



# MDP 5011

Molecular pump

## User's manual

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# MDP 5011

## Molecular pumps

Dear customer,

You have just purchased an adixen Molecular pump.

We would like to thank you and are proud to count you as one of our customers.

This product has benefited from adixen Vacuum Product's many years of experience in the field of molecular pump design.



This product is designed to generate vacuum by pumping on gases, but no liquids neither solids. It is dedicated for running in industrial and laboratory environments.

The products must not operate in an area with risk of explosion. Consult us to study a solution.

**To guarantee high performances and full satisfaction from this equipment, we suggest that you study this manual before any intervention on your pump, particularly the chapter on installation and start-up.**

### APPLICATIONS:

Fast evacuation of small volumes – Interseal pumping –  
Regeneration of cryopumps – Leak detection – Spectrometry –  
Production of electronic tubes.

INSTRUMENTATION: Mass spectrometry, Surface analysis...

### BENEFITS:

The design of the MDP pump offers the reliable and the robustness with performances adapted to numerous applications.

### CONTROLLER:

The MDP 5011 works with the ACT 100 or ACT 200 TH controller (refer to the ACT User's manual).

This user's manual includes only the instructions to connect the hybrid turbo pump to the equipment. Refer to the controller user's manual to power and use the pump (chapter B, C and D).

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# MDP 5011

## Molecular pumps

This product complies with requirements of European Directives, listed in the Declaration of Conformity contained in G 100 of controller's manual.

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*Translated from original  
version*

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*Translated from original version*

# Contents

## User's manual Molecular pumps MDP 5011

Before switching on the product, study the user's manual and make sure you follow the safety instructions. You can recognise these by the 'Caution', 'Warning' and 'Danger' symbols.

Good practice tips and manufacturer's recommendations are in a blue box.

The performance and operational safety of this product are guaranteed provided it is used normally in the operating conditions defined in this manual.

It is the customer's task to:

- train operators to use the product if they do not speak the language the manual is written in,
- ensure operators know the safe practices to apply when using the product.

### CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in property damage.

### CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in moderate or minor injury. It may also be used to alert against unsafe practices.

### WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury.

### DANGER

Indicates an imminently hazardous situation that, if not avoided, will result in death or severe injury (extreme situations).

## MDP 5011 molecular pump overview

### Two pump versions

The standard version: MDP 5011 pump.

The version for corrosive gases: MDP 5011CP pump.

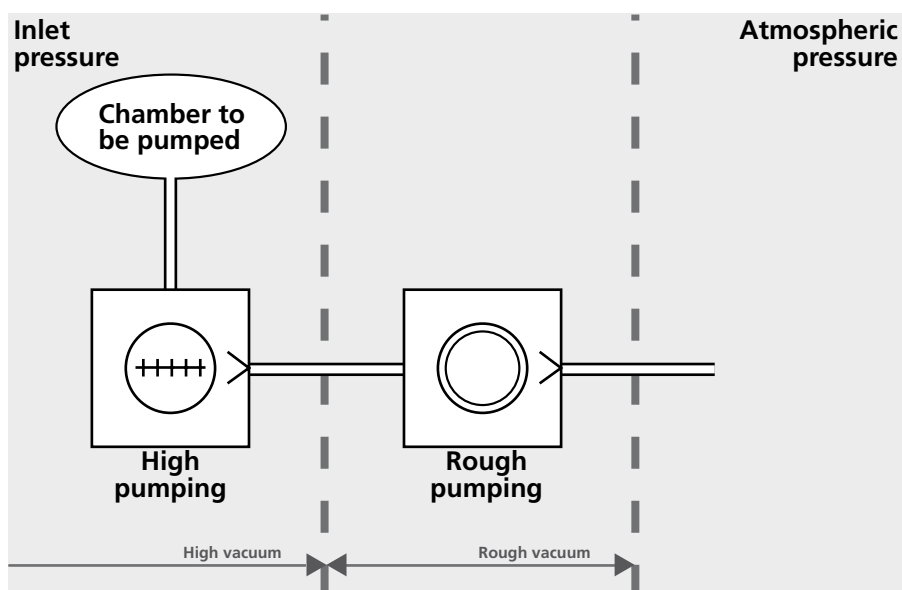
### Main characteristics

The MDP 5011 offers high pumping performances between 10 mbar and  $10^{-5}$  mbar and a maximum flowrate fo 400 sccm.

With a simple construction but robust rotor and low rotational speed (27,000 rpm), the MDP is robust against accidental air in-rush, shock venting and gyroscopic effects.

Including built in ceramic ball bearings, The MDP is easily field maintainable.

### The molecular pump in an installation



At the pump exhaust, the gases are evacuated to the atmosphere by a roughing pump. Since the MDP compression rate is set by the design, the MDP limit pressure is given by that of the roughing pump used.

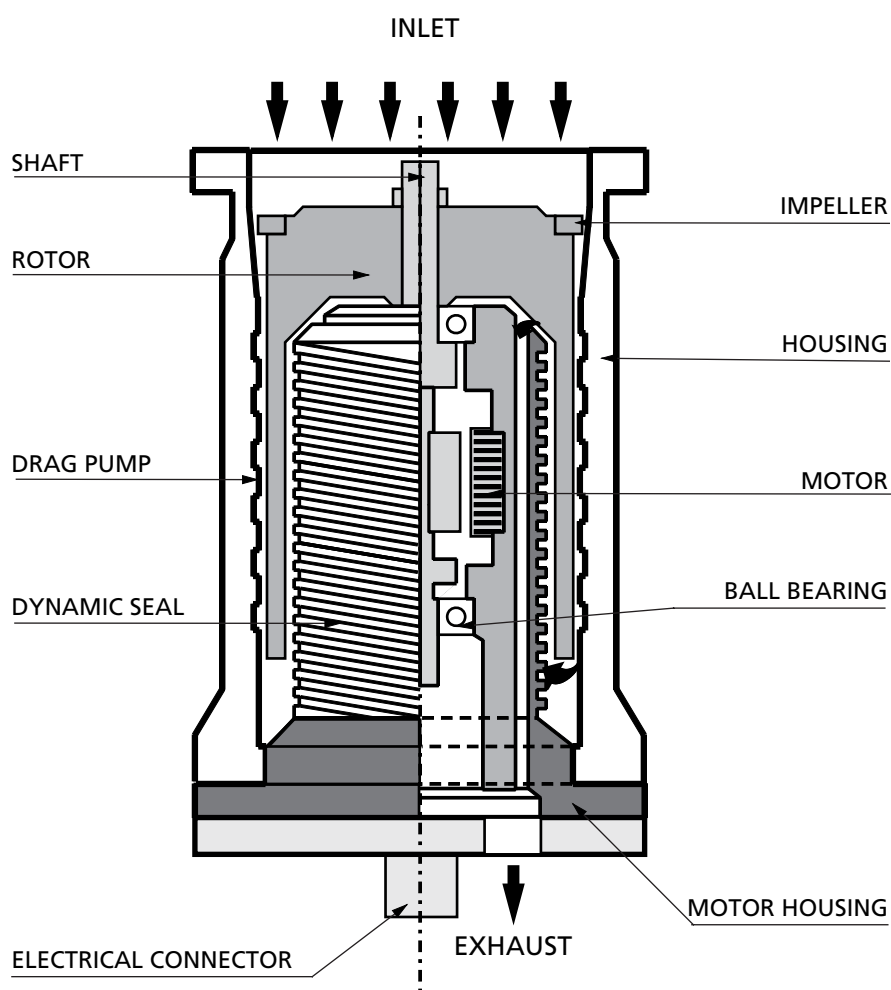
### Controller

The MDP 5011 pump work with the ACT 100 or ACT 200 TH controller. Refer to the corresponding Controller User's Manual to used the pump.

## The different version operating principle

**MDP 5011** The rotor, a smooth drum with a row of blades at the top, is mounted at the end of a shaft turning in two high-precision ball bearings lubricated with grease, and located in the low-vacuum area. All pumping elements are aluminium.

The pump is rotated by a single-phase electronically controlled electric motor. The rotor is mounted directly on the shaft, while the stator is attached to the pump body.



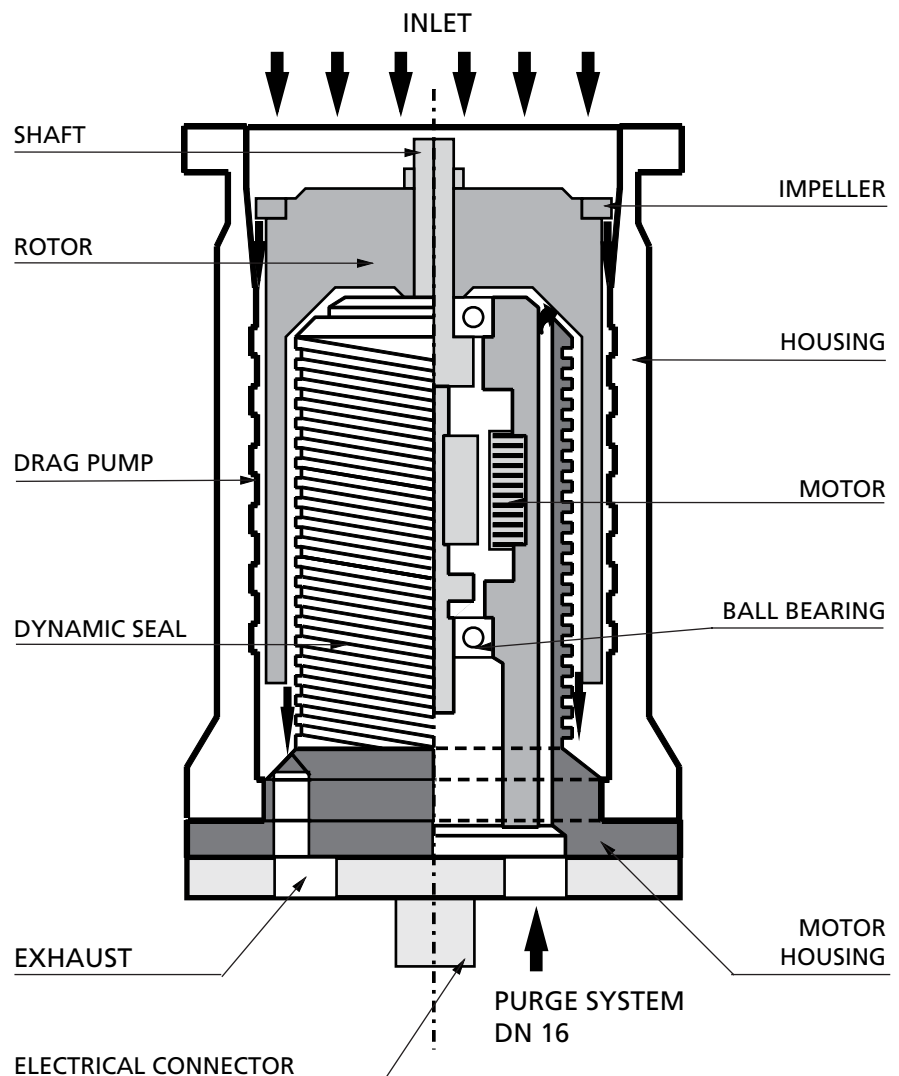
MDP 5011 standard molecular pump  
Cross section drawing

## The different version operating principle

### MDP 5011 CP version for corrosive gases

The MDP 5011 CP is specially designed for aggressive environments. Ball bearings and motor are isolated from process gases by a dynamic inert gas purge system.

MDP 5011 CP can operate with the same controller than the MDP 5011 standard.



MDP 5011 CP Molecular pump  
Cross section drawing



## Technical characteristics

Characteristics		Units	MDP 5011	MDP 5011 CP
Inlet flange			DN 63 ISO-K	
Exhaust flange			DN 16 ISO-KF	
Rotation speed		tr/mn	27,000	
Starting time (0 to 27000 tr/mn)		mn	< 1	
Pumping speed	N2	L/s	7.5	
	He		4	
	H2		3	
Compression rate	N2		1x10 <sup>9</sup>	1x10 <sup>6</sup>
	He		2x10 <sup>4</sup>	250
	H2		1x10 <sup>3</sup>	50
Ultimate pressure (CP with purge 50 sccm)*		mbar	1x10 <sup>-6</sup>	1x10 <sup>-5</sup>
Maximum pressure at inlet in continuous operation**	Natural convection	mbar	1x10 <sup>-1</sup>	
	Air cooling		10	
	Water cooling		10	
Maximum pressure at exhaust in continuous operation**	Natural convection	mbar	40	5
	Air cooling			
	Water cooling			
Ambient operating temperature	Natural convection	°C	5 to 35°C (41 to 95 °F)	
	Air cooling		5 to 35°C (41 to 95 °F)	
	Water cooling		5 to 50°C (41 to 122 °F)	
Recommended primary pump			Ultimate pressure < 20 mbar	
Weight	Natural convection	kg	2.3	
	Air cooling		3	
	Water cooling		2.5	
<b>Environmental conditions:</b> <ul style="list-style-type: none"> <li>■ Ingress Protection</li> <li>■ Use of the product</li> <li>■ Altitude</li> <li>■ Maximum relative humidity</li> <li>■ Pollution degree</li> </ul>			IP 20 indoor use up to 2000m (6562 pied) 80 % for temp. up to 31°C (87°F) decreasing linearly to 50 % at 40°C (104°F) rate 2	

\* According to Pneurop Specifications.

\*\*The 2 maximum pressures can not occur at the same time.

**Note: the MDP 5011 pump must not be baked.**

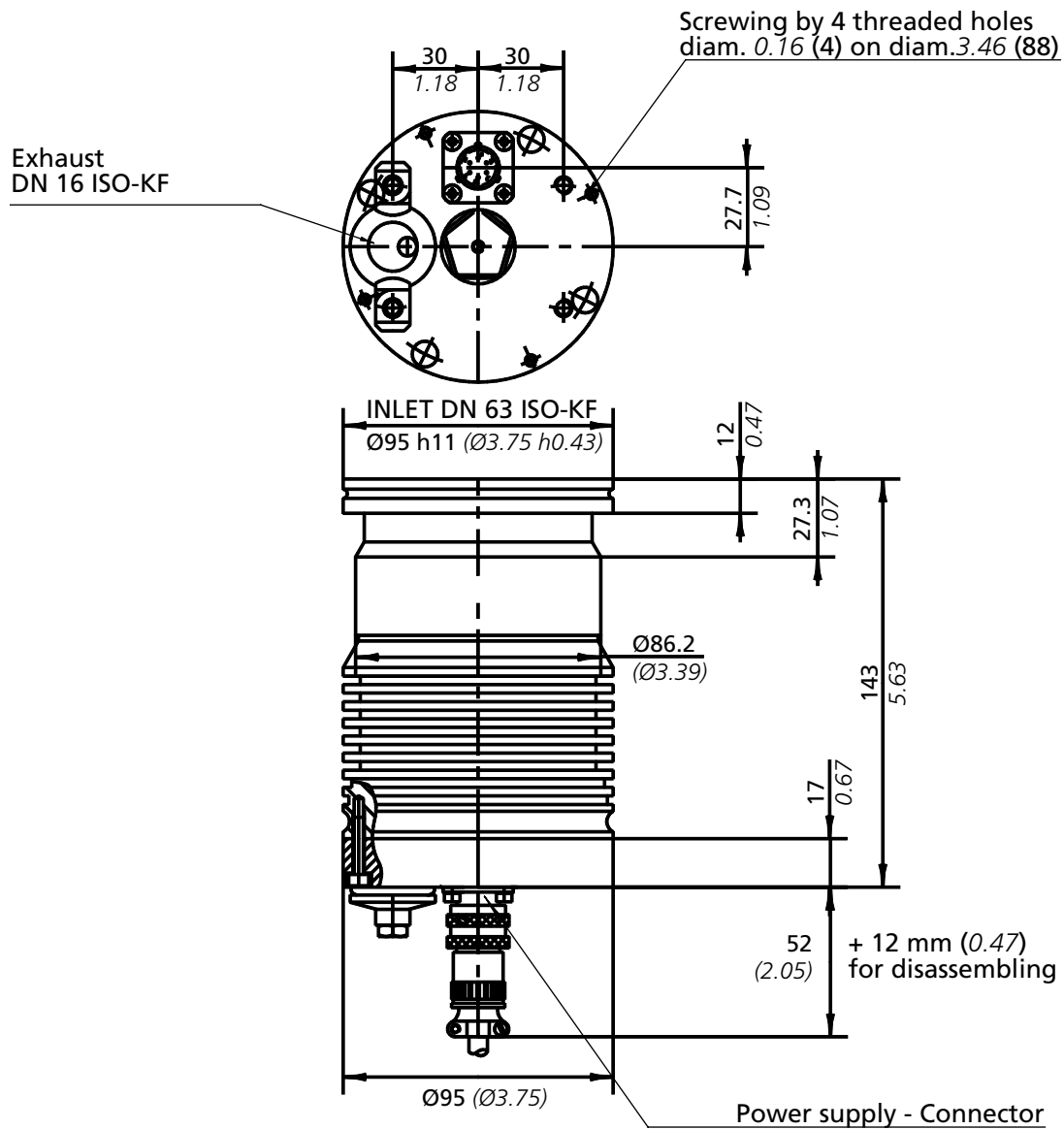
The compression rate of the MDP 5011 CP is lower than this of the standard MDP 5011 pump.

A part of the dynamic seal allows the protection against corrosion.

## Pump dimensions

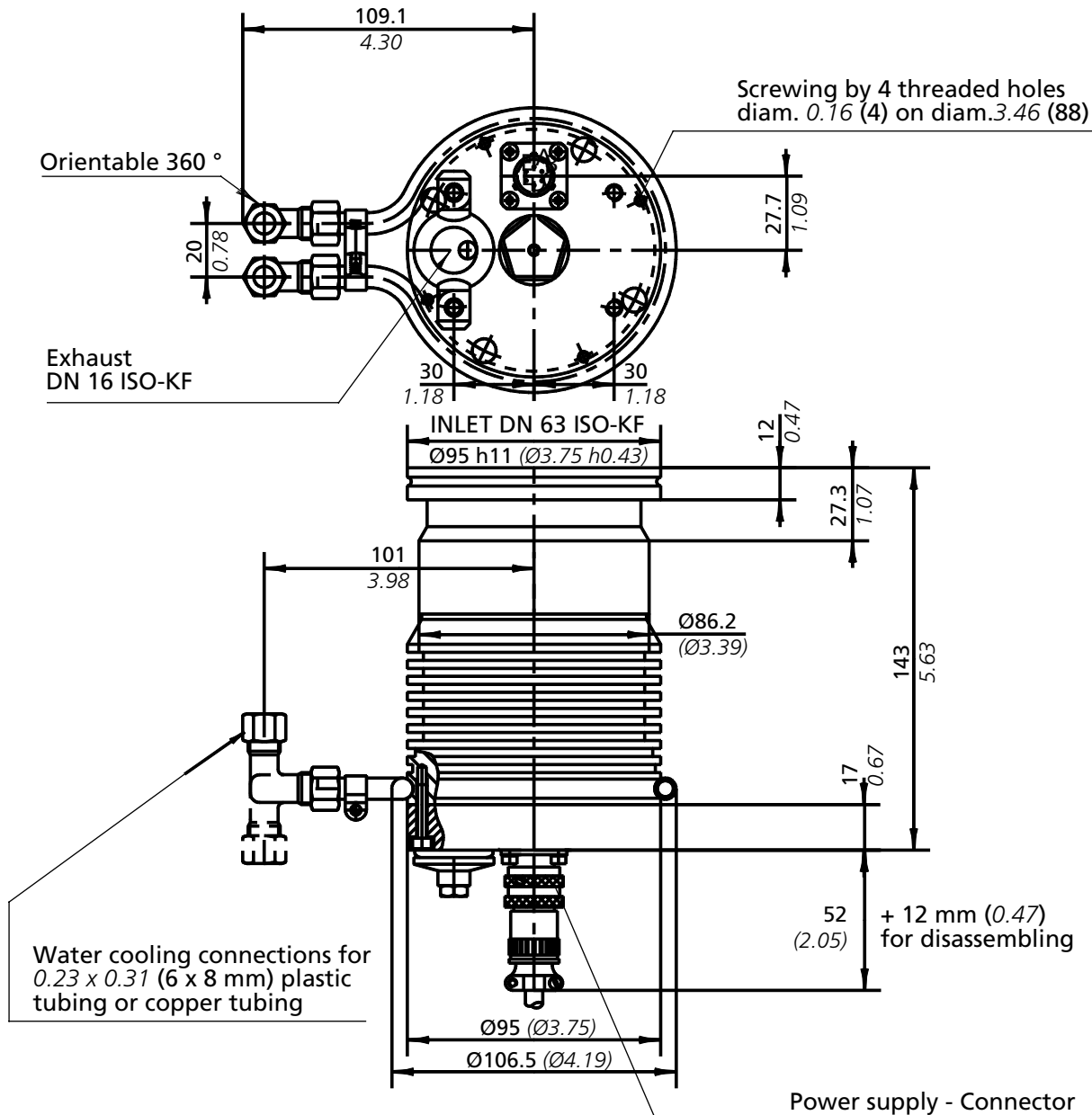
**MDP 5011 DN 63 ISO-K**  
 cooled by natural  
 convection

Dimensions mm/inch



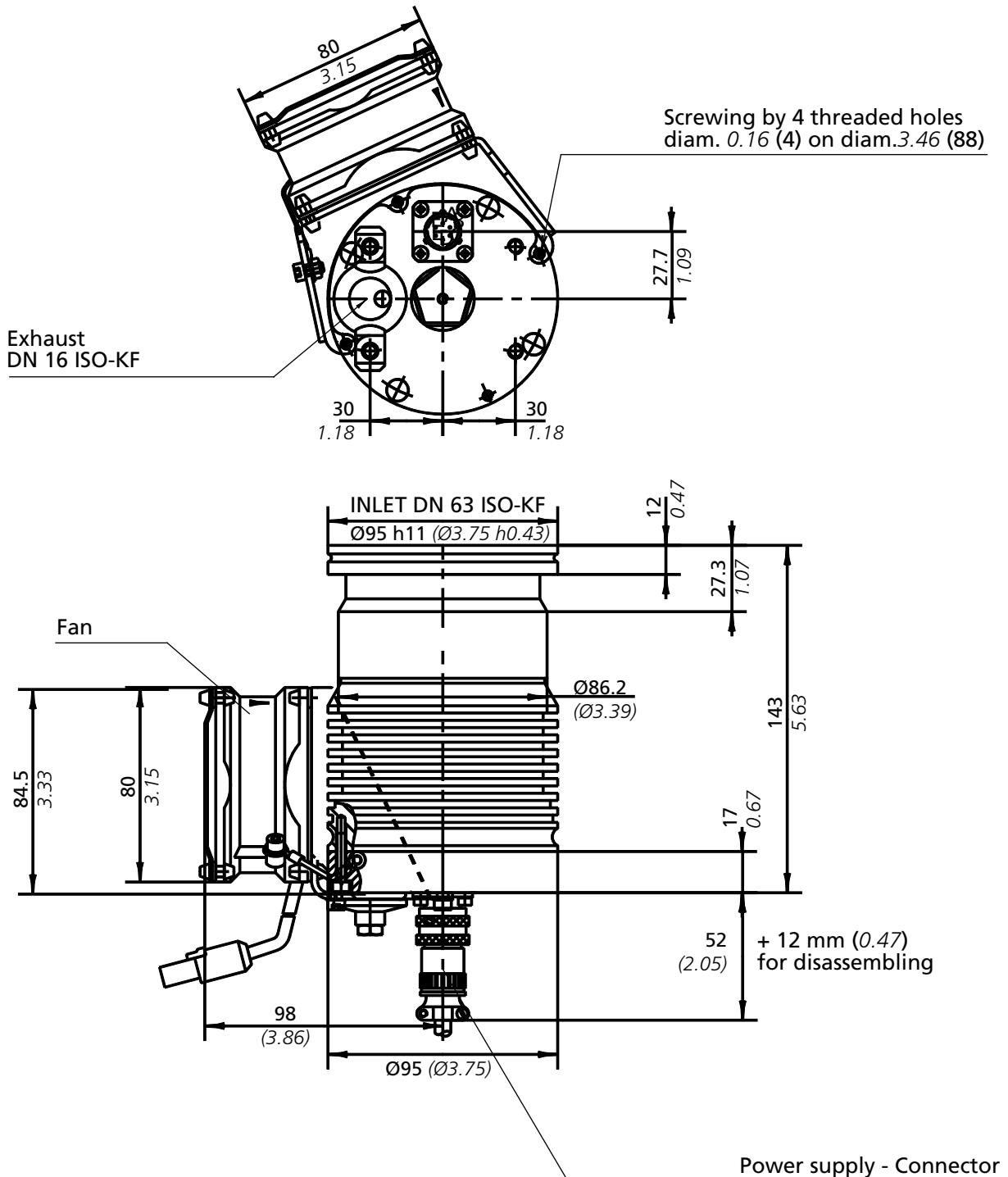
## Pump dimensions

**MDP 5011 DN 63 ISO-K** Dimensions mm/inch  
**water cooling**



## Pump dimensions

**MDP 5011 DN 63 ISO-K** Dimensions mm/inch  
**Air cooling**



## Pump accessories

### Screen filter 2.5 mm



This filter protects the pump against solid particles  $\geq 2.5$  mm.

Description	P/N
DN 63 ISO-K	063117

### Compact filter



The filter stops particles  $\geq 20$  microns and is used in the event of high densities of dust or risk of implosion when pumping tubes or lamps.

Description	P/N
DN 63 ISO-K	062912

### Electrical venting valve



This valve is used to refill the pump with air after pump stopping or after a power failure.

P/N of electrical venting valve compatible with ACT 100.

Description	P/N
Electrical venting valve DN16- ISO-KF 100 V - 50/60 Hz	063165
Electrical venting valve DN16- ISO-KF 115 V - 50/60 Hz	063171
Electrical venting valve DN16- ISO-KF 200 V - 50/60 Hz	063173
Electrical venting valve DN16- ISO-KF 220 V - 50/60 Hz	063169
Electrical venting valve DN16- ISO-KF 240 V - 50/60 Hz	063172

### Cooling kit

It is easy to install or replace a cooling kit by another :

Description	P/N
Water cooling kit	062184
Air cooling kit 110 V (ACT 100)	062187
Air cooling kit 220 V (ACT 100)	062186
Air cooling kit 12 V (ACT 200 TH)	118809

# Safety instructions for pump and controller installation

<b>CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, could result in property damage.
<b>⚠ CAUTION</b>	Indicates a potentially hazardous situation which, if not avoided, could result in moderate or minor injury. It may also be used to alert against unsafe practices.
<b>⚠ WARNING</b>	Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury.
<b>⚠ DANGER</b>	Indicates an imminently hazardous situation that, if not avoided, will result in death or severe injury (extreme situations).

## Overview

Before switching on the product, study the user's manual and make sure you follow the safety instructions. You can recognise these by the 'Caution', 'Warning' and 'Danger' symbols. Good practice tips and manufacturer's recommendations are in a blue box.

The performance and operational safety of this product are guaranteed provided it is used normally in the operating conditions defined in this manual.

It is the customer's task to:

- train operators to use the product if they do not speak the language the manual is written in,
- ensure operators know the safe practices to apply when using the product.

We took care to provide you with a clean product. To keep it in this condition, unpack it only in contamination free area and at final place of use.

## For emergencies

For emergencies and breakdowns, contact the manager of your local service center (see addresses at back of manual).

Make sure the equipment shows no sign of transport damage. If it has been damaged, take the necessary steps to record this with the carrier and inform the manufacturer. In all cases, we recommend keeping the packaging (reusable materials) for further transport of the equipment or for prolonged storage.

## Safety instructions for pump and controller installation

**⚠ CAUTION**

Our products are designed to comply with current EEC regulations. Users making their own modifications to the product are liable to break its compliance with these regulations, degrade its EMC (electromagnetic compatibility) rating, and make it unsafe to use. The manufacturer declines all liability for the consequences of such operations.

**⚠ CAUTION**

The product's EMC rating is obtained on the understanding that it is installed in compliance with EMC rules.

Specially in environments that are prone to emit interference, use shielded cables and connections on interfaces.

**⚠ WARNING**

This pump is not equipped with an emergency stop EMO device because it is designed for use on process tools and integration with the process tool EMO.

Check that the pump is correctly connected to the equipment emergency stop device.

**⚠ WARNING**

Electric shock hazard.

Some components have capacitors charged to over 60VDC, or motor operating as generator. When power is switched off, they keep their charge for a time. Take precautions concerning the access to the connector pins. Wait at least 5 minutes after the turbopump comes to complete stop before starting any work on the product.

**CAUTION**

Fire protection:

The pump is not intended to be installed on process containing flammable materials or in hazardous atmosphere.

The pump body is made of aluminium. The main part enclosure and the majority of the non metallic parts (mainly electrical components and frequency converter) have a fire rating of UL94V0 and/or are UL approved.

Smoke hazard due to the presence of electrical components.

The smoke hazard is low due to the use of approved components and the containment smoke in the pump cover.

**⚠ WARNING**

Ensure that the product is connected to an electrical installation:

- in compliance with the local and national safety requirements,
- equipped with electrical protection (fuses, circuit breaker, ...) which has a suitable earth (ground) point, properly connected.

**⚠ WARNING**

When units containing control circuits are equipped with dry contact outputs, it is the responsibility of the customer to use these outputs in compliance with extra low voltage installation and security standards.

## Safety instructions for pump and controller installation

**⚠ WARNING**

The user and /or OEM are ultimately responsible for operating the equipment in a safe manner. The manufacturer has no control over the types of gases exposed to this pump. This is the user and/or the OEM's responsibility to follow the necessary safety requirements.

Frequently process gases are toxic, flammable, corrosive, explosive and/or otherwise reactive.

Toxic gases can cause serious injury or death. Operators and users must take the appropriate safety recommendations to prevent injury. Consult the responsible department for instructions and safety information.

Hazardous gases through the pump can cause serious injury or death. It's mandatory by regulations to connect the turbomolecular pump's exhaust to a rough pumping line compatible with the process gases. Check that pump is correctly connected to the equipment (B300).

**⚠ DANGER**

**Pump connection to the installation:**

**It is strongly recommended to secure the turbopump installation to prevent any safety hazard to the user in standard operating conditions : (B300).**

**CAUTION**

The units containing control circuits are designed to guarantee normal safety conditions taking their normal operating environment into account (use in rack).

In specific cases of use on tables, make sure that no objects enter the ventilation openings or block the openings when handling the units.

### Operation

**⚠ WARNING**

Do not operate the pump until it is securely fixed. If the pump seizes, the stored energy of the rotor can cause rapid movement of the pump, which may cause further damage and injury to people. It is mandatory to respect installation instructions described in the pump user's manual.

The adixen constructor declines any responsibility if the pump installation is not made in accordance with the installation specifications.



**⚠ WARNING**  
**MOVING PARTS PRESENT**  
 Moving parts can crush and cut.  
 Keep hands or feet away from moving parts.

This label informs the user that moving parts present inside the pump could cause personal injury, like crushing or cutting. The user must keep all body parts away from moving parts.



## Safety instructions for pump and controller installation

**⚠ WARNING**

Do not expose any part of the human body to vacuum. The product is supplied with the inlet and exhaust sealed. Remove these blanking plates when you are ready to connect the product on your vacuum system. As well as, don't operate the product unless the inlet and exhaust are connected to a vacuum and exhaust pumping line.

**⚠ DANGER****Risk of cut injury:**

The access to the rotor of a turbomolecular pump with an unconnected inlet port is dangerous. In the meantime, if the pump is not switched on, it may be driven by another pump in operation.

Always connect the pump inlet port before starting the pump.

**⚠ WARNING**

Risk of tilting: although the product meets EEC safety regulations (topple angle  $\pm 10^\circ$ ), it is advisable to guard against the risk of tilting during handling, installation, and use.

**⚠ WARNING**

The products are factory tested to ensure they will not leak in normal operating conditions. It is the user's responsibility to ensure this level of leak tightness is maintained.

### Storage

**CAUTION**

The product is supplied with the inlet and exhaust sealed. These are to prevent foreign bodies entering the pump during transport and storage. Do not remove these blanking plates until you are ready to install the product on the vacuum line.

**CAUTION**

When the pump is new, if it is going to be put into storage, keep it in its packaging in the following conditions:

- in a clean and dry environment,
- at an ambient temperature between  $-5^\circ\text{C}$  and  $+40^\circ\text{C}$ ,
- for a period of 2 years maximum with a running period every 6 months (refer to C100).

If you need to store a pumping unit which has run on clean process, don't forget to purge the pump with N<sub>2</sub>. Seal the inlet, exhaust and purge ports with blanking plates (refer to F100). Don't store the pump more than 6 months in a clean and dry environment.

Never store a pump which has been used on corrosive process. Return it to an adixen repair service center (refer to G200).

## Pump connection to an installation

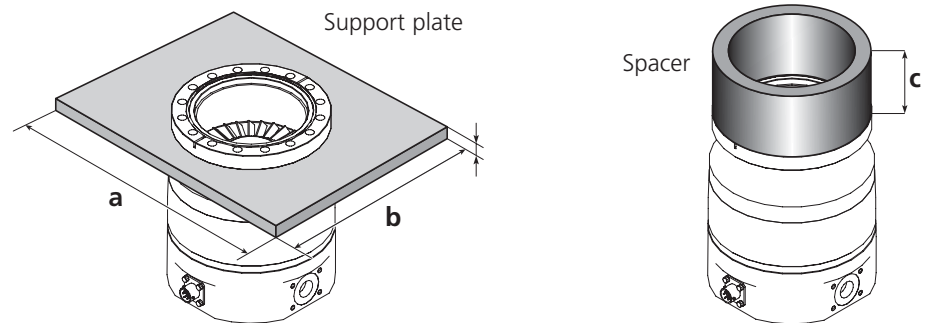
### **WARNING**

It is absolutely necessary to install the pump according to the following installation specifications to secure the user and the equipment. The adixen constructor declines any responsibility if the pump installation is not designed in accordance with the installation specifications described in this section.

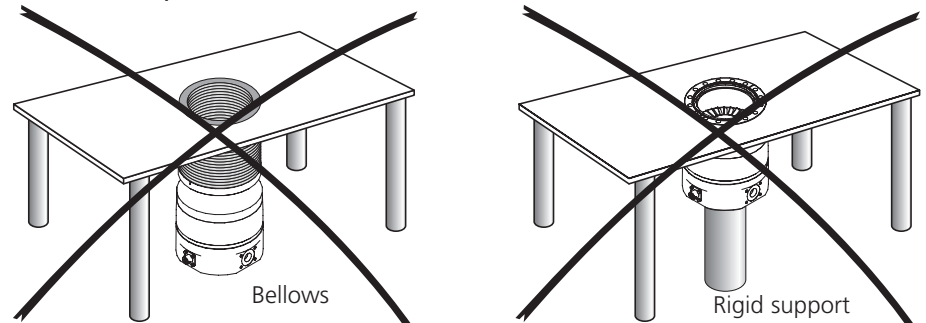
**The connection of the pump to the installation must be sufficiently rigid**

The dimensions of the connection parts should be study carefully: reduce the following as much as possible:

- dimensions **a** and **b** the flexibility of the connection plate
- the overhang **c** between the pump and its anchor point.



Some examples of unrecommended connections:



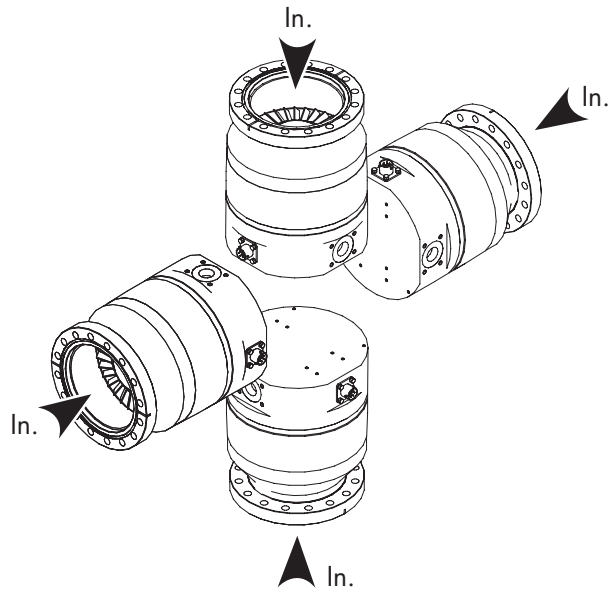
The equipment attachment devices should be sufficiently rigid to prevent potential risks in the event of failure of a rotary component or a violent shock on the pump (exceptional phenomena). For this use the rotary flange attachment holes.

If the inlet flange is attached with claw clamps, use:

- 6 claw clamps for flange < DN 100
- 8 claw clamps for flange  $\geq$  DN 100.

## Pump connection to an installation

The pump can operate in any position



### Cooling recommendations and temperature limits

Ambient operating temperature:

MDP with natural convection or air cooled	T < 35°C (95°F)
MDP water cooled	T < 50°C (122°F)

### Pumping conditions

In cases of high pressure pumping or frequent cycling, the pump temperature is higher, so water or air cooling are recommended.

## Pump connection to an installation

### Pump line connections

#### **WARNING**

Do not expose any part of the human body to vacuum. The product is supplied with the inlet and exhaust sealed. Remove these blanking plates when you are ready to connect the product on your vacuum system. As well as, don't operate the product unless the inlet and exhaust are connected to a vacuum and exhaust pumping line.

#### **CAUTION**

Make sure all parts and chambers connected to the inlet, exhaust and purge of the maglev pump can withstand a negative pressure of 1 bar below atmospheric pressure and that they are impervious to damage from vacuum (seals, etc.).

#### **CAUTION**

Risk of injury by cutting. Contact with the pump rotor cell may cause cuts. Alternatively, protective gloves may be worn when servicing the product.

#### **CAUTION**

For safety reasons, use accessories on the inlet and exhaust lines whose materials and sealing properties are compatible with the gases being used.

#### Materials in direct contact with process gases

COMPONENTS IN THE PUMP	MATERIALS
From inlet to exhaust	Stainless steel, aluminium alloy
O-ring	Fluorinated elastomers, FPM

#### **CAUTION**



Pollution risk: Unclean and contaminated component can increase the pumping down time. Use only dry and clean pipe lines, and wear gloves to make the pump connections.

After connecting the product to the pumping line, check for leaks along the entire to ensure proper connections.

## Pump connection to an installation

**Inlet** Install the screen filter or compact filter accessory on the pump; connect the pump to the installation<sup>(1)</sup>.

Inlet flange: **DN 63 ISO-K**

### CAUTION

It is recommended to install an isolation valve between the chamber to allow chamber venting without stopping the pump.

**Exhaust** Connect the Air inlet valve accessory to the pump. Connect the pump to primary pumping circuit<sup>(1)</sup>.

Exhaust flange : **DN 16 ISO-KF**

### ⚠ WARNING

When pumping on corrosive gases, or aggressive gases, the gas can cause injury or death. The exhaust of the turbopump must be connected to roughing pump line compatible with process gases.

### CAUTION

It is highly recommended to install an isolation valve between the pump and the roughing circuit.

<sup>(1)</sup> Different connection accessories can be found in the Manufacturer's catalog.

## Nitrogen purge connection (MDP 5011CP)

For proper protection from reactive gases and particles the inert gas purge system must be used continuously.

### Nitrogen characteristics

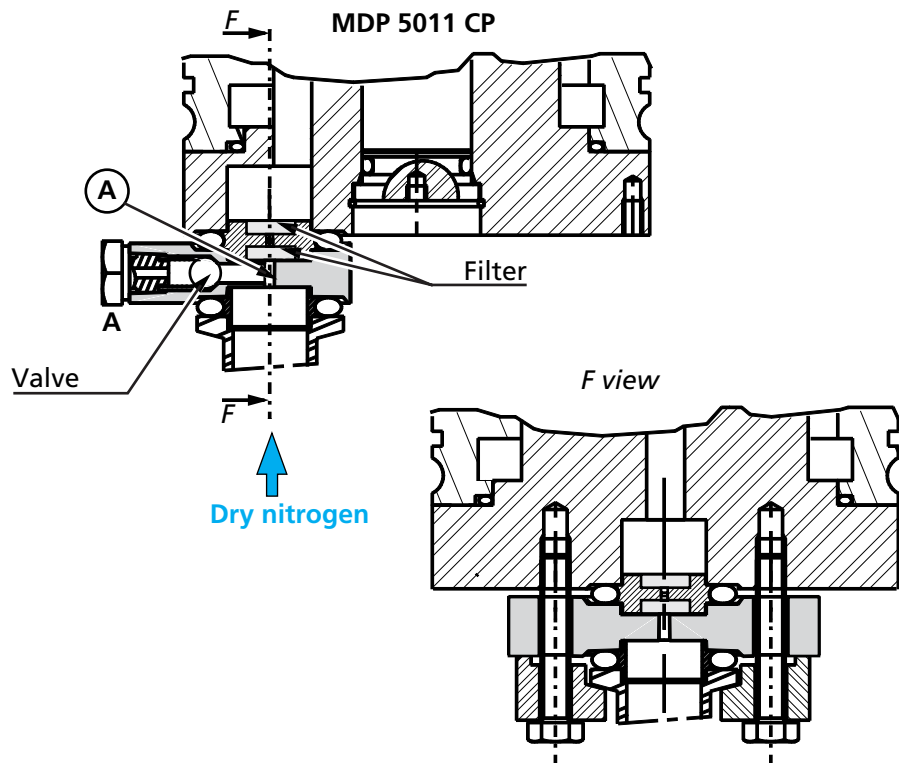
For maximum performance, a **filtered dry nitrogen supply** with the following characteristics is required:

- H<sub>2</sub>O concentration < 1 ppm
- O<sub>2</sub> concentration < 1 ppm
- dew point < - 22° C,
- particles < 1 µm
- oil < 0,1 ppm
- pressure range: 1 to 1.3 bar.

The cleanliness of the gas line must be correct.

### Nitrogen connection

The purge gas line must have an DN16 ISO-KF fitting to connect it directly to the MDP with a centering ring and quick connect clamp.



### Ni flowrate adjustment

If the pressure in the purge gas line is greater than 1.4 bar (20.5 psi) absolute the check valve automatically opens in order to limit the flow into the MDP to 50 sccm.

We recommend that the pressure of the purge line be set at 1 to 1.3 bar (15 to 19 psi) absolute to avoid wasting the purge gas.

If the pressure of the purge line exceeds 1.3 bar (15 psi ) absolute the performance of the pump will be affected.

## Venting valve connection

### **CAUTION**

Check the solenoid valve voltage : it must be compatible with line voltage (see **A510**).

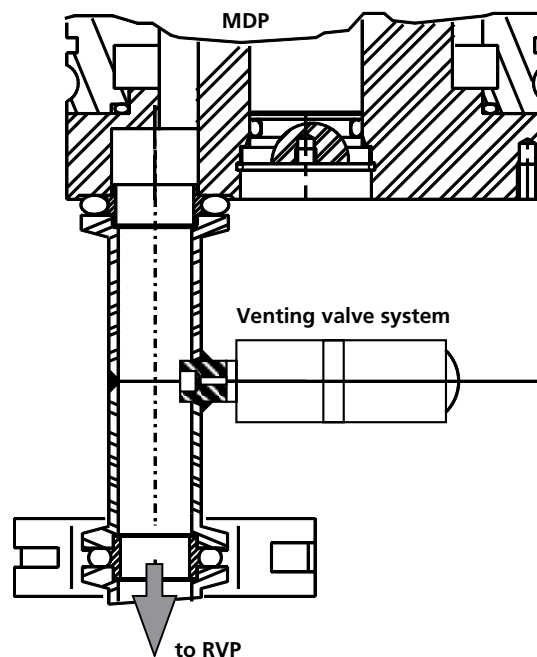
### Composition

It consists of:

- A solenoid valve normally open (NO) mounted on a DN 16 ISO-KF flanged fitting.
- The fitting is installed between the outlet flange of the MDP and the foreline of the primary pump.

### Electrical wiring with ACT 100

Connect the solenoid valve cable to the J connector of the ACT 100 controller.



### Working

If there is a power failure, this device vents the MDP pump to atmosphere to prevent oil contamination from the roughing pump.

If the user want to make a venting, he must :

- press the "STOP" switch on the ACT 100 controller.
- Disconnect the power cable on the ACT 100 controller.

### Electrical wiring with ACT 200 TH

Refer to controller User's Manual.

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## Water cooling connection

### Water characteristics

In order to limit corrosion and motor cooling circuit clogging, it is recommended to use cooling water with the following characteristics:

- Treated soft water or non-corrosive industrial water
- pH between 7.5 and 11
- Hardness < 7 milli-equivalent/dm<sup>3</sup>  
= 350 mg/l of CaCO<sub>3</sub> (calcium carbonate)  
= 35 °f (French degree)
- Resistivity: 1,500 Ω.cm < R < 20,000 Ω.cm
- Particles maximum size: 0.2 mm
- Solid pollution < 100 mg/dm<sup>3</sup>
- Maximum pressure 7 bar
- Temperature from 50 to 77°F (10 to 25°C)

**CAUTION**

The use of uncontrolled city water can lead to water circuit clogging due to limestone deposition, which may necessitate in the worst case a complete cleaning and overhaul of the cooling circuit.

**CAUTION**

The presence of micro-organisms like aquatic weed and micro-biological substances like bacteria can lead to cooling problem in the pump. Appropriate water treatment system need to be use to prevent such growth of micro-organisms.

### Connection

Provide a water inlet pipe and a tap to adjust the flow rate.

It consists of a water circulator ring which can be equipped on the MDP housing.

It is recommended for use at ambient temperature between 95 and 122°F, or in continuous use at high pressure.

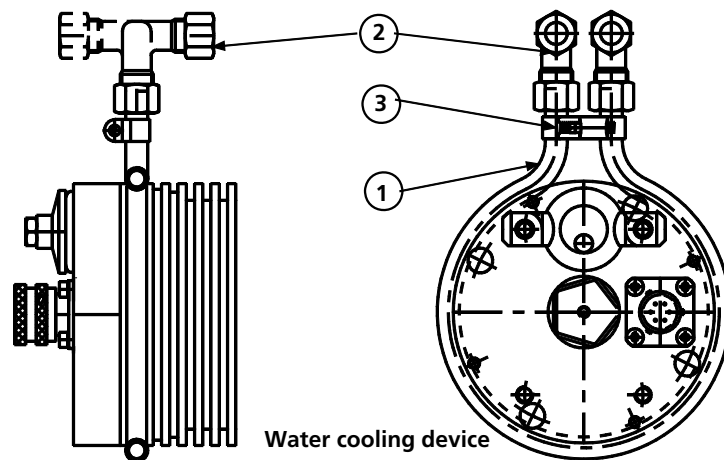


## Water cooling connection

### Connection (cont')

When the air cooling device must be replaced by a water cooling device, proceed as follows:

- Install the cooling ring (1) on the MDP housing in the specific groove and put it facing the water line.
- Screw the 2 water fittings (2) to the cooling ring and orientate them.
- Secure the device by screwing the hose clamp (3) with a screwdriver : the cooling ring does not rotate.

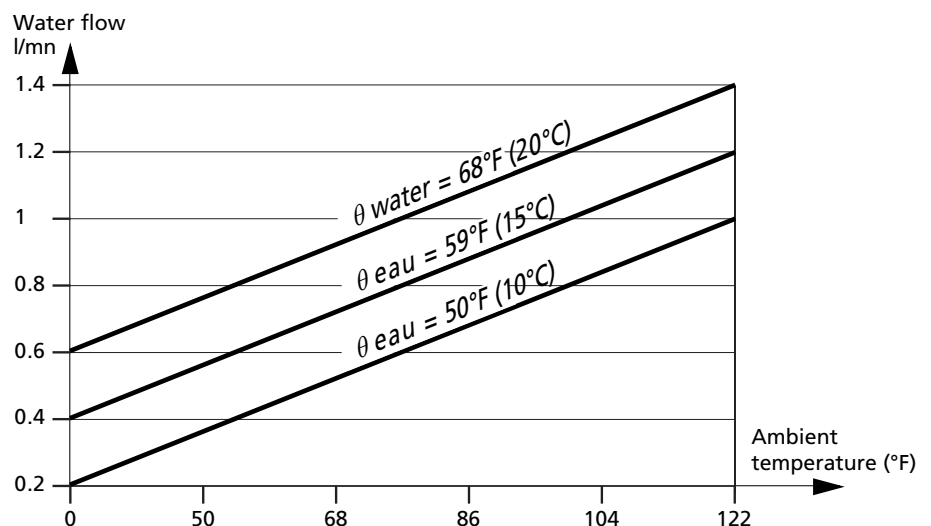


### Connection to the water line

- Use a flexible or a rigid 6 x 8 mm hose to connect one of the water fittings to the water line. The user must provide some method of controlling water flow.
- Use a flexible or a rigid 6 x 8 mm hose to connect the other fitting to the drain.

### Water flow adjustment

Control the flow of water depending on ambient temperature, and water temperature using the following graph.:



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## Air cooling kit connection

### **Mechanical connection**

When the water cooling kit must be replaced by an air cooling device, proceed as follows:

- Install the fan on the pump housing by a bracket. This last is assembled on the pump rear tape with 3 screws M4 (refer **A401 page 313**).
- Connect the contact plug of the minus wire to a fan assembling screw.

### **Electrical connection**

#### **With the ACT 100 controller**

Connect the fan cable to the K connector of the controller.

#### **With the ACT 200 TH controller**

Power the fan with the provided 12V connector on the pump/controller cable connection.

### **Functional limits**

The fan provides sufficient cooling for ambient temperature up to 95 °F.

If the ambient temperature is above 95 °F, the user should install a water cooling collar.

It is recommended for use at ambient temperature between 95 and 132 ° F, or in continuous use at high pressure.

## Safety instructions for product use

When the pump is new, or after a prolonged shut-down of 3 months or more (under normal storage conditions), it is recommended to operate the pump at atmospheric pressure for 10 minutes (inlet and exhaust open to atmosphere) in order to ensure a slow rotation and grease re-distribution in the pump ball-bearings.

### WARNING

- Do not operate the pump until it is securely fixed. If the pump seizes, the stored energy of the rotor may cause further damage and injury to people. See *B 300*.
- Before to use the controller, make sure that the mechanical and electrical connections have been made (see chapters from pump and controller's manuals).

### DANGER

#### Risk of cut

The access to the rotor of a turbomolecular pump with an unconnected inlet port is dangerous. In the meantime, if the pump is not switched on, it may be driven by another pump in operation.  
Always connect the pump inlet port before starting the pump.

### CAUTION

It is highly recommended to install:

- a screen filter at the pump inlet,
- an isolation valve between the chamber to be pumped and the pump,
- an isolation valve between the pump and the roughing pump.

### WARNING

- Specific operating conditions may exist that require extra caution from users due to the high temperatures generated (outer surfaces > 70° C): wear protective gloves and leave the pump to cool before working on the product.
- Risk of injury by cutting.  
The inlet of the pump musn't be disconnected as long as the rotor is moving and without having disconnecting the power line cable.

### CAUTION

- Risk of seizing  
Avoid moving or applying shock to a running product.  
Avoid rotating the product about a perpendicular plane to the axis of rotation of the high vacuum pump.
- Risk of electrical shock.  
The turbopump and the controller must only be disconnected from each other when the turbopump is completely at rest and the controller disconnected from the power supply.  
Never unplug the pump by disconnecting the main cable. Only the authorized and trained technicians can perform intervention on the product.

## Molecular pump operation in a pumping application

Study the safety instructions for product use (see C 100)

### First pump start-up

#### CAUTION

When the pump is new, or after a prolonged shut-down of 3 months or more (under normal storage conditions), it is recommended to operate the pump at atmospheric pressure for 10 minutes (inlet and exhaust open to atmosphere) in order to ensure a slow rotation and grease re-distribution in the pump ball-bearings.

#### DANGER

The access to the rotor of a molecular pump with an unconnected inlet is dangerous. Similarly, if the pump is not switched on, it may be driven by another pump in operation (risk of injury).

### Example of a single valve assembly

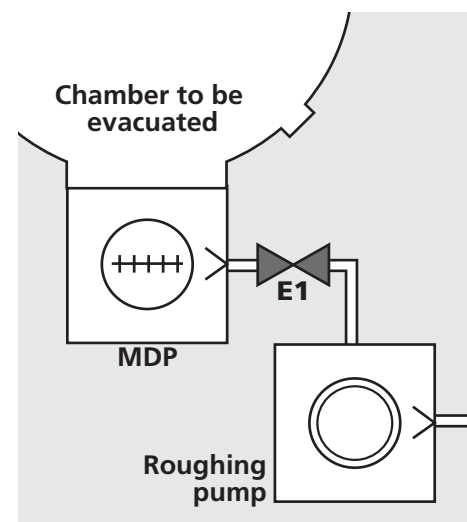
The chamber and pipes are at atmospheric pressure, the pumps are switched off, the valves are closed

Start-up:

- start up the MDP cooling system
- open the E1 valve
- start up the primary pump
- start up the MDP pump.

Stop:

- close E1
- stop the primary pump
- stop the MDP pump
- stop the cooling system.



## Molecular pump operation in a pumping application

### Example of a 3 valve assembly (example 1)

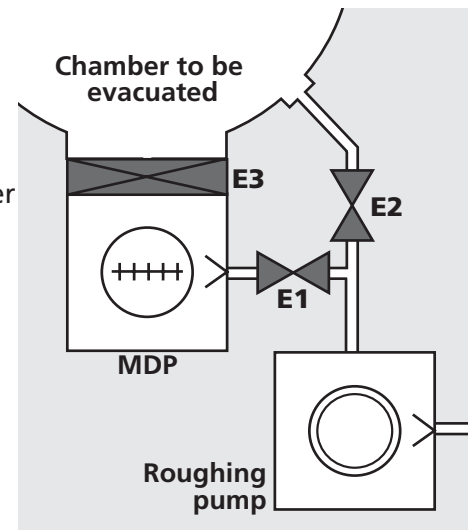
The chamber and pipes are at atmospheric pressure, the pumps are off, the valves are closed.

Pre-evacuation of the chamber:

- start up the primary pump
- start up the MDP cooling system
- open the E2 valve.

When the pressure in the chamber is  $\leq 1$  mbar, the secondary pumping can be started up:

- close E2
- start up the MDP pump
- open E1 and E3.



### Example of a 3 valve assembly (example 2)

The chamber in atmospheric, the pumps are operating, the valves E2 and E3 are closed, the cooling circuit is operating.

Pre-evacuation of the chamber:

- close E1 and open E2.

The pressure in the chamber is  $\leq 1$  mbar:

- close E2
- open E1 and E3.

### To refill the chamber with air

Close the E3 valve (E1 remains open) and open an air inlet on the chamber.

### To stop pumping

Pumps are isolated by closing the valves.

- close the E3 valve.

MDP pump and primary pump rotating

- stop the MDP pump
- close the E1 valve
- stop the primary pump
- stop the cooling circuit.

## Safety recommendations related to maintenance

### WARNING

Maintenance must be performed by a skilled maintenance operator trained in the relevant health and safety aspects (EMC, electrical hazards, chemical pollution, etc.).

Isolate the product from all energy sources (mains electricity, compressed air, water, gas ...) before starting work.

### WARNING

Standard precautions before any maintenance operations:

Before performing a maintenance operation, stop the pump. When the pump is at rest, switch off the pump by setting the controller main switch to «0», wait 5 minutes before disconnecting the main cable. If this last one remains connected, some components will still be energized.

### WARNING

Risk of injury by cutting.

The inlet of the pump musn't be disconnected as long as the rotor is moving and without having disconnecting the power line cable.

### WARNING

After pumping on corrosive or toxic gases, it is strongly recommended to seal the pump with blanking plates in case of return to the repair service centers. Refer to *F100* for connecting accessories.

### DANGER

Risk due to pumping conditions.

Remaining process gases in the pump may cause severe injury or death. Before removing the pump from the installation, continue N2 flow from the process tool for 30 min. Nitrogen pressure and flow rate should be identical to the programmed values during process.

### DANGER

During pump removal, operator could be in contact with process residues on the exhaust which could cause severe injury or death. Ask your safety department for instructions according to the local regulations.

### DANGER

Chemical supplies coming from the tool, as well as the water and the nitrogen need also to be locked out/tagged out.

## Safety recommendations related to maintenance

Users are advised:



- Wear gloves, protective glasses and, if required for the used gases, a breathing mask.
- Ventilate the premises well.
- Do not dispose of residue in the usual waste disposal network but, have it destroyed by a qualified organization.
- Install the inlet and exhaust blanking plates, thus delivered with the pump.

The outside of the appliance and control box can be cleaned with a lint free wiper. Avoid using cleaning products that deteriorate printed surfaces and self adhesive labels. All other cleaning operations must be done by our service centers.

### Decontamination – product dismantling

According to the regulations 2002/96/CE about Waste of electrical and electronical equipments, and 2002/95/CE about Restriction of Hazardous substances, the manufacturer provides a recycling paid service for the end of-life of waste electrical and electronic equipment.

Any obligation of the manufacturer to take back such equipment shall apply only to complete not amended or modified equipment, using adixen Vacuum Products original spare parts, delivered by adixen Vacuum Products, containing i.e. all its components and sub-assemblies.

This obligation will not cover the shipping cost to an adixen take back facility.

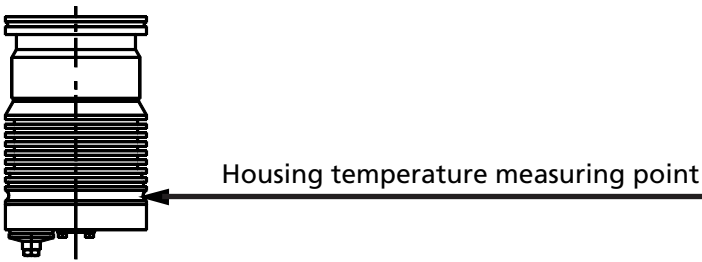
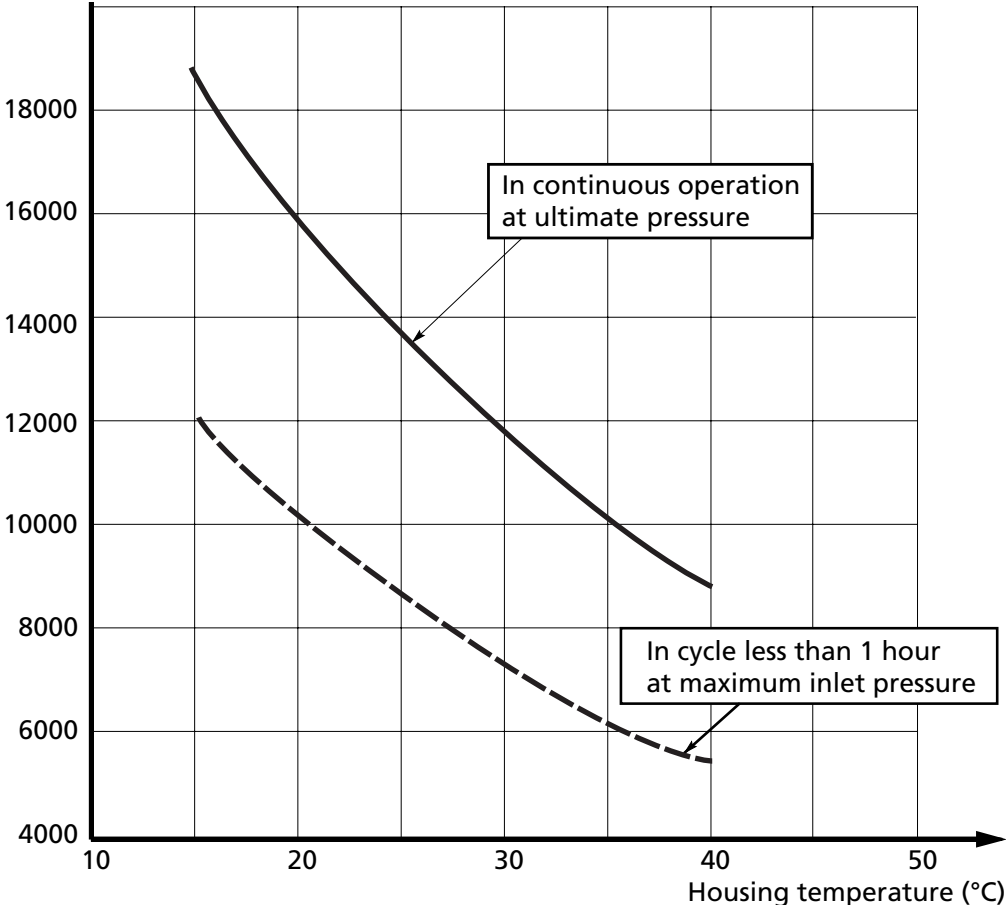
Before returning the product, fill in the safety form available in appendix of the user's manual. Attach it to the product before shipping to the service-repair office closest to you.

### How to contact us?

The partial and full overhaul must be performed by manufacturer trained personnel.

Contact nearest service center or the service support at the following e-mail address: **support.service@adixen.fr**

# MDP 5011 pump maintenance frequency



Maintenance frequency 20 °C temperature	Maintenance frequency 35 °C temperature	Operation to be carried out	Section
16 000 hours	10 000 hours	1st lubrication	E 200
32 000 hours	20 000 hours	2nd lubrication	E 200
48 000 hours	30 000 hours	Ball bearings replacement	Consult us



## MDP 5011 pump lubrication

The first lubrication required for the correct operation of MDP pumps is performed in the factory. Subsequent lubrications should be performed according to the procedure below and according to a frequency defined as a function of processes used (see **D 300**).

Only use the grease recommended by the manufacturer and contained in the lubrication syringe (see **F 100**).

### CAUTION

Avoid introducing foreign matter into the pump during these operations. Lubrication must be performed with the pump switched off.

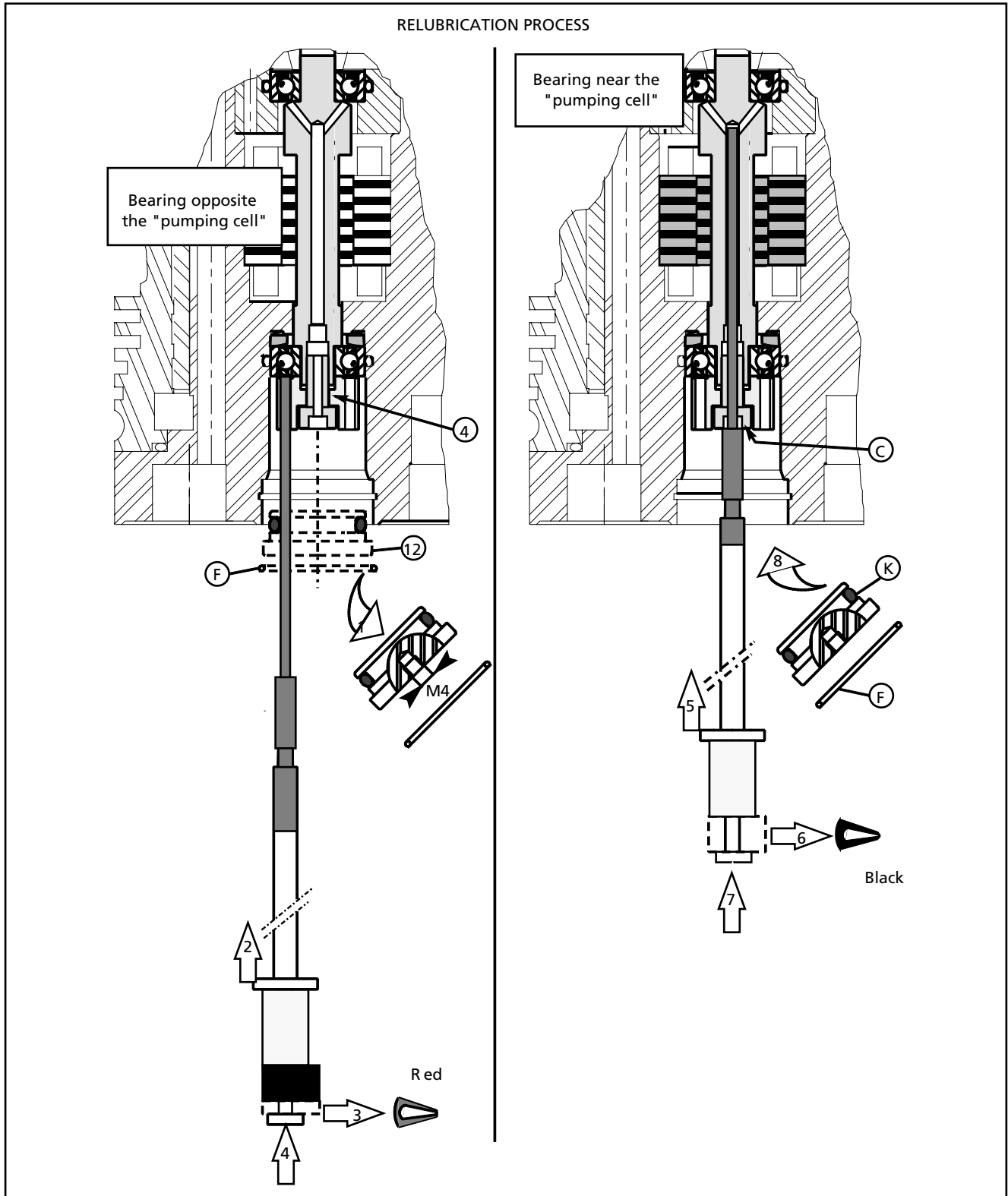
### Use of the lubrication syringe

The MDP contains two bearings which must both be reloaded with grease at each relubrication period.

The syringe is equipped with two jumpers with different widths and colours (red and black) **used to proportion the grease accurately for each pump bearing** (see figure page 2/3).

- Lubrication of bearing on the pumping cell side: **black jumper**.
- Lubrication of bearing opposite the pumping cell side: **red jumper**.

# MDP 5011 pump lubrication



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## MDP 5011 pump lubrication

- Bearing lubrication**
- Stop the MDP pump and the primary pump.
  - Vent the MDP pump to atmospheric pressure.
  - Remove the circlips **(F)**.
  - Tighten a screw M4 in the thread of the end cap **(12)** and remove it.
- Bearing opposite the pumping cell**
- Introduce the syringe equipped with its needle into a hole of the ring **(4)** and remove the red jumper.
  - Distribute the dose of grease in 2 diametrically opposed points, until the syringe plunger comes to a stop against the black jumper.
- Bearing on cell side**
- Introduce the lubrication syringe needle into the drilled screw located at the center of the rotor until it comes to a stop against the screw head.
  - Keep the syringe pressed down to the bottom of its housing throughout the operation.
  - Remove the black jumper from the syringe and introduce the grease until the plunger comes to a stop.
  - Remove the syringe.
  - Reassemble the end cap **(12)** and the circlips **(F)**.

The relubrication operation is complete.

### Execute the pump running

(see Controller User's Manual).....  **E 300**

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## Spare parts - Instructions of use

### **Replacement of parts and use of non genuine parts**

Our products are designed to comply with current EC regulations and guarantee optimal operating conditions with maximum safety conditions for the user.

**Any modification of the product made by the user is liable to lead to non-compliance with the regulations, or even to put into doubt the performance of the product and the user's safety.**

Replacement of defective components with parts that are not genuine, jeopardizes the initial safety conditions of the equipment.

**In such cases, the EC declaration of conformity becomes null: The manufacturer withdraws responsibility for such operations.**

Besides, counterfeiting and unfair trading of parts are condemned under civil and criminal laws.

The manufacturer urges the user not to use «imitation parts», or the misappropriation and pirating of intellectual property performed by some dishonest operators.

The manufacturer supplies maintenance components, spare parts or kits to perform the maintenance of its products (see **F10**).

## First level of maintenance

### Lubrication syringe



Ready-to-use, it contains the grease load required for a regreasing operation on the 2 bearings.

P/N
200027

### Air inlet electrovalves accessories

Description	P/N
Electrovalve coil 100 V - 50/60 Hz	038126
Electrovalve coil 115 V - 50/60 Hz	038122
Electrovalve coil 200 V - 50/60 Hz	038125
Electrovalve coil 220 V - 50/60 Hz	038121
Electrovalve coil 240 V - 50/60 Hz	038124
Electrovalve operator	038102
Silencer	075990

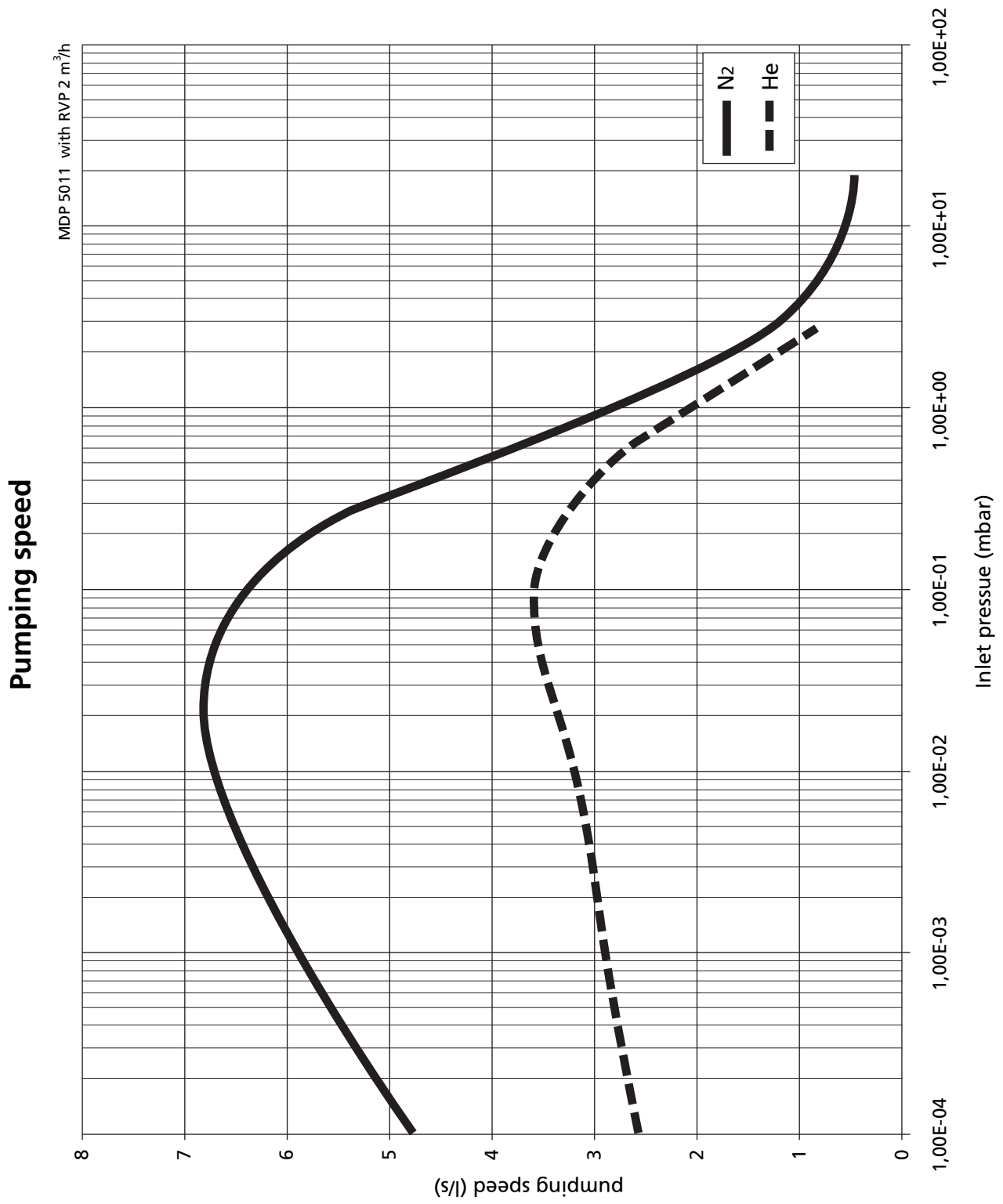
### Connecting accessories at inlet and exhaust

After pumping on corrosive or toxic gases, it is strongly recommended to seal the pump with blanking plates in case of return to the repair service centers.

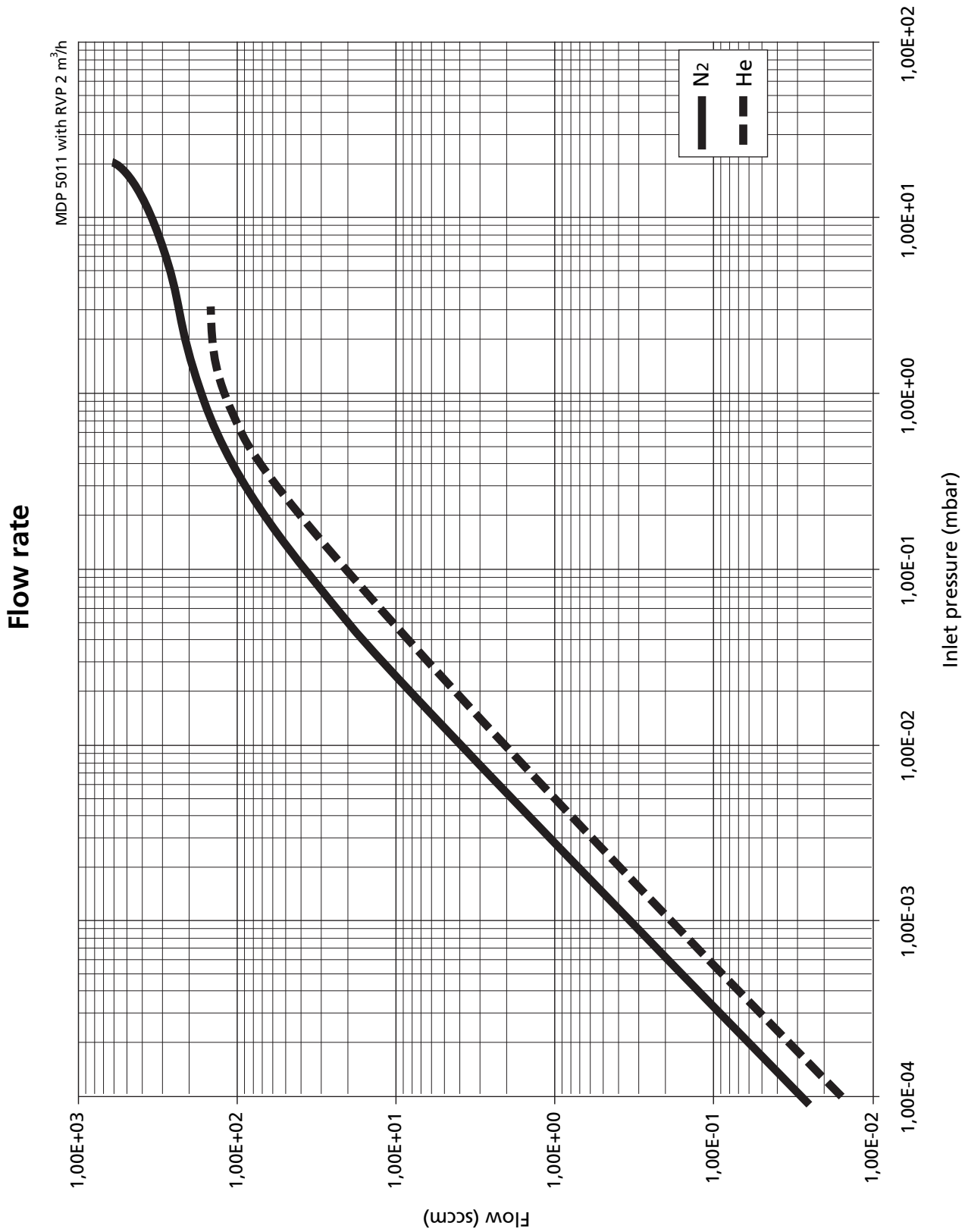
At inlet DN63 ISO-K	P/N
Blank-off flange	068285
Centrer ring with o-ring	068432
Double claw clamps (set of 4)	303056

At exhaust DN 16 ISO-KF and at purge port	P/N
Blank-off flange	068195
Centrer ring with o-ring (set of 15)	068228
Stepped lugs and fasteners (set of 4)	053221

Pumping curves



# Pumping curves



## Safety questionnaire

### Procedure for returning adixen products

You wish to return an adixen product for maintenance. The equipment will be dismantled and possibly cleaned by a technician from our Service Centre.

In compliance with European Community's L360 directives, French labor code L231 - R231 and Federal OSHA Safety Standard 1910-1200, adixen Vacuum Products requires this form to be completed to preclude the potential health risk to its service personnel that can occur when receiving, disassembling, or repairing potentially contaminated products.

**Equipment returned without this form completed and secured to outside of package will be returned to customer unprocessed.**

Equipment must be drained of fluids and residue, securely packaged and shipped prepaid. Concerning the closing of the ports (inlet & outlets of the product), metallic airtight blank flanges should be used if toxic or copper gases have been pumped.

We wish to draw your attention to the following points:

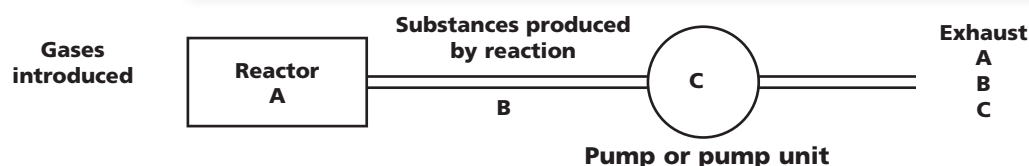
- The risk may be of the following nature:
  - **Chemical:** Danger to health, risks of explosion, fire, risks for the environment. Please indicate the chemical formula and name of the gases or substances that have been in contact with the equipment (pump or detector).
  - **Biological:** In case of contamination (such as pathogenic germs, micro-organisms (bacteria, viruses, etc.) classes 1 to 4 and group E), our Service Center is currently unable to decontaminate and recycle such material without risk to the safety of our staff. Please contact us **before sending** the product to the Service center.
  - **Radioactive:** In case of contamination, our Service Center is currently unable to decontaminate and recycle such material without risk to the safety of our staff. Please contact us **before sending** the product to the Service center.
  - **Copper contamination:** Copper based by products formed in sputtering or etching processes are considered as a poison in some semi-conductor processes.

**If following inspection and quotation, customer elects to not proceed with repair, he will be subject to service fee to cover product decontamination, disassembly, cleaning and evaluation costs.**

**Please to fill in the following form, print it and attach it to the product before shipping to the service-repair office closest to you.**

### **WARNING**

**In the event of chemical contamination, please indicate the following gases or substances:**



- Gases (or substances) introduced into the reactor and which may be found at the exhaust (A).
  - Gases (or substances) resulting from the reaction or process (B).
  - Gases (or substances) that may possibly be formed inside the pump (due to a thermodynamic or chemical reaction, condensation, deposition, precipitation, etc.) (C).
- **Precautions need to be taken before transferring contaminated products.**  
Please contact Service Center for recommendations.



## QUESTIONNAIRE DE SECURITE - SAFETY QUESTIONNAIRE

**Ce questionnaire est téléchargeable sur le site : [www.adixen.com](http://www.adixen.com)**

*This questionnaire can be downloaded from: [www.adixen.com](http://www.adixen.com)*

### Procédure de retour des produits ADIXEN

(Ce formulaire ne peut être rempli et signé que par une personne habilitée)

### Procedure for returning ADIXEN products

*(This questionnaire is only to be filled in and signed by an authorized person)*

<p><b>SOCIETE - COMPANY</b></p> <p>Nom Société - <i>Name of company</i> : .....</p> <p>Nom personne - <i>Name of person</i> : .....</p> <p><small>(Qui remplit ce formulaire) - (Who has filled in questionnaire)</small></p> <p>Fonction - <i>Position</i> : .....</p> <p>N° Tél. - <i>Tel. no</i> : .....</p> <p>N° Fax - <i>Fax no</i> : .....</p> <p><small>(Pour renseignements éventuels sur les produits utilisés) - (for any information on products used)</small></p>	<p><b>EQUIPEMENT - EQUIPMENT</b></p> <p>Description : .....</p> <p>.....</p> <p>.....</p> <p>N° de Série - <i>Serial no</i> : .....</p> <p>Type de procédé - <i>Type of process</i> : .....</p> <p><small>(Pour lequel l'équipement est utilisé) - (for which equipment is used)</small></p> <p>Date de l'expédition - <i>Date of consignment</i> : .....</p>																								
<p><b>INTERVENTION - SERVICE</b></p> <p>Intervention souhaitée (Révision, réparation,...) - <i>Service required (overhaul, repair, etc.)</i> :</p> <p>Type d'anomalie constatée - <i>Type of anomaly observed</i> :</p>																									
<p><b>PROCEDE CUIVRE - COPPER PROCESS</b></p> <p>Produit utilisé sur un procédé Cuivre - <i>Product used on a Copper process</i>      Oui - Yes      Non - No</p>																									
<p><b>ASPECT SECURITE - SAFETY ASPECT</b></p> <p>L'équipement mentionné ci-dessus a été en contact avec les produits suivants - <i>The above equipment has been in contact with the following substances</i> :</p> <p>(nom et formule chimique) - <i>(name and chemical formula)</i></p>																									
<p><b>Ces produits présentent un risque de nature - These substances present the following risks</b></p>																									
<p><b>Chimique - Chemical</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Toxique - <i>Toxic</i></td> <td style="width: 15%;">Oui - Yes</td> <td style="width: 15%;">Non - No</td> </tr> <tr> <td>Cancérogène - <i>Carcinogenic</i></td> <td>Oui - Yes</td> <td>Non - No</td> </tr> <tr> <td>Combustible - <i>Combustible</i></td> <td>Oui - Yes</td> <td>Non - No</td> </tr> <tr> <td>Corrosive - <i>Corrosive</i></td> <td>Oui - Yes</td> <td>Non - No</td> </tr> <tr> <td>Explosive - <i>Explosive</i></td> <td>Oui - Yes</td> <td>Non - No</td> </tr> <tr> <td><b>Biologique - Biological</b></td> <td>Oui - Yes</td> <td>Non - No</td> </tr> <tr> <td><b>Radioactive - Radioactive</b></td> <td>Oui - Yes</td> <td>Non - No</td> </tr> <tr> <td><b>Autre - Other</b></td> <td></td> <td></td> </tr> </table> <p><small>(Vous reporter éventuellement à la page précédente) - (See preceding page if necessary)</small></p>	Toxique - <i>Toxic</i>	Oui - Yes	Non - No	Cancérogène - <i>Carcinogenic</i>	Oui - Yes	Non - No	Combustible - <i>Combustible</i>	Oui - Yes	Non - No	Corrosive - <i>Corrosive</i>	Oui - Yes	Non - No	Explosive - <i>Explosive</i>	Oui - Yes	Non - No	<b>Biologique - Biological</b>	Oui - Yes	Non - No	<b>Radioactive - Radioactive</b>	Oui - Yes	Non - No	<b>Autre - Other</b>			<p>Explication détaillée - <i>Detailed explanation</i></p> <p>Si «Oui» risque de nature - <i>If «Yes», what type of risk</i></p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
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<b>Autre - Other</b>																									
<p><b>SIGNATURE</b></p> <p><b>Vous avez répondu "Oui" à une des questions précédentes :</b></p> <p>Je confirme que seules les substances précisées ont été en contact avec l'équipement sus-mentionné, et que les procédures de préparation, d'emballage, et de transport ont été respectées.</p> <p><b>You have replied "yes" to one of the above questions:</b></p> <p><i>I confirm that only the substances mentioned have been in contact with the above equipment and that the preparation, packing and transport procedures have been complied with.</i></p>	<p>Je confirme que le matériel sus-mentionné n'a été en contact avec aucune substance dangereuse, et a été vidé de son huile. (Si applicable)</p> <p><i>I confirm that the above equipment has not been in contact with any dangerous substance and has been emptied of oil. (If applicable)</i></p>																								
<p>Réponse "<b>Oui</b>" (fermeture étanche de l'aspiration et du refoulement)</p> <p>Reply "<b>Yes</b>" (seal inlet and outlet ports with blank flanges)</p>	<p>Réponse "<b>Non</b>" (sans risque)</p> <p>Reply "<b>No</b>" (no risk)</p>																								
<p>Nom - <i>Name</i> : .....</p> <p>Fonction - <i>Position</i> : .....</p> <p>Date : .....</p> <p>Signature autorisée - <i>Authorised signature</i> : .....</p>	<p>Nom - <i>Name</i> : .....</p> <p>Fonction - <i>Position</i> : .....</p> <p>Date : .....</p> <p>Signature autorisée - <i>Authorised signature</i> : .....</p>																								
<p>Tampon / <i>Cachet</i></p> <p>Stamp / <i>Seal</i></p>	<p>Tampon / <i>Cachet</i></p> <p>Stamp / <i>Seal</i></p>																								

**Leading. Dependable.  
Customer Friendly.**

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

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

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**Pfeiffer Vacuum Products GmbH**  
Berliner Strasse 43  
35614 Asslar - Germany  
T +49 6441 802-0  
F +49 6441 802-202  
Info@pfeiffer-vacuum.de  
[www.pfeiffer-vacuum.de](http://www.pfeiffer-vacuum.de)

**adixen Vacuum Products**  
98 avenue de Brogny  
74009 Annecy Cedex - France  
T +33 (0) 4 50 65 77 77  
F +33 (0) 4 50 65 77 89  
info@adixen.fr  
[www.adixen.com](http://www.adixen.com)

