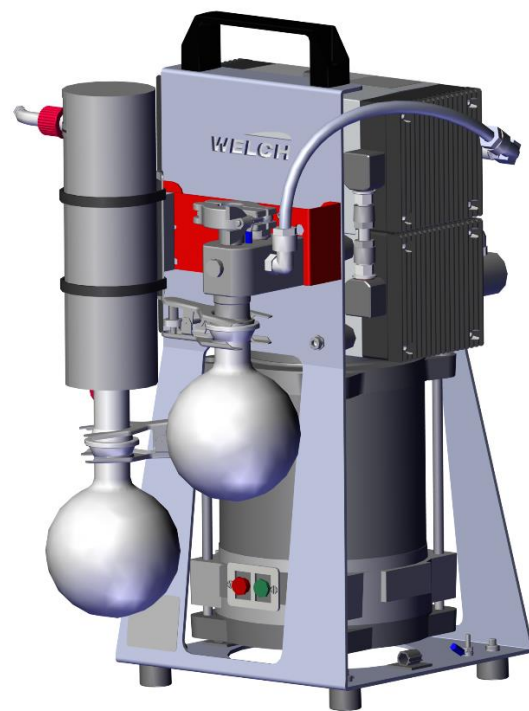


Operation Manual (EN)
Translation of the original operation manual

Laboratory Vacuum System with ATEX Conformity

LVSF 600 T ATEX 230 V
LVSF 600 T ATEX 115 V



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1 Important Information

	OBSERVE
	<ul style="list-style-type: none">▶ Read operation manual carefully before use.▶ Keep operation manual for later reference.

1.1 Note for the user / personnel

Safety

- The user/personnel must have read and understood the operation manual completely before starting work.
- The operation manual must always be kept in the place it will be used and be available to the user/personnel.
- The product may not be transferred without the operation manual.
- Safe operation can only be guaranteed with proper and correct use of the product. The safety and warning notices must be heeded!

General

- Vacuum apparatus/vacuum system generally refers a combination of components for vacuum applications, such as rotary evaporator with a vacuum control device and vacuum pump.
- The operator is responsible for the proper use of vacuum apparatuses/vacuum systems.


About this device

- In this document, the laboratory vacuum system (abbreviated LVS) will be referred to as the "device".
- "Device" describes the entire system consisting of the integrated vacuum pump (or pump), attachments and various other parts.
- Generally, the pneumatic connections are referred to as follows:
 - Intake as "suction side" toward application,
 - Outlet as "pressure side" toward exhaust.
- Condensate collection containers are generally referred to as separators.




Important Information

1.2 Depiction of safety and warning notices


The warning notices are depicted as follows:

 DEGREE OF RISK	
Additional symbols	<input type="checkbox"/> Type and source of danger. <ul style="list-style-type: none"> • Consequences if warning is not heeded. ▶ Measures for escaping/avoiding danger.

Degree of risk

 DANGER	▶ Indicates a threatening risk which, if not avoid, will result in dangerous injuries or death.
 WARNING	▶ Indicates a possibly hazardous situation which, if not avoided, can result in serious injuries or life-threatening consequences.
 CAUTION	▶ Indicates a possibly hazardous situation. If not avoided, this can result in light injury.


Prohibition

	ATTENTION
	⊗ Description of the forbidden actions!




Safety notice













Additional symbol	SIGNAL WORD
	<ul style="list-style-type: none"> ▶ Important instructions for the user/operator. ⊗ Actions / activities that are <u>not</u> allowed.

Information presentation

	Signal Word
	▶ Information for the user / operator.

1.3 Explanations of symbols

Symbol	Explanation
	General warning symbol
	High voltage warning
	Warning of hazardous atmosphere

Symbol	Explanation
	Hot surface warning
	Poisonous substances warning
	Low temperature warning
	General prohibition
	General mandatory sign
	Follow the operation manual
	Disconnect prior to maintenance or repair
	Disconnect the power plug.
	Use gloves
	Use eye protection
	General information
	Explosion protection

Important Information

1.4 Legend for the abbreviations


Abbreviation	Designation or meaning	Explanation
as per	as per	Designation
ESD	Electrostatic discharge	Designation
Fig.	Figure	Designation
gen.	General	Designation
pneum.	Pneumatic	Designation
MPC	Diaphragm pump, chemically resistant (German: Membran Pumpe)	Device model
LVS	Labor vacuum system	Device model
EB	Equipotential bonding	Connection designation
EX	Exhaust	Connection designation
IN	Intake	Connection designation
KF	Small flange (German: Standard Klein-Flansch)	Connection designation
KS	Spherical joint (German: Standard Kugel-Schliff)	Connection designation
hh:mm:ss	hour / minute / second	Time specification
abs.	Absolute	Value specification
ATM	Atmosphere	Value specification
max.	Maximum	Value specification
min.	Minimum	Value specification
DN	Nominal width – inside diameter (French: diamètre nominal)	Dimension specification
ID	Internal diameter	Dimension specification
mm	Millimeter	Dimension specification
AC	Alternating current	Electrical unit
DC	Direct current	Electrical unit
A	Ampere - current strength	Electrical unit
Hz	Hertz (frequency)	Electrical unit
V	Volt - voltage	Electrical unit
W	Watt – power	Electrical unit
hPa	Hectopascal (1 hPa = 1 mbar = 0.75 Torr)	Pressure unit
mbar	Millibar (1 mbar = 1 hPa = 0.75 Torr)	Pressure unit
Torr	Torr (1 Torr = 1.33 mbar = 1.33 hPa)	Pressure unit
EPDM	Ethylene propylene diene rubber	Material
PP	Polypropylene	Material
PTFE	Polytetrafluorethylene	Material
PVDF	Polyvinylidene fluoride	Material
PEEK	Polyetheretherketone	Material
r.H.	Relative humidity in %	Environmental condition

2 Safety


2.1 General

- Anyone who plans to use the device must have read and understood the following safety and warning notices.
- Activities may only be performed by trained personnel who are familiar with the special hazards and heed them and who have understood how the device functions as well as the operation manual.
- The device may only be used if it is in technically perfect condition.

2.1.1 Proper use

	OBSERVE
	<ul style="list-style-type: none"> ▶ The design of the device must be appropriate for the conditions of use. The operator bears sole responsibility for this. ▶ Any other use will be regarded as unintended.



- Operation of this device is only permissible under the conditions named
 - in section 3 *Technical data*,
 - on the nameplate and
 - in the technical specification for the order in question.
- The device is intended for vacuum technology applications only. It is only permissible to convey particle-free gaseous medium.
- The device is intended for indoor use.

	ATEX APPLICATION
	<ul style="list-style-type: none"> ▶ The device is only permitted to be operated as per the specifications in section 2.5.1 <i>ATEX classification</i>. ▶ Failure to comply with these limits is considered to be unintended use.

In addition, intended use is considered to be the following:

- Adherence to this operation manual including the safety and warning notices.
- Defining and ensuring safety measures (see section 2.3 *Protective measures*).
- Adherence to the operation manuals of connected devices.
- Use of approved spare parts and accessories from Gardner Denver Thomas GmbH.


2.1.2 Improper use

 CAUTION	
	<ul style="list-style-type: none"> ☐ Danger of injury due to unintended use! • Use that is <u>unintended</u> can result in personal injury. ▶ The operator must ensure the device is operated as per section 2.1.1 <i>Proper use</i>!!


Safety

The following is regarded as improper use:

- Uses that correspond to unintended use (see section 2.1.1 *Proper use*).
- Use outside of the specifications:
 - of the technical data,
 - on the rating plate or
 - contained in the conditions of the delivery contract.
- Operation in less-than-perfect technical condition.
- Operation outdoors.

	OBSERVE
	▶ Uses that are improper must be prevented by the operator or measures must be taken that ensure proper operation!


2.1.3 Foreseeable misuse

	ATTENTION
	⊗ Misuse is generally FORBIDDEN . It also counts as improper!

Regarded as foreseeable misuse are the following:

- Manipulation of the device, e.g. impermissible attachments and modifications.
- Leaving critical applications unsupervised.
- Operation of the device with tools or other impermissible objects.
- Conveying inadmissible medium, liquid medium, or medium containing particles.
- Operation by untrained or technically unskilled personnel.
- Protective measures are insufficient or non-existent.
- Failure to abide by the legally applicable regulations.

2.2 Target groups

	OBSERVE
	▶ There can be misuse due to use by untrained personnel. ▶ The operator must ensure that the personnel is trained properly and all necessary safety measures are adhered to!

2.2.1 Personnel qualification

Target group	Area of activity
User	Laboratory personnel, e.g. chemists
Operator	Representative responsible (processes)
Specialized personnel	Person with professional qualifications, e.g. mechanic, electrician, laboratory director, etc.
Manufacturer	Service and maintenance/repair may only be performed by the manufacturer or authorized service providers

2.2.2 Overview of the responsibilities


Activity	User	Specialized personnel	Manufacturer
Set-up	x	x	x
Connection		x	
Bringing into service	x	x	x
Operation	x	x	x
Analysis of operating fault	x	x	x
Eliminating operating fault	(1)	x	x
Maintenance/inspection, external	x	x	x
Maintenance/inspection, internal	(1)	x	x
Repairs by operator	(1)	x	
Damage report	x	x	
Decontamination			(2)
Disposal		x	x

(1) Performed by specially trained users

(2) Performed by qualified and authorized service providers only


2.3 Protective measures

2.3.1 General protective measures

	OBSERVE
	<ul style="list-style-type: none"> ▶ In the interest of user safety, the operator must define and ensure the protective measures. ▶ Failure to comply with this can endanger the health of users.

All protective measures must be the highest priority in order to protect the life and health of personnel. In case of potential safety hazards, these must be assessed and measures taken to avoid hazards.

Applicable operating instructions from the operator and the national regulations for accident prevention, safety and occupational health and safety must be heeded.

	PROTECTIVE CLOTHING
	<ul style="list-style-type: none"> ▶ For applications and activities that require protective clothing, this clothing must be worn for personal safety. ▶ The operator must specify the type and manner of protective clothing!

Safety



2.3.2 Reliable operation

Note the following!

- Operation as per the safety requirements in section 2.1 *General*.
- Use as per section 6.2 *Safe operation*.
- The separator can only be emptied after the vacuum system has been ventilated (see sections 2.4.5 *Vacuum* and 6.3 *End of process*).
- Note possible hazards caused by the required substances (see section 2.4.1 *Hazardous materials*)!
- The pneumatic connections must be established as per section 5.4.1 *Pneumatic connection*.
- Check the attachment for damage (see section 5.1 *Unpacking*).
- The outlet pressure must be atmospheric.
- Note the maximum elevation at which the device may be used (see section 3.2 *Characteristic values*).


Conveying vapors

In applications with vapors, condensation may form in the pump's delivery area. If required by the application, a condenser must be positioned upstream to protect the pump. The use must be defined by the operator.

OBSERVE	
	<ul style="list-style-type: none">▶ Formation of condensate can greatly reduce the service life of the components, especially of the diaphragms (see section 2.5.2 <i>Special conditions</i>).
	<ul style="list-style-type: none">▶ In applications with vapors, the gas ballast must be used (see section 4.2.4 <i>Gas ballast</i>).▶ The device must be at operating temperature before applications are started.

NOTE Condensate formation in the delivery area is reduced when the device is at operating temperature.

2.4 Special hazards

EMERGENCY SWITCH OFF	
	<ul style="list-style-type: none">▶ In dangerous situations, de-energize the device by pressing the main switch (Fig. 2-1).

NOTE When the device is de-energized, the motor stops and all valves are closed.

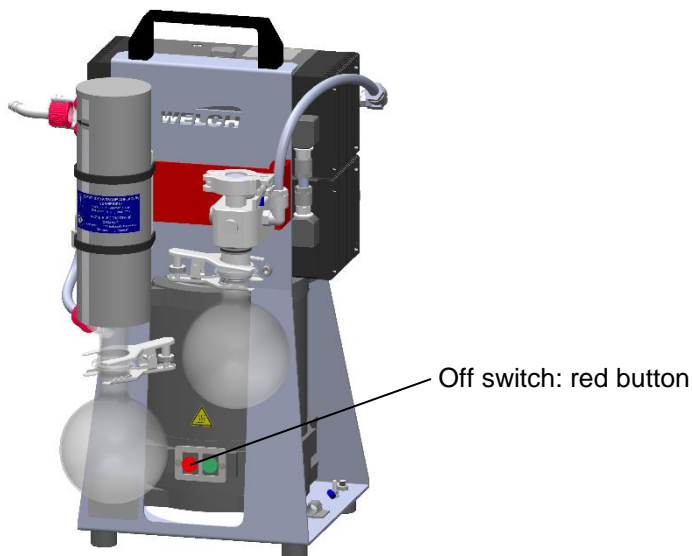






Fig. 2-1. Position of main switch (front view)

2.4.1 Hazardous materials


 WARNING	
	<input type="checkbox"/> Health hazard from hazardous materials! <ul style="list-style-type: none"> • Hazardous materials in the medium being conveyed can endanger the health of persons. ▶ Safety and warning notices regarding the handling of hazardous substances must be followed.

	HAZARDOUS MATERIALS
	<ul style="list-style-type: none"> ▶ In applications with substances with a GHS classification, measures must be implemented that protect the health of persons and the safety of the environment. ▶ The operator must – taking into account the legally applicable regulations – assess the possible hazards in order to prevent personal injuries and damage to the environment and property. The operator bears responsibility for this!



	BIOLOGICAL RISK GROUP
	<ul style="list-style-type: none"> ⊗ The operation with medium that belong to a biological risk group that can threaten the health of persons, e.g. due to viruses or bacteria, is FORBIDDEN!

Note the following in applications with hazardous materials!

- Adhere to the requirements of the safety data sheets of the manufacturers of the hazardous materials.
- Prevent the escape of poisonous and environmentally-damaging substances from the apparatus.
- The attachments must be used to protect the environment and the apparatus (see section 4.3 *Attachments*).
- Check the tightness and strength of the connecting lines and all other connected components.
- Hazardous substances should be separated out as far as this is technically possible before they reach the pump.

	MATERIAL RESISTANCE
	<ul style="list-style-type: none"> ▶ In case of applications with aggressive medium, the resistance of device parts that come into contact with the medium must be evaluated by the operator (see section 3.4 <i>Parts in contact with medium</i>).

2.4.2 Electricity


 DANGER	
	<input type="checkbox"/> Danger to life due to electric current. <ul style="list-style-type: none"> • Touching live parts will lead to an immediate danger to life due to electric shock. ⊗ It is forbidden to open the device.

Heed the following instructions!


- Operating the device without the housing is forbidden.
- Switch off faulty devices at the main switch.
- The power cable must be in perfect condition.
- The device must be connected as per section 5.4.4 *Electrical connection*.

Safety


2.4.3 Mechanics


OBSERVE	
	<ul style="list-style-type: none">▶ Improper use or manipulation of the device can lead to property damage on the connected devices or apparatuses.▶ External mechanical stresses and vibrations must not be transmitted to the device.▶ The device may only be connected with a flexible hose.

2.4.4 Temperatures

⚠ CAUTION	
	<ul style="list-style-type: none">☐ Danger of injury due to contact with hot surfaces!• During operation, the motor housing and its surroundings will become very hot. Touching this area can cause burns.▶ When pressing the main switch, avoid touching the hot surfaces (Fig. 2-2). The operator must ensure safe operation and take measures to protect the user if necessary (see section 2.3 <i>Protective measures</i>).

NOTE During normal operation, the device can reach a surface temperature (motor) of approx. 90 °C.

⊘ ATTENTION	
	<ul style="list-style-type: none">⊘ Exceeding the permissible media temperature is FORBIDDEN!

MEDIUM/OPERATING TEMPERATURE	
	<ul style="list-style-type: none">▶ Adhere to the values for permissible operation (see section 3.2 <i>Characteristic values</i>).▶ Sufficient ventilation around the device must be ensured (see section 5.2 <i>Set-up</i>).

NOTE The device is warmed by the motor (passive cooling), the temperature of the medium being conveyed and the compression heat. The device features a temperature protection switch that de-energizes the device when it overheats (see section 4.2.7 *Motor temperature protection*).

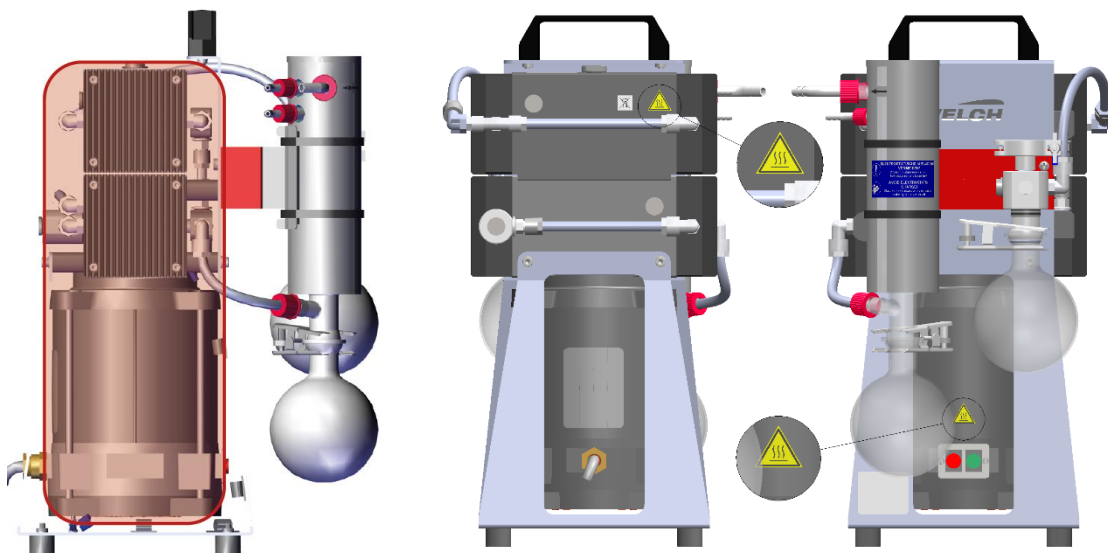






Fig. 2-2. Hot area on the device (left), warning label on the device (middle/right)



Operating fluid

 CAUTION	
	<ul style="list-style-type: none"> <input type="checkbox"/> Danger of injury due to contact with cold surfaces! <ul style="list-style-type: none"> • When using very cold coolants, surfaces such as those on the emission condenser can reach dangerously low temperatures and cause frostbites. ▶ The operator must ensure safe operation and take measures to protect the user if necessary (see section 2.3 <i>Protective measures</i>).



2.4.5 Vacuum



 CAUTION	
	<ul style="list-style-type: none"> <input type="checkbox"/> Danger of injury from bursting! <ul style="list-style-type: none"> • Due to sudden ventilation, the vacuum apparatus can burst. The splinters can cause serious injury to the user. ▶ Check the pressure in the vacuum apparatus before you disconnect the pneumatic connections.

NOTE A vacuum can also exist in the vacuum apparatus when the device is switched off.

 GLASS APPARATUS	
	<ul style="list-style-type: none"> ▶ Glass apparatus is especially endangered. Make sure that the glass apparatus is vacuum-proof and non-breakable. ▶ The glass apparatus must be suitable for the intended application.







2.5 ATEX application

 DANGER	
	<ul style="list-style-type: none"> <input type="checkbox"/> Danger of explosion due to critical applications! <ul style="list-style-type: none"> • When using the device outside of the permissible ATEX classification there is a danger to life. ▶ Only operate the device within the specifications described in section 2.5.1 <i>ATEX classification</i>. The operator bears responsibility for this.

 ATEX REQUIREMENT OF THE OPERATOR	
	<ul style="list-style-type: none"> ▶ The evaluation of the hazardous zone classification and the definition of the device requirements are the responsibility of the operator.


Safety

2.5.1 ATEX classification

Device section (nameplate)	Classification
Complete device	 II 2/3G IIB T4 X
Pump unit, inside (medium conveying area)	 II 2G Ex h IIB T4 Gb X
Pump unit drive chamber, outside	 II 3G Ex h IIB T4 Gc X
➤ Without inert gas flushing	 II 2G Ex h IIB T4 Gb X
➤ With inert gas flushing	 II 2G Ex h IIB T4 Gb X
Motor	 II 2G Ex d IIB T4 Gb


NOTE System limits (inside/outside) of the device, see section 4.2 *Set-up*.
Position of the rating plates on the device, see Fig. 4-1.


2.5.2 Special conditions

 OBSERVE
<ul style="list-style-type: none"> ▶ Special conditions apply to the device. ▶ The operator is responsible for ensuring that the following points are taken into account and implemented.

The following applies to the device:

- The device may only be operated in accordance with the installation conditions with equipotential bonding as described in section 5.4.4 *Electrical connection*.
- The pneumatic installation must exclude the possibility of afterflow or backflow of the pumping medium after the device is switched off.
- Only gaseous medium may be conveyed (see section 2.1.1 *Proper use*).
- Operation without the attachments is not permissible (see section 4.3 *Attachments*).
- The attachments and accessory parts used with the vacuum pump must be suitable for the application.
- Electrostatic charging must be prevented.

 ATTENTION
<ul style="list-style-type: none"> ⊗ Processes that generate electrostatic charge in the vicinity of the device are FORBIDDEN!

 OBSERVE
<ul style="list-style-type: none"> ⊗ No cleaning of the following areas with dry cloth: (see section 8.2 <i>Service through cleaning</i>) <ul style="list-style-type: none"> - Materials that are not electrostatically dissipative - Painted outside surfaces - Attached signs (labels) made of plastics that are not electrostatically dissipative ⊗ Users must <u>not</u> be electrostatically charged.

- The requirements described in section 8 *Maintenance* must be adhered to.
- Evaluation of the usability of the materials of the device for the intended application, taking into account that explosion protection must not be eliminated (see sections 3.4 *Parts in contact with medium* and 4.2.6 *Material*).

DANGER



Danger of explosion from diaphragm breakage!

- If the prescribed maintenance intervals are not adhered to or if medium is used that reduces the service life of the materials, explosive medium may enter into the drive chamber. Resulting in a danger to life!
- ▶ Change the membrane as specified in section 8.3 *Repairs by the operator*.
- ▶ The operator must check the compatibility of the materials used with the intended application.



Optional protective measures

- ▶ For applications that can reduce the service life of the diaphragm, the drive chamber can be purged with inert gas (see section 4.2.3 *Drive chamber flushing*).
- ▶ Monitoring is the responsibility of the operator.



FORBIDDEN APPLICATIONS

- ⊗ Substances that have a tendency to decompose, such as acetylene C_2H_2 , carbon disulfide CS_2 and explosives are not within the area of application of the ATEX regulation 2014/34/EU and are not permitted to be conveyed.
- ⊗ These applications are **FORBIDDEN!**

Technical data

3 Technical data

3.1 Dimensions

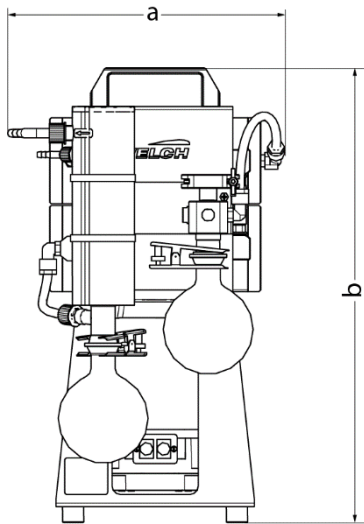


Fig. 3-1. View of device, front

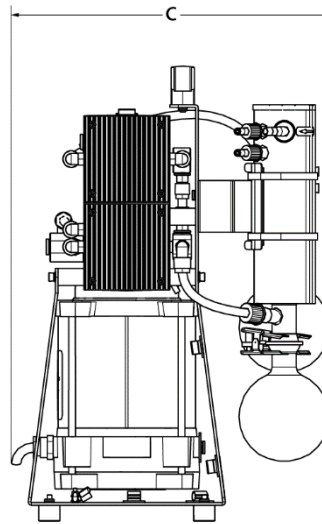


Fig. 3-2. View of device, left

Parameter	Data	Unit
Width [a]	330 ± 10	mm
Height [b]	530 ± 10	mm
Depth [c]	360 ± 10	mm

3.2 Characteristic values

3.2.1 Pumping speed

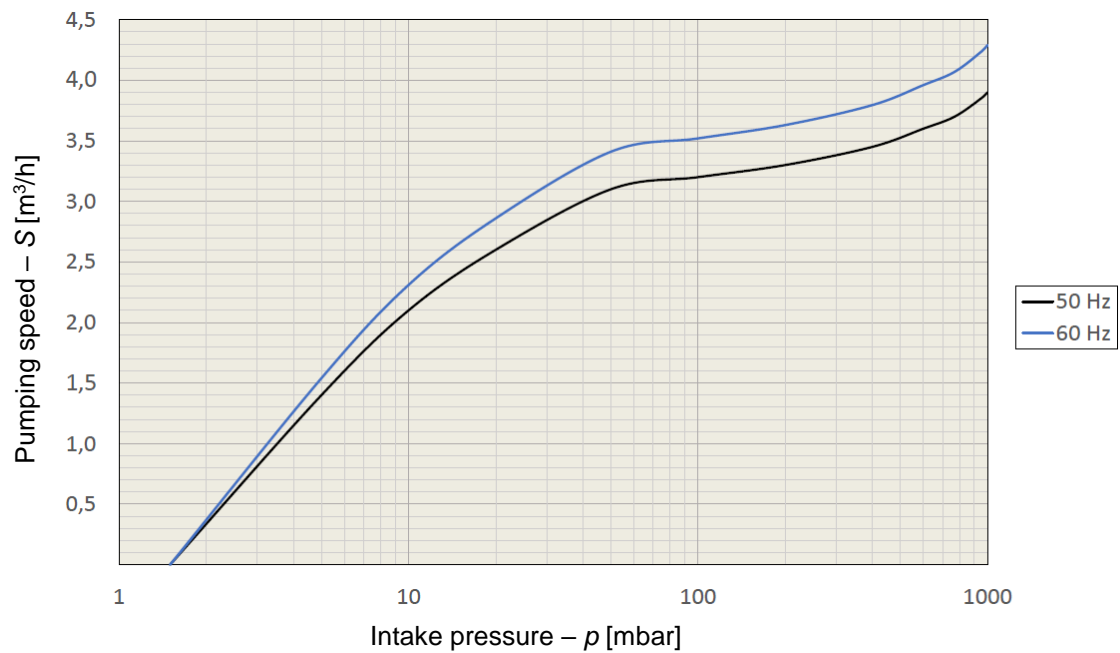


Fig. 3-3. Pumping speed characteristic curve $S(p)$


3.2.2 Parameter

Variables	Data		Unit
Designation	LVSF600T – 230 V	LVSF600T – 115 V	
Item number	116051-10	116051-11	-
Pumping speed ISO 21360-1 at 1000 mbar			
➤ 230 V/50 Hz	3.9	-	m ³ /h
➤ 115 V/60 Hz	-	4.3	
Ultimate pressure (base pressure) ISO 21360-1			mbar
➤ Without gas ballast	≤ 2		
➤ With gas ballast	≤ 3		
Rated voltage	230	115	V
Rated frequency	50	60	Hz
Rated current	1.3	3.1	A
Degree of protection DIN EN 60529	IP55		-
Sound pressure level DIN EN ISO 2151	53		db (A)
Weight (unpacked)	28.2		kg
Max. input/output pressure	1100		mbar
Operating temperature range	+ 10 to + 40		°C
Max. medium temperature	+ 40		°C
Max. coolant temperature	+ 12		°C
Max. elevation	2000		m MSL
Storage temperature	+ 5 to + 40		°C
Storage humidity	<90		% r.H.
Inert gas quantity ¹ (tolerance)	60 (± 10 %)		l/h
Inert gas pressure ¹ (abs.) ²	1100 – 1150		mbar

¹ Operation only optional

² Must be relative overpressure to ambient pressure


3.3 General information on connections

	ELECTRICAL CONNECTION
	▶ The power supply may only be connected by a trained electrician (see section 5.4.4 <i>Electrical connection</i>).

Connection type		Version
Pneumatic intake	Suction connection	DN 16 KF incl. 1/4" screw-in thread
Pneumatic outlet	Pressure connection	Hose nozzle GL 18 (ID 10 mm)
Coolant	Intake/outlet	Hose nozzle GL 14 (ID 8 mm)
Drive chamber flushing*	Intake/outlet	Hose nozzle DN 8 (ID 8 mm)
Gas ballast*		Hose nozzle DN 8 (ID 8 mm)

NOTE * Scope of delivery for inert gas connection (see section 4.4.1 *Accompanying material*).

3.4 Parts in contact with medium

	OBSERVE
	<ul style="list-style-type: none"> ▶ The operator must ensure that the application is uncritical in association with the installed materials (see section 2.5.2 <i>Special conditions</i>). ▶ Following the safety/warning notices (see section 2.4.1 <i>Hazardous materials</i>)!

Components	Material
Vacuum pump <ul style="list-style-type: none"> ➤ Pump heads ➤ Molded diaphragm ➤ Valves ➤ Seals 	<ul style="list-style-type: none"> ➤ PTFE ➤ PTFE coating on elastomer ➤ PEEK ➤ EPDM
Pneumatic connections <ul style="list-style-type: none"> ➤ Vacuum hoses ➤ Screw fittings ➤ O-ring seals 	<ul style="list-style-type: none"> ➤ PTFE ➤ PVDF ➤ EPDM
Separator/emission condenser <ul style="list-style-type: none"> ➤ Condensate collection container ➤ Hose nozzle ➤ Connection block incl. hose nozzle 	<ul style="list-style-type: none"> ➤ Glass (vacuum-proof) ➤ PTFE ➤ PVDF

4 Description

4.1 Field of application

4.1.1 General description

- The device is designed to convey neutral and (aggressive) potentially explosive gaseous medium.
- The device is suitable for use in laboratories and in industry with low-vacuum working areas.
- Gases are drawn in, compressed and output via the vacuum diaphragm pump. Condensate-forming medium are discharged via the glass attachments.
- The device must be connected according to the legal requirements and operated in accordance with the technical data.

4.1.2 Specific description

Device with ATEX conformity is designed for:

- Sucking in, conveying and compressing neutral and aggressive gases and vapors.
- Sucking in, conveying and compressing hazardous atmospheres, consisting of air and combustible gases, vapors and mists in any mixing ratios as per the specifications in section *2.5.1 ATEX classification*.
- Set-up and operation in hazardous atmospheres as per the specifications in section *2.5.1 ATEX classification*.

Nameplates

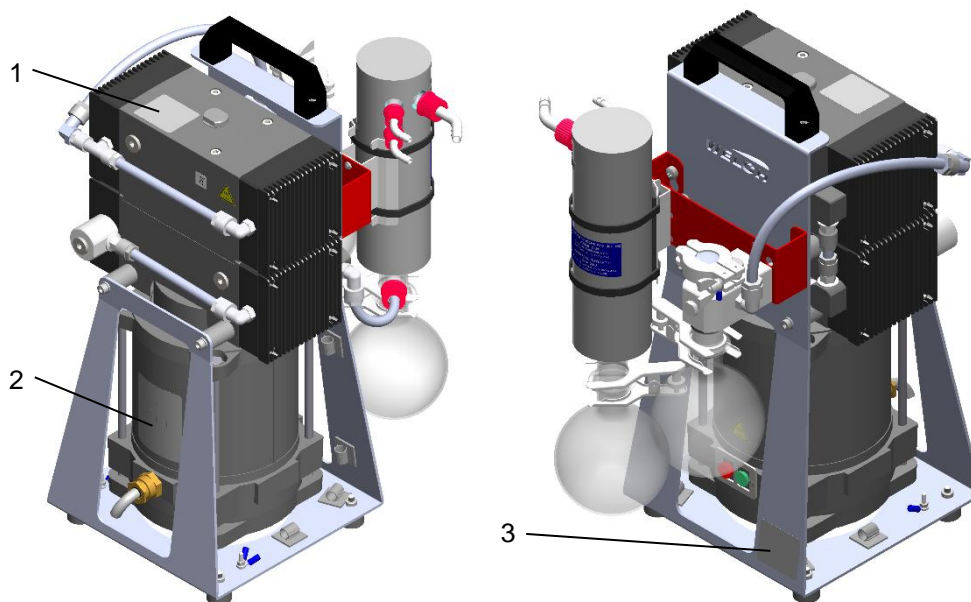


Fig. 4-1. Positions of nameplates


Pos.	Nameplate
1	Pump unit
2	Motor
3	Device (complete)

Description

4.2 Set-up

The device consists of a vertical vacuum diaphragm pump (referred to as pump) and glass attachments.

The vacuum diaphragm pump consists of a pump unit with four pump heads and a drive with an explosion-protected motor and mechanical drive elements.

	System limit
	<p>► The system limit subdivides the device into the following areas: Inside: medium conveying area of pump unit Outside: outside of complete device and drive chamber of pump unit (Fig. 4-4).</p>

4.2.1 Front of device

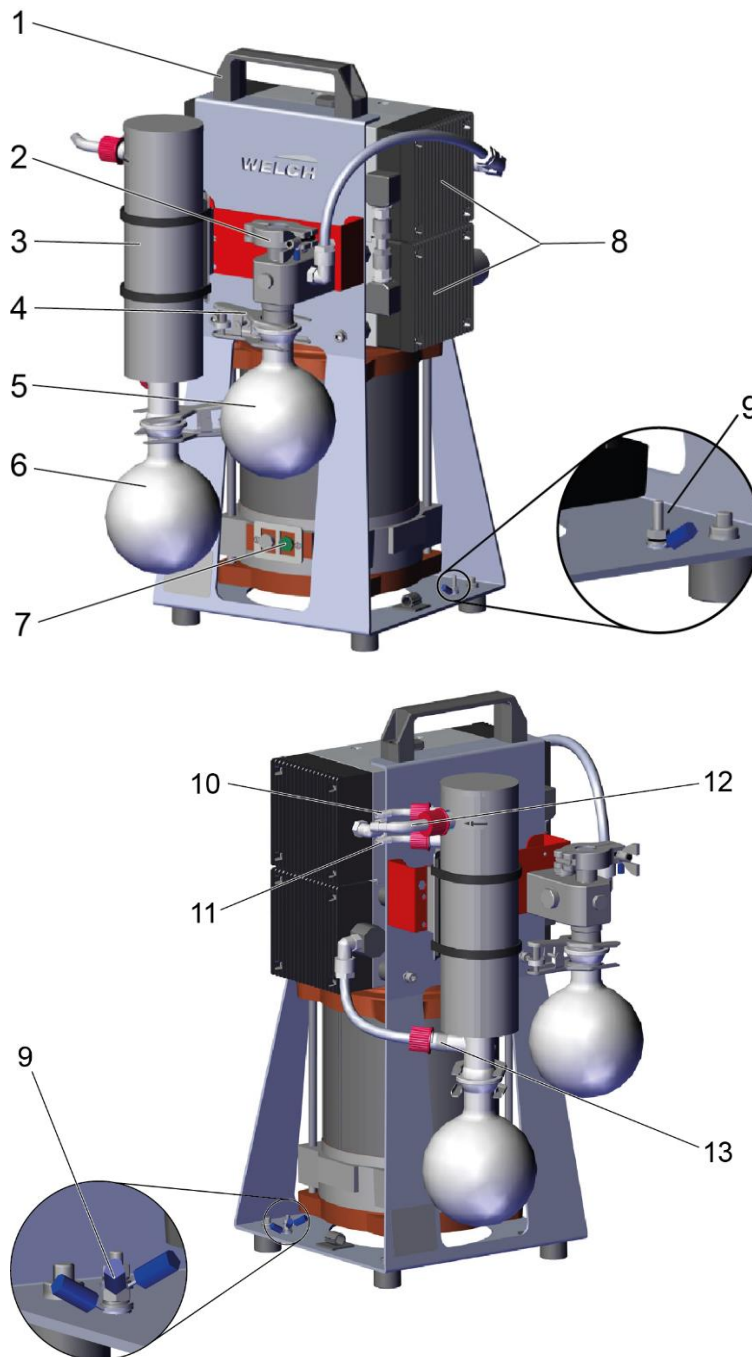


Fig. 4-2. Front view

NOTE The equipotential bonding cable is not shown.

Pos.	Description
1	Carrying handle
2	Suction connection, pneumatic intake
3	Emission condenser
4	Spherical joint clip
5	Separator "intake side"
6	Separator "pressure side"
7	Main switch: on switch "green"/off switch "red"
8	Pump unit
9	Device equipotential bonding (optional system connection, see Fig. 5-5)
10	Condenser coolant outlet
11	Condenser coolant intake
12	Pressure connection, pneumatic outlet
13	Emission condenser safety valve, outlet

NOTE All pneumatic connections, including the intake and outlet, must always be free of deposits.

4.2.2 Back of device

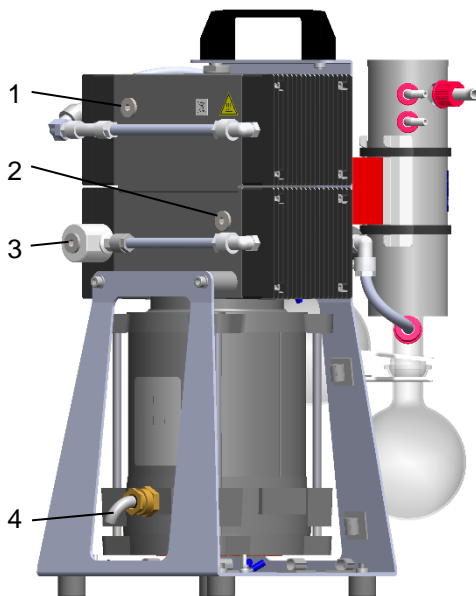


Fig. 4-3. Description of connections

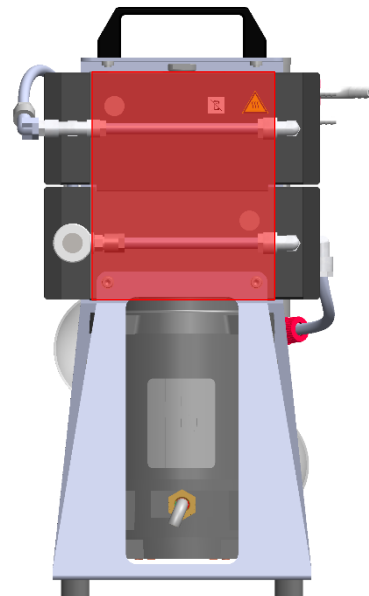


Fig. 4-4. Area of drive chamber

NOTE The drive chamber of the pump unit is inside the area marked in red.

Pos.	Description
1	Drive chamber flushing, outlet*
2	Drive chamber flushing, intake*
3	Gas ballast connection*
4	Electrical connection


NOTE * Optional inert gas connection (closed in delivery condition).

Description

4.2.3 Drive chamber flushing



Flushing of the drive chamber (Fig. 4-4) with inert gas is an optional protective measure. Flushing with an inert gas can prevent the formation of an ignitable atmosphere in the drive chamber in the event of a fault (diaphragm breakage). It is recommended to always use the flushing feature for the drive chamber.

The inert gas is introduced at the intake of the drive chamber flushing feature (Fig. 4-3/2) and emitted again at the outlet of the drive chamber (Fig. 4-3/1).

INERT GAS FLOW	
	<ul style="list-style-type: none">▶ The volume flow rate must be monitored at the inert gas connection outlet using suitable measuring equipment (Fig. 4-3/1).▶ A change in the inert gas volume flow rate may indicate diaphragm breakage (fault case). This can cause the pumping medium to enter into the drive chamber/surroundings and create a hazardous atmosphere.▶ In the event of a fault, the application must be stopped immediately and safety must be restored.


NOTE See sections 2.5.2 *Special conditions* and 5.4.3 *Connecting the inert gas*


4.2.4 Gas ballast

 DANGER	
	<ul style="list-style-type: none"><input type="checkbox"/> Explosion hazard from suction of ambient air!• When ambient air is sucked in via a gas ballast that is not closed, a hazardous atmosphere may form. This results in a danger to life.▶ Keep the gas ballast (Fig. 4-3/3) closed or only operate it with inert gas. This must be ensured by the operator!

Use of the gas ballast can prevent the formation of condensation inside the pump (see section 2.3.2 *Reliable operation*). The inert gas is fed into the 3rd stage of the pump unit via the gas ballast.

4.2.5 Equipotential bonding

 ATTENTION	
	<ul style="list-style-type: none">⊗ Removing the device equipotential bonding is FORBIDDEN!

 OBSERVE	
	<ul style="list-style-type: none">▶ The equipotential bonding must meet the requirements according to sections 2.5.2 <i>Special conditions</i> and 5.4.4 <i>Electrical connection</i>.


The device is equipped with an internal equipotential (wiring green/yellow, see example Fig. 5-1). If equipotential bonding to the system is required, the device can be connected with the supplied components (see section 4.4.1 *Accompanying material*). The connection is made via the equipotential bonding points of the device rack (see Fig. 4-2/9). The connection is carried out to section 5.4.4 *Electrical connection*.

4.2.6 Material

The device rack is made of steel 1.0038 (S 235 JR) and has a powder coating of RAL 7035 and RAL 3020. All corners and edges are fully coated.

For the materials of the pump parts in contact with the medium, see section 3.4 *Parts in contact with medium*.

4.2.7 Motor temperature protection


	OBSERVE
	<ul style="list-style-type: none"> ▶ Do not reset the thermal protection switch until after the error analysis has been completed. ▶ If the fuse is triggered again, contact service (see section 8.4 <i>Repairs by the manufacturer</i>).

The device is equipped with a thermal protection switch on the motor. This self-holding bimetallic switch switches off the overall device in the event of overheating (see section 2.4 *Special hazards*).

Resetting the thermal protection switch:

1. Switch off the device
2. Let the motor cool down completely
3. Switch on the device

4.3 Attachments


	OBSERVE
	<ul style="list-style-type: none"> ▶ Follow the safety/warning instructions as per section 2.4.5 <i>Vacuum</i> and 2.5.2 <i>Special conditions</i>. ▶ The attachments must always be used for safe operation (see section 2.3.2 <i>Reliable operation</i>)!

Intake separator

The intake separator protects the diaphragm pump. Condensate and liquid medium are captured in the collector.

Emission condenser

The emission condenser is used to separate and discharge residual vapors in the conveyed medium.


	OBSERVE
	<ul style="list-style-type: none"> ▶ The emission condenser must be used. ▶ The temperature of the coolant as per section 3 <i>Technical data</i> must not be exceeded. ▶ The pressure side (Fig. 4-2/12) of the device must <u>not</u> be throttled or closed during operation (see sections 5.4.1 <i>Pneumatic connection</i> and 6.2 <i>Safe operation</i>)!

Safety valve

The gas intake of the emission condenser is equipped with a safety valve (Fig. 4-2/13). If the pressure side is clogged with deposits, the safety valve opens due to the overpressure. The medium escapes into the environment.


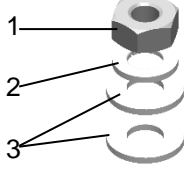
Check the valve seals at regular intervals.

4.4 Accessories

	Information
	<ul style="list-style-type: none"> ▶ The scope of delivery is determined by the delivery contract.

Description

4.4.1 Accompanying material

Figure	Description
	Inert gas connection for drive chamber flushing/gas ballast 3 x DN 8 hose nozzles (stainless steel) with 12x2 O-rings (EPDM) (See sections 4.2.3 Drive chamber flushing and 4.2.4 Gas ballast)
	Equipotential bonding external (optional connection system) 1) Nut 2) Spring washer 3) Washer See section 5.4.4 Electrical connection und

4.4.2 Option

With the ATEX connection set there is the possibility to connect the device with the vacuum application via standard small flange connection DN 16 / 25 KF. Due to its electrical conductivity, it can be integrated into the equipotential bonding of the system.

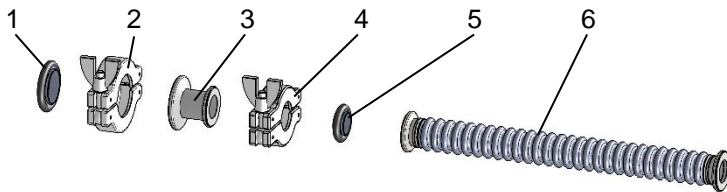



Fig. 4-5. ATEX connection set

ATEX connection set (order no. 404025)

- 1) DN 25 KF seal (stainless steel / FKM-O-Ring)
- 2) DN 25 KF clamping ring
- 3) DN 16/25 KF transition piece
- 4) DN 16 KF clamping ring
- 5) DN 16 KF seal (stainless steel / FKM-O-Ring)
- 6) DN 16 KF metal hose(stainless)

5 Set-up and connection

5.1 Unpacking

	OBSERVE
	▶ Check the device for electrical safety to exclude possible transport damage.


Unpack the device carefully and check for:

- Transport damage,
- Match with the specifications of the delivery contract (type, connection values),
- Completeness of the delivery!



Inform us immediately if there are differences from the contractually agreed-upon scope of delivery or damage!

Remove all transport locks and packaging materials from the device and remove the operation manuals and the accompanying materials from the packaging.

To claim warranty services, the device must be sent back in a suitable transport-safe package.

	Information
	<ul style="list-style-type: none"> ▶ The General Terms and Conditions of the manufacturer apply. ▶ The scope of delivery is determined by the delivery contract! ▶ Keep the packaging in case the device needs to be sent back to the manufacturer's factory or an authorized workshop for repair.

5.2 Set-up

	OBSERVE
	<ul style="list-style-type: none"> ▶ Follow the safety/warning notices. ▶ Provide for adequate ventilation or cooling.
	<ul style="list-style-type: none"> ▶ The distance to neighboring parts and surfaces must be sufficient to ensure the device does not overheat (see section 2.4.4 <i>Temperatures</i>). ▶ Set up the device on a flat and horizontal surface.


5.3 Assembly


The device does not need to be assembled since it is delivered fully mounted. The device only needs to be connected (see section 5.4 *Connecting*).


Set-up and connection

5.4 Connecting

5.4.1 Pneumatic connection


	OBSERVE
	<ul style="list-style-type: none">▶ Follow the safety/warning notices (see section 2 <i>Safety</i>).▶ The pneumatic connection must be established properly to ensure it does not leak.

	ATTENTION
	<ul style="list-style-type: none">⊗ The removing of the equipotential bonding is FORBIDDEN (see Fig. 5-1)!

	EQUIPOTENTIAL BONDING
	<ul style="list-style-type: none">▶ The suction connection is connected to an equipotential bonding on the device.▶ The operator must assess whether the pneumatic connection additionally needs to be connected to the equipotential bonding of the system.

The following requirements pertain to the pneumatic connections:

- They must be established in accordance with section 3.3 *General information on connections*.
- They must be flexible (see section 2.4.3 *Mechanics*).
- They must be made of metal.
- They must be suitable for vacuum applications.
- The hoses must be sufficiently dimensioned to ensure that the pumping capacity is not restricted.
- Keep the connection length as short as possible.
- Condensate in the pneumatic connections must always be able to drain into the separators.

	Option
	<ul style="list-style-type: none">▶ Only use preassembled lines of the manufacturer. This rules out faulty connections.▶ It is recommended to use the ATEX connection set (see section 4.4.2 <i>Option</i>).

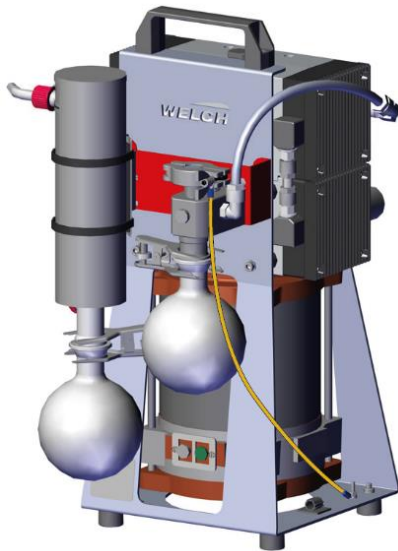


Fig. 5-1. Equipotential bonding at the pneumatic intake

5.4.2 Connecting the coolant

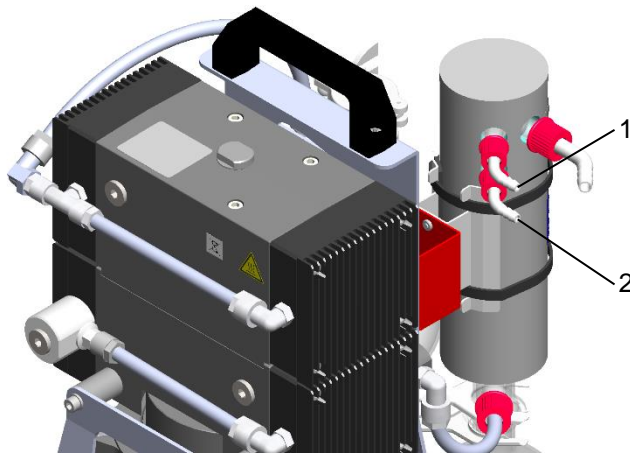



Fig. 5-2. Coolant intake and outlet (rear view)

NOTE See sections 3.2 *Characteristic values* and 3.3 *General information on connections*

Procedure

1. Connect the intake (1)
2. Connect the outlet (2)

5.4.3 Connecting the inert gas

OBSERVE	
	<ul style="list-style-type: none"> ▶ The inert gas must be connected to the gas ballast and the drive chamber flushing in <u>parallel</u>. ⊗ A serial connection is <u>not</u> permitted. ▶ The inert gas must be free of particles and must be dry (e.g. nitrogen N₂).

Set-up and connection

Drive chamber flushing

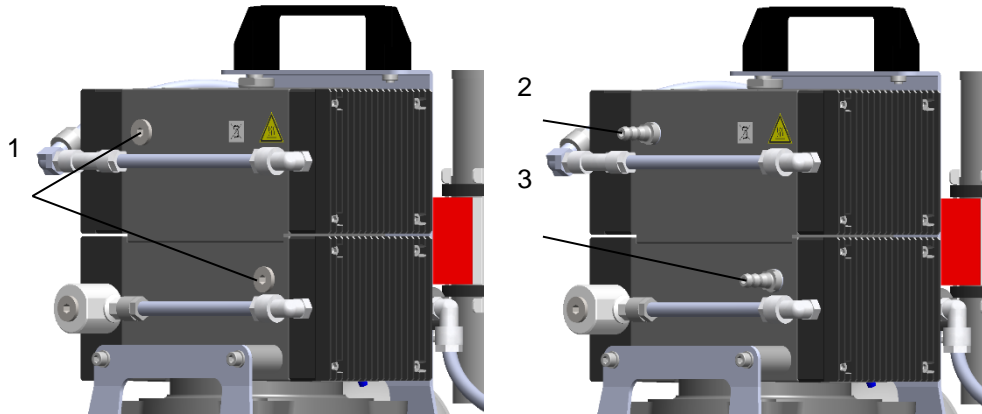


Fig. 5-3. Delivery condition with screw plugs (left), hose nozzles fitted (right)

NOTE See sections 4.4.1 *Accompanying material* and 3.3 *General information on connections*

Procedure

1. Remove the screw plugs with the seal (1).
2. Screw in the hose nozzles with the seal so they are gas-tight:
 - a. Connection of inert gas at intake (3)
 - b. Connection of inert gas at outlet (2) incl. volume flow rate monitoring (see section 3.2 *Characteristic values*).

Gas ballast

	ATTENTION
	▶ Operation with the gas ballast open is FORBIDDEN (see section 4.2.4 <i>Gas ballast</i>)!

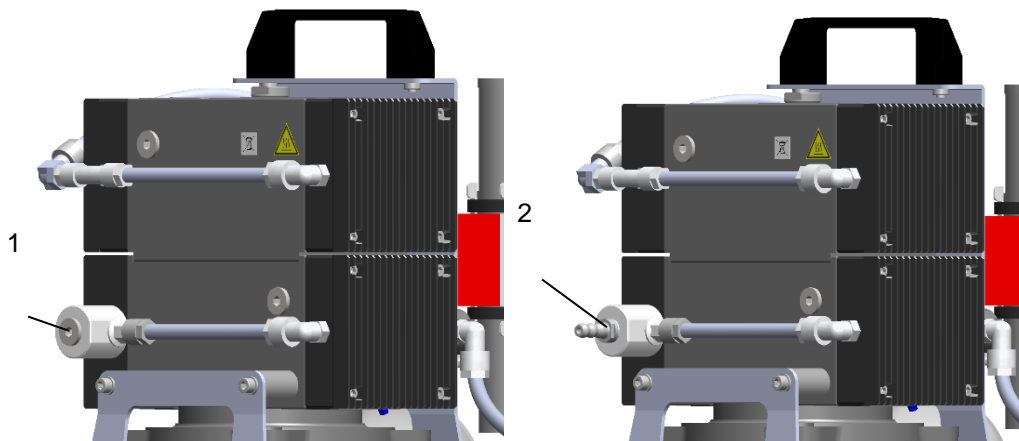




Fig. 5-4. Delivery condition with screw plug (left), hose nozzle fitted (right)


NOTE See sections 4.4.1 *Accompanying material* and 3.3 *General information on connections*



Procedure

1. Remove the screw plug with the seal (1).
2. Screw in the hose nozzle with the seal so it is gas-tight (2) (see section 3.2 *Characteristic values*).


5.4.4 Electrical connection

 DANGER	
	<p><input type="checkbox"/> Danger to life due to electric shock!</p> <ul style="list-style-type: none"> • If the device is not connected as per the legal requirements, touching during operation in case of a fault can lead to serious injury or even death. ▶ The electrical connection must be in accordance with the legal requirement of the respective country of use and may only be established by a trained technician.

ATEX REQUIREMENTS	
	<ul style="list-style-type: none"> ▶ The device must be connected in accordance with the hazardous atmosphere zone classification at the set-up location and as per EN 60079-14. The operator must evaluate and define the type of connection. ▶ The electrical connection may only be established by an electrician with training in explosion protection.

 ATTENTION	
	<ul style="list-style-type: none"> ⊗ A reduction in the cable length is FORBIDDEN!

Equipotential bonding (see section 4.2.5 Equipotential bonding)

EQUIPOTENTIAL BONDING	
	<ul style="list-style-type: none"> ▶ The equipotential bonding of the device is established via the protective conductor of the power supply connection and must be ensured before the system is brought into service. ▶ The operator must assess whether the device additionally needs to be connected to the equipotential bonding of the system. ▶ For the connection, use the connection point of the device (see Fig. 4-2/9). ⊗ The equipotential bonding of the device is <u>not</u> permitted to be removed.

NOTE For the connection use the connection points of the device (see Fig. 4-2/9)

Assembly equipotential bonding (Fig. 5-5)

- 1) Washer (3)
- 2) Ring cable lug M4 with electrical connection to the system
NOTE The connection / contact component must be by the operator
- 3) Washer (3)
- 4) Spring washer (2)
- 5) Nut (1)

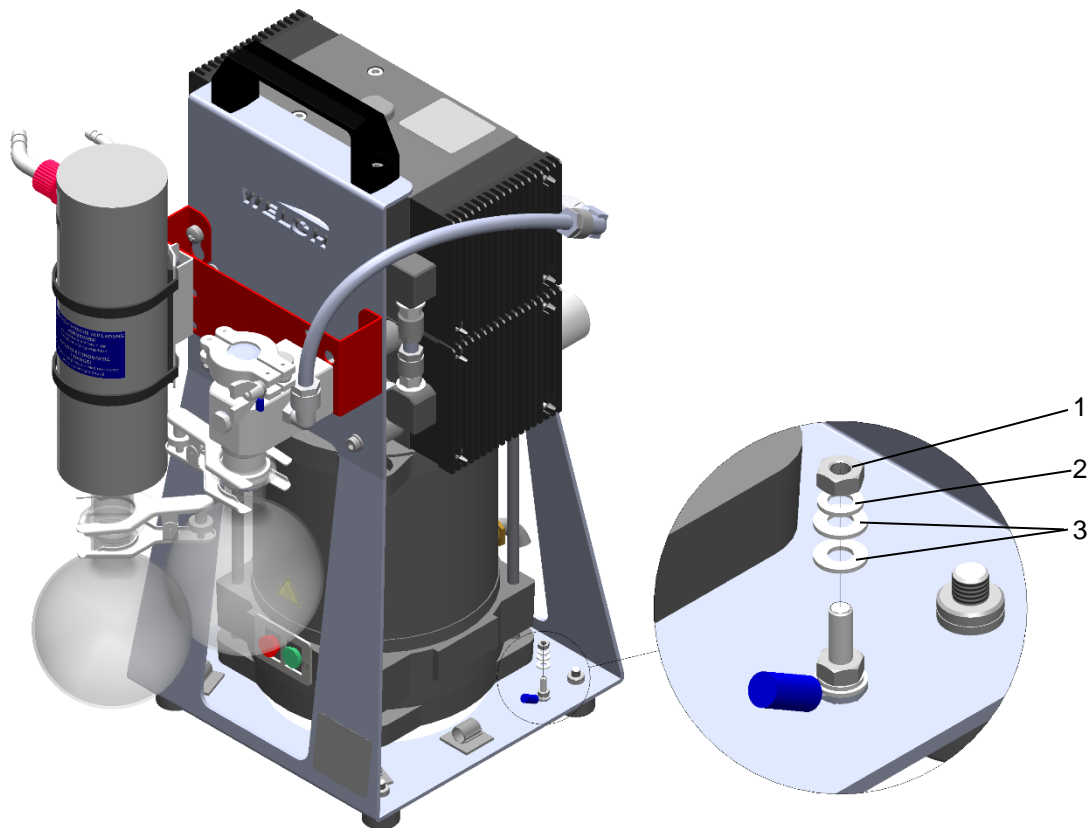


Fig. 5-5. Optional connection of equipotential bonding system

NOTE The equipotential bonding cable of the device and system are not shown.

5.5 Storage


The device must be stored in a dust-free and closed-off interior space. Follow the safety/warning notices (see section 3.2 *Characteristic values*).


	OBSERVE
	► For storage, all connections must be sealed with the appropriate included protective caps.

NOTE Another equivalent protective cap can also be used for storage.

6 Operation

6.1 Bringing into service

	OBSERVE
	<ul style="list-style-type: none"> ▶ Read the safety/warning notices before bringing the system into service (see section 2 <i>Safety</i>).


	Storage
	<ul style="list-style-type: none"> ▶ If the device is stored in a cold environment and then brought to the installation site to bring it into service, condensation may occur. ▶ Before switching on the device, wait for at least one hour until the device has reached the ambient temperature and is absolutely dry.


Procedure

1. Check the attachments to ensure there is no damage.
2. Check all connections as per section 5.4 *Connecting*.
NOTE Perform steps (a) and (b) only if using inert gas:
 - a. Open inert gas flushing.
 - b. Set the volume flow rate/inert gas pressure (see section 3.2 *Characteristic values*).
3. Open the coolant.
4. Switch the device on using the main switch (see Fig. 4-2/7).
5. Check the leak tightness of the pneumatic connections and the operating equipment.
6. Check the operating behavior, e.g. unusual running noises.

NOTE The ultimate pressure must be reached. If not, it can be assumed that the device does not have the necessary tightness.

6.2 Safe operation

	SAFE OPERATION
	<ul style="list-style-type: none"> ▶ Safe operation can only be ensured if the device is operated as per sections 2 <i>Safety</i> and 3 <i>Technical data</i>. ▶ When connecting different vacuum application to the device, the captured medium can mix. The medium mixtures must not endanger persons, the environment and/or devices.



	ATTACHMENTS
	<ul style="list-style-type: none"> ▶ The attachments <u>always</u> need to be used (see section 4.3 <i>Attachments</i>)! ▶ The filling level of the separator must be monitored. ▶ The separator must be emptied at regular intervals (see section 2.3.2 <i>Reliable operation</i>). ▶ Through the use of the optional inert gas flushing function at the gas ballast, the formation of a hazardous atmosphere in the separator on the outlet side can be avoided during operation (see section 4.2.4 <i>Gas ballast</i>).

Operation

Regular device checks



- Unusual running noises
- Firm seating of all electrical and pneumatic connections
- Check the pneumatic connection for leak tightness
- The pneumatic connection is free of deposits
- Damage-free attachments

6.3 End of process

 DANGER	
	<ul style="list-style-type: none">□ Danger of explosion due to formation of potentially explosive medium.<ul style="list-style-type: none">• After the end of the process, the collected medium can mix with the ambient air in the separator and form a hazardous atmosphere. If an explosion occurs, this can lead to serious injury or even death. (See section 2.5 <i>ATEX application</i>).▶ The separator must be drained after the process ends.

Removal and drainage of the separator

The time interval and the drainage procedure must be defined by the operator. Full drainage must be ensured.

 SEPARATOR	
	<ul style="list-style-type: none">▶ Drain the separator at the latest when it is $\frac{3}{4}$ full.▶ When removing the separator, make sure not to spill the contents.▶ Wear protective clothing if this is required when handling the condensed medium (see section 2.3 <i>Protective measures</i>).

Procedure (Fig. 6-1)

1. Hold on to the separator (1)
2. Unscrew the knurled screws (2)
3. Release the spherical joint clip (3)
4. Remove the separator

NOTE Reattach in reverse order

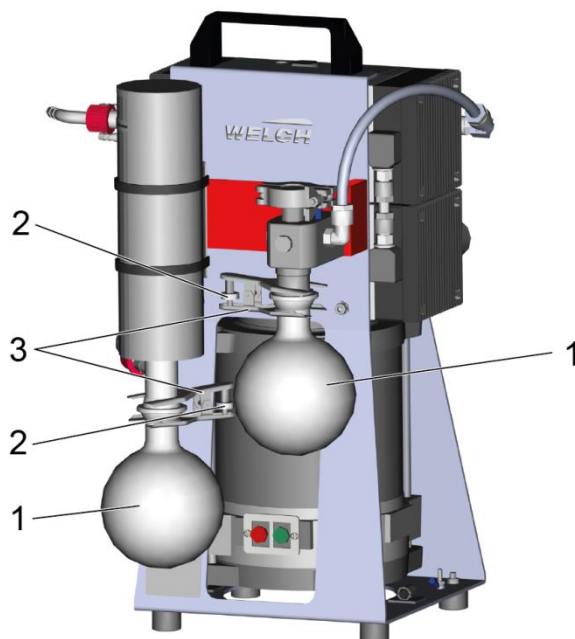



Fig. 6-1. Removing the separator

7 Operating faults

	OPERATING FAULTS IN THE DEVICE
	► To eliminate the operating faults within the device, the instructions and notes in sections 8 <i>Maintenance</i> and 8.3 <i>Repairs by the operator</i> must be adhered to!

NOTE Authorization to eliminate the operating faults (see section 2.2.2 *Overview of the responsibilities*).

Eliminating operating fault

1: User/ (1): specially trained users only

2: Specialized personnel




3: Manufacturer



Type of error	Cause	Measure	Authorization
Vacuum pump does not start up	Device is switched off	Switch the device on using the main switch (Fig. 4-2/7)	1
	No power supply	Check the power connection	2
	Faulty power cord	Notify service ¹	2
	Wrong operating voltage	Check the operating voltage as per section 3.2 <i>Characteristic values</i>	2
	Thermal switch was triggered	Reset as per section 4.2.7 <i>Motor temperature protection</i>	1
	Drive of pump unit is blocked	Diaphragm replacement ²	(1)
	Drive of pump unit is faulty	Notify service ¹	3
	Faulty motor	Notify service ¹	3
Vacuum pump generates no or only insufficient vacuum	Pneumatic connections are leaking	<ul style="list-style-type: none"> ➤ Identify the leaks ➤ Tighten or replace the seals/hoses 	1
	Pump unit is leaking	Check and tighten/replace: <ul style="list-style-type: none"> ➤ Hose connections ➤ Screw fittings 	(1)
	Pump head is leaking	Notify service ¹	3
	Faulty diaphragm	Diaphragm replacement ²	(1)
	Faulty valves	Valve replacement ²	(1)
	Soiled pump unit	General maintenance/cleaning	(1)
	Soiled valves	Clean valves	(1)
Running noises in pump unit	Soiled pump unit	General maintenance/cleaning	1



¹ See section 9.2 *Ordering and service contact*

² See section 8.3 *Repairs by the operator*



8 Maintenance

 WARNING	
 	<p><input type="checkbox"/> Health hazard from hazardous materials!</p> <ul style="list-style-type: none"> • Components in contact with medium may be contaminated in applications using hazardous materials that may be harmful to the health of persons. ▶ Affected components must be decontaminated prior to maintenance (service, inspection, repair); further protection measures may need to be taken if necessary. ▶ The operator must ensure that decontamination and protection measures are performed (see sections 2.3 <i>Protective measures</i> and 2.4.1 <i>Hazardous materials</i>!).

 CAUTION	
	<p><input type="checkbox"/> Danger of injury due to contact with hot surfaces!</p> <ul style="list-style-type: none"> • Touching hot surfaces can cause burn injuries (see section 2.4.4 <i>Temperatures</i>). ▶ Let the device cool down to the point where it is only warm to the touch before maintenance.

 ATEX REQUIREMENT	
	<p>▶ Testing and maintenance of the device must be in accordance with EN 60079-17. The operator must ensure that the requirements are met.</p>

8.1 Maintenance and inspection



 MAINTENANCE/INSPECTION	
	<ul style="list-style-type: none"> ▶ In applications using medium that shorten the service life of materials, the device must be maintained regularly. ▶ To ensure safe operation of the device, the operator must create an application-based maintenance/inspection plan and ensure that the maintenance intervals are adhered to (see section 8.3.1 <i>Maintenance intervals</i>).



NOTE Clogged lines at the outlet or intake can lead to malfunctions and damage. All connections must be free of deposits.



General

- Perform regular checks of the leak tightness of the system.
- Check that the pneumatic connection is clear, especially the outlet.
- Change the seals as necessary.
- Check that all connections are firmly seated.
- Check that the glass apparatuses are undamaged.
- Check that the device is functional, e.g. no abnormal operating noises.

8.2 Service through cleaning

 WARNING	
	<ul style="list-style-type: none"> <input type="checkbox"/> Endangerment of health due to unintended chemical reactions! • Unsuitable cleaning agents may cause harm to health by reacting with the components of the device or the coating material. ▶ Do not use cleaning agents that react with components of the device or coating material. ▶ The operator must evaluate the usability of the cleaning agent.

 OBSERVE	
	<ul style="list-style-type: none"> ▶ The ATEX requirements as per section 2.5.2 <i>Special conditions</i> must be adhered to. ▶ The use of acidic or halogenated cleaning agents may cause corrosion. ▶ Clean the device after every use to prevent possible damage from corrosion due to the substances contained in the medium.


 Information	
	<ul style="list-style-type: none"> ▶ We recommend using only the cleaning agents specified in the operation manual.


Procedure



1. Switch off the device.
2. After cleaning, remove the cleaning agent completely from the surfaces with a damp cloth.
3. After all, cleaning and decontamination measures, let the device dry completely before bringing it back into service.
4. Depending on contamination, components in contact with medium (connections, valves, sensors) must be cleaned at regular intervals with a suitable solvent (e.g. acetone).
5. Wipe off the surfaces with a damp cloth. In addition, we recommend the following cleaning agents:

Device part	Cleaning agent
Outside surfaces, motor housing	Commercially available cleaning agents without acid and without halogenides, alcohol-based solutions
Hoses, separator	Commercially available cleaning agents without acid and without halogenides
Valves, pump head and molded diaphragm	Acetone with a soft cloth

8.3 Repairs by the operator

	ATEX REQUIREMENT
	<ul style="list-style-type: none"> ▶ On the inside and outside of the device (see section 4.2 <i>Set-up</i>), ensure that there is no hazardous atmosphere (fine measurement). ▶ Only open the device while at a standstill. ▶ Provide adequate ventilation.


	AUTHORIZATION
	<ul style="list-style-type: none"> ▶ Repair work may only be performed by specialists or specially trained users (see section 2.2.2 <i>Overview of the responsibilities</i>). ▶ The operator is responsible for ensuring that the repairs are performed properly.

 	OBSERVE
	<ul style="list-style-type: none"> ▶ The device must be de-energized for all repair work! Depending on the connection type, pull the power plug or de-energize the system and protect it against being switched on again. ▶ For repair work, additional protective measures may be necessary (see section 2.3 <i>Protective measures</i>). The measures required are defined by the operator.


The following tools are required:

- Open-end wrench size 17
- Hexagon socket wrench 4 and 5 mm


8.3.1 Maintenance intervals

	SERVICE LIFE
	<ul style="list-style-type: none"> ▶ The diaphragm must be replaced annually or after 8,000 operating hours (max. permissible running period). The operator must ensure that the monitoring is being performed. ▶ In applications with medium that reduce the service life of materials, the maximum permissible runtime cannot be ensured. ▶ The operator must create a special application-based maintenance/inspection plan and define the maintenance intervals.

Spare parts

	Order option
	<ul style="list-style-type: none"> ▶ The replacement components for the pump unit can be ordered as a maintenance set; see section 9.1 <i>Spare parts overview</i>.

8.3.2 Disassembly

	ATTACHMENTS
	<ul style="list-style-type: none"> ▶ Before disassembly, the glass attachments must be removed and the separator must be drained (see section 6.3 <i>End of process</i>).

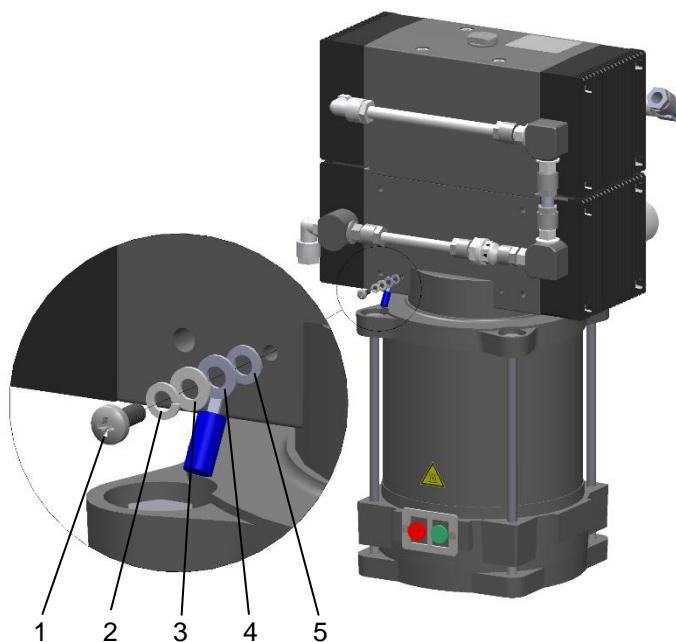
Pump removed from the carrier



Fig. 8-1. Releasing the screw connection: back (left), front (right)

Procedure

1. Release and disconnect the pneumatic connection to the pump
2. Position the back of the device horizontally and facing up
 - a. Release the screws (2x) on the back of the pump/support
 - b. Remove the spacer and screws.
3. Position the front of the device facing up
 - a. Release the screws (4x) on the front of the pump/support
 - b. Remove the spacer and screws
4. Separate the pump and support
5. Disconnect the connection between the equipotential bonding and the pump unit (Fig. 8-2)



Assembly sequence

1. Contact washer (5)
2. Ring cable lug (4)
3. Washer (3)
4. Spring washer (2)
5. Oval-head screw (1)

Fig. 8-2. Equipotential bonding of the pump unit (pump removed, front view)

NOTE The equipotential bonding cable is not shown.

Replacing the service set

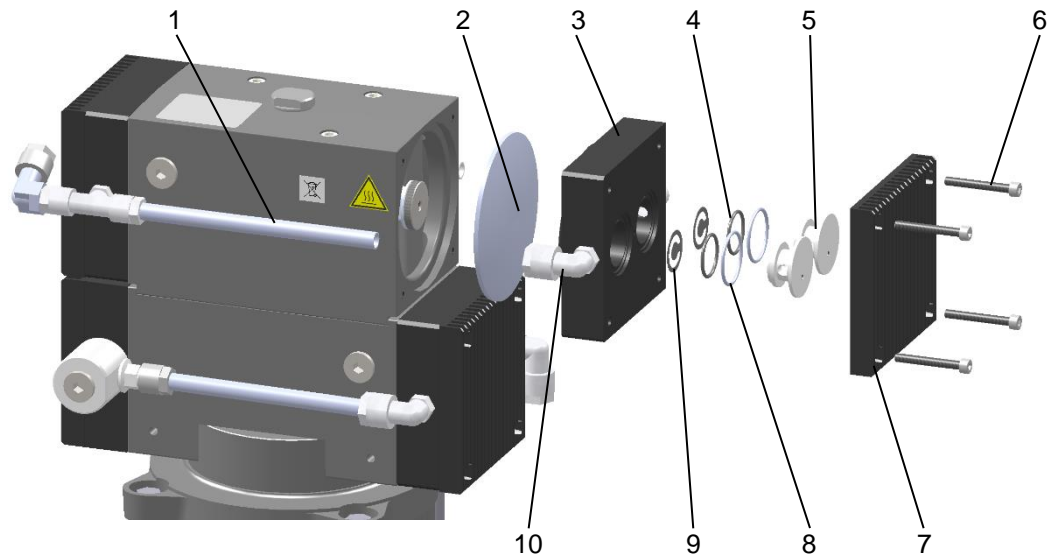


Fig. 8-3. Disassembling and assembling the pump unit

NOTE To replace the diaphragm, position the pump heads horizontally and facing up.

Pos.	Description
1	Pneum. circuitry
2	Molded diaphragm
3	Pump head
4	O-rings (22x2)
5	Valve inserts
6	Cylinder head screws
7	Heat sink
8	O-rings (28x2)
9	Valves
10	Compression fittings


Procedure (Fig. 8-3)

1. Release the compression fittings (10)
2. Release the cylinder head screws (6)
3. Remove the heat sink (7)
4. Pull the valve insert (5) out of the pump head (3)
NOTE Thread M5 valve insert
5. Remove valves (9) and O-rings (4) (8)
6. Remove pump head (3)
7. Release the molded diaphragm (2)
NOTE Counter-clockwise
8. Clean the pump head (3) if necessary (see section 8.2 *Service through cleaning*)


8.3.3 Assembly

Pump heads (Fig. 8-3)

1. Mount the molded diaphragm (2) hand-tight
2. Position the connecting rod/molded diaphragm (2) in the center position
3. Mount the pump head (3)
 - NOTE** Position the hose connection in the compression fitting
4. Insert the O-rings (4) (8)
5. Insert the valves (9)
 - NOTE** Insert correctly or else leakages may occur!
 - a. Ensure they are in full contact
 - b. Do not place the side of the valve with the burrs facing the sealing surface
6. Insert the valve inserts (5)
7. Mount the heat sink (7)
8. Symmetrically tighten the cylinder head screws (6)
9. Tighten the compression fitting (10)


	SCREW CONNECTIONS
	<ul style="list-style-type: none"> ▶ The screws must be fitted with thread locker, e.g. LOCTITE 243. ▶ The screw connections must be tightened with a torque of up to 3 to 4 Nm.

Pump in the support (Fig. 8-1)

	EQUIPOTENTIAL BONDING
	<ul style="list-style-type: none"> ▶ The equipotential bonding must be reconnected at the pump as shown in Fig. 8-2!


1. Assemble the pump and support
2. Position the front side facing up
 - a. Fit the spacer and screws
 - b. Fit the screws (4x) on the pump/support
3. Position the back horizontally and facing up.
 - a. Fit the spacer and screws.
 - b. Fit the screws (2x) on the pump/support.
4. Connect the pneumatic connection to the pump intake/outlet
5. Tighten the compression fitting

8.3.4 Functional check



	OBSERVE
	<ul style="list-style-type: none"> ▶ The device must not exhibit abnormal noises or vibrations. ▶ Switch off the device immediately if it is not functioning correctly.


Procedure

1. Connect a vacuum measuring device to the suction connection of the device.
2. Measure the ultimate pressure and adjust it (see section 3.2 *Characteristic values*).
 - NOTE** The value is reached within 1 min if functioning properly.

	ATEX REQUIREMENT
	<ul style="list-style-type: none"> ▶ The ultimate pressure must be reached within the specified time. If not, it can be assumed that the device does not have the necessary tightness. ⊗ The ATEX application <u>must not</u> be started before the necessary tightness of the device has been ensured (see section 7 <i>Operating faults</i>).

8.4 Repairs by the manufacturer

 WARNING	
	<ul style="list-style-type: none"><input type="checkbox"/> Health hazard from contaminated components!• Incompletely or incorrectly filled out damage reports may endanger the health of service personnel.▶ Provide complete information in the damage report, especially with regard to a possible contamination of the components in contact with medium.

SERVICE/REPAIR	
	<ul style="list-style-type: none">▶ Service and repair by the manufacturer or in authorized facilities only with transfer of the completely filled-out damage report with decontamination declaration.▶ The specification of the contamination or the complete cleaning is a legal component of the contract.


NOTE Handover of the device to the manufacturer; see section 9.2 *Ordering and service contact*.

Damage report

The damage report form is available for download from our website www.welchvacuum.com on the "Service" menu → "Damage reports".

If you do not have access to the Internet, you can request the form from us, tel.: +49 3677 604 0.


8.5 Disposal

NOTE	
	<ul style="list-style-type: none">▶ Incorrect disposal can cause environmental damage.▶ Disposal must be done according to the legal regulations stipulated in directive 2012/19/EU.▶ Contaminated devices must be decontaminated according to the legal regulations.

9 Spare parts

The spare parts list includes all spare parts with the required order information.

When placing your order, please specify the name, quantity, serial number and order number!

	LIABILITY
	▶ We are not liable for damage due to the installation of other parts than those provided by the manufacturer, Gardner Denver Thomas GmbH.

9.1 Spare parts overview

Designation	Order numbers
Complete service set O-rings, valves, diaphragms	402056
Emission condenser	700183-08
Separator	
➤ Spherical joint clip, stainless steel, for KS 35	828845
➤ Round-bottom flask 500 ml KS 35	828839

9.2 Ordering and service contact

Manufacturer

Gardner Denver Thomas GmbH
Am Vogelherd 20
98693 Ilmenau
Germany

Contact

Tel.: +49 3677 604 0 (customer support)
Fax: +49 3677 604 131
E-mail: welch.emea@gardnerdenver.com
Web: www.welchvacuum.com

10 Appendix

10.1 EU declaration of conformity

Translation of the original declaration (EN)

Gardner Denver Thomas GmbH
Am Vogelherd 20
98693 Ilmenau
Germany



We hereby declare under our own responsibility that the following product, based on its design and construction and on the documents we have put into circulation corresponds to the EU directives and standards listed below. In case of a change to the product not agreed upon with us, this declaration is no longer valid.

Product description	
Device type	Laboratory Vacuum System with ATEX Conformity
Designation	LVSF 600 T ATEX 230 V, LVSF 600 T ATEX 115 V
Item no.	116051-10, 116051-11

This product meets the following directives and applied harmonized standards	
2006/42/EC	EN ISO 12100:2011 / EN 1012-2: 1996+A1:2009 / EN 1127-1:2019
2014/34/EU	EN ISO 80079-36: 2016 / EN ISO 80079-37:2016
2014/30/EU	EN IEC 61000-6-2:2019 / EN 61000-6-3:2007 + A1:2011
2011/65/EU	EN IEC 63000:2018

Person authorized to issue the EU Declaration of Conformity in the name of the manufacturer:

Place, date: Ilmenau, Germany, 13.04.2022

i.A.

Dirk Paehge
(Supervisor Regulatory Affairs)

Person located in the European Union who is authorized to compile the technical file:

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Am Vogelherd 20
98693 Ilmenau / Germany

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Fax: +49 3677 604 131

E-mail: welch.emea@gardnerdenver.com

Web: www.welchvacuum.com

10.2 Notes

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