Operating Instructions
Read and observe these Operating Instructions!

Labobase®
Multi-user Vacuum Systems for the Laboratory (Base Unit)

SBC 840	SBC 840.40
SBC 844	SBC 844.40
SBC 860	SBC 860.40

CE

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Translation of original Operating Instructions, english

These Operating Instructions are for the base unit consisting of vacuum pump, high performance condenser, separator and vacuum controller of the system.

There are separate Operating Instructions for the vacuum controller used in the stand-alone workplace. These Operating Instructions must be observed.

Content Page

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 or system.

➔ Always keep the operating manual 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 where the simultaneous operation of several processes could lead to the formation of a reactive, explosive, or otherwise dangerous mixture.

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

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.

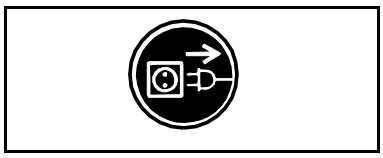

Fig. 1: Notice sticker

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

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

The LABOBASE®- vacuum systems conform to the Directive 2011/65/EU (RoHS2).

The LABOBASE®- 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 following harmonized standards have been used:

- DIN EN 61010-1
- DIN EN 61326-1 - class A
- DIN EN 50581

The pumps correspond to IEC 664:

- the overvoltage category II
- the pollution degree 2

Customer service and repairs

Only have repairs to the pump/system carried out by the KNF Customer Service responsible.

Only authorized personnel should open those parts of the housing that contain live electrical parts.

Use only genuine parts from KNF for servicing work.

4. Technical Data

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

Pump materials (for all pump types)	
Pump head	PTFE
Diaphragm	PTFE coated
Valve	FFPM

Tab. 2

Refer to the type plate for the pump’s electrical configuration.

SBC 840

Pneumatic performance			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 8		
Delivery rate at atm. pressure [l/min]*	max. 34		
Pneumatic connection			
Hose connection [mm]	ID 10		
Ambient and media temperature			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
Other parameters			
Weight [kg]	22.6		
Dimensions: W x H x D [mm]	450 x 515 x 322		
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		
Operating parameters of coolant for high performance condensers			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant tube [mm]	ID 8		
Electrical Data Pump			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	4.4	3.2	1.5
Power consumption [W]	220	250	245
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse (2x) T [A]	2.5	2.5	1.25
Protection class motor	IP 44		
Electrical Data Electrical Supply Unit			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	275	305	300
Fuse (2x) T [A]	6.3	6.3	3.15
Electrical Data Vaccum Cotroller			
Voltage [V]	90 - 260		
Frequency [Hz]	50/60		
Maximum current consump-tion [A]	10		
Fuse (internal) [mA]	280		

Tab. 3 **Liters in standard state (1,013 mbar*
***Power consumption of the whole system inclusive pump and vacuum controller*

SBC 840.40

Pneumatic performance			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 10		
Delivery rate at atm. pressure [l/min]*	max. 34		
Pneumatic connection			
Hose connection [mm]	ID 10		
Ambient and media temperature			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
Other parameters			
Weight [kg]	22.9		
Dimensions: W x H x D [mm]	450 x 515 x 322		
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		
Operating parameters of coolant for high performance condensers			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant tube [mm]	ID 8		
Electrical Data Pump			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	4.4	3.2	1.5
Power consumption [W]	220	250	245
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse (2x) T [A]	6.3	6.3	3.15
Protection class motor	IP44		
Electrical Data Electrical Supply Unit			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	275	305	300
Fuse (2x) T [A]	6.3	6.3	3.15
Electrical Data Vacuum Cotroller			
Voltage [V]	90 - 260		
Frequency [Hz]	50/60		
Maximum current consump-tion [A]	10		
Fuse (internal) [mA]	280		

Tab. 4 **Liters in standard state (1,013 mbar)*
***Power consumption of the whole system inclusive pump and vacuum controller*

SBC 844

Pneumatic performance			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 2		
Delivery rate at atm. pressure [l/min]*	max. 40		
Pneumatic connection			
Hose connection [mm]	ID 10		
Ambient and media temperature			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
Other parameters			
Weight [kg]	23.4		
Dimensions: W x H x D [mm]	450 x 515 x 322		
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		
Operating parameters of coolant for high performance condensers			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant tube [mm]	ID 8		
Electrical Data Pump			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	4.4	3.2	1.5
Power consumption [W]	220	250	245
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse (2x) T [A]	6.3	6.3	3.15
Protection class motor	IP44		
Electrical Data Electrical Supply Unit			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	275	305	300
Fuse (2x) T [A]	6.3	6.3	3.15
Electrical Data Vacuum Cotroller			
Voltage [V]	90 - 260		
Frequency [Hz]	50/60		
Maximum current consump-tion [A]	10		
Fuse (internal) [mA]	280		

Tab. 5

**Liters in standard state (1,013 mbar)*

***Power consumption of the whole system inclusive pump and vacuum controller*

SBC 844.40

Pneumatic performance			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 4		
Delivery rate at atm. pressure [l/min]*	max. 40		
Pneumatic connection			
Hose connection [mm]	ID 10		
Ambient and media temperature			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
Other parameters			
Weight [kg]	23.7		
Dimensions: W x H x D [mm]	450 x 515 x 322		
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		
Operating parameters of coolant for high performance condensers			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant tube [mm]	ID 8		
Electrical Data Pump			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	4.4	3.2	1.5
Power consumption [W]	220	250	245
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse (2x) T [A]	6.3	6.3	3.15
Protection class motor	IP44		
Electrical Data Electrical Supply Unit			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	275	305	300
Fuse (2x) T [A]	6.3	6.3	3.15
Electrical Data Vacuum Cotroller			
Voltage [V]	90 - 260		
Frequency [Hz]	50/60		
Maximum current consump-tion [A]	10		
Fuse (internal) [mA]	280		

Tab. 6 **Liters in standard state (1,013 mbar)*
***Power consumption of the whole system inclusive pump and vacuum controller*

SBC 860

Pneumatic performance			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 2		
Delivery rate at atm. pressure [l/min]*	max. 60		
Pneumatic connection			
Hose connection [mm]	ID 10		
Ambient and media temperature			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
Other parameters			
Weight [kg]	25.0		
Dimensions: W x H x D [mm]	314 x 552 x 437		
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		
Operating parameters of coolant for high performance condensers			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant tube [mm]	ID 8		
Electrical Data Pump			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	4.8	2.7	1.6
Power consumption [W]	260	240	220
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse (2x) T [A]	6.3	6.3	3.15
Protection class motor	IP54		
Electrical Data Electrical Supply Unit			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	340	320	300
Fuse (2x) T [A]	6.3	6.3	3.15
Electrical Data Vacuum Cotroller			
Voltage [V]	90 - 260		
Frequency [Hz]	50/60		
Maximum current consump-tion [A]	10		
Fuse (internal) [mA]	280		

Tab. 7

**Liters in standard state (1,013 mbar)*

***Power consumption of the whole system inclusive pump and vacuum controller*

SBC 860.40

Pneumatic performance			
Max. permissible operating pressure [bar g]	1.0		
Ultimate vacuum [mbar abs.]	≤ 4		
Delivery rate at atm. pressure [l/min]*	max. 60		
Pneumatic connection			
Hose connection [mm]	ID 10		
Ambient and media temperature			
Permissible ambient temperature	+ 5 °C to + 40 °C		
Permissible media temperature	+ 5 °C to + 40 °C		
Other parameters			
Weight [kg]	25.3		
Dimensions: W x H x D [mm]	314 x 552 x 437		
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		
Operating parameters of coolant for high performance condensers			
Permissible pressure [bar g]	3		
Permissible temperature	- 15 °C to + 20 °C		
Condenser connectors for coolant tube [mm]	ID 8		
Electrical Data Pump			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	4.8	2.7	1.6
Power consumption [W]	260	240	220
Maximum permitted mains voltage fluctuation	+/- 10 %	+/- 10 %	+/- 10 %
Fuse (2x) T [A]	6.3	6.3	3.15
Protection class motor	IP54		
Electrical Data Electrical Supply Unit			
Voltage [V]	100	115	230
Frequency [Hz]	50/60	60	50
Maximum current consump-tion [A]	340	320	300
Fuse (2x) T [A]	6.3	6.3	3.15
Electrical Data Vacuum Cotroller			
Voltage [V]	90 - 260		
Frequency [Hz]	50/60		
Maximum current consump-tion [A]	10		
Fuse (internal) [mA]	280		

Tab. 8 **Liters in standard state (1,013 mbar)*
***Power consumption of the whole system inclusive pump and vacuum controller*

5. Design and Function

5.1. Pump

5.1.1. Design

N 840.3 FT.18 and N844.3 FT.18

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

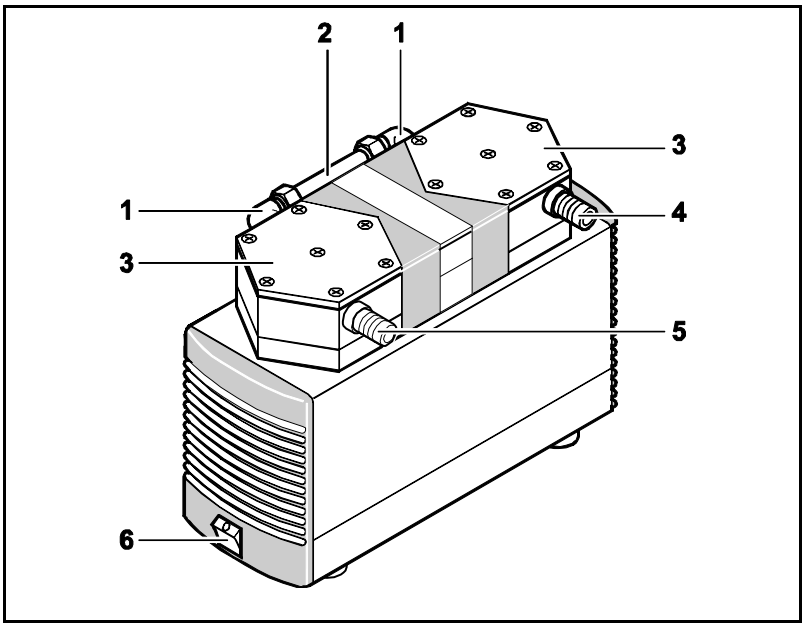

Fig. 2: Diaphragm pump (shown: pump N 840.3 FT.18)

N 840.3 FT.40.18 and N 844.3 FT.40.18

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

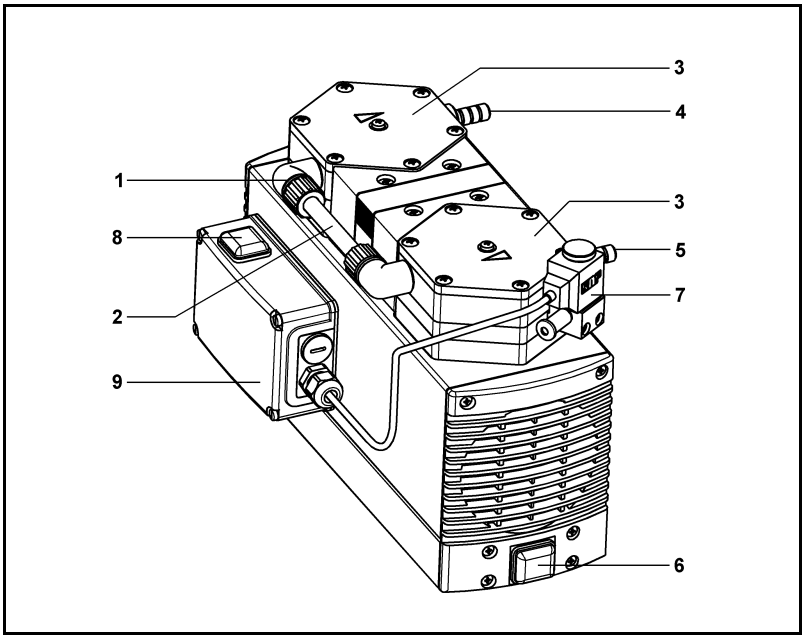

Fig. 3: Diaphragm pump (shown: pump N 840.3 FT.40.18)

N 860.3 FT and N 860.3 FT.40

1 Outlet (pressure side)
2 Connection piece
3 Pump head
4 Pneumatic connection
5 Venting valve (only pump N 860.3 FT.40 /system SBC 860.40)
6 Pump head
7 Inlet (suction side)
8 Fan cover
9 Connecting box

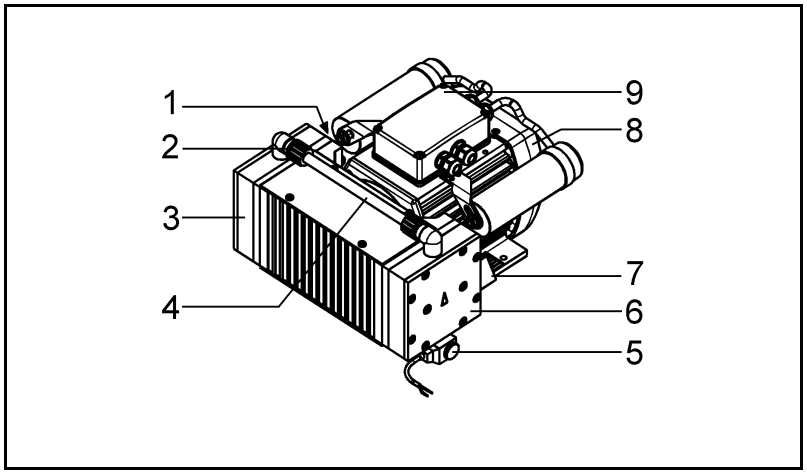

Fig. 4: Diaphragm pump (shown: pump N 860.3 FT.40)

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

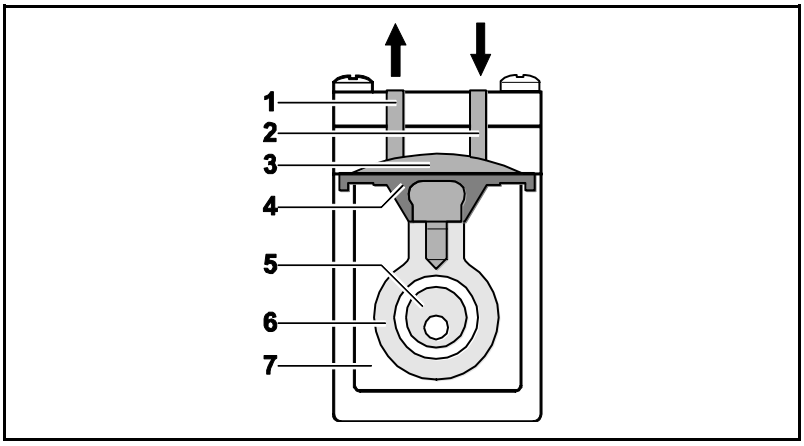

Fig. 5: Pump head

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 Electrical supply unit (behind the pump)
2 Vacuum pump
3 Base plate
4 Separator
5 High performance condenser
6 Glas flask of high performance condenser
7 Main vacuum controller

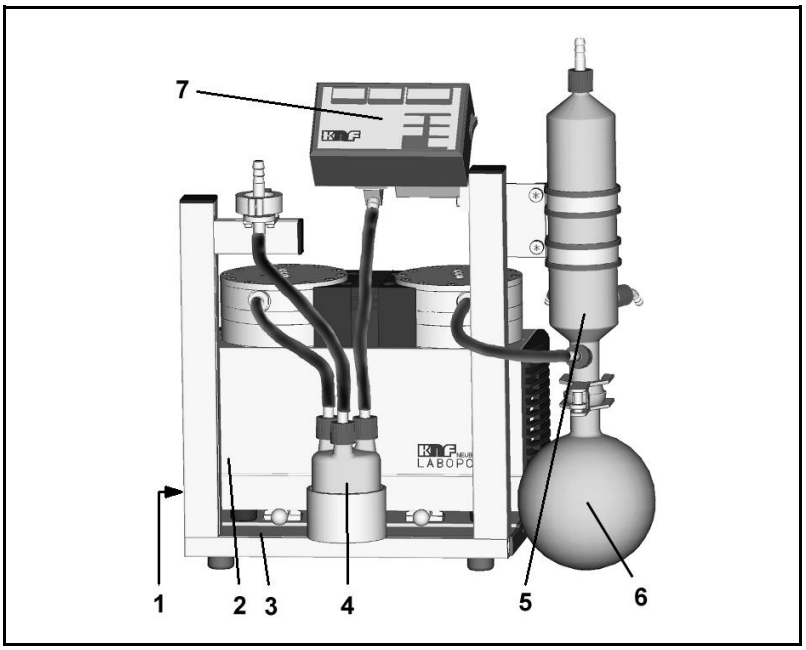

Fig. 6: Description LABOBASE Systems SBC 840, SBC 840.40, SBC 844 and SBC 844.40

1 Glas flask high performance condenser
2 Separator
3 Base plate
4 Electrical supply unit
5 Vacuum pump
6 Main vacuum controller
7 High performance condenser

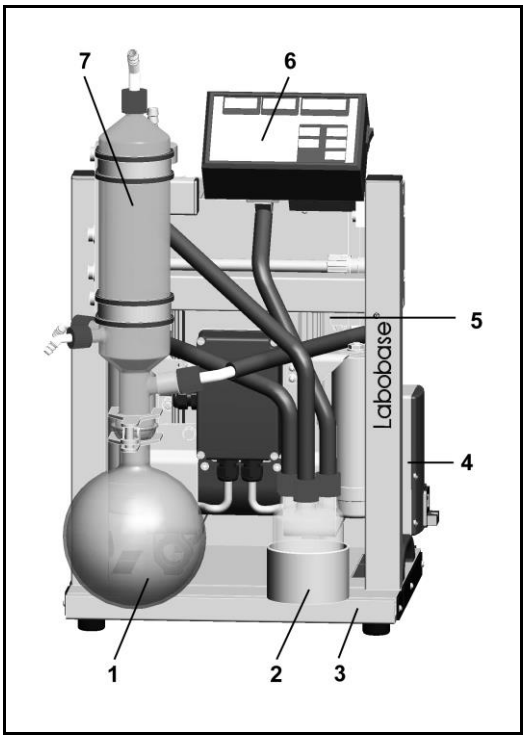

Fig. 7: Description LABOBASE Systems SBC 860 and SBC 860.40

The LABOBASE® multi-user vacuum system consists of:

- Vacuum pump;
- high performance condenser with coolant valve;
- separator;
- main system vacuum controller, which regulates the pump and coolant valve on the condenser;
- electrical supply unit;
- optional equipment for the work stations: per workstation pneumatic connections, and
  - a vacuum controller (including vent valve) and a vacuum valve
  - or a manual vacuum supply point.

Each workstation is connected to the vacuum pump; workstations with an own vacuum controller can regulate their vacuum separately.
A base plate with support rods supports all system parts.

The Vacuum Pump

The vacuum pump is capable of starting against vacuum, and has a thermal switch to protect against overheating. The pump is mounted on a baseplate, and can be removed after withdrawing two fastening rods (systems SBC 840, SBC 840.40, SBC 844 and SBC 844.40).

The Separator (suction side)
The separator collects 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 vapour 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 condensation temperature is maintained by running cold water or recirculated coolant through the condenser.

The Main Vacuum Controller

The main vacuum controller regulates the pump and controls the coolant valve via electrical supply unit.

Electrical Supply Unit

The Electrical Supply Unit consolidates all of the electrical connections for the system and also regulates the pump and the coolant valve.

5.2.2. Function Drying System (only for .40 versions)

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

Drying system control box

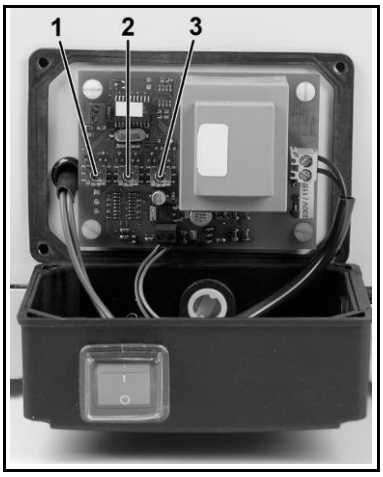

*Fig. 8: Control box (opened) of drying system with switches **1**, **2**, **3***

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	10.0
1	60.0	1.5	15.0
2	90.0	2.0	25.0
3	120.0	2.5	40.0
4	150.0	3.0	60.0
5	180.0	3.5	120.0
6	210.0	4.0	180.0
7	240.0	5.0	300.0
8	300.0	7.5	600.0
9	360.0	10.0	900.0

Tab. 9: 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.

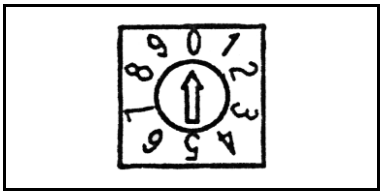

Fig. 9: Switch for setting the drying system

Switch	Switch setting	Time in sec
1	6	210.0
2	2	2.0
3	3	40.0

Tab. 10: Work setting

Changing settings

DANGER

Extreme danger from electrical shock!

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

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

1. Disconnect the pump from the mains by pulling the plug out of the socket.
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. 8).

i 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. 8). See Table 9 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. Installation and connection

Only install the pumps/systems 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. 6, page 17).

Removal of transport safety devices

Only LABOBASE systems SBC 860 and SBC 860.40: The vacuum system is supplied with two transport safety devices which must be removed before use (see fig. 10 and 11).

On both front sides:

1. Loosen screw A;
2. remove case B.

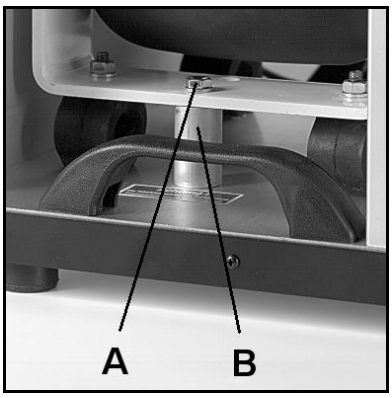

Fig. 10: Transport safety device attached

Fig. 11: Transport safety device removed

Tubing of vacuum system

If the tubing for the vacuum system has not yet been installed, this must be carried out as shown in fig. 12 (systems SBC 840, SBC 840.40, SBC 844 and SBC 844.40) or fig. 13 (systems SBC 860 and SBC 860.40). The tubes required (inside diameter 10 mm) come supplied with the system.

Tube-No.	Approx length [mm]
Fig. 12:	
1	155
2	195
3	265
4	155
Fig. 13:	
1	290
2	330
3	245
4	240

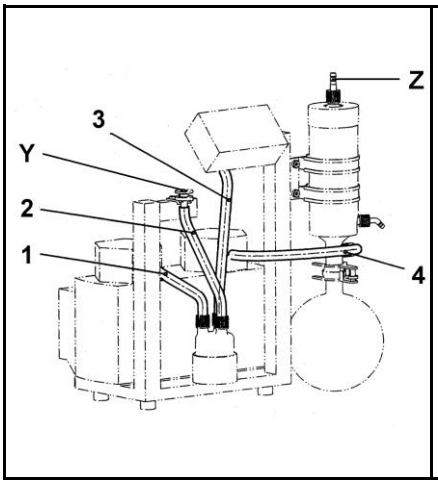

Fig. 12: Tubing of vacuum systems SBC 840, SBC 840.40, SBC 844 and SBC 844.40

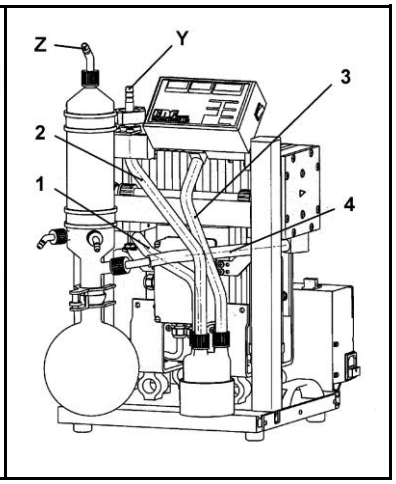

Fig. 13: Tubing of vacuum system SBC 860 and SBC 860.40

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. Attach vacuum system to vacuum connections to the workplace as follows:
   - Systems SBC 840 and SBC 844:
     to flange KF 10 (see Y in fig. 12)
   - System SBC 860:
     to hose connector (tube inside diameter 10 mm)
     (see Y in fig. 13)

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. 12/**Z**, 13/**Z**) to an exhaust.

Coolant connection of high performance condenser

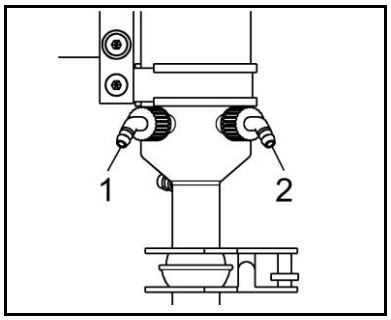

Fig. 14: Coolant supply of high performance condenser

1 Coolant inlet
2 Coolant outlet

➔ 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. 14.

➔ Connect coolant connection to the high perfomance 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.

Electrical Connections

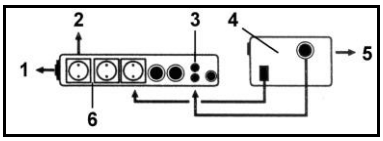

Fig. 15: Electrical connections

1 To System Power Connection
2 To Vacuum Pump
3 Connection vacuum controller
4 Vacuum Controller
5 To Coolant Valve
6 Electrical Supply Unit

The electrical connections should be made according to Fig. 15

➔ Insert plug of the Electrical Supply Unit into 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	▪ All hoses attached properly
Pump/ System	▪ 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. ▪ Vapour outlet on the top of the high performance condenser is not blocked. ▪ The media are compatible with each other when running two different proccesses simultaneously. ▪ No reactive, explosive or otherwise hazardous mixtures may be produced when ventilating the vacuum system through the air inlet. (If necessary, use an inert gas.)
System	▪ Clamp connections are tight ▪ All cables attached properly

Tab. 11

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.

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 when running several different processes simultaneously the media are compatible with each other.

➔ Make sure that no reactive or explosive mixtures will be produced when ventilating the vacuum system through the vent valve (only for .40 versions).

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. Switching pump/system on and off

Switching system on

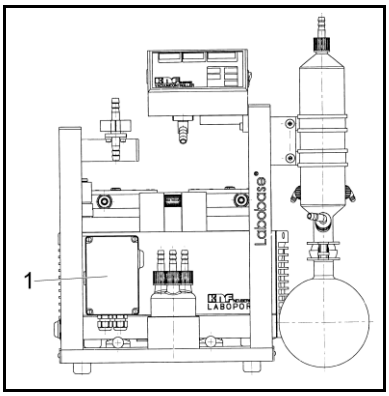

Fig 16: Control box of drying system (systems SBC840.40 and SBC844.40)

1 Control box

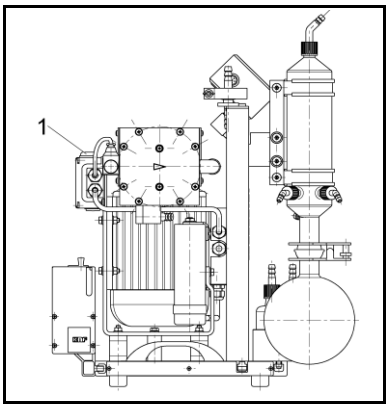

Fig. 17: Control box of drying system (system SBC860.40)

1 Control box

ℹ The pump/system may not start up against pressure during switch-on. This also applies in operation following a brief power failure. 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.

Only for systems SBC 840.40, SBC 844.40 and SBC 860.40:

➔ If cyclic drying of the pump heads is required in the current evacuation process, switch the drying system on at the mains switch of the control box (see fig. 16/**1** or fig. 17/**1**).

ℹ The drying system will only work with the pump switched on.

ℹ 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.

ℹ 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.

ℹ For the variables t_1 to t_3 of the drying system, see chapter 7.4.

➔ Switch on the vacuum controller (fig. 6/**7** or fig. 7/**6**, page 17) by the switch on the side.

ℹ The pumps from systems SBC 840, SBC 840.40, SBC 844 and SBC 844.40 each additionally have their own switch. The vacuum system can only operate if this switch is "on".

Switching off the system/removing from operation

➔ When transferring aggressive media, flush the pump prior to switch-off to increase the service life of the diaphragm (see chapter 8.2.1).

Only for systems SBC 840.40, SBC 844.40 and SBC 860.40:

➔ If the drying system is switched on: Switch the drying system off at the main switch of the control box (see fig. 16/**1** or fig. 17/**1**).

➔ Open pressure and suction lines to normal atmospheric pressure.

➔ Switch off the Main Vacuum Controller.

i When the Main Vacuum Controller is switched off, the pump is automatically switched off with it.

➔ Disconnect the power source to the Electrical Supply Unit.

➔ Empty and clean separator (see chapter 8.2.3) and glas flask of high performance condenser (see chapter 8.2.4).

Only for System SBC 860 and 860.40:

➔ If the vacuum system is to be transported, the transport safety devices must be used (see chapter 6.2).

7.4. Operating the Main Vacuum Controller

7.4.1. Definitions/Elements of Vacuum Controller

1 Display of t_A and remaining operating time before the pump switches off

2 Display of threshold P_1 and P_2:
- When the pump is running: lower threshold value P_1
- When the pump is not running: upper threshold value P_2

3 LED display of pump status
- LED illuminated: pump is running
- LED off: pump is not running

4 Display of actual pressure in mbar

5 LED display for pressure reading in mbar

6 LED display for pressure reading in torr

7 On/Off-Switch

8 LED display for Controller operation

9 MAN-Key
Starts an evacuation after interruption by the STOP-Key

10 STOP-Key
Stops the program running

11 UP-Key
(for inserting values)
- One-touch: Single step adjustment
- Hold down: Running adjustment

12 DOWN-Key
(for inserting values)
- One-touch: Single step adjustment
- Hold down: Running adjustment

13 SET-Key
To call up and change previously inserted set points

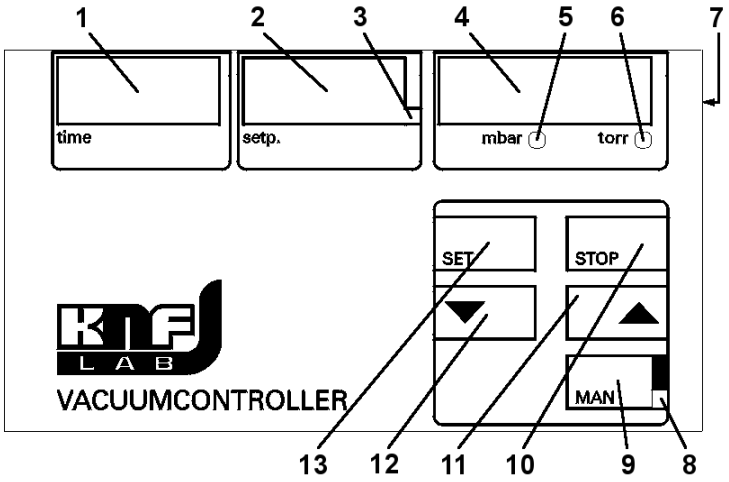

Fig. 18: Vacuum Controller

P_1: Lower threshold value of the pump in mbar
(factory set to 10 mbar)
The pressure at which the pump switches off or at which starts the delay time t_A.

P_2: Upper threshold value of the pump in mbar
(factory set to 600 mbar)
The pressure at which the pump restarts.

t_A: Delay time:
The period of time from the instant the pressure equals or falls below the lower threshold value P_1 – but without exceeding it again – until the pump stops (in min) (factory setting for t_A = 60 min)

t_C: Delay time before the coolant circuit switches off (in min)
(factory set to 0 min).

7.4.2. Vacuum Regulation

- After switching on the pump and the Main Vacuum Controller, the controller will be in the „Start“ mode and the pump will immediately begin to evacuate.
- If the lower threshold value P_1 for the pump is maintained or bettered over the period t_A, the pump switches off.

  Example:

  P_1 = 10 mbar

  t_A = 60 min.

  If the pump has provided a vacuum of ≤ 10 mbar for 60 minutes, it will switch off.
- If the pressure climbs to the upper threshold value P_2, the pump will restart.
- During pump operation the coolant valve is actuated. A delay time t_C for the cooling liquid can be entered (see chapter 7.4.3).

7.4.3. Display and Changing of values for P_1, P_2, t_A, t_C

- Using the SET-Key (fig. 18/**13**), the current parameters are indicated.
- In the centre display (**2**), the expressed value is shown, i.e. „P_1“, „P_2“, „t_A“ oder „t_C“). In the right hand display (**4**), the actual value is shown.
- The different parameters can be called up using the SET-Key as follows:

  Press once: P1

  Press twice: tA

  Press three times: P2

  Press four times: tC

  Press five times:
  The controller reverts to the original working conditions, however any changes in value are retained.
- To change the parameters, use the UP and DOWN arrow keys (**11**) and (**12**).
- ▸ 10 seconds after the last key stroke, the controller will automatically revert back to the original operating condition and will store any altered values. In this case, pressing the key five times is not necessary.

7.4.4. Changing of pressure unit

The physical unit indicating the pressure can be chosen between mbar and torr.

1. When the controller is switched off, press the MAN key (**9**) and switch on the controller with the On/Off-Switch (**7**) at the same time.
2. With the DOWN-Key (**12**) and the UP-Key (**11**) you can choose between the units hPA (mbar) and torr.

   The LEDs for mbar (**5**) and torr (**6**) show the selected pressure unit.
3. Press STOP-Key (**10**).

   The new pressure unit will be stored after 5 seconds.

   The contoller changes to the operating mode.

7.4.5. Calibration

1. Whilst holding the SET-Key down, switch on the vacuum controller with the on/off-switch.

   The "time" display shows "CAL“.

   If the "time" display does not show "CAL“, press SET key.

   The "time" display shows "CAL“.
2. Press UP-key.

   The "setp“ display shows "H1“ .
3. Insert the actual atmospheric pressure, using the UP- or DOWN-Keys.
4. Press SET-key to override.

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. 12

8.2. Cleaning

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).

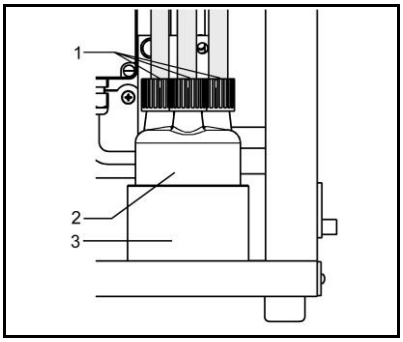

Fig. 19: Separator

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 (Fig. 19/**1**).
2. Remove separator (**2**) from the holder (**3**) and dispose of contents according to applicable regulations in your area. Then rinse out the separator.
3. Replace separator (**2**) into the holder (**3**).
4. Screw the connecting nozzles (**1**) back on.

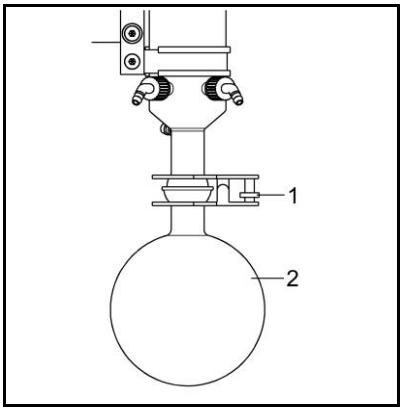

Fig. 20: High performance condenser

8.2.4. Emptying and Cleaning the Condenser

1. Carefully remove the spring clamp (Fig. 20/**1**) while supporting the glass flask (**2**).
2. Empty and clean the glass flask (**2**) – observing safety precautions.
3. Re-connect the glass flask (**2**) to the condenser and replace the spring clamp (**1)**.

8.3. Changing Diaphragm and Valve Plates/Sealings

8.3.1. SBC 840, SBC 840.40, SBC 844, SBC 844.40

Conditions

- Pump is switched off and mains plug is removed from the socket of electrical supply unit
- 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. 13

Information on procedure

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

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).

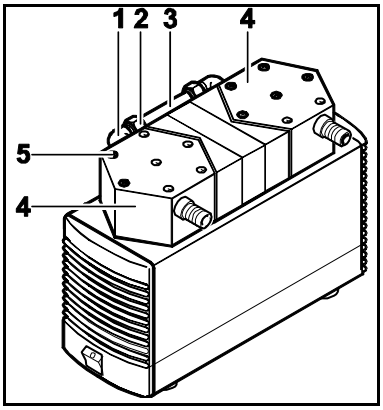

Fig. 21: Removing pump head

Removing pump head

Pumps N 844.3 FT.18 und N 844.3 FT.40.18 (vacuum systems SBC 844 und SBC 844.40) have 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. 24/**5**), head plate (fig. 24/**6**), intermediate plate (fig. 24/**8**) and adapter relatively to each other by a drawing line with a felt-tip pen. This helps to avoid incorrect assembly later.

At pumps N 844.3 FT.18 and N 844.3 FT.40.18 (vacuum systems SBC 844 and SBC 844.40), twelve (instead of six) screws must be loosened in the next work step.

3. Loosen the outer screws (**5**) on the pump heads.
4. Carefully remove pump heads.

For pumps N 844.3 FT.18 and N 844.3 FT.40.18 (vacuum systems SBC 844 and SBC 844.40): The magnetic valve of the drying system remains fitted in this situation.

Change diaphragm

Replace the diaphragms of pump heads consecutively in order to ensure that the same number of diaphragm spacers is used as before.

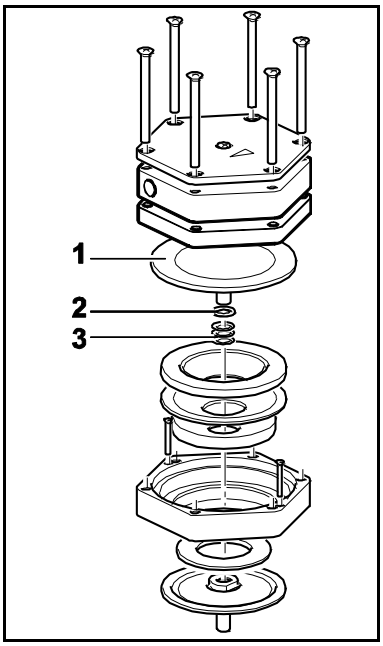

Fig. 22: Changing diaphragm

1. Push down one diaphragm until other diaphragm is pushed upwards to its highest position.
2. Carefully unscrew 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. Complete steps 1 through 4 for the second pump head.

Change valve plates/sealings

Replacing the valve plates/sealings of both pump heads consecutively.

At pumps N 840.3 FT.40.18 and N 844.3 FT.40.18 (vacuum-systems SBC 840.40 and SBC 844.40), three (instead of one) screws must be loosened in the first work step.

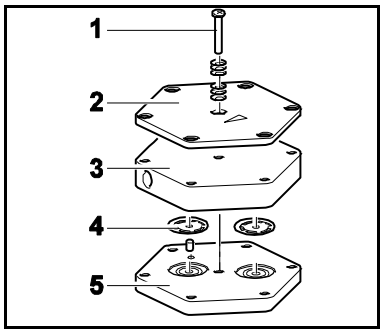

Fig. 23: Changing valve plates/sealings

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 the steps 1 to 5 for the second pump head.
7. Dispose of the old diaphragms and valve plates/sealings properly.

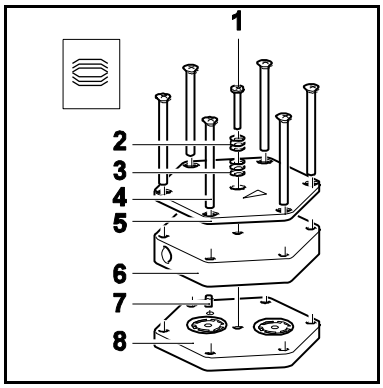

Fig. 24: Refitting pump head

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.

At pumps N 844.3 FT.18 and N 844.3 FT.40.18 (vacuum-systems SBC 844 and SBC 844.40), twelve (instead of six) screws must be tightened in the next work step.

5. Gently tighten screws (**4**) in diagonal order.

At pumps N 844.3 FT.18 and N 844.3 FT.40.18 (vacuum-systems SBC 844 and SBC 844.40), 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. 24).
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 suction and pressure line to the system.
3. Insert the pumps power cordplug into the socket of the electrical supply unit of system (**1** in fig. 6, page 17).
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).

8.3.2. SBC 860, SBC 860.40

Conditions

- Pump is switched off and mains plug is removed from the socket of electrical supply unit
- Pump is clean and free of hazardous materials
- Tubes removed from pump's pneumatic inlet and outlet
- Coolant tubes removed from high performance condenser
- Separator is emptied

Tools and material

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

Tab. 14

Information on procedure

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

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).

1 Top plate
2 Head plate
3 Intermediate plate
4 Diaphragm
5 Diaphragm spacer
6 Connecting rod
7 Counterweight
8 Cross recessed raised cheese screw
9 Valve plate/sealing
10 Cross recessed raised countersunk head screw
11 Disk spring
12 Side-panel
13 Union nut of pneumatic head connection
14 Housing

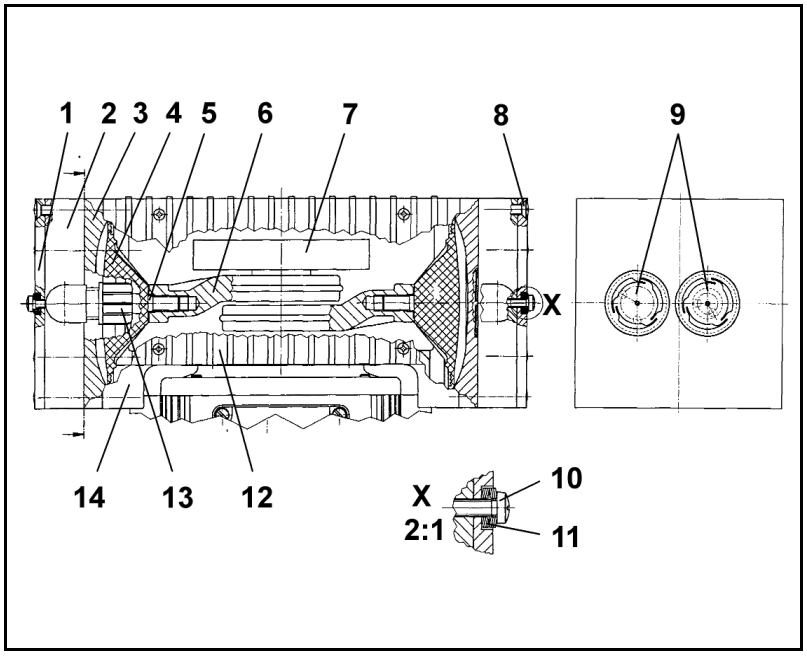

Fig. 25: Cross chapter of the pump (symbolic) (for vacuum system SBC 860 and SBC 860.40)

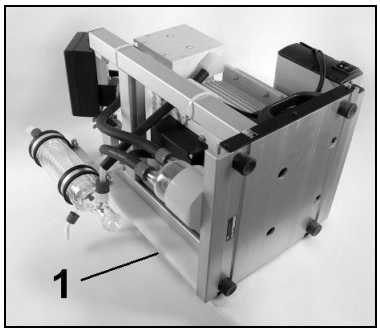

Fig. 26: Positioning of the vacuum system for service

1 Table edge

a) Preparatory steps

1. Remove the glass bulb from the high-performance condenser and empty it (see chapter 8.2.4).

Do not refit the glass bulb.

2. Slacken the coolant connection nipples on the high-performance condenser (see fig. 14, page 23).
3. On the pneumatic head connections, loosen one of the union nuts (fig. 25/**13**) by hand. Then slightly loosen the angle-fitting in the pump head by turning it anticlockwise, so that the connecting tube can be pulled out.
4. Loosen the screws of the accessible side panel (fig. 25/**12**) and remove cover.

b) Removing pump head

1. Position the complete vacuum system in such a way that it lies on one of its faces with one pump head pointing upwards (see fig. 26). To do this:
   - remove the fuse unit (electrical fuse) of the Electrical Supply Unit (situated directly underneath the mains supply of the Electrical Supply Unit (fig. 7/**4**)),
   - position the vacuum system on one of its faces (while positioning system, hold pump until pump head lies on table!).
2. At one pump head: Make a mark on the top plate (fig. 25/**1**), head plate (**2**), intermediate plate (**3**), and housing (**14**) with a felt-tip pen. This is to ensure that the parts will be reassembled correctly at a later stage.

3. Undo the eight screws (**8**) and lift the pump head off the housing (**14**).

c) Changing diaphragms

1. Move the counterweight (**7**) to bring the diaphragm (**4**) to top dead centre.
2. Using a small screwdriver, between the housing and the outer edge of the diaphragm, carefully lift the edge of the diaphragm lightly upwards at one point (making sure not to damage the housing). Screw anticlockwise to loosen the diaphragm, but do not remove it altogether.
3. Reposition the vacuum system.
4. Remove the diaphragm.
5. Take the diaphragm spacer(s) (**5**) off the connecting rod (**6**) and retain them.
6. Check that all parts are free from dirt and clean them if necessary.
7. Put the diaphragm spacer(s) (**5**) on the thread of the new diaphragm (**4**).
8. Fit the new diaphragm (**4**): hold the connecting rod (**6**) with one finger, and gently screw in (clockwise) the diaphragm with diaphragm spacers.
9. Position the vacuum system on one of its faces (while positioning system, hold pump until pump head lies on table!).
10. Move the counterweight (**7**) until the diaphragm is at the top dead centre. Using a small screwdriver, between the housing and the outer edge of the diaphragm, carefully lift the edge of the diaphragm lightly upwards at one point. Now grip the edge of the diaphragm on opposite sides (do not overstretch the diaphragm!) and tighten the diaphragm clock-wise.

d) Changing valve plates/sealings

1. Undo the both screws (**10**).
2. Separate the head plate (**2**) with top plate (**1**) from intermediate plate (**3**).
3. Remove the valve plates/sealings (**9**) 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 (**9**) 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. Move the counterweight (**7**) to bring the diaphragm (**4**) to medium position.
2. Place the intermediate plate (**3**), with valve plates/sealings (**9**) on the housing, in the position indicated by the marking.
3. Place the head plate (**2**) on the intermediate plate (**3**) in the position indicated by the marking.
4. Place top plate (**1**) in position and insert screws (**10**) with disk springs (**11**), and tighten them until the screw heads are just fully seated (do not completely tighten the screws, this follows in step 8!).

i The concave side of the first three disk springs must point away from the screw head, the next three towards it (see fig. 25, detail X).

5. Gently tighten the screws (**8**), evenly and diagonally.
6. Move the counterweight (**7**) to check that the pump rotates freely.
7. Now tighten screws (**8**) firmly (hand-tight).
8. Tighten each of the screws (**10**) a half-turn more.
9. Reposition the vacuum system.

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

i At steps b) 1. and c) 9 position the complete vacuum system in such a way that the second pump head is pointing upwards

f) Final steps

1. If necessary:
   - fix glas flask to condensor
   - insert the fuse unit into the Electrical Supply Unit.
   - remount the coolant connection nipples on the high-performance condenser
2. 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 union nut (**13**).
3. Refit the side-panel (**12**).
4. Reconnect suction and pressure line to the system.
5. Reconnect coolant tubes to high performance condenser (see chapter 6, page 21)
6. Reconnect the pump to the electricity supply.

9. Troubleshooting

DANGER

Extreme danger from electrical shock!

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

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

➔ Check the pump (see Tab. 15 to 17).

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.	➔ Detach the condensate source from the pump. ➔ Flush pump (see chapter 8.2.1). ➔ Systems SBC 840.40, SBC 844.40, SBC 860.40: Switch the drying system on or reduce t_3 respectively (see chapter 7.4 with regard to changing the value which has been set)
There is gauge pressure on pressure side and at the same time vacuum or a pressure above atmospheric pressure on suction side.	➔ Change the pressure conditions.
All workstations together demand a flow rate that exceeds the capacity of the pump.	➔ Reduce flow.
Pneumatic lines or connection parts have an insufficient cross section or are throttled.	➔ 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.	➔ Check that tubes sit correctly on hose nozzles. ➔ Replace leaky tubes. ➔ Eliminate leaks.
Connections or lines completely or partially jammed.	➔ Check connections and lines. ➔ Remove the jamming parts and particles.
Head parts are soiled.	➔ Clean head components.
Diaphragm or valve plates/sealings are worn.	➔ Replace diaphragm and valve plates/sealings, (see chapter 8.3).
After diaphragm and valve plates/sealings have been replaced	➔ 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. 24/**4** or fig. 26/**8**) of the top plate crosswise.

Tab. 15

System does not run	
Cause	Fault remedy
Vacuum system is not connected with the power source.	➔ Connect vacuum system to mains power.
No voltage in the power source	➔ Check room fuse and switch on if necessary.
Vacuum system is not switched on	➔ Switch on vacuum controller.
Pump is not switched on (not systems SBC 860 and SBC 860.40)	➔ Switch on pump (see fig. 2/**6** or fig. 3/**6**, page 15).
Mistake in operating the vacuum controller.	➔ Operate the vacuum controller correctly (see chapter 7.4).
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.
Fuse in the pump is defective (not systems SBC 860 and SBC 860.40)	➔ Remove pump's mains plug from the socket. ➔ Loosen marked lid on underside of the pump. ➔ Select and replace suitable fuse (see chapter 4).
A fuse of the Electrical Supply Unit is defect	➔ Remove vacuum system mains plug from the socket. ➔ Fuses are located at the end of Electrical Supply Unit below the mains connection.
The fuse of the vacuum controller has been triggered.	ℹ After a short period the vacuum controller is re-activated automatically.
Incorrect electrical connection in the Electrical Supply Unit	➔ Correctly connect the pump and vacuum controller.

Tab. 16

Vacuum Controller shows unrealistic values	
Cause	Fault remedy
The factory-set pressure equalization has changed.	Contact KNF (see page **Fehler! Textmarke nicht definiert.**).
Sensor is defective	Contact KNF (see page **Fehler! Textmarke nicht definiert.**).

Tab. 17

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 pump, together with completed Health and Safety Clearance and Decontamination Form (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
SBC 840	057359
SBC 840.40	057359
SBC 844	057359
SBC 844.40	057359
SBC 860	047499
SBC 860.40	047499

Tab. 18

10.2. Accessory

Accessory	Order-No.
Gas washing bottle 0.5 liter	045886
Coolant valve $G^1/_2$, ID 8	045075

Tab. 19

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 the following information, among other things:

- physiological safety
- whether medium-contacting parts have been cleaned
- whether the equipment has been decontaminated
- media that have been pumped 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 packing.

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
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