

## Instruction for startup/shutdown of mzs-pumps



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# Contents

<b>1</b>	<b>Startup/shutdown of a mzzr-pump</b>	<b>1</b>
1.1	Preparing for operation	1
1.2	Startup of the micro annular gear pump	1
1.3	Flushing procedure after use	1
1.4	Shutdown of the micro annular gear pump	4
1.4.1	Conservation	6
1.4.2	Dismantling of the system	7
1.5	Problem shooting	8
1.6	Return of the micro annular gear pump to the manufacturer	8
<b>2</b>	<b>Safety information for the return of already employed micro annular gear pumps and components</b>	<b>9</b>
2.1	General information	9
2.2	Declaration of liquids in contact with the micro annular gear pump	9
2.3	Shipment	9
<b>3</b>	<b>Declaration of media in contact with the micro annular gear pump and its components</b>	<b>10</b>

# 1 Startup/shutdown of a mzs-pump

## 1.1 Preparing for operation

After the liquid supply system had been completed, please check once again the operating conditions of the micro annular gear pump as according to the following points:

- Are the inlet and outlet tubes correctly connected?
- Is the entire liquid supply system clean - that means free of particles, foreign bodies, pollution or swarf?
- Has a filter been installed on the suction side?
- Has a sufficient amount of the right liquid been supplied?
- The pump does not run the risk of a longer dry operation?
- The entire liquid supply system has been checked for leakage?
- Is it possible to stop the pump by an emergency switch if an unexpected malfunction occurs at the startup?

## 1.2 Startup of the micro annular gear pump

Switch on the voltage supply. The micro annular gear pump can now be put into operation by turning on the potentiometer knob or by sending a nominal external voltage signal.

Start the filling in of the pump at low or middle speed (1000 - 3000 rpm).

### Warning

Avoid dry operation of the pump over a longer time. The pump should be filled in before it is put to operation.

## 1.3 Flushing procedure after use

After each service the micro annular gear pump should be carefully flushed with a non-corrosive, filtered and particle-free flushing liquid (see table 1 and table 2). During flushing procedure the pump should operate at a speed of about 3000 rpm and if possible against a low pressure (that can be obtained by using a restrictor, a capillary or similar). The flushing liquid must be compatible with the delivered liquid and suitable for solving the remaining liquid rests. Depending on the application for example water, or isopropanol may be used. If you have doubts whether a particular liquid is suitable for this function or not, please ask the manufacturer of the liquid or HNP Mikrosysteme.

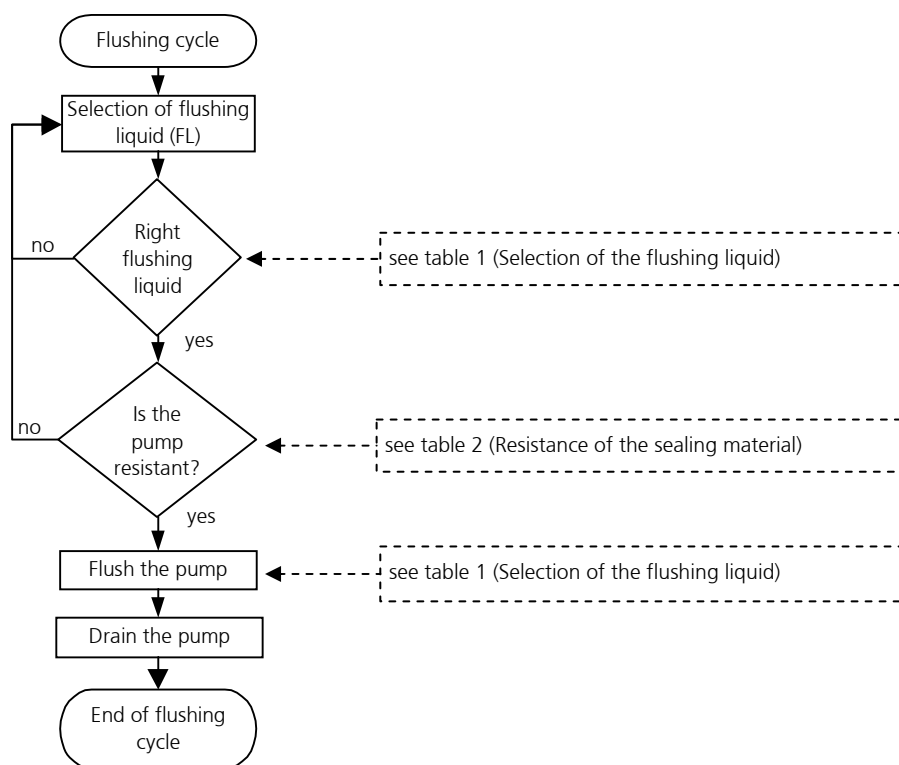


figure 1

Diagram of the flushing procedure

Warning

Liquids that remain in the pump may crystallize, coagulate or lead to corrosion and as a consequence impair the work of the micro annular gear pump.

Warning

Please make sure that the pump components and particularly O-rings and sealing are resistant to the employed flushing liquid. (see table 2).

Warning

The flushing liquid (solvent) and the recommended duration of the flushing procedure depend on the delivered liquid (see table 2). The indicated flushing liquids are simple recommendations and should therefore be checked by the user as to their compatibility and suitability.



Regulations concerning use of substances dangerous to health should be followed!

	Nature of the delivered liquid	Flushing time [min]	Suitable flushing liquid
1	Oils, fats, plastifierrss	15-20	isopropanol, ethanol, acetone, benzine/petroleum ether
2	Solvents (polar + nonpolar)	5-10	isopropanol, ethanol
3	Other organic liquids	10-15	isopropanol , ethanol
4	Refrigerating and cooling agents	15-20	isopropanol, ethanol
5	Neutral water/y solutions	20-25	isopropanol, ethanol
6	Basic solutions	25-30	DI-water (deionized water)
7	Organic acids	30-40	isopropanol, ethanol
8	Weak mineral acids	25-30	DI- water
9	Strong mineral acids	35-45	DI- water
10	Strong oxidizing liquids	35-45	DI- water
11	Paints, varnishes, adhesives	50-60	not specified - for further information please contact HNP Mikrosysteme.

table 1 Selection of the flushing liquid (solvent) and the duration of the flushing procedure depending on the delivered liquid.

**Warning**

Please make sure that the pump components and particularly O-rings and sealing are resistant to the employed flushing liquid (see table 2).

Flushing liquid	Shaft sealing		O-ring material		
	PTFE, graphite-reinforced	UHMWPE	FKM	EPDM	FFKM
acetone	0	0	3	0	0
benzene	0	3	1	3	0
benzyl alcohol	0	-	0	2	0
butanol	0	-	1	0	0
dimethyl sulfoxide (DMSO)	0	0	3	0	0
ethanol	0	0	0	0	0
isopropanol	0	0	0	0	0
methanol	0	0	2	0	0
methylethylketone (MEK)	0	0	3	1	0
styrene	0	-	1	3	1
toluene	0	1	2	3	0
water	0	0	0	0	0
xylene	0	1	2	3	0
benzine/petroleum ether	0	0	0	3	0
oil / fine mechanics oil	0	0	0	3	0

Legend: 0 ... good suitability 1 ... suitability 2 ... conditional suitability 3 ... labile - ... not specified

table 2 Resistance of the sealing materials depending on the flushing liquid (solvent)

## 1.4 Shutdown of the micro annular gear pump

In order to shut down a mzs-pump the following steps should be followed:

- Flush the pump with a filtered and particle-free flushing liquid (solvent) as described in the chapter 1.3.
- After the flushing procedure decrease speed of the pump to 0 rpm
- Fill the pump with a suitable conservation liquid (see chapter 1.4.1)
- Remove the pump from the system (see chapter 1.4.2)

By proceeding as shown in the diagram (see figure 3) you may prepare the pump for a longer standstill.

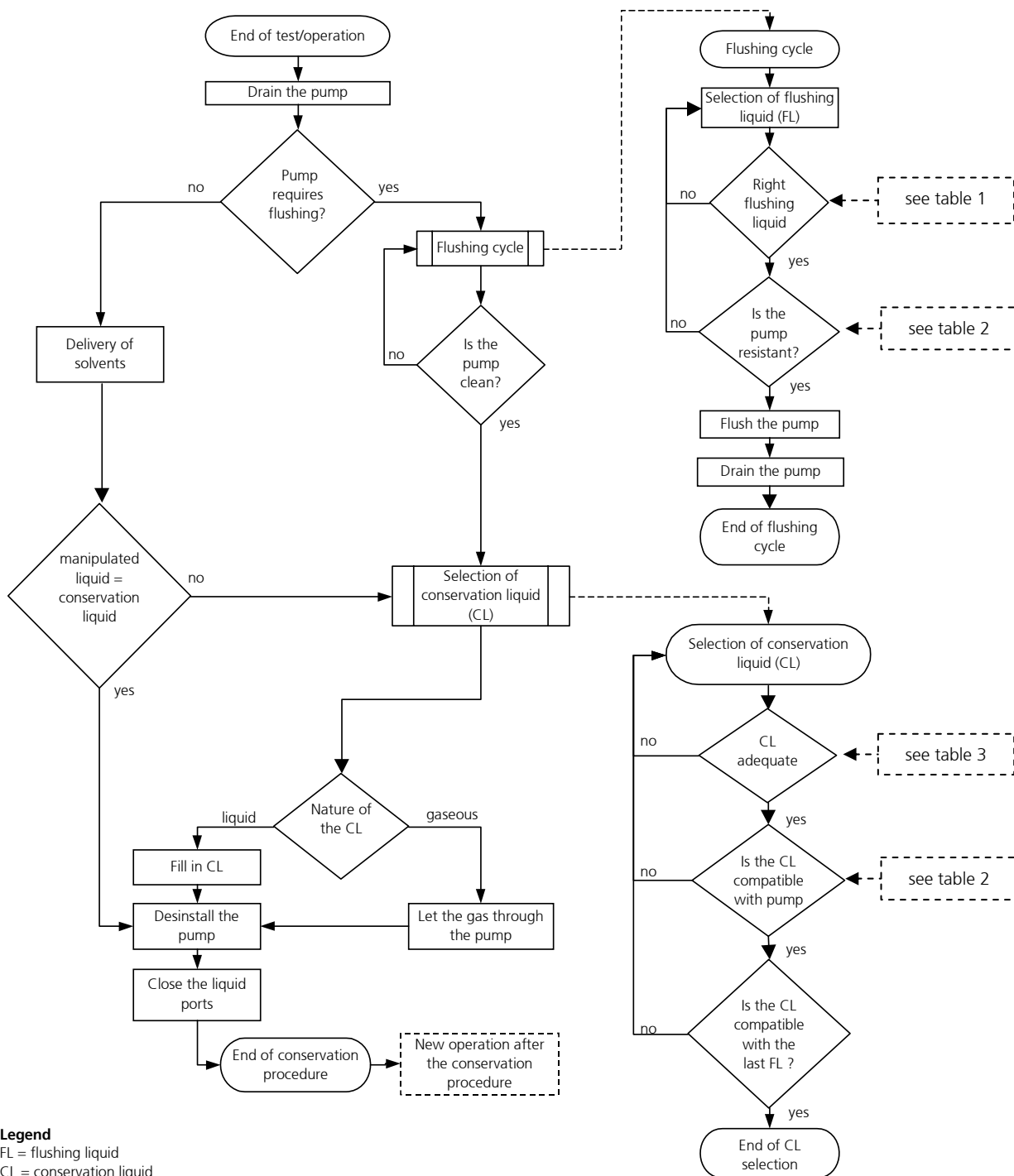


figure 2 Diagram of the shutdown procedure

### 1.4.1 Conservation

If the micro annular gear pump operates at irregular intervals or for other reasons should be put out of operation for a longer period, it should, after service and flushing procedure (see chapter 1.3), be filled in with a suitable conservation liquid.

The conservation liquid may be selected from the table 3 depending on the duration of the standstill and the resistance of the pump to the manipulated liquid. The indicated conservation liquids are simple recommendations and should therefore be checked by the user as to their compatibility and suitability. The figure 3 presents a diagram of conservation agent selection.

*Remark:* This diagram is repeated as a part of the figure 2 (shutdown procedure of the micro annular gear pump).

After the cleansing procedure the pump should be filled with a suitable conservation agent. You will find a choice of possible conservation agents in the table 3.

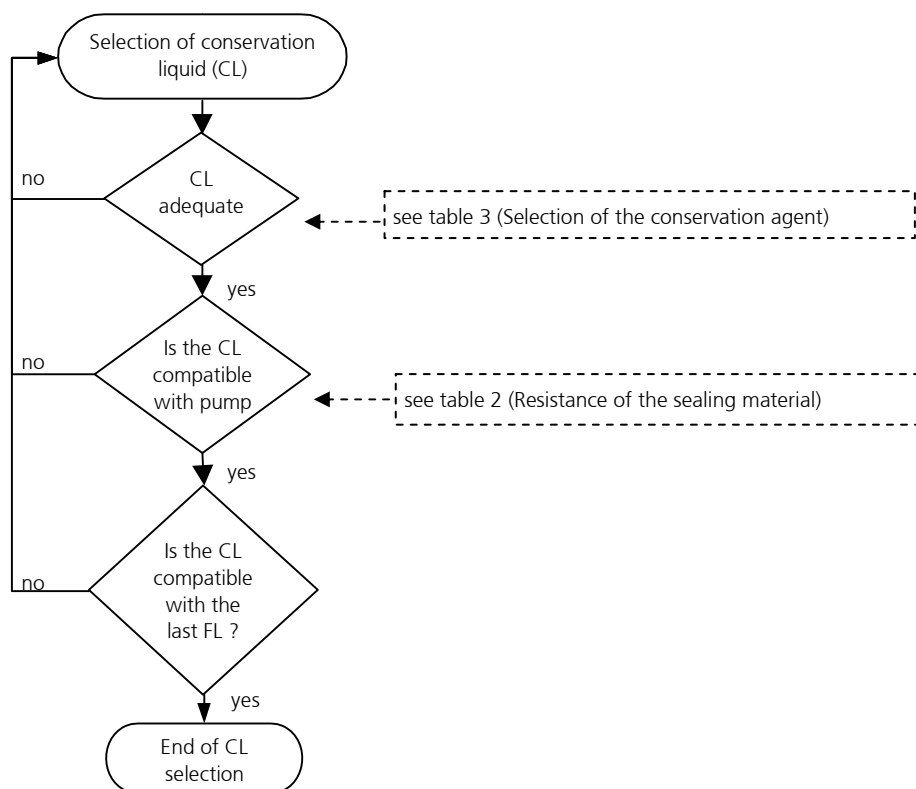


figure 3

Diagram - selection of conservation liquid (CL)



Liquids	Solubility in water	Compatibility with the delivered liquid	Duration of storage	Breakaway torque	Toxicology	Viscosity	Description
isopropanol	+	+	o	o	o	+	solvent for organic compounds, cosmetics, essential oils waxes, and esters, antifreezers, antiseptic agents
acetone	+	+	o	o	o	+	solvent for a number of organic compounds, unlimited solubility in water, dissolves natural and synthetic resins, fats, oils and commonly used plastifiers
ethanol	+	+	o	o	o	+	solvent for organic compounds, fats, oils and resins
DI-water	+	+	-	-	+	+	solvent for many organic and mineral liquids
fine mechanics oil	-	-	+	+	+	+	cleansing and protective action (dissolves fats, tar, rubber or adhesive substances, protects against corrosion).
hydraulic oil	-	-	+	+	+	-	lubricating and preserving properties ( <i>Warning</i> : may resinate or deteriorate with time)
nitrogen	-	+	+	+	o	+	is not a solvent, may leave deposits after drying out
air / compressed air		+	+	+	+	+	is not a solvent, may leave deposits after drying out

Legend: + ... good/suitable o ... satisfactory; - ... bad/inadequate

table 3 Selection of the conservation agent

In order to prevent dust particles and foreign bodies from penetrating into the pump or the conservation agent from leaking out, please secure the liquid input and output openings with the delivered protective plugs or screws.

**Warning**

Water or DI-water should not be used as conservative liquids. They germinate already after a few days and build a biofilm which can later block the pump.

## 1.4.2 Dismantling of the system

- Put the drive out of operation by turning down speed to 0 rpm and by switching off the voltage supply. Make sure that the procedure described in the chapter 1.3 has been completed.
- Now that the pump has been stopped you may remove it from the system.
- Protect the inlet and outlet openings of the pump with adapted protective plugs or screws.

## 1.5 Problem shooting

If the pump stops operating abruptly or has difficulties with starting operation, please undertake the following steps:

Try to liberate the micro annular gear pump:

- by turning the potentiometer knob back and forth or by connecting an analog voltage
- via the control software
- by pressing with a syringe a suitable flushing liquid (see table 1 and table 2) through the micro annular gear pump
- by changing the operating direction of the pump.

If these measures turn out to be ineffective, please contact the service staff of HNP Mikrosysteme and send the pump back to the manufacturer for inspection.

### Warning

*You should under no condition try to disassemble the pump by yourself. This may cause damage to the pump components and consequently annul your warranty claims.*

## 1.6 Return of the micro annular gear pump to the manufacturer

For the return of a micro annular gear pump and components that have already been employed, please follow the instructions:

- drain any remaining rests of the delivered liquid from the pump
- flush the pump with an adapted solvent
- remove the filter elements from integrated or loosely delivered filters
- protect all openings against dust with the delivered protective plugs or screws
- return the pump in its original packing

The service personnel which carries out the repair should be informed about the condition of the already used micro annular gear pump. This is done by means of the "Declaration of media in contact with the micro annular gear pump and its components" (see chapter 3). This form may also be downloaded from the web site [www.hnp-mikrosysteme.de/download](http://www.hnp-mikrosysteme.de/download).



The "Declaration of liquids in contact with the micro annular gear pump and its components" must imperatively be filled in. The nature of liquid which entered into contact with the micro annular gear pump and its components must be specified.

In case of non-compliance, the sender will be liable for any resulting injure to persons or any object damage.

## 2 Safety information for the return of already employed micro annular gear pumps and components

### 2.1 General information

The operator carries the responsibility for health and safety of his/her employees. The responsibility extends also to employees not belonging to the company that have a direct contact with the micro annular gear pump and its components during repair or maintenance works. The nature of media (liquids) coming into contact with the micro annular gear pump and its components must be specified in the corresponding declaration form.

### 2.2 Declaration of liquids in contact with the micro annular gear pump

The staff performing the repair or maintenance works must be informed about the condition of the micro annular gear pump before starting any work on the device. The »Declaration of media in contact with the micro annular gear pump« should be filled in for this purpose.

The declaration should be sent directly to the supplier or to the company designated by the supplier. A second copy of the declaration must be attached to the shipment documents.

### 2.3 Shipment

The following instructions should be observed for the shipment of the micro annular gear pump.

- drain any remaining liquid from the pump
- flush the pump with an adapted flushing liquid
- remove the filter elements from the integrated or loosely delivered filters
- all the openings should be air-tight plugged
- return the pump in the original packing

### 2.4 Return address

Please send the micro annular gear pumps and components to this address.

HNP Mikrosysteme GmbH  
Service  
Brunnenstraße 38  
D-19053 Schwerin  
Germany

### 3 Declaration of media in contact with the micro annular gear pump and its components

#### Type of the device

Pump type/serial number/article: .....

Operating hours/running time: .....

Bill of delivery-number and delivery date: .....

Reason of the return: .....

.....

.....

#### Contact with media (liquids)

The micro annular gear pump has entered into contact with: .....

.....

and has been cleansed with: .....

.....

The safety specification of the liquid has been attached (Yes / No): .....

or is available on the following web site: www.....

If a pump which had contact with dangerous substances could not be properly cleansed prior to the shipment, we reserve the right to entrust a specialized company with the cleansing of the device. The return of the pump in the original packing is purposive. This measure is necessary in order to protect the employees and the delivery staff.

Nature of the delivered liquid:

- explosive
- toxic (toxic byproducts)
- carcinogenic
- caustic

- oxidizing
- radioactive
- microbiological
- corrosive

- susceptible to moisture
- pH-value: .....
- other: .....

#### Declaration

I/we certify herewith that the stated information is exhaustive and correct. The micro annular gear pump and corresponding liquid supply components are shipped in conformity with the applicable regulations.

Company/Institute: .....

Street: ..... Zip code, location: .....

Telephone: ..... Fax: .....

Contact person (in printed characters): .....

Date: ..... Company stamp: .....

Obligatory signature: .....