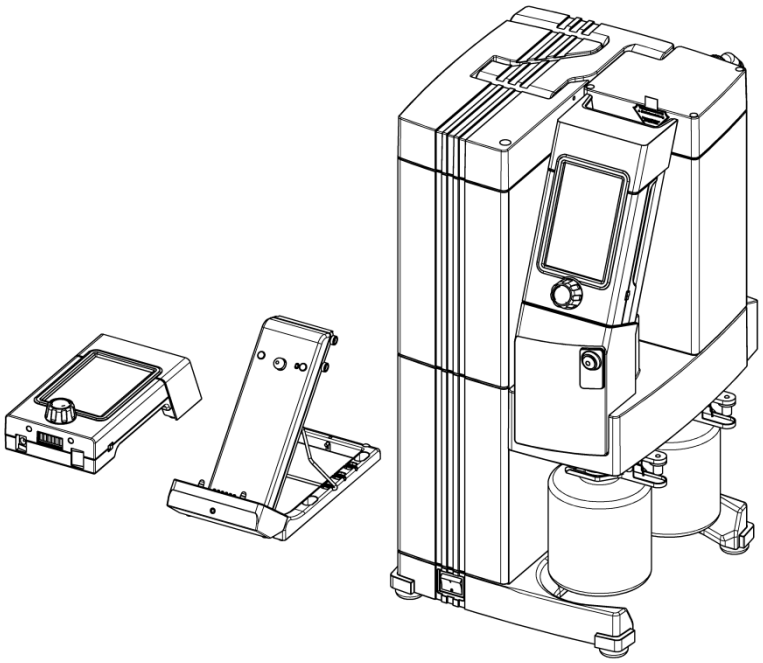
Operating Instructions
Read and observe these Operating Instructions!

Vacuum pump system

SCC 950



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Translation of original Operating Instructions, English

Items included in delivery:

- Vacuum pump system, including two hand terminals (batteries included)
- Separate charging station for second hand terminal
- Bracket to attach the charging station and second hand terminal to the vacuum pump system
- Coated collection flasks (2 x)
- Flask clips (2 x)
- Power cable
- USB cable for connecting vacuum pump system to PC
- Power supply for hand terminal
- Operating instructions
- Abbreviated instructions
- CD with digital operating instructions and software for operating the vacuum pump system with a PC

Transportation protection

Hand terminal 1 of the vacuum pump system is secured at the factory in order to prevent damage during transportation.

The transportation protection must be removed before hand terminal 1 can be removed. Refer to Chapter 6 *Setup and connection.*

Hand terminal 2 is enclosed without a transport securing device.

Content Page

1. About this document

1.1. Use of the Operating Instructions

The Operating Instructions are an integral part of the vacuum pump system.

➔ Carefully study the Operating Instructions before operating the vacuum pump system.

➔ Always keep the Operating Instructions handy in the work area.

➔ Forward the Operating Instructions to any subsequent owners of the vacuum pump system.

Custom systems

Customer-specific vacuum pump systems (model designations which begin with "PJ" or "PM") may differ from the Operating Instructions.

➔ In the case of custom systems, take note of any additionally agreed specifications.

i Compliance with the Operating Instructions is essential for safe and reliable operation of the vacuum pump system. Failure to do so may result in damage or injury.

1.2. Symbols and markings

Warning

WARNING

This symbol indicates a danger statement.

It also indicates the possible consequences of failure to observe the warning. The signal word (i.e. “Warning”) indicates the level of danger.

➔ Here you will see actions for avoiding the danger and potential consequences.

Danger levels

Signal word	Meaning	Consequences if not observed
DANGER	warns of immediate danger	Consequences include death or serious injuries and/or serious property damage.
WARNING	warns of potential danger	Death or serious injuries and/or serious property damage are possible.
CAUTION	warns of a potentially dangerous situation	Minor injuries or damage to property are possible.

Tab. 1

Other information and symbols

➔ This indicates an activity (step) that must be carried out.

1. This indicates the first step of an activity to be carried out. Any additional steps are numbered consecutively.

i This symbol indicates important information.

2. Use

2.1. Intended use

The SCC 950 vacuum pump system is designed for use in chemical, pharmaceutical, and biological laboratories. It is designed exclusively to transfer gases and vapors.

Make sure that the installation location is dry and that the system is protected against water in the form of rain, spray, splashes and drips.

The vacuum pump system is solely for use in indoor areas.

Owner's responsibility

Operating parameters and conditions

Only install and operate the vacuum pump system under the operating parameters and conditions described in Chapter 4, Technical data.

Protect the vacuum pump system against humidity.

Requirements for media to be transferred

Before using a medium, check the compatibility of the materials of the pump head, diaphragms, valves, seals and hoses with the medium.

Before transferring a medium, check whether the medium can be transferred safely.

Only transfer gases that remain stable under the pressures and temperatures occurring in the vacuum pump system.

High-performance condenser

The high-performance condenser may be used only at the pump outlet; there is a risk of implosion if it is used at the pump inlet.

Make sure the tubes for gas and cooling medium are correctly assigned on the high-performance condenser. Inlets and outlets of the gas connections must not be confused.

Accessories

Laboratory equipment or additional components connected to the vacuum pump system have to be suitable for use with the pneumatic capabilities of the vacuum pump system (see Chapter 4, page 9).

2.2. Improper use

The vacuum pump system must not be operated in potentially explosive atmospheres.

The vacuum pump system is not suitable for transferring dust.

The vacuum pump system is not suitable for transferring liquids.

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

The vacuum pump system must not be used to create vacuum and pressure simultaneously.

Never apply positive pressure to the suction side of the vacuum pump system.

3. Safety

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

Only use the vacuum pump system in a good technical and proper working order, in accordance with its intended use, with awareness of safety and potential hazards, and observing the advice within the Operating Instructions, at all times.

Personnel

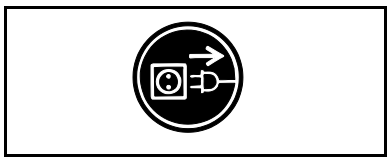
Make sure that only trained and instructed personnel or specially trained personnel work on the vacuum pump system. This especially applies to assembly, connection and servicing work.

Make sure that the personnel have read and understood the Operating Instructions, especially the "Safety" chapter.

Working in a safety-conscious manner

Ensure adherence to all pertinent accident prevention and safety regulations when working on and operating the vacuum pump system.

Do not subject parts of the body to vacuum.



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

Fig. 1: Notice sticker

Using the right hand terminal for the vacuum pump system

Ensure that personnel check before each use of the SCC 950 vacuum pump system that they have the correct hand terminal for the vacuum pump system. The vacuum pump system is equipped with a paging function for this purpose (see Paging the vacuum pump system, page 34).

Handling dangerous media

When transferring dangerous media, observe the safety regulations for handling such media.

Handling flammable media

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

Make sure that the temperature of the medium is always sufficiently below its ignition temperature in order to avoid ignition or explosion. This also applies to unusual operating situations.

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

Hence, make sure that the temperature of the medium is sufficiently below its ignition temperature, even when it is compressed to the maximum permissible operating pressure of the vacuum pump system. The vacuum pump system's maximum permissible operating pressure is specified in the Technical data (see Chapter 4, page 9).

Consider any external sources of energy, such as sources of radiation, that could additionally heat the medium.

In case of doubt, consult KNF customer service.

Ventilating the vacuum pump system

When ventilating the vacuum pump system with air or inert gas, be sure to prevent the formation of reactive or explosive media. The maximum permissible operating pressure at the ventilation connection (Fig. 2/**18**, p. 13) is 0.1 bar g.

Environmental protection

All replacement parts should be properly stored and disposed of in accordance with the applicable environmental protection regulations. Ensure adherence to the pertinent national and international regulations. This applies especially to parts contaminated with toxic substances.

Standards

The SCC 950 vacuum pump system conforms to the Directive 2011/65/EU (RoHS2).

The SCC 950 vacuum pump system conforms to the safety regulations of Directive 2014/30/EU concerning Electromagnetic Compatibility and Directive 2006/42/EC concerning Machinery. The following harmonized standards are met:

- DIN EN 61010-1
- DIN EN 61326-1 – Class A
- DIN EN 50581

In accordance with IEC 664 the systems conforms to:

- Overvoltage category II
- Pollution degree 2

Customer service and repairs

All repairs to the vacuum pump system must be carried out by the responsible KNF Customer Service team.

Housings with live parts may be opened by technical personnel only.

Use only genuine parts from KNF for servicing work.

4. Technical data

4.1. Vacuum pump system

Materials for parts in contact with the medium	
Pump head	PPS
Interconnection parts	PPS
Diaphragms	PTFE-coated
Valve plates	FFPM
Flat seals	FFPM
O-rings, green	FPM
O-rings, black	FFPM
Hose connector gas inlet	PVDF
Hose connector gas outlet	PP/PVDF
Hose connector inert gas connection	Brass, nickel-plated
Hoses	Norprene®
Adapter separator	PP
Adapter control unit	PPS
Adapter connector	PP
Pressure transducer	Ceramic / 1.4404
Ventilation valves/gas ballast valve: Anchor seal O-ring Tube	 FFPM FPM 1.4301
Vacuum valve	FFPM
Non-return valve	FFPM
Pneumatic performance	
Max. permissible operating pressure [bar g]	0
Ultimate vacuum [mbar abs.]	≤ 2 mbar ≤ 4 mbar with open gas ballast
Flow rate at atm. pressure [l/min]*	Approx. 50 (adjustable)
Max. permissible pressure at inert gas connection [bar g]	0.1
Ambient and media temperature	
Permissible media and ambient temperature	+10°C to + 40°C

** liters in standard state (1013 mbar at 0°C)*

Tab. 2 (1st part)

Other parameters	
Vacuum connection and gas outlet	For hose ID 10 mm
Ventilation connection	For hose ID 4 mm
Weight [kg]: (including hand terminals)	Approx.18.2
Dimensions W x H x D [mm]: - with charging station attached - without charging station attached	353 x 487 x 376 246 x 487 x 376
Maximum permissible ambient relative humidity (not condensing)	80% for temperatures up to 31°C, decreasing linearly to 50% at 40°C
Maximum altitude of installation [m above sea level]	2000
Coolant supply parameters (high-performance condenser)	
Permissible pressure [bar g]	3
Permissible temperature	- 15 °C to + 20 °C
Coolant connections on high-performance condenser	For hose ID 8 mm
Coolant-coated surface [cm^2]	Min. 470
Electrical data of vacuum pump system	
Nominal voltage** [V]	100-240 +/- 10%
Frequency [Hz]	50-60
Maximum operating current [A]	1.7
Max. power consumption [W]	150
Protection class	IP20
Vacuum pump system fusing [A]	2 x T2.5
Drive motor fusing	Electronic overcurrent protection

Tab. 2 (2nd part) *** Automatic mains power adjustment*

The pump of the vacuum pump system is supplied by a universal power supply with integrated overload protection. It is protected against overheating by a temperature sensor on the motor board and equipped with overcurrent protection.
If one of these safety functions is triggered, the pump will be shut down and must be manually reset, as follows:

➔ Separate vacuum pump system from the mains.

➔ Remove the cause(s) of the fault before restarting.

4.2. Hand terminal of the vacuum pump system

Dimensions: W x H x D [mm]	91 x 190 x 65
Weight [kg]	0.5
Operating voltage [V DC]	12
Operating current [A]	1.25
Wireless connection's frequency band [GHz]	2.4
Wireless range	Approx. 50 m without obstacles Approx. 10 m through walls
Power supply	Via integrated batteries or supplied power supply unit; cable length approx. 1.50 m, with adapter set: EURO / UK / USA / AUS
DC charging socket	 External diameter: 6.3 mm Inside diameter: 2 mm
Batteries	4 x AA 1.2 V 2300 mAh; quick-charge capable; see spare parts list in Chapter 11
Battery service life*	Up to 12 hours, depending on number of entries and data transmission
Charging time*	about 7 h

Tab. 3 ** Applies to standard included batteries*

When charging the hand terminals of the SCC 950 vacuum pump system, use only the original power supply from KNF.

Several SCC 950 vacuum pump systems can be operated simultaneously within the range of the wireless connection using the associated hand terminals.

The wireless connection between the hand terminal and the SCC 950 vacuum pump system is robustly compatible with cell phones and Bluetooth devices in the immediate area.

4.3. Software

The USB connection between the PC and the SCC 950 vacuum pump system is operated as an RS232 interface. Accordingly, in the operating system it is managed as an additional COM connection and can be addressed with conventional terminal software. Please see the delivered CD for information on operating the vacuum pump system via software.

5. Assembly and functions

5.1. SCC 950

5.1.1. Assembly of the vacuum pump system

1 Carrying handle
2 Holder for hand terminal 1 for transportation
3 High-performance condenser
4 Hand terminal 1 (removable; signals transmitted wirelessly)
5 Holder for hand terminal 1
6 Gas ballast switch
7 Flask clips for **8** and **9**
8 Pressure-side condensate collection flask (coated)
9 Suction-side condensate collection flask (coated)
10 Base
11 Power switch
12 Charging station for hand terminal 2
13 Hand terminal 2

14 Top fan
15 Control module
16 Connection for ventilating vacuum chamber 1
17 Connection for vacuum chamber 1 (gas inlet)
18 Connection for vacuum chamber 2 (gas inlet)
19 Connection for ventilating vacuum chamber 2
20 Bottom fan
21 Coolant valve connection
22 USB port for connecting vacuum pump system to PC
23 Fuse drawer
24 Mains plug connection
25 Coolant connection on high-performance condenser (discharge)
26 Coolant connection on high-performance condenser (feed)
27 Gas outlet

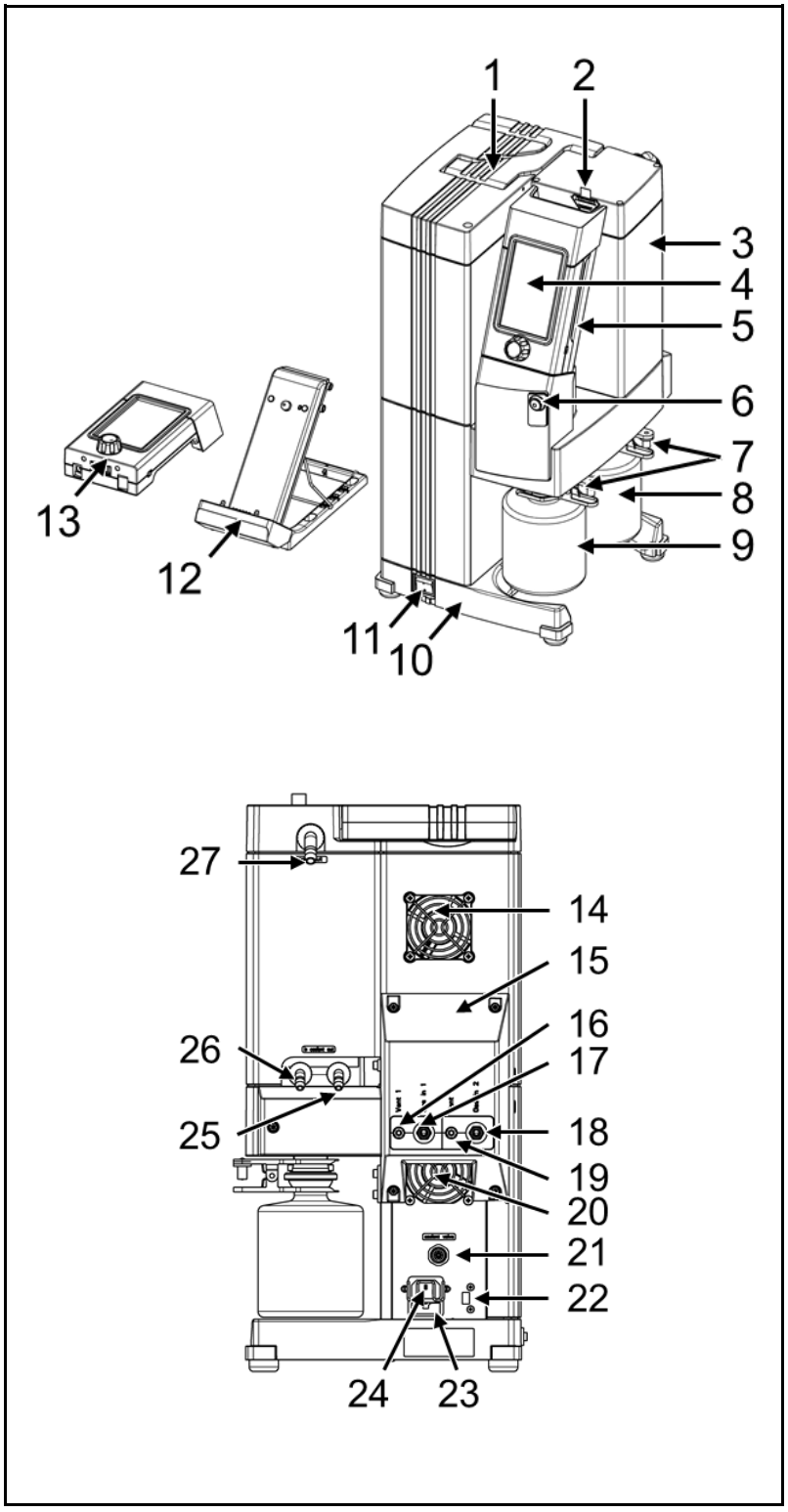


Fig. 2: SCC 950 vacuum pump system

The SCC 950 vacuum pump system uses a pump to generate a vacuum with which two separate processes can be controlled with the help of the two hand terminals (Fig. 2/**4** and **13**, p. 13) or a PC.

The control module (**15**) contains two vacuum (**17** and **18**) and two ventilation connections (**16** and **19**). Integrated non-return valves in the vacuum connections stop the two processes from affecting each other. The integrated pressure sensors each determine the current process pressure.

Collection flask **(9)** collects on the suction side of the pump particles and drops that were, contrary to the requirements of the pump, suctioned from the vacuum chamber. The collection flask is coated (implosion protection) and fastened to the vacuum pump system via a flask clip (**7**).

The high-performance condenser (**3**) at the pump outlet recovers solvent from the transferred gas instead of allowing it to get into the environment or the fume hood. The high-performance condenser is surrounded by a shell for temperature insulation and explosion protection.

Solvents separated in the high-performance condenser are collected in the collection flask (**8**), which is coated for explosion protection. A flask clip (**7**) fastens the glass flask to the condenser flange. A recirculating cooler or continuously flowing cold water (or another cooling medium) cools the high-performance condenser to the condensation temperature.

The charging station (**12**) is enclosed with the delivery and can simply be placed next to the vacuum pump system. It is used to charge hand terminal 2 (**13**) when hand terminal 1 (**4**) is on the vacuum pump system. If required, it can also be fixed to the vacuum pump system with the enclosed bracket (see Chapter 6.1, p. 19ff).

5.1.2. Vacuum pump system functions

The vacuum pump system can be operated in four different modes:

- **Evacuate**
  The vacuum pump system evacuates a vacuum chamber with adjustable pump capacity.
- **Pressure Control**
  The vacuum pump system controls the system pressure to the selected value (constant pressure).
- **Automatic**
  The vacuum system independently finds the sample's vapor pressure and adjusts the process pressure accordingly.

  In operating mode "Automatic" only one active process can be operated at a time. A possible second process can only be started after ending the first process.
- **Function**
  The vacuum system controls the pressure according to the entered pressure curve. Up to 10 different pressure curves

can be stored. The following process parameters can be entered:

- Setpoint pressure at various times after starting the process
- Coolant valve (accessory) ON and OFF with point in time after start of process
- Option "Jump" with time after the start of the process:
  The system evacuates/ventilates to the required pressure as quickly as possible.
- Option "Automatic" with time after the start of the process:
  Automatic detection of the boiling pressure
  If the set limit pressure is reached without a vapor pressure, the program goes to the next function step.
- Option "Automatic Plus" with time after the start of the process:
  Automatic detection of the vapor pressure with subsequent pressure reduction.

If one of the two options "Automatic " or "Automatic Plus" is set, again only one active process can be operated on the vacuum pump system.

At any time during an active process, you can switch to **manual process control**. Functions for evacuation and pressure control are available simultaneously. When activating manual process control, the current actual pressure will be adopted as the first setpoint pressure. In other words, process pressure will be initially "frozen" at the current value.

For smart process control, the modes of operation **can be combined as you wish**. For example, after boiling point detection in automatic mode, the following modes of operation can be used to specifically distill the solvent off:

- Evacuate
  (constant rate of evaporation for optimum utilization of the condenser)
- Function
  (operation at a specified pressure ramp to achieve separation of higher boiling components)
- Manual process control
  (active control of the distillation via the setpoint pressure)

To change to a different operating mode, the process is stopped and then restarted in the new mode.

Gas ballast

The gas ballast switch (Fig. 2/**6**) can be used to open and close the gas ballast valve on the vacuum pump system's pump (see Chapter 5.3).

5.1.3. Hand terminals

Assembly

1 Upper grip
2 Touchscreen
3 I/O switch
4 Power supply socket 12 V DC
5 Rotary knob for:
- adjusting pump speed and setpoint pressure
- switching to manual operation

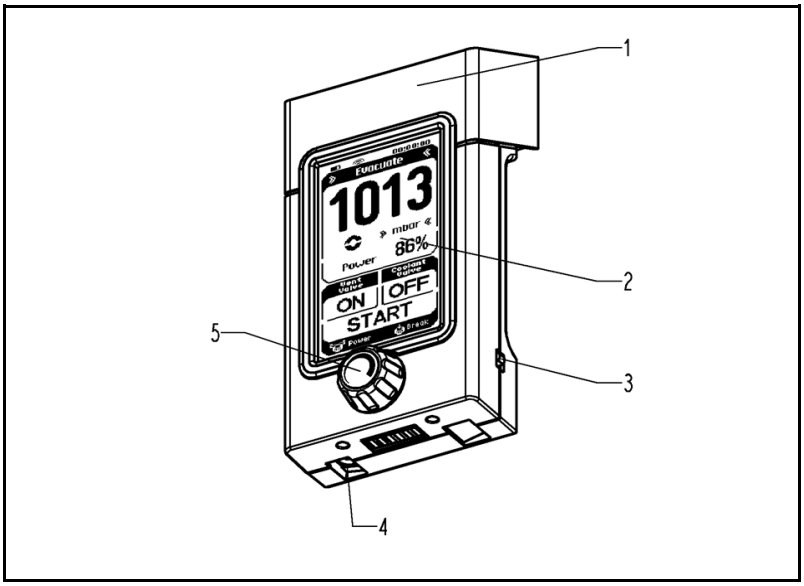


Fig. 3: SCC 950 hand terminals

To distinguish between the two hand terminals, the rotary knob (Fig. 3/**5**) is marked 1 or 2.

Hand terminal 1 controls process 1 and hand terminal 2 controls process 2.

Function

The hand terminals are used to set the process parameters of the two processes with which the SCC 950 vacuum pump system controls the pressure.

Settings can be made on the hand terminal's touchscreen (**2**) or with the rotary knob (**5**).

Hand terminal 1 can be removed from the bracket on the vacuum pump system (see Chapter 5.1.1, page 13) and the vacuum pump system can be operated wirelessly. This provides a convenient way to operate the vacuum pump system when it is in a cabinet or under a closed fume hood.

Hand terminal 2 can also be used for wireless operation of the vacuum pump system. It is packed loosely along with the other components and can, if required, be placed on the enclosed charging station.

If a hand terminal is in the bracket on the vacuum pump system when it is switched on or on the charging station and this is connected to the mains supply via the supplied power supply unit, the hand terminal batteries are charged automatically. The batteries will charge even if the hand terminal is switched off. Alternatively, the batteries can be charged through the hand terminal's power supply (see mains socket (**4**) on the hand terminal). This eliminates the need for the vacuum pump system to be positioned where it is accessible for the user.

The power supply also makes it possible to supply the hand terminal with electrical power directly from a mains.

A signal sound on the hand terminal will indicate when the batteries are nearly drained.

5.2. Pump

Assembly

1 Outlet valve
2 Inlet valve
3 Pumping chamber
4 Diaphragm
5 Cam
6 Connecting rod
7 Drive space

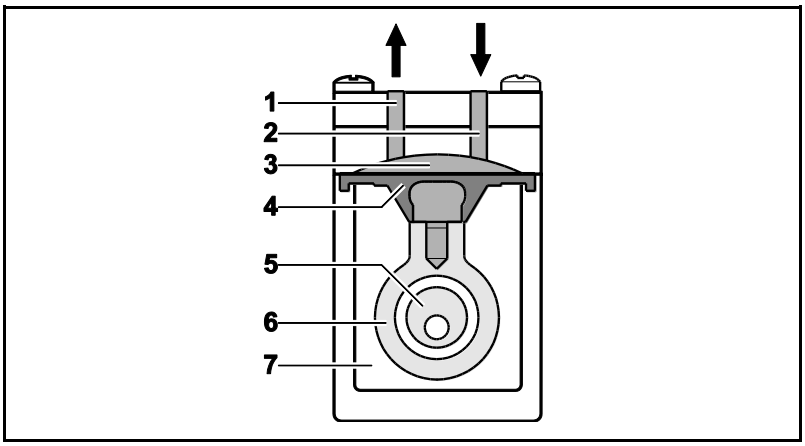


Fig. 4: Pump assembly

How diaphragm pumps work

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

The elastic diaphragm (**4**) is moved up and down by the cam (**5**) and the connecting rod (**6**). In the downward movement, the diaphragm sucks in the gas to be transferred via the inlet valve (**2**) and in the upward movement, it presses it out of the pump head via the outlet valve (**1**). The diaphragm hermetically seals the pumping chamber (**3**) from the pump drive (**7**).

5.3. Gas ballast

Assembly

1 Gas ballast valve

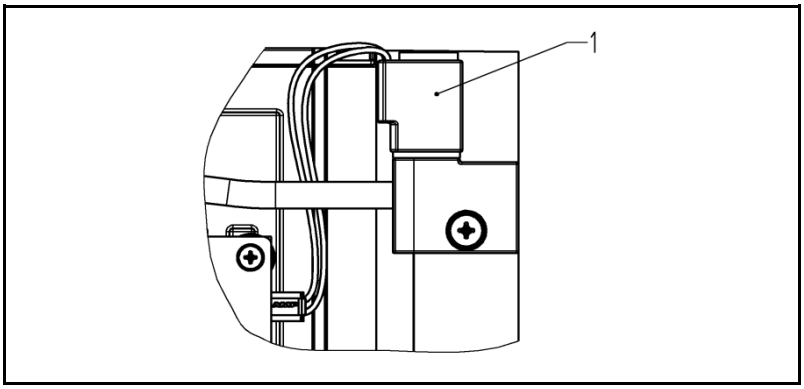


Fig. 5: Gas ballast of the pump

Function of the gas ballast

WARNING

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

➔ Make sure that no reactive or explosive mixtures will be produced when the gas ballast valve is open.

When transferring vaporous media, opening the gas ballast valve can minimize the formation of condensation in the pump heads.

Opening the gas ballast valve deteriorates ultimate vacuum performance.

The gas ballast valve is opened and closed via the gas ballast switch (Fig. 2/**6**, p. 13):
- Press once
  → Open gas ballast valve, blue LED on
- Press again
  → Close gas ballast valve, blue LED off

Please contact KNF Service if you require an inert connection for the gas ballast.

6. Setup and connection

➔ Connect the vacuum pump system only under the operating parameters and conditions described in Chapter 4. Technical data (page 9).

➔ Observe the safety precautions (see Chapter 3, page 7).

6.1. Installation

➔ Before installation, allow the vacuum pump system to reach ambient temperature at the installation location.

Cooling air supply

➔ Install the vacuum pump system so that the two fans are not blocked.

Installation location

➔ Make sure that the installation location is dry and that the vacuum pump system is protected against water in the form of rain, spray, splashes and drips.

➔ Choose a safe location (flat surface) for the vacuum pump system.

➔ Protect the vacuum pump system from dust.

➔ Protect the vacuum pump system from vibration and impact.

Connected components

➔ Only connect components to the vacuum pump system that are designed for the pneumatic data of the vacuum pump system (see Chapter 4, page 9).

Coolant for high-performance condenser

A recirculating cooler or flowing cold water (or another cooling medium) is needed to cool the high-performance condenser to the condensation temperature.

Remove transportation safeguard

Hand terminal 1 of the SCC 950 vacuum pump system is secured at the factory in order to prevent damage during transportation. The transportation safeguard must be disengaged before the hand terminal can be removed. To do this, rotate the knurled knob (Fig. 2/**2**, page 13) out until the hand terminal can be removed.

i The transportation safeguard can be screwed back in before transporting the vacuum pump system in the future.

Installing the collection flask

Install the separately included collection flasks (Fig. 2/**8** and **9**, page 13) using the included flask clips (Fig. 2/**7**, page 13).

Set up the charging station

Set up the charging station for hand terminal 2 (see Fig. 6, page 20).

Basically, there are four different setup or installation options:

1.) Bench version 1 (see Fig. 6, top)

2.) Bench version 2 (see Fig. 6, center)

3.) Wall installation (see Fig. 6, bottom)

4.) Attachment to the vacuum pump system (see Fig. 6, bottom)

1 Mounting options for foot
2 Mounting options for wire support
3 Wire support
4 Foot
5 Snap-in positions for wire support
6 LED
7 Power supply connection
8 Hand terminal holder for transportation
9 Screw to fix foot to bottom of housing

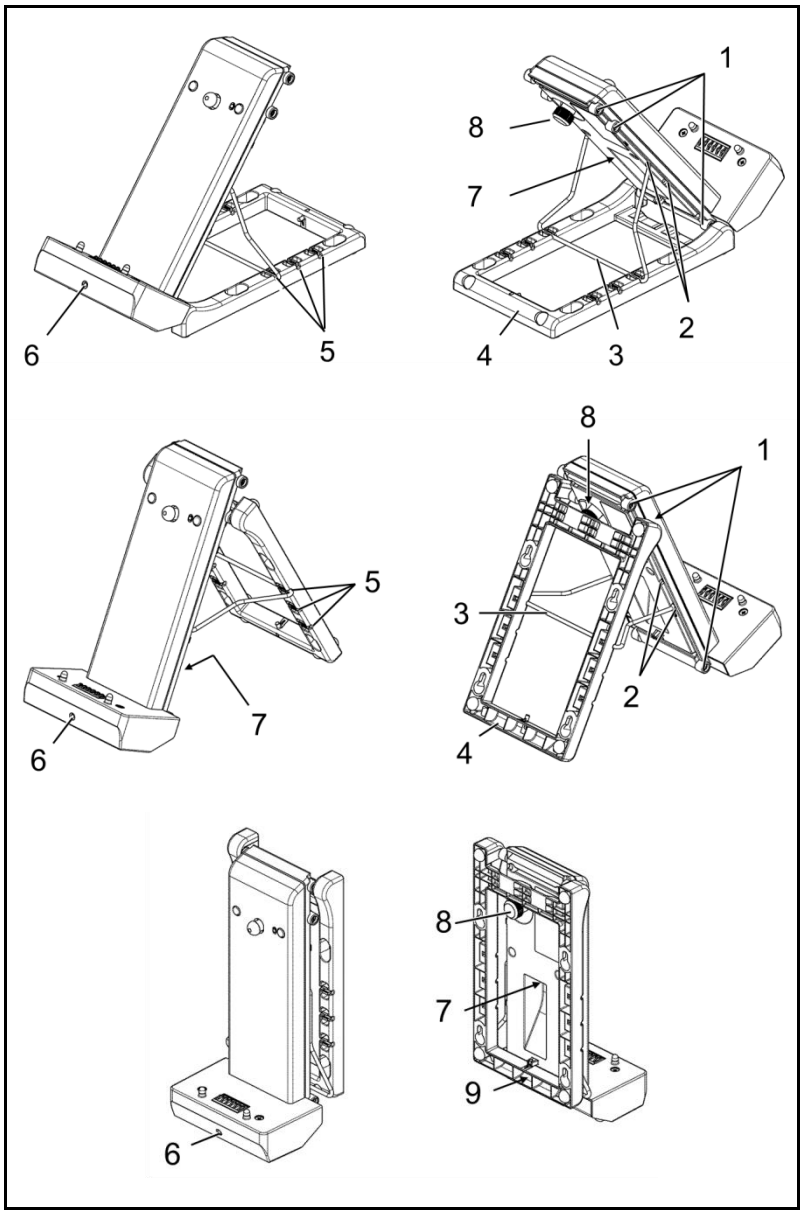


Fig. 6: Charging station for hand terminal

The green LED (Fig. 6/**6**) indicates that the hand terminal is charging (LED lit) when it is placed on the charging station and the station is connected to the power supply via the power supply unit.

Connect only the original KNF power supply unit

1.) Bench version 1 (Fig. 6, top)

The angle of the charging station can be adjusted by the positions of the foot and the wire support (mounting options, see Fig. 6).

2.) Bench version 2 (Fig. 6, center)

See Version 1).

3.) Wall installation (Fig. 6, bottom)

Requirements

- Foot in top position
- Wire support in top position and folded down
- Fixing screw (Fig. 6/**9**) tightened
- Hand terminal on charging station and fixed in place with the transport holder (Fig. 6/**8**) (optional)

1. Hang the charging station on the wall (hanging points, see arrows in Fig. 7).
2. Tighten the screws

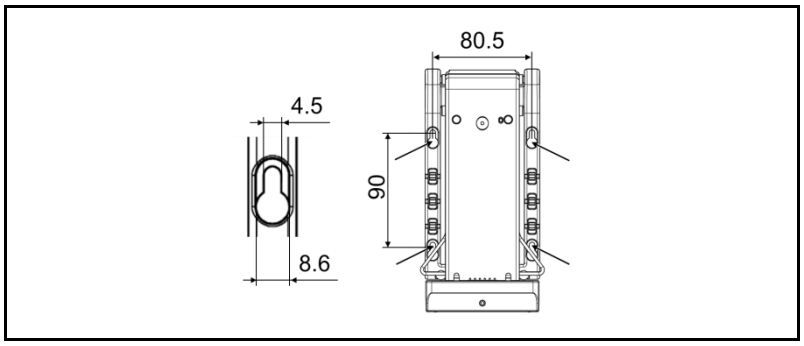


Fig. 7: Charging station fixed to a wall

4.) Attachment to the vacuum pump system (Fig. 6, bottom)

Requirements

- Foot in top position
- Wire support in top position and folded down
- Fixing screw (Fig. 6/**9**) tightened

1. Loosen the two Allen screws (Fig. 8/**1.**) so that the bracket can be mounted.
2. Mount the enclosed bracket (Fig. 8/**2.**).
3. Tighten the two Allen screws again.
4. Hang the charging station on the four screws in the bracket (Fig. 8/**3.**, hanging points, see arrows in Fig. 7).
5. Tighten the four Allen screws.
6. Place the hand terminal on the charging station (Fig. 8/**4.**) and fix in place with the transport holder (Fig. 6/**8**) (optional)

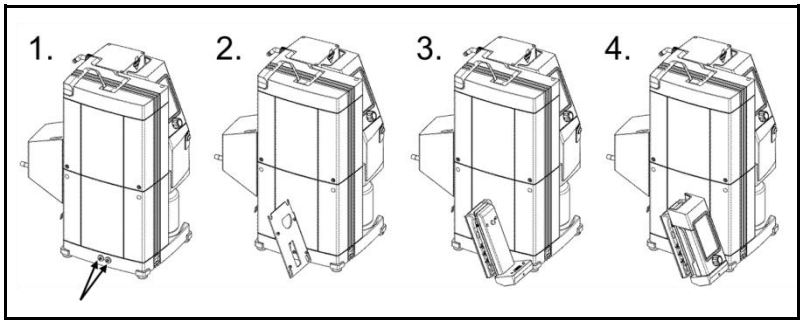


Fig. 8: Attaching the charging station to the SCC 950 vacuum pump system

6.2. Connections

1. Connect vacuum chambers 1 or 2 to the hose connectors of the gas inlets (Fig. 2/**17** or **18**, p. 13).

Use vacuum hoses for this.

2. Connect hose to high-performance condenser in order to direct gas emission away (Fig. 2/**27**, page 13).

CAUTION

Danger of high-performance condenser rupturing
The high-performance condenser is not pressure-proof.

➔ Do not reduce or regulate the gas volume at the gas outlet and do not attach any components that obstruct the gas flow.

Securely direct gas emission away so that no gas can escape into the ambient air.

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

3. Attach the coolant feed and discharge to the high-performance condenser (Fig. 2/**26** and **25**, p. 13).

Connect only the KNF coolant valve (see Chapter 11.2, Accessories) to the coolant valve connection (Fig. 2/**21**, page 13). Consult with KNF before using any other valves.

4. If necessary: Connect the inert gas feed to the ventilation connections (Fig. 2/**16** and **19**, p. 13). The safety precautions in Chapter 3 must be observed at all times. Please contact KNF Service if you require an inert connection for the gas ballast.
5. Insert the power cable plug into a properly installed grounded socket.

7. Operation

7.1. Initial start-up

Before switching on the vacuum pump system, check the following points:

Prerequisites for start-up
▪ All hoses attached properly ▪ Fan openings not blocked ▪ Specifications of the power supply correspond with the data on the vacuum pump system's type plate ▪ Recirculating cooler or cold water connection ready on high-performance condenser ▪ The high-performance condenser's gas outlet is not blocked (high-performance condenser is not pressure-proof) ▪ Vacuum pump system at ambient temperature ▪ Ensure that hand terminals are properly matched up with the appropriate vacuum pump system ▪ If the vacuum system is ventilated through the air inlets (Fig. 2/**17** and **18**, p. 13) no reactive, explosive, or otherwise dangerous mixtures can form (use inert gas if necessary) ▪ When the gas ballast valve is open (blue LED lit), no reactive, explosive, or otherwise hazardous mixtures can form (otherwise, contact KNF Service).

Tab. 4

➔ Operate the vacuum pump system only with the operating parameters and conditions described in Chapter 4, Technical Data (page 9).

➔ Make sure the vacuum pump system is used properly (see Chapter 2.1, page 5).

➔ Exclude the possibility of the vacuum pump system being used improperly (see Chapter 2.2, page 6).

➔ Observe the safety precautions (see Chapter 3, page 7).

DANGER

Uncontrolled operation may result in personal injury and damage to the vacuum pump system.

If several vacuum SCC 950 pump systems are used, there is a danger of confusing them, which can result in undesired interference with other processes: If commands are entered into the wrong hand terminal, uncontrolled reactions may occur in the associated vacuum pump system.

Before each use, make sure you are using the correct hand terminal for the SCC 950 vacuum pump system. The paging function may be used for this purpose (see Paging the vacuum pump system, page 34).

➔ In addition, color-coded stickers may be applied to SCC 950 vacuum pump systems and hand terminals that belong together (see Chapter *11 Spare parts and accessories*)

WARNING

Uncontrolled operation may result in personal injury and damage to the SCC 950 vacuum pump system.

If the wireless connection between the hand terminal and SCC 950 vacuum pump system is interrupted, the vacuum pump system will continue to operate with the current settings.

➔ Immediately determine and remove the cause of the interruption between the hand terminal and vacuum pump system (Chapter 10, page 47).

➔ If you do not succeed in restoring the wireless connection, place the hand terminal onto the vacuum pump system (Chapter 8.1.1, page 27ff). The vacuum pump system can also be operated directly and the ventilation valves and coolant valve can be opened and closed directly (Chapter 8.2, page 36).

WARNING

Personal injury through poisoning or explosion and damage to the vacuum pump system.

➔ Make sure that no reactive or explosive mixtures will be produced when ventilating the vacuum pump system through the air inlets or when the gas ballast valve is open.

WARNING

Excessive pressure may cause the vacuum pump system to rupture.

➔ Do not exceed the maximum permissible operating pressure (0 bar).

➔ Monitor pressure during operation.

➔ If pressure exceeds the maximum permissible operating pressure of the vacuum pump system: Immediately switch the vacuum pump system off and fix the fault (see Chapter 10, page 47).

CAUTION

Danger of high-performance condenser rupturing
The high-performance condenser is not pressure-proof.

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

i In order for the high-performance condenser to recover solvent from the transferred gas, it must be cooled with a cold water connection or a recirculating cooler.

If using a coolant valve:

WARNING

Danger of high-performance condenser rupturing

➔ Ensure that the coolant valve is installed between the coolant supply and the coolant inlet nozzles of the high-performance condenser.

Pump standstill

When the pump stops, restore the system to normal atmospheric pressure (release pneumatic pressure in vacuum pump system).

Inspecting and emptying collection flask

At appropriate intervals, inspect the fill level in the condensate collection flasks located on the suction and pressure sides of the vacuum pump system (Fig. 2/**8** and **9**, page 13). When needed, empty the collection flasks; properly dispose of contents.

Switch on the vacuum pump system

Do not allow the vacuum pump system to start against excess pressure. During operation as well, there must be no overpressure in the pneumatic hoses. If a pump starts against pressure, it may block. This activates the overload switch and the pump switches off.

➔ Switch on vacuum pump system at the power switch (see Fig. 2/**11,** page 13).

➔ Switch on hand terminal at its I/O switch (see Fig. 3/**3,** page 16).

Refer to Chapter 8, page 27 for information on operating the vacuum pump system.

7.2. Stopping operation

➔ Stop the ongoing process.

➔ If aggressive media are being transferred, rinse the vacuum pump system before you switch it off to extend the service life of the diaphragms (see Chapter 9.2.1, page 37).

➔ Switch off the vacuum pump system at the power switch (Fig. 2/**11,** page 13).

➔ Switch off hand terminal at its I/O switch (see Fig. 3/**3,** page 16)**.**

WARNING

Uncontrolled operation may result in personal injury and damage to the SCC 950 vacuum pump system.

If the hand terminal is switched off while the SCC 950 vacuum pump system remains switched on, the vacuum pump system will continue to operate with the current settings.

➔ Always switch the vacuum pump system off when work is finished.

8. Operating the vacuum pump system

8.1. Hand terminal

8.1.1. General functions and displays

1 Upper grip
2 Touchscreen
3 I/O switch
4 Power supply socket 12 V DC
5 Rotary knob for:
- adjusting pump speed and setpoint pressure
- switching to manual operation

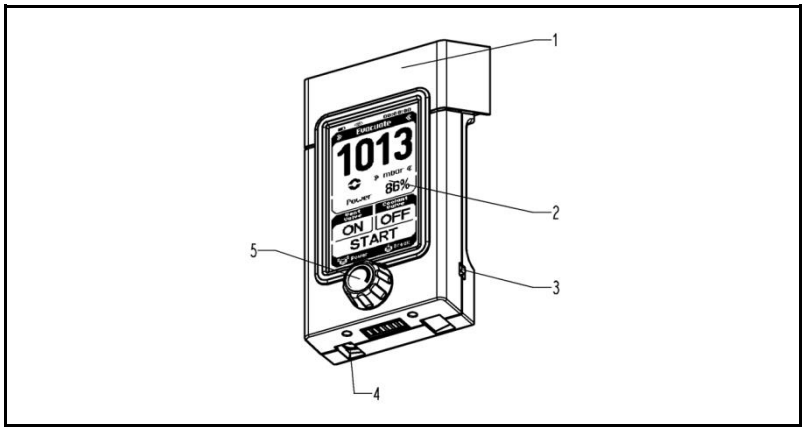


Fig. 9: Hand terminal

The vacuum pump system is operated via the hand terminal with the aid of:

- a rotary knob (Fig. 9/**5**) and
- a touchscreen (Fig. 9/**2**).

The **rotary knob** has the following functions:

- Rotate the knob: Changes pump capacity or the selected pressure setting (depending on selected operating mode).
- Press the knob: Interrupts the active process and switches to manual process control (pressing causes evacuation).

Touchscreen contents:

- Display of the most important process variables (Fig. 10, page 28);
- Menus for selecting the operating mode and units for pressure display (Fig. 11, page 29);
- Operating keys (Fig. 11, page 29) with the functions:
  - Start and stop the process;
  - Open and close the ventilation valve;
  - Open and close the high-performance condenser's coolant valve (accessory).

Picking up and replacing hand terminal

Remove the hand terminal from the vacuum pump system or the charging station:
Hold the hand terminal by the upper grip (Fig. 9/**1**) and pull until it releases.

Replace hand terminal as follows:
Replace the hand terminal on the vacuum pump system by putting its base onto the holder for the hand terminal (Fig. 2/**5**, page 13) or

into the charging station (Fig. 2/**12**); then firmly press the hand terminal at the upper grip (Fig. 9/**1**) until it engages.

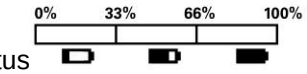
When the hand terminal is in the mounting on the operating vacuum pump system, the batteries in the unit are charged automatically. The batteries will charge even while the hand terminal is switched off. The same applies if the charging station is connected to the power supply via the power supply unit.

Before each use of the hand terminal, confirm that the hand terminal belongs to the desired vacuum pump system. The paging function may be used for this purpose (see Paging the vacuum pump system, page 34).

Displays

1 Battery:
- Charging

- Charging status



2 Connection to vacuum pump system
- Direct connection:
- Wireless connection:

3 Process time

4 Actual pressure in selected pressure unit (or "No connection" if there is no wireless connection to the vacuum pump system)

5 Process active

6 Capacity in percent or setpoint pressure in selected pressure unit (depending on operating mode)

7 Explanation of the rotary knob functions
(Rotate: Change capacity; Press: Interrupt operating mode and switch to manual process control)

8 Only in *Automatic* operating mode
Automatic with pressure reduction

9 Only in *Automatic* operating mode
Automatic pressure reduction active

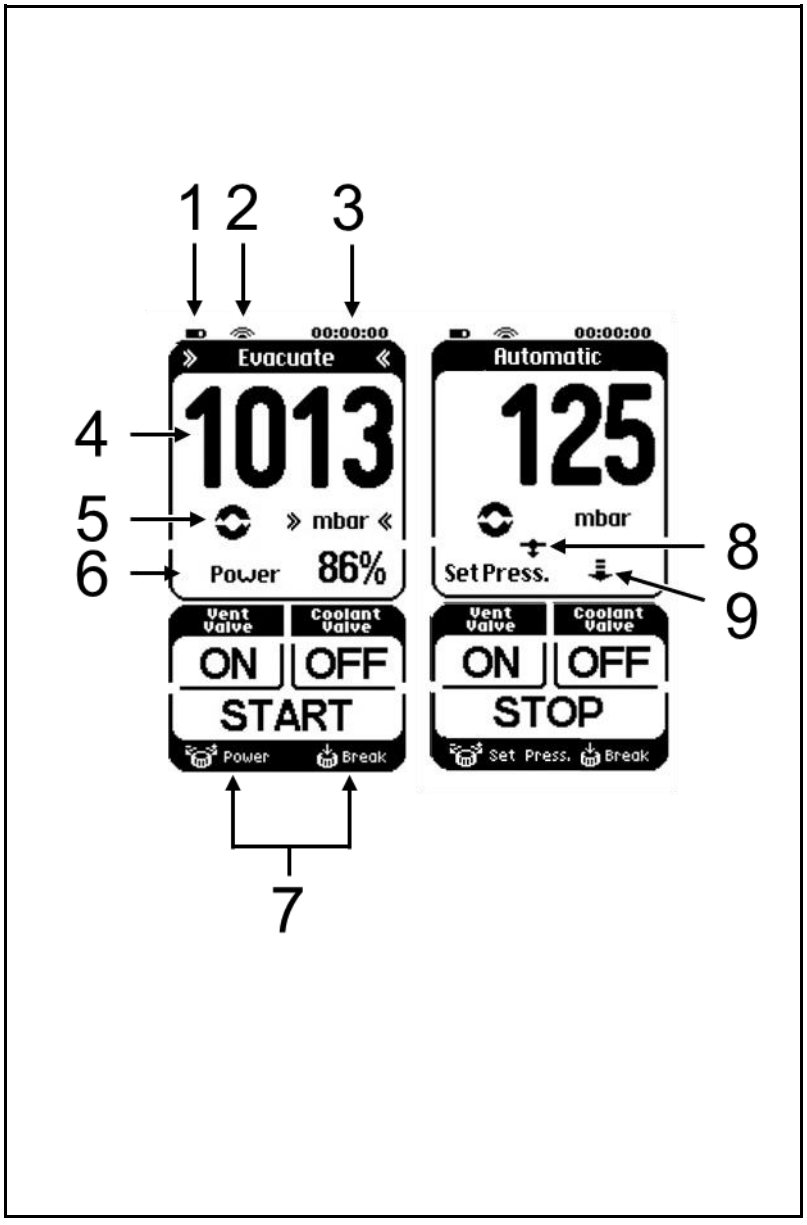


Fig. 10: Displays on the touchscreen

Menus and buttons

1 Operating mode menu
2 Pressure unit menu
3 Button to page the vacuum pump system
4 Button for ventilation valve:
ON = open
OFF = close
5 Button for coolant valve (accessory) on the high-performance condenser:
ON = open
OFF = close
6 Button for the process:
START = start
STOP = stop
7 Button for automatic pressure reduction:
Press = Finish (the current pressure is applied as the setpoint pressure)

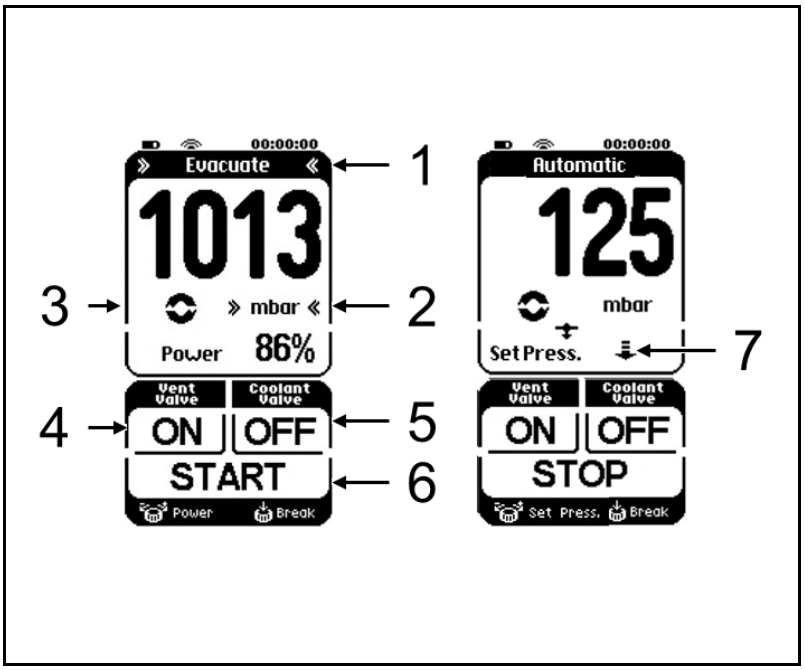


Fig. 11: Menus and buttons on touchscreen

8.1.2. Operation

Menu language

Switch on the hand terminal. On the start page you can choose between German, English, French, Italian, Spanish, Dutch, Japanese, and Chinese. The selection can be made only immediately after switching on.

Pressure unit

Process pressure can be displayed on the hand terminal in mbar, bar, hPa, or Torr.

Use the pressure unit menu to select the pressure unit (button on touchscreen; see Fig. 12).

Pressure units can be changed only when no process is active.

To change the pressure unit, you have to change to a different operating mode temporarily.

Fig. 12: Pressure units menu

Operating modes

The current operating mode is displayed at the top of the hand terminal's touchscreen. Press on this line of the touchscreen to open the menu for changing operating mode (see Fig.13 , top image).

Operating mode can be changed only when no process is active.

Switching to manual process control (break)

- Press briefly on the rotary knob:
  Manual process control; actual pressure will be adopted as the setpoint pressure and be actively adjusted.

Within manual process control

- Press the rotary knob:
  Vacuum pump system is evacuating.
- Let go:
  Actual pressure will be adopted as setpoint pressure.
- Rotate the knob:
  Changes setpoint pressure.

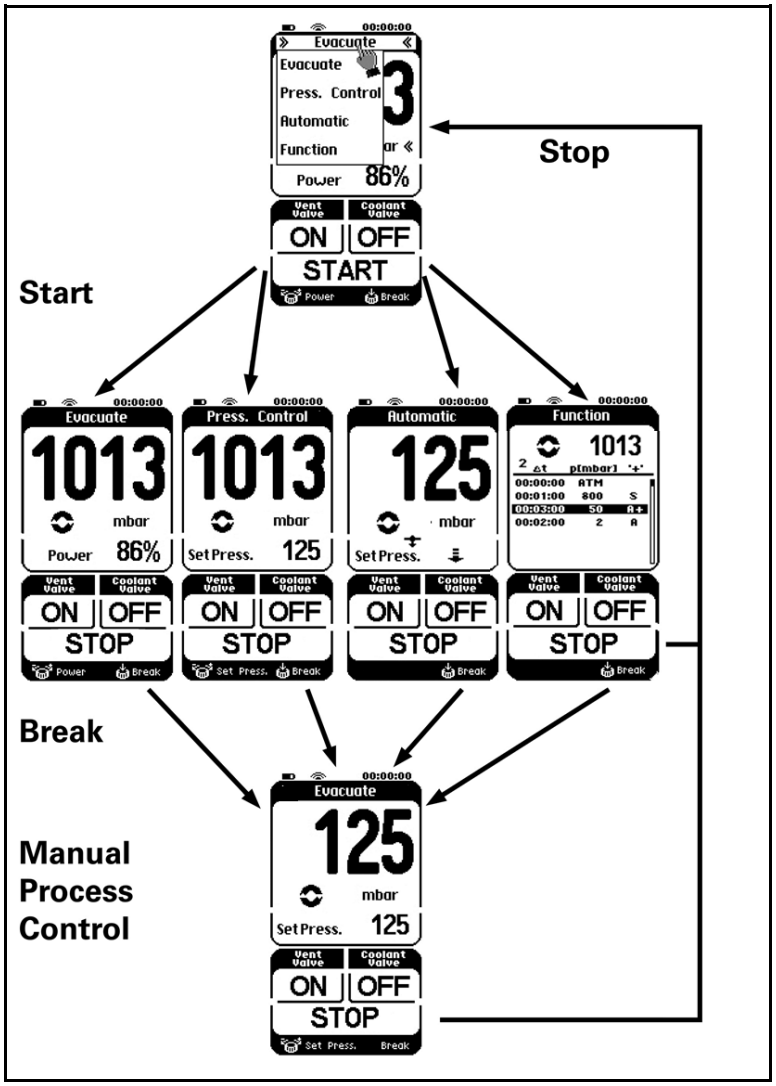


Fig.13 : Operating mode menu

Starting and stopping the process

Pressing the *START* button starts a process.

Pressing the *STOP* button stops a process.

Open and close the ventilation valve

WARNING

Personal injury caused by poisoning or explosion and damage to the vacuum system

➔ Make sure that no reactive or explosive mixtures will be produced when ventilating the vacuum system through the air inlet.

Press and hold the ON button for the ventilation valve (bottom left button) to open the ventilation valve.

i If the ON button is pressed for more than 3 seconds, the ventilation valve remains open.

If the ventilation valve is permanently open (OFF button shown in display), it can be closed again with the *OFF* button.

Opening and closing coolant valve (accessory)

The coolant valve of the SCC 950 vacuum pump system can be activated via both hand terminals (for switching behavior, refer to Tab. 5).

Press the *ON* button for the coolant valve (bottom right button) to open the ventilation valve on the high-performance condenser.

Press the *OFF* button for the coolant valve to close the coolant valve on the high-performance condenser.

Coolant valve can be activated by		Switching behavior of the coolant valve
Hand terminal 1	Hand terminal 2	
OFF	*OFF*	*OFF*
ON	*OFF*	*ON*
ON	*ON*	*ON*
OFF	*ON*	*ON*

Tab. 5: Switching behavior of the coolant valve

Entering values in Evacuate operating mode

Use the rotary knob to set pump capacity.

Entering values in Pressure Control operating mode

Use rotary knob to set desired pressure.

Entering values in Automatic operating mode

Not necessary to enter value.

If a boiling point is detected in *Automatic* mode, after the system regulates to this pressure, the pressure is reduced automatically to speed up evaporation of the solvent (see Fig. 14, page 32).

1.) Start Automatic operating mode

2.) Boiling point detected; system regulates to this pressure

3.) Automatic pressure reduction

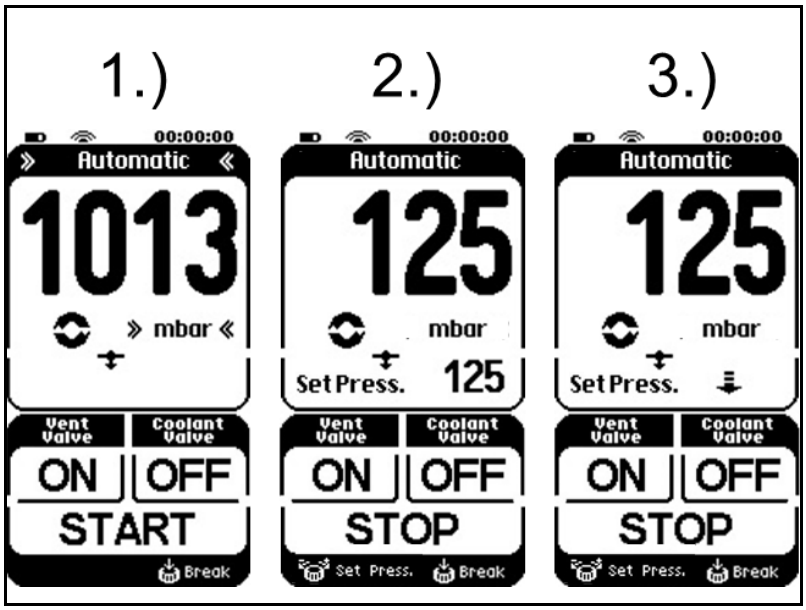


Fig. 14: Automatic function sequence

If you press the arrow key (see Fig. 11/**7**) during automatic pressure reduction, the current pressure is applied as the new setpoint pressure and the vacuum pump system regulates to this pressure. The current setpoint pressure is shown in the display in place of the arrow.

If you press again on the setpoint pressure value, automatic pressure reduction is reactivated and the arrow appears in the display after about 25 seconds.

Entering values in Function operating mode

The desired pressure curve is entered via data points that connect the vacuum pump system to pressure ramps.

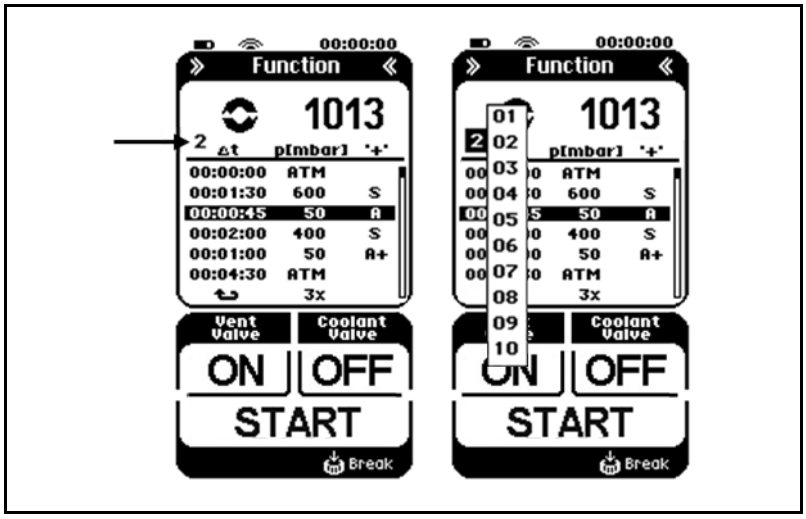


Fig. 15: Menu in Function operating mode

Entering the data points (up to 12):

1. Length of time from previous data point: Δ t
2. Setpoint pressure: p (mbar) / p (bar) / p (hPa) / p (Torr)

3. Additional options ("+" column) to influence the course of the function:
   - CV1: Open coolant valve (accessory):
   - CV0: Close coolant valve (accessory):
   - S: Jump – the system evacuates/ventilates to the required pressure as quickly as possible.
   - A: Automatic – Automatic detection of the boiling pressure

i If the set limit pressure is reached without a vapor pressure, the program goes to the next function step.

   - A+: Automatic Plus – Automatic detection of the vapor pressure with subsequent pressure reduction.

Line selection (see Fig. 15):

- To change the line:
  Turn the rotary knob.
- Select lines to edit:
  Press the rotary knob.

Editing a selected line

- To change columns
  (e.g. from Δ t to p (mbar):
  Press the rotary knob.
- To change an entry:
  Turn the rotary knob.

i After the last column (+), the display automatically returns to line selection and jumps to the next line.

i If you are in edit mode and have not entered any data within 3 seconds, the display automatically returns to line selection.

i The function values of the data point table are stored in an internal memory of the vacuum pump system when the process is started and are available the next time you start the system.

i Changes to the function values (data point table) are applied directly by the PC software if you are using it at the same time.

Repeating/deleting data points:

In the column for the time intervals, the following symbols can be inserted beneath the value 00:00:00:

- ↶ = repeat. The number of required repeats can now be entered in the setpoint pressure field.
- **...** = delete the data point.

In both cases, all following data points are automatically deleted.

Calling the stored data point tables:

- Press the button to select data point tables (arrow in Fig. 15) and select the required data point table.
  You can now see the data point table that is stored under the number.

Up to 10 different data point tables can be stored and called as required. The number in the display (arrow in Fig. 15) indicates the data point table that is currently selected.

Paging the vacuum pump system

If the circle icon for the active process (Fig. 10/**5**, page 28) is pressed on the hand terminal display, the LED beside the paging button on the vacuum pump system flashes (Fig. 17, p. 36).

Likewise, the hand terminal responds to the paging button of the vacuum pump system with a signal sound (see Chapter 8.2, page 36).

No wireless connection

If there is no wireless connection between the hand terminal and the related vacuum pump system (for example if the vacuum pump system is not switched on or the wireless connection is being established or is interrupted):

- The message "No connection" will flash in the hand terminal's display (see Fig.16);
- an audible warning will be emitted if a button on the touchscreen is pressed.

Refer to Chapter 10, Tab. 10 (page 49) for tips on resolving this problem.

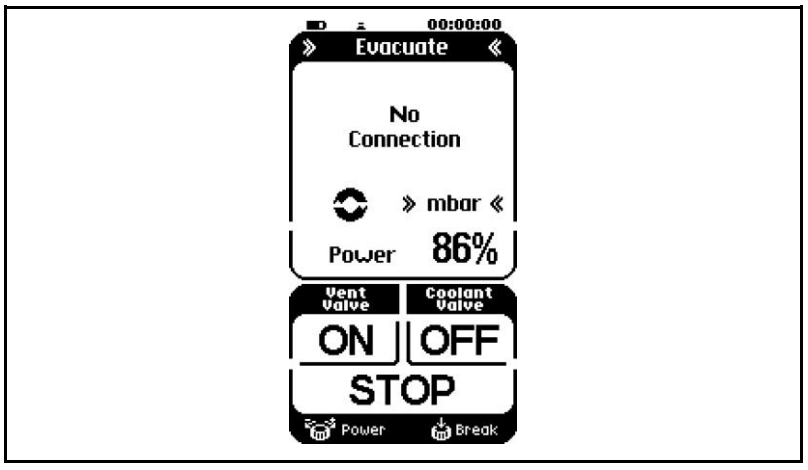


Fig.16 : Display "No connection"

8.1.3. Changing batteries on the hand terminal

Required tool

Qty	Material
1	Phillips screwdriver no. 2

Tab. 6

CAUTION

ESD-sensitive devices (ESDS)

The nonobservance of the ESD-protection specifications under the IEC 61340-5-1 can lead to a partly or total defect of the hand terminal.

➔ Only handle the hand terminal at an ESD-protected area (EPA) by a qualified person under the IEC 61340-5-1 directive.

1. Loosen the six screws on the base of the hand terminal.
2. Remove the rear cover plate.
3. Replace the batteries.

i For required battery specifications refer to Chapter 4.2, page 11.

i Never use new batteries together with used batteries. All batteries must be replaced simultaneously.

4. Re-install cover plate.
5. Dispose of batteries according to regulations.

8.2. Operation without hand terminal

The following actions can be carried out directly on the vacuum pump system when hand terminal 1 is removed (Fig. 17):

- Stop process 1 or 2 (**1** or **2**)
- Open and close ventilation valve 1 or 2 (**3** or **4**)
- Page hand terminal 1 or 2; the hand terminal responds with a signal sound (**5** or **6**).
- Open and close the coolant valve (accessory) of the high-performance condenser (**7** or **8**)

For switching behavior of the coolant valve, see Tab. 5, p. 31.

- Open/close the gas ballast valve via the gas ballast switch (**9**) (also possible when the hand terminal is on the charger):
  - Press once
    → Open gas ballast valve, blue LED on
  - Press again
    → Close gas ballast valve, blue LED off

1 Stop process 1 button
2 Stop process 2 button
3 Button to open/close ventilation valve 1
4 Button to open/close ventilation valve 2
5 Page hand terminal 1
6 Page hand terminal 2
7+8 Button to open/close coolant valve (accessory) of the high-performance condenser
9 Gas ballast switch

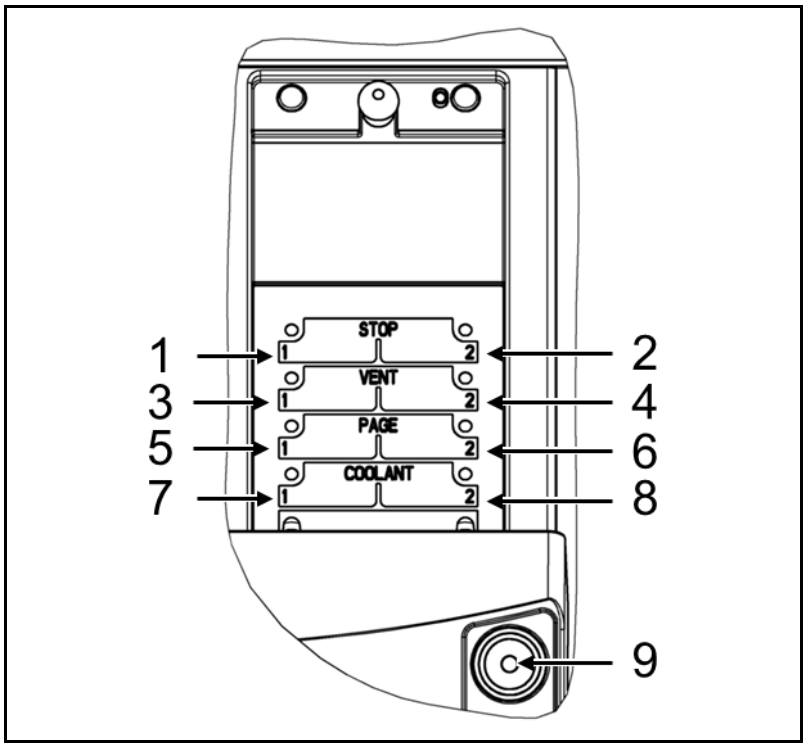


Fig. 17: Buttons on SCC 950 vacuum pump system

8.3. Software

Please see the delivered CD for information on operating the vacuum pump system via software.

9. Servicing

9.1. Servicing schedule

Component	Servicing interval
Vacuum pump system	Inspect regularly for external damage or leaks
Diaphragms and valve plates	Change as soon as pumping capacity decreases

Tab. 7

9.2. Cleaning

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

9.2.1. Rinsing the vacuum pump system

WARNING

Personal injury caused by poisoning or explosion and damage to the vacuum system

➔ When flushing the vacuum pump system with inert gas, make sure that the gas ballast valve is closed so no reactive or explosive mixtures can form.

➔ Before switching off the vacuum pump system, separate it from the vacuum chamber and flush it with air (or with inert gas if required for safety reasons) under atmospheric conditions (ambient pressure) for about five minutes.

If inert gas is used: Connect the inert gas feed to the gas inlet (Fig. 2/**18**, page 13) of the vacuum pump system and close the gas ballast valve. The safety precautions in Chapter 3 must be observed at all times.

9.2.2. Cleaning the vacuum pump system

➔ Clean the outside of the vacuum pump system with a moist cloth only. Do not use flammable cleaning agents.

9.2.3. Emptying collection flask on the suction and pressure sides

Suction side

6. Hold the collection flask (Fig. 2/**9**, page 13) and simultaneously remove the flask clip (**7)**; remove the collection flask.
7. Dispose of contents in collection flask according to local regulations. Then rinse out collection flask.
8. Reattach collection flask.

Pressure side

1. Hold the collection flask (Fig. 2/**8**, page 13) and simultaneously remove the flask clip (**7**); remove the collection flask.
2. Dispose of contents in collection flask according to local regulations. Then rinse out collection flask.
3. Reattach collection flask.

9.3. Replacing the diaphragms and valve plates

Requirements

- Vacuum pump system disconnected from mains power and de-energized
- Vacuum pump system is clean and free of hazardous materials.
- Hoses removed from pneumatic system inlet and outlet.
- Charging station not attached to vacuum pump system (remove it beforehand)

Material and tools

Qty	Material
1	Phillips screwdriver no. 2
1	Allen wrench 3
1	Allen wrench 2.5
1	Open-end wrench, width 7 mm
1	Spare parts set (see Chapter 11, page 52)
1	Pencil

Tab. 8

Information on procedure

➔ Always replace diaphragms and valve plates together to maintain the pump capacity.

WARNING

Health hazard due to dangerous substances in the vacuum pump system and pump

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

➔ Wear protective clothing if necessary, e.g. protective gloves.

➔ Flush the vacuum pump system before replacing the diaphragms and valve plates (see Chapter 9.2.1, page 37).

CAUTION

Danger of burns from hot pump parts

The pump head or motor may be hot even after the pump has been shut off.

➔ Allow the pump to cool off after operation.

9.3.1. Removing the pump

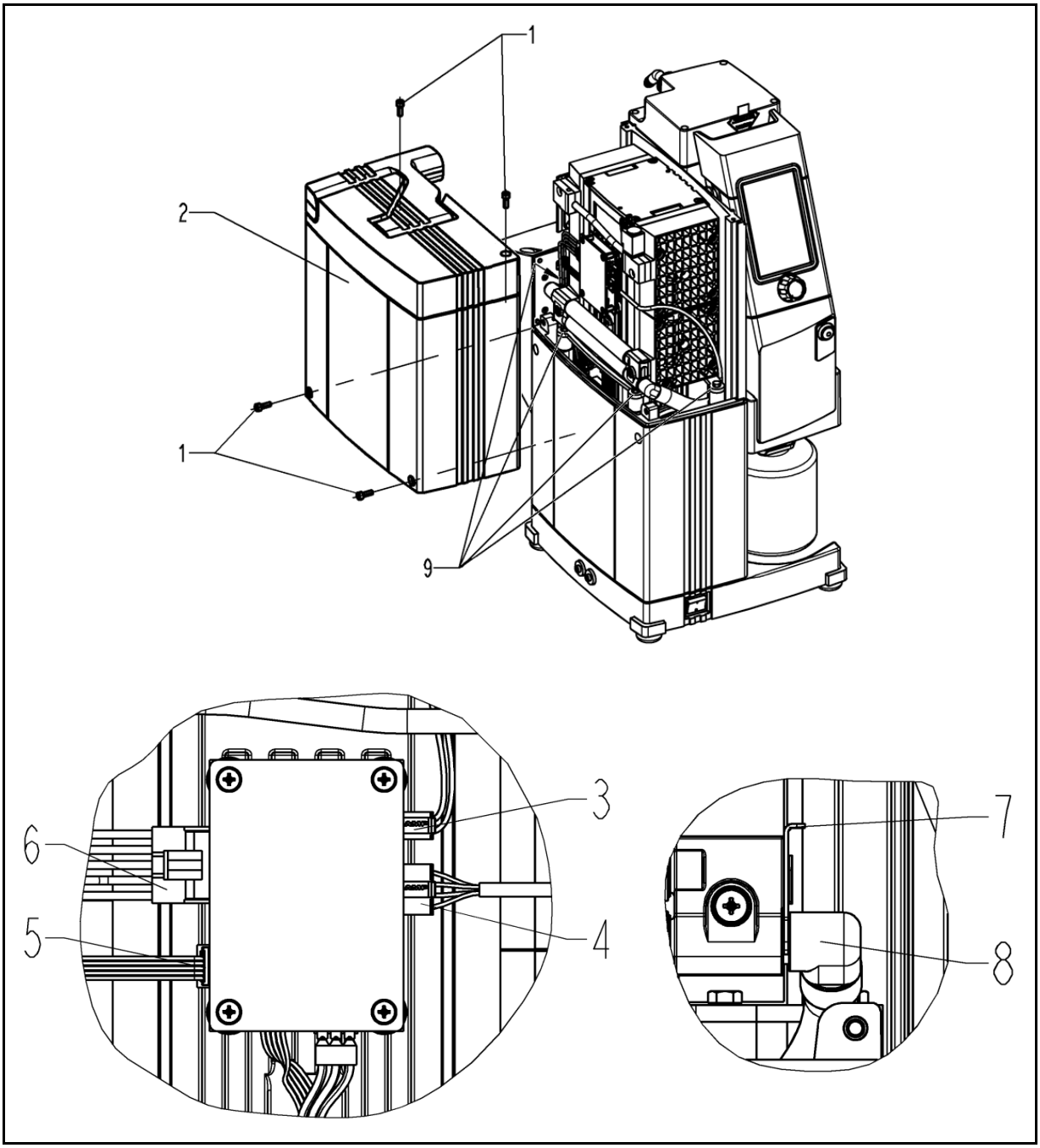


Fig. 18: Accessing the pump in the SCC 950 vacuum pump system

1 4x attachment screws (grip assembly)
2 1x grip assembly
3 1x plug for gas ballast valve
4 1x plug for pressure switch
5 1x plug for resonance sensors
6 1x plug for voltage supply
7 2x spring steel clips
8 2x head connection fittings
9 4x attachment screws (pump)

1. Loosen the four attachments screws (Fig. 18/**1**) and remove the grip assembly (**2**).

In order to remove the grip assembly, you must first lift it approximately 5 mm and then pull it away laterally over the pump.

2. Loosen plugs **3**, **4**, **5** and **6** at the pump's electrical connection.
3. Loosen the connections at the suction and pressure sides of the pump:
   To do this, remove the two spring steel clips (**7**) from the connection fittings (**8**) and then remove the two connection fittings from the connection blocks.
4. Replace the O-rings (ø10 x 1,8) in the two connection fittings (**8**) and properly dispose of the old O-rings.
5. Loosen the four attachment screws (**9**) and remove the pump.

9.3.2. Overview of pump parts

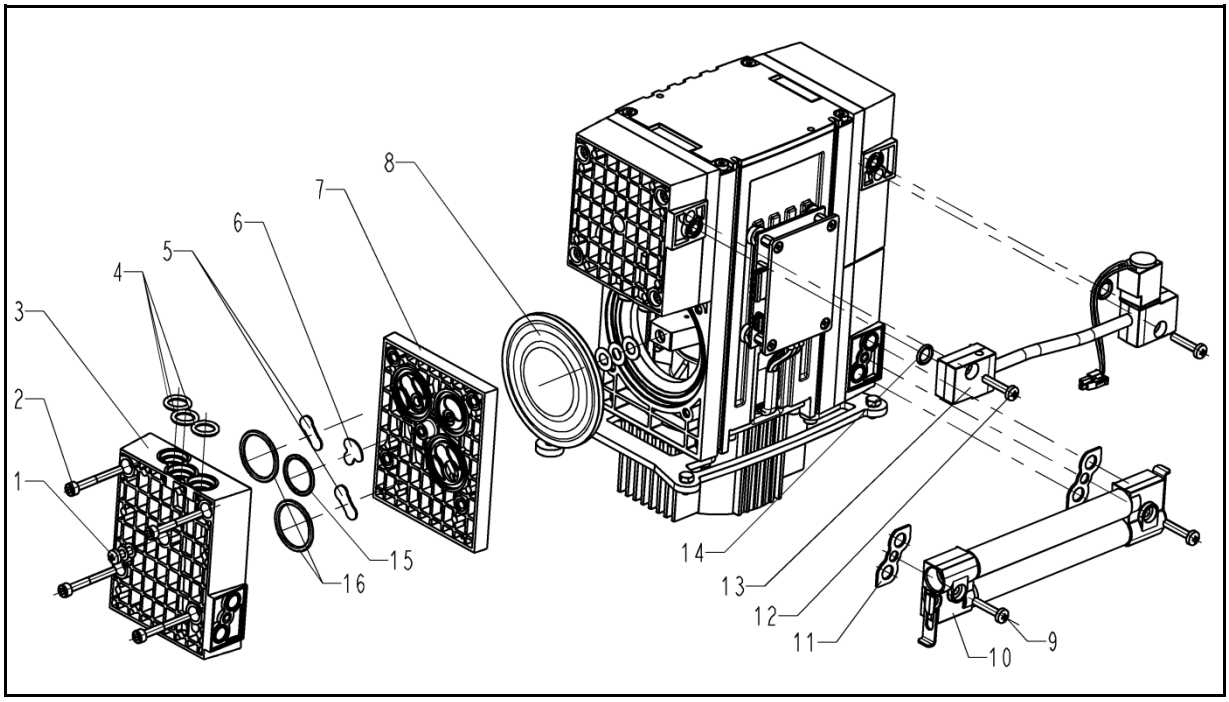


Fig. 19: Exploded drawing of SCC 950 pump

1 4x head screws
2 16x attachment screws (head)
3 4x head plates
4 6x O-rings (ø10 x 2.5)
5 8x valve plates
6 6x valve plates
7 4x intermediate plates
8 4x diaphragms
9 2x attachment screws (connection .1.2)
10 2x connection blocks .1.2
11 2x flat seals
12 2x attachment screws (connection .50)
13 2x connection blocks .50
14 2x O-rings (ø7.65 x 1.78)
15 6x O-rings (ø18.77 x 1.78)
16 8x O-rings (ø24 x 2)

9.3.3. Disassembling head connection

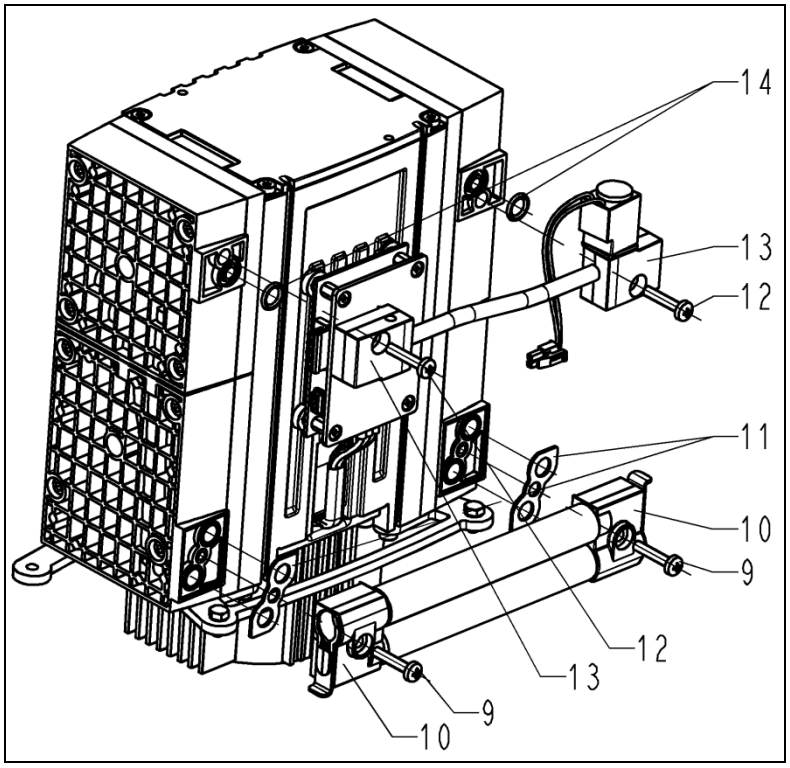


Fig. 20: Disassembling the head connections

1. Remove the head connection's (**10**) and (**13**) screws (Fig. 20/**9**) and (**12**) and remove the head connections.
2. Remove O-rings (**14**) and flat seals (**11**).

9.3.4. Disassembling pump heads

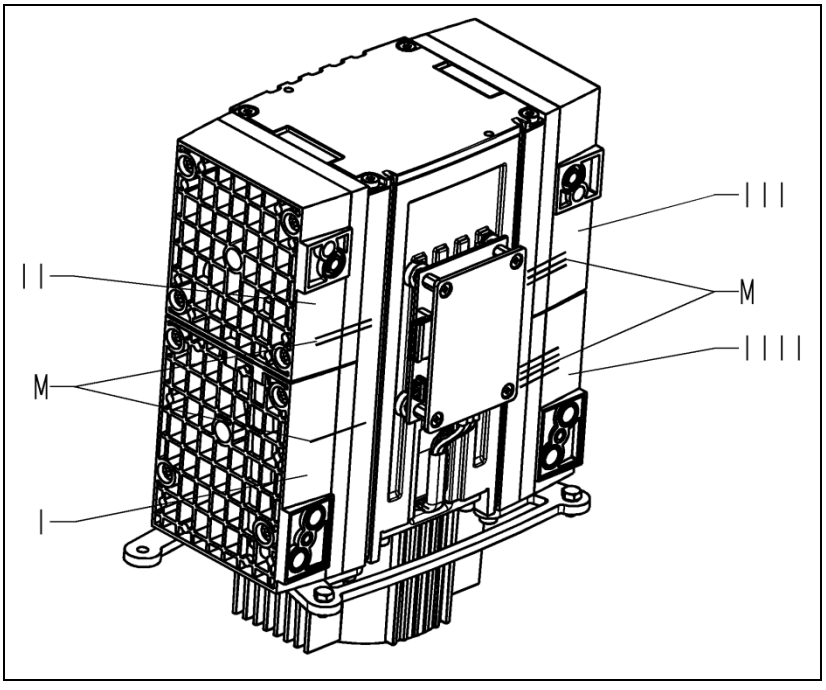


Fig. 21: Marking the pump

3. Head 1 (Fig. 21/**I**):

   Use a pencil to apply a single mark (**M**) across the head plate, intermediate plate, and compressor housing.

4. Head 2 (Fig. 21/**II**):

   Use a pencil to apply two marks (**M**) across the head plate, intermediate plate, and compressor housing.

5. Head 3 (Fig. 21/**III**):

   Use a pencil to apply three marks (**M**) across the head plate, intermediate plate, and compressor housing.

6. Head 4 (Fig. 21/**IIII**):

   Use a pencil to apply four marks (**M**) across the head plate, intermediate plate, and compressor housing.

i During re-assembly, refer to the marks on the individual heads to ensure that the parts are properly re-assembled.

7. Undo the 16 attachments screws (Fig. 19/**2**) on the heads (**1** to **4**) and remove the heads (**1** and **2** as well as **3** and **4**).

8. Pull apart heads 1 (Fig. 22/**I**) and 2 (**II**) and heads 3 (**III**) and 4 (**IIII**) and remove O-rings (**4**).

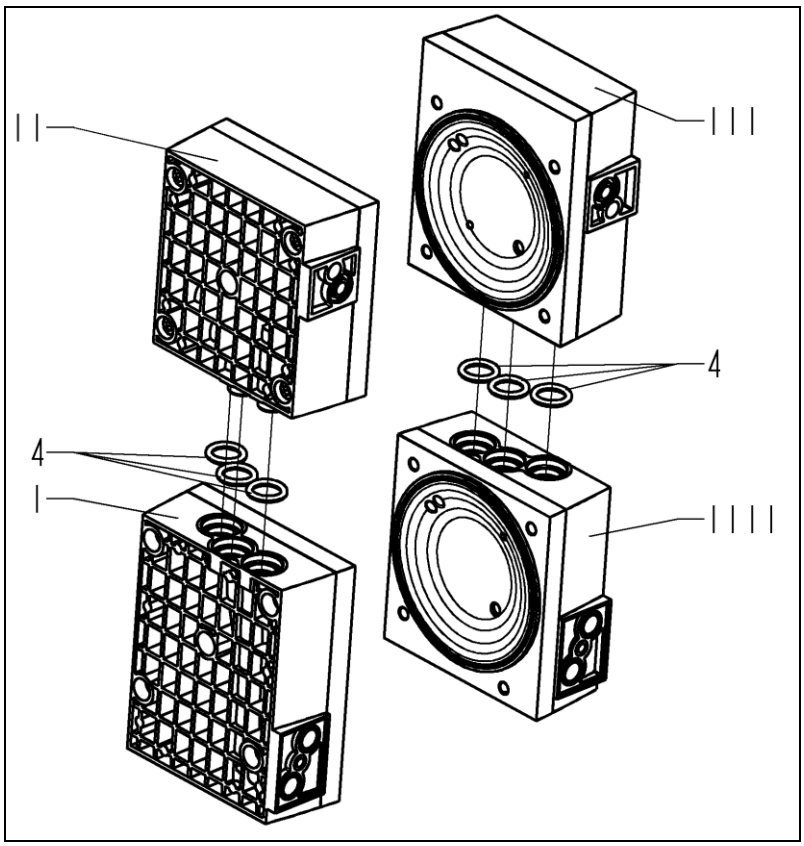


Fig. 22: Removing the O-rings

9. On all four heads, undo the head screw (Fig. 23/**1**) in the head plate (**3**) and remove head plate from the intermediate plate (**7**).

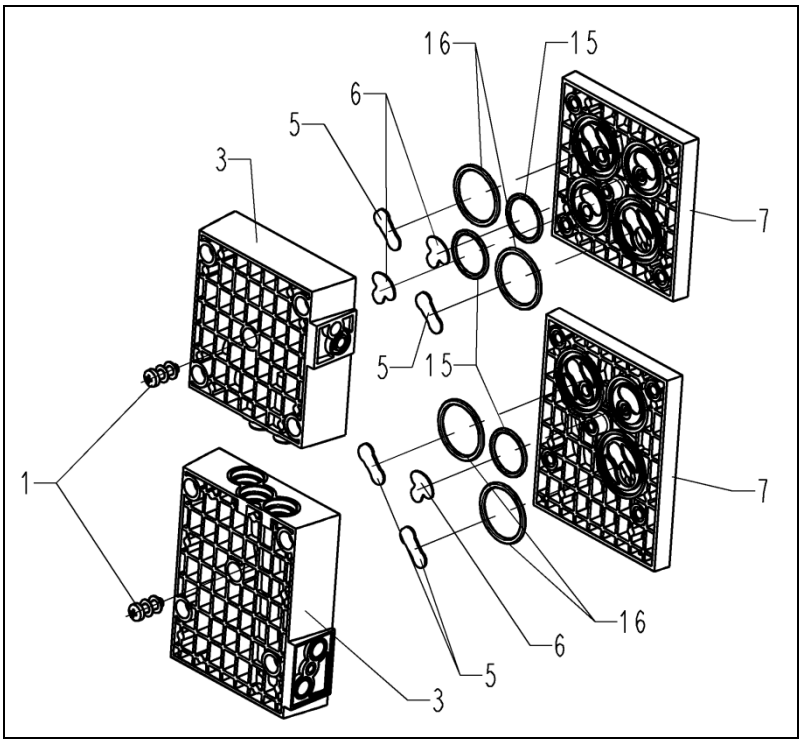


Fig. 23: Exploded drawing of pump heads 1 and 2

9.3.5. Replacing the diaphragms and valve plates

1. Manually remove the four diaphragms (Fig. 24**/8**) by turning them in a counter-clockwise direction.

i Use caution to prevent the shim rings (**17**) located between the diaphragm and the connecting rod from falling into the pump housing. The shim rings (**17**) must be installed in the same quantity as before to ensure the pump's pneumatic performance.

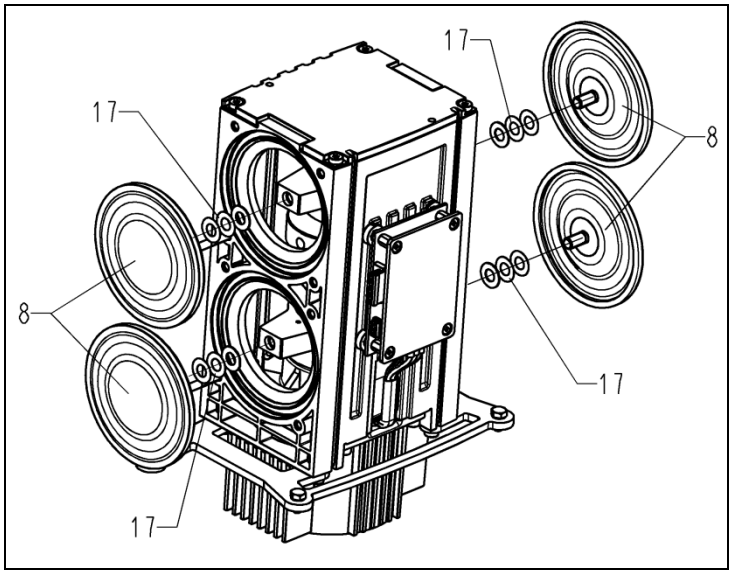


Fig. 24: Replacing the diaphragm

2. Remove from the intermediate plates (Fig. 23**/7**) the valve plates (**5**) and (**6**) and the O-rings (**15**) and (**16**).
3. Manually screw the new diaphragms (Fig. 24/**8**) into the threads of the connecting rod and tighten to hand tightness.

i Before you fully tighten the diaphragms, you are recommended to move the diaphragm to the upper dead center.

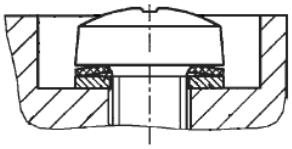
4. Insert the new valve plates (Fig. 23/**5**) and (**6**) and the new O-rings (**15**) and (**16**) into the intermediate plates (7).

i The upper and lower sides of the valve plates are identical.

i Place the black O-rings (**15**) and (**16**) into the intermediate plate of head 4 (see Fig. 22).

5. Place head plates (Fig. 23/**3**) onto the intermediate plates (**7**), observing the pencil marks (Fig. 21/**M**).
6. With your hands, carefully and lightly tighten the head plate's head screw (Fig. 23/**1**) on all four heads (torque: 60 Ncm).

i Refer to Fig. 25 for arrangement and alignment of disk springs and the washers.



The curvature of the disk spring must face the pump head (see Figure).

Fig. 25: Aligning the disk spring

9.3.6. Assembling heads and head connection

1. Place three O-rings (Fig. 22/**4**) into each of the head connection holes.

i Place the three black O-rings (**4**) into the head connection holes between heads 3 and 4.

2. Press together heads 1 and 2 (Fig. 21/**I** and **II**) and heads 3 and 4 (**III** and **IIII**).
3. Place heads 1 and 2 and heads 3 and 4 onto the compressor housing; alternately tighten attachment screws **(**Fig. 19**/**2) to hand-tightness (torque: 3.5 Nm)
4. Insert O-rings (Fig. 20/**14**) and flat seals (**11**) in the grooves and recesses in the head plates.
5. Reinstall the head connections:
   To do this, manually tighten the head connections' attachment screws (Fig. 20/**9** and **12**).

i Before assembling the head connections, make sure that the two front attachment screws (Fig. 18/**9**) are inserted into the foot plate. This is required in order to later re-fasten the pump in the vacuum pump system.

6. Properly dispose of the old diaphragms, valve plates, and O-rings.

9.3.7. Final steps

1. Place the pump back into the vacuum pump system and tighten the four attachment screws (Fig. 18/**9**) hand tight.
2. Replace the connections at the suction and pressure sides of the pump:
   To do this, place the two connection fittings (**8**) in the connection blocks and then fix them in place with the two spring steel clips (**7**).
3. Replace plugs **3**, **4**, **5** and **6** on the electrical connection of the pump.
4. Put the grip assembly (**2**) back onto the vacuum pump system and tighten the four attachment screws (**1**) hand tight.
5. Reconnect suction and pressure lines to the vacuum pump system.
6. If applicable, fix the charging station to the vacuum pump system again (see Fig. 8, p. 21).
7. Reconnect the vacuum pump system to the mains power.

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

10. Troubleshooting

Risk of electric shock, danger of death

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

DANGER ➔ Make sure that the pump is de-energized.

- Vacuum pump system generally: see Tab. 9.
- Hand terminal: see Tab. 10.
- Software operation: see Tab. 11.

Vacuum pump system generally		
Error	**Cause**	**Remedy**
The vacuum pump system is switched on, but the power switch does not illuminate.	Power cable not plugged in.	➔ Plug the vacuum pump system's mains power cable into a properly installed grounded socket.
	No voltage in the mains.	➔ Check the room's fuses.
	Fuses in vacuum pump system are blown.	1. Identify and eliminate cause of overload. 2. Replace the mains fuse(s) of the vacuum pump system: ▪ At the fuse drawer (Fig. 2/**17**, p. 13) press the locking strap downward and remove the fuse drawer. ▪ Replace defective fuse(s) (For fuse specifications, refer to Chapter 4.1, page 9f; for the order number of the fuse, see Chapter 11, page 52). ➔ Slide the fuse drawer in until it engages.
Insufficient vacuum generated although the pump is running.	Vacuum chamber leaking	1. Check by closing the gas inlets (Fig. 2/ **17** and **18,** p. 13). If the pump achieves sufficient vacuum, the vacuum chamber has a leak. 2. Repair the leak in the vacuum chamber.
	The O-ring at the holder for the suction side collection flask is not installed correctly.	➔ Align the O-ring ➔ If the O-ring is defective, replace it (order no. see Chapter 11, page 52).
	Hose connection leaking.	➔ Make sure the hoses are properly seated on the hose connectors. ➔ Replace leaking hoses. ➔ Replace leaking hose connectors. ➔ For the order number, refer to Chapter 11, page 52.

Tab. 9 (1st part)

Vacuum pump system generally		
Error	**Cause**	**Remedy**
	Ventilation valve leaking.	➔ Temporarily close the ventilation connections (Fig. 2/**16** and **19,** p. 13). If there is no leak when the ventilation connection is closed, the ventilation valve has a leak. In this case: ➔ Rinse the ventilation valve: 1. Close gas inlets (Fig. 2/**17** and **18**). 2. If necessary for safety reasons: Connect inert gas to the ventilation connection. The safety precautions in Chapter 3 must be observed at all times. 3. Run the vacuum pump system in *Evacuate* operating mode with the pump at full speed 4. Open the gas inlet again. ➔ If the problem remains, contact KNF Service.
	Condensate in pump head.	➔ Open the gas ballast and rinse the pump heads. ➔ Dry the system with fresh air or, if necessary for safety reasons, with an inert gas: 1. If inert gas is used: Connect an inert gas source to the gas inlets (Fig. 2/**17** and **18,** p. 13) and start the system in Evacuate operating mode (100% speed). The safety precautions in Chapter 3 must be observed at all times. 2. If air is used: Open gas inlets (Fig. 2/ **17** and **18,** p. 13) to the atmosphere and start the system (SC 950: in Evacuate operating mode) (100% speed). 3. After 30 seconds, close the gas inlet and run the vacuum pump system for 30 seconds in vacuum. 4. Repeat 3-5 times. ➔ If the problem occurs frequently: Place the vacuum pump system higher than the vacuum chamber.
	Gas outlet on the high-performance condenser is obstructed.	Danger of high-performance condenser rupturing ➔ Eliminate blockage of gas outlet.
	Diaphragms or valve plates are worn.	➔ Replace diaphragms and valve plates (Chapter 9.3)

Tab. 9 (2nd part)

Vacuum pump system generally		
Error	**Cause**	**Remedy**
	Diaphragm and valve plates have been replaced.	➔ Make sure that the diaphragms have the correct shim rings. ➔ If necessary, carefully tighten the attachment screws (Fig. 19/**2**, p. 41) of the pump head alternately.
	Gas ballast still open.	➔ Close gas ballast.
Despite the required pressure decrease the pump does not start when a process is started.	Hand terminal or software is not connected to the vacuum pump system.	➔ Establish connection.
	The overcurrent protection circuit of the vacuum pump system has responded.	➔ Switch the vacuum pump system off and on to reset it. ➔ Make sure that nothing is blocking the fans on the vacuum pump system (Fig. 2/**12** and **13**, p. 13) and that there is sufficient air feed and removal. ➔ Identify and eliminate cause of pump overload.

Tab. 9 (3rd part)

Hand terminal		
Error	**Cause**	**Remedy**
Hand terminal cannot be taken from the vacuum pump system.	Transportation safeguard was not removed.	➔ Remove transportation safeguard (see Chapter 6.1).
Hand terminal's display stays dark.	Hand terminal is not switched on.	➔ Switch hand terminal on.
	Batteries in hand terminal are empty.	➔ Place hand terminal on switched on vacuum pump system to charge the batteries. ➔ Alternatively: Run hand terminal via the power supply.

Tab. 10 (1st part)

The hand terminal display shows "No connection", when a button on the touchscreen is touched a warning sound is output.	Vacuum pump system switched off.	➔ Switch on vacuum pump system with mains power switch. Mains power switch must illuminate.
	The hand terminal belongs to a different SCC 950 vacuum pump system.	➔ Use the paging function (see Paging the vacuum pump system, page 34) to determine whether the correct hand terminal is used.
	Wireless connection is interrupted.	➔ Check whether the hand terminal is being used outside the wireless range. ➔ Make sure that the wireless space is not disturbed by electric devices or metal objects. ➔ If necessary, place hand terminal onto the system in order to identify that the wireless connection is the source of the problem.
	Wireless module defective.	➔ Contact KNF Service.
Vacuum pump system does not respond to the entries on the hand terminal although there is no "No connection" message and the pressure display is shown.	The hand terminal belongs to a different SCC 950 vacuum pump system that is in operation.	➔ Use the paging function (see Paging the vacuum pump system, page 34) to determine whether the correct hand terminal is used.
Hand terminal's signal tone sounds.	Batteries almost empty.	➔ Place hand terminal on switched on system to charge the batteries. ➔ Alternatively: Run hand terminal via the power supply.
The hand terminal's maximum service duration in wireless operation is noticeably shorter.	Batteries at end of service life.	➔ Change batteries (see Chapter 8.1.3, page 35).
Although the hand terminal is on the vacuum pump system, the vacuum pump system cannot be controlled.	The contacts on the base of the hand terminal or in the vacuum pump system's holder are dirty.	➔ Clean contacts.
Pressure display shows implausible values.	Pressure units were changed.	➔ Select the desired pressure unit.
	Leak in the system.	➔ See Tab. 9, "Insufficient vacuum generated although the pump is running."
	Pressure sensor has to be recalibrated.	➔ Contact KNF Service.

Tab. 10 (2nd part)

Software operation		
Error	**Possible cause**	**Remedy**
The PC software cannot establish a connection with the vacuum pump system.	Vacuum pump system is not switched on.	➔ Switch on the vacuum pump system
	The USB connection between the system and the PC is not working.	➔ Check that the USB cable is properly connected. If necessary, disconnect the USB cable and reconnect it (reset the USB interface).
Pressure display shows implausible values.	Pressure units were changed.	➔ Select the desired pressure unit.
	Leak in the system.	➔ See Tab. 9, "Insufficient vacuum generated although the pump is running."
	Pressure sensor has to be recalibrated.	➔ Contact KNF Service.

Tab. 11

Fault persists

If you are unable to identify the cause of the problem, please send the vacuum pump system to KNF Customer Service (see address on last page).

1. Rinse vacuum pump system to free the pump head, lines and glass vessels of dangerous or aggressive gases (see Chapter 9.2.1, page 37).
2. Clean the vacuum pump system (see Chapter 9.2.2, page 37).
3. Send the vacuum pump system with completed Health and safety clearance and decontamination form (see Chapter 13), to KNF stating the nature of the transferred medium.

11. Spare parts and accessories

11.1. Spare parts

Spare parts for pump

A spare parts kit contains all parts needed for complete overhaul of the pump head:

- 4x diaphragms
- 8x valve plates
- 6x valve plates
- 2x flat seals
- 8x O-rings (ø 24 x 2):
  - 6 x green
  - 2 x black
- 6x O-rings (ø 18.77 x 1.78)
  - 5 x green
  - 1 x black
- 6x O-rings (ø 10 x 2.5)
  - 3 x green
  - 3 x black
- 2x O-rings (ø 7.65 x 1.78), green
- 2x O-rings (ø 10 x 1.8), black

Spare part set for system type	Order No.
SCC 950	126111

Tab. 12

Other spare parts

Spare part	Order No.
Battery set for hand terminal (see Chapter 8.1.3, page 35).	117427
Power supply for hand terminal	302033
USB cable	136174
Mains cable D	026363
Mains cable CH	027523
Mains cable GB	029866
Mains cable USA/JP	027524
Spare parts set, hoses SCC 950	305756
Hose connectors, gas outlet for high-performance condenser Gas connections (ID 10)	026237
Hose connectors for high-performance condenser Coolant connections (ID 8)	025981
O-ring for collection flask holder	047744
Collection flask 500 ml (coated)	121415
Flask clip	025968
Mains fuse T 2.5	027575

Tab. 13

11.2. Accessories

Accessories	Order No.
Coolant valve	117121
Color-coded stickers for assigning hand terminal to vacuum pump system*	117433
Chemical-resistant protective membrane for hand terminal's display.	117407
Contact cover set **	126335

** If several SCC 950 vacuum pump systems are used within the wireless range.*

*** The contact covers are used to protect the hand terminal contacts from contamination when the hand terminal is taken off.*

Tab. 14

12. Returns

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

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

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

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

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

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

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

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

13. Health and safety clearance and decontamination form

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

Health and safety clearance and decontamination form

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

Device type: ……

Serial number(s): ……

……

……

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

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

……

……

……

……

……

We confirm that the above device(s)

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

Pumped media: ……

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

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

Name, chemical formula, Material Safety Data Sheet

☐ aggressive ……

☐ biological ……

☐ radioactive ……

☐ toxic ……

☐ other ……

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

Method / proof: ……

……

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

Measures: ……

……

Legally binding declaration

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

……	.....	.....	.....	.....
Company (stamp)	Date	Name	Authorized signature	Position

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