

Operating Instructions
Read and observe these Operating Instructions!

LABOXACT[®]

Vacuum systems for the Laboratory

SEM 810
SEM 820

SEM 840
SEM 842



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1. About this document

1.1. Using the Operating Instructions

The Operating Instructions are part of the pump/system.

- ➔ Carefully study the Operating Instructions before using a pump/system.
- ➔ Always keep the Operating Instructions handy in the work area.
- ➔ Pass on the Operating Instructions to the next owner.

Project systems and pumps

Customer-specific project systems or pumps (systems and pump models which begin with “PJ” or “PM”) may differ from the Operating Instructions.

- ➔ For project systems and pumps, also observe the agreed upon specifications.

1.2. Symbols and Markings

Warning



WARNING

A danger warning is located here.

Possible consequences of a failure to observe the warning are specified here. The signal word, e.g.

Warning, indicates the danger level.

- ➔ Measures for avoiding the danger and its consequences are specified here.

Danger levels

Signal word	Meaning	Consequences if not observed
DANGER	warns of immediate danger	Death or serious injuries and/or serious damage are the consequence.
WARNING	warns of possible danger	Death or serious injuries and/or serious damage are possible.
CAUTION	warns of a possibly dangerous situation	Minor injuries or damage are possible.

Tab. 1

Other information and symbols

- ➔ An activity to be carried out (a step) is specified here.
- 1. The first step of an activity to be carried out is specified here. Additional, consecutively numbered steps follow.

i This symbol refers to important information.

2. Use

2.1. Proper Use

The pump/system is exclusively intended for transferring gases and vapors.

Owner's responsibility

Operating parameters and conditions	Only install and operate the pump/system under the operating parameters and conditions described in chapter 4, Technical data.
	Make sure that the installation location is dry and the pump/system is protected against rain, splash, hose and drip water.
Requirements for transferred medium	Before using a medium, check the compatibility of the materials of the pump head, diaphragm and valves with the medium.
	Before using a medium, check whether the medium can be transferred danger-free in the specific application case.
	Only transfer gases which remain stable under the pressures and temperatures occurring in the pump.
High performance condenser	The high performance condenser must be installed on the outlet side of the pump; if it is installed on the inlet side there is a danger of implosion.
	Observe the correct usage of the gas- and cooling liquid-connections on the high performance condenser. Inlet and outlet connections for the gas are not interchangeable.
Accessories	Laboratory equipment or additional components connected to a pump/system have to be suitable for use with the pneumatic capabilities of the pump (see chapter 4).

2.2. Improper Use

The pump/system may not be operated in an explosive atmosphere.

The pump/system is not suitable for transferring dusts.

The pump/system is not suitable for transferring liquids.

The vacuum system must not be used if the entry of air or gas into the vacuum system during venting (safety vent valve) could result in the creation of reactive, explosive or otherwise hazardous mixtures (e.g. with the medium).

The pump/the system must not be used to create vacuum and overpressure simultaneously.

An overpressure must not be applied to the suction side of the pump/ the system.

3. Safety

i Note the safety precautions in chapters 6. *Installation and connection*, and 7. *Operation*.

The pump/system is built according to the generally recognized rules of technology and in accordance with the occupational safety and accident prevention regulations. Nevertheless, dangers can result during their use which lead to injuries to the user or others, or to damage to the pump/system or other property.

Only use the pump/system when it is in a good technical and proper working order, in accordance with its intended use, observing the safety advice within the operating instructions, at all times.

Personnel

Make sure that only trained and instructed personnel or specially trained personnel work on the pump/system. This especially applies to assembly, connection and servicing work.

Make sure that the personnel has read and understood the operating instructions, and in particular the "Safety" chapter.

Working in a safety-conscious manner

Observe the accident prevention and safety regulations when performing any work on the pump/system and during operation.

Do not expose any part of your body to the vacuum.

Open housing parts with notice sticker (see fig. 1) only after separating mains plug from power source.

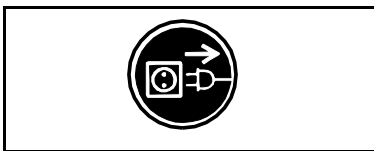


Fig. 1: Notice sticker

Handling dangerous media

When transferring dangerous media, observe the safety regulations when handling these media.

Handling flammable media

Be aware that the pump/the system is not designed to be explosion-proof.

Make sure the temperature of the medium is always sufficiently below the ignition temperature of the medium, to avoid ignition or explosion. This also applies for unusual operational situations.

Note that the temperature of the medium increases when the pump compresses the medium.

Hence, make sure the temperature of the medium is sufficiently below the ignition temperature of the medium, even when it is compressed to the maximum permissible operating pressure of the pump. The maximum permissible operating pressure of the pump is stated in the technical specifications (see chapter 4).

If necessary, consider any external sources of energy, such as radiation, that may add heat to the medium.

In case of doubt, consult the KNF customer service.

Environmental protection

Store all replacement parts in a protected manner and dispose of them properly in accordance with the applicable environmental protection regulations. Observe the respective national and international regulations. This especially applies to parts contaminated with toxic substances.

Standards	<p>The LABOXACT®- vacuum systems conform to the Directive 2011/65/EU (RoHS2).</p> <p>The LABOXACT®- vacuum systems conform to the safety regulations of the Directive 2014/30/EU concerning Electromagnetic Compatibility and the Directive 2006/42/EC concerning Machinery. The requirements of the following harmonised standards are fulfilled:</p> <ul style="list-style-type: none">▪ DIN EN 61010-1▪ DIN EN 61326-1 - class A▪ DIN EN 50581
Customer service and repairs	<p>The pumps correspond to IEC 664:</p> <ul style="list-style-type: none">▪ the overvoltage category II▪ the pollution degree 2 <p>Only have repairs to the pump/system carried out by the KNF Customer Service responsible.</p> <p>Only authorized personnel should open those parts of the housing that contain live electrical parts.</p> <p>Use only genuine parts from KNF for servicing work.</p>

4. Technical Data

i All pumps are secured against overheating with thermal switches and are equipped with a mains fuse.

<i>Pump materials (for all pump types)</i>	
Pump head	PTFE
Diaphragm	PTFE coated
Valve	FFPM

Tab. 2

i Refer to the type plate for the pump's electrical configuration.

SEM 810

<i>Pneumatic performance</i>			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 8		
Delivery rate at atm. pressure [l/min]*	max. 10		
<i>Pneumatic connection</i>			
Hose connection [mm]	ID 10		
<i>Ambient and media temperature</i>			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
<i>Other parameters</i>			
Weight [kg]	12.1		
Dimensions: L x H x W [mm]	380 x 481 x 292		
Maximum permissible ambient relative humidity	80 % for temperatures up to 31 °C, decreasing linearly to 50 % at 40 °C		
Maximum altitude of site [m above sea level]	2000		
Maximum permissible operating pressure at the inert gas connection of safety vent valve [bar g]	0.1		
<i>Operating parameters of coolant for high performance condensers</i>			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant for tube [mm]	ID 8		
<i>Electrical Data</i>			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consumption [A]	1.4	1.3	0.6
Power consumption pump [W]	100	110	90
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse pump (2x) T [A]	2.5	2.5	1.25
Protection class motor	IP44		

Tab. 3

*Liters in standard state (1,013 mbar)

SEM 820

<i>Pneumatic performance</i>			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 8		
Delivery rate at atm. pressure [l/min]*	max. 20		
<i>Pneumatic connection</i>			
Hose connection [mm]	ID 10		
<i>Ambient and media temperature</i>			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
<i>Other parameters</i>			
Weight [kg]	14.5		
Dimensions: L x H x W [mm]	420 x 481 x 306		
Maximum permissible ambient relative humidity	80 % for temperatures up to 31 °C, decreasing linearly to 50 % at 40 °C		
Maximum altitude of site [m above sea level]	2000		
Maximum permissible operating pressure at the inert gas connection of safety vent valve [bar g]	0.1		
<i>Operating parameters of coolant for high performance condensers</i>			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant for tube [mm]	ID 8		
<i>Electrical Data</i>			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consumption [A]	1.8	1.2	0.7
Power consumption pump [W]	130	130	120
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse pump (2x) T [A]	3.15	2.5	1.6
Protection class motor	IP44		

Tab. 4

* Liters in standard state (1,013 mbar)

SEM 840

<i>Pneumatic performance</i>			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 8		
Delivery rate at atm. pressure [l/min]*	max. 34		
<i>Pneumatic connection</i>			
Hose connection [mm]	ID 10		
<i>Ambient and media temperature</i>			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
<i>Other parameters</i>			
Weight [kg]	17.8		
Dimensions: L x H x W [mm]	440 x 481 x 318		
Maximum permissible ambient relative humidity	80 % for temperatures up to 31 °C, decreasing linearly to 50 % at 40 °C		
Maximum altitude of site [m above sea level]	2000		
Maximum permissible operating pressure at the inert gas connection of safety vent valve [bar g]	0.1		
<i>Operating parameters of coolant for high performance condensers</i>			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant for tube [mm]	ID 8		
<i>Electrical Data</i>			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consumption [A]	4.4	3.2	1.5
Power consumption pump [W]	220	250	245
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse pump (2x) T [A]	6.3	6.3	3.15
Protection class motor	IP44		

Tab. 5

* Liters in standard state (1,013 mbar)

SEM 842

<i>Pneumatic performance</i>			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 8		
Delivery rate at atm. pressure [l/min]*	max. 34		
<i>Pneumatic connection</i>			
Hose connection [mm]	ID 10		
<i>Ambient and media temperature</i>			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
<i>Other parameters</i>			
Weight [kg]	18.6		
Dimensions: L x H x W [mm]	440 x 481 x 319		
Maximum permissible ambient relative humidity	80 % for temperatures up to 31 °C, decreasing linearly to 50 % at 40 °C		
Maximum altitude of site [m above sea level]	2000		
Maximum permissible operating pressure at the inert gas connection of safety vent valve [bar g]	0.1		
<i>Operating parameters of coolant for high performance condensers</i>			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant for tube [mm]	ID 8		
<i>Electrical Data</i>			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consumption [A]	4.4	3.2	1.5
Power consumption pump [W]	260	290	245
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse pump (2x) T [A]	6.3	6.3	3.15
Protection class motor	IP44		

Tab. 6

*Liters in standard state (1,013 mbar)

5. Design and Function

5.1. Pump

5.1.1. Design

- 1 Connection piece
- 2 Pneumatic connection
- 3 Pump head
- 4 Outlet (pressure side)
- 5 Inlet (suction side)
- 6 Power switch

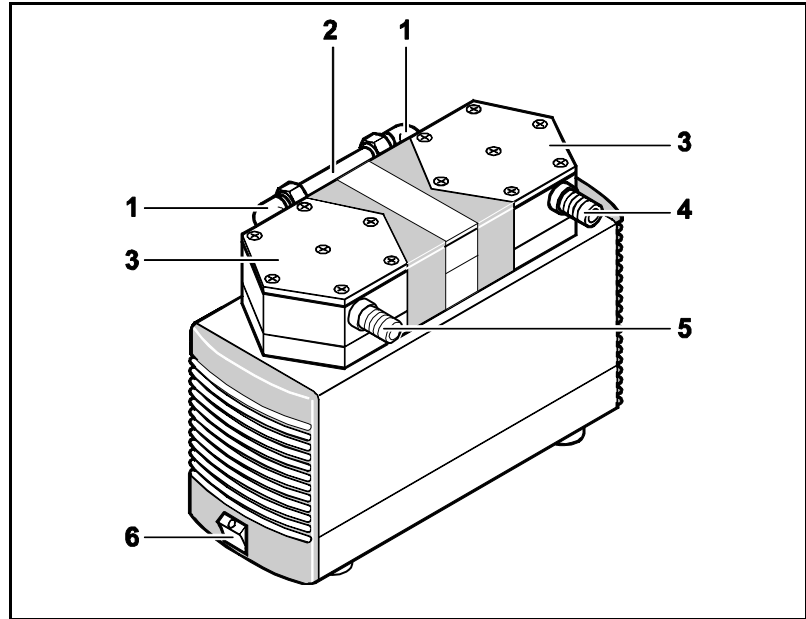


Fig. 2: Diaphragm pump (shown: pump N 840.3 FT.18)

5.1.2. Function Diaphragm pump

- 1 Outlet valve
- 2 Inlet valve
- 3 Transfer chamber
- 4 Diaphragm
- 5 Eccentric
- 6 Connecting rod
- 7 Pump drive

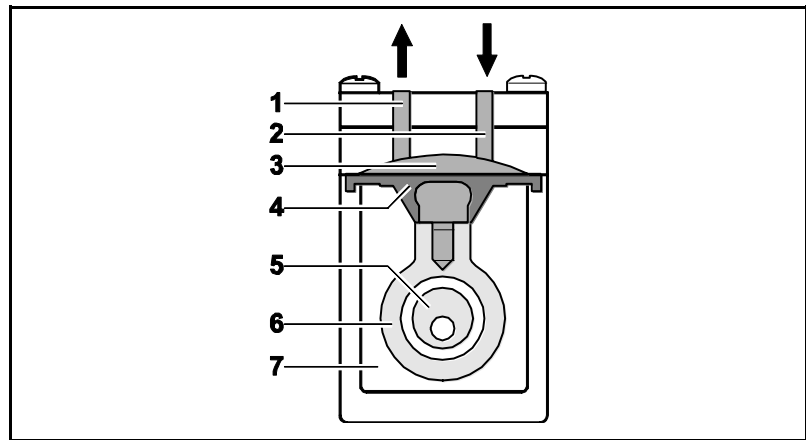


Fig. 3: Pump head

Diaphragm pumps transfer, compress (depending on pump version) and evacuate gases and vapors.

The elastic diaphragm (4) is moved up and down by the eccentric (5) and the connecting rod (6). In the downward stroke it aspirates the gas to be transferred via the inlet valve (2). In the upward stroke, the diaphragm presses the medium out of the pump head via the outlet valve (1). The transfer chamber (3) is hermetically separated from the pump drive (7) by the diaphragm.

5.2. Vacuum System

5.2.1. Design

- 1 Vacuum pump
- 2 Base plate
- 3 Separator
- 4 High performance condenser
- 5 Operating unit
- 6 Fine adjustment valve
- 7 Digital vacuum meter
- 8 Safety vent valve
- 9 Inert gas connection
- 10 On/Off switch of the system at control unit
- 11 On/Off switch of the pump at control unit
- 12 On/Off switch of the pump at pump
- A Condenser gas outlet
- B Gas inlet

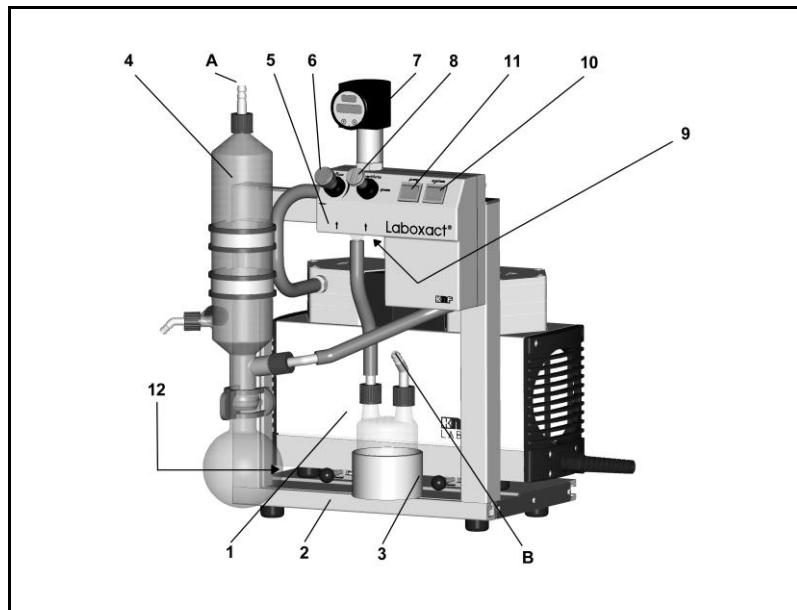


Fig. 4: Description LABOXACT Systems

The LABOXACT vacuum system consists of:

- LABOPORT vacuum pump N 810.3 FT.18, N 820.3 FT.18, N 840.3 FT.18 or N 842.3 FT.18;
- high performance condenser;
- separator;
- digital vacuum meter;
- fine adjustment valve;
- safety vent valve;
- on/off switch of the system;
- on/off switch of the pump.

A base plate with support rods supports all system parts. The fine adjustment valve, safety vent valve, system on/off switch and pump on/off switch are clearly positioned together within one operating unit.

The Separator (suction side)

The separator enables collection of particular matter and droplets. This protects the pump from contamination and ensures maximum performance of the pump. The separator is made of a specially treated glass and features implosion protection.

The High Performance Condenser

The high performance condenser enables condensable components in the vapor to be separated out and hereby removed from the atmosphere and at the same time protecting the environment. The condensate is collected in a glass flask. The flask is attached to the condenser flange with a ball-and-socket joint. The condensa-

tion temperature is maintained by running cold water or recirculated coolant through the condenser.

The Fine Adjustment Valve

The fine adjustment valve allows the vacuum to be regulated precisely by turning the valve knob.

The Digital Vacuum Meter

The line-powered digital vacuum meter displays the current pressure in absolute mbars or in torr (depending on current setting).

The Safety Vent Valve

A short press on the head of the safety vent valve produces a light increase of pressure in the system, a longer press aerates to atmospheric pressure. An inert gas connection is attached to the safety vent valve.

5.2.2. Function

The LABOXACT vacuum system facilitates a completely smooth evaporation in the rotary evaporator (patented system). This method helps to minimize solvent loss and the distillation can be carried out in a controlled fashion.

At the beginning of evaporation the fine adjustment valve will be opened until the boiling point is reached. Then the fine adjustment valve can be closed and the pump switched off. In order to counteract possible leakage from the rotary evaporator, the fine adjustment valve can be opened slightly, if the pump is switched on. By so doing the pump operates close to its ultimate vacuum, so that only very small flow rates exist. This removes both the danger of the boiling pressure in the flask of the rotary evaporator going too low as a result of high current speed as well as the threat of solvents being carried away.

By using the safety vent valve, the pressure in the flask of the rotary evaporator can be slightly or greatly increased at any time. This allows the operator to make adjustments to the process at any time.

6. Installation and connection

Only install the pump/system under the operating parameters and conditions described in chapter 4, Technical data.

Observe the safety precautions (see chapter 3).

6.1. Installation

- Before installation, store the pump/the system at the installation location to bring it up to room temperature.
- Dimensions → See chapter 4, Technical data, for the dimensions of system.
- Cooling air supply → Install the pump/system so that the motor fan can intake sufficient cooling air.
- Installation location → Make sure that the installation location is dry and the pump/system is protected against rain, splash, hose and drip water.
- Choose a safe location (flat surface) for the pump/system.
- Protect the pump/system from dust.
- Protect the pump/system from vibration and jolt.

6.2. Connection

- Connected components → Only connect components to the pump/the system which are designed for the pneumatic data of the pump (see chapter 4).
- Pump exhaust → If the pump is used as a vacuum pump, safely discharge the pump exhaust at the pump's pneumatic outlet.
- Tubing The system is supplied with complete tubing (see fig. 4, page 14).

Pneumatic connection of vacuum system



DANGER

Improper laying of hoses will result in damage to the pump

- Correctly assign gas and coolant hose connections.
- Do not reverse the gas connections' inlets and outlets.

1. Connect rotary evaporator to the free connection of the separator (fig 4/B, page 14).



WARNING

Danger of the high performance condenser bursting

- Make sure that the high performance condenser's upper gas outlet is not blocked.

2. Connect the condenser gas outlet (fig. 4/A, page 14) to an exhaust.

Coolant connection of high performance condenser

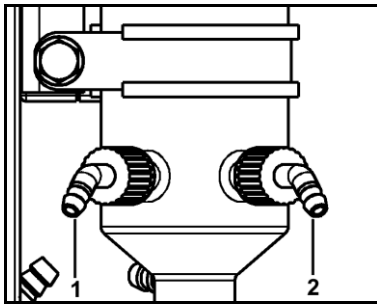


Fig. 5: Coolant supply of high performance condenser

- 1 Coolant inlet
2 Coolant outlet

Electrical connection of the pump

Electrical connection of the system

→ The coolant supply can either come direct or through the cooling system of the rotary evaporator.

i The condenser-connectors for the coolant require connection tubing with an inside diameter of 8 mm.
Coolant inlet and outlet see fig. 5.

→ Connect coolant connection to the high performance condenser.

When using a coolant valve:



WARNING

Danger of the high performance condenser bursting

→ Make sure that the coolant valve is mounted between the coolant supply and the coolant inlet port of high performance condenser.

→ Insert the plug of the pump into the socket of the operating unit (pos. 5 in fig. 4, page 14).

→ Connect the operating unit (pos. 5 in fig. 4, page 14) to a properly installed safety socket.

7. Operation

7.1. Preparing for Start-up

Before switching on the pump/system, observe the following points:

	Operational requirements
Pump	<ul style="list-style-type: none"> ▪ All hoses attached properly
Pump/ System	<ul style="list-style-type: none"> ▪ Fan openings not blocked ▪ Specifications of the power supply correspond with the data on the pump's/the vacuum system's type plate ▪ The pump outlet is not closed or constricted ▪ Vapor outlet on the top of the high performance condenser is not blocked ▪ The media are compatible with each other (when running two different processes simultaneously) ▪ No reactive, explosive or otherwise hazardous mixtures may be produced when ventilating the vacuum system through the air inlet (see fig. 4/9, page 14) (if necessary, use an inert gas)
System	<ul style="list-style-type: none"> ▪ Clamp connections are tight ▪ All cables attached properly

Tab. 7

7.2. Start-up

- ➔ Only operate the pump/the system under the operating parameters and conditions described in chapter 4, Technical data.
- ➔ Make sure the pump/the system is used properly (see chapter 2.1).
- ➔ Make sure the pump/the system is not used improperly (see chapter 2.2).
- ➔ Observe the safety precautions (see chapter 3).

**WARNING**

Hazard of the pump head bursting due to excessive pressure increase

- Do not exceed max. permissible operating pressure (see chapter 4).
- Monitor pressure during operation.
- If the pressure exceeds the maximum permissible operating pressure, immediately shut down pump and eliminate fault (see chapter 9).
- Only throttle or regulate the air or gas quantity in the suction line to prevent the maximum permissible operating pressure from being exceeded.
- If the air or gas quantity in the pressure line is throttled or regulated, make sure that the maximum permissible operating pressure of the pump is not exceeded.

Pump standstill

- With the pump at a standstill, open pressure and suction lines to normal atmospheric pressure:
 - Open fine adjustment valve.
 - Press the knob of safety vent valve.

**WARNING**

Automatic starting can cause personal injury and pump damage

When the operation of the pump is interrupted by the thermal switch, the pump will restart automatically after cooling down.

- After triggering of the thermal protection or in the event of power failure, remove the pump's mains plug from the socket so that the pump cannot start uncontrollably.
- Attempt work on the pump or system only if the pump/system is separated from mains power.

Venting

**WARNING**

Personal injury caused by poisoning or explosion and damage to the pump.

- Make sure that no reactive or explosive mixtures will be produced when ventilating the vacuum system through the air inlet.
- Make sure that the media are compatible with each other (when running two different processes simultaneously).

High performance condenser



CAUTION

Danger of high performance condenser bursting

→ Make sure that the high performance condenser's upper gas outlet is not blocked.

7.3. Operating the System

i The numbered positions within the following instructions refer to fig. 4, page 14.

Operate the system

1. Prepare the rotary evaporator for distillation.
2. Prepare system for operation
 - a) Completely close fine adjustment valve (6) by turning knob in a clockwise direction.
 - b) Turn on digital vacuum meter (7) by pressing the ON button.
 - c) Turn on pump using the on/off switch (12) and switch (11) at operating unit in case this has not yet happened.

i The pump may not start up against pressure during switch-on. If a pump starts against pressure, it may block. This activates the thermal switch, and the pump switches off.

→ Make sure that no pressure is present in the lines during switch-on.

- d) Turn on system using the on/off switch (10).
3. With the rotary evaporator submerge the glass flask containing the liquid to be evaporated into the bath.
4. With the fine adjustment valve (6) slightly reduce the pressure in the system by turning the valve knob in an anti-clockwise direction.
If the pressure falls too rapidly, i.e. the vacuum is too strong: aerate the system a little by gently pressing the head of the safety vent valve (8).

5. Once the distillation starts in the glass flask i.e. the required vacuum has been reached, the pump can be switched off using the on/off switch (11) of the operating unit. The distillation process is now running independently. The pump only has to be restarted using the on/off switch of the system (11) if the pressure in the system increases because of leakage from the rotary evaporator.

6. The evaporation rate can be increased as follows:

Change process parameter

- Increase the rotation speed of the rotary evaporator
- Increase the bath temperature of the rotary evaporator

- Use smaller flask.
7. Once the process is over:

Aerate system to atmospheric pressure:

 - a) Completely open fine adjustment valve (6) by turning the valve knob in an anti-clockwise direction.
 - b) Aerate system by pressing the knob of the safety vent valve (8).

7.4. Ending system operation

1. Clean pump:
 - a) Ensure that fine adjustment valve (fig. 4/6) is completely open (by turning the valve knob in an anti-clockwise direction).
 - b) Aerate system for about 20 seconds by pressing the knob of the safety vent valve (8).
 - c) Close the fine adjustment valve (6).

Through this procedure possible remains of condensate can be removed this ensures that the pump will work well when next used.
2. Switch off system using the on/off switch (10).
3. Remove mains plug of the operating unit of the system (5).

7.5. Operate digital vacuum meter

Switching on

Press and hold on ON button.

Switching off

Press and hold on OFF button.

Pressure indicator: Change units from mbar/hPa to Torr

1. Press ON and OFF buttons simultaneously.

"PAon" or "PAof" display appears.
2. Press ON and OFF buttons once more simultaneously.
3. Set "0001" by briefly pressing the ON button (down) or OFF button (up).
4. Press ON and OFF buttons once more simultaneously.

"LoA2" display appears.
5. Press ON and OFF buttons once more simultaneously.

"Torr" display mode has been activated.

"Torr" LED illuminates.

Pressure indicator: Change units from Torr to mbar/hPa

1. Press ON and OFF buttons simultaneously.

"PAon" or "PAof" display appears.
2. Press ON and OFF buttons once more simultaneously.

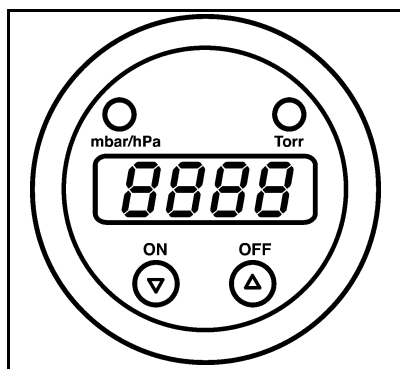


Fig. 6: Digital Vacuum Meter

3. Set "0002" by briefly pressing the ON button (down) or OFF button (up).
4. Press ON and OFF buttons once more simultaneously.
"LoA1" display appears.
5. Press ON and OFF buttons once more simultaneously.
"mbar/hPa" display mode has been activated.
"mbar/hPa" LED illuminates.

8. Servicing

8.1. Servicing Schedule

Component	Servicing interval
Pump/system	Regular inspection for external damage or leaks
Diaphragm and valve plates/sealings	Replace at the latest, when pump output decreases

Tab. 8

8.2. Cleaning

i When cleaning, make sure that no liquids enter the inside of the housing.

8.2.1. Flushing Pump

→ Before switching off the pump, flush it with air (if necessary for safety reasons: with an inert gas) for about five minutes under atmospheric conditions (ambient pressure).

8.2.2. Cleaning Pump

→ Only clean pump with a damp cloth and non-flammable cleaning agents.

8.2.3. Emptying and Cleaning the Separator

1. Unscrew the connecting nozzles.
2. Remove separator container from the holder and dispose of contents according to applicable regulations in your area. Then rinse out the separator container.
3. Replace separator into the holder.
4. Screw the connecting nozzles back on.

8.2.4. Emptying and Cleaning the Condenser

1. Carefully remove the spring clamp while supporting the flask.
2. Empty and clean the flask – observing safety precautions.
3. Re-connect the flask to the condenser and replace the spring clamp.

8.3. Changing Diaphragm and Valve Plates/Sealings

- Conditions
- Pump is switched off and mains plug is removed from the socket
 - Pump is clean and free of hazardous materials
 - Tubes removed from pump's pneumatic inlet and outlet
 - Pump is removed from baseplate

Tools and material

Qty	Material
1	Phillips-head screwdriver No. 2
1	Service Set (see Chapter 10)
1	Felt-tip pen

Tab. 9

- Information on procedure
- ➔ Always replace diaphragm and valve plates/sealings together to maintain the pump performance.

With multi-head pumps, parts of the individual pump heads can be confused.

- ➔ Replace the diaphragm and valve plates/sealings of the individual pump heads consecutively.



WARNING

Health hazard due to dangerous substances in the pump!

Depending on the substance transferred, caustic burns or poisoning are possible.

- ➔ Wear protective clothing if necessary, e.g. protective gloves.
- ➔ Flush pump before replacing the diaphragm and valve plates/sealings (see chapter 8.2.1).

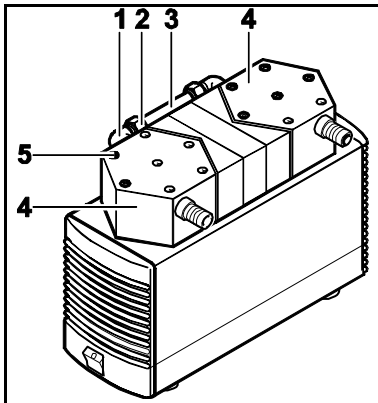


Fig. 7: Removing pump head

Removing pump head

- i** Pump N 842.3 FT.18 (vacuum system SEM 842) has a round shape of head, not a hexagonal.
1. On the pneumatic head connection (3), loosen the union nuts (2) by hand. Then slightly loosen the angle-fitting (1) in the pump head (4) by turning it anticlockwise, so that the connecting tube can be pulled out.
 2. On both pump heads mark the position of top plate (fig. 10/5), head plate (fig. 10/6), intermediate plate (fig. 11/8) and adapter relatively to each other by a drawing line with a felt-tip pen. This helps to avoid incorrect assembly later.
- i** At pump N 842.3 FT.18 (vacuum system SEM 842), twelve (instead of six) screws must be loosened in the next work step.
3. Loosen the outer screws (5) on the pump head/pump heads.
 4. Carefully remove pump heads.

Change diaphragm

- i** Replace the diaphragms of pump heads consecutively in order to ensure that the same number of diaphragm spacers is used as before.
1. Push down one diaphragm until other diaphragm is pushed upwards to its highest position.
 2. Carefully unscrew the upper diaphragm (1) anti-clockwise using both hands.
 3. Replace spacer thick (2) and spacers thin (3) onto the screw thread of the new diaphragm (same number and order).
 4. Screw in the new diaphragm and tighten it by hand.
 5. Carry out steps 1 to 4 for the second pump head.

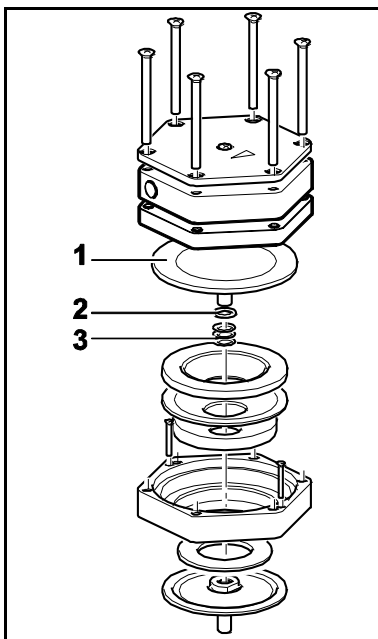


Fig. 8: Changing diaphragm

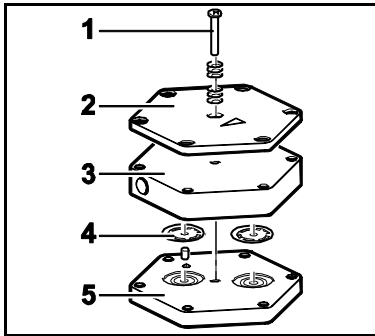


Fig. 9: Changing valve plates/sealings

Change valve plates/sealings

- i** Replacing the valve plates/sealings of both pump heads consecutively.
 - i** At pump N 842.3 FT.18 (vacuum system SEM 842), three (instead of one) screws must be loosened in the first work step.
1. At one pump head: Loosen screw(s) (1) in the center of the top plate (2).
 2. Remove top plate (2) and head plate (3) from intermediate plate (5).
Valve plates/sealings (4) are visible.
 3. Remove old valve plate/sealings (4).
 4. Clean intermediate plate (5) carefully (if there should be deposits in the recesses in the intermediate plate).
 5. Insert new valve plates/sealings (4) in the recesses in the intermediate plate (5).
 6. Carry out steps 1 to 5 for the second pump head.
 7. Dispose of the old diaphragm and valve plates/sealings properly.

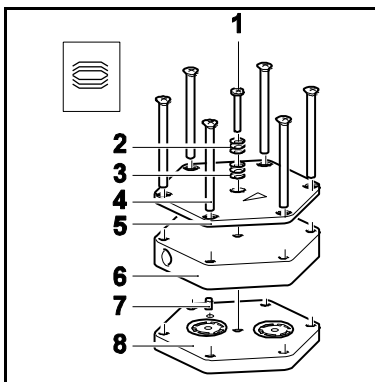


Fig. 10: Refitting pump head

Refitting pump head

1. At one pump head: Apply pressure all around the edge of the diaphragm.
2. Place the intermediate plate (8) with valve plates/sealings on the adapter in accordance with the felt-tip pen marking.
3. Place the head plate (6) on the intermediate plate (8) in the position indicated by the guide pin (7).
4. Place the top plate (5) on the head plate (6) in accordance with the felt-tip pen marking.
5. Gently tighten screws (4) in diagonal order.
- i** At vacuum system SEM 842 (pump N 842.3 FT.18), three (instead of one) screws must be tightened in the next work step.
6. Insert screw(s) (1) with disk springs (2, 3) in the center of the top plate (5). In doing so, make sure that the disk springs are arranged properly (see fig. 10).
7. Screw in the screw/screws (1) in the centre of the pump top plate (5) until it is flush with the top plate (they are flush with the top plate); then screw one final half turn to tighten.
8. Carry out steps 1 to 7 for the second pump head.
9. Refit the pneumatic head connection: Place tube onto the connecting part of the angle fitting, turn angle fitting to a straight position and tighten the union nut.

Final steps

1. Remount the pump to the baseplate.
2. Reconnect system tubing.
3. Insert the pumps power mains plug into the socket of the operating unit of system (**5** in fig. 4, page 14).
4. Reconnect system to the electricity.

If you have any question about servicing call your KNF technical adviser (see last page for contact telephone number).

9. Troubleshooting



Extreme danger from electrical shock!

→ Disconnect the pump power supply before working on the pump.

DANGER

→ Make sure the pump is de-energized and secure.

→ Check the pump (see Tab. 10 to 14).

Flow rate, pressure or vacuum too low	
The system/the pump does not achieve the output specified in the Technical data or the data sheet.	
Cause	Fault remedy
Condensate has collected in pump head.	<ul style="list-style-type: none"> → Detach the condensate source from the pump. → Flush pump (see chapter 8.2.1).
There is gauge pressure on pressure side and at the same time vacuum or a pressure above atmospheric pressure on suction side.	<ul style="list-style-type: none"> → Change the pressure conditions.
Pneumatic lines or connection parts have an insufficient cross section or they are throttled.	<ul style="list-style-type: none"> → Disconnect pump from system to determine output values. → Eliminate throttling (e.g. valve) if necessary. → Use lines or connection parts with larger cross section if necessary.
Leaks occur on connections, lines or pump head.	<ul style="list-style-type: none"> → Check that tubes sit correctly on hose nozzles. → Replace leaky tubes. → Eliminate leaks.
Connections or lines completely or partially jammed.	<ul style="list-style-type: none"> → Check connections and lines. → Remove the jamming parts and particles.
Head parts are soiled.	<ul style="list-style-type: none"> → Clean head components.
Diaphragm or valve plates/sealings are worn.	<ul style="list-style-type: none"> → Replace diaphragm and valve plates/sealings, (see chapter 8.3).
After diaphragm and valve plates/sealings have been replaced.	<ul style="list-style-type: none"> → Check that the spacers have been replaced onto the diaphragm screw thread. → Check head connection and hose connections. → Possibly carefully tighten the outer screws (fig. 10/4) of the top plate crosswise.

Tab. 10

Pump does not run; the On/Off switch of the system at control unit is switched on, but is not lit; the On/Off switch of the pump at control unit is switched on, but is not lit; the On/Off switch of the pump is switched on, but is not lit	
Cause	Fault remedy
Vacuum system is not connected with the power source.	<ul style="list-style-type: none"> → Connect vacuum system to mains power.
No voltage in the power source.	<ul style="list-style-type: none"> → Check room fuse and switch on if necessary.

Tab. 11

Pump does not run; the On/Off switch of the system at control unit is switched on and is lit; the On/Off switch of the pump at control unit is switched on and is lit; the On/Off switch of the pump is switched on, but is not lit	
Cause	Fault remedy
Pump is not connected with the control unit.	→ Connect mains plug of pump to the socket of control unit.
Fuse in the pump is defective.	→ Remove pump's mains plug from the socket. → Loosen marked lid on underside of the pump. → Select and replace suitable fuse (see chapter 4).

Tab. 12

Pump does not run; the On/Off switch of the system at control unit is switched on and is lit; the On/Off switch of the pump at control unit is switched on and is lit; the On/Off switch of the pump is switched on and is lit	
Cause	Fault remedy
The thermal switch has opened due to overheating.	→ Remove pump's mains plug from the socket. → Allow pump to cool. → Trace cause of over-heating and eliminate it.

Tab. 13

No display in digital vacuum meter	
Cause	Fault remedy
Digital vacuum meter not turned on.	→ Turn digital vacuum meter on.
System not turned on.	→ Turn system on.

Tab. 14

If you are unable to determine any of the specified causes, send the pump to KNF Customer Service (see last page for the address).

1. Flush the pump to free the pump head of dangerous or aggressive gases (see Chapter 8.2.1).
2. Remove the pump.
3. Clean the pump (see Chapter 8.2.2).
4. Send the vacuum pump system with completed Health and safety clearance and decontamination form (see Chapter 12), to KNF stating the nature of the transferred medium.

10. Ordering Information

10.1. Spare Parts

A Service Set contains all replacement parts needed for one complete service:

- 2 diaphragms
- 4 valve plates/sealings

Service Set for Vacuum System	Order-No. Service Set
SEM 810 (pump N 810.3 FT.18)	057357
SEM 820 (pump N 810.3 FT.18)	057358
SEM 840 (pump N 810.3 FT.18)	057359
SEM 842 (pump N 810.3 FT.18)	057359

Tab. 15

10.2. Accessory

Accessory	Order-No.
KNF High Performance Condenser (insulated), 250 ml	057957

Tab. 16

10.3. Pumps

LABOPORT Vacuum pumps	Order-No.
N 810.3 FT.18	057500
N 820.3 FT.18	057501
N 840.3 FT.18	057502
N 842.3 FT.18	057634

Tab. 17

11. Returns

Pumps and systems used in laboratories and process-based industries are exposed to a wide variety of conditions. This means that the components contacting pumped media could become contaminated by toxic, radioactive, or otherwise hazardous substances.

For this reason, customers who send any pumps or systems back to KNF must submit a Health and safety clearance and decontamination form in order to avoid a hazardous situation for KNF employees. This Health and safety clearance and decontamination form provides information about, for example:

- physiological safety
- whether medium-contacting parts have been cleaned
- whether the equipment has been decontaminated
- media that have been transferred or used

To ensure worker safety, work may not be started on pumps or systems without a signed Health and safety clearance and decontamination form.

For optimal processing of a return, a copy of this declaration should be sent in advance via e-mail, regular mail, or fax to KNF Customer Service (refer to final page for address). In order to avoid endangering employees who open the shipment's packaging, despite any residual hazards, the original version of the Health and safety clearance and decontamination form must accompany the delivery receipt on the outside of the packaging.

The template for the Health and safety clearance and decontamination form is included with these Operating Instructions and may also be downloaded from the KNF website.

The customer must specify the device type(s) and serial number(s) in the Health and safety clearance and decontamination form in order to provide for the unambiguous assignment of the Declaration to the device that is sent to KNF.

In addition to the customer's declaration of physiological safety, information about operating conditions and the customer's application are also of importance to ensure that the return shipment is handled appropriately. Therefore, the Health and safety clearance and decontamination form requests this information as well.

12. Health and safety clearance and decontamination form



Form: Rev. 02 / download: www.knf.com

Health and safety clearance and decontamination form

This declaration must be present and complete (the original must accompany the shipment's delivery receipt) before the returned device can be examined.

Device type:

Serial number(s):

.....

.....

Reason for returning the device (please describe in detail):

(The device(s) was(were) in operation yes no)

.....

.....

.....

.....

.....

We confirm that the above device(s)

has(have) pumped exclusively **physiologically unobjectionable** media and that it(they) are free of hazardous materials and any materials that are harmful to health.

Pumped media:

The device(s) was(were) cleaned yes no

has(have) pumped media of the following category(categories) which are not physiologically unobjectionable and that cleaning of the device(s) (potentially only media-contacting parts) is required.

Name, chemical formula, Material Safety Data Sheet

aggressive

biological

radioactive

toxic

other

The device(s) was(were) decontaminated and work can proceed without special measures yes

Method / proof:

.....

The device(s) was(were) not decontaminated and special measures are required before starting work yes

Measures:

.....

Legally binding declaration

We herewith affirm that the information provided in this form is correct and complete. Shipment of the devices and components is in compliance with statutory regulations.

.....
Company (stamp)

.....
Date

.....
Name

.....
Authorized signature

.....
Position

KNF worldwide

Please find our local KNF partners at: www.knf.com