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XDD1 - 115/230 V and 24 V DC Diaphragm Pumps

INSTRUCTION MANUAL

Official Distributor in Australia



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Vacuum and Thin Film Technology

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You must use this product as described in this manual. Read the manual before you install, operate, or maintain the product.

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1. Safety and compliance

For safe operation from the start, read these instructions carefully before you install or commission the equipment and keep them safe for future use. Read all the safety instructions in this section and the rest of this manual carefully and make sure that you obey these instructions.

The instruction manual is an important safety document that we often deliver digitally. It is your responsibility to keep the instruction manual available and visible while working with the equipment. Please download the digital version of the instruction manual for use on your device or print it if a device will not be available.

1.1 Definition of Warnings and Cautions

Important safety information is highlighted as warning and caution instructions which are defined as follows. Different symbols are used according to the type of hazard.

WARNING:

If you do not obey a warning, there is a risk of injury or death.

CAUTION:

If you do not obey a caution, there is a risk of minor injury, damage to equipment, related equipment or process.

NOTICE:

Information about properties or instructions for an action which, if ignored, will cause damage to the equipment.

We reserve the right to change the design and the stated data. The illustrations are not binding.

1.2 Trained personnel

For the operation of this equipment “trained personnel” are:

- skilled workers with knowledge in the fields of mechanics, electrical engineering, pollution abatement and vacuum technology and
- personnel specially trained for the operation of vacuum pumps

1.3 Safety symbols

The safety symbols on the products show the areas where care and attention is necessary.

The safety symbols that we use on the product or in the product documentation have the following meanings:

	<p>Warning/Caution</p> <p>An appropriate safety instruction must be followed or caution to a potential hazard exists.</p>
	<p>Warning - Dangerous voltage</p> <p>Identifies possible hazards from hazardous voltages.</p>
	<p>Warning - Hot surfaces</p> <p>Identifies a potential hazard from a hot surface.</p>
	<p>Warning - Risk of explosion</p> <p>There is a risk of explosion when you do the task.</p>
	<p>Warning - Use protective equipment</p> <p>Use appropriate protective equipment for the task.</p>
	<p>WEEE symbol</p> <p>The equipment must be discarded carefully. Obey local and national regulations for disposal of this equipment.</p>

2. Introduction

2.1 Safety information

Remove all packing material, remove the product from its packing-box, remove the protective covers from the inlet and outlet ports and keep them, inspect the equipment. If the equipment is damaged, notify the supplier and the carrier in writing within three days; state the item number of the product together with the order number and the supplier's invoice number. Retain all packing material for inspection.



WARNING:

Do not use the equipment if it is damaged.

If the equipment is not used immediately, replace the protective covers. Store the equipment in suitable conditions.

- **Read and obey this manual before installing or operating the equipment.**
- Transport the pump at the provided handle or the recessed grip.

The following symbols appear in this document:



WARNING:

Refer to accompanying documentation.



WARNING:

Isolate equipment from mains. - risk of electric shock.



WARNING:

Hot surfaces.



WARNING:

Use protective equipment.

Use the equipment for the intended use only, i. e. for generation of vacuum.

- **Prevent any part of the human body from coming in contact with the vacuum.**
- Obey notes on correct vacuum and electrical connections. Pumps with 24 V DC motor: The pump has no on/off switch. The user has to provide a suitable line disconnector.

- For pumps with 115/230 V motor: The mains plug is a disconnecting device to separate the pump from the supply voltage. Ensure that the mains plug is easily accessible at all times to allow separation of the device from the power supply.
- Make sure that the individual components are only connected, combined and operated according to their design and as indicated in the instructions for use.
- If the equipment is brought from cold environment into a room for operation, allow the equipment to warm up (pay attention to water condensation on cold surfaces).
- Make sure ventilation is adequate if pump is installed in a housing or if ambient temperature is elevated.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Obey all relevant safety requirements (regulations and guidelines) and adopt suitable safety measures.

- Provide a firm level platform for the equipment and check that the system to be evacuated is mechanically stable and that all fittings are secure.

 **Note:**

Flexible elements tend to shrink when evacuated.

Due to the high compression ratio of the pumps, pressure at the outlet port might be generated being higher than the max. permitted pressure compatible with the mechanical stability of the system.



WARNING:

Obey maximum permitted pressures and pressure differences, see [Technical data](#). Do not operate the pump with overpressure at the inlet.



WARNING:

Do not permit any uncontrolled pressurizing (e. g. make sure that the exhaust pipeline cannot become blocked). If you have an exhaust-isolation valve, make sure that you cannot operate the equipment with the valve closed. Risk of bursting!

Ensure that the system design does not allow the exhaust pipeline to become blocked:

- Avoid overpressure of more than 0.2 bar in case inert gas is connected.
- The diameter of the inlet and outlet pipeline should be at the least as large as the diameter of the pump connection pipelines.
- Adopt suitable measures in case of differences, e. g. using the equipment outdoors, installation in altitudes of more than 1000 m above mean sea level, conductive pollution or moisture.



WARNING:

Pay attention to symbol “hot surfaces” on the equipment. Adopt suitable measures to prevent any danger arising from the formation of hot surfaces or electric sparks.

WARNING:

Risk of burns from hot surfaces. In case of failure the pump surface can heat up to temperatures more than 105 °C. You must install a suitable contact guard to protect yourself from accidental contact with hot surfaces.

Ensure that the pump cools down before you do any further work. You must wear adequate personal protective equipment, if necessary.

WARNING:

The pumps are not suitable to pump dangerous or explosive gases or explosive or flammable mixtures. Ensure that the materials of the wetted parts are compatible with the pumped substances, see *Technical data* on page 14.

Adopt suitable measures to prevent the release of dangerous, explosive, corrosive or polluting fluids.



Use inert gas for gas ballast or venting if necessary.

The user must take suitable precautions to prevent any formation of explosive mixtures in the expansion chamber. In case of a diaphragm crack, mechanically generated sparks, hot surfaces or static electricity may ignite these mixtures.

Take adequate precautions to protect people from the effects of dangerous substances (chemicals, thermal decomposition products of fluoroelastomers), wear appropriate safety clothing and safety glasses.

Obey applicable regulations when disposing of chemicals. Take into consideration that chemicals may be polluted.

WARNING:

Pumps with dual-voltage motor: The motor is shut down by a thermal cutout in the winding.

Manual reset is necessary. Switch off the pump or isolate the equipment from mains. Wait approx. five minutes before restarting the pump.

WARNING:

Pumps with 24 V DC voltage: The motor is protected by a temperature sensor at the circuit board.

Avoid high heat supply (e. g. due to hot process gases).

Ensure sufficient air admittance if pump is installed in a housing.

Due to the residual leak rate of the equipment, there may be an exchange of gas, albeit extremely slight, between the environment and the vacuum system.

- Adopt suitable measures to prevent contamination of the pumped substances or the environment.

Ensure that in case of failure, the pump and the vacuum system turn always into a safe status.

- In case of leaks in the manifold pumped substances may leak into the environment or in the pump housing or the motor.
- Obey especially all notes on use and operation and on maintenance.
- Failure of the pump (e. g. due to power failure) must not lead to a critical dangerous situation under any circumstances.

Use only genuine spare parts and accessories.

- Otherwise safety and performance of the equipment as well as the electromagnetic compatibility of the equipment might be reduced.

Figure 1 General view of XDD 1 with dual-voltage motor

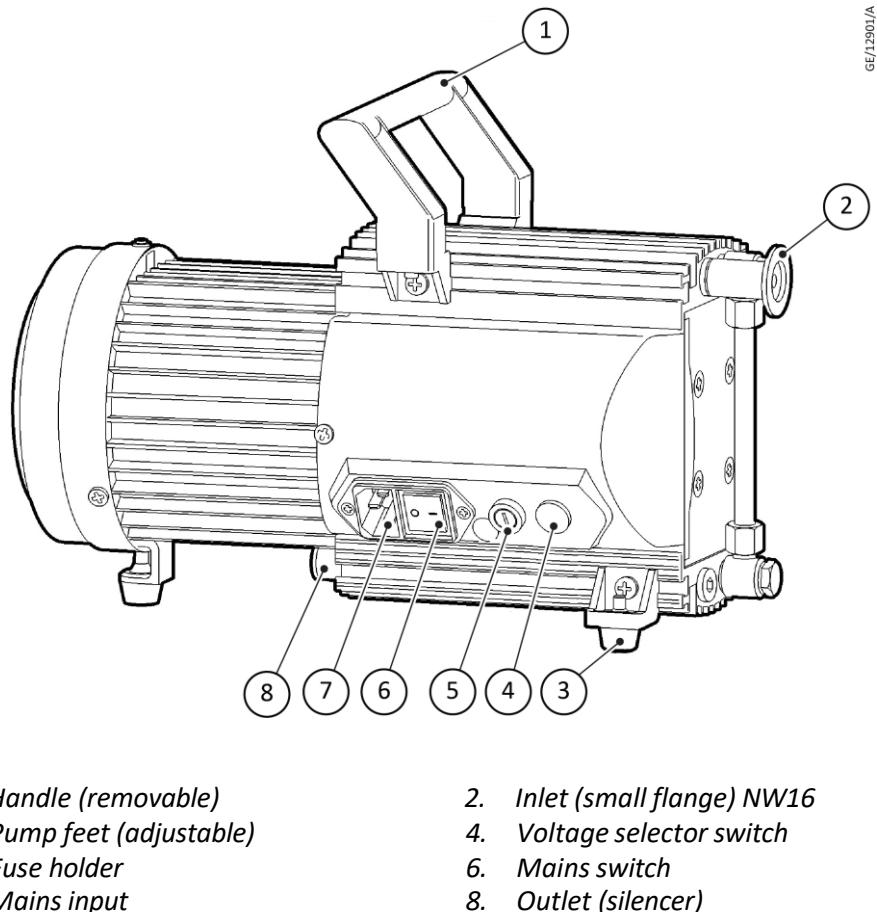
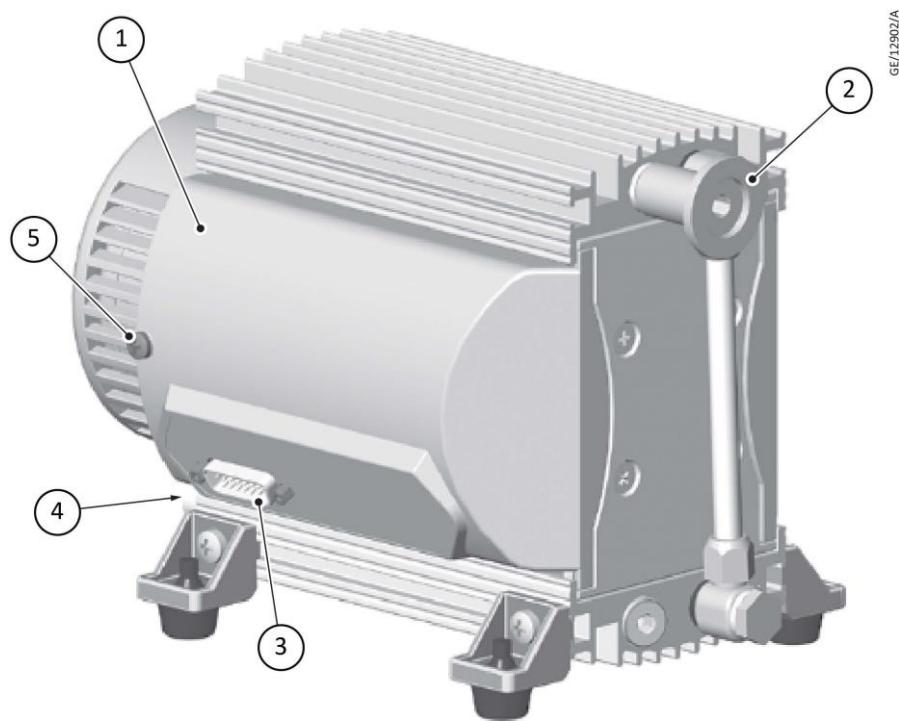


Figure 2 General view of XDD1 24 V DC



1. <i>Cover of the circuit board</i>	2. <i>Inlet (small flange) NW 16</i>
3. <i>Male 15 pin D-connector</i>	4. <i>Outlet (silencer) at lower side</i>
5. <i>Screw to secure cover</i>	

3. Technical data

3.1 Performance data

Table 1 Performance data

Parameter		XDD1 115/230 V 50/60 Hz	XDD1 24 V DC
Pumping speed (ISO 21360)	m ³ /h	1.2 / 1.4	1.4 (1700 rpm)* 1.8 (2400 rpm)
Ultimate vacuum (absolute)	mbar	1.5	< 1.0 (700 rpm)
No-load speed	min ⁻¹	1500 / 1800	100 - 2400
Maximum permissible outlet pressure (absolute)	bar		1.1
Maximum pressure difference between inlet and outlet	bar		1.1

* Factory set

3.2 Electrical data

Table 2 Electrical data

Parameter		XDD1 115/230 V 50/60 Hz	XDD1 24 V DC
Motor power	kW	0.08	0.064
Maximum permitted range of supply voltage (±10%)		Attention* 100-115 V 50/60 Hz, 120 V 60 Hz, 220-230 V 50/60 Hz	24 V DC
Maximum rated current:			
100-120 V 50/60 Hz	A	1.6/1.7	-
200-230 V 50/60 Hz	A	0.8/0.85	-
24 V DC	A	-	7
Motor protection		Thermal cut-out, manual reset	Temperature sensor on the PCB (current limitation)
Over voltage category		II	-
Fuse		20 mm x 5 mm, 250 V, 2.5 A type T	Fuse 7 AF

* Voltage selection switch

3.3 Mechanical data

Table 3 Mechanical data

Parameter		XDD1 115/230 V	XDD1 24 V DC
Mass	kg	7.3	4.1
Overall dimensions	-	Refer to <i>Figure: Dimensional drawing XDD1 (dual-voltage motor)</i>	Refer to <i>Figure: Dimensional drawing XDD1 24 V DC</i>
Inlet connection	-	Small flange NW 16	
Outlet connection	-	Silencer G 1/8 inch	

3.4 Environmental operating and storage data

Table 4 Environmental operating and storage data

Parameter		XDD1 115/230 V	XDD1 24 V DC
Degree of protection IEC 60529	-	IP 40	IP 20
Degree of protection UL 50E	-	NEMA type 1	
Permitted ambient temperature storage / operation	°C	-10 to +60 / +10 to +40	
Permitted relative atmospheric moisture during operation (no condensation)	%	30 to 85	
Maximum operating altitude	m	2000	
IEC rated pollution degree	-	2	
Sound level	dBA	45	
Area of use	-	Indoor use only	

3.5 Materials data

Table 5 Materials data

Components	Wetted parts
Housing cover	Aluminium
Head cover	Aluminium
Diaphragm clamping disc	Aluminium
Valve	FPM (e.g. Fluoroelastomer)
Diaphragm	PTFE
Inlet (small flange)	Stainless steel
Outlet (silencer)	Aluminium / silicone rubber
Hose	PE
Fitting	Aluminium anodized

3.6 Dimensional drawing

Figure 3 Dimensional drawing XDD1 (dual-voltage motor)

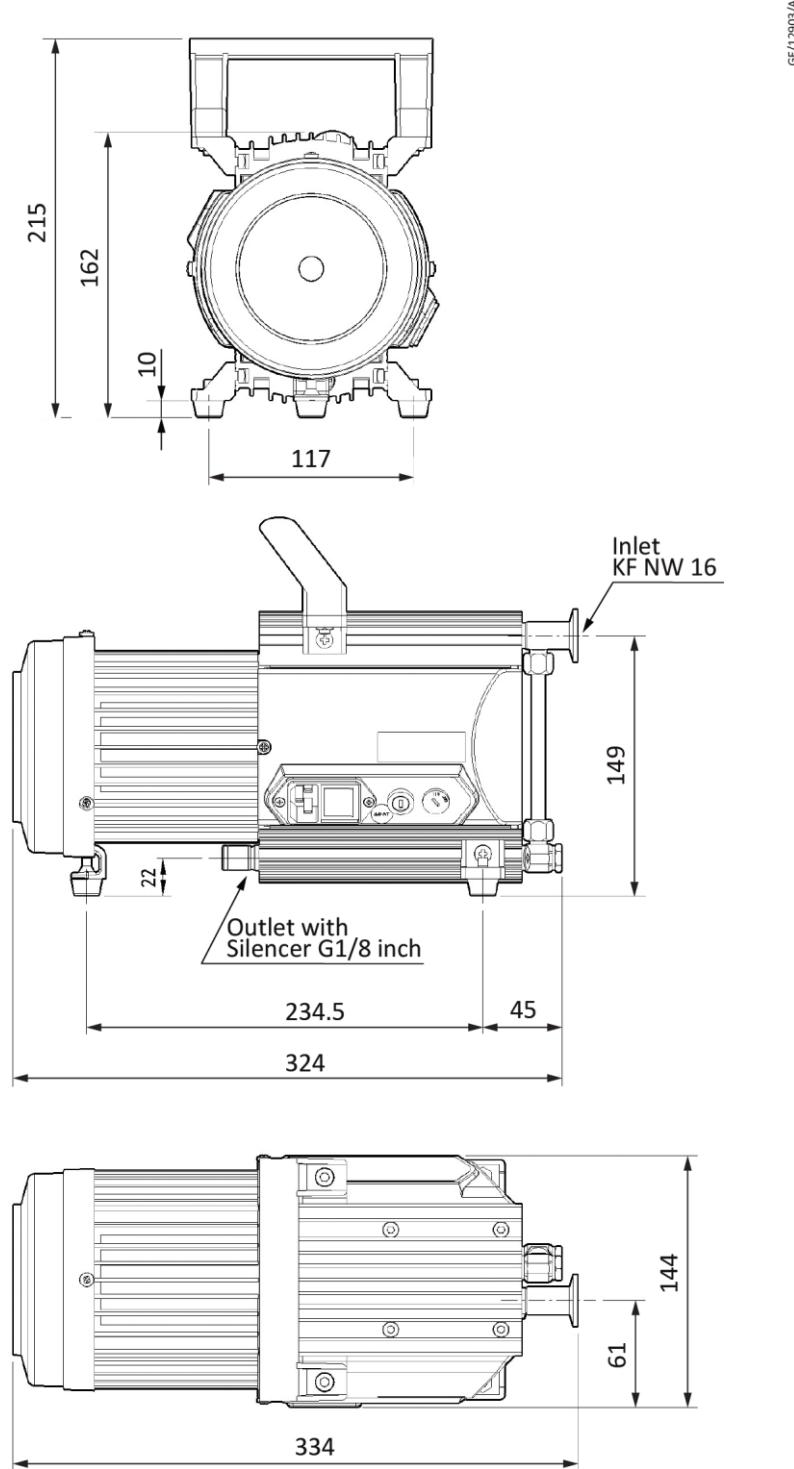
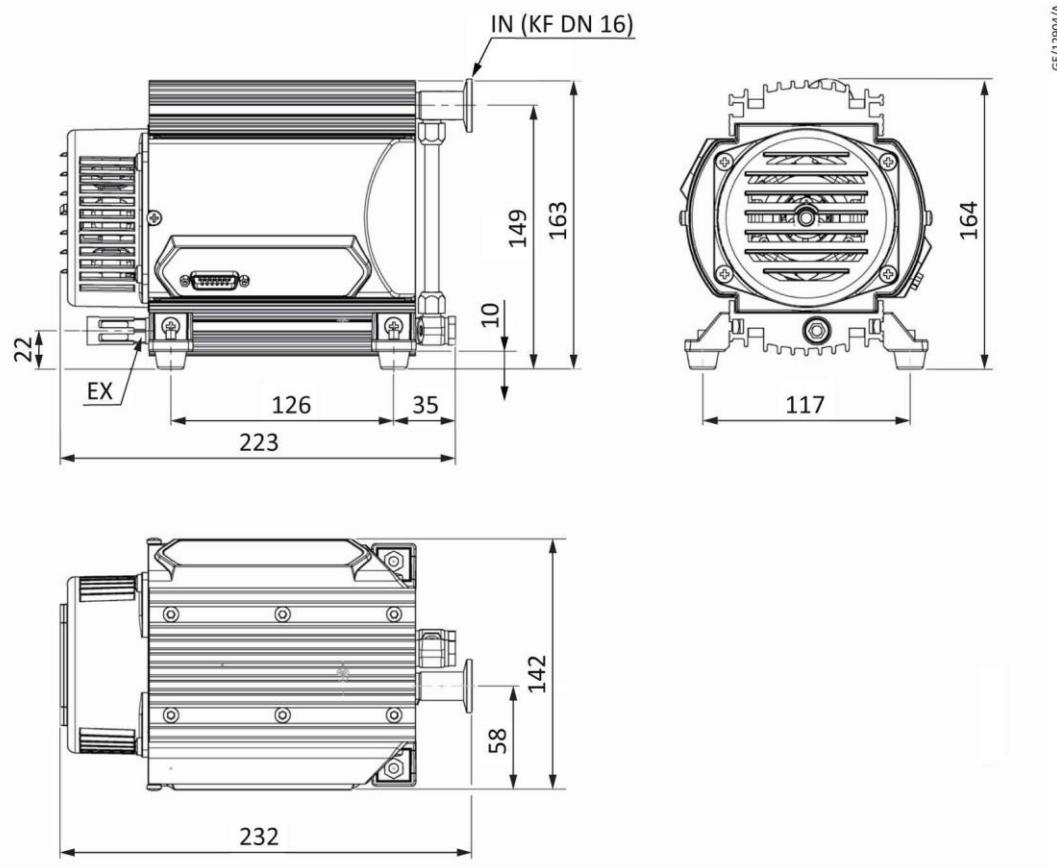


Figure 4 Dimensional drawing XDD1 24 V DC



4. Installation

 Note:

A suitably trained or qualified technician must carry out the following procedures.

4.1 Electrical connection

4.1.1 XDD1 dual-voltage motor

CAUTION:



Ensure that the motor is correctly configured for your electrical supply. If you operate the pump when the motor is not correctly configured for the electrical supply, you will damage the motor.

CAUTION:



Do not change the voltage selector switch while the pump is connected to the mains supply.

Figure 5 Adjust the supply voltage



GE/12905/A

1. *Voltage selector switch*

1. Selecting 115 covers a voltage supply range of 100 V to 120 V.
2. Selecting 230 covers a voltage supply range of 200 V to 240 V.

Ensure that the voltage shown on the voltage selector switch ([Figure: Adjust the supply voltage](#), item 1) corresponds with your electrical supply voltage. If it does not, you must change the configuration of the pump motor using the voltage selector switch to match your supply voltage. Use a screw driver to adjust the selector switch to the correct voltage.

WARNING:

Ensure that the electrical installation of the XDD1 mains pump conforms with your local and national safety requirements. It must be connected to a suitably fused and protected electrical supply and suitable earth point. For electrical data refer to [Table: Electrical data](#).

Figure 6 Replacing the motor fuse (dual-voltage motor)

GE/12906/A



1. Carefully remove the fuse holder at the side of the pump (refer to [Figure: General view of XDD1 with dual-voltage motor](#), item 5).
2. Replace the defective fuse with a 2.5 A type T and secure the fuse carrier back into its holder.

4.1.2 XDD1 24 V DC

The pump has been factory set to a constant pumping speed when connected to a 24 V DC (=-10%) supply. The pump can also be controlled using an external analogue 0-10 V signal. Use a suitable connector mating half (not supplied) to connect the electrical supplies and your control equipment to the connector on the logic interface cable. When you make the electrical connections to the XDD 1, refer to [Table: Logic interface connector pins](#) for full details of the logic interface connections.

Table 6 Logic interface connector pins

Pin number	Signal	Use
2	Control/monitor: 0 V signal	-
4	XDD 1 identity	-
9	Speed (0-10 V)	To control motor speed
8, 13, 14	Electrical supply: 0 V	Use all pins for connection!
1, 6, 11	Electrical supply: 24 V	Use all pins for connection!

5. Replacing fuse on the circuit board (only XDD1 24 V)

WARNING:



Separate the pump from mains.

Wait until live parts are discharged.

Identify and eliminate the cause of failure prior to restart.

CAUTION:

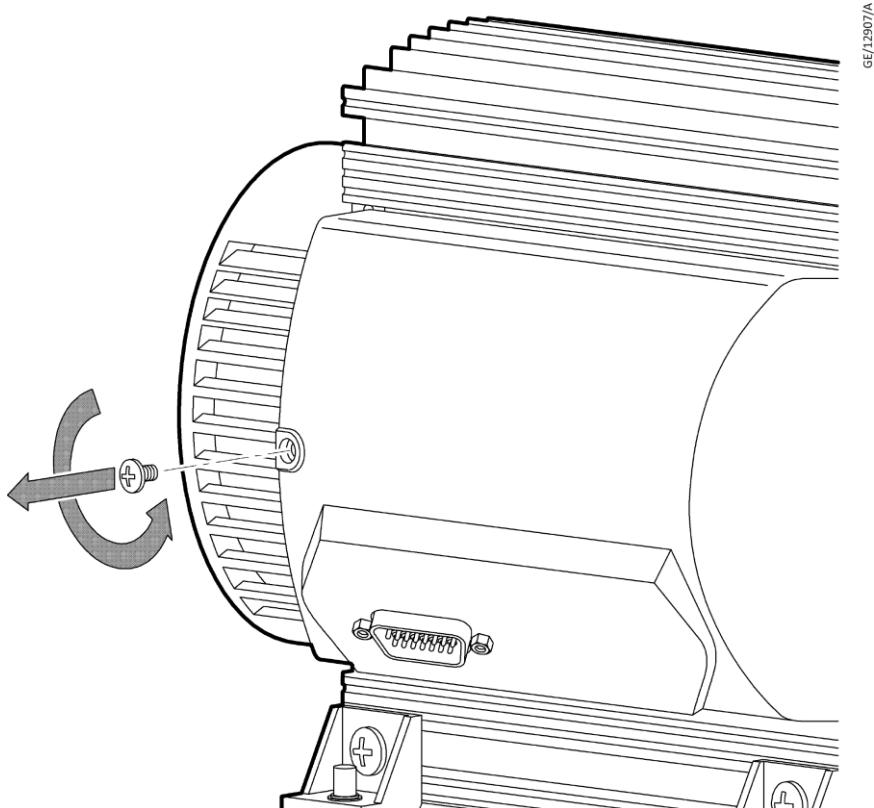


Attention: Electrostatic Sensitive Device (ESD).

All work related to the circuit board must be carried out in a ESD protected area or under ESD protective measures!

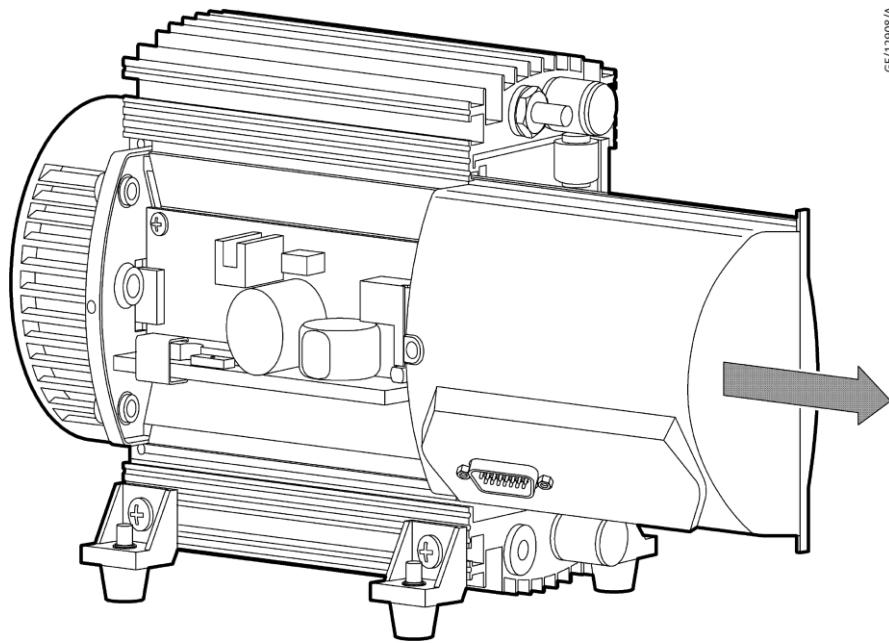
1. Unscrew at the cover.

Figure 7 Removal of cover screw



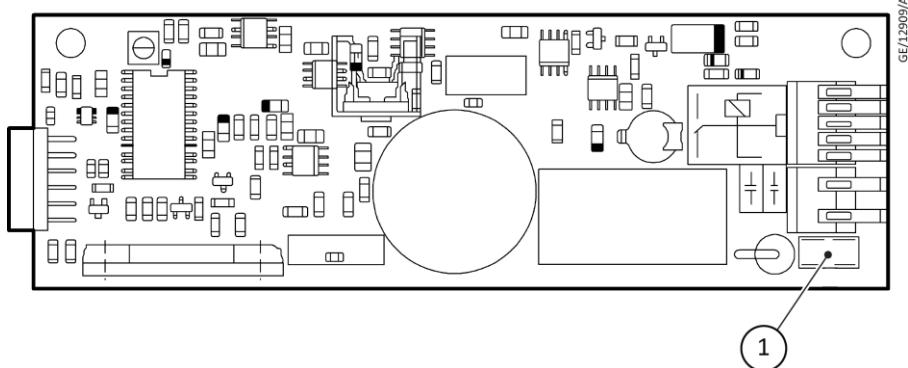
2. Slide the cover aside carefully and only as far as necessary.

Figure 8 Adjustment of cover



3. Remove the defective fuse with a tweezer and replace with a new one of the same type.

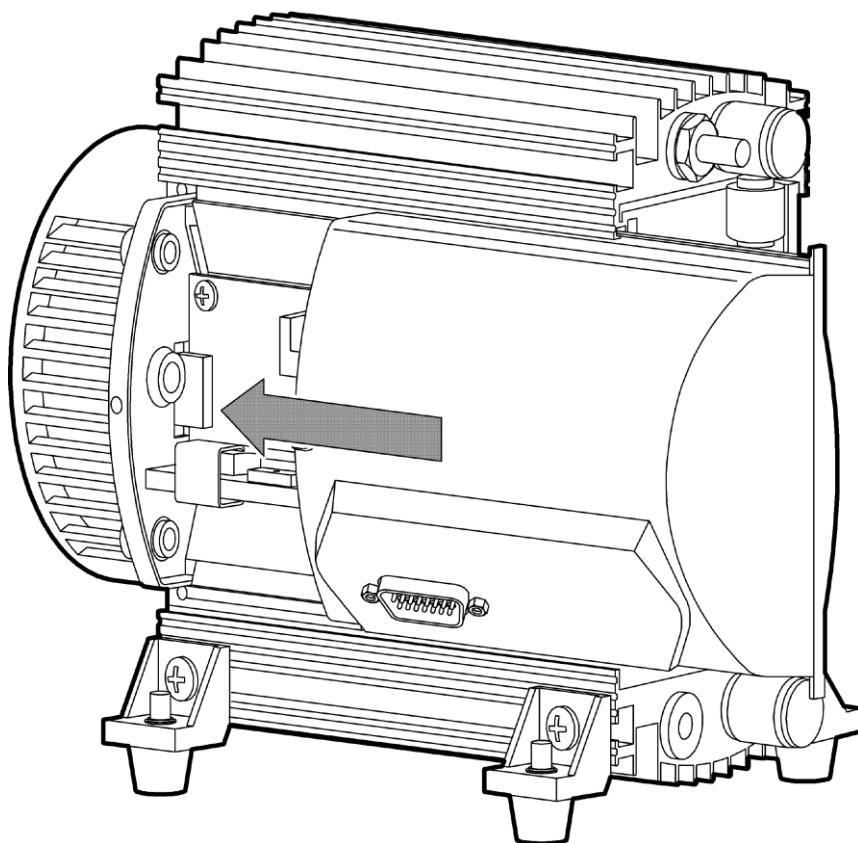
Figure 9 Removal of defective fuse



1. Fuse F7 AF, 125 V, 2 x 7 mm

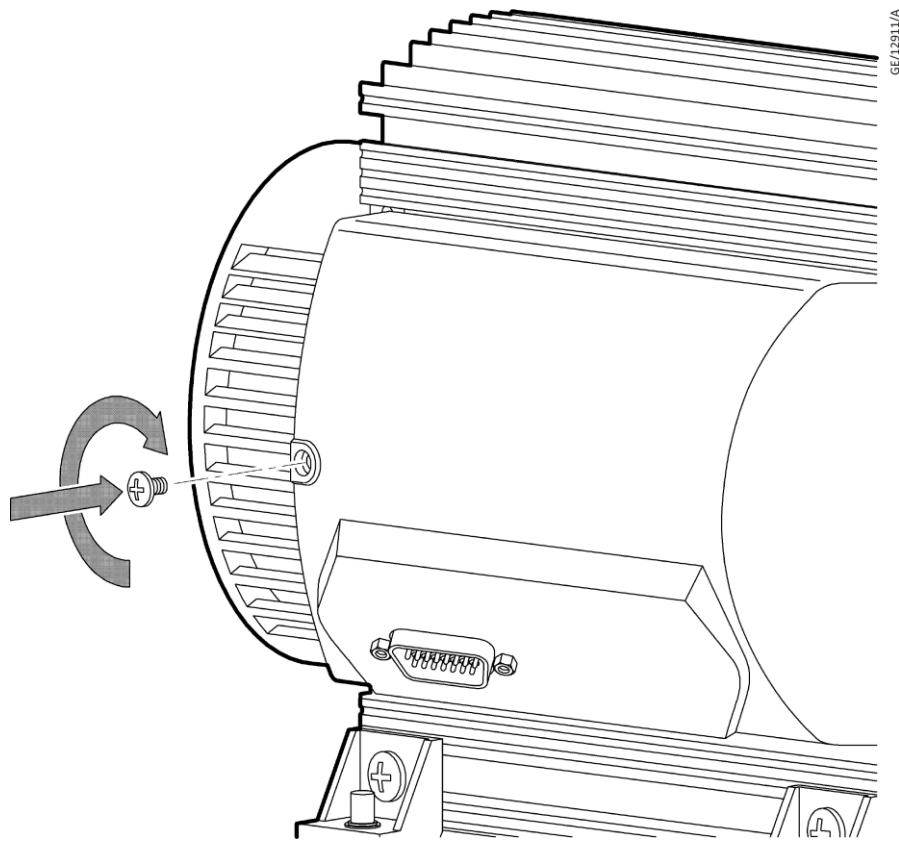
4. Assemble cover after replacing the fuse.

Figure 10 Cover reassembly



5. Screw cover

Figure 11 Installation of cover screw

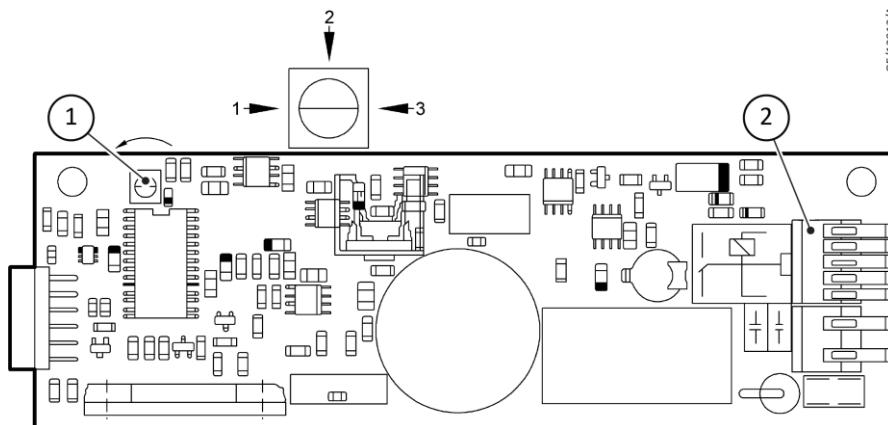


Position 1 - zero speed, set for external motor speed signal

Position 2 - normal motor speed 1700 rpm (factory set)

Position 3 - maximum motor speed 2400 rpm

Figure 12 Internal speed setting



1. Potentiometer setting
2. Terminal board (ST1A/ST1B), connection of control line (supply voltage and control signal; see print on the circuit board).

5.1 Configure the XDD1 24 V DC internal speed setting

There are two internal speed settings, use the following procedure to adjust the internal speed control (refer to [Figure: Internal speed setting](#)).

Remove the screw which secures the cover to the circuit board (refer to [Figure: General view of XDD1 24 V DC](#), item 1) Move the cover carefully and only as far as necessary. Using a screw driver, turn the potentiometer to one of two positions. Set to position 2 for normal speed or position 3 if maximum throughput is required (refer to [Figure: Internal speed setting](#)). Assemble the cover in reverse order.

5.2 Configuring the XDD1 24 V DC for external analogue (0 - 10 V) speed control

Remove the screw which secures the cover to the circuit board (refer to [Figure: General view of XDD1 24 V DC](#), item 1). Move the cover carefully and only as far as necessary. Using a screw driver turn the potentiometer anti-clockwise to position 1 (refer to [Figure: Internal speed setting](#)). Assemble the cover in reverse order. Apply external analogue 0-10 V signal for motor speed control.

Voltage input: analogue 0 V.....V

<0.5 V : Pump stopped

0.5 V to 10 V : Linear increase of the motor speed (~100 rpm to 2400 rpm)

 **Note:**

Pump runs smoothly only at speeds > 200 rpm (> ~0.9 V).

The pump is factory set for 0-10 V speed control when the potentiometer is in position 1.

5.3 Configuring the XDD1 24 V DC for PWM speed control

1. Remove the screw which secures the cover of the circuit board) refer to [Figure: Dimensional drawing XDD1 24 V DC](#), item 1). Move the cover carefully. Using a screwdriver turn the potentiometer anti-clockwise to position 1 (refer to [Figure: Internal speed setting](#)).

2. Reconfigure ST1B for Pulse-Width Modulation (PWM) control by moving the white wire.

Control signal (setting the motor speed):

Table 7 Configuration details for terminal ST1B

Terminal ST1B	V+	V-	PWM	A	B
PWM	-	Black ●	White ○	-	-
Voltage 0-10 V DC	White ○	Black ●	-	-	-

PWM; Low: 0 V - 0.5 V; High: 5 V - 24 V max.), Frame frequency: 10 Hz to 1.5 kHz.

0% to 100% PWM: Linear increase of the motor speed:

0 rpm (at 10% PWM) to 2400 rpm (at 100% PWM). Pump will run smoothly only at motor speeds higher than 200 rpm.

Example: Pulse-width at a frame frequency of 1 kHz and at 700 rpm motor speed 0.3 ms.

3. To stop the pump, disconnect the pump from the DC voltage supply.

4. [Table: Pin connections for 15 way D connector](#) shows how the pin connections on the 15 way D connector are related to the internal wiring from the back of the 15 way D connector.

Table 8 Pin connections for 15 way D-connector

Pin number	Internal wire in Control Line from back of 15 way D connector	Assignment	Use
2	Black 	Control/monitor: 0 V signal GND Signal	
4		XDD1 identity (with TIC)	
9	White 	Speed (0-10 V) of PWM: 5 V to max 24 V or voltage input: 0 V to 10 V DC (max 24 V) (depending on the control signal input for motor speed)	To Control motor speed
8, 13, 14	Blue 	Electrical supply 0 V	Use all 3 pins for connection
1, 6, 11	Red 	Electrical supply 24 V	Use all 3 pins for connection

5.4 Notes regarding the motor speed

Operating the pump at high motor speeds increases the pump throughput, this will also cause the pump to generate more heat. Ensure there is adequate ventilation especially when using the pump within confined spaces or enclosures.

Operating the pump at low motor speeds increases the ultimate vacuum performance, this will also increase the lifetime of the diaphragm and valves.

6. Use and operation

6.1 Installing in a vacuum system

The pump can be mounted in any orientation.

Avoid throttling losses by using connecting pipes with large diameter and keep them as short as possible.

Reduce the transmission of vibration and prevent loading due to rigid pipelines. Insert elastic hoses or flexible elements as couplings between the pump and rigid pipes.

 **Note:**

Flexible elements tend to shrink when evacuated.

Use a suitable valve to isolate the pump from the vacuum system to allow the pump to warm up before condensable vapours are pumped or to clean the pump before it is switched off.

Connect the exhaust to a suitable treatment plant to prevent the discharge of dangerous gases and vapours to the surrounding atmosphere. Use a catchpot to prevent the drainage of contaminated condensate back into the pump.

6.2 Prior to use

 **Note:**

Max. ambient temperature: 40 °C.

Make sure ventilation is adequate if pump is installed in a housing or if ambient temperature is elevated. Keep a distance of min. 20 cm between fans and ambient parts.

For pumps with 115/230 V motor: The mains plug is a disconnecting device to separate the pump from the supply voltage. Ensure that the mains plug is easily accessible at all times to allow the separation of the device from the power supply.

When assembling, ensure vacuum-tightness. After assembly, check the complete system for leaks.

6.3 During operation

CAUTION:



Do not start or operate the pump if pressure at the outlet is higher than 1.1 bar absolute. Attempts to start or operate the pump at higher pressure may cause blockade and damage of the motor.

WARNING:

Risk of burns from hot surfaces. In case of failure the pump surface can heat up to temperatures more than 105 °C. You must install a suitable contact guard to protect yourself from accidental contact with hot surfaces.

Ensure that the pump cools down before you do any further work. You must wear adequate personal protective equipment, if necessary.

The pump achieves its pumping speed, ultimate total vacuum and vapour pumping rate only at operating temperature (after approx. 15 minutes).

Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amounts.

6.3.1 Pumps with dual-voltage motor

Motor is shut down by a thermal cutout in the winding. Manual reset is necessary. Switch off the pump or isolate the equipment from mains. Wait approx. five minutes before restarting the pump. Identify cause of failure and eliminate.

Note:

Pump starts again after power failure.

6.3.2 Pumps with 24 V DC voltage

The motor is protected by a temperature sensor at the circuit board.

6.4 Shutdown

6.4.1 Short term

Fault	Action
Has the pump been exposed to condensate?	Allow the pump to continue to run at atmospheric pressure with inlet open for a few minutes.
Has the pump been exposed to media which may damage the pump materials or forms deposits ?	Check and clean pump heads if necessary.

6.4.2 Long term

- Take measures as described in section short-term shutdown.
- Separate pump from the apparatus.
- Close inlet and outlet port (e. g. with transport caps).
- Store the pump in dry conditions.

7. Maintenance

Ensure that maintenance is done only by suitably trained and supervised technicians. Ensure that the maintenance technician is familiar with the safety procedures which relate to the product processed by the vacuum system and that the equipment, if necessary, is appropriately decontaminated before starting maintenance. Obey local and national safety regulations.

WARNING:



Before starting maintenance vent the system, isolate the pump and other components from the vacuum system and the electrical supply, drain condensate and allow sufficient cooling of the pump.

Before starting maintenance, wait two minutes after isolating the equipment from mains to allow the capacitors to discharge.

Clean the polluted surfaces with a clean and slightly moistened cloth. We recommend using water or mild soap to moisten the cloth. In order to comply with law (occupational, health and safety regulations, safety at work law and regulations for environmental protection) vacuum pumps, components and measuring instruments returned to the manufacturer can be repaired only when certain procedures are followed. Read form HS1 and fill out form HS2, which can be found at the back of printed manuals or can be downloaded from <http://edwardsvacuum.com/HSForms/>.

7.1 Replacing diaphragms and valves

WARNING:



Please read section Replacing diaphragms and valves completely before starting maintenance.

 **Note:**

The images of the pumps may differ slightly, this does not influence replacing the diaphragm and valves.

All bearings are encapsulated and are filled with long-life lubricant, under normal operating conditions these parts are maintenance free.

The valves and the diaphragms are wear parts. If the rated ultimate vacuum is no longer achieved, the pump interior, the diaphragms and the valves must be cleaned and the diaphragms and valves must be checked for cracks or other damage.

Depending on individual cases it may be efficient to check and clean the pump heads on a regular basis. In case of normal wear the lifetime of the diaphragms and valves is > 10000 operating hours.

**CAUTION:**

Prevent internal condensation, transfer of liquids or dust. The diaphragm and valves will be damaged, if liquids are pumped in significant amount.

If the pump is exposed to corrosive gases or vapour or in case of deposits, maintenance should be carried out frequently.

Note:

Regular maintenance will improve the lifetime of the pump and also protect both man and environment.

**WARNING:**

Before starting maintenance vent the system, isolate the pump and other components from the vacuum system and the electrical supply.

Drain condensate if applicable, avoid the release of pollutants. Allow sufficient cooling of the pump.

**CAUTION:**

Ensure that the pump cannot be operated accidentally. Never operate the pump if covers or other parts of the pump are disassembled. Never operate a defective or damaged pump.

Ensure that the maintenance technician is familiar with the safety procedures which relate to the products processed by the pumping system. The pump might be contaminated with the process chemicals that have been pumped during operation. Ensure that the pump is decontaminated before maintenance and take adequate precautions to protect people from the effects of dangerous substances if contamination has occurred.

**WARNING:**

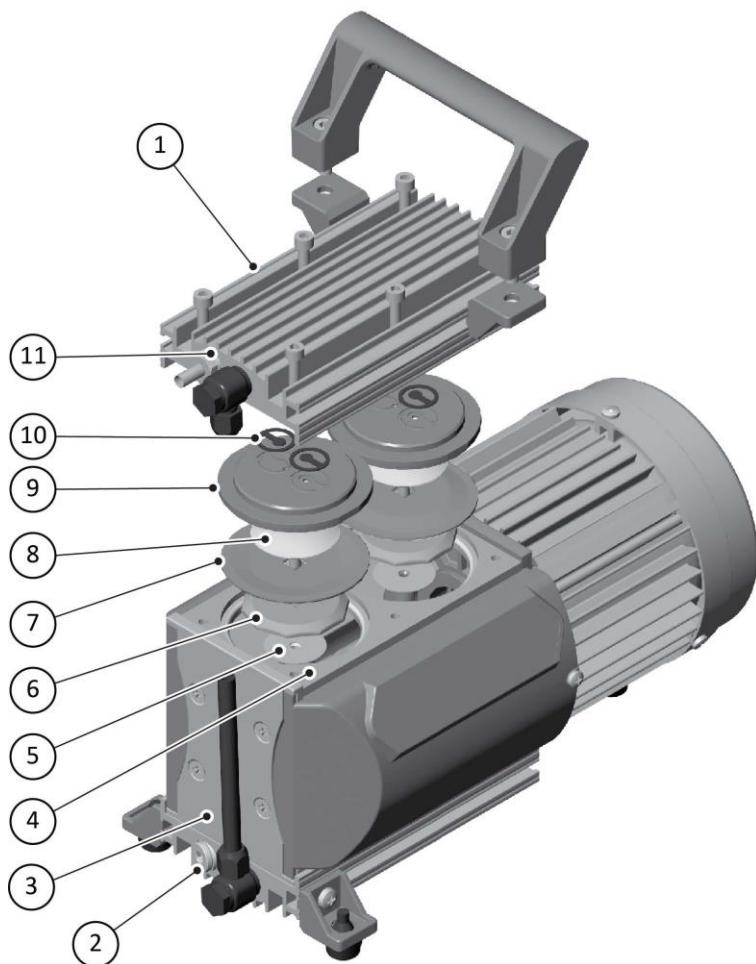
Wear appropriate safety-clothing when you come in contact with contaminated components.

**WARNING:**

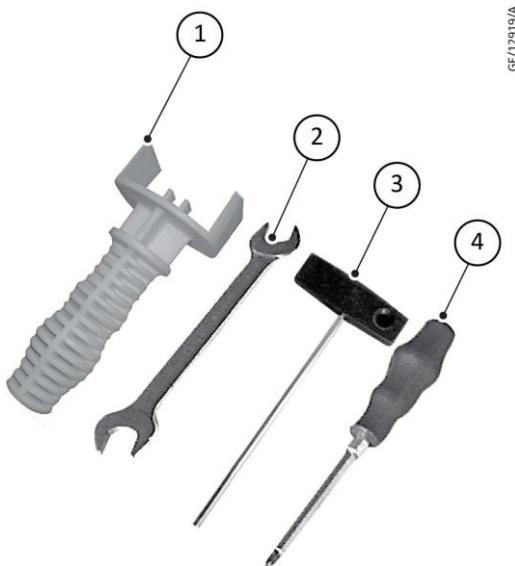
For cleaning or removing deposits of the valves and diaphragms, use a suitable solvent. The use of any solvents must be used in accordance with your local health and safety regulations.

Figure 13 View of the disassembled pump head parts

GE/12918/A



1. <i>Housing cover</i>	2. <i>VS seal</i>
3. <i>Bearing flange</i>	4. <i>Housing</i>
5. <i>Rod</i>	6. <i>Diaphragm support disc</i>
7. <i>Diaphragm</i>	8. <i>Diaphragm clamping disc with connecting screw</i>
9. <i>Head cover</i>	10. <i>Valve</i>
11. <i>VS seal</i>	

Figure 14 Tools required

GE/12919/A

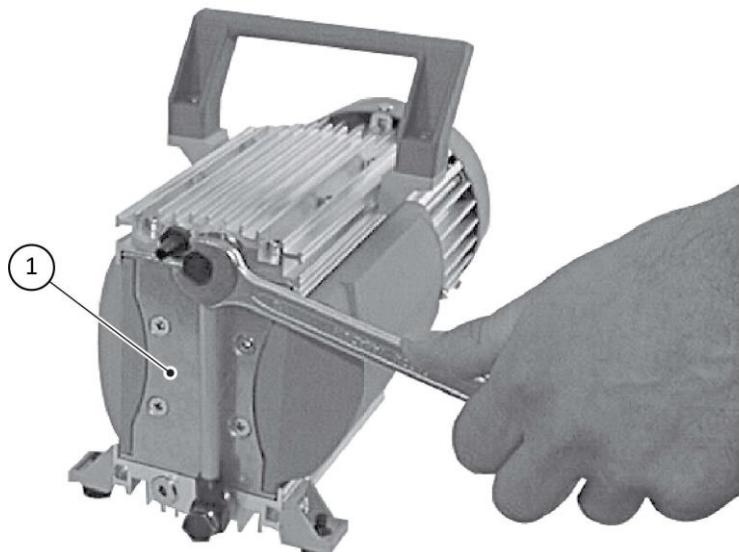
1. *Diaphragm key SW 46 (included in service kit)*
2. *Open-ended wrench w/f 14*
3. *Hex key w/f 4/5*
4. *Phillips screw driver size 2*

7.1.1 Cleaning and inspecting the pump heads

Use open-ended wrench to remove fitting at the pump head and remove together with connecting hose.

 **Note:**

Do not remove bearing flange (1).

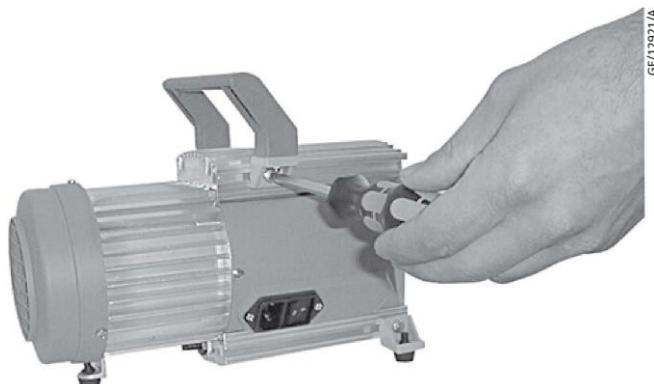
Figure 15 Remove the fitting at the pump head

GE/12920/A

1. *Bearing flange*

Remove two screws at the handle and remove together with handle.

Figure 16 Remove the handle



GE/12921/A

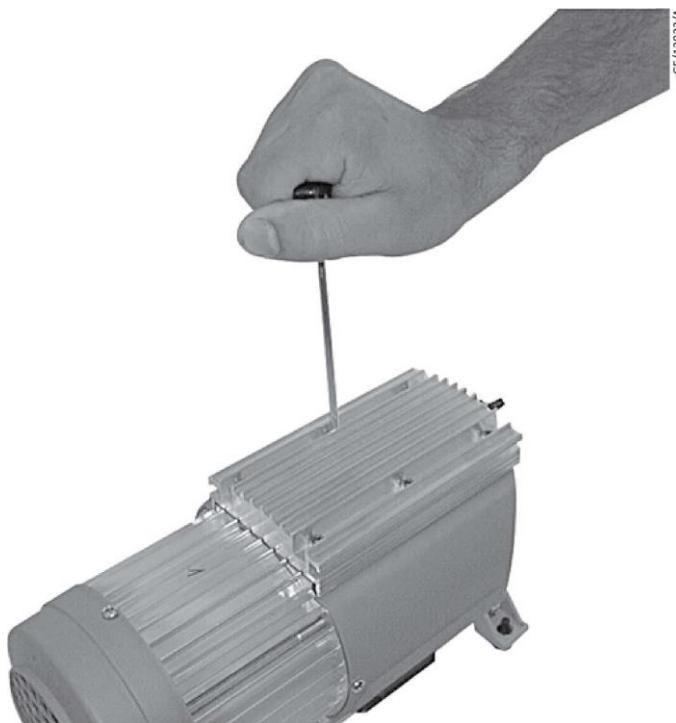
WARNING:



Never remove parts by using a spiky or sharp-edged tool (e. g. screw driver), we recommend to use a rubber mallet or compressed air (to be blown carefully into port).

Use hex key to remove six socket head screws from pump head and remove upper housing (housing cover and head cover).

Figure 17 Remove the housing cover and head cover



GE/12922/A

1. Remove head cover from housing cover and check valves. Note position of valves and remove.
2. Replace valves if necessary.
3. If necessary, use a suitable solvent to remove deposits.

4. Check diaphragm for damage and replace if necessary.

Figure 18 Remove the head cover from the housing cover



7.1.2 Replacing the diaphragm

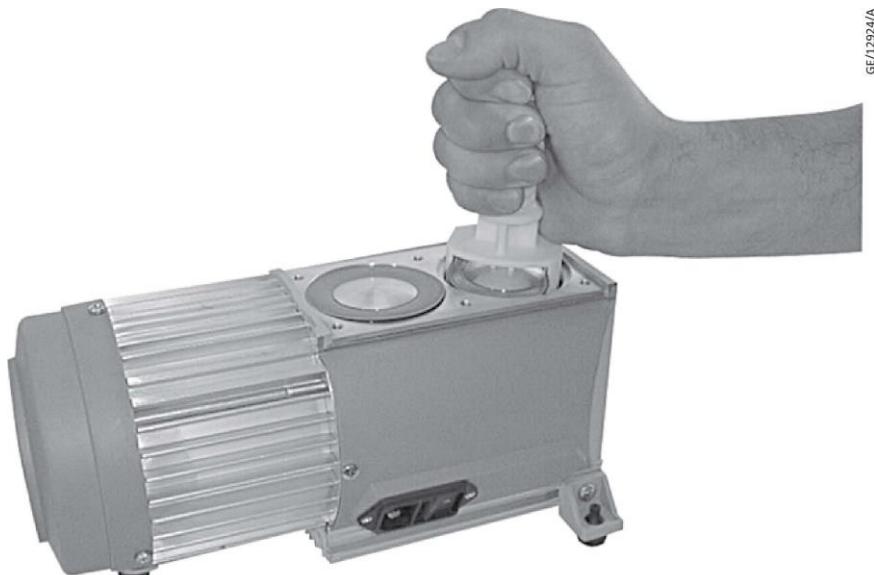


WARNING:

Never use a spiky or sharp-edged tool to lift the diaphragm.

1. Lift diaphragm carefully.
2. Apply pressure to the clamping disc beside the diaphragm to bring connecting rod into upper turning point position if necessary.
3. Use diaphragm key to grip under the diaphragm to the diaphragm support disc.
4. Apply pressure to the diaphragm clamping disc to bring the diaphragm into lower turning point position. Press diaphragm key against diaphragm clamping disc and unscrew diaphragm support disc with diaphragm.
5. If the old diaphragm is difficult to separate from the support disc, immerse the assembly in a suitable solvent in order to aid separation of the two parts.

Figure 19 Lift the diaphragm



CAUTION:

Check for washers under clamping disc. Do not mix the washers from the different heads. Make sure that the original number is reassembled at the individual pump head.

6. Position new diaphragm between diaphragm clamping disc with square head screw and diaphragm support disc.

Note:

Position diaphragm with white PTFE side to diaphragm clamping disc (to pump chamber).

Figure 20 Position a new diaphragm



7. Lift diaphragm at the side and position carefully together with diaphragm clamping disc and diaphragm support disc in the diaphragm key.

CAUTION:

Avoid damage of the diaphragm: Do not crack diaphragm in a way that light lines at the diaphragm upper side occur.

8. Smaller number of washers: The pump will not attain final vacuum. More washers: Clamping disc will hit head cover; noise or even blockage of the pump.

Figure 21 Diaphragm clamping disc



7.1.3 Assembling pump heads



WARNING:

Do not turn or change housing covers!

1. Make sure that the square head screw of the diaphragm clamping disc is correctly seated in the guide hole of the diaphragm support disc.
2. Assemble diaphragm clamping disc, diaphragm and diaphragm support disc to connecting rod.
3. Position washers if available between diaphragm support disc and rod.

Figure 22 Assemble the diaphragm assembly to the connecting rod



GE/12927/A

4. Bring diaphragm into a position in which diaphragm is in contact with housing and centered with respect to bore.

Figure 23 Position the diaphragm



GE/12928/A

5. Assemble head cover and valves. Check for correct position (refer to [Figure: Assemble the head cover and valves](#)).

Figure 24 Assemble the head cover and valves



CAUTION:

Obey position and orientation of the head covers and the valves definitely.

Figure 25 Scheme pump head with head covers

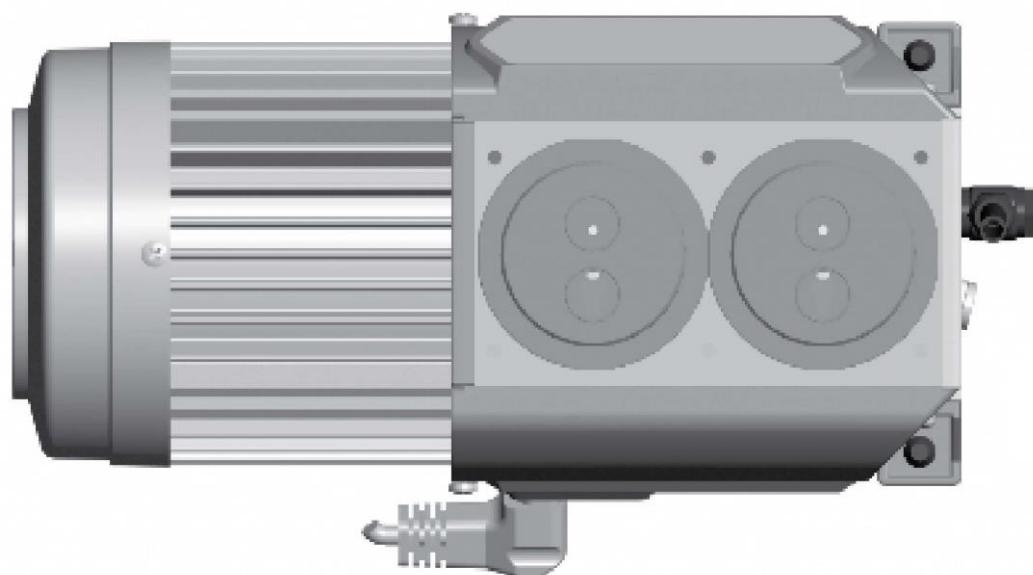
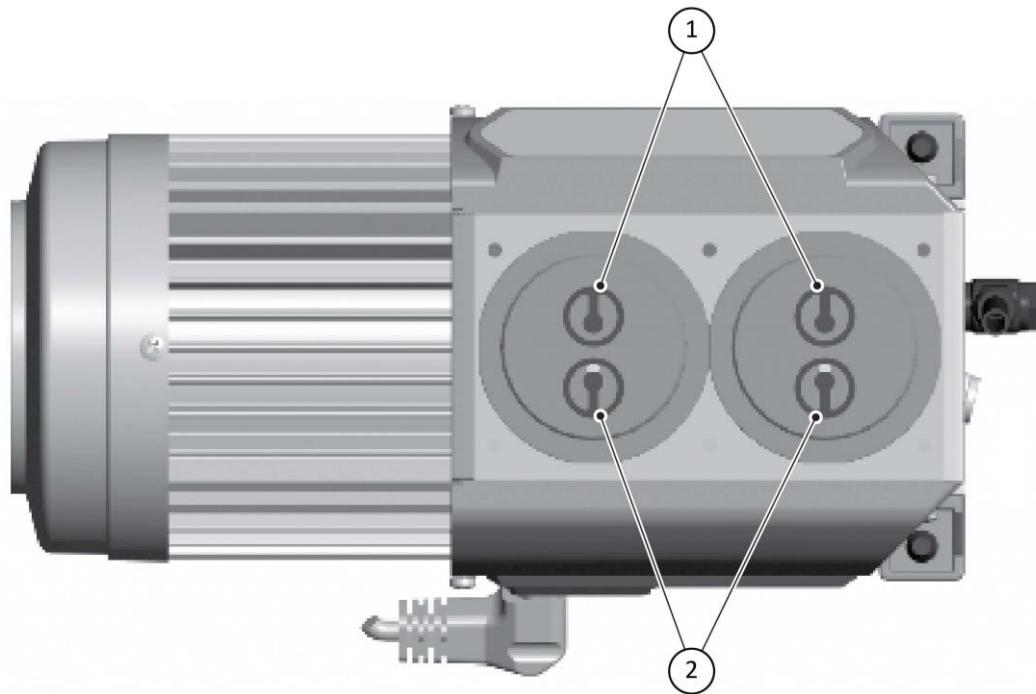


Figure 26 Scheme pump head with head covers and valves

GE/12931/A



1. *Valves at the outlet (round centered opening under valve)*
2. *Valves at the inlet (kidney-shaped opening beside valve)*
6. Position housing cover.
7. Move housing cover slightly to make sure that the head covers are correctly positioned.
8. Screw in six socket head screws fixing housing cover crosswise first slightly, then tighten.

 **Note:**

Do not tighten until head cover is in contact with housing, max. torque 6 Nm.

Figure 27 Position the housing cover

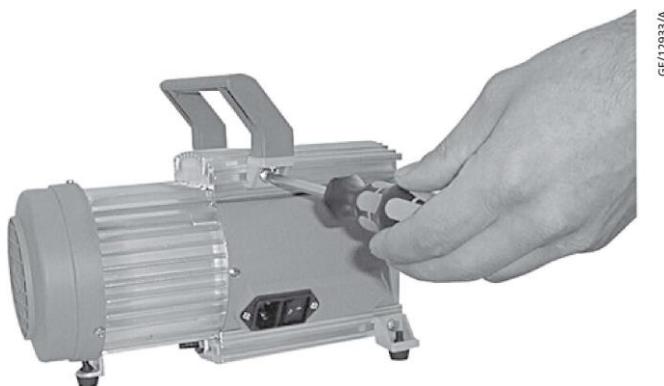


9. Assemble handle with screws and tighten.

 **Note:**

Check for correct position of the handle over the centre of gravity of the pump. The handle is in correct position if the end of the handle is positioned over the end of the housing cover.

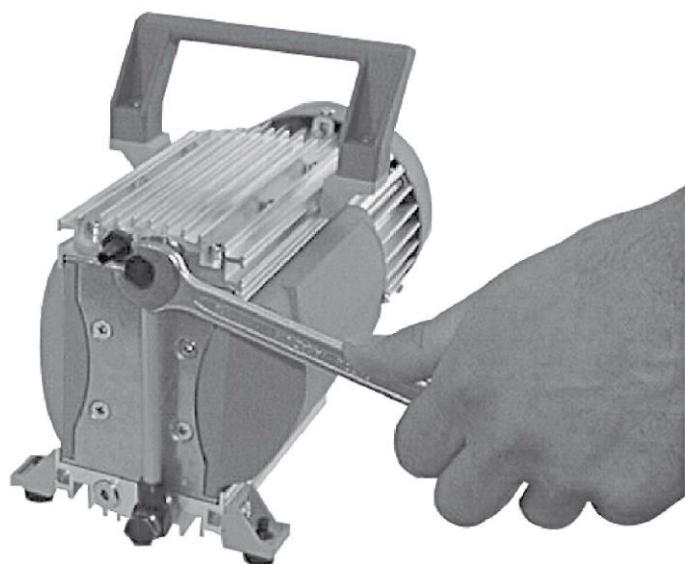
Figure 28 Assemble the handle



7.1.4 Assembling fittings

1. Use open ended wrench to reconnect fittings with connection hose to pump heads.
2. Fix the ring nut when tightening the hollow bolt.

Figure 29 Assemble the fitting at the pump head



7.1.5 If the pump does not achieve the ultimate pressure

In case the diaphragms and valves have been replaced, a run-in period of several hours is required before the pump achieves its ultimate vacuum.

If pump does not achieve the ultimate total pressure:

- Check hose connectors between pump heads and manifolds for leaks.
- If necessary recheck pump chamber.

8. Fault finding

Table 9 Fault finding

<i>Pump fails to start or stop immediately</i> on page 40
<i>Pump does not achieve ultimate total pressure or normal pumping speed</i> on page 40
<i>Pump too noisy</i> on page 41
<i>Pump seized</i> on page 41

Fault	Pump fails to start or stop immediately
Cause	Supply voltage is missing or too low?
Remedy	Check or connect supply voltage.
Cause	Only 24 V DC version: Control signal for motor speed is missing?
Remedy	Check control signal.
Cause	Pressure in outlet pipeline too high?
Remedy	Remove blockade in line, open valve.
Cause	Only pumps with dual-voltage motor: Motor overload?
Remedy	Manual reset is necessary. Switch off the pump or isolate the equipment from mains. Wait approx. five minutes before restarting the pump. Identify cause of failure and eliminate.
Cause	The motor fuse has blown
Remedy	Replace fuse (refer to <i>Table: Electrical data</i>). Identify and eliminate cause of failure.
Fault	Pump does not achieve ultimate total pressure or normal pumping speed
Cause	Centering ring not correctly positioned or leak in the pipeline or vacuum system?
Remedy	Check pump with a vacuum gauge directly at pump inlet port, check connections and line.
Cause	Long narrow line?
Remedy	Use line with larger diameter, length as short as possible.
Cause	Pump has been exposed to condensate?
Remedy	Run pump at atmospheric pressure for a few minutes.
Cause	Deposits have been formed inside the pump?
Remedy	Clean and inspect pump heads
Cause	Valves or diaphragm damaged?
Remedy	Replace valves and/or diaphragms.

Cause	Outgassing substances or vapour generated in the process?
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Remedy Check process parameters.

Cause	Only 24 V DC version: Pump temperature too high (reduced motor speed)?
--------------	---

Remedy Ensure sufficient cooling of the pump or reduce inlet pressure

Fault	Pump too noisy
--------------	-----------------------

Cause	Atmospheric or high pressure at inlet port?
--------------	--

Remedy Connect hose to a pump outlet.

Cause	Diaphragm clamping disc loose?
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Remedy Perform maintenance.

Cause	None of the above mentioned causes?
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Remedy Contact your supplier.

Fault	Pump seized
--------------	--------------------

Cause

Remedy Contact your supplier.

9. Storage and disposal

9.1 Storage

Use the following procedure to store the pump:

Close the vacuum system isolation valve to prevent suck back into the vacuum system. Switch off the pump using the on/off switch on the motor. Disconnect the pump from the electrical supply. Purge your vacuum system and the pump with dry nitrogen and disconnect the pump from your vacuum system. Place and secure protective covers over the inlet and outlet ports.

Store the pump in cool, dry conditions until required for use.

9.2 Disposal

Dispose of the pump and any components from it safely in accordance with all local and national safety and environmental requirements. Particular care must be taken with components which have been contaminated with dangerous process substances.

Do not incinerate fluoroelastomer seals and O-rings.

WARNING:



Electronic components must not be disposed of in the domestic waste at the end of their service life. Used electronic devices contain harmful substances that can cause damage to the environment or human health. End users are legally obliged to take used electric and electronic devices to a licensed collection point.

10. Spares

Table 10 Spare parts

Item number	Description
A74601700	Inlet flange spare XDD1
A74601701	VS seal spare XDD1
A74601702	Exhaust silencer spare XDD1
A74601800	Diaphragm service kit XDD1
A74601703	Fan cover white, XDD1, 115/230 V, 50/60 Hz
A74601704	Motor cover white, XDD1, 24 V DC
A74601705	Anti-vibration mount

11. Service

11.1 Return of equipment for service

Before you send your equipment to us for service or for any other reason, you must send us a completed Declaration of Contamination of Vacuum Equipment and Components – Form HS2. The HS2 form tells us if any substances found in the equipment are hazardous, which is important for the safety of our employees and all other people involved in the service of your equipment. The hazard information also lets us select the correct procedures to service your equipment.

We provide instructions for completing the form in the Declaration of Contamination of Vacuum equipment and Components – Procedure HS1.

If you are returning a vacuum pump, note the following:

- If a pump is configured to suit the application, make a record of the configuration before returning the pump. All replacement pumps will be supplied with default factory settings.
- Do not return a pump with accessories fitted. Remove all accessories and retain them for future use.
- The instruction in the returns procedure to drain all fluids does not apply to the lubricant in pump oil reservoirs.

Download the latest documents from www.edwardsvacuum.com/HSForms/, follow the procedure in HS1, fill in the electronic HS2 form, print it, sign it, and return the signed copy to us.

 **Note:**

If we do not receive a completed HS2 form, your equipment cannot be serviced.

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