

Operating Manual

SECTION 976.10

Laboport PowerDry Pumps

Laboratory Vacuum Pumps with Self-Drying System

Models:	N820.3FT.40P	N820.3FT.40.18
	N840.3FT.40P	N840.3FT.40.18
	N842.3FT.40P	N842.3FT.40.18
	N860.3FT.40P	N860.3FT.40.18

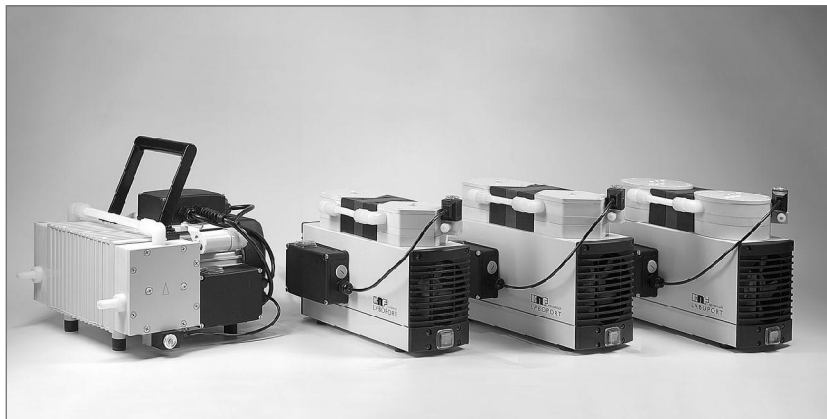


Fig. 1
LABOPORT Powerdry Pumps

You have selected a high-quality KNF product; this document will help you operate it safely and reliably.

Carefully study operating instructions before using the pumps and observe at all times the relevant instructions to avoid dangerous situations.

The manual was produced for the pumps stated above. Within customer-specified projects (pump types starting with PU, PJ or PM) there could be differences in detail. Please therefore take into account the agreed technical specifications, as well as these instructions. Models ending with a P and .18 are the same. Both are used to designate a portable pump.

0. List of Contents
1. Description, Operating Conditions
2. Safety
3. Installation
4. Operation
5. Drying System:
Changing Settings
6. Servicing
7. Trouble Shooting
8. Ordering Information
9. Specifications
10. Abbreviated instructions

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1. Description, Operating Conditions

The pumps transfer, and evacuate 100% oil-free. In operation they are gas-tight, and maintenance-free.

The self drying pumps make it possible during evacuation to blow the condensed liquid out of the pump heads at high speed, while maintaining the vacuum in the recipient at a constant level. After drying the pump heads the pumps achieve a greatly improved vacuum and evacuate much faster than pumps without a drying system.

Pumps can operate with or without the drying system. The drying system is activated by a switch on the control box. If the drying system remains switched off the pumps operate in the conventional way.

The control for the drying system is effected via three variables:

- The time between switching on the drying system and the first ventilation of the pump heads (t_1)
- The duration of the ventilation of the pump heads (t_2)
- The interval between pump head ventilation operations (t_3).

For t_1 to t_3 standard values are set in the factory.

- $t_1 = 210$ sec
- $t_2 = 2.0$ sec
- $t_3 = 40$ sec

In addition to this, the drying process can also be individually adapted to a process sequence. To do this, the values for t_1 , t_2 , and t_3 can be altered (see Section 5). The pump must be disconnected from the electricity power supply beforehand.

1.1 Electrical Equipment

- See section 9 for full electrical data.
- The pumps are fitted with a thermal -switch to protect against overloading.

1.2 Operating Conditions

⚠ The pumps and/or the drying system must not be used in areas where there is a danger of explosion.

⚠ These pumps must not be used if the entry of air into the pump during venting (drying system) could result in the creation of reactive, explosive or otherwise haardous mixtures.

Prior to any use of the pump ensure that the creation of reactive, explosive or otherwise haardous mixtures during the supply of air is prevented.

- Handling air, gases, and vapours at temperatures between + 5 C... + 40 C.
- For maximum permissible operating pressure, ultimate vacuum, and flow capacity: see chapter 9.
- The pumps must not be used for liquids. You will find suitable liquid pumps in our Product Program.

If your potential application lies outside the above limits discuss it with our technical adviser (see last page for contact telephone number).

1.3 Ambient Condition

When the pumps are operating the following ambient conditions must be maintained:

- ⚠ The pumps and/or the drying system must not be used in areas where there is a danger of explosion.
- Ambient temperature during operation: between + 5 C + 40 C
- During operation an adequate supply of air for cooling must be provided.

2. Safety

- Note that the pumps may only be used for their intended purpose (see section 1).

⚠ The pumps and/or the drying system must not be used in areas where there is a danger of explosion.

⚠ These pumps must not be used if the entry of air into the pump during venting (drying system) could result in the creation of reactive, explosive or otherwise haardous mixtures.

Prior to any use of the pump ensure that the creation of reactive, explosive or otherwise haardous mixtures during the supply of air is prevented.

- The discharge of gas on the pressure side of the pump must be safely disposed.

⚠ Components connected to the pumps must be designed to withstand the pneumatic performance of the pumps (see chapter 9).

- Plug the pump only into properly installed grounded outlets.

⚠ When the operation of the pump is interrupted by the thermal switch, it will re-start automatically after cooling down. Take all care necessary to prevent this leading to a dangerous situation.

⚠ Specific safety instructions and measures for the media being handled must be observed.

- Parts of the casing marked with the sign below are only allowed to be opened after pulling out the plug (disconnecting the power source).



- Use only original KNF replacement parts.

3. Installation

- Choose a safe location (flat surface for the pump).
- Install the pump so as to ensure adequate flow of air cooling.
- Connect the suction and pressure lines (tube ID 10 mm; N 860.3 FT.40.18: ID 12 mm).
 - ▶ Arrange the pressure line so that condensate cannot run into the pump (sloping lines).
- The discharge of gas on the pressure side of the pump must be safely disposed.
- The condensate is conducted out of the pump via the pressure line. A container is to be installed to catch the condensate.
- Plug the pump only into properly installed grounded outlets.
- Compare the supply data with the electrical data of the pump. The voltage must not vary by more than + 10 %, and - 10 % from that shown on the type-plate.

4. Operating Instructions

4.1 Operating Conditions

⚠ The pumps and/or the drying system must not be used in areas where there is a danger of explosion.

⚠ These pumps must not be used if the entry of air into the pump during venting (drying system) could result in the creation of reactive, explosive or otherwise hazardous mixtures.

Prior to any use of the pump ensure that the creation of reactive, explosive or otherwise hazardous mixtures during the supply of air is prevented.

⚠ Specific safety instructions for the media being handled must be observed.

⚠ If combustible media are used: Haard of fires and explosions due to excessively high media temperature.

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 (table 1).

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.

- The pumps must not start against pressure. When the pump is switched on the pressure in the suction and pressure lines must be atmospheric. This also applies when the pump restarts after the power has been cut off for a short period. If a pump starts against pressure, then the thermal switch will be activated and switch the pump off.
- When the operation of the pump is

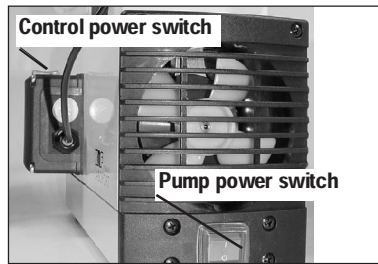


Fig. 2:
Pump power switch and control switch
(all pumps except N 860.3 FT.40.18)

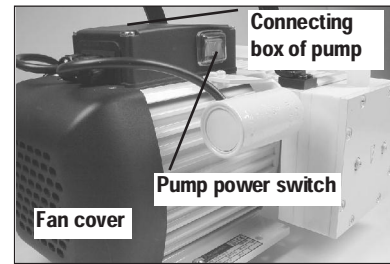


Fig. 3:
Pump power switch;
N 860.3 FT.40.18

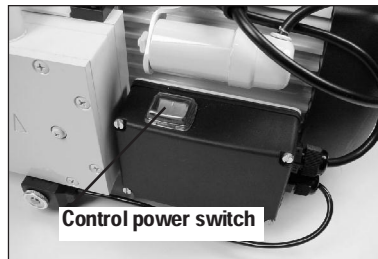


Fig. 4:
Control power switch
for pump N 860.3 FT.40.18

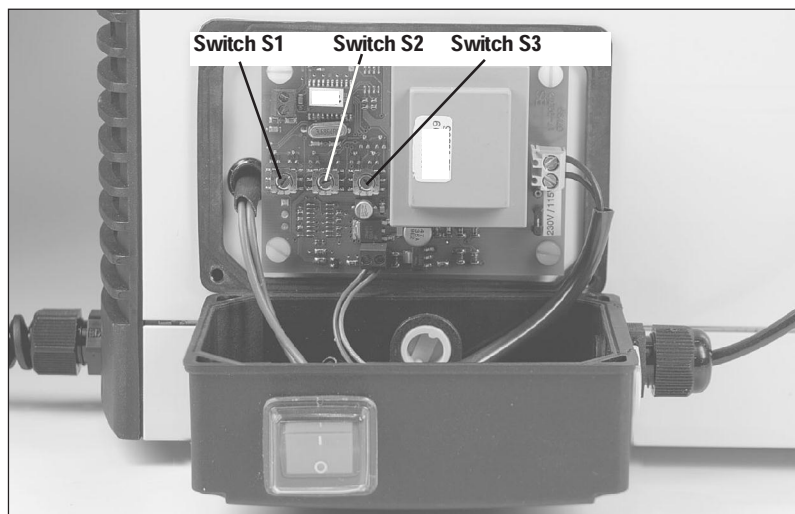


Fig. 5:
Control box (opened) of drying system with switches S1, S2, S3

interrupted by the thermal switch, the pump will re-start automatically after cooling down. Take all care necessary to prevent this leading to a dangerous situation.

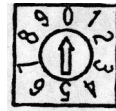
- ⚠ The components to be connected to the pump must be designed to withstand the pneumatic data of the pumps (see Section 9).
- ⚠ The maximum permissible operating pressure (1 bar g) must not be exceeded.
 - To prevent the maximum permissible operating pressure being exceeded, restriction or control of the air or gas flow should only be carried out in the suction line.
 - If restriction or control of the air or

gas flow is made on the pressure side ensure that the maximum permissible operating pressure is not exceeded.

- When the pump is at a standstill the inlet and the outlet must be at normal atmospheric pressure.
- ⚠ Ensure the pump outlet is not closed or restricted.
 - Diaphragm and valve plates are the only parts subject to wear. Wear is usually indicated by a drastic reduction in the pneumatic performance (vacuum, pressure, delivery). When replacing parts proceed as described in section 6.
 - Ambient conditions: see chapter 1.3.

Table 1: Drying system control box: Variables and values

- t_1 :
Time between switching on the drying system and the first ventilation of the pump heads.
- t_2 :
Duration of the ventilation of the pump heads.
- t_3 :
The interval between pump head ventilation operations.



Switch setting	Switch 1: t_1 in sec	Switch 2 t_2 in sec	Switch 3 t_3 in sec
0	t_3	1.0	10
1	60	1.5	15
2	90	2.0	25
3	120	2.5	40
4	150	3.0	60
5	180	3.5	120
6	210	4.0	180
7	240	5.0	300
8	300	7.5	600
9	360	10.0	900

Works setting:

Switch	Switch setting	Time in sec
1	6	210
2	2	2.0
3	3	40

4.2 Operation

Taking the pump into operation

- 1 Plug the power supply of the pump into a properly installed safety socket.
- 2 Switch the pump on at the pump power switch (see fig. 2; for pump N 860.3 FT.40.18, see fig. 3).
- 3 If cyclic drying of the pump heads is required in the current evacuation process, switch the drying system on at the power switch of the control box (see fig. 2; for pump N 860.3 FT.40.18, see fig. 4).
 - ▶ The drying system will only work with the pump switched on.
 - ▶ The drying system should only be switched on if a container has been attached to the pressure line of the pump which will catch the condensate; otherwise the condensate will flow out uncontrolled.
 - ▶ When the drying system is switched on, the time period t_1 (time until the first venting of the pumps heads) will begin. If it is intended that t_1 should run from the pump starting, the drying system should be switched on before the pump.
 - ▶ For the variables t_1 to t_3 of the drying system, see Section 5.

Check:

- 1 Tubing for correct tubing.
- 2 Electrical connections for correct connection.

After the evacuation/process has been completed, take the pump out of operation:

- 1 Purge the pump including the connecting hoses with air (if necessary for safety reasons: with an inert gas) at full flow rate for about 5 minutes.
- 2 If the drying system is switched on:
Switch the drying system off at the main switch of the control box.
- 3 Switch the pump off at the power switch of the pump.
- 4 Unplug the pump.

5. Drying system: Changing settings

The variables of the drying system can be adapted to a process sequence.

- ⚠ Before changing the variables, it is essential that the pump be disconnected from the electricity power supply: The pump is to be unplugged.
- 1 Disconnect the pump from the

power supply by unplugging it.

- 2 Check that the pump and the drying system are dead and secure them.
- 3 At the control box, loosen the collar nut of the cable inlet. Use a slotted screwdriver to release the four screws, then fold the cover forwards and lay it down (see fig. 5).
 - ▶ The control box may only be opened if there is no risk of moisture precipitating on the control unit.
- 4 Set the desired values at switches S1, S2, and S3 (see fig. 5). See Table 1 for an explanation of the switches and for the values which can be set.
- 5 Replace the cover on the control box. Take care to ensure that the seal is properly in place. Tighten the four screws of the cover to finger tightness. Then tighten the collar nut of the cable inlet.

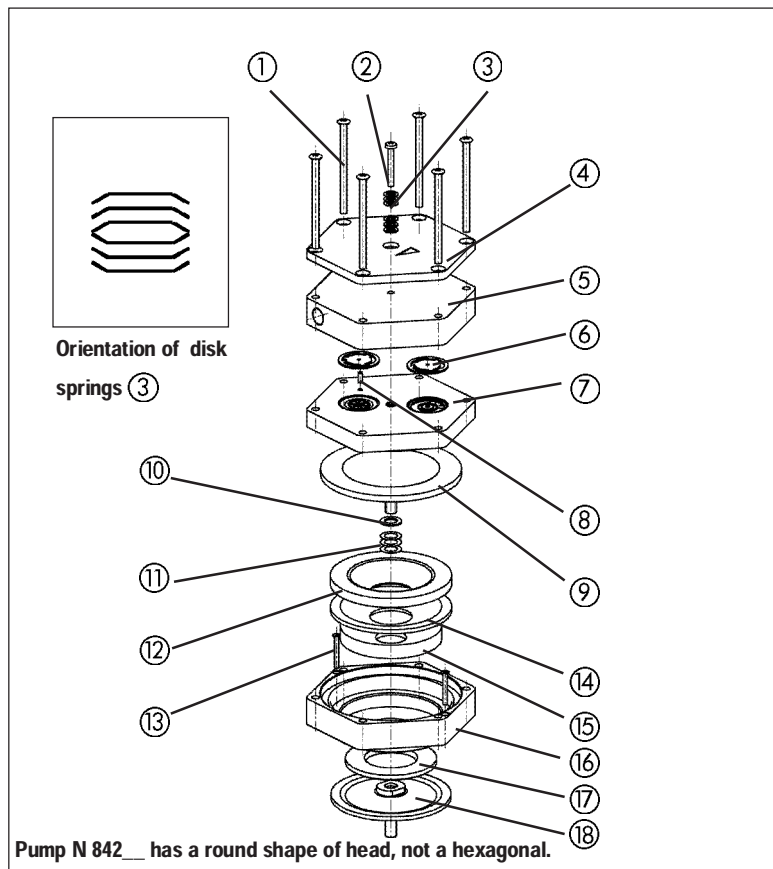
6. Servicing: Changing Diaphragms and Valve Plates/Sealings

- ##### 6.1 Pump types
- N 820.3 FT.40.18
 - N 840.3 FT.40.18
 - N 842.3 FT.40.18

The structured diaphragms in both pump heads should be changed at the same time. When structured diaphragms are changed, valve plates/sealings should also be replaced. If the structured diaphragms are not changed in both heads at the same time or structured diaphragms and valve plates/sealings are not changed at the same time the nominal performance of the pump is not guaranteed after the service.

⚠ If a pump has been used for aggressive or toxic substances or other types of substances which are hazardous, hazardous to health, or injurious, the following points must be observed:

- 1.) Clean the pump and its components before servicing.
- 2.) Ensure that the service personnel is not subject to a health hazard. Apply the safety and protection measures that are necessary for the medium that has been handled



Specification

① Screw ⁽¹⁾	⑨ Structured diaphragm	⑱ Dampening diaphragm ⁽⁴⁾
② Screw ⁽²⁾	⑩ Spacer (thick)	
③ Disk spring	⑪ Spacer (thin)	(1) 6 x; N 842_: 12 x
④ Top plate	⑫ Dampening ring A	(2) 1 x; N 842_: 3 x
⑤ Head plate	⑬ Screw	(3) N 810_: 0 x
⑥ Valve plate/sealing	⑭ Dampening felt ⁽³⁾	N 820_: 2 x
⑦ Intermediate plate	⑮ Dampening ring B ⁽⁴⁾	N 840_: 1 x
⑧ Guide pin	⑯ Adapter	N 842_: 1 x
	⑰ Dampening ring C ⁽⁴⁾	(4) only for pump types N 840__ and N 842__

Fig. 6: Pump head for N 820.3_, N 840.3_, N 842.3_ (exploded drawing, symbolic)

by the pump (example: the use of protective gloves).

- 3.) Ensure that discarded parts and materials are safely and correctly disposed of.
- Use only original KNF replacement parts.

Required tools and material:

- Service Set (see section 8.1);
- Philips-head screwdriver No. 2;
- Soft pencil.

Change the structured diaphragms and valve plates/sealings in the following sequence:

- a.) Preparatory steps
- b.) Remove pump heads
- c.) Change structured diaphragms

d.) Change valve plates/sealings

e.) Refit pump heads

f.) Final steps

- The position numbers in the following text refer to fig. 6.

a.) Preparatory Steps

- ① Shut down system (see section 4.2)
- ⚠ including disconnecting the pump from the power source (pull out plug of electrical supply unit).
- ② Remove tubing from the inlet and outlet connectors of the pump.
- ③ Mark the position of top plate ④, head plate ⑤, intermediate plate ⑦, and adapter ⑯ relative to each other by a drawing line with a pencil. This is to ensure that the parts will be reassembled in correct

position at a later stage.

b.) Removing the pump heads

- ① On the pneumatic head connections, loosen one of the union nuts by hand. Then slightly loosen the angle-fitting in the pump head by turning it counterclockwise so the connecting tube can be pulled out.
- ② Loosen the outer screws ① on each pump head.
- ③ Carefully remove both pump heads (top plate ④, head plate ⑤ and intermediate plate ⑦).
 - The magnetic valve of the drying system remains fitted in this situation.

c.) Change structured diaphragms

- ① Push down one structured diaphragm ⑨ until other structured diaphragm is pushed upwards to its highest position.
- ② Carefully unscrew the higher structured diaphragm counterclockwise using both hands.
- ③ Replace all spacers ⑩/⑪ onto the screw thread of the new structured diaphragm (same number and order)
- ④ Screw in the new structured diaphragm ⑨ and tighten it by hand; you do not need any tool.
- ⑤ Change the second structured diaphragm as described above (step ① to ④) for the first.
- Changing the two structured diaphragms one after the other ensures that the same number of diaphragm spacers are refitted as were removed. This is essential to maintain the pneumatic performance of the pump.

d.) Change valve plates/sealings

- ① At one pump head: Unscrew the single screw ② (N 842.3 FT.40.18: three screws) in the top plate ④.
- ② Carefully remove top plate ④ and head plate ⑤ from intermediate plate ⑦; exposing the valve plates/sealings ⑥.
- ③ Remove old valve plate/sealings ⑥.
- ④ If there should be deposits in the recesses in the intermediate plate ⑦, clean them until the deposits have been completely removed.
- ⑤ Insert new valve plates/sealings ⑥ in the recesses in the interme-

diaphragm plate ⑦ (upper and lower sides of the valve plates/sealings are identical).

- 6 Carry out the steps ① to ⑤ for the second pump head.

e.) Refitting the pump heads

- 1 At one pump head:
Press the lip on the edge of the structured diaphragm ⑨ into the groove in the housing.
- 2 Place the intermediate plate ⑦, with the valve plates/sealings on the adapter ⑩, in the position indicated by the pencil marking.
- 3 Place the head plate ⑤ on the intermediate plate ⑦ in the position indicated by the guide pin ⑧.
- 4 Place the top plate ④ on the head plate ⑤ in the right position.
- 5 Gently tighten screws ① in diagonal order.
- 6 Screw in the single screw ② (N 842.3 FT.40.18: three screws) in the centre of the pump top plate ④ until it is flush with the top plate (they are flush with the top plate); then screw one final half turn to tighten.
 - ▶ For orientation of disk springs ③ see fig. 6.
- 7 Carry out steps ① to ⑥ for the second pump head.

! 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.

f.) Final steps

- 1 Reconnect system tubing.
- 2 Reconnect pump to the electricity supply.
 - ▶ If the pump does not reach the desired vacuum after changing diaphragms and valve plates/sealings:
 - 1 Check whether the spacers have been replaced onto the structured diaphragm screw thread.
 - 2 Check the interconnecting pipe-work connection between both pump heads as well as the tubing for leaks.
 - 3 Possibly the screws on one of the pump heads (or both heads) are insufficiently tightened (carefully tighten them again crosswise).

▶ If you have any questions about servicing call our technical adviser (see last page for contact telephone number).

6.2 Pump type N 860.3 FT.40.18

The diaphragms in both pump heads should be changed at the same time. When diaphragms are changed, valve plates/sealings should also be replaced. If the diaphragms are not changed in both heads at the same time or diaphragms and valve plates/sealings are not changed at the same time the nominal performance of the pump is not guaranteed after the service.

⚠ If a pump has been used for aggressive or toxic substances or other types of substances which are hazardous, hazardous to health, or injurious, the following points must be observed:

1. Clean the pump and its components before servicing.
2. Ensure that the service personnel is not subject to a health hazard. Apply the safety and protection measures that are necessary for the medium that has been handled by the pump (example: the use of protective gloves).
3. Ensure that discarded parts and materials are safely and correctly disposed of.
 - ▶ Use only original KNF replacement parts.

Parts and tools required:

- 1 Service Set (see section 8.1)
- Screwdriver blade width 2 mm
- Phillips screwdriver No. 2
- Felt-tip pen.

Change the diaphragms and valve plates/sealings in the following sequence:

- a) Preparatory steps
- b) Removing pump head
- c) Changing diaphragm
- d) Changing valve plates/sealings
- e) Refitting pump head
- f) Final steps.

▶ The position numbers in the following text refer to fig. 7.

a.) Preparatory Steps

- 1 Shut down system (see section 4.2) including disconnecting the pump

from the power source (pull out plug of pump).

- 2 Remove tubing from the inlet and outlet connectors of the pump.
- 3 On the pneumatic head connections, loosen one of the union nuts by hand. Then slightly loosen the angle-fitting in the pump head by turning it counterclockwise so the connecting tube can be pulled out
- 4 Undo the screws that hold the fan cover (see fig. 3) and remove the fan cover from the motor.

b) Removing pump head (for each head separately)

- 1 Make a mark (M) on the top plate ①, head plate ②, intermediate plate ③, and housing ④ with a felt-tip pen. This is to ensure that the parts will be reassembled correctly at a later stage.
- 2 Undo the eight screws ⑤ and lift the pump head off the housing ④.
 - ▶ The magnetic valve of the drying system remains fitted in this situation.

c) Changing diaphragm

- 1 Position the pump so that the diaphragm surface is upwards.
 - 2 Turn the fan to bring the structured diaphragm ⑥ to top dead center.
 - 3 Using a small screwdriver, between the housing and the outer edge of the structured diaphragm, carefully lift the edge of the diaphragm lightly upwards at one point (making sure not to damage the housing). Now grip the edge of the diaphragm on opposite sides, unscrew it by turning counterclockwise.
 - 4 Take the diaphragm spacer(s) ⑦ off the connecting rod ⑧ and retain them.
 - 5 Check that all parts are free from dirt and clean them if necessary.
 - 6 Put the diaphragm spacer(s) ⑦ on the thread of the new diaphragm.
 - " Fit the new structured diaphragm ⑥: hold the connecting rod ⑧ with one finger, and gently screw in (clockwise) the structured diaphragm with diaphragm spacers.
- ! Turn the fan until the structured diaphragm is at the top dead centre. Using a small screwdriver, between the housing and the outer edge of the structured diaphragm, carefully lift the edge of the dia-

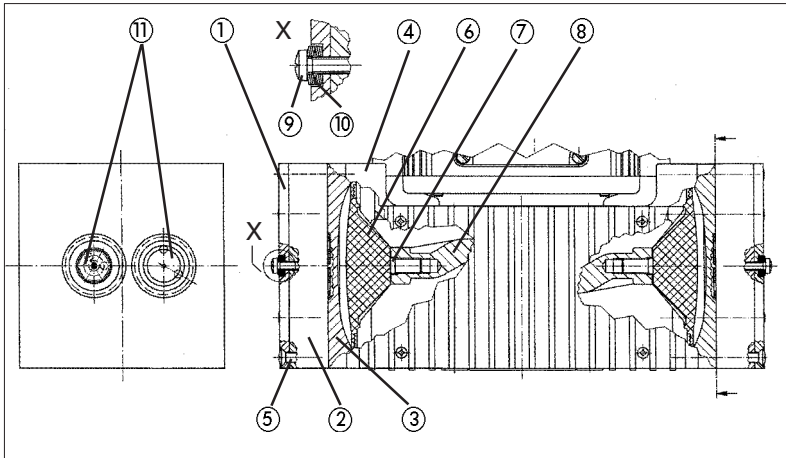


Fig. 7: Cross section of pump heads for pump N 860.3 FT.40.18 (symbolic)

phragm lightly upwards at one point. Now grip the edge of the diaphragm on opposite sides (do not overstretch the diaphragm!) and tighten the structured diaphragm clock-wise.

d) Changing valve plates/sealings

- 1 Undo the two screws 9.
- 2 Separate the head plate 2 with top plate 1 from intermediate plate 3.
- 3 Remove the valve plates/sealings 11 from the intermediate plate.
- 4 Check that the valve seats, the head plate and intermediate plate are clean. If scratches, distortion, or corrosion are evident on these parts they should be replaced.
- 5 Lay the new valve plates/sealings 11 in the recesses in the intermediate plate. The valve plates/sealings for suction and pressure sides are identical, as are upper and lower sides of the valve plates/sealings.

e) Refitting pump head

- 1 Turn the fan to bring the structured diaphragm 6 to medium position.
- 2 Place the intermediate plate 3, with valve plates/sealings 11, on the housing, in the position indicated by the marking (M).
- 3 Place the head plate 2 on the intermediate plate 3 in the position indicated by the marking (M).
- 4 Place top plate 1 in position and insert screws 9 with disk springs 10, and tighten them until the screw heads are just fully seated (do not completely tighten them!).

► The concave side of the

first three disc springs must point away from the screw head, the next three towards it (see fig. 7, detail X).

- 5 Gently tighten the screws 5, evenly and diagonally.
 - 6 Turn the fan to check that the pump rotates freely.
 - 7 Now tighten screws 5 hand-tight.
- ! Tighten each of the screws 9 a half-turn more.

Repeat operations b), c), d), and e) for the second pump head.

f) Final steps

- 1 Refit the the pneumatic head connection:
Place tube onto the connecting part of the angle fitting, turn angle fitting to a straight position and tighten the nut.
- 2 Refit the fan cover.
- 3 Reconnect the pump to the electricity supply.

► If you have any questions about servicing call our technical adviser (see last page for contact telephone number).

7. Troubleshooting

► Sufficient vacuum is not reached

Possible reasons:

- 1 Tube connections are not tight
- 2 Condensate in the pump head
 - Switch the drying system on or reduce t_3 respectively (see section 5 with regard to changing the value which has been set).
- 3 Diaphragms and/or valve plates/sealings are worn out

Specification

Pos Description

- 1 Top plate
- 2 Head plate
- 3 Intermediate plate
- 4 Housing
- 5 Cross recessed raised counter-sunk head screw
- 6 Structured diaphragm
- 7 Diaphragm spacer(s)
- 8 Connecting rod
- 9 Cross recessed raised cheese head screw
- 10 Disk spring
- 11 Valve plate/sealing

► Changing diaphragms and valve plates/sealings: see section 6.

- 4 If this problem occurs after changing of diaphragms and valve plates/sealings:
 - See information in section 7.

► Pump is switched on, but does not run, the on/off-switch on the pump is not lit

Possible reasons:

- 1 Pump is not connected with the power source.
- 2 No voltage in the power source.
- 3 Fuse in the pump is defective (only authorized/qualified personnel should investigate this problem):
 - Disconnect the pump from the power source by pulling out plug.

Placement of fuse:

- All pumps except for N 860.3 FT.40.18:
Fuse accessible after releasing the marked cover on the underside of the pump.
- Pump N 860.3 FT.40.18:
Fuse accessible after opening the connecting box of the pump (see fig. 3 for the position of the connecting box).

Dimension of the fuse:
see section 9.

► Pump is switched on, but does not run, the on/off-switch on the pump is lit

Possible reason:

- ❶ The thermal switch has opened due to overheating
- ▶ Disconnect the pump from the power source, let the pump cool down, investigate the reason for the overheating and irradiate it.
 - ▶ If the pump does not operate properly and you cannot find any of the above faults, send it to the KNF Service Department.
 - ▶ In order for KNF to repair the pump, the customer must provide a statement on the media which were pumped and on pump cleaning. Please fill out the corresponding KNF form, and submit it together with the pump. A sample statement for copying can be found in the Appendix of these operating instructions.
 - ▶ If you have been handling dangerous, or aggressive gases, please clean the pump before despatch.

8. Ordering Information

- ### 8.1 Replacement Parts Service Set
- A Service Set contains replacement parts needed for 1 head only. 2 kits are req'd for complete service.

Service Set contains
2 diaphragms and 4 valve
plates/sealings

for pump:	Order No.:
N 820.3 FT.40.18	072779
N 840.3 FT.40.18	072780
N 842.3 FT.40.18	072780
N 860.3 FT.40.18	075097

9. Specifications

N 820.3 FT .40.18

Maximum capacity:	20 l/min
Ultimate vacuum:	10 mbar abs
Max. permissible operating pressure:	1 bar ^g
Weight:	9.6 kg
Permissible ambient temperature:	+ 5... + 40 C
Permissible temperature of gas to be pumped:	+ 5... + 40 C
Hose connection for tube ID 10 mm	

Voltage [V]	100	115	230
Frequency [H]	50/60	60	50

Power Consumption Pump [W]	130	130	120
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Fuse Pump (2x) T [A]	3.15	2.5	1.6
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IP 44

N 840.3 FT.40.18

Maximum capacity:	34 l/min
Ultimate vacuum:	10 mbar abs
Max. permissible operating pressure:	1 bar ^g
Weight:	12.9 kg
Permissible ambient temperature:	+ 5... + 40 C
Permissible temperature of gas to be pumped:	+ 5... + 40 C
Hose connection for tube ID 10 mm	

Voltage [V]	100	115	230
Frequency [H]	50/60	60	50

Power Consumption Pump [W]	220	250	200
----------------------------	-----	-----	-----

Fuse Pump (2x) T [A]	6.3	6.3	3.15
----------------------	-----	-----	------

IP 44

N 842.3 FT.40.18

Maximum capacity:	34 l/min
Ultimate vacuum:	4 mbar abs
Max. permissible operating pressure:	1 bar ^g
Weight:	13.7 kg
Permissible ambient temperature:	+ 5... + 40 C
Permissible temperature of gas to be pumped:	+ 5... + 40 C
Hose connection for tube ID 10 mm	

Voltage [V]	100	115	230
Frequency [H]	50/60	60	50

Power Consumption Pump [W]	260	290	220
----------------------------	-----	-----	-----

Fuse Pump (2x) T [A]	6.3	6.3	3.15
----------------------	-----	-----	------

IP 44

N 860.3 FT.40.18

Maximum capacity:	60 l/min
Ultimate vacuum:	4 mbar abs
Max. permissible operating pressure:	1 bar ^g
Weight:	14.8 kg
Permissible ambient temperature:	+ 5... + 40 C
Permissible temperature of gas to be pumped:	+ 5... + 40 C
Hose connection for tube ID 12 mm	

Voltage [V]	100	115	230
Frequency [H]	50/60	60	50

Power Consumption Pump [W]	250	240	220
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Fuse Pump (2x) T [A]	6.3	6.3	3.15
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IP 54

▶ CE - Safety Demands

- The pumps correspond to the safety regulations of the EU low voltage directive 2006/95/EC and of the EU directive concerning electromagnetic compatibility 89/336 EWG. The requirements of the following harmonised standards are fulfilled:

EN 55014
EN 61000-6-1
EN 61000-6-3
EN 61000-3-2/3
EN 61010-1

- The pumps correspond to IEC 664:

- the overvoltage category II
- the pollution degree 2.

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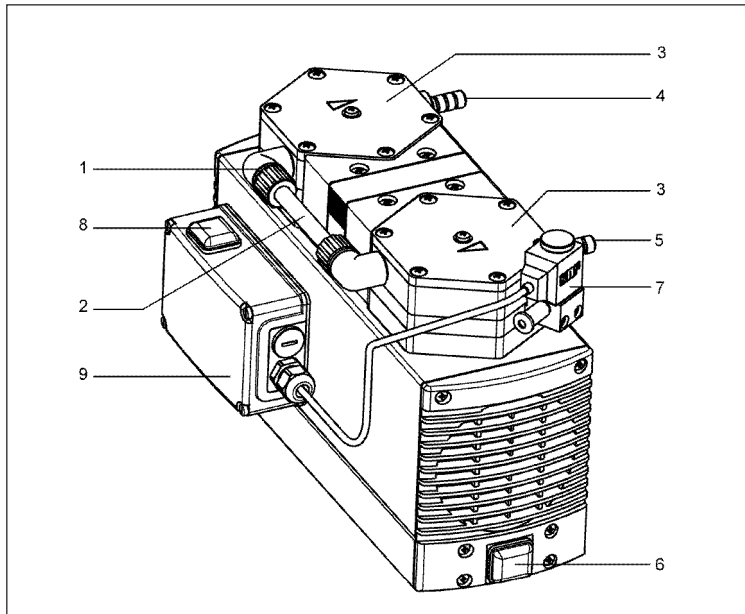
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10. Abbreviated instructions

10.1 English: Abbreviated instructions

N 820.3 FT.40.18, N 840.3 FT.40.18, N 842.3 FT.40.18, N 860.3 FT.40.18



Proper use

The pump is exclusively intended for transferring gases and vapors.

Only install and operate the pump under the operating parameters and conditions described in the operating Manual.

Before using a medium, check whether the medium can be transferred danger-free in the specific application case.

Before using a medium, check the compatibility of the materials of the pump head, structured diaphragm and valves with the medium.

Only transfer gases which remain stable under the pressures and temperatures occurring in the pump. Laboratory equipment or additional components connected to a pump have to be suitable for use with the pneumatic capabilities of the pump (see type plate).

If the pump is used as a vacuum pump, safely discharge the pump exhaust at the pumps pneumatic outlet.

Observe the accident prevention and safety regulations.

Make sure that only trained and instructed personnel use the pump.

Improper use

The pump may not be operated in an explosive atmosphere.

This pump must not be used if the entry of air into the pump during venting (drying system) could result in the creation of reactive, explosive or otherwise hazardous mixtures.

The pump is not suitable for transferring liquids.

Operation

Before switching on the pump, observe the following points:

- All hoses attached properly.
 - Specifications of the power supply correspond with the data on the pumps type plate.
 - The pump outlet is not closed or constricted.
 - A container is installed in the pressure line to catch the condensate.
- Prior to any use of the pump ensure that the creation of reactive, explosive or otherwise hazardous mixtures during the supply of air during venting (drying system) is prevented.
- Haard of the pump head bursting due to excessive pressure increase:
- Do not exceed max. permissible operating pressure (see type plate).
 - Monitor pressure during operation; if the pressure exceeds the maximum permissible operating pressure, immediately shut down pump and eliminate fault (see Operating Manual).
 - Only throttle or regulate the air or gas

These abbreviated instructions summarize major points contained in the Operating Manual for the laboratory pumps named above. The complete, unabbreviated Operating Manual is required for proper usage of the pumps.



Specification

- 1 Connection piece
- 2 Pneumatic connection
- 3 Pump head
- 4 Outlet (pressure side)
- 5 Inlet (suction side)
- 6 Power switch pump
- 7 Venting valve
- 8 Power switch drying system
- 9 Control box

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.

The pump may not start up against pressure during switch on.

If combustible media are used:

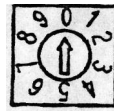
Make sure the temperature of the medium is always sufficiently below the ignition temperature of the medium, to avoid ignition or explosion. This also applies for unusual operational situations. Refer to the operating manual for more information.

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, unplug the pump.

With the pump at a standstill, open pressure and suction lines to normal atmospheric pressure.

Table 1: Drying system control box: Variables and values

- t_1 :
Time between switching on the drying system and the first ventilation of the pump heads.
- t_2 :
Duration of the ventilation of the pump heads.
- t_3 :
The interval between pump head ventilation operations.



Switch setting	Switch 1: t_1 in sec	Switch 2 t_2 in sec	Switch 3 t_3 in sec
0	t_3	1.0	10
1	60	1.5	15
2	90	2.0	25
3	120	2.5	40
4	150	3.0	60
5	180	3.5	120
6	210	4.0	180
7	240	5.0	300
8	300	7.5	600
9	360	10.0	900

Works setting:

Switch	Switch setting	Time in sec
1	6	210
2	2	2.0
3	3	40

Taking the pump into operation

- 1 Plug the power supply of pump into a properly installed safety socket.
- 2 Switch the pump on at the pump power supply switch.
- 3 If cyclic drying of the pump heads is required in the current evacuation process, switch the drying system on at the power switch of the control box.
 - ▶ The drying system will only work with the pump switched on.
 - ▶ The drying system should only be switched on if a container has been attached to the pressure line of the pump which will catch the condensate; otherwise the condensate will flow out uncontrolled.
 - ▶ When the drying system is switched on, the time period t_1 (time until the first venting of the pumps heads) will begin. If it is intended that t_1 should run from the pump starting, the drying system should be switched on before the pump.

Taking the pump out of an operation

- 1 Purge the pump including the connecting hoses with air (if necessary for safety reasons: with an inert gas) at full flow rate for about 5 minutes.
- 2 If the drying system is switched on: Switch the drying system off at the main switch of the control box.
- 3 Switch the pump off at the power supply switch of the pump.
- 4 Unplug the pump.

Drying system: Changing settings
The variables of the drying system can be adapted to a process sequence.

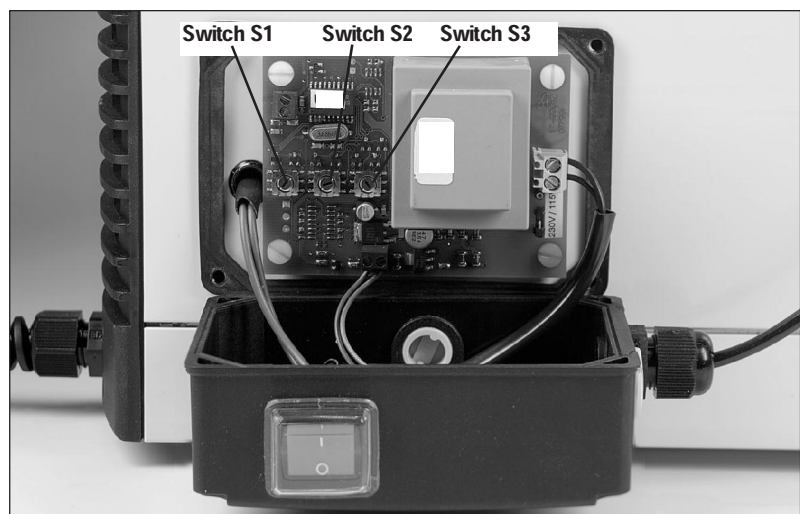
⚠ Before changing the variables, it is essential that the pump be disconnected from the electricity power supply.

- 1 Unplug the pump.
- 2 Check that the pump and the drying system are dead and secure them.
- 3 At the control box, loosen the collar nut of the cable inlet. Use a slotted screwdriver to release the four screws, then fold the cover forwards and lay it down (see fig. below).
 - ▶ The control box may only be opened if there is no risk of moisture precipitating on the control unit.
- 4 Set the desired values at switches S1, S2, and S3 (see fig. below). See Table 1 for an explanation of the switches and for the values which can be set.
- 5 Replace the cover on the control box. Take care to ensure that the seal is properly in place. Tighten the four screws of the cover to finger tightness. Then tighten the collar nut of the cable inlet.

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Control box (opened) of drying system with switches S1, S2, S3

Limited Warranty

KNF NEUBERGER, INC. (KNF) warrants to buyer that its products will be free from defects in material and workmanship under normal and appropriate use, and agrees to repair or replace any of its products without charge for parts or labor within one year from the date of shipment to the original purchaser.

Products to be evaluated for warranty coverage

Determination of coverage under this warranty is the sole responsibility of the manufacturing engineering representative of KNF. This determination will frequently require the return of the product to KNF. All product returns will be handled in accordance with KNF's product return policy. KNF reserves the right to inspect custom installations and devices that use KNF products as part of the warranty evaluation process. This warranty does not cover any misuse, negligence, deterioration by chemical action, unauthorized repair or alteration in any way, inappropriate handling or storage that in our judgment caused the product failure. KNF shall not be liable for any inconvenience, loss of use, or any consequential loss, damage or injury arising from any cause whatsoever. No employee, agent or representative of KNF shall have any right or authority to vary or alter the terms of this warranty. This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Limitations

KNF offers engineering and technical assistance to support the application and selection of our products. Except as otherwise agreed to in writing, it is expressly understood that this warranty is in lieu of any and all other warranties, whether expressed or implied, with respect to the goods sold, including any warranty of merchantability and fitness for a particular purpose. Sole responsibility or liability of KNF shall be to replace any products or parts thereof which shall not conform to such warranty, provided that the products are used in accordance with KNF specifications. Customer is responsible for determining the suitability of our products for customer's use or resale, or for incorporating them into objects or for applications which customer designs, assembles constructs or manufactures. Please call our Technical Sales Department for further information at 609-890-8600.

Return Requests

Make a copy of the "Decontamination Declaration" form on the next page complete and fax it to 609-890-8323 or email it to rma@knf.com. An RMA number will then be issued to you.

Important: This RMA number must be displayed on the outside of the shipping carton or it will be refused by our shipping department. Please call our Technical Sales Department if you need assistance at 609-890-8600.

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DECONTAMINATION DECLARATION

“ENTIRE FORM MUST BE COMPLETED BEFORE A RMA NUMBER CAN BE ISSUED!”

Please identify the KNF Model to be returned:		
Qty to be returned:	Pump Voltage:	Pump Frequency:
Serial Number(s) of the unit(s) to be returned:		
Reason for return – Please describe in detail:		
Please identify the Gases or Liquids used in the pump(s):		
Contact person for repair:		Phone #:
Email:		Fax #:

Please check one:

- (1) This piece of equipment has been decontaminated. It is free from chemical, biological, or radioactive contamination and is safe to handle without special precautions, in compliance with OSHA Hazard Communication Standard (HCS) Subpart Z, Toxic and Hazardous Substances, 29 CFR 1910.1200.
-
- (2) This piece of equipment has not been decontaminated. It is free from biological or radioactive contamination, but has been exposed to chemicals and requires special handling precautions. The chemicals used are indicated below, and a copy of the respective chemical MSDS sheet/s are attached (OSHA HCS, 29 CFR 1910.1200)
-
- (3) This piece of equipment has not been decontaminated and is safe to handle without special precautions. The basis of this statement must be indicated via Pumped Media:
-

I understand that if the equipment arrives contaminated, regardless of the signature on this document, the equipment will be returned for appropriate decontamination.

Company Name:	
Billing Address:	
Shipping Address: <input type="checkbox"/> Same as Billing Address:	

Authorized Signature of User: _____ Date: _____

Title: _____

Fax back to (609) 890-8323 or Email back to: rma@knf.com