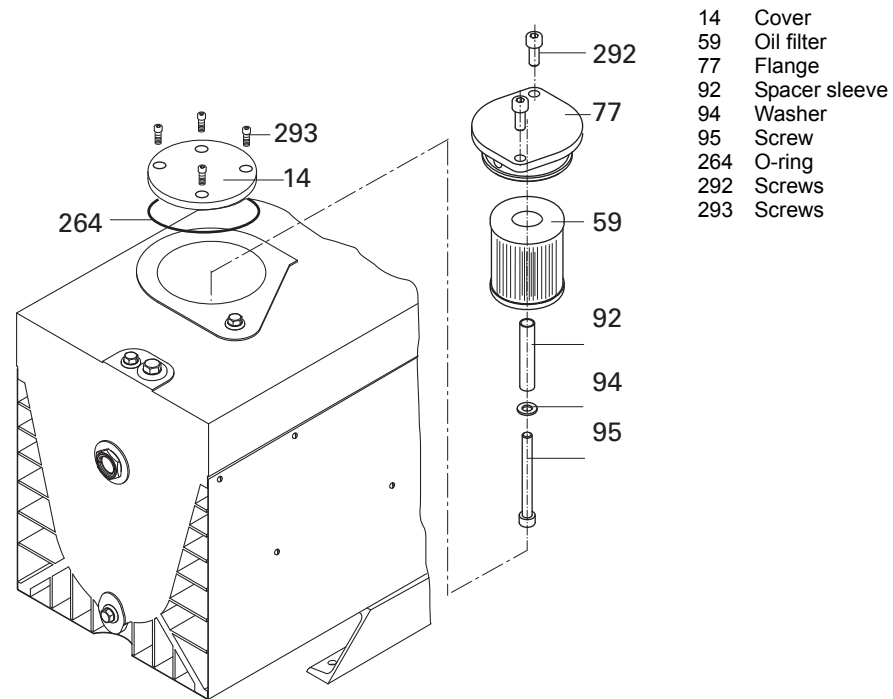
The oil filter described here is integrated into the pump's oil circulation. Alternative, an additional external oil filter can be used.



### NOTICE

**Also check and clean if necessary the oil filter every time you change the operating fluid.**

→ In case of maintenance, always change the oil filter



**Fig. 13: Dismantle and clean oil filter**

- Unscrew screws 293 and remove cover 14, use tapped holes if necessary; observe O-ring 264.
- Unscrew screws 292 from flange 77 and lift flange with oil filter 59 out of the pump; pay attention to dripping operating fluid.
- Dismantle filter unit in accordance with figure and clean oil filter 59 in petrol or similar cleaning agent.
- Blow out filter with air and dry.
- **Assembling** is carried out in reverse order.
- Fill up with operating fluid to the middle of the sight glass.
  - Filling quantity approx. 25 l of operating fluid.

## 7.3 Cleaning and re-setting the silencer

If the silencer is not functioning, a knocking noise becomes audible at final vacuum. This does not damage the pump, although can have a negative affect at the installation location.



Dismantling

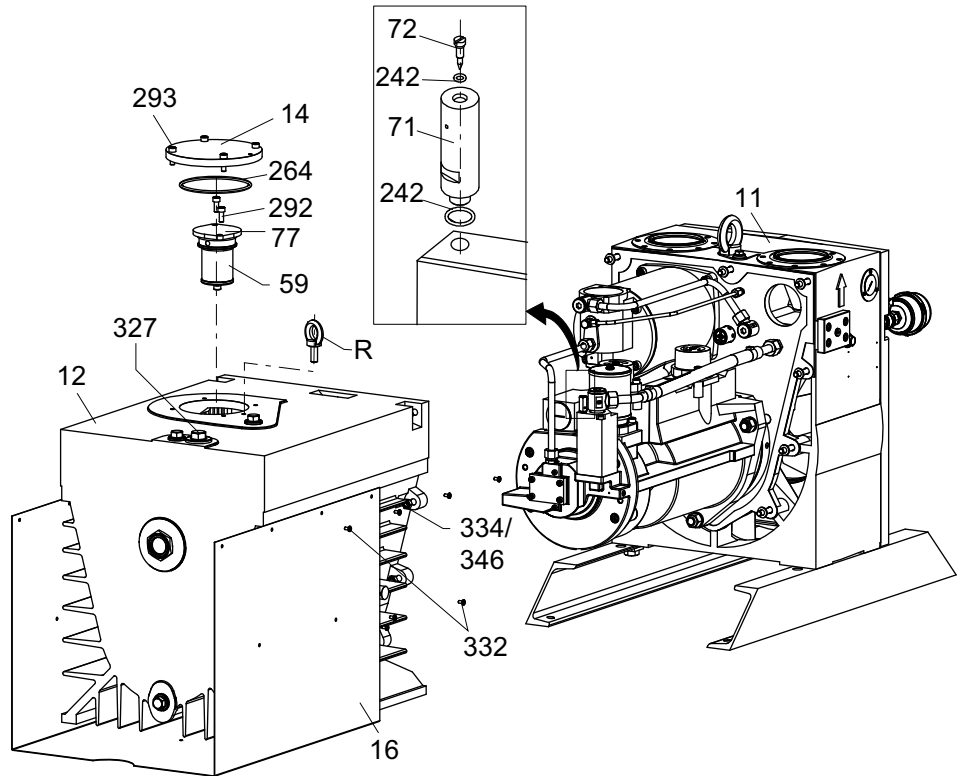


Fig. 14: Dismantle silencer

11	Support stand	72	Valve spindle	293	Screws
12	Casing	77	Flange	327	Operating fluid filler screw
14	Cover	242	O-ring	332	Screws
16	Baffle plate	264	O-ring	334	Hexagon nut
59	Oil filter	292	Screws	346	Washer
71	Valve housing				

- Drain off operating fluid.
- Unscrew screws 293 and remove cover 14, use tapped holes if necessary; observe O-ring 264.
- Unscrew screws 292 from flange 77 and lift flange with oil filter 59 out of the pump; pay attention to dripping operating fluid.
- Unscrew screws 332 and remove baffle plate 16.
- Lift casing 12 with a chain hoist at eye bolt R or a jack lift. **Caution!** Casing weighs approx. 46 kg.
- Unscrew nuts 334 and remove washers 346.
- Carefully back casing 12 away from support stand 11 in axial direction; pay attention to O-ring 269.
- Dismantle valve housing 71 in axial direction, clean and check radial borehole for free flow.
- Unscrew valve spindle 72.
- Examine O-rings 242, valve spindle 72 and valve seat for wear and replace if necessary.
- Reassemble in the reverse sequence. Carefully push O-ring 242 into the nut in valve spindle 72 and oil lightly with operating fluid.

Setting the silencer

The silencer is set using a standard screwdriver when the pump is running at operating temperature and vacuum flange and gas ballast valve are closed:

- Bring pump up to operating temperature.
- Unscrew operating fluid filler screw 327.
- Turn valve spindle 72 approx. 3 rotations using screwdriver (flush), wait a few seconds and then reclose far as it will go (clockwise).



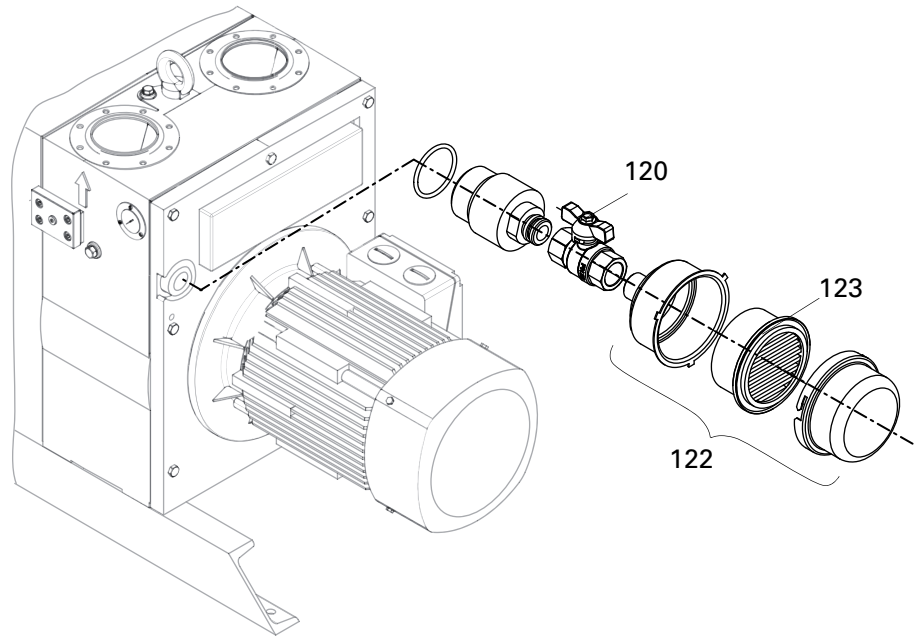


- Slowly open valve spindle 72 (1/2 to 1 rotation) until the oil hammer noise disappears.
- Screw in operating fluid filler screw 327.

## 7.4 Changing the gas ballast filter

The greater the contamination, the lower the filter air throughput and the greater the risk of condensation and corrosion within the pump.

### Standard version



**Fig. 15: Gas ballast valve (standard version)**

120 Gas ballast valve (ball valve)      123 Filter insert  
 122 Filter housing

- Turn the cover and open the filter housing 122.
- Clean filter insert 123 or replace as necessary.



## 7.5 Assembling the motor and coupling

### Crown gear coupling

When performing installation work on the coupling, it is important to observe the installation instructions of the coupling manufacturer:

[www.ktr.com/de/index/service/montageanleitung.htm](http://www.ktr.com/de/index/service/montageanleitung.htm)



#### NOTICE

##### Damage to motor bearings

Blows or pressure when mounting the coupling half can damage the motor bearings.

- Clean and lightly oil the shaft journals.
- Push the coupling half onto the shaft. If necessary, warm the coupling half, or use the internal thread in the shaft journal and suitable tools and push the coupling half in place.
- The shaft of the drive motor must be aligned with the pump shaft:
  - Observe the permissible angular and radial displacements.
  - Maintain clearance E so that the crown gear can still move axially.
- Tighten the screws in the coupling half with the prescribed torque and secure the stud bolt with Loctite 243.

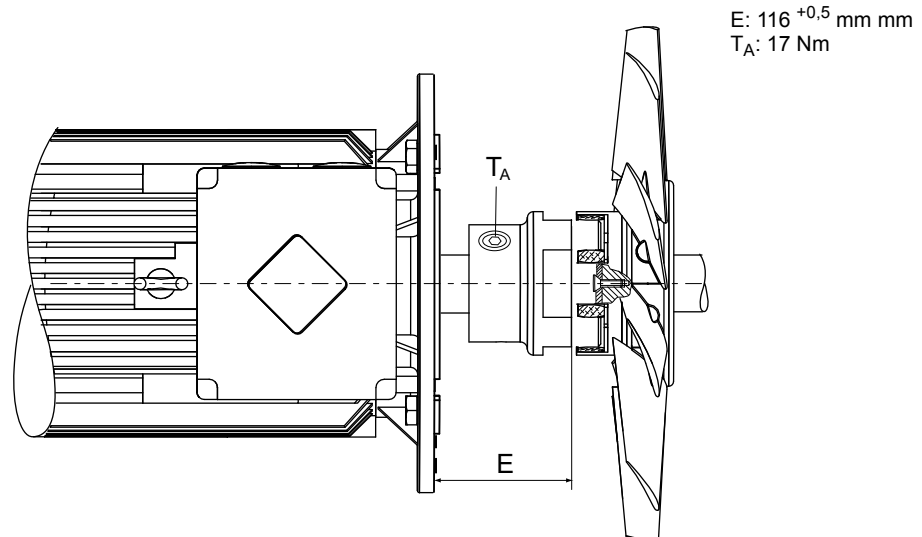


Fig. 16: Assembling the crown gear coupling at pump with standard coupling

### Magnetic coupling

The following safety instructions are only valid for the **disassembly** of the drive system for vacuum pumps with **magnetic coupling**!



#### DANGER

##### Strong magnetic field in the vicinity of the drive system!

Danger to life for persons with cardiac pacemakers when the drive system is disassembled.

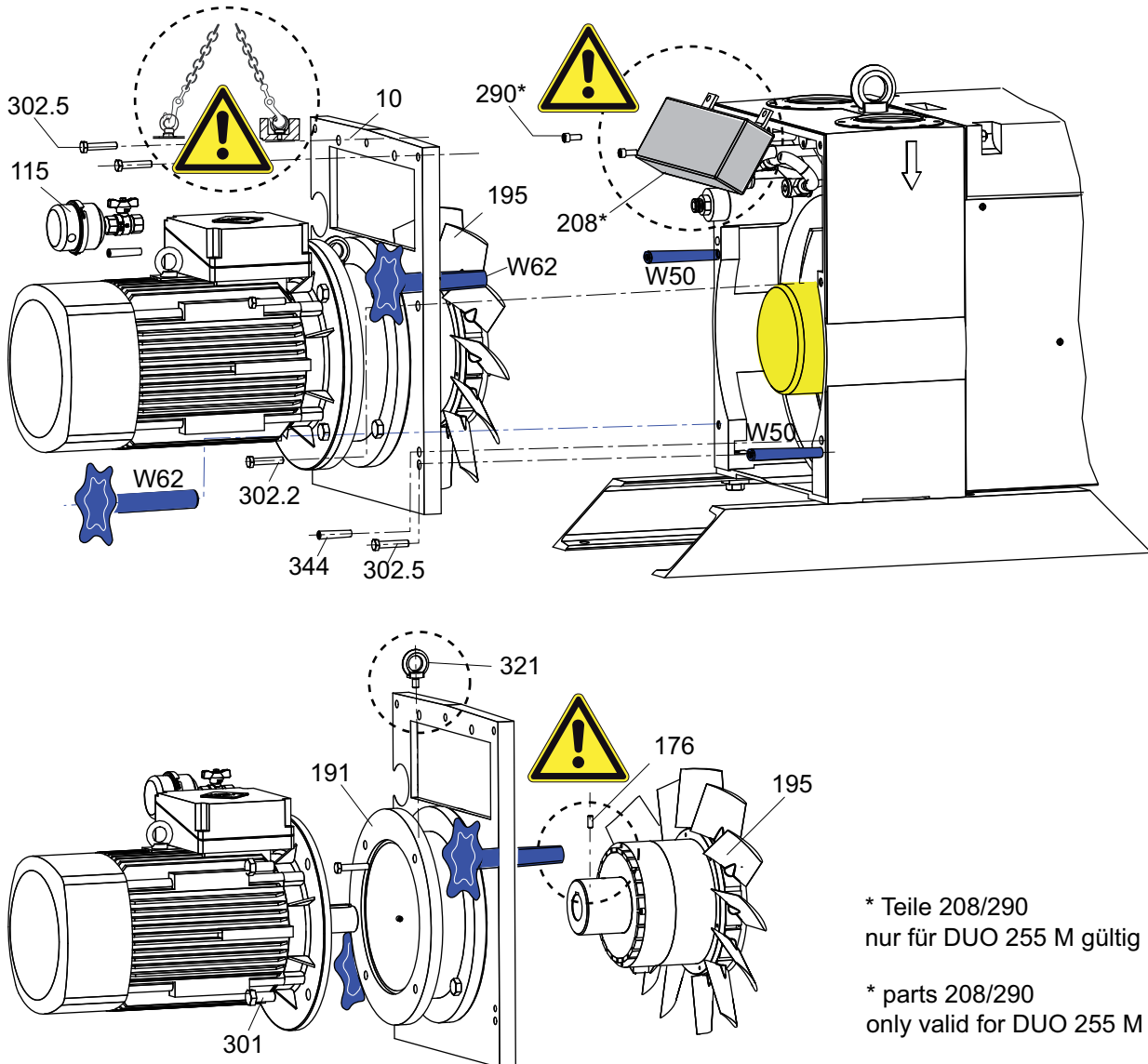
- Persons with cardiac pacemakers must not enter the area ( $\leq 2\text{m}$ ) of the magnetic field.
- Rooms in which open couplings are accessible must be identified: "No trespassing for persons with heart pacemaker"!
- Disassembled magnetic couplings must be kept away from computers, data storage media and other electronic components.



**NOTICE****Danger of bursting when the motor is removed!**

The separating can of the magnetic coupling is made of plastic or ceramics, and can be destroyed when the motor is pulled off.

- Suspend the motor at the eyebolt to the lifting device and pull it off horizontally.
- Use jack screws and guide pins.



**Fig. 17: Dismantling/assembling the drive motor at pumps with magnetic coupling**

- Secure motor with chain hoist.
- Remove gas ballast valve 115 from the pump and absorb the operating fluid underneath.
- Pull off taper pins 344 with a pin puller (tool kit).
- Unscrew screws 302.2.
- Screw in two guide pins F in place of the two screws 302.2.
- Pull off taper pins 344 with a pin puller (tool kit).
- Then unscrew the remaining screws 302.5 (5x).
- Press cover 10 and motor off evenly with two jack screws W62 and pull off horizontally;
  - loosen the screws 290 at the oil cooler 208 during the releasing process and gently tilt the oil cooler 208 when passing the fan 195.



- Detach motor in an axial direction from motor intermediate flange 194.

## 8 Decommissioning

### 8.1 Shutting down for longer periods

Before shutting down the pump, observe the following procedure and adequately protect the pump system against corrosion:

- Switch off pump.
- Change operating fluid.
- Start the pump and allow the pump to warm up.
- Switch off the pump.
- Fill up the pump with new operating fluid to the top edge of the sight glass.
- Close vacuum flange and exhaust flange with locking caps.
- Store the pump only indoors, preferably at temperatures between -10 °C and +40 °C.
  - In rooms with moist or aggressive atmospheres, the pump must be airproof shrink-wrapped in a plastic bag together with a bag of desiccant.
  - After storage periods longer than two years, it is recommended to carry out maintenance and change the operating fluid before using the pump.
- Do not store pump in the vicinity of machines, lanes, etc., because strong vibrations can damage the rotor bearings.

### 8.2 Re-starting



#### Emission of operating fluid!

Danger of the operating fluid being emitted at the exhaust flange if overfilled.

- Drain the operating fluid to the normal level before restarting the pump.



#### NOTICE

#### Re-starting

The serviceability of the operating fluid without operation is a maximum of 2 years. Before restarting after a shut-down of **2 years or longer**, carry out the following work.

- Replace the operating fluid.
- Replace the radial shaft sealing rings and further elastomer parts.
- Replace bearings at pumps with anti-friction bearings.
- Follow the maintenance instructions and inform Pfeiffer Vacuum.

### 8.3 Disposal

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

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



## 9 Malfunctions

Please note the following instructions should the pump malfunction:



### CAUTION

#### Hot surface!

Danger of burns if hot parts are touched. The surface temperature of the pump may rise above 105 °C in case of malfunction.

→ Carry out work on the pump only after it has cooled to a safe temperature.



### NOTICE

#### Motor overload!

Depending on the malfunction (e.g. blocking during cold start), the motor may not be sufficiently protected by the built-in thermal protection switch from damage through overheating.

→ Implement an additional network safety device.

### 9.1 Rectifying malfunctions

Problem	Possible causes	Remedy
Pump will not start up	No mains voltage or voltage does not correspond to the motor data	Check mains voltage and mains fuse protection; check motor switch
	Pump temperature too low	Warm up pump to > 12 °C
	Thermal protection switch has responded	Detect and fix cause of overheating; allow pump to cool off if necessary.
	Pump system dirty	Clean pump; contact Pfeiffer Vacuum Service if necessary.
	Pump system damaged	Clean and overhaul pump; contact Pfeiffer Vacuum Service if necessary.
	Motor defective	Replace motor
Pump switches off after a while after being started	Thermal protection switch of the motor has responded	Detect and fix cause of overheating; allow motor to cool off if necessary.
	Mains fuse protection triggered due to overload (e.g. cold start)	Warm up pump
	Exhaust pressure too high	Check opening of exhaust line and exhaust accessories
Pump does not attain ultimate pressure	Measurement reading is false	Check gauge, check ultimate pressure without installation connected.
	Pump or connected accessories are dirty	Clean pump and check components for contamination.
	Operating fluid dirty	Operate pump for a longer period with gas ballast valve open or change operating fluid
	Leak in system	Repair leak
	Operating fluid filling level too low	Top off operating fluid
	Pump damaged	Contact Pfeiffer Vacuum Service.
Pumping speed of pump too low	Intake line not well-dimensioned	Keep connections as short as possible and ensure that cross-sections are sufficiently dimensioned
	Exhaust pressure too high	Check opening of exhaust line and exhaust accessories
Loss of operating fluid	Swivel gasket leaky	Check tightness; replace gasket if necessary
	Radial shaft seal ring leaky	Replace seal ring and check bushing
	Operational loss of operating fluid, without ONF/OME	Install oil mist filter and oil return unit
	Operational loss of operating fluid, with ONF/OME	Clean oil mist filter and oil return unit, change filter respectively



Problem	Possible causes	Remedy
Unusual operating noises	Silencer dirty	Clean or replace the silencer.
	Damage to the pump system	Clean and overhaul pump; contact Pfeiffer Vacuum Service if necessary.
	Motor bearing defective	Replace motor; contact Pfeiffer Vacuum Service if necessary

Problem	Possible causes	Remedy
Unusual operating noises	Motor runs - pump doesn't (only valid for pumps with magnetic coupling system)	<p>Magnetic coupling system defective or magnetic field "broken away", contact Pfeiffer Vacuum Service if necessary.</p> <p><b>Attention! Magnetic field:</b>                      If the magnetic field has "broken away", the orientation of the magnets with respect to each other can only be re-established at standstill. If the pump is left to operate with a "broken away" magnetic field, demagnetisation will take place and the coupling is destroyed.</p>



<b>NOTICE</b>	
<p><b>Service work should be carried out by a qualified person only!</b></p> <p>Pfeiffer Vacuum is not liable for any damage to the pump resulting from work carried out improperly.</p> <p>→ Take advantage of our service training programs; additional information at <a href="http://www.pfeiffer-vacuum.com">www.pfeiffer-vacuum.com</a>.</p> <p>→ Please state all the information on the pump rating plate when ordering spare parts.</p>	



## 10 Service

### Pfeiffer Vacuum offers first-class service!

- Maintenance/repairs on site by Pfeiffer Vacuum field service
- Maintenance/repairs in a nearby service center or service point
- Fast replacement with exchange products in mint condition
- Advice on the most cost-efficient and quickest solution

Detailed information and addresses at: [www.pfeiffer-vacuum.com](http://www.pfeiffer-vacuum.com) (Service).

### Maintenance and repairs in Pfeiffer Vacuum ServiceCenter

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

- Download the forms "Service Request" and "Declaration on Contamination".<sup>1)</sup>
- Fill out the "Service Request" form and send it by fax or e-mail to your Pfeiffer Vacuum service address.
- Include the confirmation on the service request from Pfeiffer Vacuum with your shipment.
- Fill in the contamination declaration and enclose it in the shipment (required!).
- Dismantle all accessories.
- Drain operating fluid/lubricant.
- Drain cooling medium, if used.
- Send the pump or unit in its original packaging if possible.

### Sending of contaminated pumps or devices

No units will be accepted if they are contaminated with micro-biological, explosive or radioactive substances. "Hazardous substances" are substances and compounds in accordance with the hazardous goods directive (current version). If pumps are contaminated or the declaration on contamination is missing, Pfeiffer Vacuum performs decontamination at the shipper's expense.

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

### Service orders

All service orders are carried out exclusively according to our repair conditions for vacuum units and components.

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

# 11 Spare parts

## 11.1 Spare parts packages

The spare parts packages listed here are only applicable for standard models.

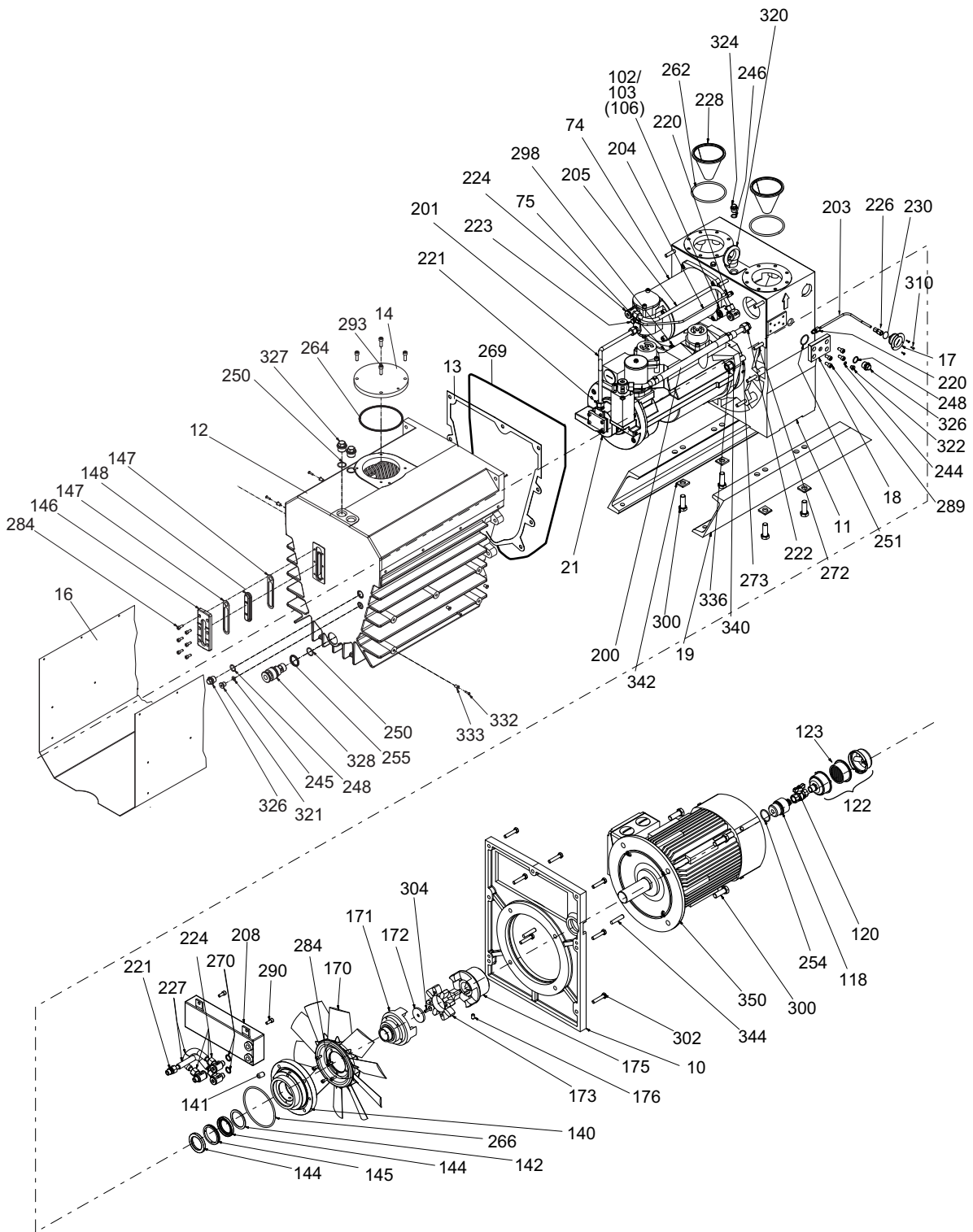
Please state all information on the rating plate when ordering spare parts. Other spare parts than those described in this manual must not be used without the agreement of Pfeiffer Vacuum.

Spare parts pack/ spare parts	Revision index / Version	No.	consisting of the parts correspondent to exploded views on the following pages
Sets of seals	"A"	PK E00 023 -T	48, 106, 144, 240, 242, 244, 246, 248, 250, 251, 254, 256, 258, 260, 262, 264, 266, 269, 270
	"C"	PK E00 025 -T	48, 102, 144, 147, 240, 242, 244, 245, 246, 247, 248, 250, 251, 255, 256, 258, 260, 262, 264, 266, 269, 270
	"C"/DUO 255 M	PK E00 027 -T	48, 102, 144, 147, 240, 242, 244, 245, 246, 247, 248, 250, 251, 254, 255, 256, 258, 260, 262, 264, 266, 267, 269, 270
Maintenance kit	"A"	PK E01 033 -T	29, 59, 60, 142, 144, 145, 173, 250, 254, 260, 264, 266, 269
	"A"/DUO 255 M	PK E01 035 -T	59, 60, 228, 247, 250, 256, 264, 269
Overhaul kit	"A"	PK E02 036 -T	PK E00 023 -T, 15, 17, 24, 29, 30, 31, 38, 52, 53, 56, 59, 60, 65, 70, 81, 85, 88, 98, 99, 142, 145, 173, 206
	"C"	PK E02 038 -T	PK E00 025 -T, 17, 24, 29, 30, 31, 38, 52, 53, 56, 59, 60, 65, 70, 81, 85, 88, 98, 99, 142, 145, 148, 173, 230
	"C"/DUO 255 M	PK E02 051 -T	PK E00 027 -T, 17, 24, 29, 30, 31, 38, 52, 53, 56, 59, 60, 65, 70, 81, 85, 88, 98, 99, 142, 145, 148, 173, 230
Pumping system, P3	DUO 255	PK E03 013 -T	22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 41, 42, 43, 44, 48, 52, 53, 54, 56, 57, 58, 59, 60, 254, 256, 258, 260, 280, 282, 287, 288, 294, 296, 312, 338
Pumping system, P3	DUO 255 M	PK E03 050 -U	22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 41, 42, 43, 44, 48, 52, 53, 54, 56, 57, 58, 59, 60, 254, 260, 280, 282, 287, 294, 296, 338
Pumping system, D1	DUO 255	PK E03 014 -T	22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 41, 42, 43, 44, 48, 52, 53, 54, 56, 57, 58, 59, 60, 254, 260, 280, 282, 287, 294, 296, 338
Pumping system, D1	DUO 255 M	PK E03 051 -U	22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 41, 42, 43, 44, 48, 52, 53, 54, 56, 57, 58, 59, 60, 254, 260, 280, 282, 287, 294, 296, 338
Fore-vacuum safety valve set	DUO 255 -/M	PK E04 008 -T	59, 79, 80, 81, 82, 83, 84, 85, 88, 98, 99, 262, 264
Exhaust valve set, stage I	DUO 255 -/M	PK E05 011 -T	56, 59, 60
Exhaust valve set, stage II	DUO 255 -/M	PK E05 013 -T	48, 52, 53, 54, 258, 294
Coupling set	DUO 255	PK E06 006 -T	170, 171, 173, 175
Set of vanes	DUO 255 -/M	PK E08 028 -T	30, 31, 38
Filter insert for gas ballast valve	DUO 255 -/M	P 0996 094	123





Exploded view DUO 255, pump complete



## Spare parts

10	Cover	172	Washer	269	O-ring (for revision index "A")
11	Support stand	173	Coupling set	270	Flat seal
12	Casing	176	Stud screw for coupling	272	Stud screw
13	Sealing, casing	200	Pipe	273	Stud screw
14	Flange	201	Oil pipe, $\varnothing$ 12	284	Allen head screw
16	Baffle plate	203	Oil pipe, $\varnothing$ 6	289	Screws for flange (18)
17	Spring manometer	204	Oil pipe, $\varnothing$ 6	290	Allen head screw
18	Flange, OFM	205	Oil pipe, $\varnothing$ 12	293	Allen head screw
19	Base	208	Oil cooler	298	Allen head screw, M 10
21	Pumping system, complete	220	Straight screwed coupling, G 1/8"	300	Hexagon head screw
74	Vacuum safety valve, complete	221	Straight screwed coupling, G 3/8"	302	Hexagon head screw
75	Flange ring	222	Straight screwed coupling, G 1/2"	304	Countersunk screw
102	Over pressure valve, complete	223	Elbow union, G 1/8"	310	Allen head screw
103	Housing	224	Elbow union, G 3/8"	320	Crane eye
106	Valve seat ring (pressure relief valve)	226	Screw fitting	321	Locking screw, M14 x 1.5
118	Screw fitting, G1 1/4" to G 1/2"	227	Hose connection for oil cooler	322	Locking screw, G 1/8"
120	Ball valve, G 1/2"	228	Strainer	324	Locking screw, G 3/8"
122	Gas ballast filter, complete	230	Sealing ring	326	Locking screw, G 1/2"
123	Filter insert for gas ballast filter	244	O-ring	327	Locking screw, G 3/4"
140	Centering flange for rcsr.	245	O-ring	328	Operating fluid drain screw
141	Sealing nipple	246	O-ring	332	Allen head screw
142	Compensating washer for rcsr.	248	O-ring	334	Hexagon nut
144	Radial shaft seal ring (rcsr)	250	O-ring	336	Hexagon nut
145	Spacer	251	O-ring	340	Lock washer
146	Sight glass frame	254	O-ring	342	Washer
147	Sight glass seal	255	O-ring	344	Tapered pin
148	Sight glass	262	O-ring	346	Washer
170	Fan	264	O-ring	350	Motor
171	Coupling half	266	O-ring		



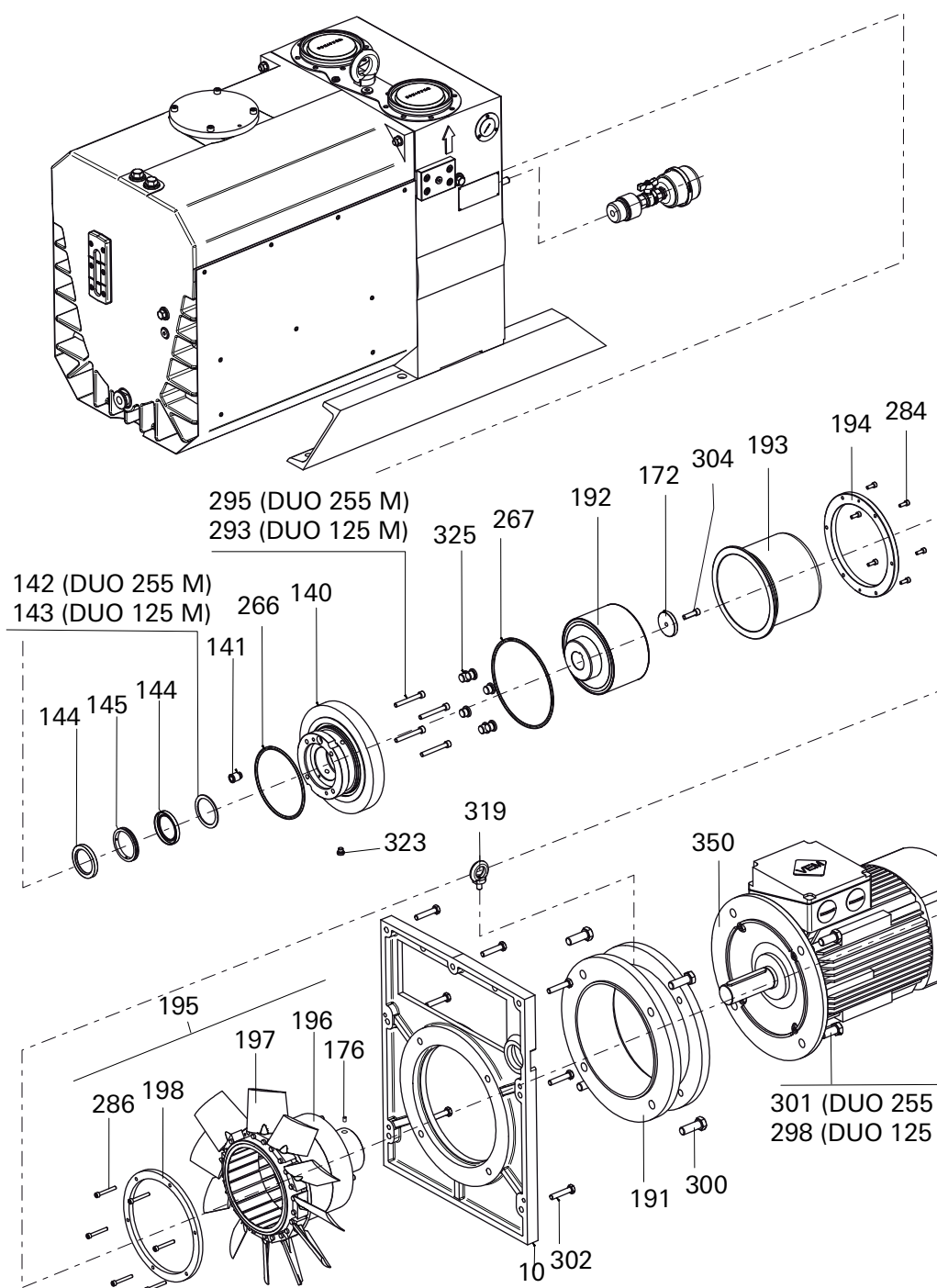
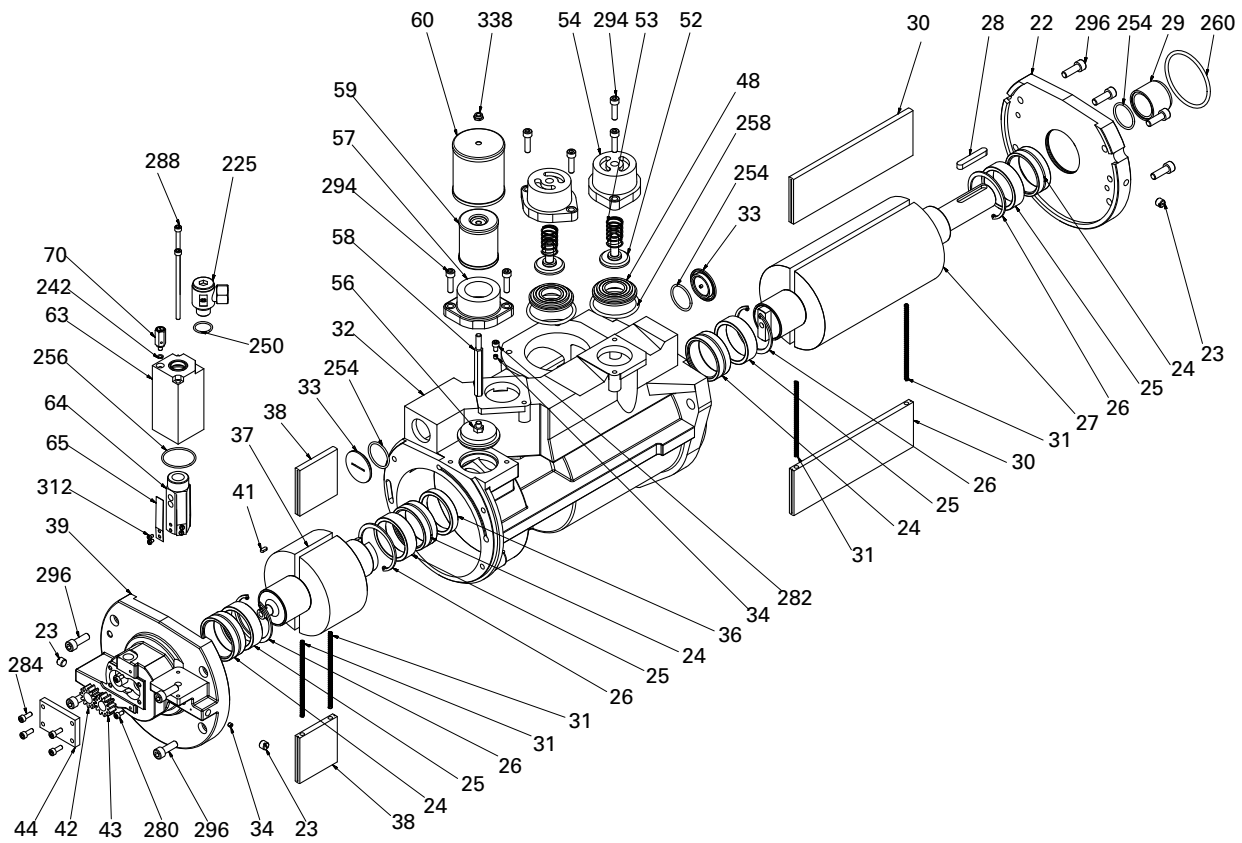


Fig. 18: DUO 255 M with magnetic coupling

10	Cover	192	Magnetic coupling	293	Allen head screw
140	Centering flange	193	Can	304	Allen head screw
141	Sealing nipple (for DUO 125 M in support plate 22)	194	Collar flange	295	Allen head screw
142	Washer	195	Fan	298	Hexagon head screw
143	Supporting ring	196	Magnetic coupling, motor	300	Hexagon head screw
144	Radial shaft seal ring	197	Fan blade	302	Hexagon head screw
145	Spacer	198	Counter ring, fan	301	Hexagon head screw
172	Washer	266	O-ring	319	Eye bolt
176	Stud screw	267	O-ring	323	Locking screw
191	Motor intermediate flange	284	Allen head screw	325	Locking screw
		286	Allen head screw	350	Motor



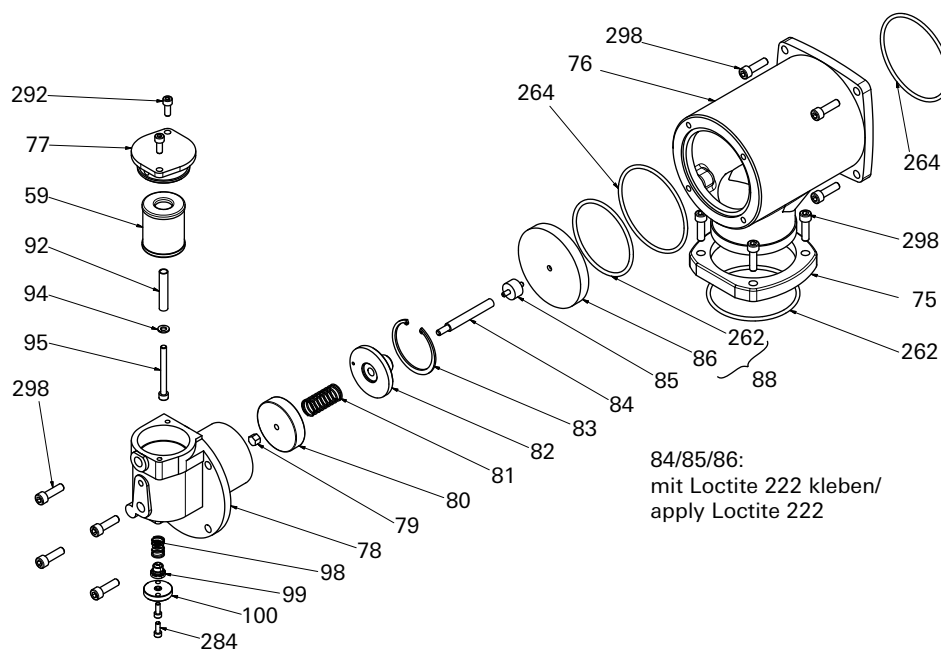
Exploded view DUO 255, pumping system



- |    |                                   |    |                                    |     |                                  |
|----|-----------------------------------|----|------------------------------------|-----|----------------------------------|
| 22 | Support plate                     | 39 | Bearing cover                      | 65  | Plate spring of non-return valve |
| 23 | Set screw                         | 41 | Key                                | 70  | Silencer, complete               |
| 24 | Needle bearing                    | 42 | Gear wheel, driven                 | 225 | Elbow union G 1/2"               |
| 25 | Cover ring for needle bearing     | 43 | Gear wheel, treibend               | 242 | O-ring                           |
| 26 | Circlip for needle bearing        | 44 | Cover, oil pump                    | 250 | O-ring                           |
| 27 | Rotor I                           | 48 | Valve seat, complete               | 254 | O-ring                           |
| 28 | Key                               | 52 | Valve stamp, stage I               | 256 | O-ring                           |
| 29 | Protective sleeve for radial ssr. | 53 | Pressure spring for valve, stage I | 258 | O-ring                           |
| 30 | Vane, stage I                     | 54 | Valve housing, stage I             | 260 | O-ring                           |
| 31 | Pressure spring                   | 56 | Pressure valve, stage II           | 280 | Allen head screw                 |
| 32 | Cylinder                          | 57 | Valve housing, stage II            | 282 | Allen head screw                 |
| 33 | Locking screw                     | 58 | Stud bolt of valve, stage II       | 284 | Allen head screw                 |
| 34 | Nozzle                            | 59 | Oil filter                         | 288 | Allen head screw                 |
| 36 | Spacer                            | 60 | Sieve box of valve, stage II       | 294 | Allen head screw                 |
| 37 | Rotor II                          | 63 | Housing of non-return valve        | 296 | Allen head screw                 |
| 38 | Vane, stage II                    | 64 | Valve insert of non-return valve   | 312 | Allen head screw                 |
|    |                                   |    |                                    | 338 | Hexagon nut                      |



## Exploded view DUO 255, vacuum safety valve



59	Oil filter	83	Circlip	100	Cover
75	Flange ring	84	Valve stem	88	Pos. 86 + 262
76	Valve housing	85	Buffer	262	O-ring
77	Valve cover	86	Valve plate	264	O-ring
78	Valve cover for hydraulic valve	92	Pipe	284	Allen head screw
79	Hexagon cap nut	94	Washer	292	Allen head screw
80	Piston	95	Allen head screw	298	Allen head screw
81	Pressure spring	98	Pressure spring		
82	Guiding piece	99	Hydraulic piston		



## 12 Accessories

Designation	Duo 255
STP 100, dust separator, single-stage for minor contamination	PK Z60 212
STR 100, dust separator, dual-stage for medium contamination	PK Z60 112
KAS 100, condensate separator for pumping speeds of up to 250 m <sup>3</sup> /h	PK Z10 012
OME 100, oil mist filter for pumping speeds up to 300 m <sup>3</sup> /h	PK Z40 012
FAK 100, activated carbon filter	PK Z30 012
PTC-resistor tripping device	P 4768 051 FQ
Oil level monitoring 24 V DC for Okta 250 / M / Okta 500 / M / Okta 1000 / M / Okta 2000 / M / Okta 4000 / M / Okta 6000 / M, G 1 1/4	PK 005 639 -U
Oil level monitoring 20-250 V AC for Okta 250 / M / Okta 500 / M / Okta 1000 / M / Okta 2000 / M / Okta 4000 / M / Okta 6000 / M, G 1 1/4	PK 004 930 -U
OFM 255, mechanical oil filter	PK Z90 341
Oil return unit, ORF 005, standard version	PK Z90 065
Oil pressure switch for Duo 125/255	PK 223 806 -T
Gas ballast valve - conversion kit with magnet valve, 24 V DC	PK 215 795 -T
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
D1, synthetic diester based oil, 1 l	PK 005 875 -T
D1, synthetic diester based oil, 5 l	PK 005 876 -T
D1, synthetic diester based oil, 20 l	PK 005 877 -T

Further detailed accessories are contained in the Pfeiffer Vacuum printed or Online Catalogue.



## 13 Technical data and dimensions

### 13.1 General

Conversion table: pressure units

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

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

Conversion table: gas throughput units

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

## 13.2 Technical data

Parameter	Duo 255
Flange (in)	DN 100 ISO-F
Flange (out)	DN 100 ISO-F
Pumping speed at 50 Hz	250 m <sup>3</sup> /h
Pumping speed at 60 Hz	300 m <sup>3</sup> /h
Ultimate pressure with gas ballast	4 · 10 <sup>-3</sup> hPa
Ultimate pressure without gas ballast	3 · 10 <sup>-3</sup> hPa
Exhaust pressure, min.	250 hPa
Exhaust pressure, max.	1500 hPa
Rotation speed at 50 Hz	1000 min <sup>-1</sup>
Rotation speed at 60 Hz	1200 min <sup>-1</sup>
Leak rate safety valve	≤ 1 · 10 <sup>-5</sup> Pa m <sup>3</sup> /s
Emission sound pressure level without gas ballast at 50 Hz	≤ 75 dB (A)
Ambient temperature	12-40 °C
Protection category	IP 55
Rated power 50 Hz	7.5 kW
Rated power 60 Hz	9.0 kW
Switch	No
Mains cable	No
Shipping and storage temperature	-25-+55 °C
Operating fluid filling	25 l
Weight	360 kg
Cooling method, standard	Air

**Table 1: Typical ultimate pressure according to PNEUROP**

Parameter	Duo 255 M
Flange (in)	DN 100 ISO-F
Flange (out)	DN 100 ISO-F
Pumping speed at 50 Hz	250 m <sup>3</sup> /h
Pumping speed at 60 Hz	300 m <sup>3</sup> /h
Ultimate pressure with gas ballast	4 · 10 <sup>-3</sup> hPa
Ultimate pressure without gas ballast	3 · 10 <sup>-3</sup> hPa
Exhaust pressure, min.	250 hPa
Exhaust pressure, max.	1500 hPa
Rotation speed at 50 Hz	1000 min <sup>-1</sup>
Rotation speed at 60 Hz	1200 min <sup>-1</sup>
Leak rate safety valve	≤ 1 · 10 <sup>-5</sup> Pa m <sup>3</sup> /s
Emission sound pressure level without gas ballast at 50 Hz	≤ 75 dB (A)
Ambient temperature	12-40 °C
Protection category	IP 55
Rated power 50 Hz	7.5 kW
Rated power 60 Hz	9 kW
Switch	No
Mains cable	No
Shipping and storage temperature	-25-+55 °C
Operating fluid filling	25 l
Weight	397 kg
Cooling method, standard	Air

**Table 2: Typical ultimate pressure according to PNEUROP**





### 13.3 Dimensions

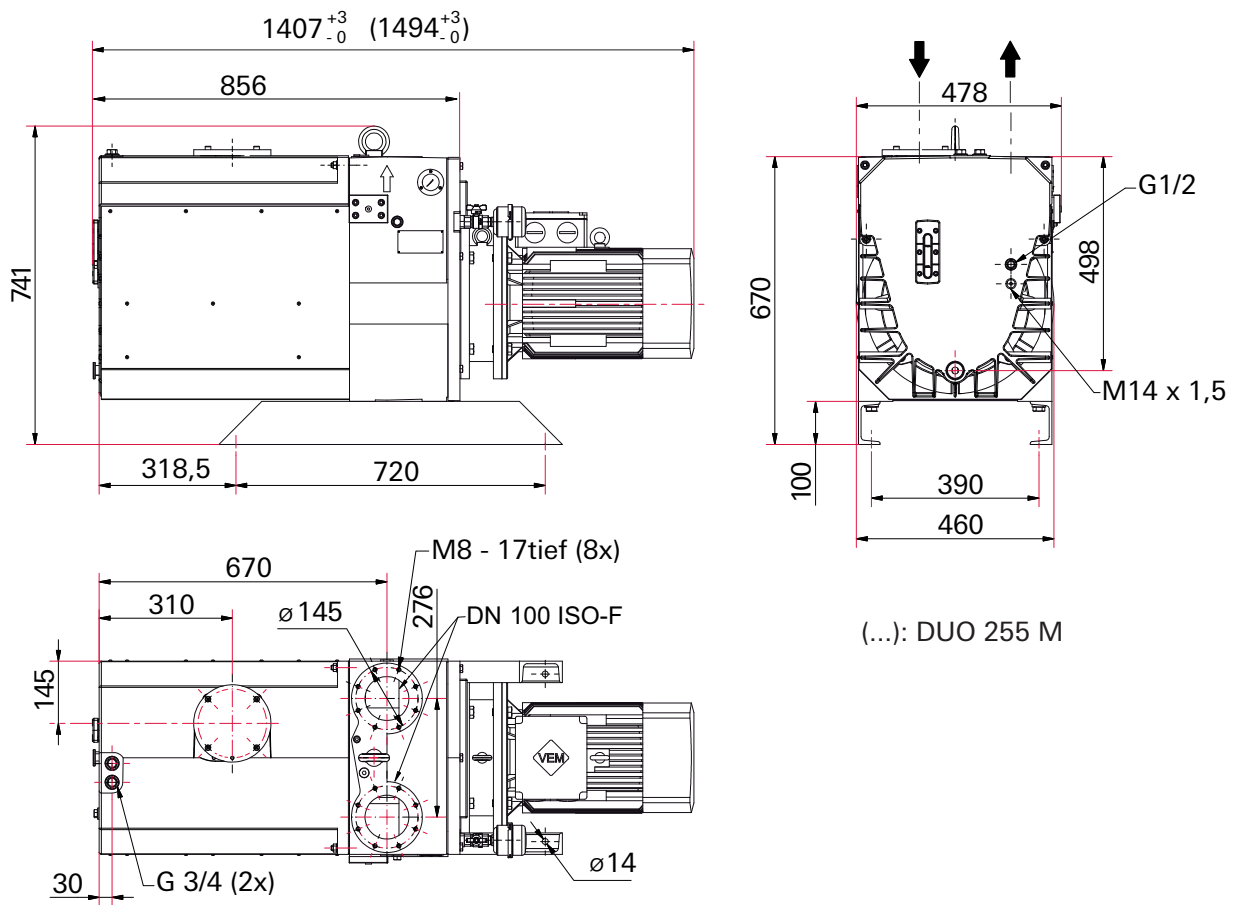


Fig. 19: DUO 255, DUO 255 M





# Declaration of conformity

We hereby declare that the product cited below satisfies all relevant provisions according to 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 agent responsible for compiling the technical documentation is Mr. Sebastian Oberbeck, Pfeiffer Vacuum GmbH, Berliner Straße 43, 35614 Asslar.

**DuoLine™**  
**DUO 255**

Harmonised standards and national standards and specifications which have been applied:

DIN EN ISO 12100 : 2010	DIN EN 61010-1 : 2010	DIN EN 61000-6-3 : 2007 + A1: 2011
DIN EN 1012-2 : 2011-12	DIN EN 61000-6-1 : 2007	DIN EN 61000-6-4 : 2007 + A1: 2011
DIN EN ISO 13857 : 2008	DIN EN 61000-6-2 : 2006	DIN EN ISO 2151 : 2: 2008
ISO 21360-1, 2 : 2012		

Signature:

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Managing Director

2016-04-11



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