

UniDry™ System

Rotary Piston Pump with inert gas supply

Operating Instructions

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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 refer 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.net.

Applicable documents

UniDry™ System	Operating instructions
Declaration of Conformity	Part of this document
Operating instructions for accessories (order-specifically)	see section "accessories"*

*also available via www.pfeiffer-vacuum.net

1.2 Conventions

Safety instructions

The safety instructions in Pfeiffer Vacuum operating manuals 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:

DANGER
Immediate danger Death or very severe injuries can occur.
WARNING
Possible danger Injuries or severe property damages can occur.
CAUTION
Possible danger Injuries or property damages can occur.
NOTE
Command or note Command to perform an action or information about properties, the disregarding of which may result in damage to the product.

Pictogram definitions



Prohibition of an action or activity in connection with a source of danger, 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.

Instructions in the text

→ Work instruction: here you have to do something.

Symbols used

The following symbols are used consistently throughout the diagrams.

- Ⓟ Vacuum flange
- Ⓛ Exhaust flange
- Ⓢ Gas ballast connection
- ⓈⓂ Sealing gas connection
- ⓈⓂ Inert gas connection
- ⓈⓂ Flushing gas connection

2 Safety

2.1 Safety precautions



NOTE

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.



NOTE

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 components to us please note the instructions in the Service section.
- Adjust the customer's process/operation mode clearly to the capacity of the pumping station.
- The electrical connection may only be made by an expert electrician according to VDE 0105 in accordance with the regulations of VDE 0100.

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 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 directive 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



NOTE

CE 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 pumping station is intended for evacuating vacuum chambers to pressure values in the medium vacuum range.
- Only use the pumping station for creating vacuum.
- Only use the pumping station for evacuation of dry and inert gases; other applications only after consultation with Pfeiffer Vacuum.
- Use suitable gases (process-specific) such as sealing gas, flushing gas and cooling gas at the inlets of the pumping station components.
- 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 deemed to be all use for purposes deviating from those mentioned above, especially:

- Evacuation of corrosive and reactive gases; special conditions of use only after consultation with Pfeiffer Vacuum.
- Evacuation of explosive media or of oxygen at greater than atmospheric concentration.
- Operation of the pumping station in potentially explosive areas.
- Operation of the pump with open vacuum flange.
- 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 pumping station to generate pressure.
- Pumping of liquids.
- 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.
- The evacuation of gases that may form adherent deposits or condensate in the suction chamber.

3 Transport and storage

3.1 Unpacking / repacking

For transport, the pumping station is fastened to a pallet in a slip-free manner, covered with a plastic sheet and secured in wooden holders or wooden crates.



NOTE

Disposal of packaging materials

The packaging materials cannot be reused after unpacking.

→ Dispose of them according to the applicable regulations.

3.2 Transport

- Remove the locking cap from the vacuum and exhaust flange immediately before connecting!
 - Check the cone strainer, paying attention to the o-ring.
- Lift the pumping stations using the eyebolts provided on the frame or transport them with a fork lift truck.
 - For versions without a frame and eyebolts, use transport straps for lifting.
 - Do not lift pumping station by the intake flange of the Roots pump.



WARNING

There is a risk of injury if the system is not transported properly.

Danger to life from falling or protruding loads if the system is not properly secured to lifting devices or is not transported properly.

- Use suitable lifting devices and tools.
- Ensure that the weight is distributed evenly (danger of tipping!).
- Test the hanging for high center of gravity.

3.3 Storage

The pumping station is suitable for storage. Enclosed, dry and dust-free rooms are suitable storage locations.

- Check that all the openings on the pumps are securely closed.
- Store the pumping station only indoors, preferably at temperatures between +5 °C and +40 °C.
 - For a longer period of storage, leave the pumping station in its original packaging or cover with a plastic sheet.
 - After a period of storage longer than one year, it is recommended to carry out maintenance and change the operating fluid and lubricants prior to commissioning.



CAUTION

Note the risk of corrosion for storage

Storage of vacuum pumps can lead to corrosion and aging of lubricants/operating fluids and elastomer seals.

- Observe the notes in the operating manuals for the individual components.
- Change lubricants and operating fluids before restarting operation.

4 Product description

4.1 Product identification

Roots pumping stations of the CombiLine™ series basically consist of a Roots pump (Okta), a backing pump and process-specific accessories. Various pumps can be used as backing pump.

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

- Pumping station type and article number
- Serial number
- Voltage and rated current
- Date of manufacture

For component-specific data, please see the separately installed rating plates for the pumps and motors.

Scope of delivery

- Pumping station components mounted on frame ready for connection, with all necessary pipings:
 - Stationary pumping stations with bores in the base plate for fastening
 - Mobile pumping stations with castors
 - Pumping stations on mounting feet
- Roots pump with motor in standard version or with magnetic coupling
- Backing pump with motor in standard version or with magnetic coupling
- Operating fluid P3, D1
- Optional accessories
- Operating manuals for pumping station and individual components

Variants

The inert gas panel is loaded differently depending on the variant shipped. Dummy plates are used in the inert gas panel in place of any non-existent inferential meters. There are six different inert gas units available (IG 1 to IG 6) for the UniDry™ 50 and CombiLine pumping stations for the different processes:

- Inert gas unit 1:UniDry sealing gas
- Inert gas unit 2:UniDry sealing gas+gas ballast
- Inert gas unit 3:UniDry sealing gas+gas ballast + flushing gas
- Inert gas unit 4:UniDry sealing gas+ Okta sealing gas
- Inert gas unit 5:UniDry sealing gas + gas ballast + Okta sealing gas
- Inert gas unit 6:UniDry sealing gas + gas ballast + flushing gas + Okta sealing gas

4.2 Function

The inert gas unit allows the pump to be operated with inert gas to seal shaft feedthroughs, clean the suction chamber, and avoid condensation in the suction chamber. Six different inert gas units supply and dose sealing gas, gas ballast, and flushing gas. The inert gas units consist of inert gas piping that is fitted to the pump housing and an inert gas panel for supplying and dosing the inert gas (usually nitrogen N₂) connected to this via lines.

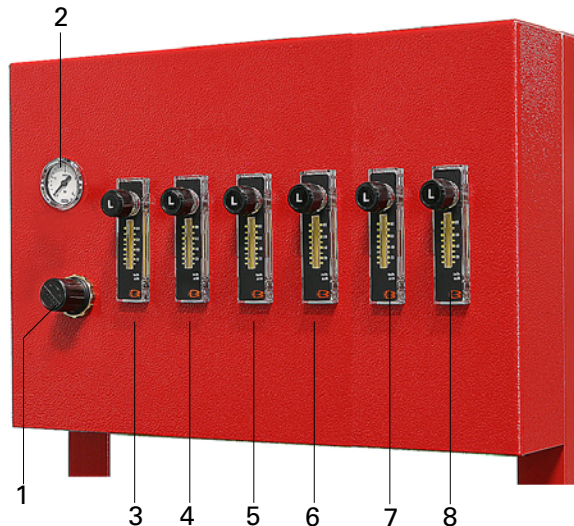


Fig. 1: Inert gas unit (similar to fig.)

1	Pressure reducer adjusting knob	4	Inferential meter for UniDry™ 50 sealing gas	7	Inferential meter for UniDry™ 50 flushing gas (intake side)
2	Pressure gauge	5	Inferential meter for UniDry™ 50 gas ballast (stage 2/ 3)	8	Inferential meter for Roots vacuum pump sealing gas
3	Inferential meter for UniDry™ 50 flushing gas (exhaust)	6	Inferential meter for UniDry™ 50 gas ballast (stage 3/ 4)		

Sealing gas function

Letting in sealing gas considerably increases the life of the shaft seal, bearing parts, and gear parts. Letting in sealing gas also prevents lubricant from the gear chamber penetrating the suction chamber. This is necessary if a high degree of purity is required of the vacuum being generated. The sealing gas connections are equipped with a G 1/4" thread.

Inferential meter 4 for sealing gas supplies both bearings; a dosing valve 9 can be used to throttle the intake side gas supply. The sealing gas quantity that has been set influences the effective volume flow rate of the vacuum pump and the attainable final pressure.

Criteria for setting the sealing gas quantity:

- Permissible quantity that can be fed to the medium being pumped.
- Necessary quantity that is required to provide sufficient protection for the operating fluid.

Gas ballast function

If condensable vapors or aggressive media are being pumped, the pump can be operated with gas ballast. This increases the gas temperature and dilutes the concentration of process gases. The gas ballast connections are equipped with a G1/4" thread.

Flushing gas function

If the medium being pumped is causing serious contamination or deposits in the suction chamber, the pump can be sprayed with flushing gas or fluid. Suction chamber flushing can proceed continuously or according to requirements during operations. A G1/4" thread is provided on the intake flange and at the exhaust for admission of flushing gas/fluid.

Non-return valve

Each of the banjo fittings on the pump side have an integrated non-return valve to prevent backflow.

5 Installation



NOTE

Increased pressure in the sealing gas line!

Damage to the inert gas system caused by over pressure.

→ When connecting the inert gas supply, insert **pressure reducers** to ensure that the supply pressure in the sealing gas line does not exceed 10 bar.

→ Connect hose (6 mm) to inert gas connection 10.

5.1 Installation location

Observe the following requirements when setting up the pumping station:

- 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%
- The installation location is to be chosen so that pumping station components are freely accessible for inspection and servicing.
- Note set-up conditions for the individual components.
- Always place the pumping station on a firm, even surface.
- The base frame has four holes for anchoring onto the base.
- Protect pumping station against air draughts and direct atmospheric exposure.
- When installing the pump in a closed housing, ensure there is sufficient air circulation.
- Sightglass and gas ballast valve must be visible and readily accessible.
 - Voltage and frequency information given on the motor rating plate must be visible.
- Mobile pumping stations must be located on a horizontal surface and the locking rollers secured.

5.2 Preparatory work

Make sure that no solids can enter the pump. We recommend installation of a suitable intake filter or protective strainer. The pump can transport a limited amount of surge fluid, which can enter the pump through process errors. If this happens, the pump must be run dry with flushing gas after the process end and the silencer completely emptied.

Before installing and commissioning the system, the installation location must be equipped.

The pumping station is delivered mounted on a base frame and ready for connection. If parts of the pumping station are dismantled for transport reasons, they must be re-mounted according to the design drawing.



NOTE

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.

**NOTE****Ensure media supply!**

Note information on supply and disposal of relevant media to be provided such as electricity, cooling water and inert gas.

- See rating plate
- See technical data for individual components

- Fill pumping station components with operating fluids and lubricants;
 - Quantity and type in accordance with the rating plate.
- Remove protective cover from intake and exhaust flange.
- Provide process-specific and pump-specific media supply and connect.
- Connect inert gas supply at inert gas connection 10 (6 mm hose diameter);
 - Supply pressure: 4 - 10 bar.
 - Operating pressure: 2,5 ... 3 bar.
- Check inert gas connection 10 for leak-tightness

**CAUTION****Risk of tripping!**

Risk of tripping when working in the pumping station area.

- Lay supply lines of the pumping station in such a way that no trip hazards occur.

**NOTE****Electrostatic unloading procedures**

Damage of safety-relevant parts or releasing unintentional machine movements.

- Carry out installation works at the pumping station only by EMC trained specialists according to the instructions of the parts manufacturers.

Make the following settings on the inert gas units:

5.3 Connections

Connecting the inert gas UniDry™ System

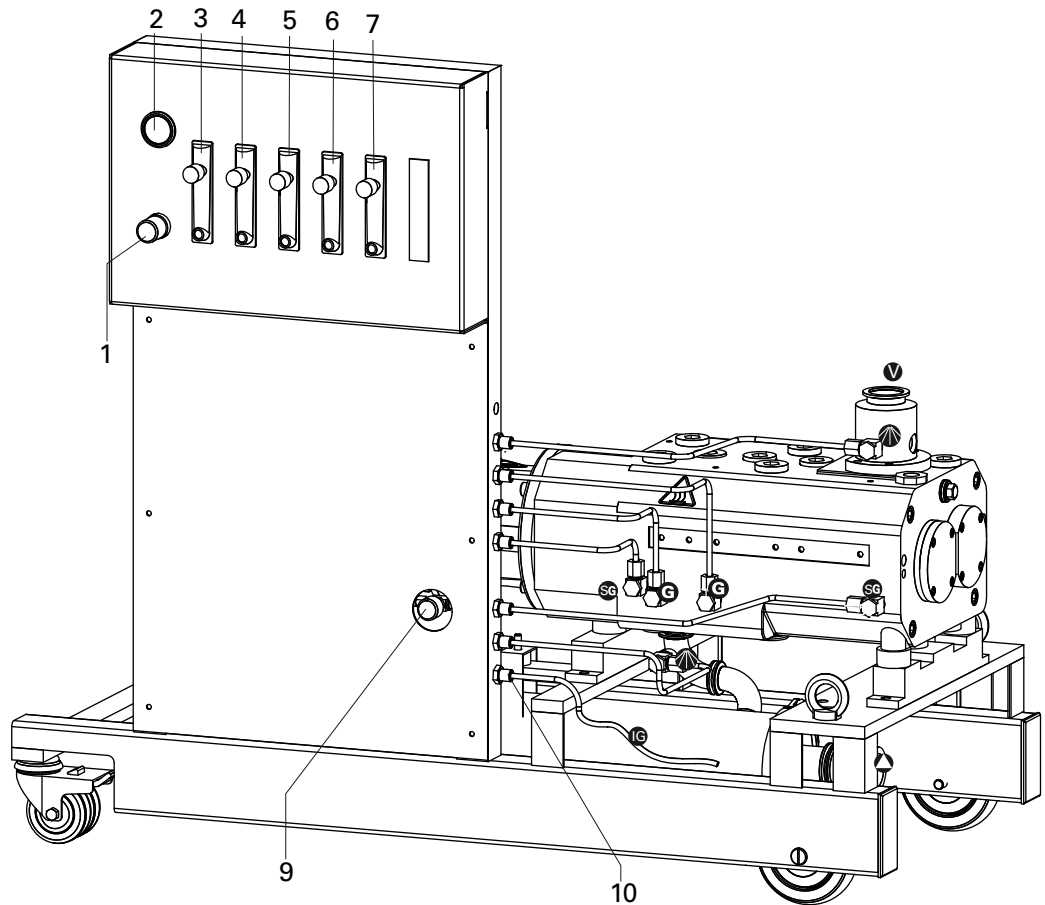


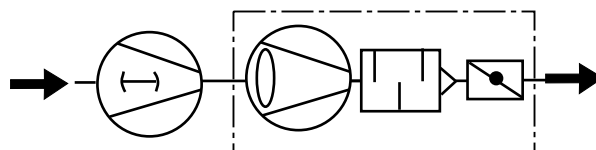
Fig. 2: Inert gas unit with UniDry™ 50 and no Okta Roots vacuum pump

- | | | | | | |
|---|---|---|---|----|---|
| 1 | Pressure reducer adjusting knob | 5 | Inferential meter for UniDry™ 50 gas ballast (stage 2/3) | 9 | Dosing valve for UniDry™ 50 sealing gas (intake side) |
| 2 | Pressure gauge | 6 | Inferential meter for UniDry™ 50 gas ballast (stage 3/4) | 10 | Inert gas connection (clamp collar connection) |
| 3 | Inferential meter for UniDry™ 50 flushing gas (exhaust) | 7 | Inferential meter for UniDry™ 50 flushing gas (intake side) | | |
| 4 | Inferential meter for UniDry™ 50 sealing gas | | | | |

CombiLine™ -WH with UniDry rotary piston pump UniDry™

The CombiLine™ -WH pumping stations consist of a Roots pump Okta and a rotary piston pump UniDry plus accessories (optional).

- Final pressure, total: $< 5 \cdot 10^{-3}$ mbar (UniDry 50 S/SM)
- Final pressure, total: $< 5 \cdot 10^{-2}$ mbar (UniDry 50 P/PM)



CombiLine™ - WH	UniDry ...	Okta ... A	Pumping speed at 1 mbar 50 Hz in [m³/h]	Pumping speed at 1 mbar 60 Hz in [m³/h]	Motor power at 50 Hz in [kW]	Motor power at 60 Hz in [kW]	Emission sound pressure level at p _A < 1 mbar in dB(A)	Nominal connection diameter, inlet, flange according to ISO-F, DN ...	Nominal connection diameter, outlet, flange according to ISO-F, DN ...	Weight in [kg]
WH 240 S/SM	50 S/SM	250	240	290	3.75	4.5	75	63	40	360
WH 400 S/SM	50 S/SM	500	400	470	4.5	5.4	75	100	40	390
WH 240 P/PM	50 P/PM	250	240	280	3.75	4.5	75	63	40	360
WH 400 P/PM	50 P/PM	500	400	450	4.5	5.4	75	160	40	390

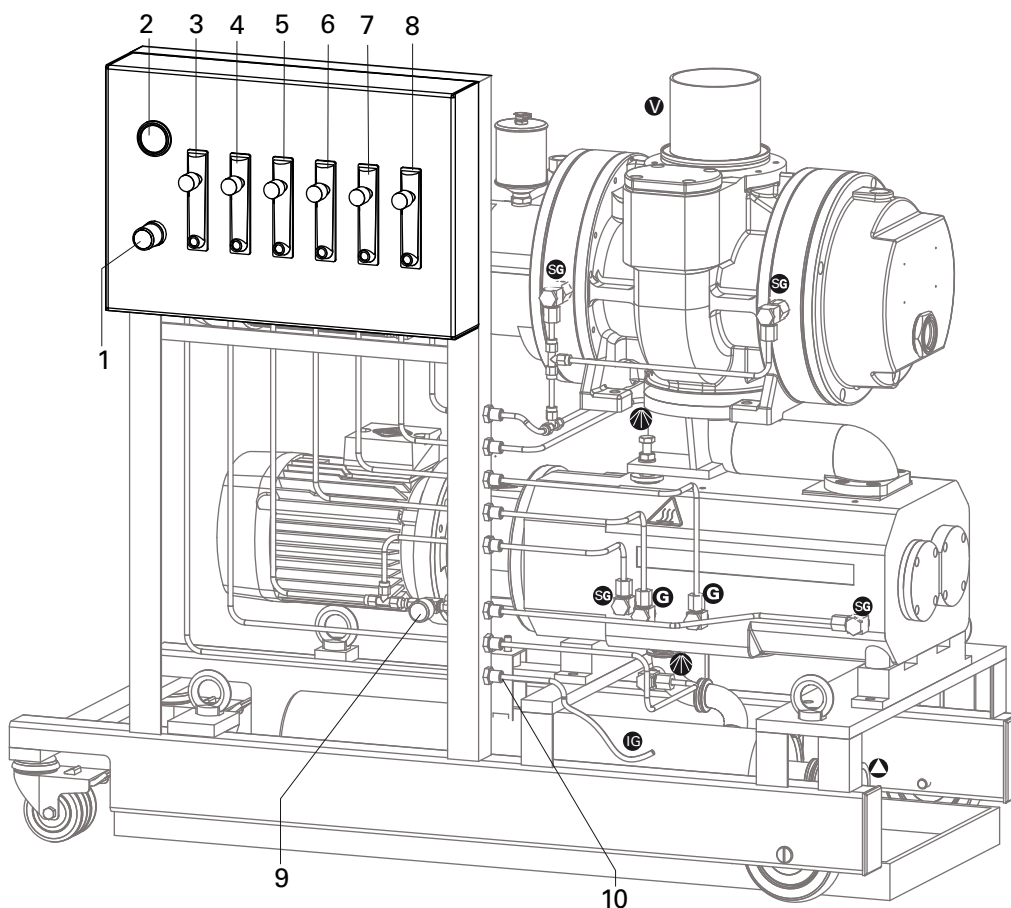


Fig. 3: Inert gas unit with UniDry™ 50 and Okta Roots vacuum pump

- | | | | | | |
|---|---|---|---|----|---|
| 1 | Pressure reducer adjusting knob | 5 | Inferential meter for UniDry™ 50 gas ballast (stage 2/3) | 8 | Inferential meter for Roots vacuum pump sealing gas |
| 2 | Pressure gauge | 6 | Inferential meter for UniDry™ 50 gas ballast (stage 3/4) | 9 | Dosing valve for UniDry™ 50 sealing gas (intake side) |
| 3 | Inferential meter for UniDry™ 50 flushing gas (exhaust) | 7 | Inferential meter for UniDry™ 50 flushing gas (intake side) | 10 | Inert gas connection (clamp collar connection) |
| 4 | Inferential meter for UniDry™ 50 sealing gas | | | | |

→ Close the dosing valves on the inferential meters; turn adjusting screw clockwise.
 – 4 with inert gas unit 1

- 4/5/6 with inert gas unit 2
 - 3/4/5/6/7 with inert gas unit 3
 - 4/8 with inert gas unit 4
 - 4/5/6/8 with inert gas unit 5
 - 3/4/5/6/7/8 with inert gas unit 6
- Set inert gas pressure to > 2.5 - 3 bar; to do this, pull and adjust adjusting knob 1.
- Counter-clockwise → CLOSED, clockwise → OPEN
- Push adjusting knob back in.

Connecting the vacuum side



WARNING
<p>Exposed, rotating rolling pistons!</p> <p>Fingers and hands can become crushed when the intake flange is open.</p> <p>→ Keep all body parts out of operating range of the rolling pistons.</p> <p>→ Use a wooden handle to rotate the rolling pistons during cleaning.</p> <p>→ Switch on pumping station with closed intake line only.</p> <p>→ The connection between the pump and the vacuum chamber should be kept as short as possible and should have at least the nominal diameter of the pump flange. Use a greater nominal diameter on line lengths > 5 m.</p> <p>→ Lay the pipes in such a way that the Roots or backing pump will not be subjected to any mechanical tension.</p> <ul style="list-style-type: none"> - Suspension components should be integrated into the piping. - Ensure that mating flanges are in a parallel position. <p>→ Clear welded lines of any welding scales, loose parts etc. before installation.</p> <p>If dust appears in the intake medium, a dust filter must be installed in addition. When extracting vapors we recommend using condensate separators on the intake side and on the exhaust side. Please enquire for details.</p>



NOTE
<p>Danger of intake of solid particles!</p> <p>Even in clean processes, fouling from the system must be anticipated during initial commissioning.</p> <p>→ Use a suitable start-up strainer at the intake connection (see accessories).</p> <p>→ Ensure that this strainer is only removed when the risk of solid particles entering the pump can be excluded.</p> <p>→ Note loss of pumping speed if necessary.</p>

Connecting the exhaust side



CAUTION
<p>High pressure in the exhaust line!</p> <p>Danger of damage to the seals and danger of the pump bursting.</p> <p>→ Install the line without shut-off valves on the exhaust side.</p> <p>→ If there is danger of a build-up of excess pressure (> 1500 mbar abs.) in the lines, observe all official accident prevention safety regulations.</p> <p>→ If the exhaust gases are being extracted, the exhaust pressure must be at least → 250 mbar greater than the pressure at the intake side.</p> <p>→ 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.</p>

- 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.

Connecting to the mains power supply



DANGER

Voltage-bearing elements

Danger to life from electric shock.

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

The pumps are shipped as standard with a three-phase motor, but without accessories for the electrical connection. Connection according to regulations requires the use of a suitable motor protection switch. The setting of the motor protection switch must correspond to the specification on the rating plate of the pump motor in question.

- Check the direction of rotation for pumps with three-phase motors in accordance with the description in the operating manual of the individual components (see the arrow on the housing).
- The operator must provide suitable safety devices, when connecting the pumping station, for the separation of the pumping station from the mains (e.g. main switch or emergency-stop button), so that the pumping station can be switched off in an emergency situation without any problems.

6 Operation

6.1 Recommendations for the operator

- The service personnel must be advised in regular training courses on the necessity for wearing the personal protective equipment. Working without protective equipment can lead to serious and also lasting health damages.
- The operator advises in recurring training courses the operating, maintenance, and service personnel in the correct behaviors while handling the pumping station. He explains that damages to persons and systems can occur, if the pumping station is not operated correctly. To this in particular belong also information concerning the residual risks.
- Before maintenance and repairs the pumping station is shut down. The main switch, provided by the operator, is switched off by the operational, technically responsible supervisor and secured against restarting with a lock. The key is taken off and carried.
- After completion of the work and before restarting, the responsible supervisor makes sure, that this is possible without endangerment of persons or equipment. Before switching on a well-timed and clear warning must be given to all involved persons.

6.2 Before switching on

The instructions also apply for each time the pumping station is restarted after shutting down for storage, maintenance or inspection.

- Check operating fluid and lubricant levels of the pumps and refill if necessary.
- Check sealing oil chamber on Roots pump (oiler).
- Check that all lines are properly connected.
- Check process-specific and pump-specific media supplies.
- Verify direction of rotation of pumps as described in the operating manuals for the individual components.
- Operate shut-off units in the exhaust line in such a way that they open before or at the same time as starting the pump.

6.3 Commissioning



NOTE

Danger of backflow of process gas!

Damage to the inert gas system caused by aggressive process gas.

- Before every interruption of the inert gas supply, switch off the pump/pumping station and close the inferential meter and, if applicable, the solenoid valves.
- If switching off the pump/pumping station is not possible, at least close the inferential meter and, if applicable, the solenoid valves.

Status at standstill

- Shut-off unit in the intake line, if present, closed.
- Exhaust valve closed, if present.
- Inert gas pressure set to 2.5 ... 3 bar.
- Inferential meter 7 closed.
- Dosing valve 9 closed.

Switching on

The pumping station can be switched on using a common switch contact for the backing pump and the Roots pump or with separate switches in accordance to the process requirements.

- Open exhaust valve (ball valve), if present.
- When water cooling is used: Open cooling water supply and check the flow.
- Switch on vacuum pump via mains power supply;
 - The pump achieves its operating temperature after approx. 30 minutes and thus the maximum final pressure.
- Open inferential meter 4 for UniDry™ 50 sealing gas; and set (to 20 ... 40 sl/h).
 - If the seals are new, it may not be possible to set the specified sealing gas quantity on account of too low leakage.
- In this case, fully open the inferential meter and then close by two revolutions.
- Open inferential meter 8 for Roots vacuum pump sealing gas and set process-specifically (according to the specifications in the operating instructions of the component).
- Open the inferential meter and set the gas supply for the applicable process.
 - Inferential meter 3 flushing gas (exhaust): min. 240 sl/h, max. 3000 sl/h
 - Inferential meter 5 gas ballast (stage 2/3): min. 6 sl/h, max. 72 sl/h
 - Inferential meter 6 gas ballast (stage 3/4): min. 6 sl/h, max. 72 sl/h
 - Inferential meter 7 flushing gas (intake side): min. 240 sl/h, max. 3000 sl/h
- On pressure reducer 1, adjust the inert gas pressure to 2.5 ... 3 bar, if necessary.
- Bring pump up to operating temperature.
 - For water cooling: The warm-up time depends on the UniDry™ 50 operating temperature set at cooling water control valve 86. The warm-up is finished once there is hot water flowing at cooling water outlet 81 and the housing temperature is the same as the set temperature (see operating manual PP 0938 BN).
- Open intake port valve (ball valve), if present.

Process operation

If possible, operation of the pump should continue during process breaks; with the intake port valve closed and using a flushing process, for example.

- Re-check the presets during process operation.
- Open dosing valve 9 if the sealing gas function is required at the intake-side shaft feedthroughs.
 - To improve effective volume flow rate and attainable final pressure, the sealing gas function (on the vacuum side) may be dispensed with for clean processes. In this case, throttle or close dosing valve 9.
- Monitor the operating temperature of the pump, adjusting at the cooling water control valve if necessary.

6.4 Switching off

If possible, continue operating the pump in process breaks, e.g. with the valve in the intake port (if present) closed, and simultaneously flush the suction chamber via the gas ballast connection.



CAUTION

High pressure in the sealing gas line when the pump is switched off!

Risk of damage to the pump seals.

- Lower sealing gas pressure to < 1.2 bar or stop sealing gas feed immediately.

- Close shut-off valve in the intake line (if present).
- Interrupt inert gas supply at inert gas connection 10.
- Switch off the pump.
- Close inferential meter.
- Close pressure side connection valve (if present).
- Stop cooling water supply.

7 Malfunctions

Problem	Possible causes	Remedy, please refer to component operating instructions
Pumping station does not start	No mains voltage or voltage does not correspond to the motor data	Check mains voltage and mains fuse protection; check motor switch.
	Thermal protection switch has responded	Backing pump/Roots pump
	Suction chamber dirty	Roots pump
	Gear wheels damaged	Roots pump
	Pumping system dirty	Backing pump
	Pumping system damaged	Backing pump
Pumping station switches off after a while after being started	Motor defective	Backing pump/Roots pump
	Thermal protection switch of the motor has responded	Backing pump/Roots pump
	Mains fuse protection triggered due to overload (e. g. cold start)	Backing pump
Pumping station does not attain final pressure	Exhaust pressure too high	Backing pump
	Pump or connected accessories are dirty	Backing pump/Roots pump
	Backing pump faulty	Backing pump
	Leak in system	Localize/repair leak
	Dirty or damaged overflow valve	Roots pump
Pumping speed too low	Operational loss of lubricant at the oiler	Roots pump
	The inert gas quantity set is too high	Reduce inert gas flow rate
	Intake line not well-dimensioned	Keep connections as short as possible and see that cross-sections are sufficiently dimensioned
	Exhaust pressure too high	Check opening of exhaust line and exhaust accessories
	Loss of operating fluid	Casing seal leaky, operational loss of operating fluid
Radial shaft seal ring leaky		Roots pump, Backing pump
Unusual operating noises	Suction chamber dirty	Roots pump
	Bearings or gear wheels damaged	Backing pump/Roots pump
	Dirty overflow	Roots pump
	Motor bearing defective	Backing pump/Roots pump
	Motor runs - pump doesn't: only valid for pumps with magnetic coupling system	Roots pump, Backing pump
Backflow of process gases	Polluted non-return valve	Clean or replace

8 Maintenance

→ Turn off the vacuum pump, vent to atmospheric pressure and allow to cool, if necessary.



WARNING

Contamination of parts and operating fluid by pumped media is possible.

Poisoning hazard through contact with materials that damage health.

- In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.
- Decontaminate affected parts before carrying out maintenance work.



NOTE

Disclaimer of liability

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



WARNING

Risk of electric shock

The pumping station is only free of voltages when the mains plug has been disconnected.

- Switch off the master switch and disconnect the mains plug before all work.
- Secure against unintentional restarting.



NOTE

Release of the connecting screws between backing and Roots pump because of vibrations during operation

Roots pump moves and falls down.

- Control connecting screws regularly during maintenance work and tighten with a tightening torque of 40 - 50 Nm.

8.1 Maintenance intervals and responsibilities

- Carry out the required maintenance on the components of the pumping station in accordance with the instructions in the individual operating manuals.
- Clarify shorter maintenance intervals for extreme loads or impure processes with Pfeiffer Vacuum Service.
- For all other cleaning, maintenance or repair work, please contact your Pfeiffer Vacuum service location.

8.2 Removal of components for their maintenance

In some cases, components may need to be dismantled from the pumping station so that customers can carry out necessary maintenance work on them (they should then be reassembled in reverse order).



CAUTION

High weight of backing pump when dismantling and mounting

Body parts can become crushed between backing pump and pumping station frame.

- Use lifting device for lifting the backing pump.
- If necessary wear protective gloves according to directive EN 420.
- Wear safety shoes with steel toe cap according to directive EN 347.



**CAUTION****Refer to the notes on Proper Use of the unit.**

The pumping station must only be operated as a complete unit. Disassembly and operation of individual pumping station components is deemed to be improper use.

- In this case the declaration of conformity will become invalid.

9 Decommissioning

9.1 Shutting down for longer periods

**CAUTION****High pressure in the sealing gas line when the pump is switched off!**

Risk of damage to the pump seals.

- Ensure that the sealing gas supply is interrupted before pump is switched off.

**WARNING****Contamination of parts and operating fluid by pumped media is possible.**

Poisoning hazard through contact with materials that damage health.

- In the case of contamination, carry out appropriate safety precautions in order to prevent danger to health through dangerous substances.
- Decontaminate affected parts before carrying out maintenance work.

If the pumping station should be shut down for longer than a year:

- Close shut-off valve in the intake line (if present).
- Interrupt inert gas supply at inert gas connection 10.
- Close inferential meter.
- Remove the pumping station from the system, if necessary.
- Only store the pumping station indoors at an ambient temperature between + 5 °C and +40 °C.
- When shutting down for longer periods, see the operating manuals of the individual components.

9.2 Re-starting

**CAUTION****Note the risk of corrosion for storage**

Storage of vacuum pumps can lead to corrosion and aging of lubricants/operating fluids and elastomer seals.

- Observe the notes in the operating manuals for the individual components.
- Change lubricants and operating fluids before restarting operation.

- Check pumping station for contamination and moisture.
- If necessary, have Pfeiffer Vacuum Service clean the pumping station completely.
- Installation and commissioning in accordance with the operating instructions.

9.3 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.

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.net (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".¹⁾
- 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.

¹⁾ Forms under www.pfeiffer-vacuum.net

11 Spare parts

Spare parts	Article no.:
Pressure reducer; 0.1 - 3.5 bar	P 0992 199
Inferential meter, (6 - 72 sl/h)	P 0102 279
Inferential meter, (240 - 3000 sl/h)	P 0102 291
Cooling water controller, thermic	P 4156 121 DA
Pressure gauge	P 0992 165
Control valve (dosing valve for UniDry sealing gas)	P 0102 252
Serto Flex hose	P 0102 247
G 1/4" banjo fitting with non-return valve	PK 055 137 -X
Anti-vibration rail	PP 024 024
Rubber-bonded metal rail	PP 024 025
Support sleeve	P 0102 248

12 Accessories

Designation	UniDry™ 50 SM	UniDry™ 50 PM
CWK 050, Cooling water unit for UniDry™	PP Z10 300	PP Z10 300
Intake flange, DN 100 ISO-F	PK 055 473 -T	PK 055 473 -T
Intake flange, DN 63 ISO-F	PK 055 214 -T	PK 055 214 -T
Barretter actuation unit 3 TF	P4 768 051 FQ	P4 768 051 FQ
PT 100, Temperature sensor	P 0992 605	P 0992 605

12.1 Documentation for accessories

Depending on the pump version, supplementary information may be required for safe use of accessories:

Component operating manuals/supplementary information for accessories	Document no. ¹
UniDry 50 P/PM/S/SM	PP 0938 BN
Okta 250 A, Okta 500 A/AD	PP 0071 BN
Okta 250 AM, Okta 500 AM/ADM	
Exhaust silencer for UniDry	PP 1001 BN
Cooling water unit CWK 050 for UniDry	PP 0960 BN
Supplementary information for motor change of Roots pumps with magnetic coupling	PW 0142 BN
Special overflow valves ² <ul style="list-style-type: none"> • with modified pressure differential at the overflow valve • buffered version for short-time evacuation • blocked version 	PW 0022 BN

¹. these documents can be downloaded from the Internet

². no accessories of pumping stations with PPC... article numbers

13 Technical data

Parameter	UniDry™ 50 S	UniDry™ 50 P
Pumping speed at 50 Hz	50 m ³ /h	45 m ³ /h
Pumping speed at 60 Hz	60 m ³ /h	54 m ³ /h
Ultimate pressure without bearing purge at 50 Hz	5 · 10 ⁻² mbar	0.5 mbar
Ultimate pressure without bearing purge at 60 Hz	5 · 10 ⁻² mbar	0.5 mbar
Intake pressure at continues operation max.	500 mbar	1013 mbar
Exhaust pressure, min.	500 mbar	500 mbar
Exhaust pressure, max.	1500 mbar	1500 mbar
Rotation speed at 50 Hz	3000 rpm	3000 rpm
Rotation speed at 60 Hz	3600 rpm	3600 rpm
Leak rate	1 · 10 ⁻³ mbar l/s	1 · 10 ⁻³ mbar l/s
Ambient temperature	5-40 °C	5-40 °C
Number of pumping stages	4	3
Operating fluid filling	0,32 l	0.32 l
Frequency range	40-60 Hz	40-60 Hz
Weight: with motor	210 kg	196 kg
Nitrogen connection for hose	6 mm	6 mm
Inert gas unit	IG 1 ... 6	IG 1 ... 6
Inert gas pressure, supply	4-10 bar	4-10 bar
Inert gas pressure, operation	2.5-3 bar	2.5-3 bar
Inert gas flow (process dependent) max.	0-3000 sl/h	0-3000 sl/h
Cooling method, optional	Water	Water
Cooling water pressure	2-10 bar	2-10 bar
Cooling water temperature	5-35 °C	5-25 °C

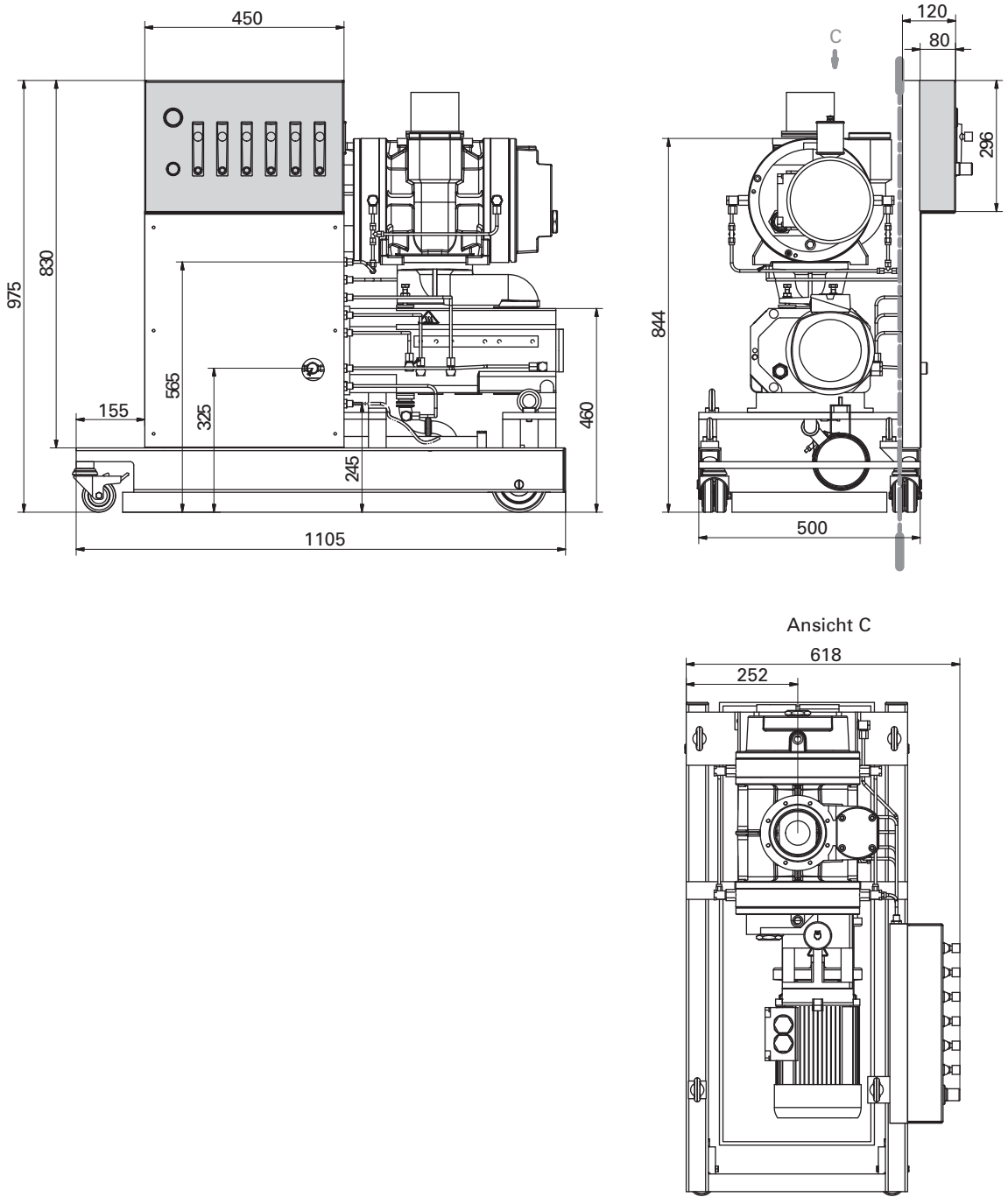
Parameter	UniDry™ 50 SM	UniDry™ 50 PM
Pumping speed at 50 Hz	50 m ³ /h	45 m ³ /h
Pumping speed at 60 Hz	60 m ³ /h	54 m ³ /h
Ultimate pressure without bearing purge at 50 Hz	5 · 10 ⁻² mbar	0.5 mbar
Ultimate pressure without bearing purge at 60 Hz	5 · 10 ⁻² mbar	0.5 mbar
Intake pressure at continues operation max.	500 mbar	1013 mbar
Exhaust pressure, min.	500 mbar	500 mbar
Exhaust pressure, max.	1500 mbar	1500 mbar
Rotation speed at 50 Hz	3000 rpm	3000 rpm
Rotation speed at 60 Hz	3600 rpm	3600 rpm
Leak rate	1 · 10 ⁻⁵ mbar l/s	1 · 10 ⁻⁵ mbar l/s
Ambient temperature	5-40 °C	5-40 °C
Number of pumping stages	4	3
Operating fluid filling	0,32 l	0.32 l
Frequency range	40-60 Hz	40-60 Hz
Weight: with motor	210 kg	196 kg
Nitrogen connection for hose	6 mm	6 mm
Inert gas unit	IG 1 ... 6	IG 1 ... 6
Inert gas pressure, supply	4-10 bar	4-10 bar
Inert gas pressure, operation	2.5-3 bar	2.5-3 bar
Inert gas flow (process dependent) max.	0-3000 sl/h	0-3000 sl/h
Cooling method, optional	Water	Water
Cooling water pressure	2-10 bar	2-10 bar
Cooling water temperature	5-35 °C	5-25 °C

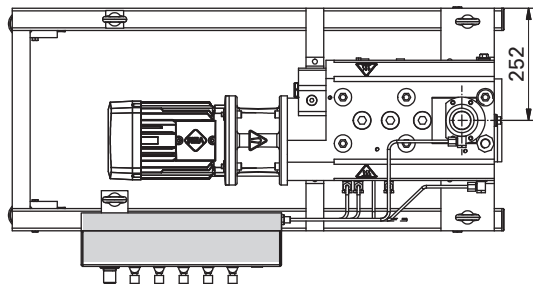
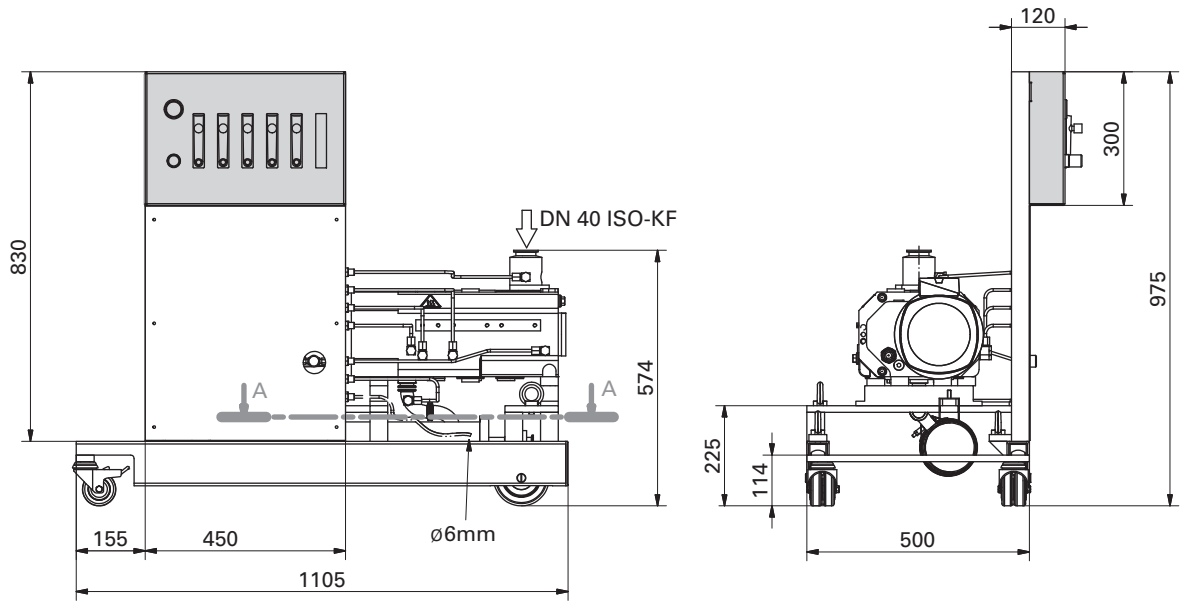
Parameter	UniDry™ 50 SDM	UniDry™ 50 PDM
	Pressure surge protected up to 16 bar	Pressure surge protected up to 16 bar
Pumping speed at 50 Hz	50 m ³ /h	45 m ³ /h
Pumping speed at 60 Hz	60 m ³ /h	54 m ³ /h
Ultimate pressure without bearing purge at 50 Hz	5 · 10 ⁻² mbar	0.5 mbar
Ultimate pressure without bearing purge at 60 Hz	5 · 10 ⁻² mbar	0.5 mbar
Intake pressure at continues operation max.	500 mbar	1013 mbar
Exhaust pressure, min.	500 mbar	500 mbar
Exhaust pressure, max.	1500 mbar	1500 mbar
Rotation speed at 50 Hz	3000 rpm	3000 rpm
Rotation speed at 60 Hz	3600 rpm	3600 rpm
Leak rate	1 · 10 ⁻⁵ mbar l/s	1 · 10 ⁻⁵ mbar l/s
Ambient temperature	5-40 °C	5-40 °C
Number of pumping stages	4	3
Operating fluid filling	0,32 l	0.32 l
Frequency range	40-60 Hz	40-60 Hz
Weight: with motor	210 kg	196 kg
Nitrogen connection for hose	6 mm	6 mm
Inert gas unit	IG 1 ... 6	IG 1 ... 6
Inert gas pressure, supply	4-10 bar	4-10 bar
Inert gas pressure, operation	2.5-3 bar	2.5-3 bar
Inert gas flow (process dependent) max.	0-3000 sl/h	0-3000 sl/h
Cooling method, optional	Water	Water
Cooling water pressure	2-10 bar	2-10 bar
Cooling water temperature	5-35 °C	5-25 °C

CombiLine™-WH

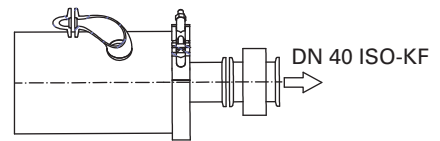
Parameter	WH 240 S	WH 400 S
Flange (in)	DN 63 ISO-F	DN 100 ISO-F
Pumping speed at 1 mbar, 50 Hz	240 m ³ /h	400 m ³ /h
Pumping speed at 1 mbar, 60 Hz	290 m ³ /h	470 m ³ /h
Ultimate pressure	< 5 · 10 ⁻³ mbar	< 5 · 10 ⁻³ mbar
Emission sound pressure level (EN ISO 2151) at intake pressure 1 mbar	75 dB (A)	75 dB (A)
Motor rating 50 Hz	3,75 kW	3,75 kW
Motor rating 60 Hz	4,5 kW	4,5 kW
Mains requirement: voltage (range)	220-240 V / 380-420 V, 50 Hz ; 250/277 V / 400-480 V, 60 Hz	220-240 V / 380-420 V, 50 Hz ; 250/277 V / 400-480 V, 60 Hz
Weight	360 kg	390 kg
Pumping station components	Okta 250 A, UniDry 50 S	Okta 500 A, UniDry 50 S

13.1 Dimensions





Schnitt A-A
(1:5)





Declaration of conformity

according to the EC directive:

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

We hereby declare that the product cited below satisfies all relevant provisions of EC directive "Machinery" **2006/42/EC**.

In addition, the product cited below satisfies all relevant provisions of EC directive "Electromagnetic Compatibility" **2004/108/EC**.

The agent responsible for compiling the technical documentation is Mr. Andreas Würz, Pfeiffer Vacuum GmbH, Berliner Straße 43, 35614 Asslar.

UniDry
UniDry™ System

Guidelines, harmonised standards and national standards and specifications which have been applied:

DIN EN ISO 13857 : 2008	DIN EN 61000-6-4 : 2007
DIN EN ISO 12100-1 : 2004	DIN EN 61000-6-2 : 2006
DIN EN ISO 12100-2 : 2004	DIN EN 60204-1 : 2007

Signatures:

Pfeiffer Vacuum GmbH
Berliner Straße 43
35614 Asslar
Germany

(M. Bender)
Managing Director

(Dr. M. Wiemer)
Managing Director

CE/2010

**Leading. Dependable.
Customer Friendly**

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide. For German engineering art, competent advice and reliable services.

Ever since the invention of the turbopump, we've been setting standards in our industry. And this claim to leadership will continue to drive us in the future.

**You are looking for a
perfect vacuum solution?
Please contact us:**

Germany

Pfeiffer Vacuum GmbH
Headquarters
Tel.: +49 (0) 6441 802-0
info@pfeiffer-vacuum.de

Benelux

Pfeiffer Vacuum GmbH
Sales & Service Benelux
Tel.: +800-pfeiffer
benelux@pfeiffer-vacuum.de

China

Pfeiffer Vacuum
(Shanghai) Co., Ltd.
Tel.: +86 21 3393 3940
info@pfeiffer-vacuum.cn

France

Pfeiffer Vacuum France SAS
Tel.: +33 169 30 92 82
info@pfeiffer-vacuum.fr

Great Britain

Pfeiffer Vacuum Ltd.
Tel.: +44 1908 500600
sales@pfeiffer-vacuum.co.uk

India

Pfeiffer Vacuum India Ltd.
Tel.: +91 40 2775 0014
pfeiffer@vsnl.net

Italy

Pfeiffer Vacuum Italia S.p.A.
Tel.: +39 02 93 99 05 1
contact@pfeiffer-vacuum.it

Korea

Pfeiffer Vacuum Korea Ltd.
Tel.: +82 31 266 0741
sales@pfeiffer-vacuum.co.kr

Austria

Pfeiffer Vacuum Austria GmbH
Tel.: +43 1 894 17 04
office@pfeiffer-vacuum.at

Sweden

Pfeiffer Vacuum Scandinavia AB
Tel.: +46 8 590 748 10
sales@pfeiffer-vacuum.se

Switzerland

Pfeiffer Vacuum (Schweiz) AG
Tel.: +41 44 444 22 55
info@pfeiffer-vacuum.ch

United States

Pfeiffer Vacuum Inc.
Tel.: +1 603 578 6500
contact@pfeiffer-vacuum.com